The 1819-20 Measles Epidemic: Its Origin, Diffusion and Mortality Effects upon the Indians of the Petit Nord

By

F.J. Paul Hackett

A Thesis
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in Partial Fulfillment of the Requirements
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ABSTRACT

In 1819-20, measles swept through the native populations of the fur trading lands of the Canadian Northwest. This was the first such epidemic in this region and was accompanied by mortalities characteristic of virgin soil epidemics. This study seeks to establish the origins of this epidemic and the pathways by which it reached the Northwest. It then examines in detail the diffusion of the disease throughout the Petit Nord, or the eastern section of the Northwest lying to the east of Lake Winnipeg and between Hudson Bay and Lake Superior. Finally, it attempts to reconstruct the distribution and magnitude of the mortalities among the native peoples of this region.

The evidence indicates that the measles diffused from the northeastern U.S. from an endemic focus comprised of the cities of Baltimore, New York, and Philadelphia. The virus was then relocated westward along two routes, entering the Canadian Northwest at Brandon House, on the eastern plains, and at Fort William, at the western end of Lake Superior. Within the Petit Nord, the disease was confined to the more heavily populated southwestern sector, where it was carried by North West Company canoe brigades from Fort William. Among the afflicted populations, the severity of the disease and resultant mortality varied widely, with as many as two-thirds succumbing in some places and relatively few at others. The 1819-20 measles epidemic marked the beginning of a new era in the disease history of the Canadian Northwest. It was the result of the breakdown in the isolation of the Northwest, a process which accelerated as the nineteenth century progressed and led to frequent epidemics of diseases previously absent from the region.

ACKNOWLEDGEMENTS

I would first like to thank the Hudson's Bay Company for allowing me to conduct research within the archives, and to quote from their vast collection. As well, I am grateful to the archivists for their guidance over the course of my research. I must single out David Arthurs for special praise, as his expertise and assistance went far beyond that which his job required. Without his help and friendly conversation, this thesis would have been much more difficult and much less enjoyable to write. I also owe a considerable debt of thanks to David R. Mosscrop, Marjorie Hallmarson, and Ed Pachanuk of the Geography Department for teaching me about the computer programs and for cartographic critique. My brother and sister-in-law, Chris Hackett and Robin Adkins (and Laura, too), provided me with a great deal of encouragement over the course of my studies, as well as explaining to me some of the more enigmatic aspects of graduate school. Additional thanks are owed to Dr. L.-L. Mayo and Dr. D. Salmon for their guidance and gentle prodding over the past few years. Dr. D.W. Moodie has also been instrumental to my graduate career, not only in his work as thesis advisor, a role to which he has devoted considerable time and energy, but through the knowledge he has imparted to me in my three year tenure at the University of Manitoba. Finally, I must thank my wife Jennifer for her unwavering support during what has become a rather extended stay in University. Without her help and many sacrifices this work would not have been possible, and it is to her that I owe the greatest debt of all.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

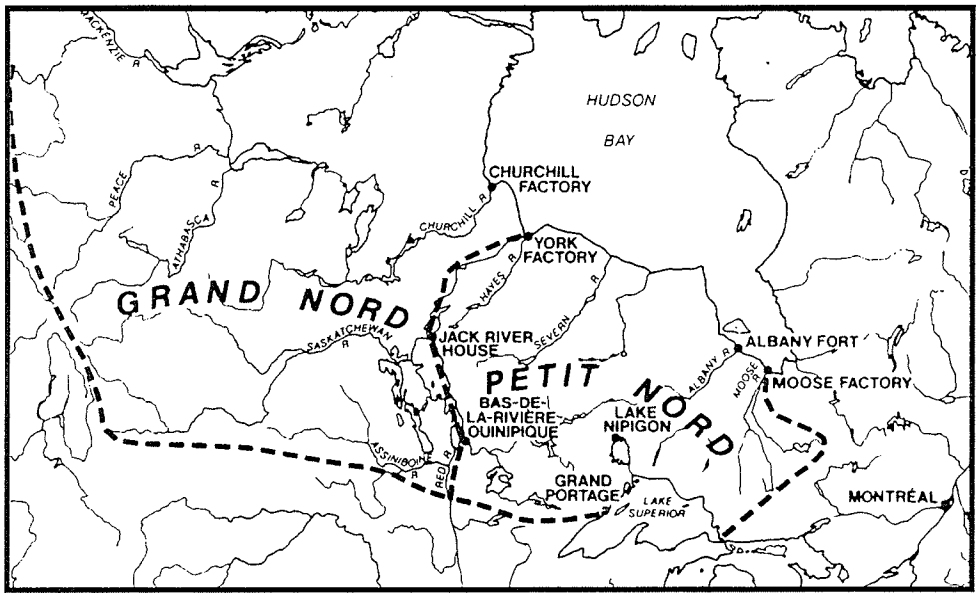
LIST OF TABLES

CHAPTER 1: INTRODUCTION

In the spring of 1819, a measles epidemic swept into the fur trading lands lying to the north and west of Lake Superior. Within the space of a year, the measles virus had diffused over an area extending west from Lake Superior to the Rocky Mountains, and as far north as Great Slave Lake. For the native peoples living within this vast region, it was their first experience with this disease, one to which they had no immunity. It was therefore a virgin soil epidemic which, like the massive smallpox epidemic in this region in 1780, was accompanied by heavy mortalities among the afflicted Indian populations. The mortality of this epidemic was exacerbated in places by a synchronous, but much less extensive, outbreak of whooping cough, and possibly dysentery. Scholars have examined the spread and demographic consequences of this measles epidemic in different parts of the Grand Nord, or that portion of the Northwest lying to the north and west of Lake Winnipeg (Decker, 1989; Krech, 1983; Ray, 1988). This study attempts to illuminate the progress and mortality effects of this disease in the Petit Nord, the country lying to the east of Lake Winnipeg and north of Lake Superior (Fig. 1). It also attempts to establish the origins of this disease episode, and the circumstances under which this virgin soil epidemic penetrated into the fur trading lands of the Northwest.

Disease in Historical Research

In the past there has been a tendency for scholars to underestimate the significance of epidemic disease as an historical event worthy of more than passing comment, or as a factor in aboriginal culture change. According to McNeill (1976: 191), a major reason for the failure of historians to pay attention to such visitations has been an uncomfortableness with supposedly



Source: Moodie (1987:362)

Figure 1: The Canadian Northwest

random variables. Seemingly, the occurrence of an epidemic cannot be predicted nor can its effects be placed into an overall historical framework[1]. The epidemic, then, is dismissed as a "wildcard", and discarded in favour of other factors. One consequence has been the failure to comprehend the devastation of virgin soil epidemics. For many western historians, their experience with communicable disease has been a relatively mild one. In modern industrialized nations, measles and whooping cough are considered diseases of childhood, influenza is merely a temporary annoyance to the healthy, while smallpox has been eradicated. Under virgin soil conditions, however, all of these have resulted in large-scale mortality.

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[1]To those familiar with the "epidemic" literature, this preconception is largely errant. Certainly one can predict the outcome, if not the timing of the outcome of interaction between populations experienced with disease and those with no prior experience. As to the effects, among virgin soil populations mortality rates approaching or exceeding forty per cent have been common, depending on the disease and the circumstances. These conclusions concerning historians obviously do not extend to medical historians such as Heagerty (1928).

In the fur trade literature the failure to consider epidemic disease has been exacerbated by a lack of concern for aboriginal people other than their role in collecting furs (Walker, 1971: 27)[2]. Thus, the epidemics experienced by Indians have held little importance for historians. For instance, there is no mention of the 1819-20 measles epidemic in the standard fur trade histories of western Canada. Typically, the second decade of the nineteenth century has been characterized as a period of intense, and often violent, competition between the two fur companies. E.E. Rich's history of the Hudson's Bay Company[3] (1959) focussed on events such as the arrests of Lord Selkirk, Colin Robertson, and the North West Company[4] partners, as well as a variety of incidents of assault, murder, and theft, as did Davidson's history of the NWC (1967). The same general preoccupation with inter-company conflict can be noted in A.S. Morton's (1939) A History of the Canadian West to 1870-71. Those who were able to see beyond this rather narrow portrayal of a critical participant in the fur trade had more to say about non trade related occurrences. Harold Innis's The Fur Trade in Canada (1930) was one of the first works to place emphasis on the Indian role within the fur trade (Trigger, 1987: 2; Walker, 1971: 28). He focussed on the entire working of the trade, not just the EuroCanadian end of the business. He also chose to discuss the impact of the 1780-82 smallpox epidemic, going so far as to consider the diffusion between Indian tribes (Innis, 1930: 195). While much of his concern was with the epidemic's effects on the year's trading returns, the formation of the NWC, and the HBC's endeavours to settle the Athabasca territory (Ibid: 156, 202, 256), his attempt to analyze the effects of the epidemic may be considered a significant departure from the practices of his contemporaries. Nevertheless, Innis took no note of the 1819-20 measles epidemic, despite similar heavy losses in the trade suffered by the fur companies. It would seem that many historians now accept the role of disease in historical events (Crosby, 1972; McNeill, 1976). In the fur trade

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[2]For a more complete discussion of the role of the Indian in historical literature, as well as the failure of the anthropological literature to account for culture change, see Trigger (1987: "Introduction") and Walker (1971).

[3]Hereafter referred to as the HBC.

[4]Hereafter referred to as the NWC.

literature, perhaps the best evidence of this is E.E. Rich's (1976) later paper detailing the food, sicknesses, and health care of the fur trade participants, including the Indians. Significant to this study, Rich took note of the 1819-20 measles epidemic and observed that some bands were almost exterminated (Ibid: 51). Friesen's (1984) The Canadian Prairies: A History is one recent work in which native Canadians are considered to have their own history, improving on the work of earlier historians such as Innis by examining Indian life beyond their narrow role in the fur trade. By broadening his focus, he was able to consider the consequences of European introduced factors which were not directly trade oriented, but nonetheless were significant in altering native lifestyles. Thus, he wrote that "guns and horses and European diseases [represented] significant factors in native life..." (Ibid: 22). He singled out the 1837-8 smallpox epidemic as a major factor contributing to the end of cultural adaptability of the Prairie Indian, and also acknowledged the depopulation of the 1819-20 measles epidemic (Ibid: 42, 44)[5].

Although specifically concerned with the Indian way of life, cultural anthropologists have traditionally failed to take notice of culture change throughout the entire contact period, generally relying on ethnographic studies for information (Trigger, 1987; Bishop, 1975). During the late nineteenth century, a large number of these studies were undertaken in order to preserve a record of Indian culture, which researchers felt was undergoing rapid change and would soon pass away. The underlying assumption was that elements of precontact culture were being recorded, and that change had not occurred prior to the periods recalled by the informants. In reality, considerable change had been experienced by most aboriginal groups during the entire period following contact (Hickerson, 1967; Bishop, 1974). These earlier ethnographic studies were followed by further studies in the twentieth century to assess the degree of change from the previous field studies, which were assumed to have recorded aboriginal culture (Trigger, 1987: 11). Many of the later works are useful in assessing Indian culture at the time of the research and

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[5]Friesen's detailed examination of the Prairie Indians is all the more remarkable since his work was a general history of the Prairies, and not of the fur trade or the Indians specifically. Earlier works such as that by Morton (1939) tended to ignore native history altogether. As well, Friesen did not make broad generalizations, either temporally or across tribal lines.

during the lifespan of the informant[6]. According to Bishop (1975: 245), however, these studies are of very little use in analyzing culture change prior to the early to mid-nineteenth century, and present a cross section of Indian life at the time of the interview. With no consideration of change, these ethnographic records had no place for discussing the effects of epidemics.

At the same time, the cultural frameworks suggested by the ethnographers were accepted by archaeologists and have been used to make sense of the physical artifacts (Ramenofsky, 1987: 3). By forcing the physical evidence to fit these ahistoric frameworks, there has been a tendency to reinforce the ethnologists' conceptions. Thus, if some sort of massive depopulation was evident, it might be attributed to warfare, rather than epidemic disease. At least one researcher has called on archaeologists to reconsider their framework in favour of the alternative provided by ethnohistorians, a relatively recent, and related, field of study (Bishop, 1975: 245). It would seem that some archaeologists have begun to heed Bishop's call. Ramenofsky (1987), for one, has examined sites attempting to assess the possibility of protohistoric depopulation due to epidemics.

Perhaps the most striking example of the failure to consider the historical role of disease is in the debate over precontact population size. For example, anthropologists such as Kroeber (1934) have consistently made estimates of the precontact population of the Americas based on documentary evidence recorded centuries after initial contact, thereby ignoring the possibility of any prior, heavy depopulation due to epidemic mortality. Later researchers have attempted to assess the mortality of virgin soil epidemics and have provided estimates of a much higher order (Dobyns, 1966)[7]. Debate has extended to include the size and timing of decline, the role of disease in that decline, and the implications of upward revisions of the estimates to models of precontact Indian economies.

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[6]See Bishop (1975) for a listing of many of the more important ethnographical works, as well as a call for the greater use of archival sources by anthropologists.

[7]For a synopsis of the dispute, including estimates, see Dobyns (1966) and Ramenofsky (1987: 1-21).

Ethnohistory developed in the early 1950's to fill the gap between the prehistory of archaeologists and the ethnographic present of the cultural anthropologist (Bishop, 1975: 254; Trigger, 1987: 11). Initially, ethnohistory was conceived of as the use of historical techniques and sources by anthropologists. In practice, however, it has become a subject in its own right, adopting the tools of a number of disciplines to achieve a common objective - the illumination of the history of preliterate peoples (Brown, 1991). Archival documents, linguistic evidence, oral traditions, environmental reconstructions, archaeological evidence, and geographical techniques and tools are used by researchers who, although trained in a variety of disciplines, identify themselves as ethnohistorians (Brown, 1991: 115).

The frequent use of archival materials has demonstrated that, for a number of reasons, extensive culture change has taken place among the aboriginal people throughout the postcontact period. Indeed, it is now accepted that such change was experienced prior to direct contact, or protohistorically. Trade goods, disease, and other introduced influences diffused from groups interacting with the whites to others more distantly located. This has forced the ethnohistorian to attempt to explain why the change has occurred, and has led to increased consideration of the role of disease. Beginning in the 1970's, a large number of studies have considered the effects of infectious disease on Indian populations[8]. However, if change is the essence of ethnohistory, it does not necessarily mean that epidemics receive the consideration that they are perhaps due. Ethnohistorians are subject to the same preconceptions as other scholars. If they do not consider epidemic disease to be a significant agent of change, that will be reflected in their conclusions, although in certain cases the disease factor is impossible to ignore[9]. As evidence, one might contrast two pioneering ethnohistorical works written in 1974. Ray's seminal Indians in the Fur Trade (1988 [1974]) focussed on the Indians residing to the

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[8]Significant examples are: Cockburn (1971); Ewers (1973); Ray (1988); Crosby (1976); Ray (1976); Taylor (1977); Krech (1978); Dobyns (1983); and Boyd (1985). Stearn and Stearn (1945) was an early work of great significance, considering how smallpox epidemics impacted on the life of Aboriginal peoples.

[9]This was particularly the case among the Huron where a series of smallpox epidemics during the mid-sixteenth century weakened them, prior to their dispersal at the hands of the Iroquois (See Trigger, 1987; Heidenreich, 1971).

southwest of Hudson Bay. Critical to his analysis were the effects of a number of severe epidemics that occurred in the late eighteenth and early to mid-nineteenth centuries. These were shown to have had profound demographic and cultural implications. By way of contrast, Bishop's The Northern Ojibwa (1974) dealt with the Northern Ojibwa of northwestern Ontario and eastern Manitoba. Despite the fact that the same epidemics struck the Ojibwa, Bishop did not consider them a significant factor in Ojibwa history. Similarly, there has been debate concerning the role of epidemic disease in depopulation among the Northern Athapaskans. Krech (1978, 1983) has suggested that virgin soil epidemics played a significant role in keeping Dene populations low during the nineteenth century. Conversely, the anthropologist Helm (1980) has discounted the impact of these epidemics among the same people. She has argued that there was no significant mortality due to disease, prior to 1820 and that female infanticide was the critical factor in maintaining low populations during the remainder of the century. Here, then, is another example of how different assumptions can affect the consideration of disease's role in culture change.

One of the benefits of the "open" nature of ethnohistory has been the participation by researchers trained in a variety of fields. This includes geographers, who have brought additional perspectives to ethnohistory including diffusion studies which have focussed upon disease. These have frequently been combined with demographic analyses, and the technique has become an accepted tool for ethnohistorical research, for which it is ideally suited. Several different works have examined the diffusion of epidemics west of the Great Lakes[10]. For instance, Decker (1989) tracked the diffusion of epidemic events among the Indians of the northern plains between the years 1774 and 1839. Ray (1976) has examined the diffusion of a number of epidemics in the period 1830 to 1850, as they spread through an area corresponding to the Northern Department of the HBC. These multi-epidemic studies are useful in that they allow the researcher to draw broader conclusions about how introduced contagious diseases and

[10]There have also been a large number of studies relating to virgin soil epidemics in the Northeast. These epidemics took place much earlier than to the west, beginning in the early seventeenth century. Thus, the western epidemics may be treated as separate from those of the east.

virgin soil populations interact (Decker, 1988: 22). In a similar manner, there have been attempts to create inventories of epidemics among a particular people, a goal which Ray (1976: 139) suggested is critical towards greater understanding of the longterm effects of repeated epidemics. Thus, Boyd (1985) studied the effects of repeated epidemics among the Indians of the Pacific Northwest. His work, while not strictly a diffusion study, had much to say about the human-disease interaction, as well as the mechanisms of diffusion, and the demographic consequences. Similarly, Taylor (1977) compiled an inventory of epidemics on the Northern Plains and attempted to suggest how, over the long run, serious alterations to the lifestyle of the Plains Indians had resulted. Hurlich (1983), in analyzing demographic and cultural change among the Northern Algonquians, collated secondary sources in an attempt to assess the link between epidemic depopulation and dependence. A similar inventory has been created for the Arctic Lowland Drainage Dene by Krech (1983).

Diffusion studies of single epidemics in the Canadian West have also been undertaken. One that has been analyzed repeatedly is the smallpox epidemic of 1780-82. Both Ray (1988) and Decker (1988; 1989) outlined the progress and mechanisms of diffusion for that epidemic as it made its way through the Canadian plains. Boyd (1985: 92) noted the presence of epidemic smallpox in the Pacific Northwest at roughly the same time and suggested that it may have been an extension of that of the Plains. Krech (1983: 126) established that the epidemic was transmitted to the Chipewyan from the Cree. Another well-studied event was the 1837 smallpox epidemic. Again, Ray (1975; 1976) and Decker (1989) have mapped its diffusion in the area west of Lake Winnipeg. In what may be one of the most comprehensive reconstructions of an epidemic from historical sources, Dollar (1977) illustrated how the same epidemic made its way from St. Louis to the Upper Missouri. Although Dollar's work dealt with the initial stages of the epidemic in American territory, both his work and that of Ray (1975) are vital to showing how the disease passed from the American trading sphere to the Canadian plains via Indian trade movements. These individual studies are useful for at least two reasons. Firstly, they aid in building up the inventory of epidemic events for particular peoples or regions. With that

knowledge, it is possible to assess the effects of repeated epidemics and the long term demographic impact of these virgin soil diseases.[11] A second benefit concerns the diffusion patterns themselves. In order to better understand how and why diffusion occurs, we need to have a number of empirical studies to draw out common elements. Thus, by collecting and comparing these studies, broader theoretical and historical conclusions may be made[12].

Objectives and Organization

The initial objective of this study is to determine the origin of the 1819-20 measles epidemic, and to suggest the most likely paths of diffusion from that origin to the primary study area, the Petit Nord of eastern Manitoba and northwestern Ontario. The diffusion studies of epidemics in the Canadian Northwest have not undertaken to link the presence of these epidemics with the broader set of mechanisms operative on the continent, beyond the immediate point of entry into the study region. Thus, for example, researchers have been content to point to neighbouring tribes such as the Sioux Indians or Snake Indians as the source of the 1780 smallpox epidemic on the Canadian Plains (Decker, 1988; Ray, 1988)[13], or to the Red River Settlement as a source of later epidemics in the Northwest (Decker, 1989: Ray, 1976). One therefore finds statements suggesting that the origin of mid and late-nineteenth epidemics among the Northern Ojibwa was "the new settler colony on the Red River..." (Young, 1988: 37).

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[11] See Krech (1983) for the necessity of understanding the total epidemic history before drawing conclusions about long-term demographic trends.

[12] It is possible to differentiate between those studies which are empirical, and are concerned with the effects of the epidemics, and works such as Cliff *et al.* (1986), which use individual epidemics "for testing specific hypotheses...and...to model and to forecast the occurrence of epidemiological events" (Ibid: "Preface"). This difference in philosophy is not necessarily reflected in the data collection process and the determination of the diffusion pattern, but in the subsequent interpretation.

[13] Decker (1989) did suggest that the epidemic may have been linked to origins in Mexico City, based on conclusions reached by Dobyns (1966). She was concerned with only that part of the epidemic occuring on the Canadian plains, however, and she did not attempt to map the broader path of diffusion. Given her goal of simply providing an example of the proper methodology of tracing historical epidemics this is entirely understandable.

In a limited sense such a statement is true in that the epidemics may have found their point of entry into the study area through a particular group of people or locale, but it does not acknowledge the external network of diffusion that must be in place if virgin soil populations are to participate in "crowd" diseases. The smallpox and measles viruses require large human populations for their continued existence, populations of an order not found in western Canada until well after these epidemics. Since their presence within the less densely populated regions could not be maintained, these diseases had to be constantly reintroduced over long distances from endemic areas, or areas with sufficient population to maintain the disease.

Dobyns (1983) has asserted that the introduction of several communicable diseases, including measles, in sixteenth century meso-America led to pandemics, or extremely widespread epidemics. It was his belief that the disease diffused to the northern reaches of North America, preceding the direct contact between European and Indian. Despite this assertion, however, there is no evidence to support the presence of measles in the Canadian Northwest prior to 1819. Until that year, some three hundred years after the initiation of the introduction of crowd diseases to the Americas, the Northwest existed in isolation from the developing pool of the measles virus to the east. The breakdown of the area's isolation from major communicable disease pools had begun in the eighteenth century, as smallpox, a disease with greater capacity for long distance diffusion (Ramenofsky, 1987: 167), made its appearance after diffusing from the southward. As settlement from the east expanded and transportation technologies improved, measles, whooping cough and, later, diseases such as influenza which have lesser diffusion capabilities, were experienced with increasing frequency. The 1819-20 measles epidemic was the result of alterations to the settlement and transportation networks, alterations which allowed the virus to diffuse to the Northwest from which it had previously been absent. By examining the origin of this epidemic, and the routes and mechanisms of its diffusion, it should be possible to obtain an understanding of how this area's isolation was breached, and the Northwest was opened up to a new set of diseases from the east.

The second major objective of this study is to map the diffusion of the measles epidemic as it spread within the Petit Nord. Decker (1989) has identified the pattern of diffusion of this epidemic within the region corresponding to the Grand Nord. Other than this work, there has been no attempt to trace the diffusion of this, one of the more significant epidemics of the Canadian west during the nineteenth century. Although she considered some evidence concerning the diffusion of the disease within adjoining areas of the Petit Nord, it was not her objective to reconstruct patterns within this region. Thus, the diffusion of the 1819-20 measles epidemic within the Petit Nord has yet to be analyzed. This lack of analysis is significant in that the dynamics of population movement and interaction throughout the area studied by Decker were not the same as those of the present study area. As such, mechanisms and patterns of diffusion likely differed, and it would not be appropriate to simply assume that a similar diffusion process was experienced within the Petit Nord. For this reason there is a need to study, indepth, the spread of the epidemic as it passed through the Petit Nord.

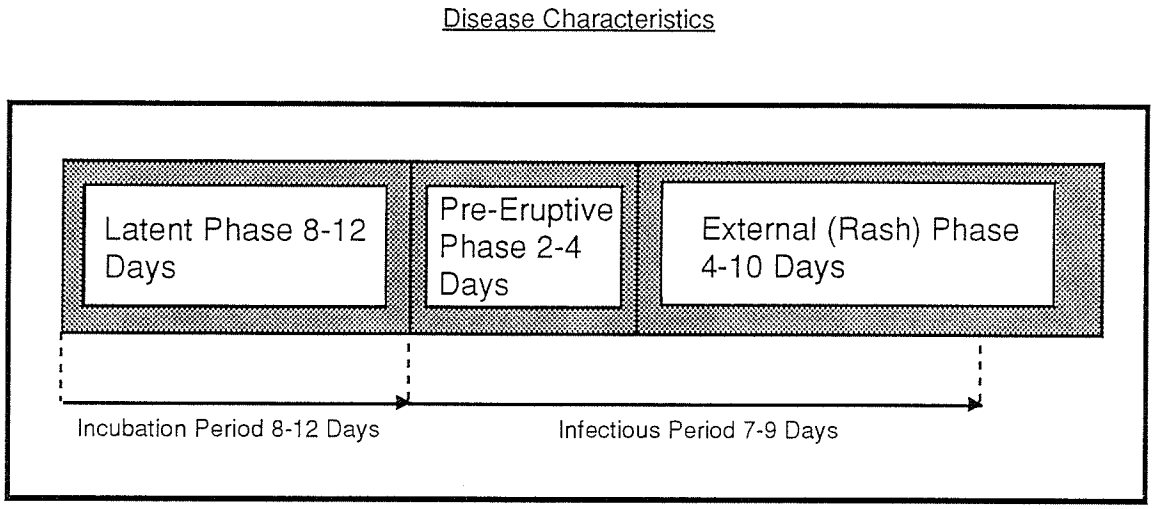
The final objective of the present work is to assess the demographic impact of the epidemic on the Northern Ojibwa and Cree of the Petit Nord. Both Ray (1988) and Decker (1989) have examined the combined mortality effects of the 1819-20 measles and whooping cough epidemics in the Canadian Plains. Ray (1978) concentrated on the Assiniboine, Plains Cree, and Plains Ojibwa, and Decker (1989) dealt with these as well as the other tribes of the Canadian Plains. Both studies suggest that mortality varied among different tribes and groups within them. This study will examine the different elements that combined to create the heavy mortalities of this virgin soil epidemic in the Petit Nord. Decker (1989: 13) has stated that it is "futile" to attempt to sort out "the relative importance of genes, culture, or socioeconomic collapse to mortalities in epidemics...". However, within a single cultural group, variation in mortality rates may be isolated and weighed. Thus, an attempt will be made to establish the geographical variation in mortality levels among the Indian peoples of the Petit Nord, and to somewhat account for these differences.

CHAPTER 2: NATURE AND ORIGINS OF THE EPIDEMIC

The methodologies of most historical diffusion studies are relatively similar. Generally, the dates of particular cases in the primary literature, as determined by clinical symptoms, are mapped. These dates are then compared against population movements in the area, in order to determine the path of epidemic diffusion. Occasionally, contemporary reports of the diffusion path may be available, and can be weighed for accuracy by the researcher. This is not always an easy undertaking given the problems associated with extracting evidence from documents not designed for the purpose of collecting scientific data (Moodie and Catchpole, 1975: 4). The accuracy of the diagnosis can be greatly increased, however, by exploiting as fully as possible the clinical and epidemiological knowledge relating to the disease, as demonstrated by Decker (1988). In most instances, this process involves the diagnosis of a single disease. In some cases, however, the process can be made more difficult by concurrent epidemics of different diseases sharing common symptoms.

In analyzing the epidemic history of the Indians of the Canadian plains, Decker (1989) noted the presence in 1819-20 of two concurrent epidemics, measles and whooping cough, that made it difficult to separate the two diffusion patterns. Nevertheless, she was able to tentatively identify the routeways of both diseases (Ibid: 95-100). The same problem confronts this study of the 1819-20 measles epidemic in the Petit Nord. In some locations, both diseases were experienced, in others only one. The major problem in identifying the diseases is the similarity of symptoms at certain stages. Thus, it is possible to confuse the coughing fits of the cattarhal stage of the measles with the later stages of whooping cough, since the characteristic "whoop" is not always present among adults (Ibid: 89). As this study is concerned with the diffusion of the measles epidemic, it is possible to minimize the risk of this confusion by adopting a conservative

approach. This involves considering only those reports which describe symptoms positively identifiable as those of measles, or are identified as measles by reliable observers.



Source: After Cliff *et al.* (1981)

Figure 2: Stages of Illness for Measles

Measles is the physical manifestation of a viral infection that can be a serious disease capable of significant mortality, despite its common portrayal as a mild disease of childhood. The disease process may be divided into three stages (Fig. 2). During the first, or latent stage, no visible symptoms appear. This stage begins with initial infection and lasts approximately eight to twelve days[1] (Cliff *et al.*, 1981: 42). This is followed by the prodromal stage, lasting two to four days. Symptoms include reddened, watery eyes, nasal discharge, coughing, fever, and a reddened mucosal lining of the mouth with clustered white spots known as Koplik spots (Brincker, 1938: 807; Ball, 1977: 239). Finally, the external, or rash, stage is that which is most characteristic

[1]Estimates vary from seven to ten days to about two weeks. Peart and Nagler (1954: 6) found that the latent period among Canadian Inuit in a 1952 epidemic was consistently lower than seven days, perhaps due to nutritional status.

of the disease, and is the stage at which the disease is most likely to be correctly diagnosed by the layman. Estimates of the duration of this third stage vary from between four to seven days to about ten days (Cliff *et al.*, 1981: 42). The red rash appears initially behind the ears, then on the face, and finally on the body and limbs.

The infected person is capable of transmitting the disease during the prodromal stage and the early part of the external stage, for a total of about nine days with a rate of infectivity approaching 100% (Ibid, 1981: 42). Transmission of the virus occurs through mucous discharge from the upper respiratory tract via the nose and mouth. Extraordinary means of transmission are not required as the disease may be spread through normal contact, including conversation. The transmission of the measles virus is thus relatively simple, involving no intermediate vectors such as fomites or arthropods[2], but only direct interaction between humans. The high rate of infectivity and ease of transmission mean that under favourable conditions only a single case is required to start an epidemic. Those who survive the disease acquire a lasting immunity.

Also known as Pertussis, whooping cough is a bacterial infection of the respiratory tract. As is the measles, it is communicated by emissions from the upper respiratory tract. Initial symptoms include a runny nose, fever, and a persistent cough (Miller and Keane, 1983: 1213). These symptoms may be easily confused with those experienced by a measles victim during the cattarhal stage. Later symptoms include chills and the characteristic "whooping" form of cough. This is a readily identifiable combination of loud coughs alternated with rapid heavy inhalations, the whoop. This rapid inhalation is not always present when adults contract the disease, however, making correct diagnosis by the layman, or using historical accounts, difficult (Decker, 1989: 89). By relying on the rash for identification of the measles, a symptom not shared with the whooping cough, that confusion is eliminated.

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[2]Arthropods are insect vectors such as the flea (plague) or mosquito (malaria) which support the disease-causing agent through a portion of its lifecycle. Fomites are inanimate, personal, articles such as blankets or clothes, on which the agent can survive for a time (Miller and Keane, 1983: 435, 1175). The smallpox virus is particularly successful in utilizing fomites.

As noted above, the measles and whooping cough epidemics of 1819-20 have been acknowledged in the secondary literature. There is, however, a very good possibility that a third, undocumented, epidemic swept through the Little North, at the same time. Thus there are several reports of illness with symptoms that do not correspond to either of the two recognized epidemics. For example, in mid-November of 1819, two Indian men suffering from dysentery arrived at Norway House from Swan River, while on March 18th, 1820, Louis Lacroix at Lac la Pluie became ill with the same disease (Provincal Archives of Manitoba, Hudson's Bay Company Archives[3], B.154/a/8: fo.6; B.105/a/7: fo.73). Elsewhere in the Little North there are reports of affliction characterized by pain in the breast or belly, sometimes accompanied by pain in the head. Among the symptoms of dysentery are abdominal pain and stomach cramps (Miller and Keane, 1983: 347). For instance, at Island Lake, through October and November of 1819, both John Spence and a man by the name of Cumming complained of a sore breast (HBCA, B.93/a/2: fo.s 5d, 8d). In August of the same year James Wishart, an Orkneyman at Fort Douglas, was afflicted with an "inflammation in his belly" (HBCA, B.51/a/2: fo. 10). Throughout February and March of 1820, several men at Martin's Fall complained of pain in the breast and belly (HBCA, B.123/a/: fo.s 13d, 14, 18). Not all recovered. Wishart died on August 4, 1819. James Graham, an HBC employee at Martin's Fall, died of complaints of the belly in the spring of 1820, as did Robert Cock of nearby Attawapiskat (HBCA, B.123/a/18: fo.s13, 18). Although vague in their description, these accounts seem to have been referring to the effects of dysentery. It may be noted that dysentery was present in the midwestern U.S. at this time, possibly serving as the source for the apparent epidemic of dysentery in the Petit Nord. Detroit and the surrounding countryside experienced a severe epidemic of "billious disease", after July 1st of 1819 (Detroit Gazette: Sept.10, 1819). Billious disease was a common term for a number of of disorders which included the symptoms of "abdominal discomfort" and headache (Miller and Keane, 1983: 129). As well, a

[3]Hereafter HBCA.

man accompanying John Tanner as he passed through Chicago in 1820, was abruptly struck by the "bloody flux", a term which refers to dysentery (James, 1830: 258).

This study does not attempt to analyze the limited evidence for this apparent third epidemic in the Petit Nord in 1819-20. For the purposes of this research, it is sufficient to acknowledge the possibility of this epidemic when considering evidence and placing episodes of illness within the overall framework of diffusion. The presence of an unidentified illness may not fit into either of the other two patterns, and may therefore be misleading if not acknowledged as such[4].

Diffusion and Measles

Given that measles results in permanent immunity for all who contract it, a population may be divided into three categories: susceptibles; infectives; and immunes, or those who have recovered from the disease. Under virgin soil conditions, the vast majority, if not all, of the population may be classified as susceptible, and at risk[5]. Infectives are those suffering from the disease and capable of transmitting the virus. Immunes, who are the majority under endemic conditions, act to dilute the susceptible population, limiting or slowing diffusion. If a large enough

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[4]It is very interesting to note that HBC employees seem to have been susceptible to this disease, regardless of age or ethnicity. Contemporary observers were not immune to the confusion caused by simultaneous epidemics. In a letter to John Davis of Martin's Fall, HBC Governor Thomas Vincent linked the death of James Graham to that of Thomas Sanderson who succumbed to the 'prevailing' disease, the measles (HBCA, B.123/b/2, fo.24d). Graham's symptoms were clearly not those of measles and Vincent erred.(HBCA, B.123/a/18, fo.s14, 14d, 15, 16d). This is understandable in light of the relative infrequency of epidemic disease in the area to that point in time.

[5]Some have applied the term 'virgin soil' only to those populations which have never experienced a particular disease in the group's history. If such a limited definition is adopted, then only the very first epidemic can be considered virgin soil, even if all survivors of the original epidemic have passed on by the time of the next occurrence. Nevertheless, the effects of the epidemic would likely be the same if all other conditions had remained constant. In keeping with the definition suggested by Boyd (1985: 43), I have chosen to broaden the definition somewhat and include subsequent attacks. Although Boyd's type I virgin soil epidemic refers to situations with no surviving immunes, I would argue that the presence of a very few individuals, either elderly survivors of a previous epidemic or those who had contracted the disease on trips out of there home area, would have little effect on the course of an epidemic, and thus some leeway in using the term virgin soil to describe populations could be acceptable.

population of susceptibles is accumulated, however, epidemics become possible, even in regions where the disease is endemic.

There are two basic ways in which the diffusion of disease can be expressed geographically (Fig. 3). The first is expansion diffusion. This refers to a disease spreading from individual to individual throughout a population. Both the total number of infected individuals and the area of incidence increase over time. Expansion diffusion may be further broken down into contagious diffusion and hierarchical diffusion. Contagious diffusion involves the general spread of a disease from infective to susceptible, without regard to any characteristics of the latter individual except immune status. No susceptibles are bypassed. This is the wavelike diffusion commonly associated with epidemics. Alternatively, a disease can progress from area to area in a hierarchical manner. The disease passes from highly populated locations to other locations of a similar nature, initially bypassing those less densely populated areas in between, and later infilling the areas. The key to the differentiation between these two diffusion types is in the manner of contact between infective and susceptible. If the infective simply passes on the disease to the nearest neighbouring susceptible, then it is contagious diffusion. Should the transfer occur in an ordered manner, and some bypass occur, then it is hierarchical diffusion.Relocation diffusion, the second major diffusion type, occurs when an infective person moves from one place to another. There is no transmission of the disease between individuals, simply movement of the infective. While the area of incidence is increased, the number of infectives remains the same[6].

According to Decker, the pattern of diffusion of a given epidemic is determined by the structure of the afflicted population, and movement by infected individuals. In general, "epidemics of infectious diseases usually follow a contagious pattern..." (1989: 22). She concluded that, among the highly mobile plains Indians, the 1819-20 measles epidemic tended

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[6]These categories are somewhat arbitrary. In practice one expects some sort of expansion diffusion to result from relocation diffusion. Likewise, the differentiation between hierarchical and relocation diffusion types is based solely on whether the disease is passed on at the new location. It seems likely, then, that a given epidemic might exhibit the characteristics of different types, depending on what stage of the epidemic is being studied, at what scale, and within what population.

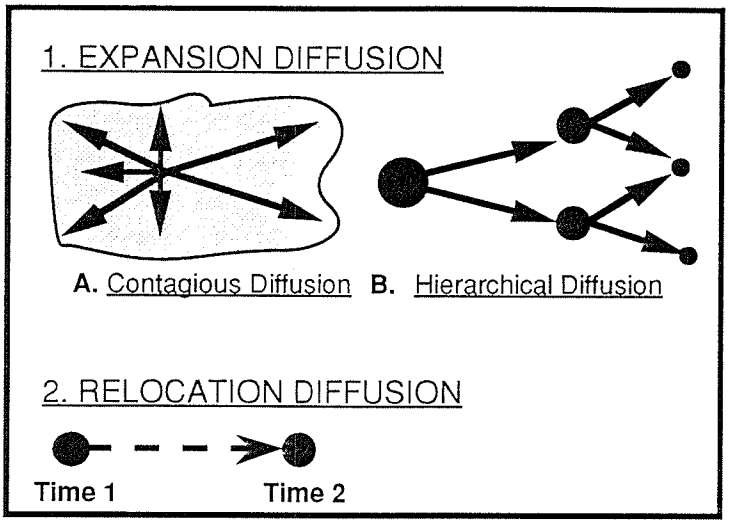

Figure 3: Geographical Expressions of Diffusion

towards relocation diffusion (Ibid: 12). It is possible that the measles may have a tendency towards relocation, when compared to smallpox, due to a long incubation period and relatively short (compared to smallpox) period of infectivity. These characteristics provide plenty of opportunity for infected individuals to flee during the long incubation period, but less time and opportunity to spread the disease during the contagious period. Ramenofsky (1987: 167) ranked measles in the second rank of diseases in terms of diffusion potential, behind smallpox and whooping cough, based on the disease's period of communicability. With lesser diffusion potential, all things being equal, the measles epidemic would tend to be more spatially constrained than smallpox. Another factor limiting measles' capacity for expansion diffusion among some people may be the disease's extremely high rate of infectivity, and its severity. Once introduced in a given area, the majority of susceptibles will very quickly be infected, contract the disease and be immobilized, hindering movement by infectives. Thus, according to Black (1966: 210) "when

measles was first introduced to the Americas it did not sweep the continents but affected one area at a time."

Ray (1976) examined the 1846-7 measles epidemic as it diffused through much the same area studied by Decker. He concluded that for that epidemic, and for a number of others between 1830 and 1850, the fur brigades of the HBC manned by Métis employees, were critical in diffusing disease. As a result, the pattern which developed was essentially a hierarchical one, reflective of the company's organizational pattern (Ibid: 156). Among more sedentary people, diffusion patterns are also different. Iceland, a nation of coastal village settlements, exhibited little of the relocation diffusion noted by Decker. Instead, that nation's measles epidemics have been a mix of hierarchical and contagious diffusion (Cliff *et al.*, 1981: 184). Similarly, wavelike diffusion of acute infectious disease was common among the densely populated, sedentary Indian groups of the Pacific coast (Boyd, 1985: 44).

The pattern of diffusion depends on a number of factors. Perhaps most significant are the patterns of settlement and movement evidenced by the susceptible population. For example, areas with large susceptible sedentary populations would normally be expected to have a contagious pattern. Where there are multiple towns or cities, with movement of susceptibles between them, a hierarchical pattern might be expected. Relocation diffusion is characteristic of the flight reaction of mobile peoples. This is not to say that there will always be a single pattern for a particular epidemic. In fact, in areas with complex patterns of movement one might expect to see some combination of these types.

Many of the above characterizations refer to populations that are, for the most part, either sedentary or highly mobile. Those people living within the Petit Nord maintained lifestyles which were both sedentary and mobile, depending on the season. In this case, then, the pattern of diffusion would be expected to vary with the season. In addition, there was also a seasonally mobile labour force employed by the fur companies. The brigades, if susceptible, would have generated a different pattern of diffusion among the aboriginal inhabitants of the Petit Nord. It is thus significant to compare the pattern of diffusion for the 1819 measles epidemic within the Petit

Nord with the patterns noted elsewhere, in order to draw conclusions about the structures and movements of the afflicted people.

Origins of the Epidemic

Theoretically, it should be possible to trace the diffusion of a given measles epidemic back to its endemic source in a large population[7]. The virus which causes the disease has no reservoir other than the humans it has infected. The disease is an acute one, characterized by comparatively short duration, an extremely high rate of morbidity and normally permanent immunity among survivors. As a result, the measles virus requires for its continued existence "continual pools of susceptible individuals..." (Ramenofsky, 1982: 39). In communities where the replacement of susceptibles falls below a critical level, the disease's presence is felt as infrequent epidemics of great extent followed by a complete absence of the disease. The disease remains absent until a sufficient non-immune population is built up and the disease is reintroduced from elsewhere.

In urban areas of large population it is possible for the virus to maintain a continued existence passing from susceptible to susceptible with periodic epidemics as a sufficient supply of susceptibles is built up. Black (1966) concluded that in order to maintain such a presence a population in excess of 200,000 to 500,000 is required. The latter figure refers to areas with denser populations, where the disease would diffuse with greater rapidity. Cities which are densely peopled provide greater opportunities for infectives to come in contact with susceptibles

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[7] Some very complete diffusion studies have been undertaken. Among these Panum (1940) and Peart and Nagler (1954) are two that produce very comprehensive narratives of the introduction and diffusion of the measles virus in isolated areas: The Faroe Islands and Inuit communities in Canada's north respectively. In dealing with epidemics considerably removed from the present a more complete picture may be unobtainable, depending on the scale and accuracy of the researcher's data. In the case of this study there is little concrete data to work with, and some degree of speculation has been engaged in. Pyle's (1969) study of the diffusion of cholera demonstrated how detailed conclusions about the diffusion of epidemics in the settled U.S. can be made where data is available.

who then contract the disease and eventually become immune. Where the spacing between individuals is greater, opportunity for communication of the virus is lessened, and the diffusion process occurs more slowly. As a result, fewer susceptibles are required to maintain the disease. Bartlett (1972) found that three types of urban epidemic profiles for measles were possible, again depending on the number of people living within the urban area (Fig. 4). Cities above the critical level experience measles endemically[8]. Those which contain between 10,000 and 250,000 people have periodic fadeouts, or periods in which the measles virus is absent, but produce a regular pattern of epidemics when the possibility of external introduction is consistently present. Finally, those with less than 10,000 people experience an irregular pattern of epidemics, occasionally "missing" some when not enough susceptibles have been collected.

These levels are only theoretical, however, and specific conditions could render them irrelevant. Bartlett (1957: 59) provided a caveat to the discussion of population levels needed for measles endemicity by suggesting that for "non-isolated urban areas" immigration of susceptibles from surrounding areas could lower the critical figure. These act as a supplement to children who have never experienced the disease, forming a larger pool of susceptibles than would be expected from a given size of city. A second, related, variation in expected epidemic behavior may be the endemic persistence of the virus in closely located groups of cities, each below the critical size, but together above it. In such a situation, movements of people and goods provide opportunities to share the virus and it circulates (Black, 1980: 44).

These exceptions may have been significant in early nineteenth century North America, the source of the virus which caused the 1819-20 measles epidemic in the Canadian Northwest. According to Borchert's (1967) description of urban growth, city location was at that time dictated by sail and wagon transportation technology. As a result the major concentration of cities was

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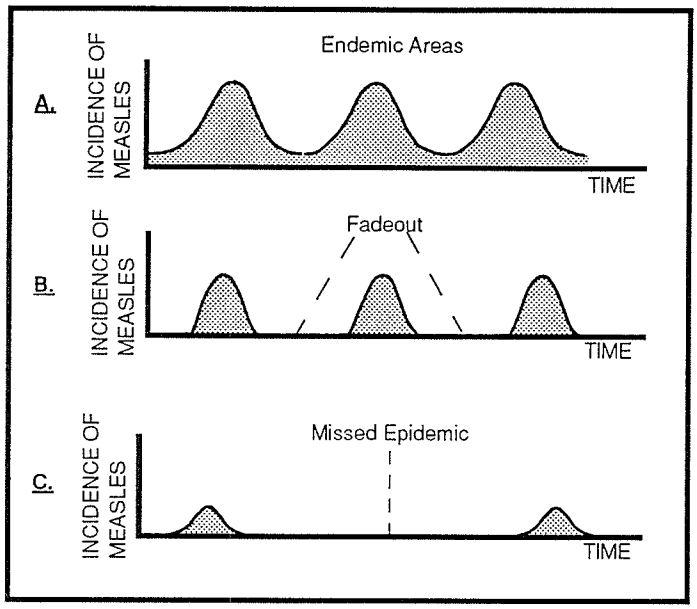
[8]These figures refer to situations prior to the development of an effective measles vaccine (Morley, 1980: 126). Obviously the vaccination of infants would significantly alter the relationship between endemicity and city size.



Source: Cliff *et al.* (1981: 40)

Figure 4: Characteristic Epidemic Measles Profiles for Cities: **A**. Over 250,000 Total Population; **B**. 10,000- 250,000; **C**. Under 10,000

along the Atlantic coast. Smaller concentrations occurred along the St. Lawrence (Quebec and Montreal), the Ohio (Cincinnati and Pittsburgh), and New Orleans, which took advantage of the Mississippi's transportation potential (Borchert, 1967). It should be noted that only a small portion of the North American population lived in cities (Yeates and Garner, 1980: 50). For that reason it is likely that the rural to urban migration provided fuel for the emergence of a region of measles endemicity.

In 1818 there existed in northern North America[9] no single city exceeding the critical levels observed for measles endemicity. There was, however, a group of three cities which

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[9]It is assumed that Mexico was too distant for the epidemic to have originated there. Measles' ability to diffuse is somewhat less than that of smallpox due to a shorter period of communicability. There is strong evidence to suggest that earlier smallpox epidemics, including the 1780 epidemic, diffused into the north from southern origins (Ramenofsky,1982; Taylor, 1977: 59). Dobyns (1983) has suggested that epidemics diffused into northern North America from Meso-America as early as the 16th century. While his work has been heavily criticized, he did draw attention to the ability of smallpox to diffuse great distances protohistorically, or prior to direct physical contact between whites and aboriginal populations. Measles may tend to move more by relocation. As such, distance and speed of transportation are important factors in determining the spatial extent of an epidemic. Thus it is safe to rule out Mexico by virtue of the great

together was of sufficient size. In fact, the three largest American cities were located in close proximity to one another along the Atlantic coast. The two largest, Philadelphia and New York, were located less than 100 miles apart as were Baltimore and Philadelphia, only a day's journey (Brown, 1943: 35). Their total population, including hinterlands, exceeded 300,000 by 1818 (Darby, 1962: XXXiii Addendum 1). Transportation linkages between the three were well developed. As early as 1790 the three were linked by a highway which would have provided relatively quick ground transportation (Vance, 1986: 165), including regularly scheduled passenger service (Dunbar, 1968, Vol I: 173). As well, ocean-going ships served all three cities. Sailing ships were supplemented between New York and Philadelphia after 1809 with the initiation of steamboat service, begun with the launching of the Phoenix (Vance, 1986: 450), as well as between New York and Baltimore (Dunbar, 1968, Vol I: 398).

Other cities had significant populations in 1818 but were isolated from other urban centres. Cincinnati was a city of some 9,000 in 1818 (Brown, 1948: 232). Boston and environs had a population of 43,000 and Quebec city 10,000 by 1810 (Ibid: 155, 170). Even allowing for substantial growth, none of these would have been large enough by 1818 to host the measles virus endemically. The origin of the 1819 epidemic, then, was likely the urban agglomeration formed by New York, Baltimore, and Philadelphia. Certainly the disease had been present in the area for some time, if not extensively documented. In all probability, the disease was introduced to the Americas during the seventeenth century (Ramenofsky, 1987: 170). Until that century, trans-oceanic voyages were too long, and the number of people on board was too small to support the virus over the long journey. Hauptman and Knapp (1977: 174) have claimed that the Dutch residents of New Netherlands (and presumably the Indian people who lived in the area) suffered from a wide array of fatal diseases, including measles, during the period between 1624 and 1664. Cook (1973: 494) suggested that, in 1687, the disease was brought to New France by

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distances and available transportation technology. As shall be shown below, the evidence points to an eastern origin.

a ship from Europe[10]. By the 1790's, the measles was common throughout the coastal United States. It was especially common, possibly endemic, in Philadelphia (Currie, 1792: 99). Given a further fifteen years of population growth and improvements to inter-urban transit it is likely that measles existed endemically within the three cities of the urban agglomeration in 1818. From this urban endemic hearth, the virus was carried westward to areas inhabited by people with no previous experience with the disease, starting an epidemic in 1819. The probable routes of diffusion of the disease from this endemic area through the expanding American settlement frontier, and the entry points of the virus into the Canadian Northwest will be dealt with in the following chapter.

[10]These early reports should be regarded with some caution. According to Radbill (1974: 259), measles and smallpox were not seperated in the minds of Europeans until Thomas Sydenham did so in 1670. Koplik spots, which are characteristic of measles and allow the two to be readily differentiated, were not noted until the eighteenth century (Ibid: 260).

CHAPTER 3: PATHWAYS TO THE PETIT NORD

Diffusion from the Endemic Region

As late as 1832, traffic within the U.S. was mainly along the major water-based routes, both internal and coastal (Pyle, 1969: 60). Prior to the construction of a significant railroad network, land-based transportation was generally slow and, for the most part, local. As a result, movement from the relatively densely populated Atlantic coastal cities was directed along the inland waterways leading into the continent. It was almost certainly along one of these major transportation corridors that the virus was carried westward to the Canadian Northwest. In 1818, there were only a few routes into the continent of any significance. Potential pathways included: the Ohio River; the fur trade route along the Ottawa River and Lake Huron; and the Great Lakes. These will be assessed as to the likelihood of the disease having diffused along them.

The Ohio River

In the two decades prior to the completion of the Erie Canal in 1825, the major corridor of American settlement expansion was along the Ohio River (Fig. 5). The first quarter of the nineteenth century marked a new era of westward movement of pioneer settlement across the Appalachians, a movement which intensified after the War of 1812 (Smith, 1985: 162). Previous to this, Kentucky, Virginia and North Carolina had attracted the bulk of the flow of settlers (Dunbar, 1968, Vol I: 456) but later that flow was directed to the area north of the Ohio, including the future states of Ohio, Illinois, and Indiana. Much of this settlement consisted of homesteads and small settlements strung out along the river and its tributaries, with a few larger towns or cities. Most notable among the latter was Cincinnati. By 1819 this string of settlements had reached the Mississippi (Brown, 1948: 195).

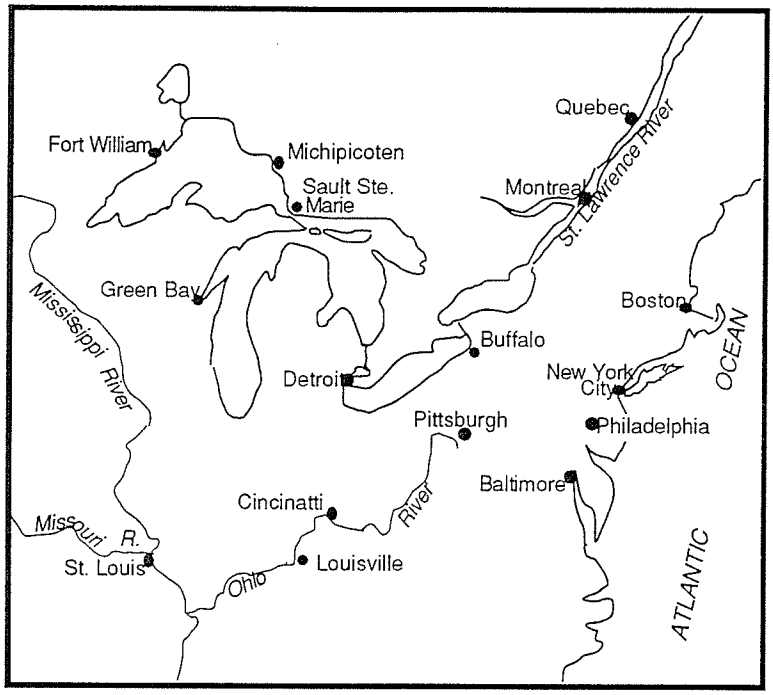

Figure 5: The Ohio River and Settlement in North America: 1818

One major characteristic of this population movement was a heavy boat traffic on the Ohio as far west as the Mississippi (Brown, 1948: 197). In the main, this traffic consisted of individuals or families purchasing or constructing rafts and floating downriver to their destination. There also existed a passenger service that could be accessed in stages. Starting in Philadelphia, an individual could travel by one of the frequent stagecoaches to Pittsburgh. From there, regular packet boats moved at scheduled intervals between Pittsburgh, Cincinnati, and Louisville. These large barges carried both passengers and freight between the settled east and the expanding west (Dunbar, 1968, Vol I: 287).

Given the nature of this migration it would be logical to consider the Ohio River the initial route of diffusion for the 1819 measles epidemic. Large numbers of susceptible children, the

regular, relatively quick boat travel, and the number of small settlements that could act as places of human interaction and thus transmission of the virus, all suggest an ideal route of diffusion. The evidence concerning the first identifiable outbreak, however, renders this route unlikely. As shall be seen, this initial occurrence points to a more northerly path of introduction through the Great Lakes. The Ohio River, while ideal for entering the Midwest, was not the optimum route for accessing the Great Lakes. One obstacle was the large number of Indian people living to the south of the Great Lakes, whose territory would have to be crossed. According to Dunbar (1968, Vol I: 475), the settlers of southern Indiana (and presumably other states as well) were separated from those of Michigan by the Pottawatomies until 1826. Despite the fact that Detroit could be reached from the Ohio by a number of traditional Indian trails (Ibid: 653) and a post road linking it with Cincinnati (Paullin and Wright, 1975: plate 138) such an arduous and dangerous means of travel would likely have been eschewed in favour of an all-water route from the east. Additionally, the Black Swamp also served to isolate Michigan from southern Ohio. Although the 1819-20 measles epidemic did not diffuse along the Ohio, this route had great potential for diffusing communicable diseases due to its heavy traffic. It is very probable that some infections were being carried downriver, resulting in other epidemics in the communities located along its shores. For example, the 1832 cholera epidemic diffused along a large section of the Ohio, eventually reaching the Mississippi and diffusing down that river to Louisiana (Pyle, 1969: 64).

While it is certain that the measles epidemic in the Canadian Northwest occurred between the spring of 1819 and the summer of 1820 (Decker, 1989), it is also apparent that there was an outbreak of measles at Michipicoten, on the north shore of Lake Superior (Fig. 5), nearly a year earlier. This outbreak can be traced back to Sault Ste. Marie. Given the rarity of that disease west of the Atlantic coast[1] at that time, there is little doubt that this outbreak was related to the epidemic of 1819-20.

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[1]Contrasted with the likely endemic status of the East, the experience of the central Great Lakes was sparse. Documents suggest that a measles epidemic occurred in 1715 at Mackinac (Harstad, 1960b: 258) and John Tanner, a white captured and raised by Indians, tells of his adoptive family being afflicted with the measles in about 1792 in the area (James, 1830: 39). There may have been others although not many. Measles, because of its shorter period of communicability, does not diffuse as well as smallpox

On August 17th, 1818, Andrew Stewart, in charge of the HBC post at Michipicoten, noted the arrival of Joseph Dufaut and two canoes of men and goods. It seems that these men brought the measles virus with them as well. Among the men were two Canadians, three "half-Indians", and four "Fond Du Lac Indians" (HBCA, B.129/a/9: fo.6d). They were employees of Augustin Nolin and had arrived from Sault Ste. Marie. Nolin was a merchant of that town and had outfitted the men to act as independent traders in opposition to the English at Capoonicagomie. Anxious to avoid such opposition, Stewart undertook an agreement with Dufaut, on behalf of Nolin, to launch a joint opposition to the NWC at "Matagaumie" [Mattagami] to the east (HBCA, B.129/a/9: fo.7d). On August 24th a canoe was dispatched to Mattagami manned by most of Dufaut's men and a few of Stewart's. Among those who remained at Michipicoten were Dufaut and two of his men. Stewart noted that the latter two "are unwell at present with the measles" (HBCA, B.129/a/9: fo.8d). On September 3rd Stewart was alerted to the fate of the party sent on the 24th.

> This morning I received information that Mr. Monin and party that departed from here for Mataugumie [sic] on the 24th ULT were still at the first portage about two hours walk from here... They had not even got their canoe over the portage owing as they say to two of the men being unwell (HBCA, B.129/a/9: fo.9d).

After resuming their journey the men arrived at Mattagami on the 11th of September. While it is entirely possible that they exaggerated the degree of their illness in order to take a break and partake of the goods they were meant to trade, it is unlikely that the illness was feigned, as Stewart claimed in the district report (HBCA, B.129/e/2). It would also seem probable that these two were Dufaut's men beginning to show some of the same symptoms.

If we accept that the external rash symptoms were first present on August 24th, the point when an accurate diagnosis of measles by a nonprofessional is most likely, then it is possible to

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(Ramenofsky, 1987: 167). A relatively long incubation period means that it can relocate long distances, but prior to improvements in transportation this area may have normally been beyond that ability. Intermediate towns or travel in larger groups (military or fur trade) may have facilitated relocation on these rare occurrences.

estimate the approximate day of infection. Cliff *et al.* (1981) use an estimate of between eight and twelve days for the Latent (pre-symptomatic) phase, and two to four for the Prodromal (pre-eruptive) phase. Thus, they estimate that the external rash appears between ten and sixteen days following infection. This would suggest that infection occurred between August 8th and 14th. The men appeared in Michipicoten on the 17th. Thomas Vincent, Governor of the Southern Department of the HBC, estimated that a minimum of four to five days were required to travel from Sault Ste. Marie under ideal conditions (HBCA, B.135/b/40: fo.41d). If this estimate is correct then the men could not have left after the 12th. This suggests that infection took place either in Sault Ste. Marie or its vicinity, since the men had little time to travel prior to their departure for Michipicoten.

The Ottawa River - Lake Huron Route

Sault Ste. Marie was an important transport centre in the Canadian fur trade. It served as a break of bulk point between Lake Huron and Lake Superior because of the falls from which it derived its name. During the shipping season, goods were sent by the NWC from Montreal to Fort William, at the head of Lake Superior, via the Great Lakes route. The goods travelled from Montreal to Niagara on Lake Ontario where they were transported the approximately ten miles over land to Lake Erie (Fig. 6), bypassing Niagara Falls, and continued to their destination on board the Company's ships (Garvin, 1927: 46). The Falls forced the company to operate a fleet of three ships, two of which serviced Lakes Erie and Huron and one on Lake Superior, which travelled a number of times between Sault Ste. Marie and Fort William each season (Garvin, 1927: 46).

More significant was the yearly flow of men bound for the Northwest. The NWC did their hiring in Montreal and employed a large body of men to transport goods from that city to their field headquarters at Fort William each spring. In early May each year, these men, and others hired to prosecute the fur trade, departed as a brigade from the Lachine rapids, just to the west of

Montreal. According to the explorer and fur trader Alexander Mackenzie, the brigade generally comprised fifty canoes, each with eight to ten men (Garvin, 1927: 35).

The route taken[2] was one suitable for canoes only, due to the large numbers of portages required, and thus was largely restricted to fur trade employees and the Indians who travelled it (Fig. 6). The journey from Montreal to the Sault, a distance of some 700 miles, could be accomplished in four to six weeks under ideal conditions with favourable weather (Brown, 1948: 175). From the Lachine rapids the men paddled up the Ottawa River, unloading and portaging or else pulling the loaded canoes over the frequent shallows and rapids. At present-day Mattawa, they left the Ottawa and ascended the Mattawa River into Lake Nippissing. From there they travelled the French River to Georgian Bay and on to Sault Ste. Marie.

The NWC was not the only one utilizing this route to send men into the west. The arch-rival HBC, who traditionally travelled via the large rivers emptying into Hudson Bay, had by this time begun their own recruitment in Lower Canada. As part of Colin Robertson's plan to vigorously oppose the Nor'Westers in the Athabasca district, a small number of HBC employees were hired in Montreal between 1815 and 1820 (Alwin, 1978: 401). These men were primarily French-Canadians and Iroquois. In 1819 Roderick Mackenzie accompanied the recruits from Lachine, leaving in mid-May (HBCA, B.105/a/7: fo. 3). Unlike their NWC counterparts, they were engaged to join the fur trade only in the Athabasca. Their journey would not end until they reached the posts of the Grand Nord. The French-Canadians employed by the NWC were utilized throughout the entire Canadian Northwest.

It is possible that the epidemic diffused from the east along this route. Although far below the endemic threshold population, Montreal could have served as a link in the epidemic chain. Certainly, travel between New York and Montreal along the Hudson River-Lake Champlain corridor, or by the post road connecting the two cities, could have been accomplished by an

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[2]For an in-depth discussion of the fur trade routes see Morse (1979).

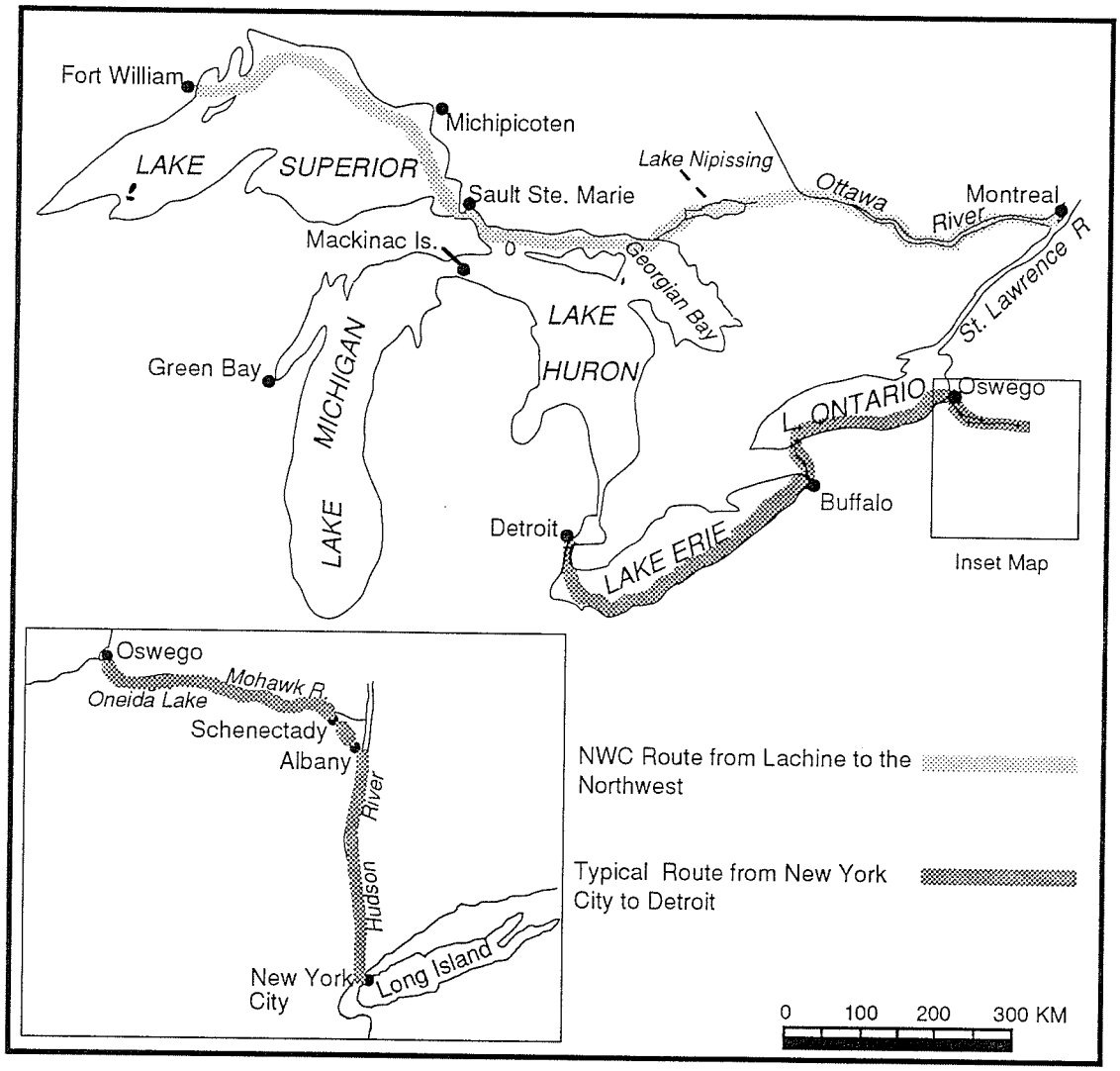


Figure 6: Major Transportation Routes to Lake Huron

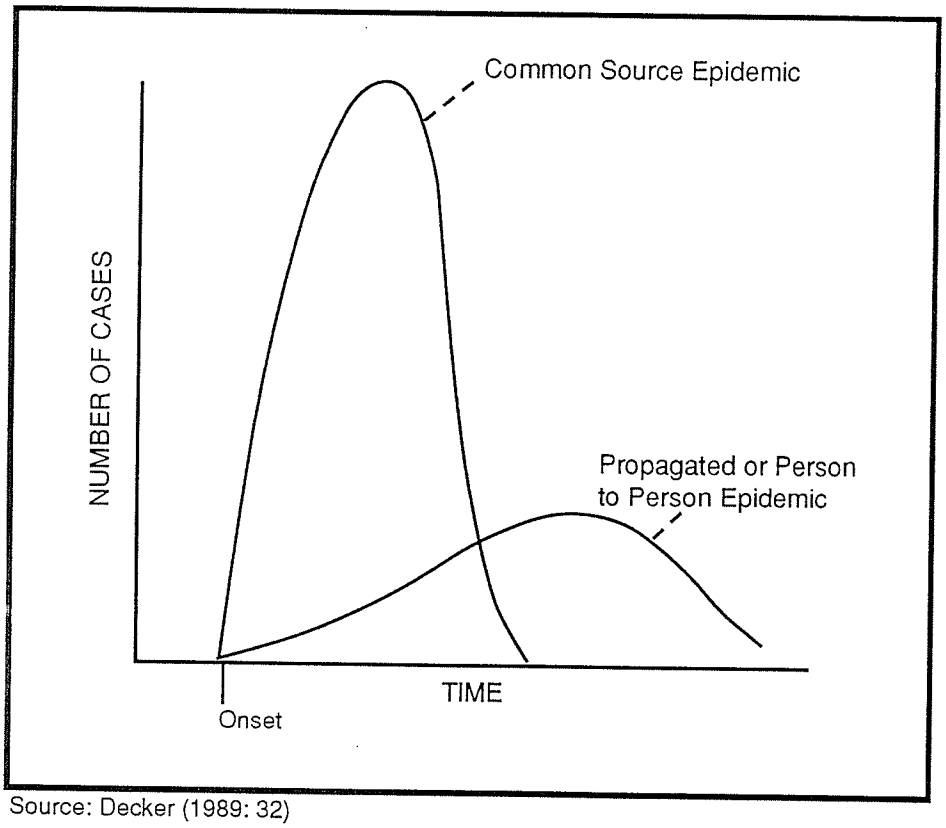
individual before the end of the infectious period. In fact, the entire Northeast has been characterized as "a single disease interaction sphere" (Ramenofsky, 1987: 100). Although this statement probably applies more to smallpox than other diseases, there was the potential for Montreal to suffer an epidemic of its own, diffused from the south.

The large numbers in the brigades also lends support to this conclusion, providing the numbers to maintain the virus through the journey to Sault St. Marie. Given the ideal journey of some four to six weeks, only a few transmissions among the susceptibles on the brigades would have been needed to perpetuate the disease. Since the period between initial infection of an individual and the end of the infectious period can be as much as twenty-one days, theoretically only two to three susceptibles would be needed to last the twenty-eight to forty-two days.

The timing of transmission within a population can vary, however, and the assumption that retransmission of the virus takes place approximately every twenty-one days is not always valid. Where endemicity prevails, or where there are few susceptibles, the interaction between infectives and susceptibles is infrequent. Under these conditions the period between initial infection and retransmission will approach the maximum twenty-one days. An infective will therefore likely infect only a single susceptible before communicability ceases. This pattern of transmission is referred to as propagated, or person to person infection (Fig. 7). Propagated infection tends to prolong the presence of the virus in the population by slowing down the rate of retransmission. Endemicity of a disease within a given population develops when the number of susceptibles available always exceeds the numbers being made immune due to exposure. When this occurs, a fresh supply of susceptibles, generally children, is constantly maintained. If, however, the population is largely susceptible, which is the case with virgin soil populations, and there is a high degree of interaction between individuals, common source infection will result. Under these conditions, the infective has the opportunity to infect a large number of susceptibles, and the disease rapidly diffuses through the population. The supply of susceptibles will then be exhausted very quickly, and the disease will rapidly run its course,

remaining absent until a sufficient supply of susceptibles is gathered and the disease is reintroduced.

Under conditions dictated by the brigade, common source infection would have resulted. Travel by brigade, accompanied by collective encampment, would ensure that diffusion would be rapid and simultaneous. Given infection of an individual on the day of departure, at the latest, eight to twelve days later infection of others in the brigade's crew would begin. Instead of infecting a single individual in a propagated pattern of transmission, however, the single infective would infect several others. Depletion of available susceptibles would have been rapid.



Source: Decker (1989: 32)

Figure 7 Diagrammatic Representation of Common Source and Propagated Epidemics

Common source infection would have been accompanied by a considerable delay in the journey, as large numbers of the men were simultaneously afflicted As noted, the journey was both long and physically demanding. The disablement of a significant number of men would seriously limit the group's ability to proceed. A journey that would have taken twenty-eight days or more under ideal conditions with healthy crews would take much longer, suffering delays due to a lack of manpower. Much as the crew which left Michipicoten in August was forced to stop, the NWC brigades would have been slowed, or even temporarily halted, depending on the numbers incapacitated by the measles. By the time they reached Sault Ste. Marie, the disease would have exhausted the supply of susceptibles, leaving none to pass the virus on. Although Montreal had the potential to act as a link in the chain of diffusion of the 1819-20 measles epidemic, by virtue of its relative proximity to the endemic urban agglomeration, transportation to Sault Ste. Marie via the Ottawa River to Lake Huron brigade route was such that it would have been impossible to maintain the virus over the long and arduous journey. It is therefore probable that the disease diffused over a different route.

Sault Ste. Marie also participated in a fur trade based transportation network involving the settlements on Lake Huron. The NWC purchased goods at Detroit and Michilimackinac that were shipped through Sault Ste. Marie (Garvin, 1927: 46) As well, goods were shipped from Montreal via the Great Lakes. At Sault Ste. Marie the Nor'westers maintained a saw mill, several houses, and stores (Anick, 1976: 259). For its part, the HBC also obtained goods from these places when needed. The HBC posts at both Point Meuron and Michipicoten were obliged to buy provisions from a number of places, foremost of which was Sault Ste. Marie where Charles Ermatinger served as provisioner. Additionally, the British garrison stationed at Drummond's Island, frequently required supplies which were obtained from Sault Ste. Marie or shipped via the Great Lakes.

Michilimackinac (on Mackinac Island), the field headquarters of John Jacob Astor's American Fur Company[3], was a distribution point for goods and men throughout the Great Lakes

[3]Hereafter referred to as the AFC.

(Johnson, 1971: 124) as well as a stopping point for the heavy sloop traffic between Detroit and Lake Michigan. Among those stopping there before the end of March, 1818, were the Ruthy-Ann, the Tyger, and the Monroe (Detroit Gazette: March 27, 1818). It was reported by John Fairbanks, employed by the AFC at Michilimackinac in July of 1818, that ships travelling between Detroit and that place were "passing and repassing all the time" (Nye, 1938: 16). For its part Detroit was the key to this rather complex Great Lakes traffic pattern.

The Great Lakes Route

The journey between New York City and Detroit via the Great Lakes represents the most likely path of measles diffusion from endemic to epidemic regions. This was a commonly travelled, nearly all-water route, even before the completion of the Erie Canal in 1825 revolutionized Great Lakes transportation (Dunbar, 1968, Vol I: 335). In 1807, Christopher Schultz went from New York City to Pittsburgh, much of his journey duplicating the main route to Detroit (See Fig. 6, Table 1). It is useful, for the purposes of examining the potential for diffusion of the epidemic, to consider Schultz's trip in detail, especially in relation to the time spent and improvements made by 1818.

Table1: Typical Travel Times from NYC to Detroit in the Early-Nineteenth Century

DESTINATION	DISTANCE	METHOD	DAYS
New-York to Albany	160 Miles	Hudson river steamboat	1 1/2
Albany to Schenectady	15	turnpike	1 1/2
Schenectady to Utica	104	5 ton keel-boat	5
Utica to Oswego	104	5 ton keel-boat	3
Oswego to Lewiston	172	lake sailing boat	3
Lewiston to Black Rock	17	mud road	1 1/2
Black Rock to Detroit	290	lake sailing boat	5 (estimate)

Source: Dunbar (1968)

The first stage took Schultz up the Hudson River from New York to Albany. This section was easily completed by steamboat. Experimental steam navigation had been attempted on the Hudson as early as 1798, though it was not until 1807 that regular service was instituted. This was at first provided by the Clermont, launched by Robert Livingston and Robert Fulton who held a loosely enforced monopoly on steamship travel in New York State until 1824 (Vance, 1986: 441). It was this ship which Schultz took in 1807, completing the journey to Albany in one and one-half days (Dunbar, 1968, Vol I: 334). By 1818 a number of steamships offered service up the Hudson to Albany, despite the monopoly (Ibid: 398). The Clermont was considered slow by that date and presumably the one and one-half days would have been a leisurely trip.

Next, Schultz had to make his way from Albany to Lake Ontario. The Mohawk River valley was one of the few natural corridors through the Appalachians (Vance, 1986: 125) and as such was a funnel for traffic to the west. After 1825, and the completion of the Erie Canal, Albany and Buffalo were linked by a comparatively easy, unbroken journey. This had facilitated a tremendous boom of settlement along the Great Lakes. In 1818, as in 1807, the journey was longer, more difficult, and interrupted by frequent changes of modes of conveyance.

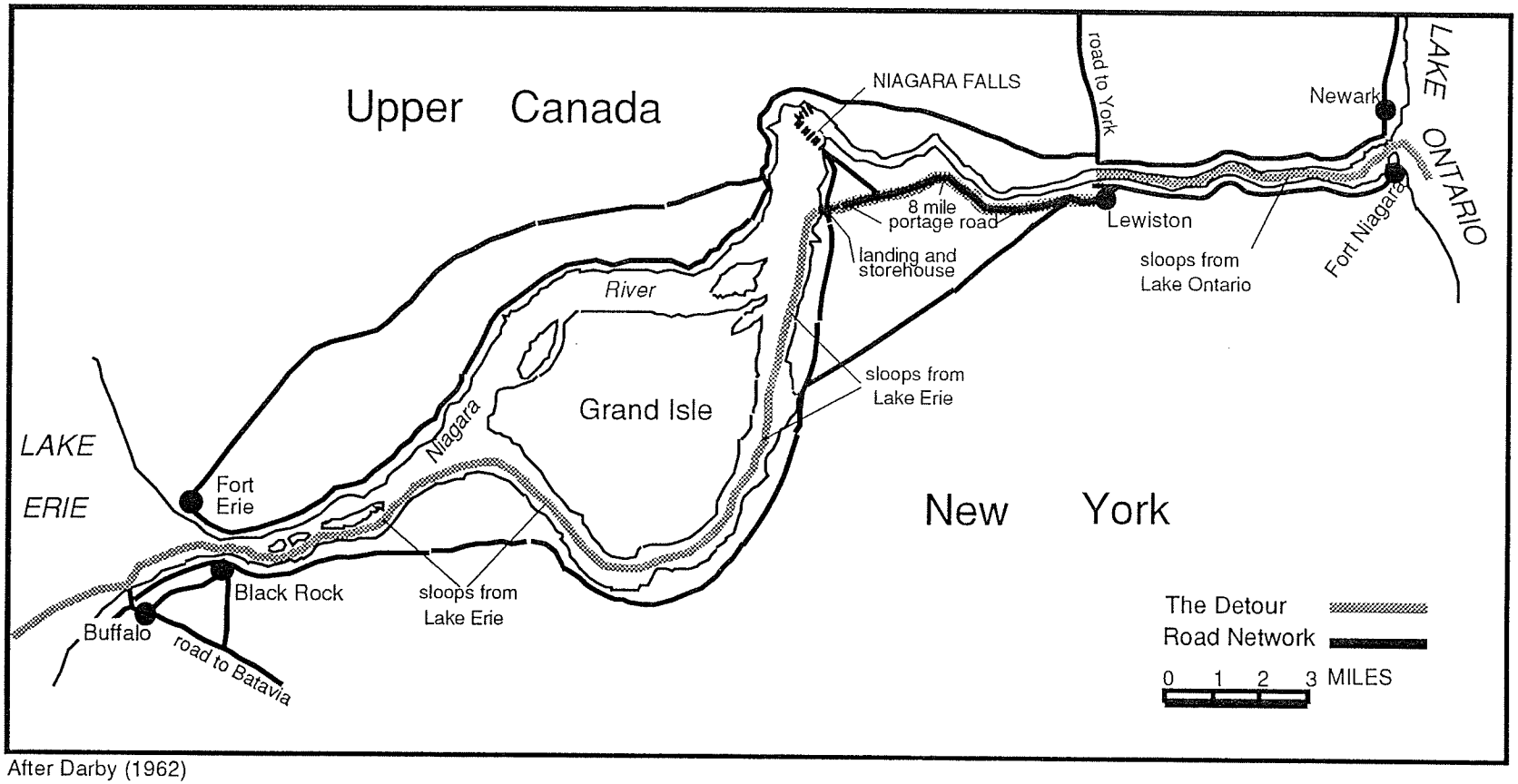
At Albany the traveller was confronted by a portage over a turnpike of some fifteen miles to Schenectady on the Mohawk, which Schultz estimated took one and one-half days. The portage was still to be dealt with nine years later, though one would suspect that the improvements to turnpikes being made in other parts of the eastern United States were duplicated on this stretch, and that this portion of the trip could have been completed in less than a day. From the town of Schenectady, the Mohawk River, Lake Oneida and the Oswego River brought Shultz by keelboat to Oswego, New York in about eight days. The importance of this route for navigation had long been recognized, and as early as the 1790's improvements had been made between Albany and Rome in order to increase navigability (Vance, 1986: 125). Unlike the Erie Canal, however, this route exited on Lake Ontario, and further travel was needed to enter Lake Erie.

After arriving at Oswego, Schultz journeyed for a further three days by "lake sailing boat" to Lewiston located on the Niagara River. Niagara Falls formed an impenetrable barrier to water travel, forcing him to portage around it. In 1807 Schultz walked seventeen miles from Lewiston to Black Rock (now a suburb of Buffalo) by road. This short detour took him a total of one and one-half days, since the road was merely a "mud road". By 1818, conditions had changed, as a rudimentary road network had been created on both sides of the border (Fig. 8). A contemporary map of the area shows a portage road of only eight miles between Lewiston and a landing/harbour just above the Falls (Darby, 1962). From the landing to Lake Erie the Niagara River was again navigable.

Black Rock (or Buffalo) was where Schultz parted company with those travelling to Detroit. For those continuing on to Detroit, the remainder of their journey was simply a matter of boarding one of the many schooners bound for that city. On August 23rd of 1818, a major innovation to that journey was instituted as the first steamship on the upper Lakes, the Walk-in-the-Water, departed Buffalo for Detroit (Darby, 1962: 173). Not only did this vessel cut travel time between these two cities down to thirty-six hours (Brown, 1948: 282), but it marked the institution of a regular, weekly traffic service between the two cities, a service much anticipated by the people of Detroit[4]. For the purposes of mapping the likely path of diffusion, however, this was not a factor. The initial outbreak, as noted above, occurred almost a week before the Walk-in-the-Water left Buffalo for the first time.I

f this particular ship was not involved, there were certainly ample running between the two cities to provide opportunity for transmission. The Detroit Gazette of 1818 reported the arrival of a large number of vessels from Buffalo throughout the summer and fall. Between May 14 and 22, the first schooners from the eastern end of Lake Erie arrived, one of which carried some

[4]This was a common theme in the Detroit Gazette during the period leading up to inaugural voyage of the Walk-in-the-Water.



After Darby (1962)

Figure 8: The Niagara Falls Detour in 1818

ninety passengers (Detroit Gazette: May 22, 1818: 2). On June 26th another schooner arrived from Buffalo with 115 troops and several passengers aboard (Detroit Gazette: June 26th, 1818: 2). Indicative of the frequent traffic was an advertisement in the March 6th edition of the Gazette. Charles Smyth of Albany offered to ship goods to Detroit or the upper Great Lakes at the rate of $4.50 per hundred weight.

William Darby, travelling from New York City to Detroit in 1818, left Buffalo on August 2 aboard the Zephyr and arrived at his destination on the 13th. His journey of some eleven days was, according to Darby, in excess of what was normal due to contrary weather conditions (1962: 172). He estimated a distance of some 290 miles (Ibid: Addendum IV), giving an average speed of just over one mile per hour. If we accept Schultz's journey of 172 miles between Oswego and Lewiston in three days as being a typical rate, east to west on the Lakes, an average speed of approximately 2.4 miles per hour was possible (Dunbar, 1968, Vol I: 334). This would suggest that the 290 miles between Buffalo and Detroit might have been done in about five days (Table 1).

Given Schultz's travel times and this estimate, the journey from New York City to Detroit might be conservatively estimated at about twenty days. What is more likely is that it required a somewhat shorter period in 1818 as improvements to the transportation infrastructure decreased the required travel time. Given this length of time, an individual infected in New York could possibly travel to Detroit before he or she ceased to be infectious. This does not take into account the possibility of transmission of the virus to another individual en route, something that was quite likely given the numbers travelling on the ships.

Trade was one reason for the heavy traffic between Detroit and the east. When he arrived in August of 1818, William Darby found a "place of extensive commerce" (1962: 190). Detroit's role as a "connecting link" between the settled east and the west (Brown, 1948: 280) made it a key transshipment point. Goods and personnel destined for the communities and garrisons of the upper Great Lakes, as well as the fur trade regions, passed through Detroit in almost a continuous stream when water navigation was possible (Brown, 1948: 283).

Another reason for the large number of ships was the flow of settlers into the west. According to Pritchett (1942: 243), after 1811, and especially after 1815, a heavy migration of settlers left the cities of the east destined for the western territories. While much of this was directed through the Ohio Valley, a portion was filtered through the Great Lakes. Thus, by 1818 Detroit had a large floating population of immigrants, fur traders, and Indians (Brown, 1948: 280). Many of these immigrants would have brought their families with them. It is most likely that the children of the immigrants carried the measles from the urban east, given the disease's likely endemic status in the major cities of the Atlantic seaboard. Since a sub-twenty-one day journey from New York was a definite possibility in 1818, and there was a flow of settlers to Detroit, the relocation of the virus to the west by the Great Lakes and through Detroit was the most likely path of diffusion. The first stage of this diffusion, from New York to Detroit, could have been accomplished by the relocation of a single family, and consequently there was no need for the continuous settlement required by contagious diffusion.

This situation runs counter to at least one later epidemic. According to Pyle (1969), the 1832 cholera epidemic diffused throughout the interior of North America along the major inland waterways, travelling from city to city in a hierarchical pattern of diffusion. The 1819-20 measles epidemic did not diffuse in the same way, probably for two reasons. Firstly, in 1818 the U.S. settlement network was largely aligned with the Atlantic coast. There was less access to the interior than noted by Pyle, due to an even more embryonic transportation network than in 1832 (Ibid: 59). In 1818, there were very few communities of any size along the major inland waterways. With few communities, there was little opportunity to pass the disease on to others, and thus extend the range of the epidemic. Secondly, and perhaps more importantly, most of the North American population was virgin soil for cholera in 1832. The disease had been first introduced to North America only in 1826, and it appears that it had to be reintroduced before the 1832 epidemic (Ibid: 61). A large body of susceptibles, located along the path of diffusion, meant that the disease could easily be passed on, with widespread diffusion the result. Conversely, the endemic nature of measles in coastal America meant that much of the adult population was

immune due to prior exposure. This suggests that there were probably relatively few opportunities to pass the disease on to other travellers, and that when diffusion occurred it had to be primarily through relocation diffusion, rather than through expansion diffusion.

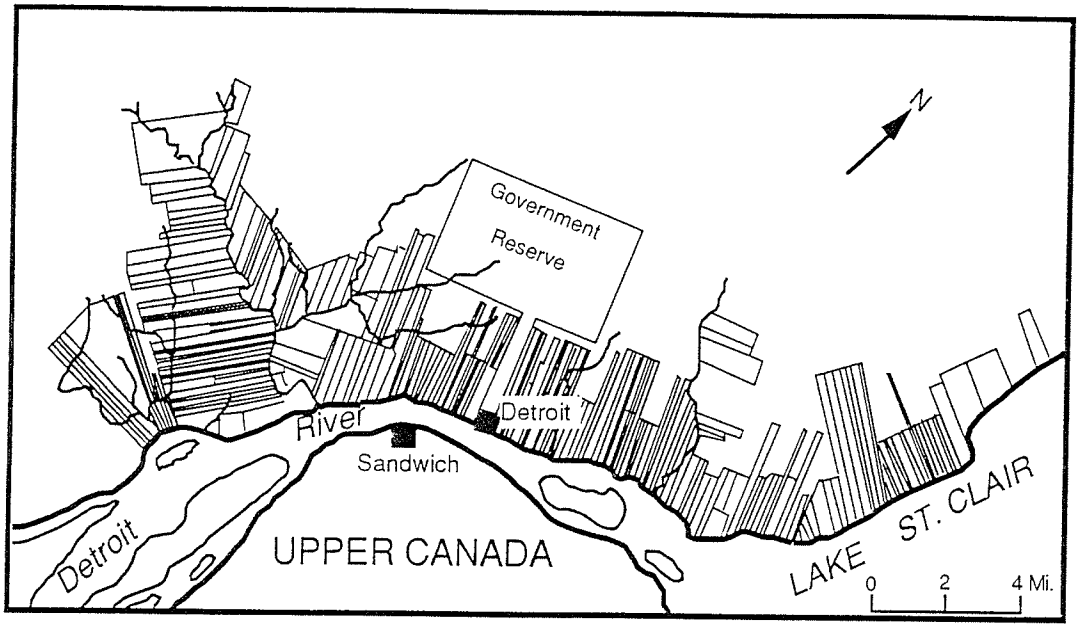
Detroit in 1818

Between the first outbreak of measles in August of 1818 at Michipicoten, and the initial stages of the epidemic in May of 1819, at Point Meuron, at the head of Lake Superior, and Brandon House, on the eastern Canadian plains, there is, seemingly, no mention of the disease. One possibility may be that the disease lingered through the fall and much of the winter. Dormancy, or the absolute lack of activity of the disease is, of course, impossible as the virus needs a continuous supply of susceptibles in order to maintain itself. With no non-human reservoir, a chain of human infection must be maintained, with retransmission taking place, at least as frequently as every twenty-one days (Cliff *et al.*, 1981: 43). In place of dormancy, however, the disease may simply fail to diffuse spatially. Given enough susceptibles in a given area under relatively dispersed conditions, measles may be maintained for an extended period of time. In the extreme, for instance, fifty susceptibles could maintain the virus for almost three years, given contact between progressive pairs (infected and susceptible) every twenty-one days. It is in this way that crowd diseases are supported endemically in large cities where the constant supply of births ensures that the supply of susceptibles is never exhausted. Under the proper conditions, a settlement in an epidemic area can act as a temporary reservoir, allowing the virus to be maintained while spatial expansion is curtailed. In 1818, Detroit was a strong candidate to act as a reservoir, if indeed the measles did persist there for a portion of the winter of 1818-19.

In 1818 the town of Detroit had a population of just over 1,100 (Detroit Gazette: Jan. 29, 1819). The total population of the region was much higher, however. According to Brown (1948: 276), "within a short distance of the Detroit River lived most of the Territory's 9,000 people." Additionally, there was Fort Shelby, the local military garrison just outside the city (Brown, Ibid: 279). Much of the population living outside the town was comprised of French farmers

descended from the original residents from the days of French rule. Typical of much of French settlement in North America, their lands were arrayed along the waterfront in the longlot system, rather than the concentrated villages more typical of Anglo-American settlement. From the River Rouge to Lake St. Clair, a distance of some twelve miles, "the river front resembled the suburbs of a large town, the houses being no more than 20 rods apart" (Brown, Ibid: 279) (Fig. 9). Since most of these people had been born in the area (given that French rule in Michigan had passed in the mid-18th century), it is fairly safe to assume that they would have had no experience with the measles. Here then was an ideal reservoir for a delayed diffusion of the epidemic.

Day to day communication in these longlot settlements might be directed, not to a central place, but in a linear pattern to one's neighbours. Once introduced, especially in winter, the disease would probably not have exhibited the rapid exhaustion of susceptibles typical of virgin soil conditions, but the slower diffusion of endemic situations. Opportunities for infecting others by those living outside the town would probably have been limited due to a lack of central contact, and therefore a slower rate of diffusion would be the result. Within the town a different situation prevailed. Here much of the adult population originated in the east (Brown, 1948: 279). For most of them, their status was one of immunity due to prior exposure, given endemicity in the more populated areas. There were also, however, a number of children, many of whom likely never had had the measles. At the end of 1818 this included some 295 children under the age of ten (Table 2). Opportunities for transmission among these children were present, despite Detroit's status as a frontier town. One of these was the Lancasterian School which, in the fall of 1818, had a total of 180 pupils, many of them of French descent but born in the area (Detroit Gazette: Nov. 6, 1818). It would seem, then, that Detroit and environs could have played a role in carrying over the epidemic until the next spring, possibly not within the city, but along the river-based lots. The combination of a large supply of susceptibles and the longlot settlement pattern provided the potential for a "slow" diffusion with the appearance of "dormancy".



Source Brown (1948: 278)

Figure 9: Longlot Settlement in Early-Nineteenth Century Detroit

Table 2: The Population of Detroit in 1818

AGE GROUP	MALES	FEMALES
0-9	139	156
10-15	86	68
16-25	177	119
26-44	152	70
45+	42	31
Total=	596	444

Source: Detroit Gazette, Jan.29, 1819

Entry Points Into the Northwest

Discussion of a period of delayed diffusion in Detroit, although compelling, is speculative. There is no evidence that the delay in westward diffusion of the disease over the winter of 1818-

19 was due to a prolonged stay in Detroit. Neither, however, is there any evidence of diffusion[5]. The intervening progress (or lack thereof) must therefore be deduced from other evidence. The best clue would be from the entry points into the Northwest[6].

Decker (1989) considered a number of potential points of entry of the measles onto the Plains. Although not conclusive in her mind, she suggested that there was evidence that the disease diffused by a number of routes: from the Mandan villages on the upper Missouri to theSelkirk Settlement via the settlers returning from the south; from the same villages directly into the area west of Lake Manitoba; from the Sioux to the Ojibwa of the Rainy Lake-Lake of the Woods region; and from the NWC brigades to the east shore of Lake Winnipeg (Decker: 147 Fig. 3.18). While her research was not decisive in establishing any one route, additional evidence seems to mitigate against entry by way of the Sioux or directly through the Red River Settlement.

Diffusion from the Sioux

This path would seem to offer a direct route from Lake Huron to the Northwest. Following 1816, Mackinac Island (Michilimackinac) (Fig.11) at the north end of Lake Huron was the main entrepôt for the AFC. Every summer men and goods were dispatched to the western fur trade. From there, the AFC traders left to winter at one of the company's posts within a large territory which included much of the American Midwest[7]. One of the major AFC posts was at Lake Traverse (Lac Travers of the HBC) near the headwaters of the St. Peter's River (now Minnesota R.) (Brown, 1948: 248), a major area of Sioux settlement (Fig.11). It is entirely conceivable that, late in

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[5]There probably is evidence either way, somewhere, but logistical constraints do not allow me to consult the likely archival repositories in the United States.

[6]Decker (1989) and others have used the term "Origins". While correct in the sense that they may discern the origin within the study area, the term "Entry Point" better conveys the population movement that must occur if these virgin soil epidemics are to develop. Origin better describes those areas where the disease is endemic.

[7]This was described in 1820:

> They (the AFC) have about 300 men in their employment who come to Mackinac in the spring with the fur collected during the winter, where they stay from one to three months, when they receive another assortment of [trading] goods and proceed to their wintering grounds (Brown, 1948: 175).

This seasonal ebb and flow of goods was characteristic of all of the major fur-trading companies.

the summer of 1818, the measles virus was carried from Lake Huron by AFC employees and introduced among the Sioux living along the St. Peter's. It could then have diffused through their affiliated bands until the spring of 1819.

This possibility is strengthened by historical evidence for the presence of the disease, both at Lake Traverse and at the juncture of the St. Peter's with the Mississippi. Tanner (1987, map 32: 169) has dated these outbreaks to 1818-19, in her map documenting disease episodes among the native peoples of the Great Lakes. This information was probably based on the Dakota, or Sioux, winter counts published by Mallery (1882-3). These counts were pictorial representations of the year's most important event. Several years' counts were recorded on a single hide, and each was associated with a descriptive phrase. Together they served as an aide-mémoire to recall the particular event. There was no single winter count recorded by the tribe

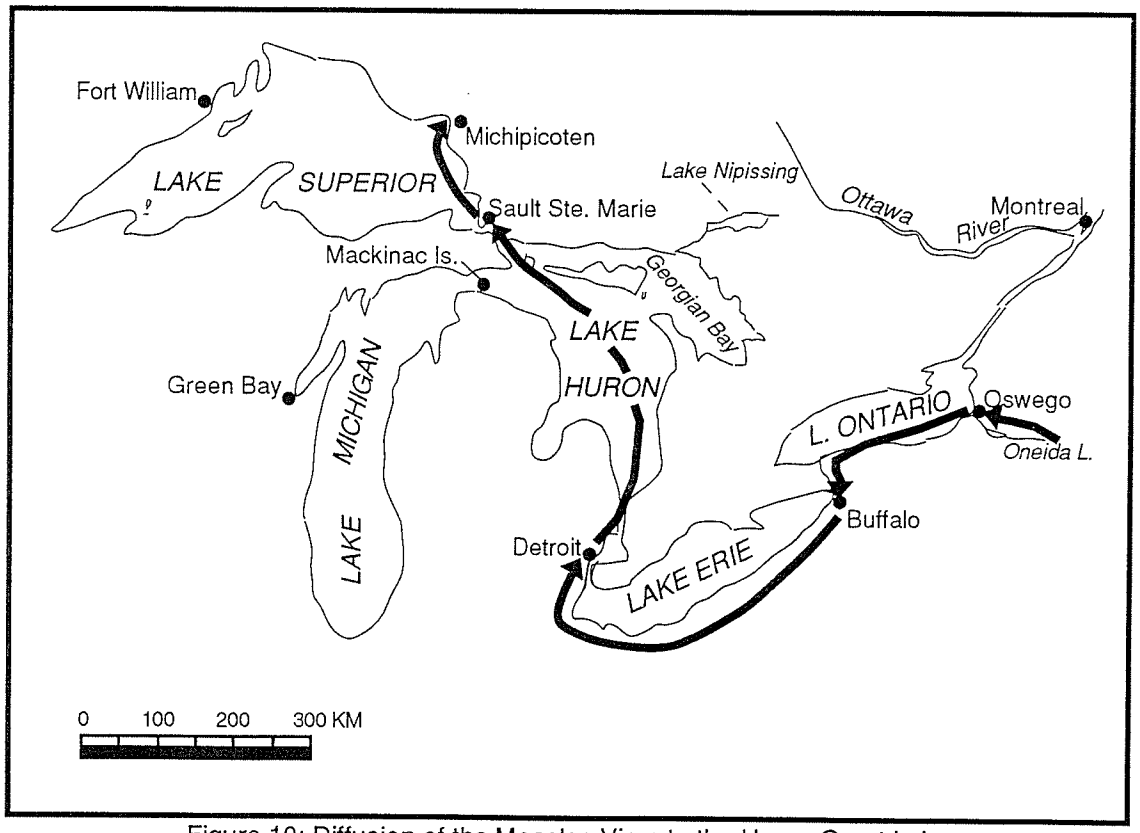

Figure 10: Diffusion of the Measles Virus to the Upper Great Lakes

This path would seem to offer a direct route from Lake Huron to the Northwest. Following 1816, Mackinac Island (Michilimackinac) (Fig.11) at the north end of Lake Huron was the main entrepôt for the AFC. Every summer men and goods were dispatched to the western fur trade. From there, the AFC traders left to winter at one of the company's posts within a large territory which included much of the American Midwest[8]. One of the major AFC posts was at Lake Traverse (Lac Travers of the HBC) near the headwaters of the St. Peter's River (now Minnesota R.) (Brown, 1948: 248). This was a major area of Sioux settlement (Fig.11). It is entirely conceivable that, late in the summer of 1818, the measles virus was carried from Lake Huron by AFC employees and introduced among the Sioux living along the St. Peter's. It could then have diffused through their affiliated bands until the spring of 1819.

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[8]This was described in 1820:

> They (the AFC) have about 300 men in their employment who come to Mackinac in the spring with the fur collected during the winter, where they stay from one to three months, when they receive another assortment of [trading] goods and proceed to their wintering grounds (Brown, 1948: 175).

This seasonal ebb and flow of goods was characteristic of all of the major fur-trading companies.

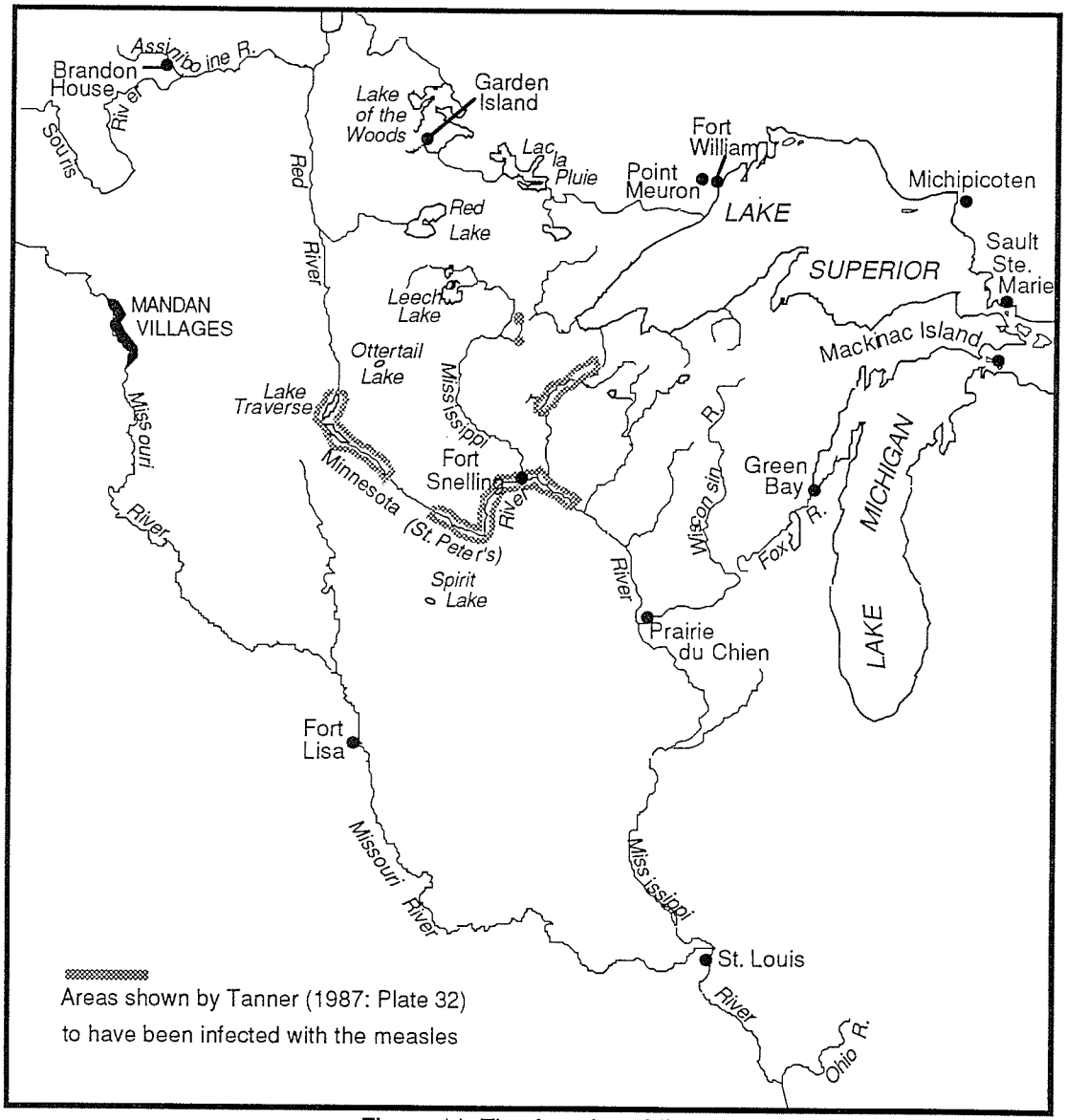
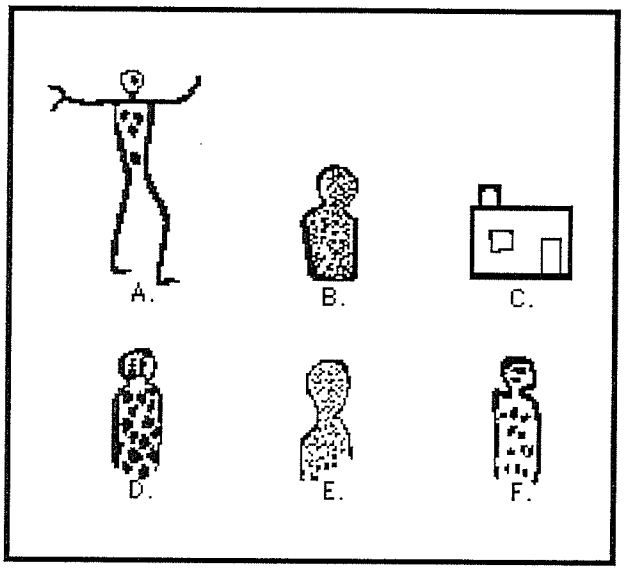


Figure 11: The American Midwest



Source: Mallery (1882: 110, 111, 137)

Figure 12: Dakota Sioux Winter Counts for 1818-19

Decker (1989: 94) claimed that this evidence indicates a diffusion from the Sioux to the Ojibwa, stating that "Taylor...has unearthed numerous primary sources indicating that the Sioux...were struck with measles...from 1819-20." Taylor's sources (1977) were winter counts as well, and it is obvious that these people were afflicted by the measles epidemic. The precise timing of this affliction, however, cannot be established from the winter counts. According to Howard (1960: 339), the counts refer not to the season, but to the single most significant event of the year. Thus, "many of the events in a Dakota "winter" count actually took place during the spring, summer, and fall" (Ibid: 339). On the basis of this evidence, the epidemic could have taken place at any time throughout much of 1818 and 1819.

John Tanner, a white American captured as a boy in Kentucky and raised by a band of Ottawa and Ojibwa Indians, was living at Lake of the Woods when the measles epidemic was raging in this region. He left an account of its effects upon his family and the local Indian population. However, neither he nor his editor, Edwin James, provided many precise dates, or

even the years of events recounted in Tanner's memoirs. It is therefore necessary to estimate the dates of events by their relation to other occurrences, the dates of which are known. Decker (1989) suggested that Tanner was referring to the spring of 1819 as the time of the epidemic. This is significant in that a spring epidemic at Lake of the Woods would support her thesis that the measles diffused from the Sioux to the Ojibwa through spring warfare, and then from the Ojibwa to the north and west (Ibid: 95). It would seem, however, that Tanner arrived at Garden Island[9] in Lake of the Woods in late summer[10]. This suggests that a springtime diffusion through inter-ethnic warfare was unlikely.

Other evidence points to a later introduction of the measles among the Sioux. Edwin James[11] was the recorder of the Stephen H. Long expedition from Pittsburgh to the Rockies via the Missouri River. While in the winter encampment at Fort Lisa (present-day Omaha, Nebraska) he was apprised of the disease among the Indians living to the north.

> Mr. Fontenelle, in the employ of the Missouri Fur Company...called to-day on his return [Jan. 6th, 1820]...He met with some of the nation of the Sioux, called Gens de Feuille by the French. They have been much thinned in numbers by a disorder, which, from the description given of it, may be quinsy[12]. This same band is said to have suffered much from the small-pox [actually measles] last autumn (James, 1825: 169).

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[9]Tanner used the Ojibwa name, Me-naw-zhe-tau-naung (James, 1830: 255), also known as Garden Island or Plantation Island. This was a major Indian agricultural centre (Moodie and Kaye, 1986).

[10]The "calculation" of the time is a rather complex undertaking. Tanner reported that he went from Chicago to Mackinac by a "vessel" (James, 1830: 254). Shipboard navigation on the upper Great Lakes likely began in early April, if 1818 was typical (Detroit Gazette, April 17, 1818). It took him ten days to get to Michilimackinac, followed by a trip to Drummond's Island and then on to Sault Ste. Marie (Fig. 11). There he remained two to three months while the NWC ship passed three times, going to Fort William (James, 1830: 254). Tanner was then forced to travel to Fort William by canoe. A conservative estimate from Chicago to Fort William, then, would be about three months placing him at Fort William in early July at the earliest. It would seem, however, that he was not at Fort William, the NWC fort, but at the nearby HBC post Point Meuron. Tanner mentions leaving some goods with "...Mr. Giarson, who was there to take care of some property of the Hudson's Bay people" (Ibid: 254). At that time Charles Giasson was in charge of Point Meuron, and it is probable that after several years Tanner had simply misspelled his name. Tanner was joined there by Colonel Dickson (who had forced him to not take the NWC ship from the Sault, and had subsequently abandoned Tanner on the canoe trip to Point Meuron). According to HBC records Dickson was at Point Meuron between August 12th and August 18th, 1819 (HBCA, B.231/a/5: fo.s 5d, 6d). Tanner, then, was at Point Meuron at that time before departing for Lake of the Woods. A canoe trip to Lac La Pluie took approximately ten days (Lytwyn, 1987), with perhaps an additional day to Garden Island. This time-frame places Tanner arrival at Lake of the Woods on or after August 23rd, and not in the spring.

[11]The same man who edited Tanner's memoirs.

[12]Peritonsillar abscess (Miller and Keane, 1983: 949). He was possibly referring to the whooping cough.

The band was said to be heading for "Min-da-wa-cong, or Medicine lake (on the maps, Spirit lake)" (Fig.11). In his annotations, editor Reuben Gold Thwaites incorrectly identified the band. He noted that "The Gens de Feuilles (people of the Leaves) were the Assiniboin tribe of the Sioux family" (James, 1905: 275, f.n. 197). Fontenelle, however, had described them as of the Sioux nation. The Assiniboine, once a part of the Sioux nation but having long since split off, were in 1820 a very separate group and the enemies of the Sioux. They were commonly referred to as the Assiniboine or Stone Indians and it is probable that had Fontenelle been speaking of them he would have used one of those names[13]. Thwaites probably mistook Fontenelle's Sioux for the Gens de Filles (We che ap pe nah) an Assiniboine division (Ewers, 1961: 79). The Gens de Feuille were likely the People of the Leaves (Wahkpatoan) a branch of the Sioux who generally hunted near Otter Tail Lake, just to the northeast of Lake Traverse (Fig.11) (Keating, 1959: 394, 403).

The fact that they were of the Sioux would explain why they were heading for Dickinson county in northeastern Iowa (James, 1905: 275, f.n.198). It is very unlikely that an Assiniboine band, suffering from sickness and starvation, would head for Sioux territory, given the common warfare between the two. It is interesting to note that Taylor (1977: 80) did not note the error and considered the statement to be evidence of the epidemic among the Assiniboine[14]. In reality it suggests that the measles spread to the Sioux living in present-day Minnesota in the fall of 1819[15]. The bulk of the evidence, then, points not to an initial diffusion through the Sioux, but to some other route.

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[13]The Assiniboine were called Hoha or "revolted" by the Sioux. This was in reference to their break with the Sioux nation.

[14]There is, as we shall see, other evidence placing the measles among the Assiniboine.

[15]It eventually spread to the Southern Ojibwa of Minnesota. One of William Warren's informants told him in 1850 that:

> about thirty years ago [1820] the Ojibwas were, many of them, destroyed by the measles, or the "great red skin", as they termed it, on the St. Croix; whole communities and families were entirely cut off, and the old traders affirm that at least one-third of the "Rice-Makers", or St. Croix Indians, disappeared under the virulence of this pestilence. Other portions of the tribe did not suffer so much, though some villages, especially that of Sandy Lake, became nearly depopulated (Warren, 1984: 335).

See Fig. 11 for those locations. Given the retrospective nature of this account, the year cannot be relied upon, exactly. Note the variation in impact, even within a single tribal group.

Diffusion through the Selkirk Settlement

However the disease diffused, it is certain that the Selkirk Settlement suffered from the measles through much of the summer of 1819. Decker has suggested that the colonists played a key role in transporting the virus from the south (1989: 91). Due to problems with locusts during the summer of 1818, a number of the settlers spent the winter of 1818-19 at the settlement of Pembina, farther up the Red River. They were forced there by the inadequacies of their agricultural food reserves, and therefore participated in the annual plains bison hunt, beforew returning to the Selkirk Settlement in the spring. Decker speculated that the colonists may have been infected during their southern stay, or on the journey home (1989: 92). There is little chance of this having occurred, however, as there was no opportunity for infection, either on the at Pembina or on the return journey There is no indication that any residing at Pembina had contact with the Mandan who were infected, and the Sioux who lived nearby would not contract the disease until the fall of 1819. At that time, there was no other local source of infection present in the Red River valley to the south of the colony. Additionally, it would seem that the settlers were healthy when they returned. The first mention of the measles in the colony is not until July 10 (HBCA, B.51/a/2: fo.8), long after the party had returned[16]. Had they been responsible, almost certainly there would have been reports of the disease in the Selkirk Settlement long before July 10th. It is, therefore, highly unlikely that it was this party which brought the disease to the settlement, and from there into the Canadian Northwest.

Certain NWC personnel attempted to implicate the colony in the spread of this disease, both in company reports, and by circulating rumours among the Indians. This is understandable, as the Selkirk Settlement represented a direct challenge to the NWC's provisioning lines, and

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[16]Although the measles was common in the colony that summer, Fidler's journal indicates that, among the settlers, few but the children suffered (see HBCA, B.51/a/2, fo.11). Father Joseph Provencher, the recently arrived Roman Catholic priest in the settlement, wrote to Bishop Plessis verifying this point. "The whooping cough and measles have reigned here this summer, and have taken a number of children" (Nute, 1942: 242). If this was correct, it suggests that adult Europeans were generally immune to the measles due to prior exposure, unlike the children and those born in the Northwest (at that time only Indians and Mixed Bloods). See "Corporate Ethnicity and Diffusion Potential", below Chapter 4.

therefore threatened the company's very existence (Peers, 1988: 113) Chief among the accusers was Willard Ferdinand Wentzel, a long-time NWC clerk stationed at Great Slave Lake in 1819-20. He wrote to NWC partner Roderick McKenzie:

> These Colonists imported with them the measles and chincough...so that it would seem as if Governor Semple, as he was styled, from a presage of what might happen, had prophesied this melancholy accident, when he wrote to Mr. Alexander MacDonnell at Qu'appelle, in 1816, that "he possessed means to make his power felt, the shock of which should reach from Montréal to Athabaska" (Masson, 1889, Vol.I: 130).

Supposedly, these were 40 "German" colonists who arrived at York Factory aboard the HBC's ship, the Prince of Wales. Decker (1989: 91) has pointed out that the statement was false, as the ship, and the colonists, arrived in late August, after the epidemic had started. Wentzel's motive for writing this to a NWC partner may have had something to do with his having failed to rise above the post of clerk and a desire to curry favour in order to do so[17]. Despite this accusation, then, there is no evidence that the measles was channeled into the Canadian Northwest through the Selkirk Settlement. The settlement's role in the 1819-20 measles epidemic was not as a point of entry for the measles into the Canadian Northwest, but as a point of redistribution. It was the misfortune of those living in and around the settlement to have had the disease transmitted to them from the Mandan via Brandon House.

Diffusion From the Mandan

It was generally accepted by employees of the HBC that both the measles and whooping cough diffused from the Mandan of the upper Missouri. In the summer of 1820, Governor Williams wrote to the Governor and Committee in London. He stated that

> The disease has been introduced from some of the American out posts on the River Missouri, and first shewed themselves at the Mandan villages and has from them spread all over the country like contagions with a rapidity almost beyond belief (HBCA, D.1/2: fo.11d).

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[17]His almost triumphant tone and use of the epidemic in an attempt to garnish favour is sadly ironic, as he was to die in a cholera epidemic in 1832 (Wallace, 1934: 505).

Peter Fidler, a highly reliable recorder, wrote in June of 1819 that "Grant + party brot it from the Mandans last month when they visited them" (HBCA, B.51/a/2: fo.6d). It was through this trip to the Mandan, then, that the measles was brought to Brandon House.

The Mandan were especially vulnerable to epidemic attack. Their location on the upper Missouri was a key one in terms of transportation. They were heavily involved in the horse trade, acting as middleman between the tribes of the southern plains and those of the north (Ewers, 1970: 2), as well as trading with white traders and especially the NWC, the HBC, and the Missouri Fur Company. This gave them numerous potential sources for epidemic disease through a very widespread trading network. As well, they were sedentary and agricultural, cultivating a number of foods including the major Indian staples of corn, beans, and squash, and living in villages that were easy to locate and frequently visited (Will and Spinden, 1967: 94)[18]. The Mandan were therefore frequently hit with severe epidemics.

The Mandan played a key role in the diffusion of two of the most severe smallpox epidemics on the plains. In 1780, smallpox was brought to them by horse traders from the Southern Plains and was diffused via the Mandan's extensive trade links throughout much of the Northern Plains. In 1836, the disease was brought to them from St. Louis via the AFC ship the St. Peter's, and again diffused through much of the territory to the north of them. In both cases, the Mandan experienced heavy mortality, and after the latter episode they were forced to join with their neighbours, the Arikaras (Will and Spinden, 1967: 100-101)[19]. In 1819 it would seem that they were hit for the first time by the measles, and possibly also the whooping cough.

Other than the statements by Fidler and Williams, concrete evidence of the measles among the Mandan is limited. Most significant is the experience of a large party of Assiniboine warriors who went to make war on the Mandan in the summer of 1819. They began collecting in

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[18]Ewers (1973: 111) has suggested that the greatest losses among plains groups during these virgin soil epidemics occurred among the more sedentary peoples.

[19]See Ray (1974; 1975); Decker (1988; 1989); and Dollar (1977) for more on these epidemics.

early April (HBCA, B.27/a/8: fo.31) and headed south in June. On June 4th Fidler wrote "60 tents of Stone Inds are going to war against the Mandans..." (HBCA, B.51/a/2: fo.4). On August 27th Fidler noted the return of what remained of the party. "...Only 7 returned, all died by the way, on their return supposed by the indians to be Smallpox" (Ibid: fo.13). They were referring to the measles, which can easily be mistaken for smallpox by someone unfamiliar with the disease.

The diffusion to Brandon House occurred sometime before this event. On November 28, 1818 a large group of HBC traders left to trade with the Mandan, led by a man named Archibald MacDonald. At that time there was no mention of disease among the Mandan villages but "they learned from the Mandan that the nearest American was 300 miles below but that the next spring they were intended to go up [the Missouri River] and settle at the Mandan villages" (HBCA, B.22/a/21: fo.40). Here the Mandan were probably referring to the employees of the Missouri Fur Company, whose headquarters was downstream on the Missouri, at Fort Lisa (present-day Omaha, Nebraska).

If it was this company that brought the measles to the Mandan, and the timing and Governor Williams' statement are strong evidence that this was the case, then some sort of delaying mechanism along with a complex path of diffusion combined to bring the virus from northern Lake Huron to the upper Missouri over a span of perhaps eight months. As earlier suggested, the most likely possibility is that Detroit acted as a reservoir for several months. Pritchett (1942: 245) stated that "on February 10, 1819, Lieutenant Colonel Henry Leavenworth was ordered with troops from Detroit by way of Green Bay and Prairie du Chien to establish a military post at the mouth of the St. Peter's." This post, Fort Snelling, (present-day St. Paul, Minn.) would be completed later in 1819 but a preliminary force was sent out to begin construction (Fig.11). Those troops could have provided a body to carry the virus from Detroit to perhaps either Green Bay or Prairie du Chien. Like Detroit, both of these had populations descended from fur traders of the French Regime who had the potential to act as a reservoir for the measles[20].

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[20]Another possibility was through the AFC. According to Brown (1948; 298), the three principal routes of the AFC were: along the St. Louis River from the Fond du Lac (on Lake Superior) west via the Savanna River into Sandy Lake (posts at Fond du Lac and Sandy Lake); Green Bay to the Fox River, through Lake

From there, it could have been carried downstream to St. Louis, the collecting point for the furs from the American Great Plains (Wishart, 1979: 106). A brigade of traders would then be required to transport the disease to the upper Missouri, possibly in March, or early April.

While the path to the upper Missouri is unclear, subsequent events and timing are more apparent. The Grant referred to by Fidler as having carried the disease to Brandon House from the Mandan was an Ojibwa called Captain Grant or Oo ke mow es cum. He was originally from the Severn River area, but had established a small agricultural settlement on the Assiniboine River in 1815, at a place called the Half Way Bank located between Brandon House and Portage la Prairie. The settlement was termed Grant's Village and, besides Grant, six or eight others lived there. They had "two houses built in the European manner", a few tents, all enclosed by pickets, and a healthy garden (Moodie and Kaye, 1986: 175; HBCA, B.51/e/1: fo.18d). The purpose of his visit was as likely an attempt to ensure peace as to trade, especially given the reports of hostilities circulating at the time. Peter Fidler, at Brandon House, noted Grant's departure on April 22nd. He wrote: "Captain Grant + 15 Bungees [Ojibwa] gone to the Mandans as friends" (HBCA, B.22/a/21: fo.51)[21]. Presumably Grant was among the party which had traded at Brandon House on October 7th, 1818. Fidler wrote then that "4 Indians came in with Dry Provisions Traded and they went away. They speak of going soon to the Mandan villages to purchase horses, as they are friend" (HBCA, B.22/a/21: fo.34). It would appear that Grant had not returned to the vicinity of Brandon House before Fidler's departure for Fort Douglas in mid-May, although Fidler later wrote that the Grant party returned sometime in May (HBCA, B.51/a/2: fo.6d). Since the journey from the Mandan to Brandon House could be accomplished in as little as eight days (B.22/a/21: fo.40), the journey was within the virus' incubation period, and could therefore be transported by one

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Winnebago to the Wisconsin and into the Mississippi River (posts at Green Bay and Prairie du Chien); and up the Mississippi River to the Minnesota, and over to the Red. The post in this area was very close to Lake Traverse. There is conclusive evidence of the presence of the measles in the vicinity of routes one and three (Fig.11).

[21]Brandon House was located six miles west of the mouth of the Souris River on the Assiniboine. At least one researcher has confused Captain Grant with Cuthbert Grant. Decker (1989: 91) wrote "The 'Grant' Fidler speaks of was Cuthbert Grant...". This confusion is understandable. Grant, a NWC employee, was a key figure in the Red River area. He had been tried and acquitted on charges stemming from his participation in the 1816 Seven Oaks Massacre (MacLeod and Morton, 1963). Conversely, Captain Grant is an almost totally unknown figure.

seemingly healthy man. At some point in time, the infected Ojibwa made contact with the HBC post at Brandon. This may have taken place on the return from the south or, more likely, after the disease had begun to appear among Grant's people, perhaps as they were seeking aid. In either case, the disease had spread to Brandon House by late June. On June 27th Fidler, by that time at the Red River Settlement[22], wrote that

> the colony men came from Brandon Ho. where they were left by Mr. Laidlaw enclosing the Ground- most of our people at Brandon badly with the Whooping Cough + Measles - as also the Indians - 5 Crees + 4 Stone [Assiniboine] Indians already dead of it (HBCA, B.51/a/2: fo.7).

One day later he recorded that "several people [are] bad with the chincough [whooping cough]" (Ibid: fo.7). By July 10th a number of his own children and others were ill with the measles. "Sally, Andrew, Alban + Polly all bad with the measles - Mr. Harrison's daughter died 17 years old + 1 Indian" (HBCA, B.51/a/2: fo.8). A period of thirteen days had elapsed between the arrival of the people from Brandon and the first reports of the measles in the Selkirk Colony, long enough for transmission to occur and the rash to develop. From that point on, and throughout the summer, the colonists' children and the native population of the area suffered greatly from both diseases.

Diffusion Through Fort William

There was a second point of entry of the measles into the Canadian Northwest. This was through the NWC depot of Fort William on Lake Superior (Fig.11). In August of 1820, Peter Fidler wrote that the diseases had been "introduced last spring 12 month from the Grand Depot of theirs [the NWC] on Lake Superior..." (HBCA, A.10/2: fo.242). Fort William was the palisaded fort where that company conducted its annual spring gathering to exchange goods, and to collect the winter's fur returns. Inside during the annual spring gathering, were the elite and important men,

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[22]It would appear that Decker (1989: 91, 93) mistook Fidler's location, probably due to the Journal's title which referred to Dauphin, and was confused as to the diffusion of the disease from Brandon House to the Colony. She wrote "according to Peter Fidler who wrote in his journal on June 27, 1819 at Fort Dauphin...". Fidler spent the summer at Fort Douglas (next to the settlement) and did not depart for Dauphin until September 27th.

including the wintering partners, and outside were the lesser employees, the Indians, and the Freemen (Davidson, 1967: 238). At this entrepôt, the brigades from Lachine met those from the territory of the fur trade, starting in early May (Morse, 1971: 20).

The HBC maintained a post nearby on the Kaministiquia River called Point Meuron. This post was little more than a way station for those travelling from Montreal to points further west (Alwin, 1978: 410). Definitive evidence of the measles at that place appeared in late May. An HBC carpenter by the name of Antoine Pacquette began complaining of illness on April 23rd, 1819 (HBCA, B.231/a/4: fo.25)[23]. Nearly a month later, on May 21st, Post Master Charles Giasson wrote "Pacquette gets worse and I am afraid his disorder is of a serious nature as **Livid spots** [emphasis mine] are breaking out in different parts of his body" (Ibid: fo.27d). Despite the rather lengthy illness, there is little doubt that he was suffering from the measles. In all probability he was afflicted with some disorder prior to contracting the disease, or its course was in some way altered by his nutritional state or some such factor.

During the period when infection was most likely to have occurred, there was no one at the post who could have given him the disease. Periodically, however, Pacquette would visit one of his friends (also a carpenter) employed at Fort William. For instance, Giasson noted in January that "this afternoon Pacquette + Girard asked my leave to go to the Free Men[']s Houses opposite Fort William" (Ibid: fo.18). While there is no mention of a visit during the critical period, frequently Giasson would neglect to detail the men's activities on Sundays. It was probably on a Sunday visit to the fort, then, that Pacquette became infected.

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[23]Pacquette's origin is unknown. He may have been employed previously by the NWC as he was familiar with some of the men at Fort William. There is no record of Point Meuron's employees among the Company's records for 1818-19 (HBCA, A.30/16) nor is his contract on file (HBCA, A.32/19, 49). Sprague and Frye (1983: Table 1) list two men named Antoin Pacquet as having lived in the Red River Settlement. One was born in 1762, one in 1784 (in Canada). If either, it was more likely the latter who was this Pacquette. The former would have been 58 years old in 1820, a rather advanced age to be actively engaged in the fur trade, though by no means impossible, especially for a carpenter who would probably not have been subjected to the physical exertions of long distance travel.

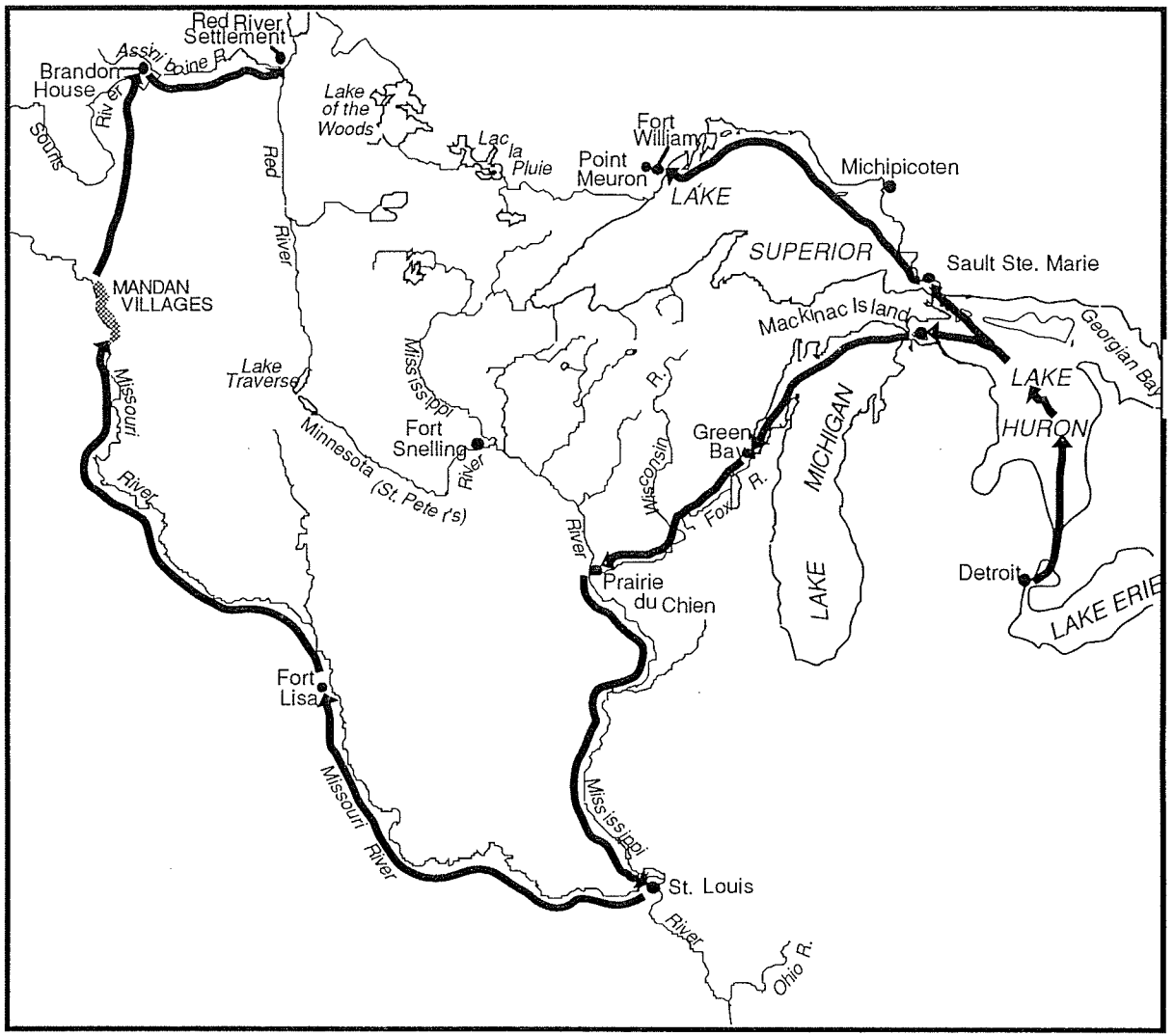

Figure 13: Entry Points of the Measles Virus into the Canadian Northwest

On June 6th he remained ill and Giasson "sent him with Two Men and a note to Dr. McLaughlin[24] desiring his admittance into their hospital" (Ibid: fo.28). In all probability, Pacquette was no longer communicable, and therefore could not have passed the disease on to those at Fort William. Thus the measles diffused from the NWC fort to Pacquette, and not vice-versa. This timing suggests that the measles entered Fort William in May. A likely scenario would have had the virus being maintained in Detroit through the winter until water-based traffic again became possible. Once Lake Superior opened up, the NWC's own ship could easily have transported the virus to Sault Ste. Marie and then to Thunder Bay. In any case, by August of 1819, the disease had made significant inroads into the Petit Nord (HBCA, B.155/a/32: fo.5).

It is apparent that the virus which started the 1819-20 measles epidemic did not sweep into the Northwest from its area of origin along the broad front that characterizes contagious diffusion. Instead, the virus was carried along a complex of diffusion pathways. The epidemic originated in the most highly urbanized area of the coastal U.S., where the measles existed endemically. This was an agglomeration comprised of three cities, Philadelphia, New York, and Baltimore, where the population was sufficient for the virus to maintain itself by circulating among the constantly replenished supply of susceptibles. From there, it entered a second spatial sphere of relatively isolated, smaller, communities, wherein it was carried by migrating settler families to the northwestern limits of the American settlement frontier, and in particular to Detroit in 1818. Finally, the measles virus was channelled along the transportation routeways of the fur trade. Within this framework, the virus diffused along two different paths, one simple and one complex, which led to the Canadian Northwest. The simpler of the two brought the virus from Lake Huron to Fort William on Lake Superior, probably via the NWC's ships. From Fort William the measles was then diffused throughout the Petit Nord. The more complex route was from Lake Huron to the Mandan of the upper Missouri. It is most probable that Detroit acted as a temporary pool,

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[24]Dr. John McLaughlin was the doctor at Fort William for many years up until the merger in 1821 (Campbell, 1976: 86).

maintaining the virus prior to the epidemic resuming its westward movement in the late winter or early spring of 1819. At that time, it could have been carried from Lake Huron, across Lake Superior to the Mississippi, and downriver to St. Louis. Infected employees of the Missouri Fur Company then could have transmitted the disease to the Mandan, with whom they went to trade. In turn, the Mandan passed the measles virus on to a visiting group of Ojibwa, who brought the disease back to the Assiniboine River with them. This complex path of diffusion is indicative of the obstacles that hitherto had isolated the Canadian Northwest from the disease pools in the more heavily populated regions of the northeastern U.S. It would not be until the settlement frontier came into closer contact with the aboriginal populations of the west that epidemics would become a frequent, almost yearly, event. The measles epidemic of 1818-19 was thus a harbinger of the waves of pestilence which would plague the Indian people of the Canadian Northwest for the remainder of the nineteenth century.

CHAPTER 4: THE PETIT NORD ON THE EVE OF THE 1819-20 MEASLES EPIDEMIC

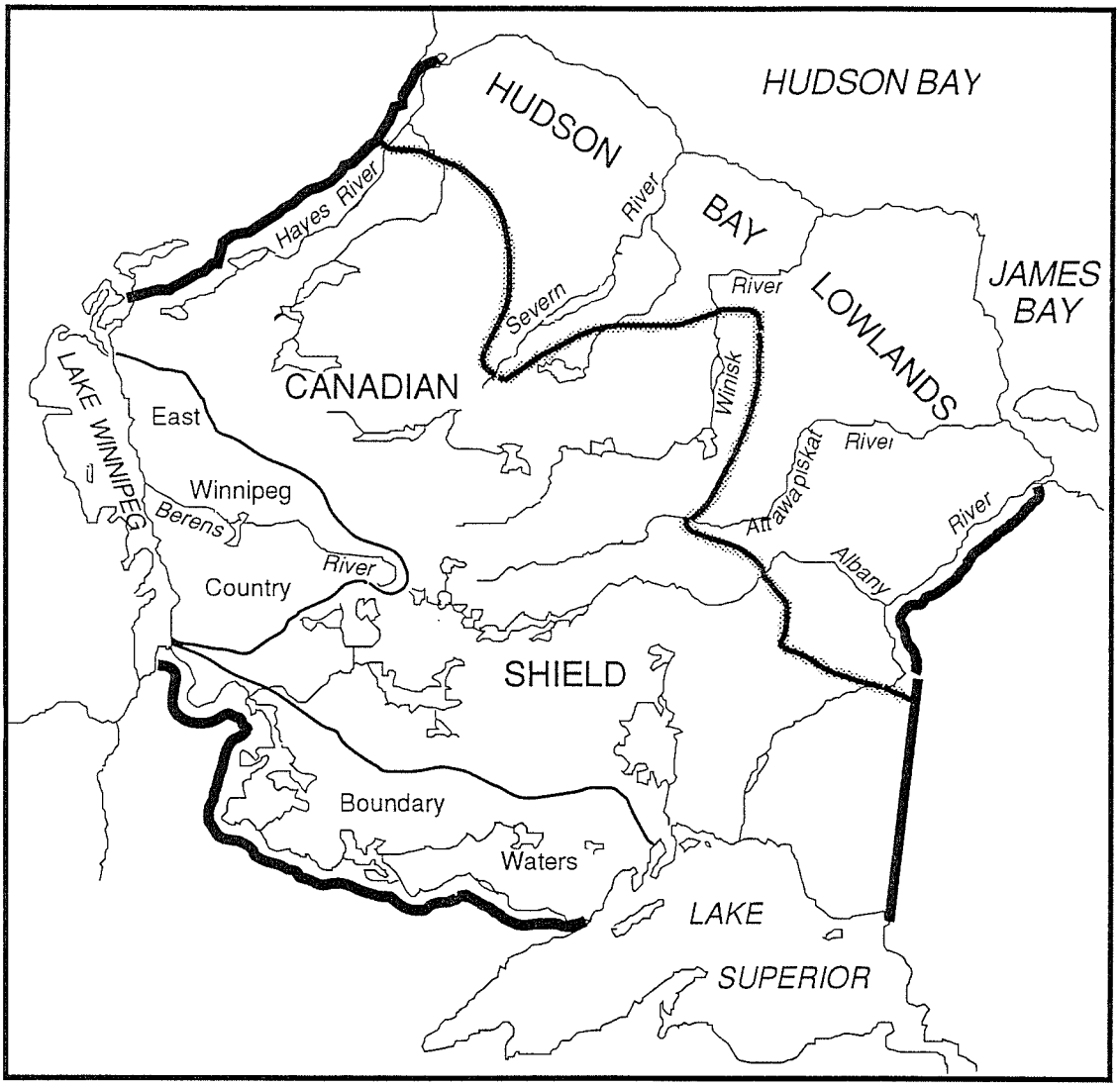

Figure 14: The Petit Nord

To the Montreal traders, the Petit Nord comprised the fur trading lands to the east of Lake Winnipeg and north of Lake Superior[1]. The imprecision of this regional term has led researchers to adopt differing interpretations as to its extent[2]. This study defines the Petit Nord as the tract of land bordered on the north by Hudson and James Bays, on the east by the Albany River, on the south by Lake Superior and the Boundary Waters, on the west by Lake Winnipeg, and on the northwest by the Hayes River system (Fig. 14).

The Petit Nord is comprised of two major physiographic regions: the Hudson Bay Lowlands occupying approximately the northern third of the region, and the Canadian Shield encompassing the remainder of the Petit Nord to the south. By 1819, there had evolved distinct patterns of fur trade settlement and transportation within these two physiographic regions. The northernmost part, the Hudson Bay Lowlands, is a large, flat, and swampy plain, underlain by easily eroded carbonate and sandstone strata (Alwin, 1978: 24, 27). Consequently, it is crossed by broad rivers with gentle gradients, which were ideal for travel by boats of considerable size. These rivers flow from the interior of the region to Hudson Bay and James Bay, dropping over fall lines as they emerge from the Canadian Shield (Ibid: 24). Among the most significant for transportation were the Albany, Severn, Moose, and Hayes Rivers. Journeys along these streams within the Lowlands region were free from portages, although tracking was frequent for

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[1]The terms Grand Nord and Petit Nord refer to operational units in the Northwestern fur trade. The fact that transportation networks were separate and that the trades of the two developed exclusive of each other, make the regionalization significant (Moodie, 1987: 363). Moodie (1987) has suggested that research on the Petit Nord has been neglected in favour of the fur trade in the Grand Nord. Lytwyn (1986) has written an excellent study of the historical geography of the area, the only geographical synthesis of the region. Moodie's (1987) examination of the evolution the pattern of trading post settlement was explicitly concerned with the differences between the Petit Nord and the Grand Nord.

[2]For instance, Moodie (1987) included the Hudson Bay lowland, the Moose River drainage basin, the Boundary Waters region between Lake Superior and Lake of the Woods, as well as the area to the east of the Red River. These were not included by Lytwyn (1986) who adopted a more restricted definition. Lytwyn's (1987) map of the transportation routes in the Petit Nord included the Boundary Waters and the Hudson Bay Lowland but not the other areas, and he specifically noted that the Lowland was not part of the region.

the larger boats[3]. Despite the ease of transport, however, no fur trade posts were located in this region, other than the Bayside posts. Instead, the Swampy Cree who resided in the Hudson Bay Lowlands brought their yearly returns to those posts (Joubert, 1984).

The Canadian Shield portion, which forms the bulk of the Petit Nord, is an area of erosion-resistant, igneous and metamorphic Pre-Cambrian rock, heavily modified by glacial action, which created "a maze of lakes, swamps, rivers, and ice-scoured rock..." (Lytwyn, 1987). The Shield is characterized by an "intricate interconnected network of lakes and rivers" which provided access to the interior of the Petit Nord by water, while denying any long distance overland travel (Alwin, 1978: 27, 28). Additionally, this area is covered by a dense tree cover which also hindered overland travel (Bishop, 1972: 59). Although the Shield rivers enabled traders to journey long distances through the interior, interruptions and portages were frequently necessary at rapids and physical discontinuities in the transport network. Thus, with few exceptions, the birchbark *Canot de Nord*, a canoe which could be quickly unloaded and carried by a few men, was the mode of conveyance throughout much of the Canadian Shield portion of the Petit Nord (Lytwyn, 1987). The most significant exception was along the Albany River system, where the HBC employees travelled long distances using bateaux which were capable of carrying two tons of cargo (Ibid). It was in the southern portion of this area, towards the international border, that the two fur companies established their most dense network of posts, vying with each other to obtain the fur production from the Indian population of this region. Frequently, opposing posts were located very close to each other, and men were sent to the Indian encampments in order to head off the opposition. Farther north in the Shield section, the pattern of posts was much less dense. Fewer posts were settled as the big game hunters of that region were fewer, and more dispersed than their kinsmen to the southward.

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[3]Tracking over shallow spots was accomplished by men on the shore pulling ropes attached to the vessel. Unloading the goods was usually not necessary.

Seasonal Movements Within the Petit Nord

Ray noted that the timing of disease introduction was an important factor in determining the pattern of diffusion of epidemics in the western interior of Canada during the period 1830 to 1850 (1976: 156). Depending on the time of year when the disease was introduced, an epidemic could either be widely dispersed or confined to the local area around the initial point of infection. The key to these variations lay in the seasonal patterns of movement of both the Indians and the fur traders, and to the interaction between the two groups. To understand the pattern of diffusion of a single epidemic, then, it is necessary to ascertain the dynamics of population movement within the study area. In the Petit Nord in 1819, the relevant populations were the local Indian groups, who were the Cree and Ojibwa, and the personnel of the two fur trading companies, the HBC and the NWC.

Seasonal Pattern of Indian Movement and Settlement

The Indian inhabitants of the Petit Nord lived in "co-residential units" which varied both in size and location depending on the season[4]. The size of these units was determined by available food resources which dictated the optimal population densities (Rogers and Black, 1976: 21). During summer months, larger bands could be maintained by more abundant and varied food sources, while the more limited winter resources could maintain only smaller population densities (Rogers and Smith, 1981). In addition to the seasonal variations, there were also significant spatial

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[4]The co-residential unit can be defined simply as the group of people living and interacting together at a given time. Identification of a particular group of people can be problematical. Jenness (1989: 121) has suggested that the tribal designation may not be entirely appropriate for the eastern and northern Indians of Canada, but that such divisions can be useful if it is remembered that they are not absolute. Some anthropologists such as Rogers (for example Rogers, 1983; Rogers and Black, 1976; Greenberg, 1978) would agree. They tend to concentrate on differences between groups rather than unifying characteristics, and as a consequence have focussed on smaller units of study. Examples include the differentiation of the Crane and Sucker Indians from the Cree and Ojibwa, as speakers of the Severn Dialect (Rogers, 1983); the emphasis on the different subsistence economy of the Rainy Lake Ojibwa from their Northern Ojibwa neighbours (Waisberg, 1984); and various designations based on the presence or absence of certain cultural attributes (Helm, Rogers, and Smith, 1981; Rogers and Taylor, 1981; Steinbring, 1981). Caution should be taken with these designations, however, as conditions do not always remain constant, and differentiations which are valid at one time may not be at another time.

variations in resource availability, increasing from north to south. In turn, this spatial variation was manifest in a population density gradation, such that it is possible to identify at least three broad zones of population density.

Within the Hudson Bay Lowlands, food resources were limited. Caribou were available, but only in small numbers (Honigman, 1981: 217). During the fur trade period, the Swampy Cree relied principally on water fowl, notably geese, which were abundant only during the migration season. As a result, population densities in the Lowlands were "considerably lower than further south" (Joubert, 1984: 42). Many of the Cree who resided closest to the coast were employed by the HBC's posts to hunt for provisions (Ibid: 31). These 'Homeguard' Cree lived year round around the posts, with no variation in group size. Elsewhere in the lowlands, other Cree visited the posts twice a year, and also hunted for the HBC during the annual migrations of the caribou and geese. Additionally, they were employed as wage labourers (Ibid: 32-33). During the winter they lived inland in small groups.

The Ojibwa and Cree living in the interior of the Petit Nord, in the northern sectors of the Canadian Shield,[5] relied on big game, mainly moose and caribou. Also available were fish and water fowl (Rogers and Taylor, 1981: 232)[6]. These people lived north of the range of the wild rice and sugar maple, however. This "limited the subsistence potential of their area compared to that of their southern neighbours" (Ibid: 231). Much of the year was spent in small dispersed groups of between 10 and 30 people, which were composed of a few interrelated families, hunting and trapping together (Rogers, 1983: 103). These hunting bands located themselves near the habitats of the fur-bearing animals they trapped. By summer, a wider variety of food sources was available. At that time, the Indians gathered together along the shores of large lakes and rivers, especially at productive fishing locations (Rogers and Smith, 1981: 136). There, several winter

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[5]According to Bishop (1972, 60) the major HBC posts in the Petit Nord were, for the Northern Ojibwa : Long Lake, Fort William, Nipigon House, Osnaburgh House, Lac Seul, Rainy Lake, and Berens River. For the Inland Cree to the immediate northwards they were: Trout Lake Post and Martin's Fall. The coastal Cree were at Moose Factory, Albany Fort, Severn House, and York Factory.

[6]As the nineteenth century progressed, many areas became depleted of big game, as well as beaver, and the inhabitants were forced to place great reliance on the fish and the erratic hare resources (Bishop, 1974).

groups fused into summer bands, some as large as 200-300 people (Ray, 1976: 141). Interaction with the fur trading posts occurred primarily in the fall, when supplies were distributed and debt[7] was given out, and in the late spring, when the furs were brought in and debts were discharged. Between November and March, in most areas, contact between Indian and trader was very limited[8].

Finally, to the south, and especially along the Rainy River, a greater variety of food resources allowed larger summer gatherings. In late spring and early summer, as many as 1500 people could be supported by the highly productive fisheries (Waisberg, 1984: 127). Of potential importance for the spread of disease was the wide territory from which these people gathered. The Ojibwa gathered there from places as far afield as "...Lake Winnipeg on the west, Lake [Lac] Seul on the north, Leech Lake to the south, and Lake Superior to the east" to harvest the sturgeon (Holtzkamm, *et al.*, 1984: 198). These large gatherings allowed the renewal of social ties and friendships, reinforced through religious ceremonials and warfare with enemies to the south (Ibid: 199). The people living in the southernmost portion of the Petit Nord also harvested copious quantities of wild rice and maple sugar (Vennum, 1988). At certain locations, most notably Plantation Island on Lake of the Woods, the Indians planted gardens of corn and potatoes which provided food for the fur trade, as well as for their own subsistence (Moodie and Kaye, 1969). Here, then, was an extremely varied set of seasonally abundant food resources which supported comparatively large and dense populations. As well, many of these food resources could be processed, stored, and used throughout the year. As a consequence, higher winter densities could be supported in these southern regions than could be supported among the big game hunting Indians to the northward, and the Swampy Cree of the Hudson Bay Lowlands (Bishop, 1978: 222).

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[7]This was the goods given to the Indian trapper in anticipation of the year's returns.

[8]This would have been the case during most years, prior to faunal depletion in the Petit Nord. Following the decline of big game in the area, dependence on the post became common, especially during the winter when food resources were at their lowest (Bishop, 1974). This was also the case during epidemics when debilitation prevented them from hunting effectively.

As noted above, variations in population densities were reflected in corresponding variations in the density of trading post settlement. Thus, in the relatively poor subsistence areas of the Lowlands, population densities were low, and trading posts confined to the coast. This contrasted highly with the ecologically rich areas of the south, where populations reached the greatest numbers in the Petit Nord, and the pattern of posts was densest. Consideration of these tendencies towards seasonal agglomeration and dispersal, and geographical variations in population densities, is critical to understanding disease diffusion.

Seasonal Patterns of the Fur Trade

The critical mechanism for diffusing the 1846 measles epidemic through Canada's western interior was the boat brigades of the HBC (Ray, 1976). From its initial point of introduction at the Red River Settlement, the disease was first carried to the major redistribution centre of Norway House. Infected boat brigades then diffused the virus to York Factory, while other brigades carried the disease throughout the fur trade territory west of Lake Winnipeg. The resultant pattern of diffusion was largely hierarchical in nature. However, the nature of the fur trade in the Petit Nord in 1819 was much more complex than in the period studied by Ray (1976) and so too were the possibilities for the spread of disease.

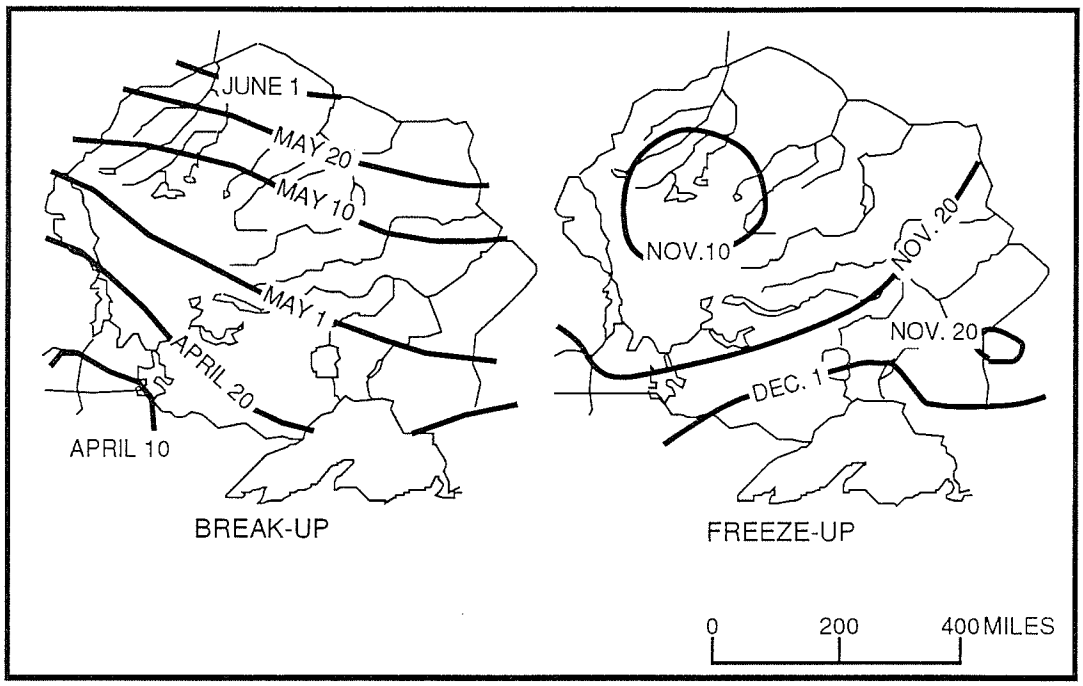
Firstly, the fur trade transportation network analyzed by Ray operated under monopoly conditions, involving only the HBC. Conversely, in 1819, the fur trade of the Petit Nord was bitterly contested by the HBC and the NWC. Both companies had a large number of posts in the area, and the comprehensive transportation network connecting them to their respective administrative posts created considerable potential for diffusing disease throughout much of the area. This potential was all the greater as the fierce competition forced the traders to send men to the Indians at their encampments, increasing the spatial extent of the influence of the two companies. However, the HBC and NWC brigades generally traveled by different routes and, while the entire area may have been potentially susceptible to epidemic disease, diffusion by one or other of the companies' brigades made some areas at greater risk than others.

The other notable difference was in the composition of the labour force manning the brigades. By 1846 the brigades were primarily manned by the Métis (Ray, 1976: 141). Since there does not seem to have been a measles epidemic in the west subsequent to that of 1819-20, individuals born in the Northwest during the intervening period would have been susceptible. Thus, those Métis under the age of 26 who were employed on the brigades provided a ready supply of susceptibles to diffuse the disease through a wide area. Since they were employed by the HBC, the pattern of diffusion tended to reflect the transportation network of that company. In 1819, however, the annual brigades were manned by crews of varied ethnic composition. A number of these employees would have had prior exposure to the disease, and therefore would have had immunity during the 1819-20 epidemic. Others came from regions where the disease was normally absent. These employees were susceptible, and therefore could participate in the diffusion of that epidemic, just as the Métis did in 1846. It was only where susceptible employees.were employed on the brigades that the measles could diffuse along the brigade routes. The remainder of this chapter will discuss, in greater detail, these two factors: the patterns of movement of the two fur companys within the Petit Nord, and the differences in their diffusion potential due to the backgrounds of the personnel employed.

Transport Patterns

Fur trade transportation in the Petit Nord was largely relegated to the short summer season. According to Ray (1976: 141), "severe winter weather and transportation technology precluded any extensive movement of goods during the winter, so almost all of the traffic between posts occurred during the summer...". This water-based transport operated on a tight schedule with the beginning of the season determined by the end of the break-up period of the rivers, and the cessation of travel determined by the freeze-up of the rivers. Outside of this season, traffic was local, accomplished by walking along the frozen rivers, and the possibility of widespread transmission of the measles was limited. During the transitional periods, when the rivers were in a state of flux, even the limited foot travel of winter was impossible. Thus, long distance travel, and

therefore long distance diffusion, could only be accomplished during the short open water season (Fig. 15).



Source: Alwin (1978: 31, 32)
Figure 15: Average Dates for River Freeze-Up and Break-Up in the Petit Nord

The HBC in the Petit Nord

HBC operations were based out of administrative posts located on Hudson Bay and James Bay, and seasonal movements by the HBC brigades were generally oriented towards those posts (Fig. 16). The Northern Department was controlled and supplied from York Factory, on Hudson Bay. Most of this department's trade was carried on within the Grand Nord (Moodie, 1987). Its linkages to the study area were mainly along the major transportation corridors flanking the Petit Nord. The posts along these corridors, including Lac la Pluie, Norway House, and Oxford House, served as break-of-bulk-points and supply centres for the trade of the Grand Nord (Moodie, 1987: 362). Their hinterlands were small, and penetrated only a short distance into the

interior. There were few exceptions to the peripheral pattern in the Northern Department. Big Fall House, located on Berens River, and its outposts at Bad Lake and Sandy Point Lake, were located a short distance within the East Winnipeg Country of the Petit Nord (Fig. 16, see also Fig. 14). Also located within the boundaries of the Petit Nord, were Island Lake and Trout Lake, to the north. All of these posts, however, were only a relatively short distance from either the major transport route to York Factory, along the Lake Winnipeg-Hayes River corridor, or were on a direct and short route to Hudson Bay (Fig. 16). As a consequence, the brigades that supplied these posts, if infected, could play only a limited role in spreading the measles through the Petit Nord.

The Southern Department of the HBC embraced most of the Petit Nord. Commerce in this area was directed from Moose Factory and Albany Fort on James Bay. Most of the fur trade of the Petit Nord was conducted from Albany, which established a long string of posts along the Albany River and interconnected waterways. Albany Inland stretched from Martin's Falls, a short distance from Albany Fort, to Escabitchewan, in the English River system, near Lake Winnipeg. According to Lytwyn (1986: iii), this was one of only two major routeways into the interior of the region, the other being the NWC's route via Lake Nipigon. Only within the Southern Department and, for the most part, only within the Albany Inland District, was there the potential for the same long distance diffusion by the HBC brigades that was noted by Ray for the 1846 measles epidemic.

Long distance movement between all of these posts was directed to and from the Bayside posts. Thus, the fall brigades, carrying supplies and trade goods for the following winter, travelled from the Bay to the interior posts. In the spring, the pattern was reversed, and the brigades carrying the winter's returns left the inland posts and headed for either Hudson Bay or James Bay, where the furs were collected and shipped to England. For some brigades, distances prohibited the completion of the journey during the short summer season, and so redistribution posts on major transportation routes to the Bay posts would be the goal. This was the role filled by Norway House, which saved some time for the brigades travelling the greatest distances in the

Grand Nord, and by Martin's Fall, which spared the Albany Inland men from having to make the return journey from Albany Fort (Alwin, 1978: 211).

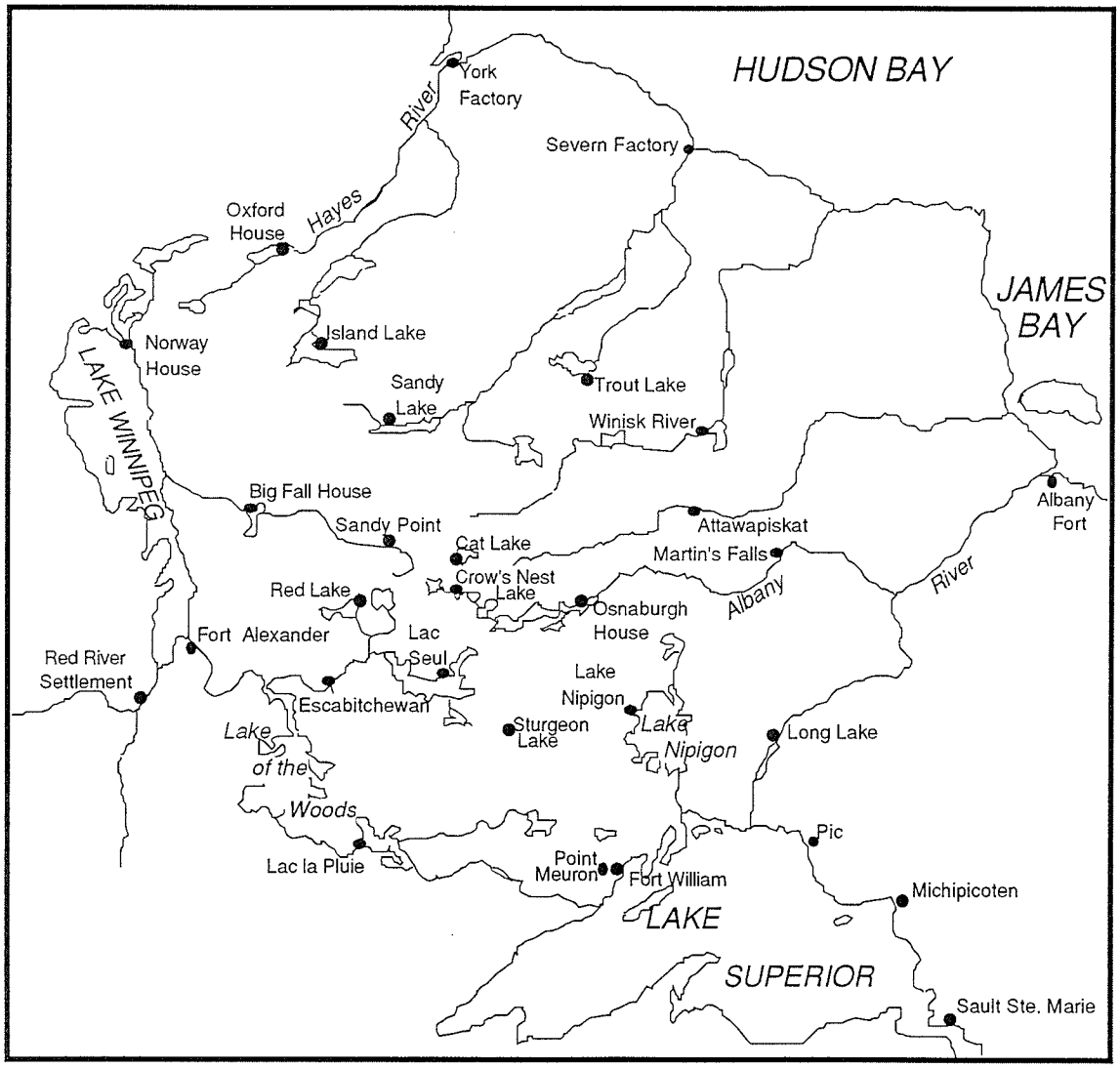


Figure 16: Fur Trade Posts in the Petit Nord: 1819-20

The implication of these patterns of movement for the diffusion of the 1819-20 measles epidemic is that, for the most part, the HBC could only diffuse the measles virus in a peripheral pattern or with very minor penetration into the Petit Nord. The exception to this was in Albany

Inland, where significant penetration could have diffused the disease a considerable distance. Additionally, with movement of the brigades oriented in a general north-south direction, the southerly introduction of the measles that has been documented would have limited diffusion by the HBC brigades to the spring, when movement was directed from the south to the north. Fall or late summer introduction would have prevented HBC participation in the diffusion, since the employees were moving away from the unaffected area towards the points of introduction.

The NWC in the Petit Nord

In contrast to the HBC's operations, those of the NWC were supplied and controlled by a single post on Lake Superior, Fort William. Although the fur trade of both the Petit Nord and Grand Nord was controlled from the same post, they were served by different transportation routes. Travel to the region to the west of Lake Winnipeg was routed along a heavily travelled corridor hinging on Fort William, Lac la Pluie (present-day Rainy Lake), and Lake Winnipeg (Fig. 16). The posts within the Petit Nord were reached by a network of routes radiating from the company's post on Lake Nipigon, just to the north of Lake Superior (Moodie, 1987: 361). The route to the Grand Nord, like the Hayes route of the Northern Department of the HBC, was largely peripheral to the fur trade of the Petit Nord. The brigade routes to the interior posts, however, provided an ideal path of diffusion throughout much of the Petit Nord.

In the spring and early summer, the Nor'westers left their assigned posts for Fort William with the year's returns. After collecting the goods for the next year's trade, they would depart for their wintering stations. One exception to this was the brigade from the Athabasca district of the Grand Nord. It was assumed that the time for them to complete a round trip journey to Fort William would exceed the season of open water. As a result, some of the members of the Montreal brigades continued on to Lac la Pluie, and provisioned the Athabasca men from there (Garvin, 1927: 51). In general, however, Fort William served as the nexus of the NWC's trade network, and diffusion from that post placed much of the Petit Nord at risk from the measles in 1819.

Corporate Ethnicity and Diffusion Potential

The HBC brigades played a major role in the diffusion of the 1846 measles epidemic. These brigades were manned almost exclusively by Métis employees, men who were almost certainly susceptible. In 1819, however, there were major differences in the ethnic composition and areas of origin of the employees of the HBC and NWC. Given ethnic differences, it is entirely possible that overall differences existed in each company's ability to participate in the diffusion of the measles epidemic in 1819[9].

Management and decision-making in the HBC was vested in the Governor and Committee in London, and hiring, with few exceptions, was done in Britain. For the most part, in 1819, the greater part of the working ranks of the company was occupied by men from either England, Scotland, or Ireland. Contracts were signed at one of the major hiring centres including Stromness in the Orkneys[10], Glasgow, and the Island of Col in the Inner Hebrides (Alwin 1978: 347). Of the three, Stromness was the most important in terms of numbers hired. By the mid-seventeenth century, the HBC had come to rely principally on the Orkneys as its chief source of employees (Brown, 1980: 27). This small group of islands to the north of Scotland had provided the bulk of the company's labour force for some time. By the time of the measles epidemic, Orkneymen accounted for just under 40% of the total HBC total workforce, the majority of these from the West Mainland, part of the largest of the Orkney islands and home to the port Stromness (Fig. 17) (Nicks, 1980: 102, 106).

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[9]Brown (1980) has compared the corporate structures of the HBC and NWC. For a close examination of the hiring of Orcadians by the Hudson's Bay Company see Nicks (1980).

[10]Although nominally a part of Scotland, its physical isolation, ethnic background, and history as a colony of Norway seem to provide it with a separate identity from the rest of the country. See Smout (1970) and Fenton (1978) for a discussion of the culture, economy, and history of the Orkney Islands.

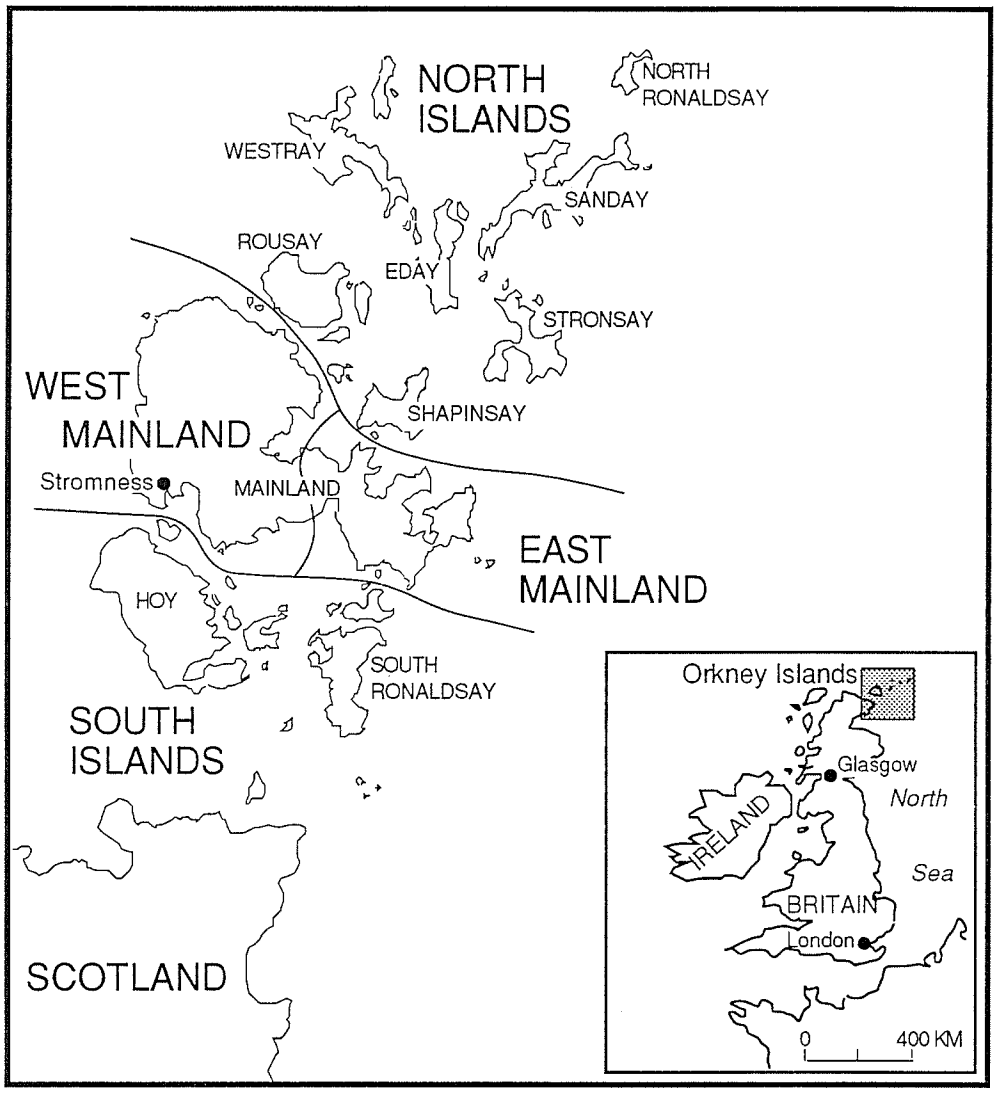

Figure 17: The Orkney Islands

The Orkneys' geographic location north of Scotland and away from the large population centres of western Europe and major shipping lanes would appear, at first glance, to be a very isolated one. In reality this was far from the truth. The Orkneys occupied a position "more like [a] busy crossroads" than a "remote backwater" (Fenton, 1978: 1). An extremely healthy export economy based on goods such as linen, kelp, agricultural products, and livestock ensured frequent contact with England, Scotland, and continental Europe (Ibid). Even the HBC ships

made the Orkneys a last stop for provisioning before heading for Hudson Bay (Lytwyn, 1986: iii). These commercial contacts allowed more than the transference of goods.

On board the ships came the diseases of the more populous cities to the south. Travel from the cities of London and Glasgow, both teeming with disease, was not so long as to exceed the communicable periods of smallpox and measles. Smallpox, for instance, was already common on the Orkney Islands by the late-eighteenth century, and innoculation efforts were well received (Smout, 1970: 272). It is probable that the measles had also reached the islands in 1808. Although the measles had become a childhood disease throughout the more heavily populated parts of England, there were still periodic epidemics within the British Isles. In 1807, a severe epidemic occurred in Edinburgh and Aberdeen. The next year a second epidemic[11] took place, one that "appears to have been somewhat general in England and Scotland" (Creighton, 1965: 652). Particularly hard hit by these epidemics was the city of Glasgow, where measles accounted for greater than 10% of all fatalities between 1807 and 1812 (Smout, 1970: 278). This was also a city with which Stromness had major trade links. Coincidentally, kelp exports to Glasgow peaked in 1808, the year of the largest epidemic. Given the degree of traffic between Stromness and Glasgow, and Creighton's assessment of the extent of diffusion of the 1808 epidemic, it is probable that the epidemic reached the Orkneys and spread through the Orkney population. Population figures for the islands show a significant decline between 1801 and 1811 (Fig. 18) (Barclay, 1965: 8). This decrease of about 5% is the only such decline in population for the Orkneys between 1790 and 1861 as otherwise a period of steady growth was experienced. Moreover, Fenton's (1978: 9) figures indicate that this period of steady growth had begun some time prior to 1755. It is impossible to date the decline exactly since the figures are averaged in 10 year increments, but there is no other obvious explanation for such a dramatic change in the Orkney Island's' demographic fortunes.

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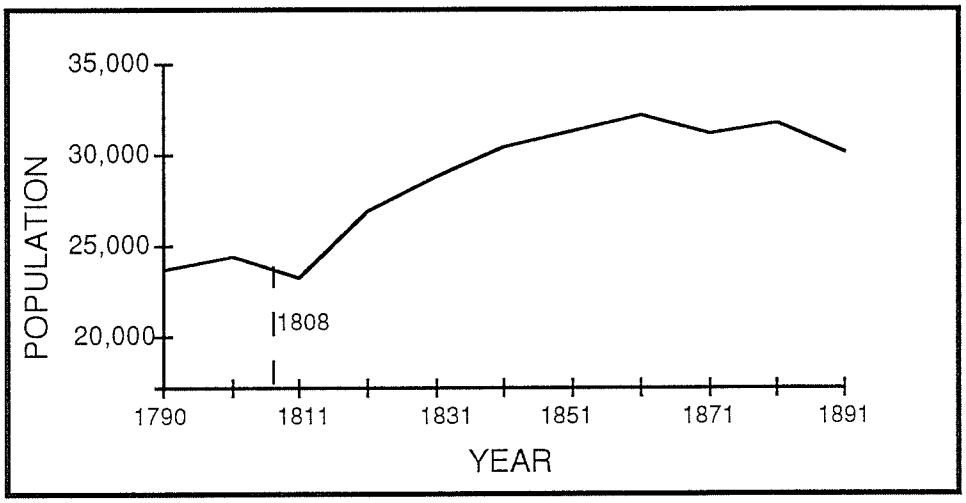
[11] Possibly a continuation of the earlier one.



Source: Barclay (1965: 8)

Figure 18: Population of the Orkney Islands: 1790-1891

Measles is a highly contagious disease, which would have diffused very rapidly, especially through the Mainland, the large island which was the major area of recruitment for the HBC and on which was the Orkneys' major port of Stromness[12]. If the demographic figures do indicate severe measles related mortality, then, the epidemic was widespread. This would have meant immunity for a large portion of the Orkney population present on the islands as of 1808, eleven years before the 1819-20 epidemic in the Canadian Northwest. Consequently, many of those Orkneymen hired by the HBC after that year would have been immune during the later epidemic. The same was likely true of those employees living in England and Scotland at the time, where the 1807 and 1808 epidemics seem to have spared few. This immune status may be illustrated by the fact that, despite repeated contact with infected individuals, very few of the HBC's employees in the Petit Nord contracted the disease. These included Antoine Pacquette, an employee at Point Meuron, probably of either French or mixed blood origin, and Thomas Sanderson, a mixed blood employee at Red Lake who succumbed (HBCA, B.231/a/4: fo.25; B.64/a/8: fo.9). Three others

[12] Both Panum (1940), and Peart and Nagler (1954) illustrate just how well the measles virus can diffuse, even between seemingly isolated communities. Dispersed communities and families in both the Faroes and Northern Canada, respectively, were afflicted as a few infected individuals were able to relocate.

at the Red Lake post may have been ill of the same disease. James Slater, master at Escabitchewan, wrote in his district report for 1819-20 that during the winter at Red Lake, "most of the men were badly with the [measles]..." (HBCA, B.64/e/2, fo.3). This statement was based on a letter written to him by Marcus Calder at Red Lake. In the letter, however, Calder stated that the men were "badly all the time of fall fishing..." without identifying their affliction as measles (HBCA, b.64/a/8: fo.9). It is also possible that the men had suffered from dysentery, which had appeared in some parts of the Petit Nord by this time. If it was measles, only four men in the Escabitchewan (Red Lake) district, including Sanderson, had contracted the disease. The three other men, John Rendall, John Stainger, and Andrew Rich, were all born in Scotland (HBCA, A.30/16), but may have entered the Northwest prior to 1808. None of the District's other men was afflicted. Throughout the rest of Petit Nord, many HBC employees came in contact with infected individuals but did not contract the disease.

By 1819, Orkneymen no longer made up the bulk of the HBC total employees, although they were still the single largest group employed by that company. There appear to be a number of reasons for this decline. Rich (1959: 315) claimed that they had become somewhat of a liability and thus the Company was pursuing other hiring avenues to break its dependency on them. Probably more significant was a combination of problems with recruiting and the expansion of HBC trade into the Athabasca. In 1817, for example, hiring was limited to about twenty servants as the men assembled in Stromness after the ships had sailed (Rich, 1959: 349). Two years later the Orkneymen were reluctant to engage. The HBC's agent at Stromness, John MacDonald, wrote to Governor Williams stating that enthusiasm to engage was dampened by good wages offered by the local herring industry coupled with severe anxiety at seeing disabled men returning from the fur trade (D.1/11: fo. 24d).

Another reason for this decline was the hiring of French-Canadians and Iroquois in Montreal, starting in 1815 (Alwin, 1978: 401). In 1818 the HBC agents in Montreal wrote to Governor Thomas Vincent of the Southern Department. "We have engaged in all about 70 Men of whom 26 are Iroquois, principally as hunters..." (B.145/b/3: p.4). These men were hired

specifically for the newly contested Athabasca territory. This geographic specialization is reflected in a map of ethnic composition in the fur trade of the period which shows a strong French and Indian concentration within that area (Moodie, Kaye, *et al.*, 1987). Such French-Canadian employees were much more likely to be susceptible than those from Britain. In researching the hiring practices of the fur trade of New France, Allaire concluded that there was an increasing trend towards hiring rural men, as the eighteenth century wore on. Accordingly, "By the mid-18th century, contracting an *engagement* for the fur trade tended to be the act of an *habitant* living, by definition, in a rural area" (Allaire, 1984: 25). This trend was probably accelerated after the fall of New France, as the French-speaking population of Lower Canada began to leave the cities. By 1800 almost 95% lived in the rural areas of Lower Canada (Harris, 1974: 117). Thus, in 1819 French-Canadian participation in the fur trade was principally by those from outside the three major cities of Lower Canada.

Due to a smaller, more dispersed population, rural areas are less frequently exposed to the measles than urban areas. Where cities exceed critical populations the disease may be maintained endemically, and the surrounding countryside may be exposed to occasional epidemics. The two largest cities, Montreal and Quebec, fell far below the levels needed for measles endemicity. Thus, for these cities the measles virus had to be reintroduced after every epidemic. This would have limited the frequency of further outbreaks, and meant that the rural areas would very rarely be exposed, since there was no local source of the virus. As noted above, the only population agglomeration large enough to support the virus indefinitely was to the south, in the U.S. While it was not impossible for a measles epidemic to have been started in either Quebec or Montreal due to the arrival of an infected individual from the south, this was almost certainly an infrequent occurrence. Thus, with little opportunity for prior exposure, these rural-dwelling French-Canadian employees of the fur trade were probably susceptible to the measles.

Within the Petit Nord, only a small percentage of the HBC's employees were of French-Canadian origin, and these were concentrated in a very few districts. Only in Lac La Pluie and Norway House Districts were there large numbers of French-Canadian employees (Moodie, Kaye,

et al., 1987). Throughout the remainder of the Petit Nord almost all the employees were from Britain or "Rupert's Land"[13]. It is entirely possible that this ethnic composition was reflected in the HBC's ability to diffuse the measles throughout the Petit Nord. As mentioned, it is highly likely that all the employees from Britain who were hired after 1808 had been exposed to measles during the epidemic that year. Other employees, including those from Lower Canada and those born in the territory, were probably susceptible. The latter, however, made up only a small minority of the total employee pool of the HBC, and few of these were assigned to the Petit Nord. This ethnic composition suggests that, within the Petit Nord, the majority of HBC employees were immune to the measles, and thus unable to participate in the diffusion of the epidemic.

The NWC, operating out of Montreal, inherited both the traditional labour force and trade routes of the French fur trade. The managerial and upper echelon positions, such as the partners and clerks, were generally of English and Scottish descent from Montreal (Moodie, Kaye, *et al.*, 1987). French-Canadians remained the bulk of the lower ranks, however, acting as guides, interpreters, and *voyageurs* (Brown, 1980: 45). In terms of origin and susceptibility to measles, there was probably no difference between the French-Canadians employed by either of the companies. Also forming a significant part of the working force were men of mixed French and Indian descent, the Métis[14]. These were also men who, in all likelihood, had never been exposed to the measles virus.

Whereas the HBC men, almost exclusively of British origin, had little potential for diffusing the disease in the Petit Nord, the Nor'Westers employed a majority of men in the region, both French-Canadians and Métis, who probably had no experience with the disease. Consequently, the NWC had by far the greatest potential to diffuse the measles, employing a largely susceptible workforce. Once introduced among its employees, the virus could have been maintained for extended periods of time to diffuse through the company's transport network. Thus, unlike the

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[13]That is: born in the territory and of mixed descent. There was also a category for "Indian".

[14]Plate 65 of the Historical Atlas of Canada (Moodie, Kaye, *et al.*, 1987) shows a large French Canadian majority working in the Petit Nord, with a small percentage of British origin and even less Indian. The Mixed-Blood population is missing, presumably absorbed into the French and Indian categories.

situation in 1846, when all the brigades were manned by the Métis who lacked immunity to the measles, the conditions in 1819 were more complex, but nonetheless such as to facilitate the spread of the disease over very large areas.

CHAPTER 5: DIFFUSION OF THE EPIDEMIC WITHIN THE PETIT NORD

The Outbreak at Michipicoten

Before discussing the diffusion of the epidemic, it is necessary to consider the circumstances surrounding the initial outbreak of measles at Michipicoten. As mentioned earlier, the measles arrived at Michipicoten on August 17th of 1818, where it was carried by a number of men employed by Augustin Nolin of Sault Ste. Marie, and led by Joseph Dufaut. These men were originally bound for Capoonacagami, immediately to the northward (Fig. 19), but were redirected to Mattagami, to the east. Upon departing for that place, they were halted almost immediately due to the illness of some of the crew members. After a period of eleven days, they resumed their journey to Mattagami, arriving after a further eight days. In all probability these men had ceased to be infective by the time they reached their destination, given the lengthy delay and the time spent on the trip. Nineteen days had passed since they began to exhibit the symptoms of the disease, and it is unlikely that there was any risk of passing the disease on to the Indians they had gone to trade with at Mattagami. Had they continued on with their original plan, however, they might very well have initiated an epidemic among the Indians living in the Moose Factory to Michipicoten corridor. Andrew Stewart, the post master at Michipicoten, had delayed the men there for seven days. In fact, this period of time would probably have been sufficient for Dufaut and his crew to reach their intended destination, Capoonacagami. The delay was critical in preventing the introduction of measles into the Indian population at that time, since there was little danger

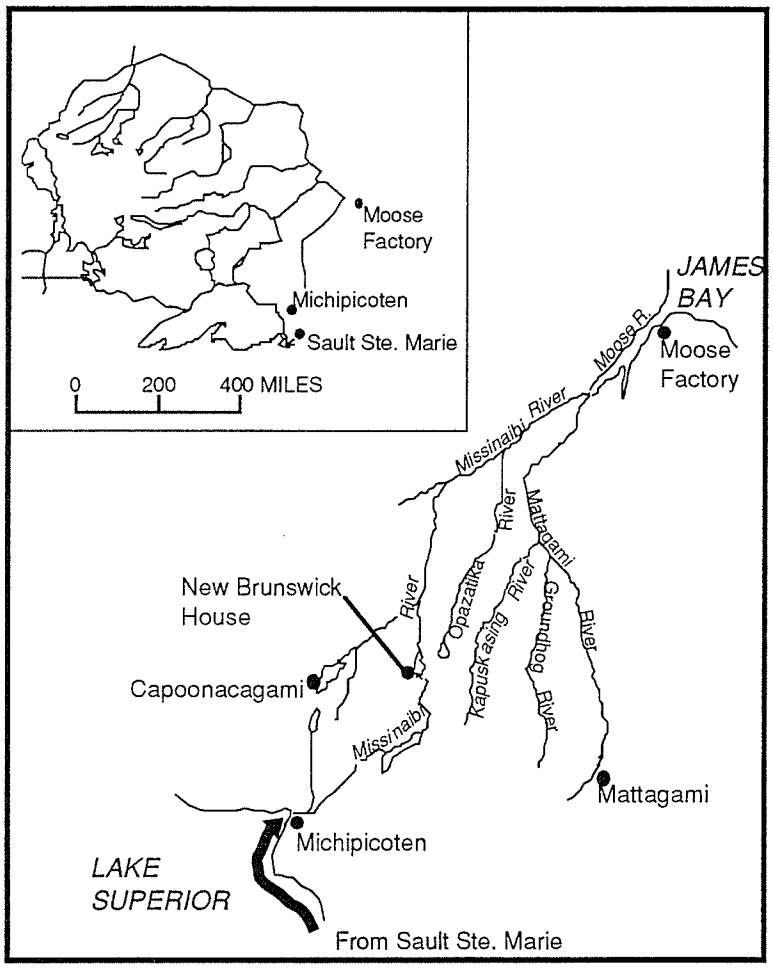

Figure 19: The Michipicoten to Moose Factory Corridor

of this occurring at Michipicoten. The HBC post at Michipicoten served almost exclusively as a provisioning depot, or staging post, for travellers making the journey from Montreal to the Northwest (Alwin, 1978: 409). There was generally little trade in furs and, consequently, Dufaut and his men had no contact with Indians during their stay there, although in two instances canoes loaded with fur trade employees passed through (HBCA, B.129/a/9: fos.6d,7). Had the infected men continued on to Capoonacagami, however, there is a very good possibility that the disease would have been passed on to the Ojibwa that hunted in the vicinity. Late August and early September was the time for trading with the Indians, and therefore there was significant risk of diffusion among the Indians arriving at the post at that time. More than just a few local Ojibwa were

at risk, however, as both the Cree an Ojibwa living between Moose Factory and Michipicoten were highly mobile and moved freely up and down the system of rivers between the two posts (Greenberg, 1978: 57). The presence of a third trading party eager to distribute goods, along with the HBC and NWC, would have been a strong inducement for native trappers to visit the post from considerable distances. The potential for a widespread epidemic was great, and by redirecting Nolin's men, Stewart most probably delayed the start of the epidemic.

In fact, the disease does not seem to have reached this area during the period of the epidemic. Michipicoten's journal for 1819-20 contains no mention of any disease that could be construed as measles. Farther to the north, at New Brunswick House, there was no mention of measles in either the 1818-19 or 1819-20 journals, but it seems that whooping cough had diffused through parts of the area, possibly during the spring of 1819. Charles McCormick, in charge of the HBC's New Brunswick House, wrote on May 29, 1819 that:

> In the afternoon the Gull's 2nd Son came in with the old man's sister, who is very bad with the cold, and says that his brother is likewise afflicted with it. Indeed there [is] an epidemical catarrh at present prevailing which affects almost everyone in this quarter (HBCA, B.145/a/39: fo.49).

The "cold" was also present at Capoonacagami through the winter of 1819-20. Jacob Truthwaite, who established the HBC's outpost there, wrote to his superior, John Murphy at New Brunswick House[1] on January 15, 1820:

> ...the Indians as well as me and the men have had a terrible hard cough all the fall and are not quite clear of it yet. It has been as hard a cough as ever I have witnessed (HBCA, B.145/a/41: fo.12).

As has already been noted, the characteristic "whoop" of whooping cough is not always present, especially if the victim is an adult (Decker, 1989: 89). These extracts point to the introduction of a disease which had symptoms which correspond to those of whooping cough,

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[1]Murphy replaced Charles McCormick in charge of New Brunswick House as of December 1st, 1819. For that reason there are two post journals for the year (HBCA, B.145/a/40, 41).

not measles. If measles had failed to diffuse through the region to the north of Michipicoten, due in part to the inadvertant actions of Andrew Stewart, it seems that whooping cough did.

Diffusion along the Red River to York Factory Corridor

Despite the outbreak at Michipicoten among Nolin's men in the summer of 1818, the measles epidemic in the Petit Nord did not commence until the following spring. The overall pattern of the epidemic suggests that there were two independent systems of diffusion at work[2]. One system existed to the west of Lake Winnipeg, with an initial entry point at Brandon House, and corresponded to the Grand Nord. This has been studied in some depth by Decker (1989). The other spread from Fort William throughout much of the Petit Nord, and will be considered in detail below. As the epidemic diffused within this system, however, it did not spread to encompass the whole of the Petit Nord. Instead, it manifested itself regionally, afflicting some areas while leaving others untouched. This study will therefore examine the diffusion of the measles epidemic from a regional perspective, attempting to identify the mechanisms of diffusion where the disease was present, and suggesting why diffusion was thwarted in other areas.

Where the two fur trade regions met, along the transportation corridor from the Red River Settlement to York Factory (Fig. 20), was a common path of travel for both parts of the Canadian Northwest, and movement along this corridor by both Indian and white travellers resulted in some overlap of the two epidemic systems. Diffusion of the measles along this path will be considered separately from the rest of the Petit Nord, as it is likely that the measles virus was carried from the settlement to York Factory. This was not the case within the Petit Nord, where the epidemic diffused from Fort William.

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[2]This overall pattern of the measles epidemic in the Northwest reflects the conclusions made by Moodie (1987) about the spatial organization of the fur trade. He suggested that the Petit Nord and the Grand Nord existed as two independent trading regions, with different transportation networks running through each.

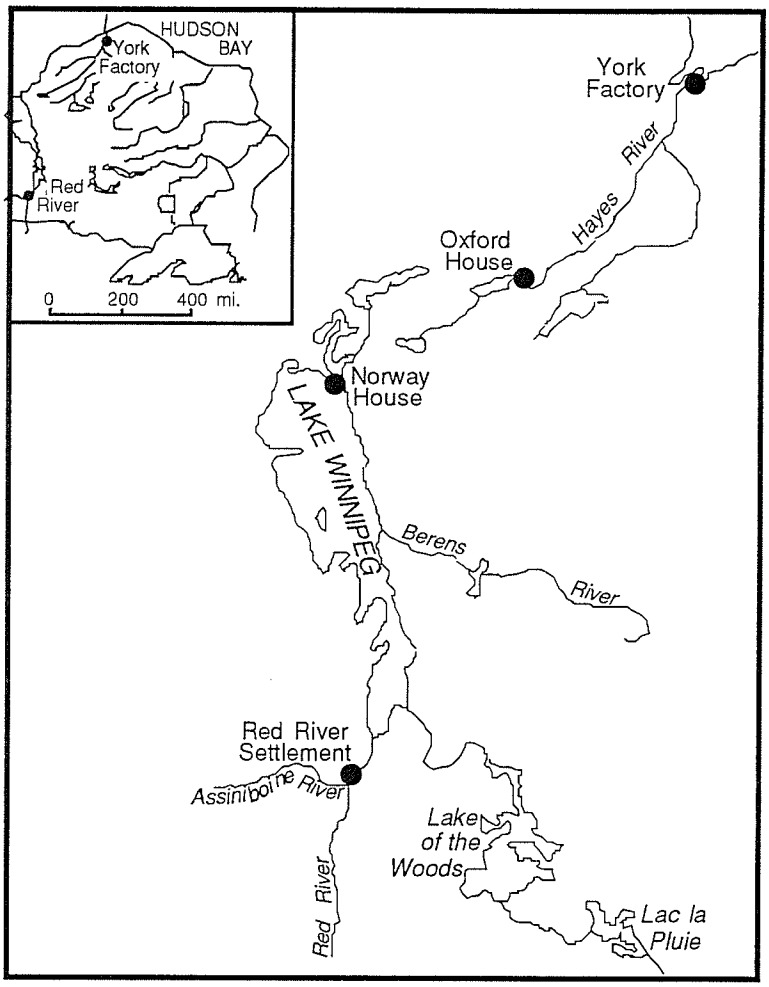

Figure 20: The Red River to York Factory Corridor

The transportation corridor linking the Selkirk Colony to Norway House, on the north end of Lake Winnipeg, and York Factory played a major part in the HBC's transportation network, and was heavily travelled during the season of open water. In later years, it would also play a major role in the diffusion of disease throughout the Canadian west. For instance, of the nine non-localized epidemics occurring in the western interior between 1830 and 1850, only the smallpox epidemic of 1837 did not break out along this corridor (Ray, 1976: 157). Given the potential for diffusion, and the fact that by mid-July both measles and whooping cough had established themselves in the Red River Settlement, it was entirely possible for the disease to have diffused to the

northward along this route. The evidence is by no means conclusive, but there would seem to be sufficient to support this interpretation.

Sir John Franklin, the English explorer, was commissioned to survey the territory to the west of Hudson Bay as far north as the Arctic Ocean. His first journey was begun in 1819 and took him from York Factory to Norway House, and beyond during the height of the epidemic. Accompanying Franklin was Dr. John Richardson, a surgeon who had been employed to make scientific observations, as well as to attend to medical emergencies. Among their duties, they were to observe the condition of the Indians they encountered, and to record them in a journal. This they did, and the journal, which was subsequently published, serves as an excellent source of information about events taking place at that time in the Northwest (Franklin, 1823).

The party arrived at York Factory from England on August 30th after a voyage from Britain aboard the HBC's ship the Prince of Wales. After exploring the vicinity of the factory, Franklin noted that the local Swampy Crees "had a squalid look, and were suffering under the combined afflictions of hooping cough and measles..." (Ibid: 25). Franklin's party later headed south along the Hayes River. On September 28th they arrived at Oxford House, which appeared to be in "decay"[3]. Here they found that "a few Crees were at this time encamped in front of the fort. They were suffering under the combined maladies of hooping cough and measles, and looked miserably dejected" (Ibid: 37). In both cases Franklin specifically noted the presence of both diseases. After resuming their journey, the party reached Norway House on October 6th, where they found no Indians, nor any sign of measles (Ibid: 42). They then continued westward, entering Lake Winnipeg, Cedar Lake, the Saskatchewan River, and then northwards to Great Slave Lake.

Unfortunately, for the purposes of this study, Franklin's observations are not confirmed by the post journals. At York Factory the journal notes only the presence of whooping cough among the Swampy Cree following July 7th, a disease that was apparently widespread by July 13th

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[3]Perhaps for the same reason why no journal was kept between August of 1819 and October of 1820.

(HBCA, B.139/a/126: fos. 32,33). There is, however, no mention of measles during either James Swain's tenure (until September, 1819) or that of Adam Snodie (starting in late September). It is apparent that Franklin's account and that of Swain are not reconcilable, and that one is in error, or negligent[4]. In consideration of the scientific objectives of the expedition, this study accepts Franklin's version. The probability that Franklin would be more likely to pay close attention to the problems of the local Indian population, and the presence of Dr. Richardson who was probably better able to diagnose the disease than Swain or Snodie, support this view. For Swain or Snodie, on the other hand, the diagnosis was less important than recording the loss of capable hunters. It is therefore suggested that neither of the York Factory Factors noticed the presence of measles among the Swampy Cree[5]. Since there was no post journal for Oxford House between August of 1819 and October of 1820, nor for Norway House between June and October of 1819, however, Franklin's diagnoses cannot be confirmed or rejected.

Assuming that Franklin was correct, the measles reached York Factory by September, Oxford House some time prior to September 28th, and probably did not reach Norway House before his arrival on October 6th. The latter conclusion is supported by the journal at Norway House which, although it does not cover the period when Franklin was there, points to an introduction of measles on November 13th (HBCA, B.154/a/8: p.6). On that date, a native family from Swan River to the west of Lake Winnipeg arrived at the post carrying both diseases, an area which was at that time suffering the combined effects of measles and whooping cough, (Decker, 1989: 95). Decker's (1989: 90) map of the diffusion of the measles and whooping cough epidemics suggests that the measles virus did not reach the north end of Lake Winnipeg before November. Therefore, if the disease was present at York Factory prior to September, it would

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[4]Decker (1989) considered the same evidence and concluded that the measles never reached York Factory or Oxford House, and did not diffuse to Norway House until late November. It appears that she assigned greater weight to the the post journals of York Factory than to the journal of Franklin's expedition. There is no problem with evidence concerning the diffusion of whooping cough, however. All accounts agree that it reached York Factory, probably in late June or early July.

[5]The fact that both Swain and Snodie mentioned only whooping cough is not necessarily significant in and of itself. Upon taking command Snodie was probably briefed by Swain as to the status of the Indians.

have had to have diffused from some place outside the immediate vicinity. The most likely source was the Red River Settlement.

Diffusion from the Red River to York Factory would have required the relocation of only a single infected individual, as the length of the journey did not exceed the infectious period, given infection at the settlement. One possibility was a canoe dispatched for York Factory on August 3rd, as noted by Peter Fidler (HBCA, B.51/a/2: fo.10). It is also possible that a canoe which Fidler did not make note of was dispatched to York to meet the Prince of Wales. In any case, it was entirely possible for an infected individual to have passed Norway House without showing any symptoms of the disease, and without being infectious, before passing the infection on to others at York Factory. If a single day is estimated for the journey down the Red River to Lake Winnipeg, then one could reach Hudson Bay via the Hayes River after a journey of, on average, only 13 days (Lytwyn, 1987). The average incubation period of a case of measles is between eight and twelve days (Cliff, *et al.*, 1981). Given the larger estimate, the infective could be within perhaps a day of York Factory before becoming communicable. Even given the lesser estimate, Norway House would have been reached eight days earlier than York, and an infective could easily have passed through without transmission, and before visible symptoms became apparent. Thus, it is quite possible for the disease to have diffused to York Factory and Oxford House by the progress of a single infective, with Norway House remaining free of the disease until it was introduced from another source in November. It cannot be discerned from Franklin's account, however, whether Oxford House was infected by the original infective, or through "infilling" from York Factory.

Diffusion from Fort William

The NWC post at Fort William served as the local point of origin for the measles epidemic which swept through much of the Petit Nord in 1819-20. From this administrative depot, that company's fall fur brigades spread the virus through a large part of the Petit Nord. In many ways,

the circumstances surrounding this process were optimal for widespread diffusion. Although the disease was introduced at the post in May, or several months prior to the departure of the brigades for their wintering posts, it was maintained by the large numbers of people gathered in and around the fort. As many as 2000 people were accommodated within the fort during the summer. Outside was a village along the Kaministiquia River, housing Indian families as well as Freemen (Campbell, 1915: 295). The large supply of susceptibles at Fort William acted as a pool, circulating the disease until late in the summer when the brigades embarked. Also significant was the unified nature of the NWC's trade network. All of the brigades were routed through Fort William, with the exception of the Athabasca canoes which stopped at Lac la Pluie. With measles being introduced at the central hub of the network, the entire operating territory of the NWC was potentially vulnerable. As well, the ethnic background of the men manning the brigades aided in the diffusion of the disease. These men were primarily French Canadians and Métis, men who had never been exposed to measles, were susceptible to the disease and who could pass it on to the Indians with whom they traded. Finally, the timing of the brigades dictated a widespread pattern of diffusion. The brigades were generally dispatched from Fort William during the late summer and early fall, not only to precede the freeze up of the rivers, but also to maximize contact with the Indians. This coincided with the period of greatest population densities and interaction among the Indians. As a result, transmission occurred prior to the winter 'fission' into smaller, more isolated winter camps when a lack of interaction would preclude transmission. These factors combined to create a widespread potential for diffusion, one that largely reflected the transportation network of the NWC.

Regional Patterns within the Petit Nord

The Boundary Waters Region

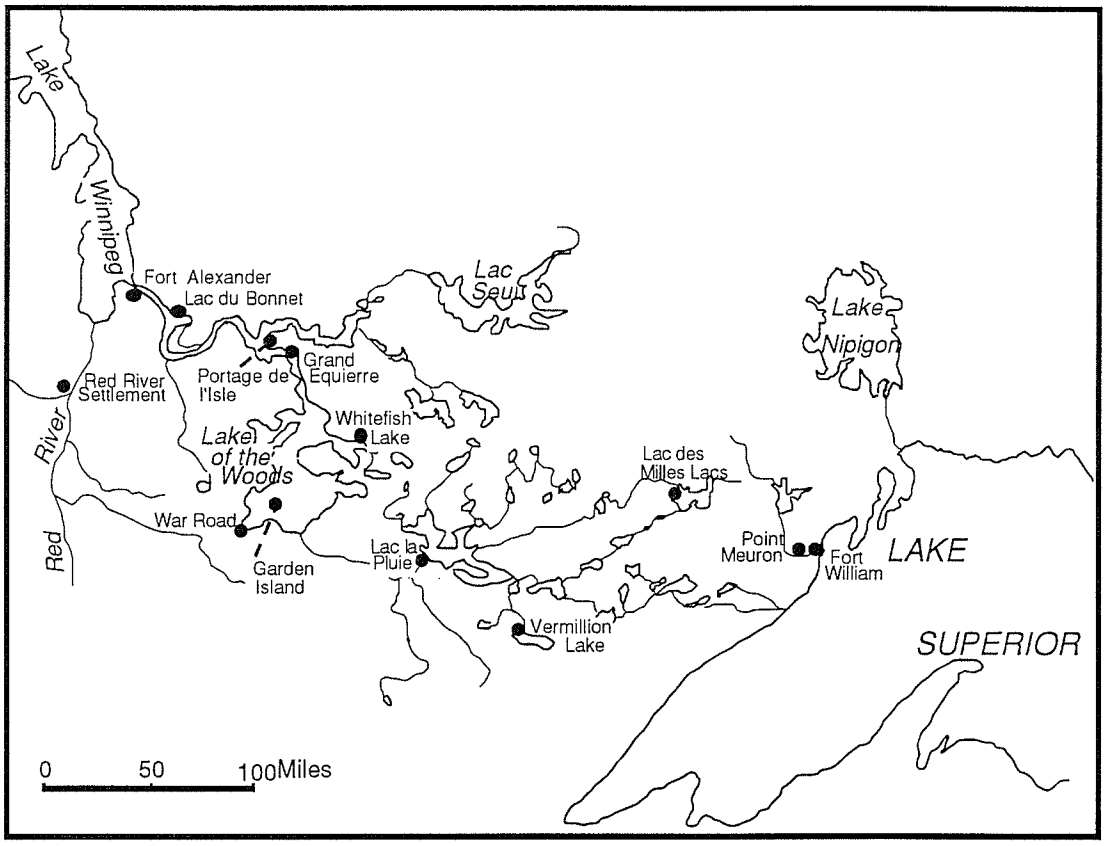

Figure 21: The Boundary Waters

The Boundary Waters route, connecting Lake Superior, Lake of the Woods, and Lake Winnipeg, was the NWC's sole link with the Grand Nord and, as a consequence, was heavily travelled by both local brigades and those destined for the lands west and north of Lake Winnipeg (Fig. 21). The company maintained several posts along the route, but the two most significant for the purposes of this study were Fort Alexander and Lac la Pluie.

Fort Alexander played a critical role in the long distance traffic to the Grand Nord. From its strategic location near the junction of the Winnipeg River and Lake Winnipeg[6], the post collected

[6]Fort Alexander was erected on the former site of the HBC's Pointe au Foutre House (Lytwyn, 1986: 141). At one time it had been known as Bas de la Rivière Ouinipique.

provisions to maintain the brigades on their journeys. Provisions included pemmican, collected by the NWC's plains posts and transported to Fort Alexander via the Red River and Lake Winnipeg, sturgeon from the Rainy River (Holzkamm *et al.*, 1984), and garden produce from Garden (or Plantation) Island on Lake of the Woods (Moodie and Kaye, 1987: 78). The latter two were obtained directly from the Indian suppliers by those stationed at the fort. Befitting the critical role played by Fort Alexander was the substantial nature of the post. It was described in 1815 by HBC employee Dr. George Holdsworth:

> The buildings are extensive consisting of an elegant house for the officers, of several extensive warehouses, of a large Barn and a corn hill. Cultivation is carried on to the extent of four or five acres (quoted in Lytwyn, 1986: 141).

This description suggests that along with the products of the fort's own gardens, a large amount of produce was being traded from the Indians living between the Rainy River and Lake Winnipeg. These trade connections with the plains and Boundary Waters regions, as well as with the passing brigades, made Fort Alexander ideal for disseminating the measles virus.

The other significant NWC post in this region was Lac la Pluie. Its importance lay not with collecting furs, since the beaver population of the Boundary Waters region had ceased to be plentiful by the 1790's (Lytwyn, 1987), but in its transport function. According to Lytwyn (1986: 133), "Lac la Pluie was not a highly productive fur trade department in 1811, but it was a strategic centre for the North West Company's transportation and provisioning network." Although describing its role as of eight years prior to the epidemic, Lytwyn's description is none the less applicable for Lac la Pluie in 1819. Similar to Fort Alexander, locally produced provisions were collected at the post, as well as from the plains, which were passed on to the brigades headed for the Grand Nord, some of whom were likely infectious. It is also possible that the disease was brought to that post by its own employees returning from Fort William. In either event, the disease was then passed on to the Ojibwa living in the area through the provisioning trade, and the trade

for furs going on at Lac la Pluie, and at the smaller posts in the Lac la Pluie department[7]. By the fall of 1819, the disease was widely diffused throughout the Indian population of the Boundary Waters (HBCA, B.105/a/7: fo.43). The exact timing and circumstances surrounding this diffusion cannot be directly discerned from available evidence and must instead be inferred. The NWC, the principal agents in the diffusion process, did not leave behind journals relating the day to day activities and status of the men, unlike their rivals. Their exact movements are unknown, except when they appear in the documents of the HBC. Fortunately for this study, the HBC also maintained a post at Lac la Pluie, and the journal written by Roderick McKenzie provides significant information about both the movements of the NWC men and the health of the Indians living in the region. From this information it is possible to establish the events surrounding the diffusion of the measles virus in this area.

Roderick McKenzie began the 1819-20 season, not at Lac la Pluie, but at Montreal, preparing to escort the HBC's French-Canadian employees to the Athabasca country. He left Montreal in mid-May of 1819 and proceeded to the Northwest using the same route as was used by the NWC's brigades (HBCA, B.105/a/7, Fos. 3-15d). He arrived at Lac la Pluie on July 5th. While there, he made no mention of measles having occurred either at that time or earlier, of which he would have been apprised through conversation with the men who had summered there. McKenzie and the Athabasca brigade continued on after a brief stay heading for Lake of the Woods. On July 8th he met two healthy Indians who made no mention of disease. The following day, he encountered a band of Indians at Rat Portage (present-day Kenora, Ontario) on Lake of the Woods (Ibid: fo.16d). By July 12th the party reached the Winnipeg River and conversed with another band of apparently healthy Indians. None of these Indians suggested to McKenzie that measles was present at that time. The same day, however, he stopped to talk to another group of

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[7]These posts were Vermillion Lake, War Road, and Whitefish Lake (Fig.21). There were small posts in the area belonging to other NWC departments as well. Lac des Milles Lacs was settled from Fort William, while Lac du Bonnet and Grand Equierre belonged to the department called River and Lake Winnipeg (HBCA, A.64/26).

Indians at Lac du Bonnet. He was well acquainted with the leader of the group who gave him news of the epidemic. He met

> the Duck Indian + some of his Band who formerly traded with me at Dead River[8] + Portage Le Prairies...He expressed a desire we should establish a post in this Lake or in its viscinity where he + his Band would winter promising they would exert themselves in hunting + making Rice. He told us that numbers of the Indians were dying of the measles" (HBCA, B.105/a/7: fo.17).

Decker (1989: 90) has taken this statement as evidence that the measles epidemic had reached Lac du Bonnet by July. However, another interpretation of this evidence is possible. From the statement, it appears that the Duck Indian and his group had left their usual territory to winter on the Winnipeg River. If they had come to winter there, they had arrived far earlier than was normally the case. In general, most Indian peoples living in this part of the Northwest would not depart for the wintering grounds until the fall, much later than July 12th, which was when McKenzie met them. If the party had departed earlier than was normal, the most likely reason was that they were fleeing the measles epidemic, which was rampant in their usual territory. Thus, when McKenzie was told that "numbers of Indians were dying of the measles", the Duck Indian was probably referring to those living farther west, where he had come from, and not those inhabiting the Winnipeg River country. Given that measles was widespread at Brandon House by June 27th (HBCA, B.51/a/2: fo.7), it was quite possible that the epidemic had reached Portage la Prairie by early July, although there is no evidence of it having reached Dead River. The statement, then, is compatible with events occurring at that time to the west of the Red River. An interpretation suggesting that the disease was present in the Lake of the Woods-Winnipeg River area by early July is not supported by McKenzie's other encounters in that vicinity. None of those Indians had mentioned measles, and none exhibited any symptoms of the disease. It appears, then, that the epidemic had not reached this region by the time McKenzie passed through.

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[8]This river was also called Rivière aux Morts, Ne-bo-wese-be, or Netley Creek (Moodie and Kaye, 1987: 173). It flowed into the Red River near Lake Winnipeg. Along this small river was "the earliest historical centre of native agriculture in the Canadian Northwest", founded by a band of Ottawa Indians at the turn of the nineteenth century (Ibid: 172).

After a prolonged and arduous trip, which took him first to Fort Douglas[9] during the height of the epidemic there and then on to York Factory, McKenzie returned to the Winnipeg River on September 3rd, passing Fort Alexander around which he saw a number of Indian tents (HBCA, B.105/a/7: fo.27). On September 6th he left four men at an outpost at Portage de l'Isle on the Winnipeg River (Fig. 21), where the NWC had already settled (Ibid: fo.28). There he found four Indians who provided him with provisions and told him "that a number of them [the Indians] were ill with a sickness which was brought among them by the White people but [they] did not particularize either party" (Ibid: fo.28). At Garden Island on Lake of the Woods, on September 10th, McKenzie attempted to obtain provisions from the Indians who cultivated extensive gardens there. By that time both measles and whooping cough were widespread.

> The Indians were very troublesome partly owing our not understanding them + the North West having circulated a report among them that it was the English that had brot the measles + hooping cough Among them which [causes] so many of them to die (HBCA, B.105/a/7: fo.29d).

This timing is consistent with the interpretation of John Tanner's arrival at Garden Island presented in Chapter 3, which suggested that Tanner arrived on or about August 24th, with the measles epidemic in full force and causing great suffering. According to Tanner:

> A few days after my arrival at Me-naw-zhe-tau-naung one of my children sickened and died of the Measles, a complaint at that time very fatal amongst the Indians. The others were subsequently attacked, but I now knew better how to take care of them and no more died (James, 1830: 255).

It was most likely the NWC men from Fort Alexander and Lac la Pluie who brought the disease among them. McKenzie was told by an Indian family making rice at another part of the Lake of the Woods that, "the NWest have been among the Indians in the [different] places in which they make rice..." (HBCA, B.105/a/7: fo.28d). The NWC men had also earlier traded with the Garden Island Indians, collecting most of the rice that was available for trade. Conversely,

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[9]The HBC fort at the forks of the Red and the Assiniboine Rivers.

McKenzie was informed by the White Partridge, who acted as spokesman for these Indians, that the HBC's Lac la Pluie men had not been among them as of September 10th (Ibid: fo.29). In fact, judging from the general state of confusion existing at the HBC post at Lac la Pluie over the summer of 1819, it would seem that these men had not been among any Indians.

When one of McKenzie's men finally went to obtain rice from Indians of the southern part of Lake of the Woods in late September, he found that the measles had been present for some time, and that a number had died of the disease (Ibid: fo.36d). The fact that the transmission of the measles virus to the Winnipeg River and Lake of the Woods Ojibwa took place during the rice making season is significant. Rice making camps assembled in late August and early September, prior to the harvest of the gardens (Waisberg, 1984: 127). Typical camps could support very large populations which broke up into the fall and winter hunting bands (Vennum, 1988: 143, 163). This was a period of considerable interaction among the Indian people and introduction of the virus at that time would ensure that the disease would have had the greatest possible diffusion through the Indian population. Had the disease made its presence a little later in the fall, after the Indians had dispersed, the epidemic would have been much more localized.

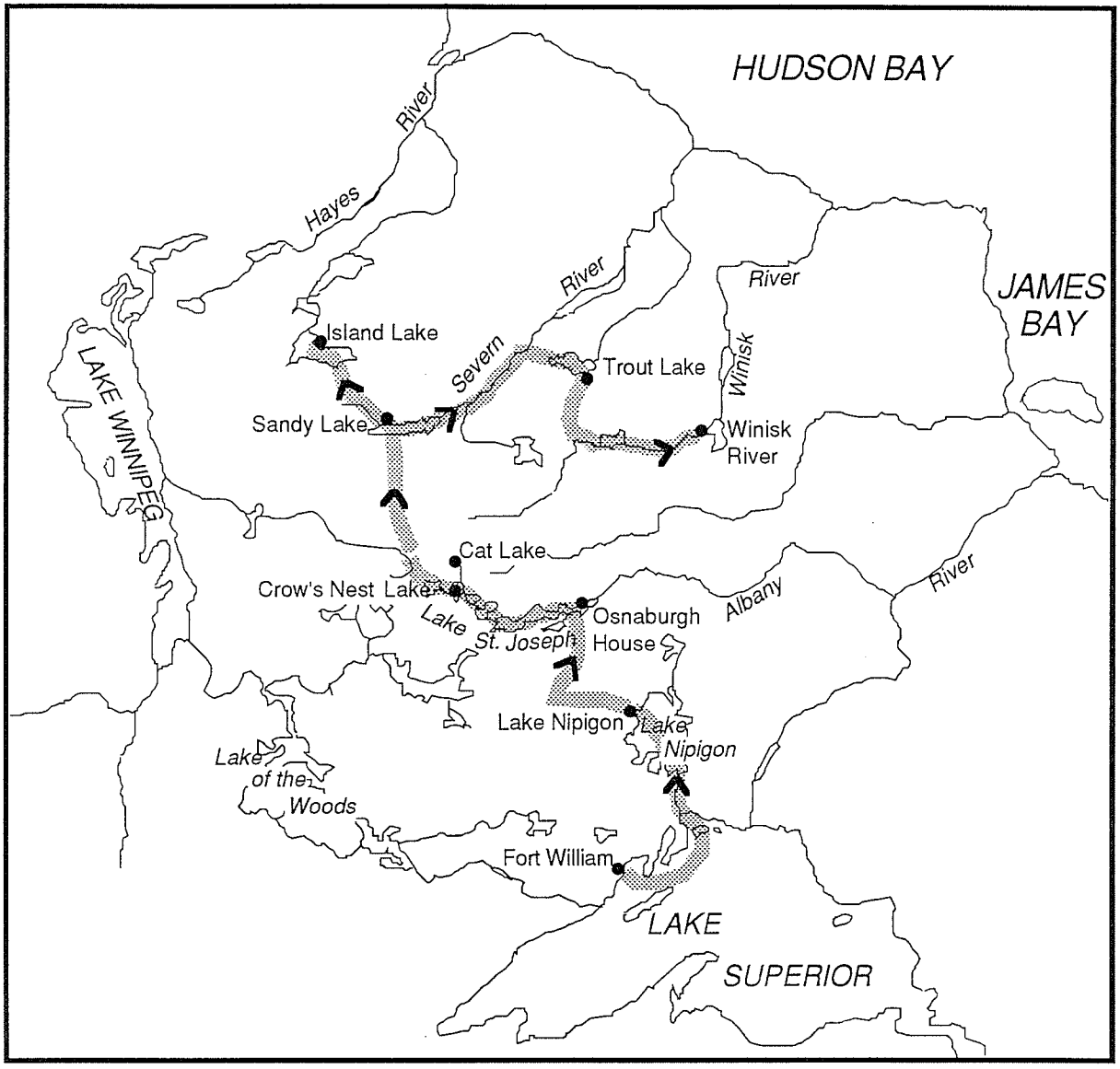
Roderick McKenzie arrived at the HBC post at Lac la Pluie on September 14th (HBCA, B.105/a/7: fo.30d). It was around that time that the measles diffused to the Indians living in the vicinity of the post. He noted that the NWC post, manned by 14 men under a trader named Dease, had "already debted + sent off the greatest number of the Indians" by the 18th of September (Ibid: fo.32, 33d). By October 3rd the disease had made its presence felt throughout the Lac la Pluie area. According to McKenzie, "I endeavoured to get the Indians to Seine but they had all refused Saying how could I expect them to Seine when they are all dying of the measles" (Ibid: fo.38d). The disease persisted throughout the remainder of the fall and into the winter. In a letter to James Bird written on November 29th, McKenzie wrote that "the Indians are both dying + starving in numbers" (Ibid: fo.51d).

A short time prior to McKenzie's arrival at Lac la Pluie, several of his opponents departed their post for their outposts. He was told that "Mr. Sayer of the NWest with 6 men and one clerk

Monsr. Russeau left this on the 11th Inst. [September] on there [sic] way to Vermillion Lake" (Ibid: fo.31) (Fig.21). Another brigade under "Mssrs Caddote [sic] and Grant with 8 men in two canoes" had departed for Lake of the Woods, presumably for the outposts at War Road and Whitefish Lake (Ibid: fo.31). The disease was probably carried by these men to their outposts. By this time, measles was already present among some of the Indian groups living around Lake of the Woods, and these brigades served to carry the disease through the rest of the area. The Vermillion Lake brigade carried the virus into an area that had previously been unaffected. On October 21st, McKenzie was told by a group of Indians that "all the Indians toward Vermillion and Sturgeon Lake were starving + many of them dieing [sic] of the Sickness which we suppose to be the measles which is [raging] among them all over this part of the country" (Ibid: fo.43).

The measles virus was introduced in the Boundary Waters region in late August and early September, prior to the seasonal dispersal of the Indians. Reports of the disease suggest that it was introduced first along the Winnipeg River, and a little later in the vicinity of Lac la Pluie. Throughout the region, the Indians were infected when they were most concentrated, and carried the disease back to their wintering grounds where the epidemic continued on into the winter. This timing, combined with the role of the NWC outposts, and the NWC men who went among the Indians to purchase rice, ensured that the epidemic was diffused throughout the entire area.

Lake St. Joseph and the North



After Lytwyn (1987)

Figure 22: North West Company Brigade Routes through Lake St. Joseph to the North

The progress of one infected NWC brigade was noted by HBC employee George Atkinson of Osnaburgh House, on Lake St. Joseph (Fig. 22). On August 14th, 1819 he encountered a brigade at Pedlar's Path, near the house. Atkinson

> saw the servants of the N.W. Mr McKinzey [sic] (chief clerk) with 10 men in two Large Canoes who informed me of a Distemper raging amoungst the Indians to the Southward, and have destroyed numbers of them - and I much fear that great numbers of thease Indians in this quarter will feel the Horror of this malady as they [sic] are already numbers of People in a most distressing situation belonging to the NW Servants who are now proceeding to the Northward. He informed me that two of his men were [prevented] from walking and that six more were ill of the same disorder (HBCA, B.155/a/32: fo.4d).

Of McKenzie's ten man crew, eight were ill with the measles at that time, and it would seem that more crews were proceeding in that direction. This crew did not remain in the vicinity of Osnaburgh House, but continued on to Crow's Nest Lake (Fig. 22). Given the description of the men's condition, it is likely that they were suffering from the advanced stages of the disease, and as the crew passed along Pedlar's Path on August 14th they would probably soon be unable to transmit the disease. Since they were bound for nearby Crow's Nest Lake, a short distance from where the HBC men met them, they were likely still infective when they reached that post, unless prevented from continuing by a worsening of the men's condition. There was, therefore, a good possibility that this brigade was able to pass on the measles virus when they reached their destination, but that their period of communicability was approaching its end. The limits of the brigade's potential for spatial diffusion was rapidly being reached, somewhere to the north of Osnaburgh House. Although headed for a nearby post, however, there is some evidence that McKenzie wintered at Lac Seul, as shall be shown below.

It is clear that the brigade failed to pass on the virus while travelling past Osnaburgh House. The HBC journal for 1819-20, written by Atkinson and William McKay, makes no mention of measles among the Indians frequenting that post, including some who traded with the Canadians, nor does the season's district report (HBCA, B.155/a/32; B.155/e/8). This absence is verified in a letter written to HBC Governor Thomas Vincent by John Davis of Martin's Falls after the

epidemic had run its course and further diffusion was no longer possible. In July of 1820, he wrote that the disease "had not reached lower than Lake Sal [Lac Seul] as not an Indian as I have learnt at Sturgeon Lake[10] or Osnaburgh had been ill of it" (B.123/b/2: fo.20). That year the HBC at Osnaburgh House were opposed by the NWC only at Sturgeon Lake (Anick, 1976: 410). It would seem, then, that the Indians who normally traded in the region of Osnaburgh were spared the disease.

As mentioned above, other infected brigades were on the way to the north. Several of these would have passed through Lake St. Joseph, on which Osnaburgh House had been established. This lake formed part of a transportation corridor which included posts at Sandy Lake and Trout Lake, and a connection with Island Lake (Fig. 22). In all probability, these areas were protected from the epidemic by the extended travel times of the NWC brigades from Fort William. Sandy Lake was approximately 50 days travel from Fort William, Island Lake was 56 days, and Trout Lake was nearly two months (Lytwyn, 1987). These times greatly exceeded the communicable periods for the brigades[11]. The Indians living in the vicinity of Island Lake, which the NWC crews only visited but did not settle, were spared the misery of the measles epidemic. They were, however, severely afflicted by the whooping cough beginning in late September. The disease had been brought from the Red River Settlement by mixed-blood men in the HBC's employ (Decker, 1989: 95). There was also no mention in the HBC journal of the measles among the Indians at Trout Lake (HBCA, B.198/a/59). Since the HBC did not settle at Sandy Lake that year, verification is impossible, but given the distance of travel involved, diffusion from the southward was highly unlikely. Much of the northern part of the Petit Nord, then, was spared the epidemic by virtue of the lengthy journeys required to get there from Fort William.

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[10]Directly to the south of Osnaburgh and midway between Lake Nipigon and Lac Seul.

[11]The period of communicability for a single case may, with a fair degree of confidence, be treated as representative for the entire brigade, since infection of the entire crew almost certainly took place at the same time, at Fort William. This situation is known as a common source infection. Propagated or person to person infection, in which serial transmission occurs and the epidemic is extended, would have been unlikely among members of the same brigade who departed Fort William, the place of infection, at the same time.

Lac Seul

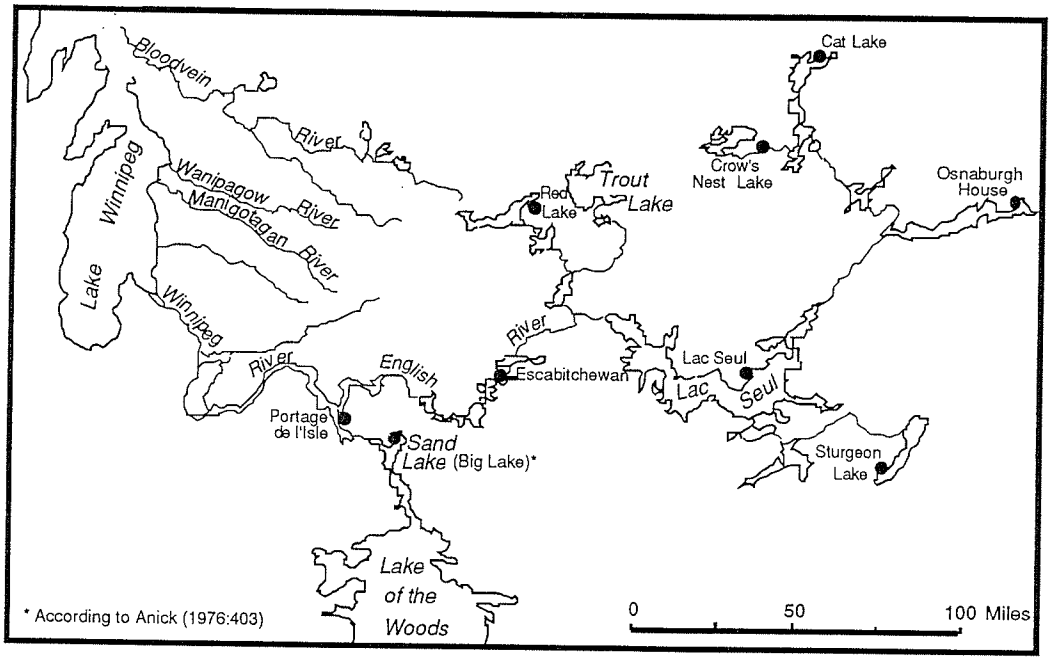

Figure 23: Lac Seul and the Red Lake District

Measles was also carried by the NWC's brigades into the country to the north of the Boundary Waters, between Lake Nipigon and Lake Winnipeg (Fig. 23). In this area, the brigades were destined for the NWC's Lake Nipigon department. While it is not known whether the disease was introduced to the Indians in the eastern section of this department, near Lake Nipigon and Sturgeon Lake Posts[12], it is certain that, at Lac Seul, to the west, the epidemic was widespread

[12]There is a very good possibility that the Indians living around Lake Nipigon Post were at risk. This post was the jumping off point for all of the NWC's brigades penetrating into the Petit Nord (Moodie, 1987: 361). Additionally, the NWC clerk McKenzie had informed the HBC men at Pedlar's Path that "the Indians to the Southward..." were suffering from the disease (HBCA, B.155/a/32: fo.4d). This may have included Lake Nipigon which was to the south of Lake St. Joseph. Sturgeon Lake may not have been afflicted. As noted above, it was reported by John Davis of Martin's Falls that, as of July 1820, no Indians at Sturgeon Lake had contracted the disease (HBCA, B.123/b/2: fo.20). If so, this would suggest that the disease had diffused by another route other than directly from Lake Nipigon through Sturgeon Lake.

and severe by the fall. As was the case further south, the timing of the diffusion must be discerned from HBC documents, as there are no NWC records which provide this information.

On August 21st, HBC trader James Slater and his men passed through Lac Seul, on their way from Albany Fort to their winter posts at Red Lake, Escabitchewan, and Big Lake[13] (Fig. 23). At the NWC post on Lac Seul, Slater noted the presence of only William Harris and his three men, who had summered there (HBCA, B.64/a/8: fo.1d). Harris was not to remain at Lac Seul for long, however, but would winter at Bad Lake, on the upper reaches of the Bloodvein River, after being outfitted from Lac Seul (Lytwyn, 1986: 155). During the winter, another set of NWC men manned Lac Seul. When Slater departed Escabitchewan the following spring (1820), he stopped in again. While there, he talked to Mr. McKenzie, the man in charge of his opponents' post (HBCA, B.64/a/8: fo.20). This was Charles McKenzie, a key figure in the area for many years. He had joined the NWC in 1803, serving as a clerk in the Missouri area from 1803 to 1807 (HBCA File: Charles McKenzie). He arrived at Lac Seul in 1808 (HBCA, B.107/a/16: fo.25), and was made master of Lac Seul District in 1815. After the union of 1821, he joined the HBC and remained at Lac Seul until 1854, when he retired to the Red River Colony (HBCA File: Charles McKenzie). McKenzie had arrived at Lac Seul for the 1819-20 season on September 4th, 1819, with 2 canoes and ten men (HBCA, B.64/a/8: 4d). According to Anick (1976: 410), in 1819-20, McKenzie settled four posts besides Lac Seul, including Cat Lake, where three men were left, and which was also near the immediate destination of the infected brigade at Pedlars Path[14]. Other posts were at Bad Lake, and probably Crow's Nest Lake and Red Lake. The post at Lac Seul served as a supply base for these other settlements, and it is probable that the disease was redistributed from there.

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[13]There was no HBC post at Lac Seul in 1819-20. The HBC had abandoned that place in 1805 and would not resettle there until after the union of the HBC and NWC in 1821. As a result, there is no eyewitness account of the events at Lac Seul. Nevertheless, there are confirmatory accounts, given by both the local Indians and the NWC men, of the measles inflicting severe casualties among the Indian population of Lac Seul.

[14]Anick(1976: 410) stated that McKenzie also settled Big Lake, but according to James Slater, there were no Canadians at Big Lake (HBCA, B.64/e/2: fo.3d).

The brigade which brought the measles to Lac Seul was probably led by the same McKenzie whose brigade passed Osnaburgh. Crow's Nest Lake, to which the latter brigade was headed, was likely one of those posts settled by Charles McKenzie. Additionally, Atkinson had described the Crow's Nest Lake-bound McKenzie as a Chief Clerk (HBCA, B.155/a/32, fo.4d). Charles McKenzie was the NWC's District Manager for Lac Seul, and Atkinson's description of McKenzie's rank would have been appropriate for Charles McKenzie. Finally, the timing would have allowed him to proceed to Lac Seul after arriving at Crow's Nest Lake. The first brigade arrived at Pedlars Path on August 14th. It was not until September 4th that Charles McKenzie reached Lac Seul. In the interim, he had twenty-one days to make the circuit from Crow's Nest Lake to Lac Seul, a time period that would have been sufficient for him to have travelled to Crow's Nest Lake, Cat Lake, and finally on to Lac Seul.

If it was Charles McKenzie who passed Osnaburgh on August 14th, his original crew could not have been infective when it arrived at Lac Seul, nearly a month later. Instead, he had to have picked up new crew members along the way. This is entirely possible, given the circumstances. The infected brigade which passed to the north eventually settled five posts (HBCA, B.155/a/32: fo.23). There were, however, only eleven men in the two canoes. It does not seem that that small number of men was not enough to settle that many posts. Given that the majority of the original crew was ill on August 14th, with some men incapable of continuing, it would have been logical for McKenzie to exchange his crew for the healthy men who had been left in the country, presumably at Cat Lake or Crow's Nest Lake. This would allow the disease to be transported to Lac Seul.

Whether the two McKenzies were the same, or a different man led the Lac Seul brigade, arriving directly from Fort William, it must have been Charles McKenzie's brigade which brought the measles to Lac Seul. The Indians living in the vicinity of Lac Seul told Slater that "the Canadians at Lac Sall had brought the Mesals to that place..." (HBCA, B.64/e/2: fo.2). Harris and his men were apparently well when Slater passed by August 21st, and there was, at that time, no local source for the disease in the vicinity of Lac Seul. Therefore, the virus was brought to Lac

Seul by a later arrival at the post. From Fort William, then, the measles had been carried by a NWC brigade to Lac Seul, very probably by a circuitous route through Lake St. Joseph, and diffused to the Indian population at Lac Seul. Whatever the source, throughout the remainder of the fall, and into the winter, the epidemic battered the Lac Seul Indians, eventually killing an estimated two thirds of them (HBCA, B.64/a/7: fo.20). Here was the 1819-20 measles epidemic at its most severe in any part of the Canadian Northwest.

During the 1819-20 season, the NWC established two posts to the west of Lac Seul, at Bad Lake and Red Lake (Lytwyn, 1986: 155). It has already been noted that William Harris settled Bad Lake from Lac Seul, and it is probable that Red Lake was also settled from that post. It was from Lac Seul, then, that the measles was transmitted to the area to the immediate west (Fig. 23). The disease also diffused from the NWC's Red Lake post when debt was given to the Indians in late September. By September 25th, the majority of Indians had been debted by the HBC at Red Lake, and there had been no mention of the disease to that point (HBCA, B.64/a/8: fo.5). Shortly after, it was passed on to the HBC employees. Marcus Calder reported to Slater that Thomas Sanderson died of the measles on October 11th, after a few days illness (Ibid: fo.8d). Since the incubation period of the disease lasts between eight and twelve days, infection likely took place near the end of September, or early the next month. As such, it was not possible for Sanderson to have been infected before arriving. He was dispatched to Red Lake on September 1st, and arrived shortly thereafter, long before the time of infection. The exact timing of the arrival of the measles at Red Lake cannot be discerned from the Escabitchewan journal. What is known is that, from late September until the spring of 1820, the measles circulated among the Red Lake Ojibwa, afflicting all of the Indians, young and old, regardless of the company they traded with (HBCA, B.64/e/2: fo.3). Although the disease had been introduced by the NWC men, once within the Ojibwa population, it was transmitted to others and became widespread throughout the area.

There is better evidence concerning the timing of the diffusion to the area around the HBC post of Escabitchewan, at Ball Lake on the English River (Fig. 23). The pattern of activity of the Indians living near Ball Lake for the late summer and early fall was similar in some respects to

that of the Ojibwa living to the south. They began harvesting wild rice in late August and finished in mid-September. The rice lakes in this area attracted people from as far away as Red Lake (HBCA, B.64/a/7, fo.5d). Following this activity, they headed for their wintering grounds and took debt and traded rice at one of the nearby posts (HBCA, B.64/a/8, fo.17). In 1819, the unopposed HBC post of Escabitchewan had, for the most part, finished this trade by the end of October. During this period, the measles had not appeared among the local Indians, who primarily hunted at Cut Lake and Eagle Lake.

The disease finally appeared at Escabitchewan on October 24th. On that date, "an Indian and family arrived from Cut Lake in a bad state of health with the Measles..." (Ibid: fo.6d). Evidently, by that time the disease had become widespread among the people living there. Slater had sent men to to trade with the Cut Lake people, between October 10th and October 14th, and there had been no sign of the disease at that point (Ibid: fo.5d). Sometime between the 14th and the 29th, then, the Indians at Cut Lake had begun to develop symptoms, and infection had taken place between early and mid-October. The Cut Lake Indians remained at the post and, on October 29th, others arrived at the HBC post and soon began to exhibit symptoms. According to Slater, "Old Stickie + Sons and all his family passed the house, going to their wintering ground. - They scarcely would come into the house for fear of catching the disorder from the other [Cut Lake] Indians" (Ibid: fo.6d). Old Stickie and his family had already been infected, and two days later were indisposed with the measles (Ibid: fo.7). On November 15th, Slater wrote that three of his own children were sick with the disease (Ibid: fo.7d). Throughout the remainder of the winter of 1819-20, the measles was widespread in the area, causing great misfortune to the Indians, and ruining the year's trade in furs.

The measles virus was probably introduced to this area directly from Lac Seul. On October 10th, a group of Indians heading for their wintering grounds stopped in at Escabitchewan and informed Slater "that many of the Ind [Indians] belonging that place were already dead with that Sickness " (HBCA, B.64/e/2: fo.2). Shortly after, the measles broke out locally. This timing is

fairly compelling evidence, especially since the NWC seemingly had no presence among the Indians in the vicinity of Escabitchewan.

To the southwest of Escabitchewan was Big Lake[15] (Fig. 23), where Slater had his other outpost. The NWC did not settle there in 1819-20, but were located only two days walk away at Portage de l'Isle, as were the HBC's Lac la Pluie men (HBCA, B.64/e/2: fo.3d). It has already been noted that the measles appeared in the vicinity of Portage de l'Isle some time in late August, during the ricing season. The disease appeared much later among the Indians at Big Lake. As Edward Mowat's men distributed debt in mid-September, there was no indication of the measle's presence among the Indians they traded with, nor was there any mention of the disease to the traders. By the time of the fall freeze-up, however, the Big Lake Indians "were all taken badly with the measles..." (HBCA, B.64/a/8: fo.3). In 1819, freeze-up in that region started in mid-October, continuing until late in the month (Ibid: fo.6d). Given that, it is apparent that infection of the Big Lake Indians took place in late September, as was the case farther to the north at Red Lake. From this timing, it appears that the NWC men had not visited these Indians during the ricing season, although Big Lake was only two days walk from Portage de l'Isle. It was suggested to Roderick McKenzie of Lac la Pluie, however, that the NWC men had been among all of the rice camps in the vicinity of Lake of the Woods and, given the shortage of rice that year, it is unlikely that they would have passed over the Big Lake Indians (HBCA, B.105/a/7, fo. 28d). One possibility may be that these Indians had gathered their rice to the north, in the vicinity of Escabitchewan, and had arrived at Big Lake later in the fall. According to Vennum (1988: 164), "In times of want, particularly if the rice had failed, Ojibway with plentiful rice stands invited [the] less fortunate" to share in their harvest. With conditions for the growth of wild rice poor near Lake of the Woods, the Big Lake people may have been forced to travel north to get their rice. In his 1818-19 journal, Slater stated that the Red Lake Indians made rice at Escabitchewan, and afterwards departed for Red Lake

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[15]Present-day Trout Lake, according to Lytwyn (1986: 155). Anick (1976: 403) claimed that it was Sand Lake, north of Lake of the Woods. In light of statements made by Slater concerning problems with competition from the HBC and NWC posts at Portage de l'Isle, Anick's location is more likely (HBCA, B.64/e/2: fo.3d). Slater also noted that Big Lake was two days walk to Portage de l'Isle (Ibid). Therefore, Big Lake had to be much closer than Trout Lake, which was far to the north.

(B.64/a/7, fo.5d). They did not remain at Ball Lake during the winter as they were afraid of starving since "there [were] no Bigg animals" in that area (Ibid). Escabitchewan, then, was somewhat of a gathering place for the Ojibwa during the late summer and early fall. Very possibly, the Indians gathered there in the late summer of 1819 were joined by their kinsmen from the south.

Without a NWC post at Big Lake, there is no obvious local source of infection. However, it is probable that the Big Lake Indians became infected from the south, the virus brought back to Big Lake by some who had traded with the NWC at Portage de l'Isle. According to Anick (1976: 405), many of the Big Lake Indians were accustomed to trading at that post. The delay in the infection between the first stages of the epidemic at Portage de l'Isle in August, and the later incidence at Big Lake, in October, would have been simply the result of their delayed return from the ricing areas. It is less likely that the Big Lake Ojibwa contracted the measles while obtaining rice in the vicinity of Ball Lake during the ricing period. The infection of those trading at Escabitchewan appears to have occurred at a slightly later date than at Big Lake. If indeed the disease had been brought to Escabitchewan by the Indians arriving from Lac Seul on October 10th, then infection at Big Lake occurred much earlier than at Escabitchewan. As well, at least some of them had begun arriving at the Big Lake post by mid-September, indicating that they had left the ricing areas prior to infection at the other post. The evidence for this interpretation is minimal, though. The HBC journal for the Red Lake District was written by James Slater at Escabitchewan. Contact between Slater and Marcus Calder (Red Lake) and Edward Mowat (Big Lake) was limited to only a few instances after the latter two departed for their assigned posts early in September. There is, therefore, little information in Slater's journal concerning events unfolding at the two outposts during the period when the disease made its appearance. Thus, the exact details of the diffusion of the disease in the area of Big Lake cannot be ascertained.

The East Winnipeg Country

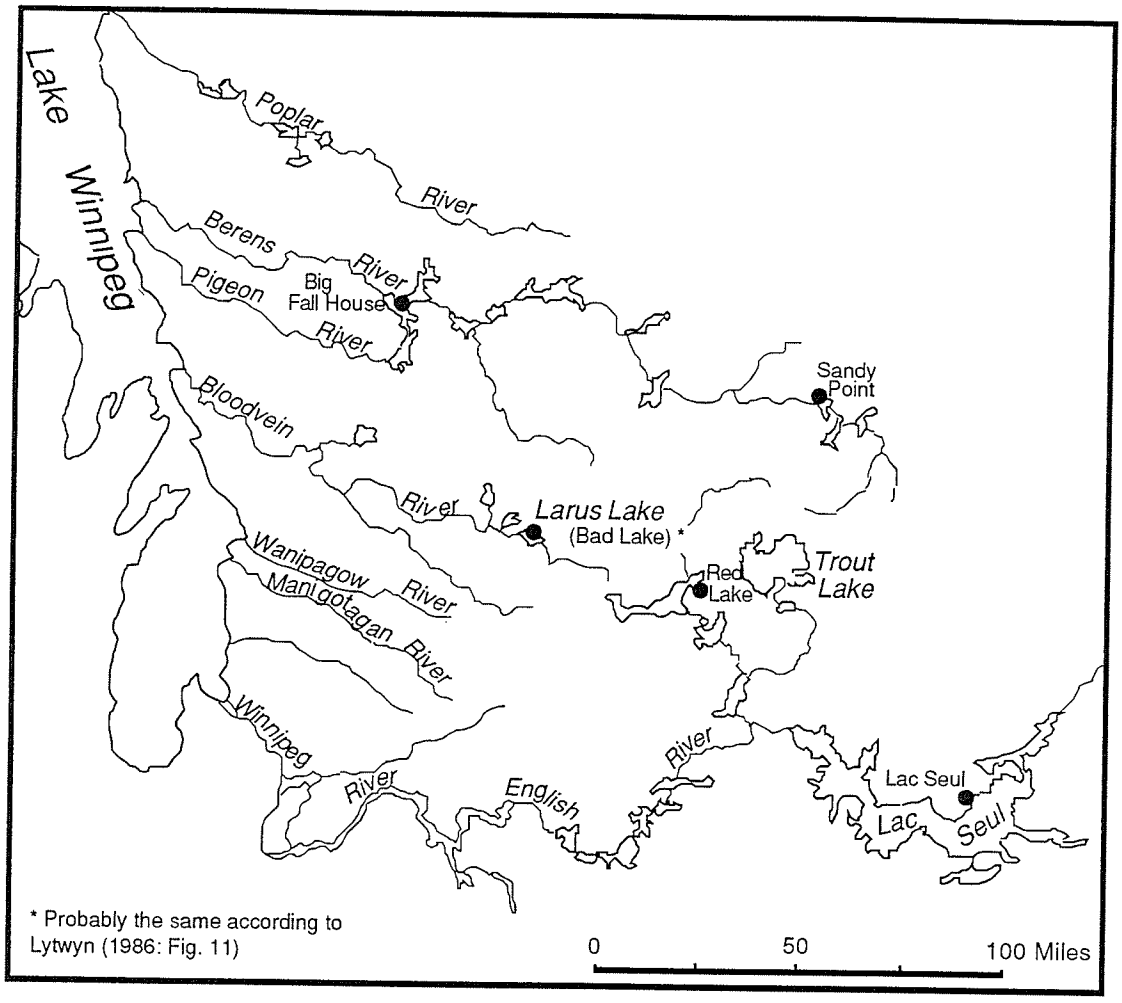

Figure 24: The East Winnipeg Country

It was William Harris and his men who were responsible for first bringing the measles to Bad Lake, on the upper reaches of the Bloodvein River in the East Winnipeg Country[16] (Fig. 24). Harris left for Bad Lake shortly after Charles McKenzie arrived at Lac Seul on September 4th,

[16]This was the land drained by the rivers flowing into the east side of Lake Winnipeg (Lytwyn, 1986: i)

bringing the measles virus with him to his wintering post. He passed Red Lake on the 12th, by that time settled by the HBC's men, before continuing on to his destination (HBCA, B.64/a/7: fo.4d). He and his men wouldn't have been communicable at that time, though, as their infections would still have been in the incubation stage. Some time shortly after that date, the men arrived at Bad Lake. The date of their arrival is unknown. James Robertson of the HBC was dispatched from the mouth of Berens River on August 28th to oppose Harris at Bad Lake, but due to extremely difficult travelling conditions, experienced a much prolonged journey (HBCA, B.16/e/3: fo.2; Lytwyn, 1986: 150). When he finally reached Bad Lake, Robertson found the Indians at that place sick and dying "owing to a disorder the Canadians [NWC] have when they arrived at Bad Lake" (HBCA, B,16/e/3: fo.10d). If Harris' men were infected on September 4th, in all likelihood they ceased to be infective fifteen to twenty-one days later. Therefore, infection of the Indians at Bad Lake took place sometime before September 25th. This infective period coincided with the fall trading period, and thus, the NWC men distributed the disease to the Indians who traded at their post.

Other evidence points to the earlier introduction of some other disease. On September 25th, Donald Sutherland, master at the HBC's Big Fall House (Berens River), was visited by two Indians from the Bloodvein River. According to Sutherland, "this is the Indians that wanted people at bad [sic] Lake, they report that they were all very badly the Course of the Summer..."(HBCA, B.16/a/3: fo.8). Some sort of debilitating condition also seems to have afflicted the Indians further to the north, prior to the arrival of Harris. When Donald Sutherland arrived at the Berens River from Norway House on August 28th, he did not find the Indians waiting to trade with him, as he had expected. Instead, as he later learned, "they wear at Pigeon River all laying badly and near to death "(Ibid: fo.7).

It was unlikely, however, that this was the measles. It was specified by the Bad Lake Indians that that disease had been brought by the NWC men. In 1819-20, Bad Lake was the only post settled by the NWC in the East Winnipeg Country. There was little chance of another NWC brigade travelling up the Bloodvein River to settle further inland from Lake Winnipeg. This was

especially true since the Bloodvein River was extremely difficult to travel, and did not provide easy access to the interior of the Petit Nord (Lytwyn, 1986: 150). If the measles was brought to that area, it would have had to have been by Harris' Bad Lake men. As well, the deaths of the Indians at Bad Lake occurred shortly after they took their debts, and continued until after January (HBCA, B.16/a/3: fos.13, 18). Had the measles epidemic first diffused among the Bad Lake Ojibwa in the early part of the summer, it almost certainly would have exhausted itself well before January. This timing suggests that the measles was introduced during the period of debt giving, in September. More likely, then, was that another disease diffused first, followed by the measles after the summer. By the spring of 1820, however, the latter disease had diffused throughout a large part of the lands to the east of Lake Winnipeg, according to Sutherland, who stated that "the Dreadful Death among the Indian over the whole of this part of the country is the occasion of" the loss incurred in the trade (Ibid: fo.11d).

Despite this widespread diffusion, it has been suggested that the measles made no inroads among the people living in the Berens River area. Anick (1976: 408), for instance, has concluded that the measles did not reach the area. This conclusion is supported by the day to day accounts of the HBC's Big Fall House (Fig. 24), which do not make note of any local Indians suffering from the disease. The HBC men began giving debt to the local Indians in early September, and the process was complete by the end of October. The Indians trading at this post primarily came from an area between Poplar River and Pigeon River, north of the Bloodvein River (Fig. 24), and during the fall there was no indication of the measles among them. It was not until November 30th, when the Swan arrived from Bad Lake to the south, that the disease made its appearance at the Berens River post. He brought with him "the Dreadfull news of the Death of So many of these Indians, the Chief Indian [Gutahapek] and his oldest Daughter to be both buried in one grave and three more Indians to have shared the same fate..[17]" (HBCA, B.16/a/3: fo.10d). On December 2nd, the Swan began to show symptoms of the disease. Sutherland noted that

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[17]He was chief of the "King Fisher tribe". It was suggested by Lytwyn that almost all of the Indians at Bad Lake died (Lytwyn, 1986: 155).

this man was "very badly with the Distemper they all had at the above place" (Ibid: 10d). This was the only recorded incidence of the measles at Sutherland's post throughout the 1819-20 season and, on the surface, Anick's conclusion is supported by the post's journal.

Lytwyn (1986: 155), however, noted that the decline in the trade in furs at Big Fall House was due to the epidemic[18]. Additionally, Sutherland stated in his district report that the measles afflicted the Indians "over the whole of...the country...", the implication being that the entire East Winnipeg Country had suffered from the disease (HBCA, B.16/e/3: 26). He did not single out his area as being free of the measles. The lack of mention in the journal may also be explained. If it did diffuse to the Berens River area, the infection of the people with whom Sutherland dealt likely took place after debt was given, and those who contracted the measles did so away from his post. Thus, the Indians who appeared at the Big Fall post in the fall would have been healthy, and only later would they develop the disease.

It is quite possible that the Bad Lake post also passed the disease on to the Indians wintering near Big Fall house. James Slater, master of the HBC's Red Lake District, noted in his journal for 1818-19 that the Indians at Big Fall commonly traded with the NWC at Bad Lake. If infection occurred at that post, and was subsequently brought back to Berens River where the infected individuals wintered, it would explain why none trading at Big Fall House showed symptoms of the disease.

The Ojibwa at Sandy Point Lake suffered heavily from the measles during the fall of 1819, despite the absence of the NWC from the area. It is unlikely, however, that Harris' post was responsible for the introduction of the virus among these people. In all probability they contracted the disease while obtaining debt elsewhere. According to Marcus Calder, in charge of the HBC's outpost at Red Lake, he had provided debt for a large number of Sandy Point Ojibwa who had come to Red Lake before departing for home (HBCA, B.64/a/7: fo.13). Calder did this before learning that the York men under Sutherland were to settle at Sandy Point Lake, providing debt to

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[18]This decline was apparently temporary. The value of furs for Berens River went from 1,837 £ sterling, in 1818-19, to 1,316 £ sterling, in 1819-20, and then up to 1,815 £ sterling the year after the measles epidemic (Lytwyn, 1986: 147).

the same Indians. It was probably on this trip to Red Lake, where the disease was already present, that they became infected. They then carried the disease back to their wintering grounds on the upper reaches of the Berens River.

Overall, Charles McKenzie's brigade outfitting the NWC post at Lac Seul was responsible for bringing the measles to the country west of Lake Nipigon. From Lac Seul, William Harris' men carried the disease to Bad Lake, and possibly Berens River. Another brigade diffused the virus to the Red Lake Indians and probably those of Sandy Point Lake. Those residing at Escabitchewan, or Ball Lake, were likely infected directly from Lac Seul, by an infected family headed for their wintering grounds. Finally, the epidemic reached Big Lake from the south, from Portage de l'Isle rather than from Lac Seul.

In general, the measles appeared over a month later in the country between Lac Seul and Lake Winnipeg, than in the Boundary Waters Region. This stemmed from two reasons. Firstly, McKenzie's Lac Seul brigade was late, arriving only on September 4th. It is only after that date that diffusion to the westward began. In the major transportation corridor of the Boundary Waters, in contrast, traffic with Fort William was frequent, and there were numerous opportunities for the disease to be carried to Fort Alexander, and then redistributed. The other reason is that the NWC men at Fort Alexander had to trade with the Indians much earlier than those at Lac Seul. As a provisioning post, the men had to collect available country produce prior to the departure of the brigades from Fort William, generally in early September. As such, they were required to visit the Indians at their camps. The disease was therefore diffused to the local Ojibwa in late August during the ricing season. Farther north, there was not the same need to conduct an early trade in rice. There, it appears that the Indians generally brought their harvests to the posts in late September and early October, as they traded and received their provisions. It was at this time that measles was passed to them, just prior to their dispersal for the wintering grounds.

North of Lake Superior

As noted, the measles did not diffuse into the area immediately to the north of Michipicoten, despite the presence of the NWC at Michipicoten, New Brunswick, Mattagami, Capoonacagomi, and Batchawana Bay (HBCA, B.129/e/3: fo.3) (Fig.25). These posts were part of the NWC's Michipicoten Department (HBCA, A.64/26:fo.18d) and were located only a short distance from Fort William. Certainly, they were well within the spatial limits to infectivity of an infected brigade. In theory, the Indians trading at these posts were at great risk to the measles, and it is not entirely clear why they were spared the epidemic. It would seem, however, that these posts were supplied from Sault Ste. Marie and not Fort William. Sault Ste. Marie is listed as a depot in the Michipicoten Department, and the other posts in the Department are all located towards that town (Ibid). If the men had arrived from there, and Sault Ste. Marie was free of the disease at this time, they would not have carried the measles virus, and the posts that they manned would have been free of the disease. This would appear to have been the case, but there is no conclusive evidence for this interpretation.

At Long Lake, to the west of Michipicoten, the HBC's men were struck by an unidentified disease which was probably not the measles. On September 12th, the master of the post, John Train, noted that four of his men were sick (HBCA, B.117/a/5: fo.5). By the 19th, Train himself was ill of the same disorder (Ibid: fo.5d). Train was unaware of the identity of the sickness, but commented that some of the men had been ill of it before arriving at the post (Ibid). These men had left Albany Fort on July 23rd, and had arrived at Long Lake on September 9th (Ibid: fo.5). In between, they had paused only briefly at the deserted Henley House on the Albany River. It was likely at Albany, then, that they had contracted the illness. The fact that Train could not identify the disease, and made no mention of spots, suggests that it was not the measles.

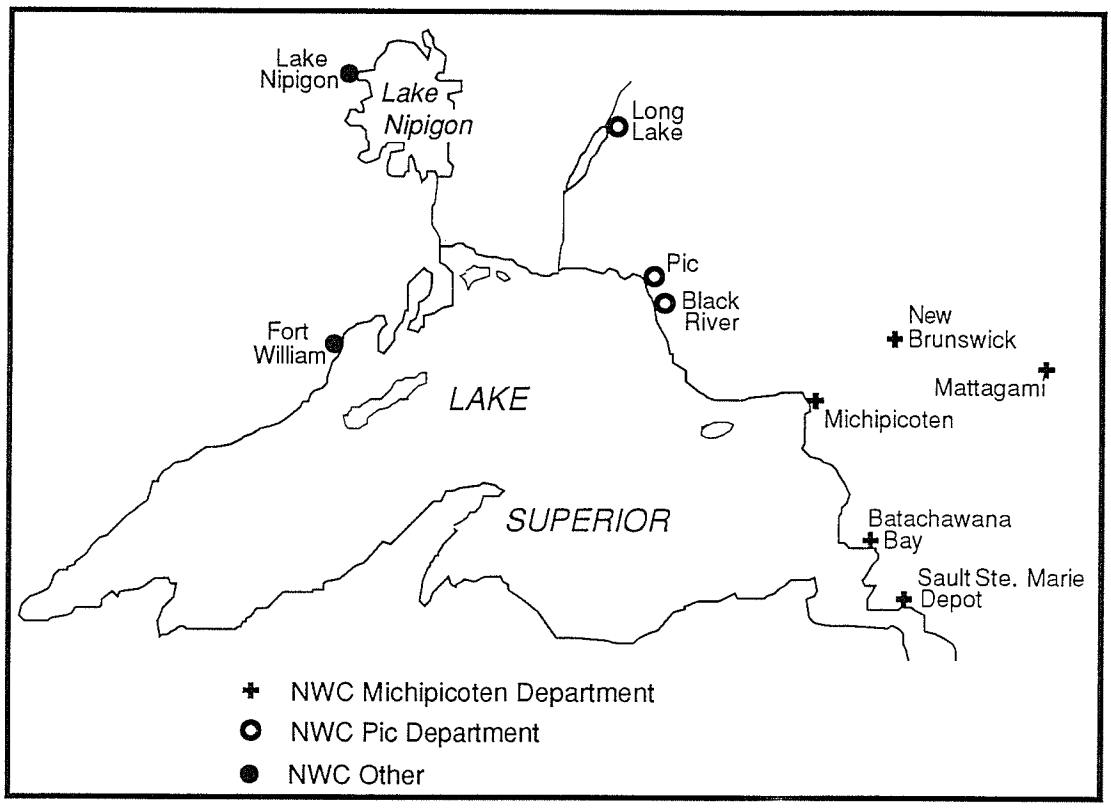

Figure 25: North West Company Posts on the North Shore of Lake Superior

Train's NWC opposition for the 1819-20 season was Solomon Mittleberger, who had with him ten experienced men (HBCA, B.117/a/5: fo.5). The NWC men arrived at Long Lake on the 28th of August, and conversed with Train on September 10th (Ibid), seemingly healthy at that time. By then, they had been at Long Lake for some thirteen days, and the journey from their depot would have required several more. If they had been infected before departing for their assigned post, they would have been showing symptoms of the disease by the time Train talked to them. They were exhibiting no symptoms, however, and were apparently free of the measles. Given this, it would seem that Mittleberger and his men were free of the measles for the 1819-20 season. As was the case with the NWC men near Michipicoten, there is no clear explanation as to why this brigade was not infected. Other brigades departing from Fort William at about the same time were infected, and carried the disease to their posts to the west of Lake Nipigon. This

suggests that the NWC posts at Pic and Long Lake, along with posts such as Michipicoten and Mattagami to the eastward, were supplied from Sault Ste. Marie. Consequently there was no contact with Fort William, where the measles was present and infecting departing brigades, and the posts on the northeast shore of Lake Superior remained safe from the epidemic.

Farther north of Lake Superior, at Martin's Falls and Attawapiskat, the HBC men were not opposed by the NWC (Anick, 1976: 414). Here again, there were several men complaining of an illness, but it was not the measles. Beginning in early February[19], several of the Martin's Falls men began complaining of pain in the "breast" and "belly" (HBCA, B.123/a/18: fo.13d). The most severly afflicted was James Graham. He first became ill on February 21st, complaining of pain in both the breast and stomach (Ibid: fo.14d). With few respites, he was severely ill, and unable to work until his departure in early May for Albany Fort, where he died (HBCA, B.135/b/3: fo.35). The affliction was also present at Attawapiskat, where Robert Cock succumbed to a disease with the same symptoms. He died on March 15th, "after one or two Days illness of a complaint of the Belly and breast" (Ibid: fo.18). The disease from which Graham and the others suffered was probably dysentery. Although Graham experienced a few additional symptoms, such as convulsions (HBCA, B.123/a/18: fo.15), immobilization (Ibid: fo.15d), and "...Rheumatism in his limbs" (Ibid: fo.30), all of the men generally complained of pain in the breast and belly. These symptoms are not generally associated with the measles.

Whatever the disease was, it was not passed on to the Indians trading at the post, probably because the illness made its appearance during the latter part of the winter, or long after the Indians had dispersed. Both Martin's Falls and Attawapiskat had excellent returns for 1819-20 and the Indians at these posts appear to have been disease free during this period. This was in contrast to the other Albany Inland posts which, for several reasons including the epidemic, had very poor returns (HBCA, B.123/e/3).

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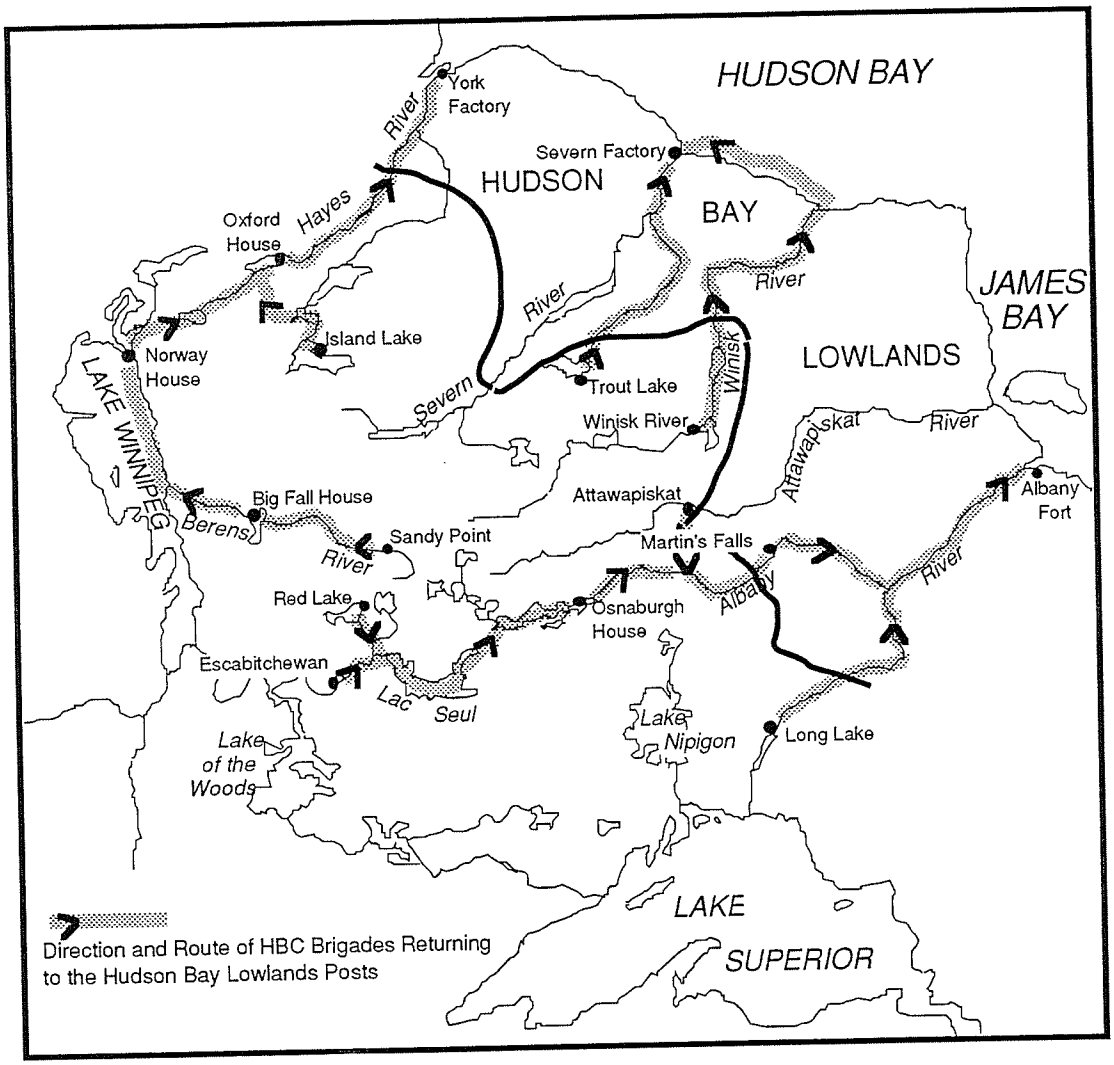
[19]This was very shortly after the arrival of some men from Attawapiskat, and it is possible that the disease was brought from that place, although how it was brought there is unknown.

In general, the 1819-20 measles epidemic did not spread into the country east of Lake Nipigon and north of Lake Superior. This is easily explained for Martin's Falls and its outpost at Attawapiskat, since the NWC had no presence in the area, and the HBC men arrived from Abany Fort on Hudson Bay, which was far removed from the entry points of the measles epidemic. Therefore, there was no one to bring the virus from the south. It would appear, however, that the Albany men carried dysentery into the interior and that this was confined to the Company's personnel. There is no apparent reason why the measles did not diffuse into the lands just to the north of Lake Superior. The NWC settled several posts here and, if they had been supplied from Fort William, the brigades outfitting the posts carried the potential for distributing the measles. Conversely, if Sault Ste. Marie, and not Fort William, was the starting point of the brigades, it would explain why the measles was not carried to these posts.

The Hudson Bay Lowlands

The measles epidemic failed to diffuse into the Hudson Bay Lowlands region of the Petit Nord, other than in the Norway House to York Factory corridor, as has been noted. The journals of both Severn House and Albany Fort make no report of the disease, and this was to be expected in that the NWC maintained no presence within the region (Fig. 26). Despite this, there was at least a small risk to the area from two different sources. One was through the HBC's coastal transportation network, linking the Bayside posts by sloops (Lytwyn, 1987). It was possible that the measles virus, which was present at York by September, could have been distributed from that post to the others. There was little chance of this occurring, however, as the crews manning the sloops would probably have been of British origin, experienced seamen, and almost certainly immune to the disease. Without an infected individual on board, then, there was no opportunity for diffusion.



After Lytwyn (1987)

Figure 26: Brigade Routes to the Hudson Bay Lowlands

A second, and more threatening, possibility was through the spring return of the men from the inland posts. This was not a concern at Severn, where the outposts of Winisk River and Trout Lake were isolated from the epidemic. Parts of Albany Inland, however, were severely affected by the disease and some feared that the returning men would transport the measles back to Albany Fort.

Following freeze-up, the posts in Albany Inland were isolated from each other, generally not communicating until the spring. It was during this period of isolation that Indians living around the upper posts of Escabitchewan, Red Lake, and Big Lake, were ravaged by the measles. It was not until March 25th that William McKay of Osnaburgh House was alerted to the state affairs farther west, by a dispatch from Marcus Calder of Red Lake (HBCA, B.155/e/8: fo.1). On May 5th, McKay responded by sending a letter to John Davis, lower down the Albany River at Martin's Falls, informing him that "...it is my opinion from the accounts which I recieved [sic] from Mr. Calder [Marcus Calder of Red Lake]...that some unforeseen unfavourable circumstance will take place in that quarter..." (HBCA, B.123/b/2: fo.18). Davis noted these events with much concern, and formulated a plan to quarantine the returning men at Martin's Falls, if they showed any sign of the disease. On June 15th, he wrote to Governor Vincent, who wintered at New Brunswick House, detailing his plan.

> ...it is probable should it still rage it may take a direction down the country [towards Martin's Falls], and prove equally dreadfull. If I find this the case on the arrival of the craft from OH [Osnaburgh House], I may judge it necessary to adopt such strict measures so as to prevent the contagion, and in case any of the people on there [sic] arrival here have the disorder at the time and it is any way alarming I shall if possible have no communication with Albany so that in the event of you not hearing me soon after the peoples arrival from Inland it may be judged I do not think it safe to have communications with the lower forts... (Ibid: fo.20).

This series of letters clearly illustrates the line of communication operating within the extended Albany Inland Department, and the delays involved in the reporting of events. There was, however, little danger of the measles being carried to the Bay by the time John Davis learned of the epidemic. Slater and his men departed Red Lake District on June 1st, long after the disease had ceased at Red Lake, and arrived at Osnaburgh House on June 10th (HBCA, B.64/a/7: fo.21; B.135/b/40: fo.55). Additionally, the Red Lake District men had been exposed to the disease during the fall of 1819, and by June of 1820 the measles would have run its course, and there was no chance of the men being infective. Thus, there was no need for Davis' containment plan. The eastern and northern reaches of Albany Inland, and Albany Fort itself,

were sheltered from the epidemic by the isolation that was the natural consequence of winter transportation conditions in the Petit Nord, as well as by the lack of NWC presence in the area.

The 1819-20 measles epidemic diffused primarily in a hierarchical manner within the Petit Nord (Fig. 27). From Fort William, NWC brigades carried the virus westward, along their major transport lines flanking the Petit Nord and to the posts of the Boundary Waters Region. From these centres, as well as from the small outposts established from them, the disease was transmitted directly to the local Ojibwa of this region. Within the Petit Nord, another brigade brought the measles to Lac Seul. Again, the epidemic diffused both directly to the Indians at that post and the Indians trading at the outposts in the region served by Lac Seul. The disease also spread heirarchically from the Red River Settlement to Oxford House and York Factory, via HBC transport. Diffusion along this path was linear, however, and there was not the same secondary diffusion to smaller posts, that was a characteristic of the heirarchical diffusion by the NWC brigades. This was probably due to the likely immunity of many of the HBC men. Overall, then, the pattern of this epidemic resembled the 1846 measles epidemic in the Northwest, in so far as both were hierarchically diffused. To the west of Lake Winnipeg, however, the highly mobile Plains Indians spread the measles virus among their kinsmen as they fled in fear (Decker, 1989: 12), producing a combined pattern of relocation and trade-based heirarchical diffusion. Among the Ojibwa of the Petit Nord, relocation diffusion was limited to much shorter distances, as the Indians migrated for the purposes of trade and journeyed to seasonal hunting grounds, and not in flight from the epidemic. Relocation diffusion was therefore spatially limited in the Petit Nord, and less a factor in the overall pattern of diffusion, than was the case among the Plains Indians of the Grand Nord

There were spatial limits to diffusion via the brigades, imposed by their rate of travel and the infectivity period of the disease. With infection occurring at Fort William, and transportation routes radiating outward from that post, the men would eventually cease to be infective. There was thus a degree of "friction" due to distance over some of the longer brigade routes. This effect was noted by Pyle (1969) for the 1832 cholera epidemic in the eastern U.S., where the poorly

developed internal transportation network, and the lack of an established urban heirarchy resulted in spatial constraints to the diffusion of the epidemic. For the 1819-20 measles epidemic, friction was manifested by a gradual decrease in infectiousness of the brigades as time passed and, because of this, the northernmost posts in the Petit Nord were spared the epidemic. The northward limit to spatial diffusion by a single brigade was probably achieved somewhere to the north of Cat Lake and Crow's Nest Lake, judging from the length of the journey from the point of infection and the state of the men passing Osnaburgh House. It is unlikely that the NWC men would have remained a threat as they traveled beyond that area. An exception to the frictional effects of distance took place between Lac Seul and Lake Winnipeg. There, it was possible for the hierarchical network of NWC posts to extend the diffusion of the disease beyond what would have been possible had a single brigade undertaken the entire trip. In this case the measles virus was passed from a single infected crew at Lac Seul, to two other brigades which had remained in the interior and were therefore susceptible. As the measles virus was passed along, the period of infectivity was reset, facilitating further diffusion of the disease, in this case to the post at Red Lake and Bad Lake and to the Indians who traded there.

Beyond the spatial limit, the few brigades which serviced the northern portion of the Petit Nord failed to transmit the disease, and because the density of posts was low, there was no opportunity to pass it on to men who had summered in the territory and were susceptible. Thus, when the NWC brigades arrived at Sandy Lake and Trout Lake free of infection, the greater part of the northern territory of the Petit Nord was spared the 1819-20 measles epidemic. It should be noted, however, that although the spatial extent of the epidemic was limited to the southern and western sections of the Petit Nord (Fig. 27), the measles diffused through the areas of densest Indian population and, as such, large numbers were afflicted with the disease.

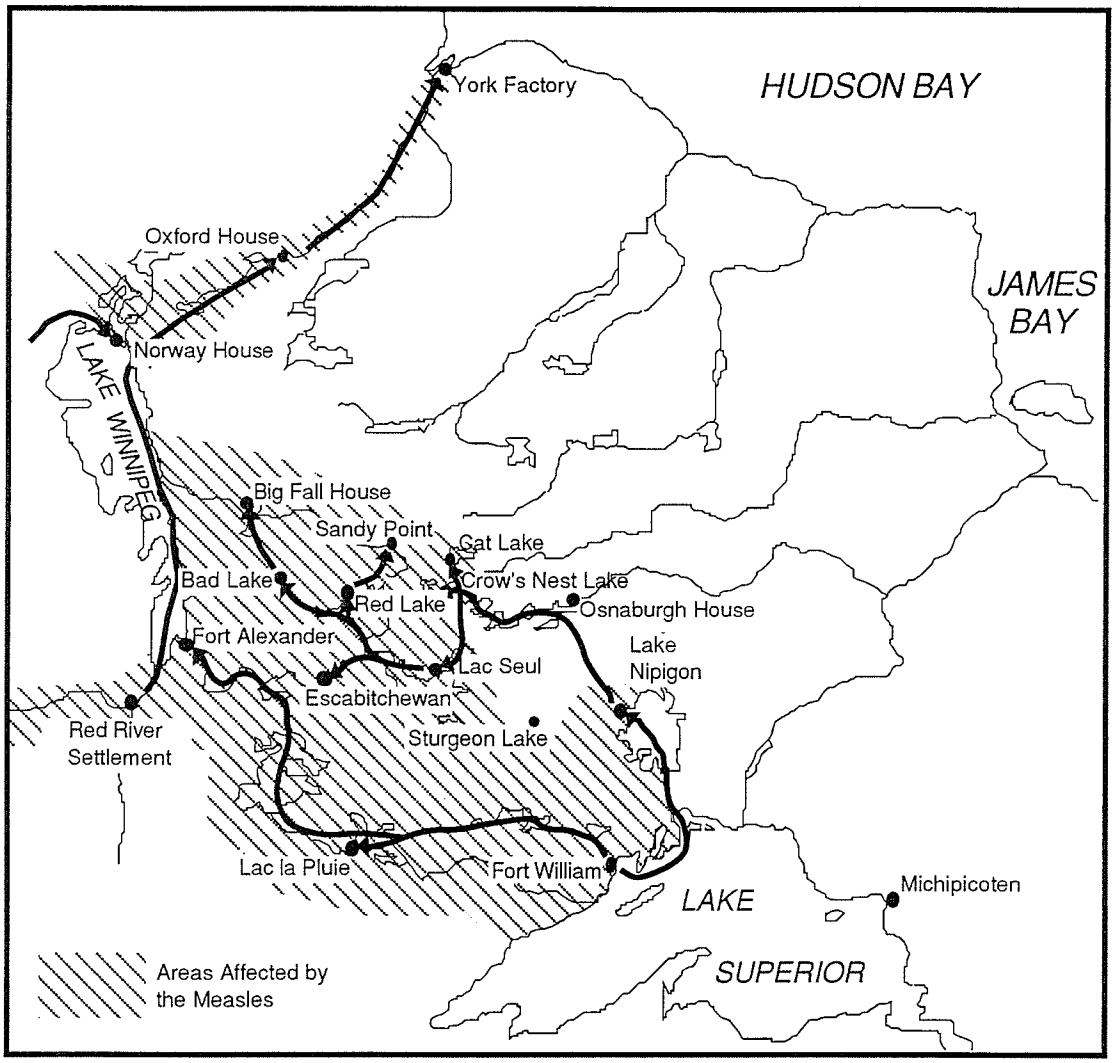


Figure 27: Affected Areas and Major Routes of Diffusion of the 1819-20 Measles Epidemic in the Petit Nord

CHAPTER 6: MORTALITY EFFECTS OF THE EPIDEMIC

Virgin Soil Epidemics

Virgin soil epidemics are the result of the introduction of previously absent acute infectious diseases among entirely susceptible populations, which are termed virgin soil populations. Boyd (1985: 43) differentiated between two categories of these populations. The first is those groups whose current members have had no exposure to the disease up until the time of the epidemic, although it had earlier occurred among their ancestors. Boyd's second class is the "true" virgin soil population, or people who "have never, at any time in their history, experienced the disease in question" (Ibid).

Associated with these virgin soil epidemics are large scale mortalities. Without outside intervention and assistance, expected death rates range between 30 and 100 per cent (Ramenofsky, 1982: 5). This contrasts strongly with the experiences of non-virgin western populations contracting the same diseases, where the chance of succumbing is considerably less. The severity of the virgin soil epidemic results from a complex interaction of culture, immunological status and nutritional state. However, it is possible to isolate four common patterns of reaction among true virgin soil populations that heighten both morbidity and mortality (Boyd, 1985: 44-47). First, a common response to the introduction of epidemics is flight, due to fear of the disease. This reaction results in maximum dispersal of the disorder, both spatially and demographically. As noted, this was a major factor in the diffusion of the 1819-20 measles epidemic in the Grand Nord. It was not, however, a significant factor in the spread of the disease within the Petit Nord.

A second factor heightening mortality is an inappropriate health care system. Aboriginal health care practices evolved to treat diseases that differed greatly from the epidemic diseases

introduced from the Old World following the fifteenth century. Instead of chronic conditions afflicting individuals, native healers were faced with highly contagious diseases of unprecedented severity, diseases with which they were unable to cope. Very often their responses were inappropriate for the diseases they were trying to treat. Indeed, treatments such as drumming, dancing, and singing, which often involved the entire community, served only to spread the disease quickly through the population (Boyd, 1985: 45). Other remedies such as the sweat bath (or lodge) aggravated the condition of the patient, inadvertently causing greater mortalities than would otherwise have been experienced. When attempting this cure, the afflicted individual spent time in a sauna-like room, and then jumped into cold water or a snowbank. Suffering from an acute disease, the result was commonly death from a combination of hypothermia, shock, and cardiac arrest, or it could be the result of bronchopneumonia (Taylor, 1977: 58; Krech, 1978: 715). Although there is no recorded instance of this treatment during the 1819-20 measles epidemic in the Petit Nord, it was common to many Indian groups, including the Ojibwa, and was probably resorted to by some living to the east of Lake Winnipeg. At Cedar Lake, just to the west of Lake Winnipeg, John Franklin met a group of infected Cree preparing to cure their affliction using traditional practices. He observed them "preparing a sweating house to cure their sick companions. By singing and drumming and sweating they cure all their diseases they meet with" (Franklin, 1823: 25).

The final two circumstances noted by Boyd relate directly to the lack of immunity of the group[1]. Among virgin soil populations, all are susceptible and can contract the disease at the same time. With the majority ill, it is likely to overload the health care system (Boyd, 1985: 44). When this occurs, there is no one to treat those suffering from the disease, and side effects which

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[1]There are three types of immunity, none of which is found among virgin soil populations. Active immunity is gained through the creation of antibodies due to prior exposure to the disease. Many diseases including smallpox and measles result in lasting immunity for those who recover. Passive immunity is temporary. Antibodies are passed from a nursing mother with active immunity to her child, who then gains a temporary immunity for as long as nursing continues. Finally, there is non-specific resistance, caused by natural selection. This results from long term (over many generations) exposure to a disease associated with heavy mortality. The latter type of immunity seems not to have been a factor in diseases such as smallpox and measles, but has been manifested among people living with very long term exposure to malaria (Cockburn, 1971: 51-2; Crosby, 1976: 292; Decker, 1989: 12).

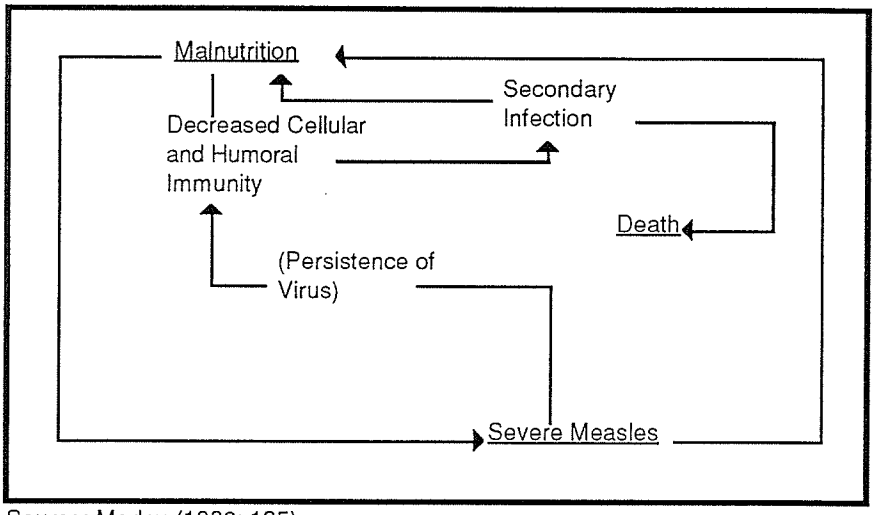
might otherwise have been treated successfully become life threatening complications. Secondly, high concurrent morbidity prevents normal subsistence activities, creating the possibility of starvation and complications induced by nutritional deficiencies (Ibid: 46). This is especially significant where food reserves are limited. In turn, the nutritional state of the individual can determine the course of the disease, how the person recovers, the length of the illness, and susceptibility to other diseases. Where health care overload and subsistence interruption are both experienced, the result can be social disintegration, and an extremely high rate of mortality.

Measles and Virgin Soil Populations

Despite commonly held beliefs, measles is capable of causing severe complications and even mortality where health care is inadequate (Rogers, 1965: 289). Like all viral infections, there is no cure, only symptomatic treatment and medicines to stave off secondary afflictions. The victim is generally confined to bed, and must be fully cared for and provided with food and liquids. In the western world, exposure tends to take place in childhood unless immunization has been previously performed. Adults are therefore immune, and can provide adequate care and fulfill the nutritional requirements of the patient and, after a time, the disease runs its course. Under these conditions the rate of mortality is comparatively low, although complications may occasionally develop such as pneumonia, otitis media, mastoiditis, and, infrequently, encephalitis (Miller and Keane, 1983: 678).

Among virgin soil populations, the possibility of death becomes much greater than among those living where the measles virus is endemic. For example, thirty per cent of the afflicted population in Fiji died during an epidemic in 1875 (Morley, 1980: 117). A death rate of about twenty-seven per cent was experienced in the Faroes in 1846 (Ramenofsky, 1987: 161), and between six and thirty percent of the victims died in four epidemics in tropical Africa during the 1960's (Cliff *et al.*, 1981: 186). In 1952, an epidemic at Ungava Bay, and on Baffin Island, resulted

in mortality rates of seven and two per cent, respectively (Peart and Nagler, 1954: 147). The lower rates at these latter places reflects the outside intervention provided in the form of medical and food aid. As well, Baffin Island received aid sooner in the course of its epidemic than did Ungava Bay and, consequently, suffered fewer casualties and complications (Ibid: 151-2).



Source: Morley (1980: 125)

Figure 28: The Relationship Between "Severe" Measles and Malnutrition

Overall, the greater mortality among virgin soil populations is not due to any prior biological susceptibility or lack of genetic immunity to measles[2], but derives from the interaction of the disease with the undernourished individual. One aspect of this relationship was noted by Peart and Nagler (1954: 151). During the 1952 epidemic, many of the afflicted who succumbed did so before aid was available. Among these victims, they found that "most of the Eskimos [at Baffin Island and Ungava Bay] were confined to bed for a week or 10 days. When the entire family was disabled, there was no one to provide food and fuel. This was an important factor in the high mortality rate." Malnutrition was an equally significant result of epidemics among the hunter-gatherers of the boreal forest who frequently starved as the result of epidemic immobilization (Helm, Rogers, and Smith, 1981: 148).

[2]It has been demonstrated that there is no difference between the effects of the disease on Indian and white children, where nutritional status is equal (Sievers and Fisher, 1981: 196).

Although starvation plays a part in the mortality of virgin soil measles epidemics, there is also a more complex relationship at work. When a malnourished individual is infected with the measles virus, or where malnourishment develops during the course of the disease, "severe" measles may result (Morley, 1980) (Fig. 28). Victims suffering from this form of the disease are afflicted with many more complications of greater severity, which are largely responsible for the high death rates. Blindness, laryngitis, extremely severe bronchopneumonia, and diarrhea are frequently experienced (Ibid: 122). The latter is especially significant in that diarrhea depletes the individual of water, electrolytes, and nutritive elements, all of which are necessary for the maintainence of health. Because of this, the victim may slip into an even poorer nutritional state, increasing the severity of the disease and greatly enhancing the possibility of death. According to Morley (1980: 125), children are at greater risk than adults, as their nutritional reservoirs are much smaller.

Regional Patterns of Mortality of the 1819-20 Epidemic

It is extremely difficult to calculate the mortality rates of the 1819-20 measles and whooping cough epidemic. Detailed pre and post-epidemic censuses are lacking for the native peoples of the Canadian Northwest. Where population estimates are available, they rarely coincide with the years immediately preceding and following the epidemic. These enumerations, moreover, generally derive from traders' estimates of the number of tents comprising the group. The numbers of people living in a single tent cannot always be determined accurately[3], and even band designations may vary and their composition may not remain consistent over time, making

[3]It was common for a census to simply refer to the number of tents or lodges in a band. If the number of persons per tent is known then a fairly accurate estimate of the total population may be arrived at. In many cases, however, the latter information must be taken from a different source than the tent count. This calls into question the accuracy of calculations derived from estimates from different observers. See, for example, Ray (1988: 108).

comparative analysis difficult at best. Nevertheless, several researchers have estimated the depopulating effects of the 1819-20 measles and whooping cough epidemic in the Plains region.

Using reports by Alexander Henry the Younger and John MacDonald, Ray (1988: 108) calculated that nearly fifty per cent of the Brandon House Assiniboine and greater than forty per cent of the Carlton House Assiniboine lost their lives in the epidemic. He then applied the same mortality rate to the Plains Cree population to arrive at a post-epidemic estimate (Ibid: 110). Decker (1989) examined several censuses and suggested that the mortality among the Plains Indians generally was far less than that claimed by Ray for the Assiniboine and Plains Cree. She estimated that the overall rate for the Plains people was just over twenty-five per cent (Ibid: 57). She also concluded that the "...Plains Natives were not affected as badly from diseases as were the Woodlands groups..." (Ibid: 234). Taylor (1977: 78) also estimated mortality rates of greater than twenty-five per cent for the Assiniboine, Blackfeet, Cree, and Gros Ventre inhabitants of the Plains. He considered the Sioux to have experienced medium mortality, between ten and twenty-five per cent. It would seem, then, that there is much variation in the estimates that have been made for this epidemic among the Plains Indians. It would also seem that mortality estimates for the Plains people are not directly applicable to the Petit Nord. There were entirely different native settlement and subsistence patterns in the Petit Nord, suggesting different mortality rates in this region. Additionally, there were internal variations in the lifestyles of the people of the Petit Nord, and the disease was introduced at different times into different areas. This led to an uneven pattern of diffusion and doubtless of mortality as well. This study attempts to establish regional variations in mortality rates and the factors responsible for them. Unfortunately, there are few population estimates for this region, such that a comprehensive analysis is not possible. Instead, an attempt will be made to discern relative levels of mortality in those places where evidence is available.

York Factory

It is not known exactly how many Indians succumbed of the combined afflictions of measles and whooping cough at York Factory. In theory, the greatest death rates in the Petit Nord should have occurred there, as both diseases were in evidence and, according to Decker (1989: 101), the presence of both within a population at the same time leads to more deaths than either disease alone. There are, however, reports of few fatalities, despite the apparent widespread illness among the York Factory Indians (HBCA, B.239/a/126: fo.35). This was probably due to two reasons. First, the two diseases appeared during the summer when food was easier to obtain, and the climate was less harsh. Secondly, the infected people living in the vicinity of the post, the Homeguard Cree, were able to obtain medical aid and food from the HBC men at the Factory. During the summer, the ill were encamped around the post. After winter set in, several families of starving Indians made their way to York Factory, most of whom were diseased, and presumably they were supplied with enough provisions and aid to prevent starvation and offset the possibility of developing severe complications which would have made death more likely.

The Boundary Waters

Although the 1819-20 epidemic diffused throughout the Boundary Waters region, there are no mortality figures and population declines cannot be accurately determined. Instead, it is only possible to consider the factors which were most influential in determining fatalities, and the few existing observations concerning post-epidemic population levels in the area. Since the disease was introduced earliest near Lake of the Woods and the Winnipeg River, and later among the people to the east along the Rainy River and at Lac la Pluie, and at an undetermined time in the vicinity of Fort William, these three areas will be considered separately.

The bulk of the evidence concerning the first of these sub-regions refers to the people of Garden Island on Lake of the Woods. Living conditions of those Indians were almost ideal for the rapid spread of the virus through common source infection. Large numbers lived in close proximity during the summer, interacting regularly. Consequently, most, if not all, would have

contracted the diseases at the about same time, and health care and subsistence practices should have been interrupted temporarily. John Tanner's memoirs suggest that the measles was "very fatal" among his adopted people towards the end of the summer of 1819 (James, 1830: 255). When Roderick McKenzie arrived at that place on September 10th, he found "many" of the Indians dying of the measles and whooping cough (HBCA, B.105/a/7: fo.29d). At first glance, it would seem from these remarks that the Indians were dying in large numbers. Consequently, starvation would then have been common and played a major part in their demise. It was entirely possible, however, that losses were moderate compared to elsewhere in the Petit Nord, and that famine was not necessarily the result of their widespread illness.

There does not appear to have been a lack of food at Garden Island during the epidemic, a condition that would have exacerbated the effects of the disease and, consequently, the level of mortality. The measles was introduced during the harvesting of the wild rice, and did not begin to manifest itself until after the Indians were finished their harvest. Before being incapacitated, they had gathered a supply of food that would have met most of their nutritional needs. Shortly thereafter, the gardens which they had previously planted were ready to be harvested. This action did not require a great deal of energy, and could probably be done by someone who was ill. Thus, when Roderick McKenzie arrived in early September, he found the Garden Island Indians to be sick, but preparing to harvest an excellent crop of potatoes, corn, squash, beans, and other produce (HBCA, B.105/a/7: fo.29). This food would have enabled most of the afflicted to endure the course of the disease. With proper nutrition, complications were fewer and less severe, the duration was shorter, and the possibility of mass starvation was small. By the time winter arrived and there was a scarcity of food resources, there were probably many who had recovered and who could hunt and fish for those who remained ill. These factors likely combined to limit the number of fatalities among the Indians of the Lake of the Woods region compared to their neighbours to the east.

Along the Rainy River and at Lac la Pluie, there would have been greater mortality. McKenzie's Lac la Pluie journal frequently refers to dying and starving Indians during the fall and

winter, almost always together. According to McKenzie, "...the Indians are dying in numbers all around us through sickness and want" (Ibid: fo.54d). Hardest hit were the children and, at Rapid River, the women. Of the Indians there, he reported that "severals [sic] of their Women + Children having died of the measles and hooping cough has dispirited them [the men] from every exertion" (Ibid: fo.71d). The situation became so bad that, by December, there were reports of cannibalism in this region (Ibid: fo.54d).

There are several factors which combined to create this catastrophic situation. For one, 1819 was a very poor year for wild rice in this area. McKenzie was told that "the water was to[o] [high?] + that prevented them from collecting as much rice as usual", and he noted that the Indians would suffer for it as rice was their "principal living" (Ibid: fos.30d, 44). Unlike those at Garden Island, there is no indication that these Indians were cultivating gardens to any great extent in 1819 (Moodie and Kaye, 1986: 177). Thus, with the rice having failed, they had to switch to another food source. In former years, this would have been big game such as moose and caribou (Waisberg, 1984: 141). By 1819, however, these animals were few in the region of the Boundary Waters, and they were forced to turn to fish, and especially sturgeon, for their survival (HBCA, B.105/a/7: fo.44). In 1819, even the fish were in short supply and, by the time some began to seine for sturgeon, they were stricken with the measles and unable to continue (Ibid: fos.37d, 38, 49d). Thus, when the epidemic struck the people of this area in late September, and as it continued into the winter, there were no food reserves to fall back on and, for many starvation and death due to severe measles appears to have been the result. For some, starvation was tempered by the aid provided by the NWC and HBC posts in the area. Those who were able to travel obtained food and shelter from the traders and had a much better chance of recovery than those who were incapacitated in isolation on their hunting grounds. It would seem, then, that the Indians living in this area suffered heavy mortalities, though perhaps not as great as would have been the case had the traders not been there to provide food and medical assistance.

Little is known about the course of the epidemic among the Ojibwa nearer Lake Superior. There is, however, some evidence suggesting that mortalities were significant, if not massive. In

April of 1821, J.G. McTavish stationed at the NWC's Fort William wrote that there were "few" Indians remaining about that place (Davidson, 1967: 305). However, at least part of this population loss was due to migration. John Haldane wrote in 1824 that "The Indians about Fort William are not so numerous as they were some years ago - some having gone to Nipigon - Others to Fond du Lac, and a small portion to St. Mary's" (HBCA, B.231/e/1: fo.2). Still, the measles did cause some deaths in this area. During the July following the epidemic, Nicholas Garry visited the fort and wrote of meeting a band of Indians who spoke of the measles.

> We had today the Ceremony of Two Chiefs offering their presents in the great Hall and Receiving a return. The Chiefs preceeded [sic] by an English Flag marched into the Hall accompanied by all the tribe...One of the Chiefs then rose and really in a very graceful manner made a speech...He said his Tribe had been afflicted with the Measles and this would a **little** [emphasis mine] account for the few People he had brought with him but there was another cause...(Garry, 1900: 116)

The other cause the chief referred to was the NWC's new competitor in the area, the American Fur Company. That company had established posts along the northern margins of the U.S. territory, within the Boundary Waters region. It was there that competition with the Americans was keenest, and it is likely that this group had originated within the trading hinterland of Fort William, since they took their furs there, rather than to the post at Lac la Pluie. The statement seems to suggest that, although they had lost numbers to the epidemic, there was not the overwhelming mortalities which could be experienced by virgin soil populations, and that only a few people had come to Fort William because the others were trading with the Americans. Although the evidence is limited, it would seem that the people around the Rainy River and Lac la Pluie suffered the greatest losses, at least relative to those living at Lake of the Woods and along the Winnipeg River, and in the vicinity of Lake Superior.

The East Winnipeg Country, Red Lake, and Escabitchewan

Farther north, in the East Winnipeg Country, the mortality rate appears to have been greater than was generally the case in the Boundary Waters region. At Bad Lake many of the

Indians succumbed to the measles. This included at least six members of the "King Fisher" band who hunted for the HBC, among them the chief, and three men who hunted for the NWC post (Lytwyn, 1986: 155; HBCA, B.64/e/2: fo.2d). Although these numbers may seem small, they refer only to the adult males who hunted for the companies, and the total including children and women would have been much more. As well, the numbers of people living in this area were much smaller than to the south, where food resources supported much greater population densities. Several others died at Sandy Point Lake and Berens River, and the measles epidemic was so severe among the East Winnipeg Indians that it was described by Donald Sutherland as the "Dreadful Death" (Lytwyn, 1986: 155).

Death rates were perhaps even higher at Red Lake and Escabitchewan. At the former, four out of the five HBC hunters died and, in all, twelve Indians succumbed (HBCA, 64/e/2: fo.3). The total population is unknown, and so the mortality rate cannot be established, but it certainly would have been greater had Marcus Calder at the HBC's Red Lake post not fed those who remained ill at the house (Ibid: fo.3). At Escabitchewan, James Slater reported that, of the twenty-four Indians at that place, most caught the measles, and more than half, a total of thirteen, died (Ibid: fo.4).

The high rate of mortality was at least partly determined by the late introduction of the disease, which occurred at the time the Indians dispersed to their winter grounds. This meant that there was little chance of the traders providing assistance, except when men were sent to their tents or for those few who were able to make their way to the posts. The natural outcome of this situation was starvation[4]. During the winter, meat from big game species, especially moose, was the primary food source for the people in this region. Those suffering from the measles would have been incapacitated, and thus prevented from hunting, and would quickly develop protein deficiency and malnutrition. The result was severe measles and widespread death.

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[4]Black-Rogers (1987: 631) has claimed that subarctic subsistence strategies were flexible enough to accommodate these acute infectious epidemics. However, it would appear that when the more severe epidemics occurred during the winter, big game hunting was impossible during the course of the disease, and some cases of starvation must have resulted.

Lac Seul

The mortality rate at Lac Seul was also extremely high. Despite the absence of the exacerbating effects of the whooping cough, about two-thirds of the Lac Seul Indians died of the measles (HBCA, B.107/e/3: fo.2). From the evidence available, this appears to have been the highest rate of death during the 1819-20 epidemic, and the total number of fatalities was probably greater than at any other place in the Petit Nord. When James Slater passed through Lac Seul on his way to Martin's Falls in the spring of 1820, he was told by the few survivors that a total of seventy Indians had died, twenty-three of them hunters, and that only five capable hunters remained (HBCA, B.64/e/2: fo.4d; B.64/a/8: fo.20). Charles McKenzie, who had wintered at Lac Seul for the NWC, confirmed the numbers reported to Slater. McKenzie's estimate varyied only slightly from that of the Indians. He later wrote that seventy-six died in total, and that only seven hunters remained (Bishop, 1974: 267)[5]. During the previous season, 1818-19, there had been thirty hunters attached to the NWC post which, without HBC opposition, would have outfitted all who hunted at Lac Seul (Anick, 1976: 404). It is thus apparent that the Indian population living in this area had suffered extreme mortalities from the epidemic.

The course of the disease among the Lac Seul Indians was extremely swift, with most succumbing in a period of less than four months. The disease was not brought to the area until September 4th, with the arrival of Charles McKenzie and his brigade, and retransmission occurred shortly thereafter (HBCA, B.64/e/2: fo.55). On Christmas Day, the HBC's Roderick McKenzie was visited at his Lac la Pluie post by some of the few remaining Lac Seul Indians. He was told that greater than sixty had died since the previous fall, "all that were in that Department except three" (HBCA, B.105/a/7: fo.56d). Between early September and late December, then, by far the greater part of the Lac Seul Indians who would succumb to the disease had already died. This

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[5]A report was circulated among the HBC men that a total of ninety-five died at Lac Seul and Escabitchewan, and that only two Indians were left at Lac Seul (HBCA, B.135/b/40: fo.55). Given that thirteen died at Escabitchewan and twelve at Red Lake, this estimate probably included all three of those places, rather than just Escabitchewan and Lac Seul.

contrasts with events elsewhere, such as at Lac la Pluie, where the epidemic and starvation lingered among the Indians throughout the winter. The conditions which led to such explosive mortality at Lac Seul were probably similar to those at Red Lake and Escabitchewan. Concurrent illness, typical of common source infection, prevented fall and winter hunting, and led to deterioration of the nutritional state of the afflicted. Severe measles, starvation, and an extremely high death rate were the results. The situation at Lac Seul was probably even more desperate. There the population seems to have been much greater than to the immediate westward. The small NWC contingent would have been overwhelmed by the vast numbers of the ill, and thus would have been unable to provide for them, as the HBC men at Red Lake and Escabitchewan had been able to do for a few.

By 1823-24 the number of hunters at Lac Seul was twenty-five, nearly back to the pre-epidemic total of thirty (HBCA, B.107/e/2: fo.5; Anick, 1976: 404). Based on these estimates, Bishop (1974: 267) suggested that the population at Lac Seul remained fairly constant between 1814 and 1824, despite the epidemic. However, estimates for the numbers of hunters remaining immediately after the epidemic had passed range between three and seven. It is therefore highly unlikely that the adult male portion of the population, or the hunters, could have been replenished in the three years following the epidemic, simply through the graduation of the younger male segment of the population. Much more likely is that the regional population had been drastically reduced and was subsequently augmented by in-migration from other areas of the Petit Nord.

There are at least two reasons why this migration may have taken place[6]. First, after the merger of the HBC and NWC in 1821, the number of posts operated was drastically reduced. For many of the Indians who still participated in the fur trade during this period, continued commerce required either long distance travel during the spring and fall, or relocation to the vicinity of a

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[6]Peers (1988: 155) studied the Plains Ojibwa and speculated that the "general westward movement of the Ojibwa...may have been partially the result of the effects of the 1819-20 measles-whooping cough epidemic of 1819-20." She argued that severe depopulation among neighbouring tribes opened up territory for the Ojibwa to expand into. If so, this illustrates the spatial reorganization among aboriginal groups which may result from uneven demographic effects of virgin soil epidemics.

remaining post (Lytwyn, 1986: 161). Lac Seul was one of those posts that remained operative during the period of monopoly, and it would have been an attractive place to relocate for many of the Ojibwa, since the diminution of the previous residents meant that there would have been much less chance of territorial conflict. Additionally, Lac Seul provided excellent access to transportation routes, and the possibility of a dependable supply of fish for food. Both of these were very important to the Ojibwa in determining residence location, the latter especially so as the normal winter food source, moose and caribou, was in severe decline and almost absent from many parts of the Petit Nord (Rogers and Black, 1976: 5-6). Lac Seul, then, offered several reasons for relocation of families from other areas, particularly from those areas where overpopulation and resource depletion were becoming problems, such as at Osnaburgh House and Sturgeon Lake, and which were not affected by the 1819-20 epidemic.

A second reason for migration to Lac Seul is that the few remaining Ojibwa probably attempted to replenish their population through additions from other groups. According to Rogers and Black (1976: 22), Northern Ojibwa bands were flexible, and attempted to maintain the ideal population size for the available food resources. Normally, this involved only the seasonal agglomeration and dispersal which matched the abundance and scarcity of food. When unforeseen and more drastic inbalances occurred, such as may result from epidemics, the size and composition of the group could be adjusted by arranging marriages, with temporary alterations to the traditional rules of familial residency (Ibid: 33). This allowed the depleted group to replenish its numbers back to optimal size, gaining members from other groups without losing its identity. Although it is unlikely that marriage alliances were solely responsible for bringing the Lac Seul population back to near pre-epidemic levels in only three or four years, they may have played a significant role in the demographic rebounding, along with migration of other groups into the area. In any event, although the numbers were similar and it may appear that the population remained constant despite the epidemic, most of those hunting at the post in 1823-24 could not have been the same people who hunted there in 1819-20.

It appears that the 1819-20 epidemic was extremely variable in its demographic impact throughout the Petit Nord. Obviously, there was considerable variation between people exposed to the epidemic, and those living in areas which were untouched. Also significant were the differing mortality rates experienced by those who did contract one or both of the diseases. Depending on factors such as the date of infection, the availability of aid, and the amount of food reserves available, the percentage of the population who died could vary considerably. The uneven rates experienced in the Petit Nord were also the rule among the Southern Ojibwa living in what is now Minnesota. Some villages were almost "entirely cut off" by the measles while others suffered lesser casualties, or escaped with very few dead (Warren, 1984: 335).

The regional heterogeneity of mortality effects calls into question some of the generalizations which have been made about the effects of this epidemic. Thus, Ray's (1988: 335) application of the calculated rate of death among the Assiniboine to the Plains Cree population estimates may not have been warranted, while Taylor's (1977: 78) estimates for the other Plains tribes may require further study. Additionally, Decker's general statement that Woodland Indian groups were harder hit by virgin soil epidemics than were the Plains Indians must be tested. Part of this conclusion was based on her belief that the Woodland groups "did not store food for emergencies" unlike the Plains people who maintained stores of pemmican (Decker, 1989: 228). There was, however, a gradient of food sources available to the people living within the Petit Nord. Thus, some such as the Garden Island Ojibwa, had supplies of fish, rice, and garden produce all of which could be stored. For others, there was less surplus food which could be saved, and food procurement was a constant necessity. Still other groups could rely on cached wild rice stores and dried fish to supplement their winter hunting. When an epidemic struck, therefore, not all were helpless and starved to death. Some had enough food on hand to ride out the disease, and therefore suffered many fewer fatalities.

CHAPTER 7: SUMMARY AND CONCLUSIONS

The 1819-20 measles epidemic marked the beginning of a new era in the disease history of the Canadian Northwest. Previously, only smallpox had appeared, and only in 1780 was it widespread. Subsequent to 1820, several different acute infectious diseases appeared in the Northwest. Measles, whooping cough, scarlet fever, and influenza were all experienced thereafter. Although smallpox epidemics continued to occur at thirty to fifty year intervals, as new supplies of susceptibles were built up (Decker, 1989: 71)[1], after 1820 other diseases filled in the intervening periods. The 1819-20 measles epidemic was thus the harbinger of a new set of diseases that would strike the native peoples of the Northwest at frequent intervals throughout the remainder of the fur trade period. This study has attempted to illuminate the circumstances that gave rise to this epidemic and, by implication, the new disease episodes that would follow in its wake. It has also traced the progress of this disease within the Petit Nord, and has attempted to assess its mortality effects upon the virgin soil populations of the region.

The appearance of measles in the fur trading lands of the Northwest during the second decade of the of the nineteenth century was the result of the emergence of endemic measles in the northeastern United States, and of transportation linkages capable of carrying the virus the vast distances from this source area to the fur trading lands. Since the disease cannot persist unless a sufficient population is collected in a given area, the 1819-20 measles epidemic could not have been caused by a virus maintained in the sparsely populated Northwest. Instead, the virus which triggered this epidemic

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[1] A similar cycle was produced by the measles. Epidemics in the Petit Nord occurred about every twenty-five years, in 1819-20, 1846 and 1871.

originated in an urban agglomeration comprised of three American cities: Baltimore, Philadelphia, and New York. In 1818, their combined population exceeded the endemic threshold of approximately 250,000 persons required to maintain the measles virus indefinitely. At this time, no other city, or group of cities in close proximity, on the continent had a population exceeding that threshold.

In 1818, the transportation routes serving the interior of North America were few in number, and the settlements within this region were widely spaced. As a result, there was no possibility of a measles epidemic sweeping westward from the endemic hearth in a contagious manner. Instead, the disease was carried by small groups along the major transport routes. From the Atlantic coast, the virus was transported to the upper Great Lakes, where it appeared in August of 1818 as a brief outbreak at Michipicoten on the north shore of Lake Superior. The initial path of diffusion from the endemic hearth apparently followed the commonly travelled route along the Hudson and Mohawk rivers to Lake Ontario and Lake Erie. After the outbreak in August, it was not until May of 1819 that the measles appeared again. By this time, the disease had made its way to the Canadian Northwest, entering the region almost simultaneously at Brandon House, on the eastern plains, and at Point Meuron, on the western end of Lake Superior. This suggests that, after being transported to Lake Huron during the summer, its progress was delayed until some time in the spring or winter. Following that short delay, the measles virus was carried into the Northwest along two separate paths of diffusion.

The pathway to the western end of Lake Superior can be established with reasonable certainty. It would seem that the measles virus was carried from Detroit to Fort William (and Point Meuron) by the NWC's ships, which operated on both Lake Superior and Lake Huron. The route of diffusion to Brandon House, however, cannot be as easily ascertained. Given the delay between the initial outbreak and the arrival of the disease at Brandon House, it is most probable that the virus was maintained at Detroit

among a susceptible population that had settled this area during the French regime. There it was delayed until some time in the late winter or early spring of 1818-19, when it resumed its westward progress. , It was then probably carried to St. Louis by way of Green Bay, Prairie du Chien, and the Mississippi River, a route that was commonly travelled by fur traders, military men, and Indians at that time. In American territory, the measles appeared among the Sioux and Southern Ojibwa who inhabited the country between Lake Superior and the Upper Missouri. However, the timing of introduction among these two peoples indicates that the epidemic reached them after it had appeared among the native people of the Canadian Northwest. This indicates that the epidemic must have first diffused to the north and west of this territory before striking those people. The route of diffusion, then, must have been down the Mississippi and then up the Missouri. The upper Missouri was frequently travelled by traders and Indians, and the disease could very easily have been transported directly from St. Louis to the Mandan, who commonly traded with many different groups and were thus at great risk of being exposed to epidemic diseases. Alternatively, it may have been passed on at Fort Lisa, the headquarters of the Missouri Fur Company, which sent men to trade with the Mandan in the spring of 1819. The evidence points to the measles appearing among these Indians early in 1819, or about the same time the American traders would have been visiting. After appearing there in May of 1819, it was brought to Brandon House by a group of Ojibwa returning from a visit to the Mandan. The disease was then carried to the Red River Settlement by a party of colonists who had been infected at Brandon House.

This account of the 1819-20 measles epidemic differs from previous works on the diffusion of epidemics in the Canadian Northwest. Earlier studies have not attempted to place epidemics within the context of continental disease patterns, and therefore have not been able to explain the sudden appearance of virgin soil epidemics in this region. In fact, they have been confined to the region under study, such as Ray's (1976) Northern Department of the HBC, or Decker's (1989) Northern Plains. While these regional

diffusion studies are necessary, without including the broader scale of inquiry they do little to explain the presence of the phenomenon they are investigating[2]. Ray did not seek to account for the presence of these diseases in the Northwest at this time, and Decker, in attempting to do so, arrived at essentially erroneous conclusions. She has thus suggested that the 1819-20 measles epidemic and the new diseases that followed were:

> largely due to a progressive increase in the opening of inland posts by the American fur companies, the HBC and the NWC, and a concomitant increase in non-Native population. The establishment of the Red River Colony in 1812 added considerably to the population increase (Decker, 1989: 145).

It is unlikely, however, that the fur trading posts were to blame for the increased prevalence of epidemics. By far the greatest rate of epidemic activity occurred after 1821, the year of the merger of the NWC and HBC. In the years immediately following the merger, the number of posts was drastically reduced as the "new" HBC revamped the workings of the industry. In fact, the peak period of post construction in the Northwest had passed in 1805 (Moodie, Lytwyn, *et al.*, 1987). As well, by 1821 the Americans had long been engaged in the fur trade of the upper Missouri, and that of Wisconsin and Minnesota.

It should also be noted that, by the time epidemics were becoming frequent, the Red River Settlement was growing almost exclusively through the retirement of fur trade employees, both white and mixed blood, and that the initial influx of settlers from Europe ceased soon after its founding (Moodie, Kaye, *et al.*, 1987). After 1821, and until late in the nineteenth century, there was little in-migration from densely settled

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[2]The same is true of diffusion studies in North America in general. Pyle's work (1969) is the only detailed study of epidemic diffusion in the continental context, but even this study takes little cognizance of patterns in Canada.

areas, where these diseases were endemic[3]. As such, there was no possibility of the settlers bringing in new diseases, since these people had already been present in the Northwest for some time before retiring to the colony. Rather, this new disease era was the result of the breakdown of the isolation of the Northwest, an ongoing process during the nineteenth century. Not only were epidemics far more frequent, but the newer diseases had far less diffusion potential than does smallpox[4]. With much less ability to be maintained by a single person for extended time periods, long distance diffusion, such as occurred in the smallpox epidemic of 1780, was unlikely until westward expansion of the American settlement frontier and more efficient transport brought the Northwest within the diffusion potential of these diseases.

Previous studies of the 1819-20 measles epidemic in the Northwest have concentrated on the Grand Nord, virtually ignoring the Petit Nord, its counterpart in the east. A second objective of this study has been to fill this gap and thereby shed further light upon the extent of the epidemic and its mortality effects. It has been demonstrated that, within the Petit Nord, the measles epidemic diffused in a dominantly hierarchical manner via the NWC brigades originating at Fort William, and that it thus followed the Canadians' transportation routes. In general, the NWC's men carried the disease to their assigned posts, and it was subsequently passed on directly from these locations and their outposts to the Indians. Unlike the situation on the plains, where Decker (1989) noted that the Indians themselves were largely responsible for long distance diffusion of the measles, the Indians living in the Petit Nord carried the virus only short distances before being immobilized. For their part, the HBC men had little to do with the spread of

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[3]This was unlike the situation on the Pacific coast, where diseases with shorter diffusion potentials were imported into the area by the constant flow of settlers from the American territory to the south beginning in the 1840's (Boyd, 1985: 174).

[4]Although Ramenofsky (1982: 97) has grouped smallpox and whooping cough in the same category based on the characteristic period of infectivity, smallpox actually has a far greater potential by virtue of its ability to survive in a dried state outside of the human body for an extended period of time.

the disease, either because of prior immunity or because of the directions in which their brigades proceeded, which were toward the infected area during the height of the epidemic. The only exception in this respect occurred when the HBC transported the virus from the Red River Settlement north to the HBC posts at Oxford House and York Factory.

With this exception, the epidemic was almost exclusively limited to the southwestern section of the Petit Nord. Most of those living in the northern reaches of the region were spared the measles due to the extended travel time of the NWC brigades, which exceeded the disease's infectivity period, or because the NWC did not operate posts in their vicinity. The epidemic also failed to diffuse to the east of Lake Nipigon, as this region does not appear to have been supplied from Fort William, but from Sault Ste. Marie, where there is no evidence for the measles at this time. Despite the confined nature of the epidemic in the Petit Nord, however, a large part of the Indian population of the region suffered its consequences, as the affected area was also the most densely populated.

The combined mortality effects of the measles and whooping cough among the afflicted populations of the Petit Nord varied considerably. Depending on factors such as food reserves, the timing of introduction, and the amount of aid provided by the traders, the mortality rate ranged from moderate to severe, as compared to other virgin soil epidemics. For instance, at Lac Seul, at least two-thirds of the Indian population succumbed. Farther south, at Garden Island, the mortality rate was much lower, while at Lac la Pluie to the east and at Red Lake and Berens River to the northwest, fatalities ranged between these two extremes. These widely varying levels of mortality suggest that there is a need to examine the effects of such epidemics on a small scale, focussing on the implications at the band level, before creating generalizations at the tribal level, or that of tribal groups. Therefore, these findings support Fisher's (1980: 349-50)

call for both the study of individual groups and "more sophisticated analysis of the impact of European disease..." on Indian populations.

Local variations in disease experience can have significant consequences that extend beyond their mortality effects. These include: the emergence of new groups from the remnants of depleted ones, loss of territory, alterations in kinship structure, health care and religious beliefs, and even a tendency for cultural simplification (Taylor, 1977: 60-68; Boyd, 1985: 527-9). As a result, groups suffering repeatedly from epidemics may diverge culturally from their kinsmen or other neighbouring peoples who remain free of disease. It is therefore hoped that studies such as the present one, which distinguish the geographical variability of epidemics, will enable future researchers to more fully assess the effects of disease and other factors contributing to changes in the lifestyles of the aboriginal people of the Canadian Northwest.

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