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DIFFUSION OF DISEASES IN THE WESTERN INTERIOR OF CANADA, 1830–1850*

ARTHUR J. RAY

MUCH has been written about the effects of certain European diseases, most notably smallpox, on Indian populations; yet few scholars have attempted to assess the impact that a series of epidemics had on Indian life in various areas of North America. According to the anthropologist John C. Ewers, the paucity of such studies has probably led scholars to underestimate the havoc that diseases wreaked. He contends that scholars should consider the cumulative effects which these visitations of death had on population trends, band sizes and structures, tribal movements, balances of power, and the customs of Indians.[1] For most areas of North America, however, before these questions can be dealt with effectively the historical record must be examined to construct an inventory of diseases. Also, the geography of epidemics must be worked out in as much detail as possible to determine the frequency with which diseases occurred regionally, the origins and patterns of dispersals of the various epidemics, and the diffusion processes that produced these spatial patterns. This paper focuses on a portion of the Western Interior of Canada between 1830 and 1850 and attempts to achieve these latter objectives. It should also illustrate the type of work that can be done and should be a useful building block for further studies in the historical population geography of western Canada.

The area chosen for examination comprises the former Northern Department of the Hudson's Bay Company. This department covered a vast territory and was divided into eighteen districts for administrative convenience (Fig. 1). The physical and cultural geography of the department was highly varied. The central and southern portions of the Red River, Swan River, and Saskatchewan districts were grassland areas, home of nomadic bison-hunting Indian groups such as the Blackfoot, Plains Assiniboine, Cree, and Ojibwa. Arching from the east bank of the Red River northwestward across the northern sections of the Swan River and Saskatchewan districts was a transitional vegetational zone known as the parklands. Here prairie meadows were interspersed with sections of woodlands. The vast boreal forests of the subarctic stretched east of Lake Winnipeg and north of the Swan River and Saskatchewan River districts. These lands were inhabited by Woodland Indians such as the Ojibwa, Cree, Assiniboine, and Chipewyan. In the northern section of the Churchill District and the northeastern portion of the Great Slave District, the forest yielded to open tundra. This region came to be known as the barren lands. An analysis of the diffusion of diseases in the Northern Department thus affords an

* I wish to thank the Hudson's Bay Company for permitting me to consult and quote from its microfilm collection in the Public Archives of Canada, in Ottawa; the Canada Council, for defraying my travel and research expenses; and C. F. Godfrey, M.D., and the late Andrew H. Clark, for their comments and suggestions on earlier drafts of this paper. I would also like to thank the York University cartographic office, particularly Robert P. Ryan, for drafting the maps.

[1] John C. Ewers: The Influence of the Fur Trade on Indians of the Northern Plains, *in* People and Pelts: Selected Papers of the Second North American Fur Trade Conference (edited by Malvina Bolus; Peguis Publishers, Winnipeg, 1972), pp. 1–26, reference on p. 20.

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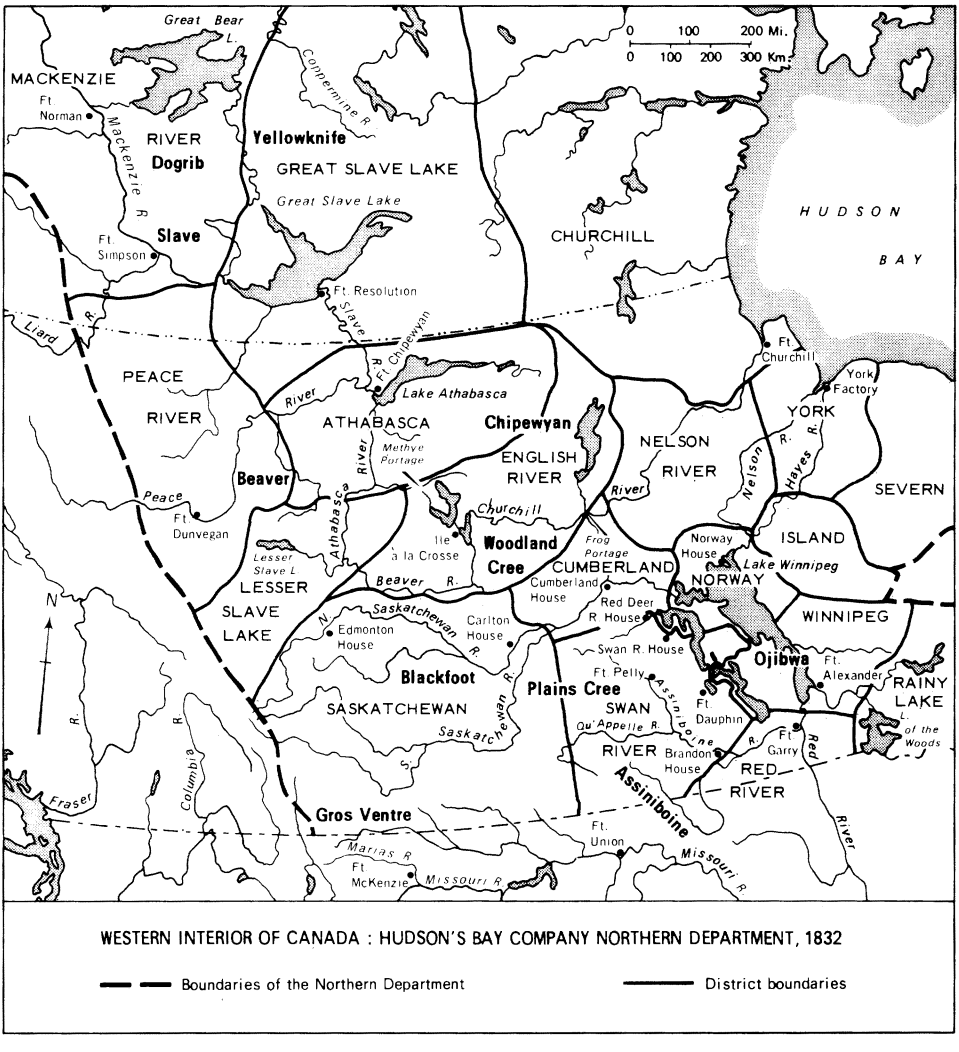

FIG. 1

opportunity to consider how a variety of physical and cultural ecological factors may have influenced patterns of dispersal.

Of significance to diffusion processes, in certain sections of the Northern Department large numbers of Indians followed seasonal patterns of migration (Fig. 2). For example, in the Saskatchewan, Swan River, and Red River districts, Plains Indians such as the Assiniboine, Cree, and Ojibwa passed the winters in the sheltered river valleys and forested portions of the parklands. They spent the summers in the open grasslands, hunting the massive bison herds and traveling south to trade with horticultural Indians and American Fur Company traders in the Missouri River valley. Their Woodland Cree, Ojibwa, and Assiniboine relatives inhabited the woodlands during the warmer months of the year but often joined the Plains groups in the

parklands during the middle and late winter in order to hunt bison.[2] Large-scale seasonal shifts of population also took place in the northeastern portion of the department in the vicinity of the boreal forest-tundra zone, where bands of Chipewyan Indians followed the migratory barren-ground caribou. These caribou passed the summer grazing in the open tundra and retreated to the shelter of the northern edges of the forest in winter.

The spatial concentration of Indian populations also varied seasonally. In all areas summer was the time when Indian groups came together to form larger villages. In the woodlands, fishing encampments of two or three hundred were common, whereas in the grasslands, bison camps of one to four thousand were frequently reported. In the grassland and woodland areas, the Indians dispersed into smaller bands during the winter. These bands varied greatly in size depending on local resources. In the woodlands they often consisted of twenty to thirty individuals; in the parklands some camps of up to a thousand people were reported, but most were probably much smaller.[3]

A large portion of the non-Indian population of the department was also highly mobile, being involved in the inland transport business of the London-based Hudson's Bay Company. The company's extensive network of posts were linked together by boat, canoe, and cart brigades (Fig. 2). The boat and cart brigades were largely manned by Métis of mixed Indian and European ancestry. 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, with the peak volume between the middle of June and the middle of August. Boat brigades were usually dispatched from the various district headquarters to Norway House and/or to York Factory. The latter was the chief port of entry for the Northern Department and a terminal point for brigades of the Rainy Lake, Winnipeg, Island, Swan River, and Cumberland districts. The flow of traffic was heaviest between York Factory and Norway House because of the key functions they served in the trading network. These two posts also had frequent contacts with the Red River Colony in the vicinity of Fort Garry.

Because of the relatively short open-water season, boat transport operated on a tight schedule and every effort was made to avoid delays. The late dispatch of a brigade often meant that a district ran the risk of not receiving critical winter supplies. This was particularly the case with the more northerly Mackenzie River and Great Slave Lake districts, where brigades often did not complete their return voyage until late autumn or early winter.

In addition to the summer movement of cargo between posts, there was limited contact during the winter, when letters were exchanged among traders via the so-called winter express. However, relatively few men were involved as couriers, so the possibility of transmission of disease at that time was limited.

In southern Manitoba and the adjacent portions of Saskatchewan, the Red River cart brigades carried a considerable volume of trade between the various posts during the summer season. These cart trains, consisting of horse-drawn two-wheeled carts,

[2] Arthur J. Ray: Indians in the Fur Trade: Their Role as Trappers, Hunters, and Middlemen in the Lands Southwest of Hudson Bay, 1660–1870 (Univ. of Toronto Press, Toronto and Buffalo, 1974), pp. 166–181.

[3] Charles A. Bishop: The Northern Ojibwa and the Fur Trade: An Historical and Ecological Study (Holt, Rinehart and Winston of Canada, Toronto, 1974), pp. 277–289.

followed well-established routes (Fig. 2) and played an increasingly important role in the company's transport business as time passed.

In short, during the period between 1830 and 1850 there was a considerable amount of interaction of population between the various sections of the Northern Department. This interaction was facilitated by the migratory habits of certain Indian groups, by their trade at Hudson's Bay Company posts, and by the movement of men and material between the various posts by boat, canoe, and Red River cart. Furthermore, there was a marked seasonality to these patterns of interaction. Interregional, Indian–European and Indian–Indian contacts were all more intensive during the summer, and the possibilities of transmitting diseases were therefore greatest at that time.

Influenza

During the period under consideration, a series of major and minor outbreaks of contagious diseases occurred.[4] Epidemics of influenza, most frequently reported, were recorded in 1835, 1837, 1843, 1845, 1847, and 1850. Influenza is a viral infection, with an incubation period of one to four days. Symptoms vary, but individuals generally experience a fever during the first twenty-four hours and suffer from inflammation of the respiratory and/or alimentary canal. General body aches and weakness are common. Significantly, since the disease usually affects primarily the respiratory passages, the first appearance of the illness may lead an untrained observer to diagnose it as a bad cold.

The influenza epidemic of 1835 was first reported almost simultaneously at Norway House and York Factory (Fig. 3). The journal entry for Norway House for June 22 reads, "Several of the people laid up with a most severe cold." The following day, Don Ross, chief trader at the post, added, "The whole establishment...[was] much afflicted with sickness, somewhat resembling a cold but of a much more serious nature."[5] On the 26th the disease was said to be spreading in every direction. On June 29 Ross wrote, "We are all severely affected with the prevailing sickness, Influenza, no one escapes it: there are now upwards of 120 individuals young and old, including Indians, labouring under it at and about the Establishment."[6] Ross was the first to diagnose the disease as influenza.

At York Factory the first man to be reported sick was one of the crewmen of the

[4] The Hudson's Bay Company records are an excellent source of information regarding diseases and the general health of the Indians. The traders in charge of the various districts of the Northern Department generally wrote two to four letters a year to Governor George Simpson, in which they reported on the general state of the fur trade in their respective areas. Since epidemics almost always disrupted trade, they were usually reported. Frequently these reports include accounts of when and where a disease broke out. Supplementing the correspondence are the journals of the posts. The daily entries in many of these journals make it possible to pinpoint the date on which an epidemic erupted and the length of time it lasted.

The principal difficulty with the data relates to the fact that many of the posts lacked trained medical personnel to diagnose illnesses. Compounding the problem is the fact that some diseases, such as smallpox and measles, have similar symptoms in their early stages and that others produce classic symptoms in an individual only once, making subsequent attacks of the illness hard to diagnose. Finally, in some years, such as in 1843, several diseases reached epidemic proportions at almost the same time. For these reasons, the traders' diagnoses of illnesses must be viewed with caution, particularly when the epidemics were localized. Generalized outbreaks afford an opportunity to do more cross-checking of sources, so that correct diagnoses are more likely.

[5] Norway House Journal, 1835, Public Archives of Canada, Hudson's Bay Company Collection (microfilm) [henceforth referred to as HBC], B 154/a/26, p. 6.

[6] *Ibid.*, p. 8.

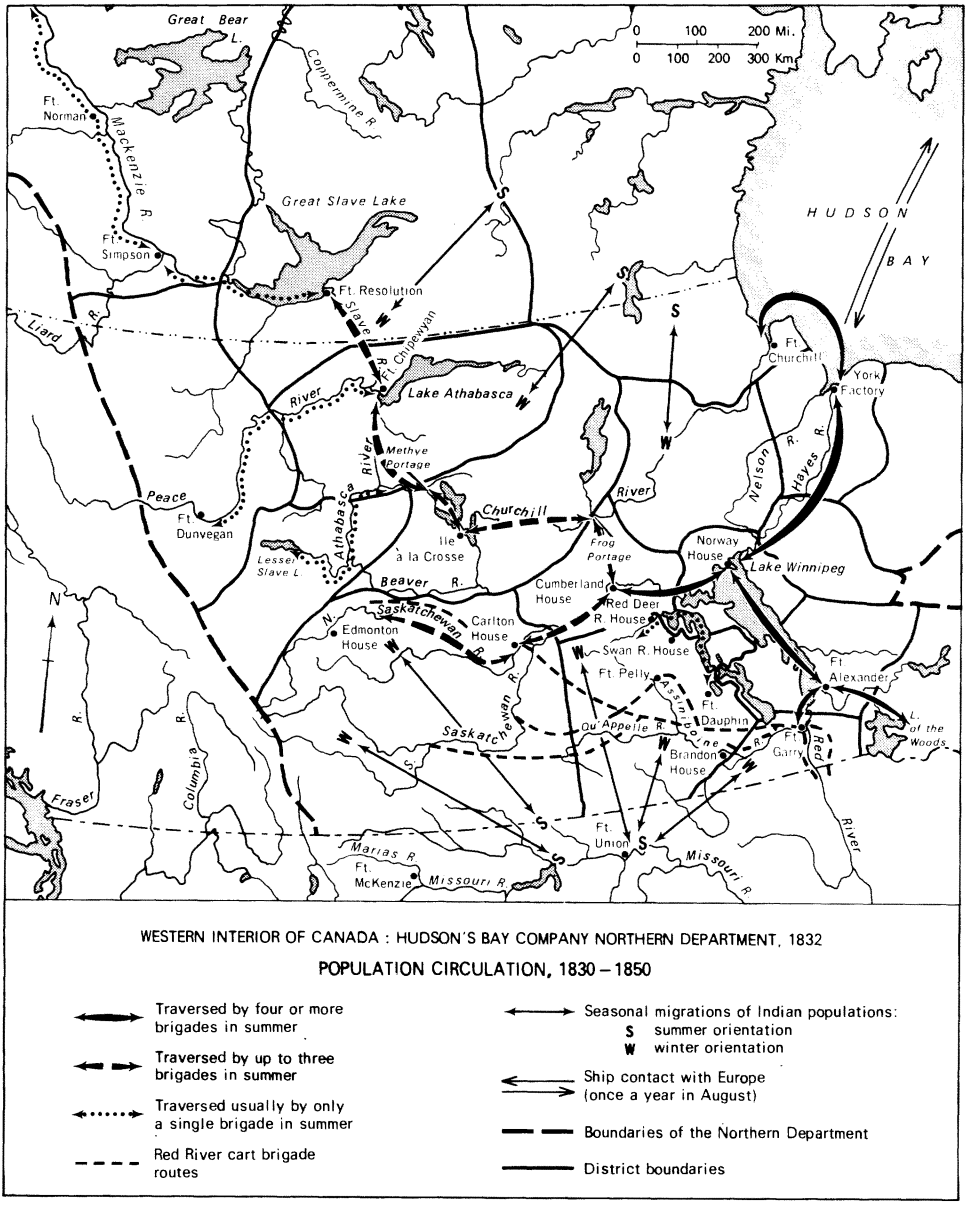

FIG. 2

Red River boat brigade. On June 21 this brigade departed for Norway House, but the sick man remained at York Factory. Five days later, chief trader James Hargrave said that six men were suffering from severe colds and sore throats. The number of men sick continued to increase, and on July 5 Hargrave wrote, "Severe colds, sore throats, pains in the breast, headaches, etc. still prevail very generally both in the establishment among the crews of the inland brigade and also among the Natives."[7]

[7] York Factory Journal, 1834–1835, HBC 239/a/148, p. 60.

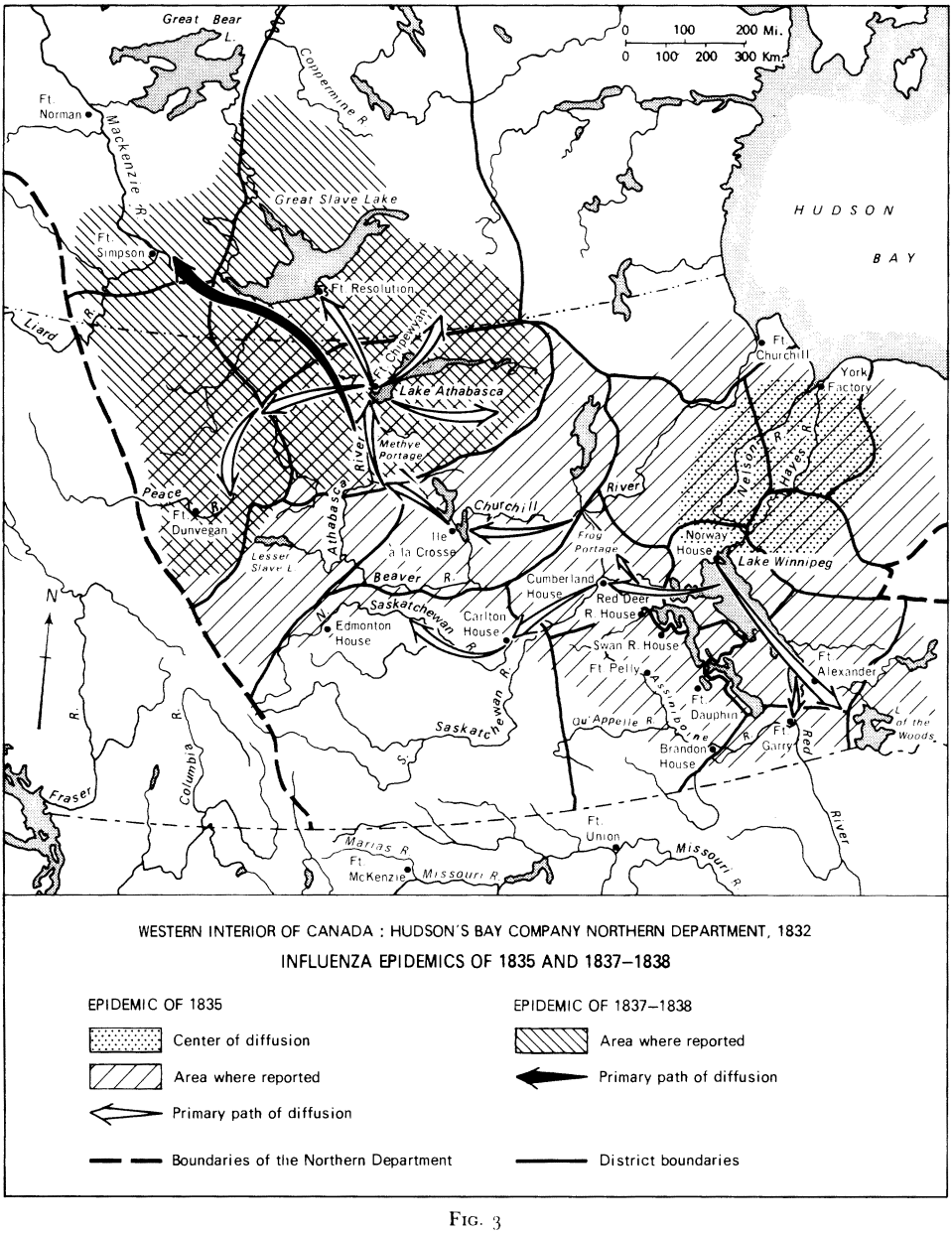

FIG. 3

Hargrave never indicated that the disease was influenza, but his men were suffering from the same symptoms as those of the people at Norway House. On the basis of the information contained in the York Factory and Norway House journals, it therefore appears that the source area of the epidemic was in the York, Island, Nelson River, and Norway districts.

Illness spread quickly to other brigades that arrived at Norway House or York Factory from the interior. For instance, on July 1 and 2 the Red River and Rainy Lake

brigades arrived at York Factory healthy, but three days later many of the crewmen were sick. The tight time constraints under which the company operated made it necessary to dispatch the boats anyway, and the sick crews were sent into the interior on July 5.[8] Because of their weakened condition they took twenty-seven days to reach Norway House.[9] On arriving at this post they reported that most of the other inland brigades were laid up along the route to York Factory. Among these were the crews from the Swan River and English River districts, who had been forced to stop at Oxford Houses.

Meanwhile, on July 12 the Athabasca brigade of four boats arrived at Norway House in good health. Eight days later they were ready to head inland again, but many of the boatmen and Edward Smith, who was in charge of the brigade, were too sick to proceed.[10] They finally departed on July 23, with many of the crewmen still suffering from the effects of influenza.[11] Although the Athabasca brigade was thus a carrier of the disease, as were the other brigades, the epidemic apparently preceded the brigade as far to the northwest as Ile à la Crosse. According to Roderick Mackenzie, "the few Indians that we found at the Establishment [Ile à la Crosse] on arrival were laid up with Influenza; which broke out among them early in August."[12]

Farther to the north, the Indians did contract the disease from the Athabasca brigade, which arrived at Fort Chipewyan on October 3. Smith wrote, "Shortly after our arrival at this station Influenza broke out among the people that pass the summer inland and the families. The Indians being all about us at this season did not escape the effects of the disease."[13] By October 12 the sickness was reported to be raging throughout the country. The rapid spread of the epidemic to the Chipewyan Indians in the hinterland of Fort Chipewyan was appareantly a consequence of the fact that when the brigade arrived at the post, 162 Indians were waiting to trade. They bartered their furs for the goods they wanted and then dispersed to their winter hunting grounds, inadvertently carrying the disease with them. On January 22, 1836, Smith learned the illness had reached the "Caribou" Indians in the forest-tundra zone.[14]

The diffusion of influenza to the north and west of Fort Chipewyan seems to have been the result of dispatching company men and supplies in those directions. For instance, on October 3, men departed from Fort Chipewyan for Forts Vermillion and Dunvegan, in the Peace River District. Three days later crews departed for Fort Resolution and the Mackenzie River District. On December 19, Smith received a letter from the Peace River brigade informing him that the influenza epidemic had broken out in that region.[15]

Although the Mackenzie River brigade no doubt carried the disease with them when they left Fort Chipewyan on October 6, influenza apparently did not break out in the Mackenzie River Valley during the winter. No references to the contagion are found in the journals of posts located in that district. The late arrival of the disease-

[8] *Ibid.*
[9] Norway House Journal, 1835, HBC B154/a/26, p. 12.
[10] *Ibid.*
[11] *Ibid.*, p. 13.
[12] Governor George Simpson, Letters Inward to Simpson [henceforth referred to as Simpson Inward], Roderick Mackenzie, Ile à la Crosse, Jan. 10, 1836, HBC D 5/4, p. 152.
[13] Simpson Inward, Edward Smith, Fort Chipewyan, Dec. 31, 1835, HBC D 5/4, p. 148.
[14] Fort Chipewyan Journal, 1835–1836, HBC B 39/a/31, p. 79.
[15] *Ibid.*, p. 72.

carrying brigades may account for the failure of the epidemic to spread; by the time the crews arrived, the Indians had already scattered to their winter hunting grounds.

Farther to the southwest, the epidemic seems to have been spread to the Saskatchewan District by brigades from that area which arrived at Norway House between June 25 and August 2, 1835. Like the other inland crews, they contracted the disease at the post and left before they were fully recovered. All of the Saskatchewan boats embarked for the trip home by August 3. Unfortunately, the records for the Edmonton District for this period are incomplete, and no journals have survived for this year for Edmonton House. Thus it is difficult to obtain a clear picture of the diffusion of disease in this quarter. Nonetheless, judging from the information contained in a letter addressed to Governor George Simpson by John Rowand at Edmonton House on December 31, 1835, it is clear that the epidemic broke out during the summer but apparently affected only the Woodland Assiniboine and Cree.[16] The Plains Indians may have avoided exposure because most of them were farther south in the open grasslands.

In 1837 influenza broke out again in the Northern Department (Fig. 3). Although information concerning this epidemic is less complete than was the case with the preceding one, its diffusion can be outlined. The 1837 epidemic seems to have erupted in the Athabasca and Peace River districts. On December 30, 1837, Alexander McLeod informed Governor Simpson from Fort Chipewyan that "a bad cough or Influenza afflicted the Natives all over this District, since the middle of summer."[17] A journal entry for Fort Dunvegan for May 29, 1837, states that most of the Indians living in the district were ill. As late as February 28, 1838, the post journal indicates that many Indians were still suffering from the "prevailing illness."[18]

The records from York Factory, Norway House, and Fort Edmonton contain no references to influenza during the summer and autumn of 1837, suggesting that the epidemic did not spread southward. Rather, it seems to have diffused northward, into the Mackenzie District. For instance, the journal for Fort Resolution for the summer of 1837 indicates that on several occasions company men suffered from bad coughs. Also, one of the Indian crewmen of the Mackenzie River brigade became ill on July 3 and was left at Fort Resolution to recuperate. Considering that the brigade had just come from the Athabasca District, where influenza was widespread, it seems highly likely that the Indian was suffering from the same illness. Unfortunately, no diagnosis was offered in this case, or for the "bad cough" suffered by the other men at the post. In any event, although influenza may have been present at Fort Resolution, it did not spread to the adjacent parts of the district as no contagion was reported among the Indians.

The epidemic did reach the Mackenzie River District, however. The timing of its appearance there suggests that the Mackenzie brigade which passed Fort Resolution on July 3 was the carrier. A letter dispatched to Governor Simpson from Fort Simpson on November 27, 1837, states that, "a kind of Epidemic disease or Influenza got among the Indians towards the latter end of summer, and still continues.[19] Assuming that "latter end of summer" was August, the disease broke out after the Mackenzie brigades arrived home.

[16] Simpson Inward, John Rowand, Edmonton House, Dec. 31, 1835, HBC D 5/4, p. 143.
[17] Simpson Inward, Alexander McLeod, Fort Chipewyan, Dec. 30, 1837, HBC D 5/4, p. 364.
[18] Fort Dunvegan Journal, 1838, HBC B 56/a/6, p. 4.
[19] Simpson Inward, McPherson, Fort Simpson, Nov. 27, 1837, HBC D 5/4, p. 346.

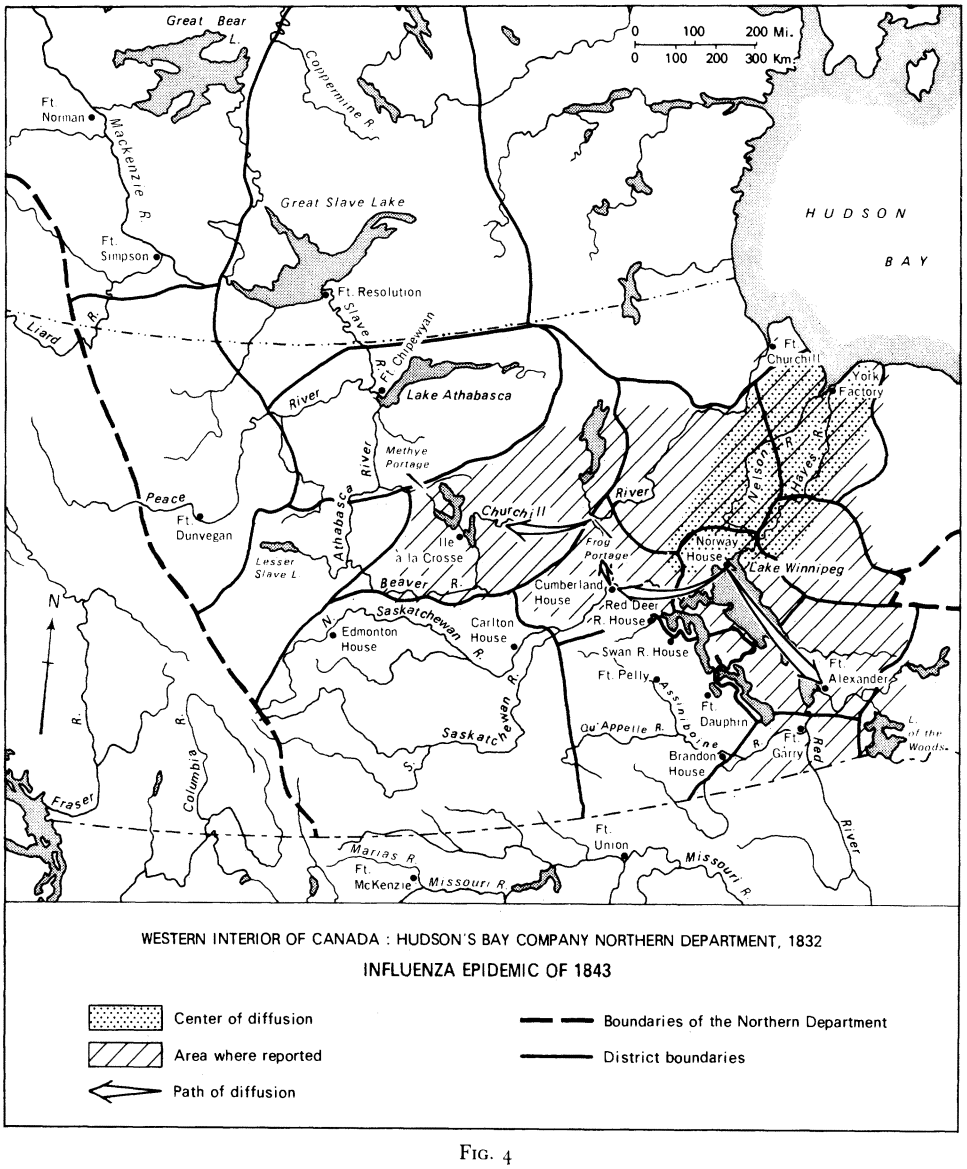

FIG. 4

Although the epidemic spread to Indians in the vicinity of Fort Simpson, it does not appear to have reached much farther down the Mackenzie River Valley or east of the Coppermine River area. Not one of the dispatches from Fort Norman includes any references to influenza or to any other diseases. Thus, as Figure 3 shows, the influenza epidemic of 1837 was apparently more localized than was that of 1835.

Six years later, in 1843, yet another epidemic of influenza occurred (Fig. 4). Initial reports of the disease came almost simultaneously from York Factory and Norway House. Letters from these two posts indicate that it broke out in July and persisted through August. During the late summer and autumn, Indians in the vicinity of Fort

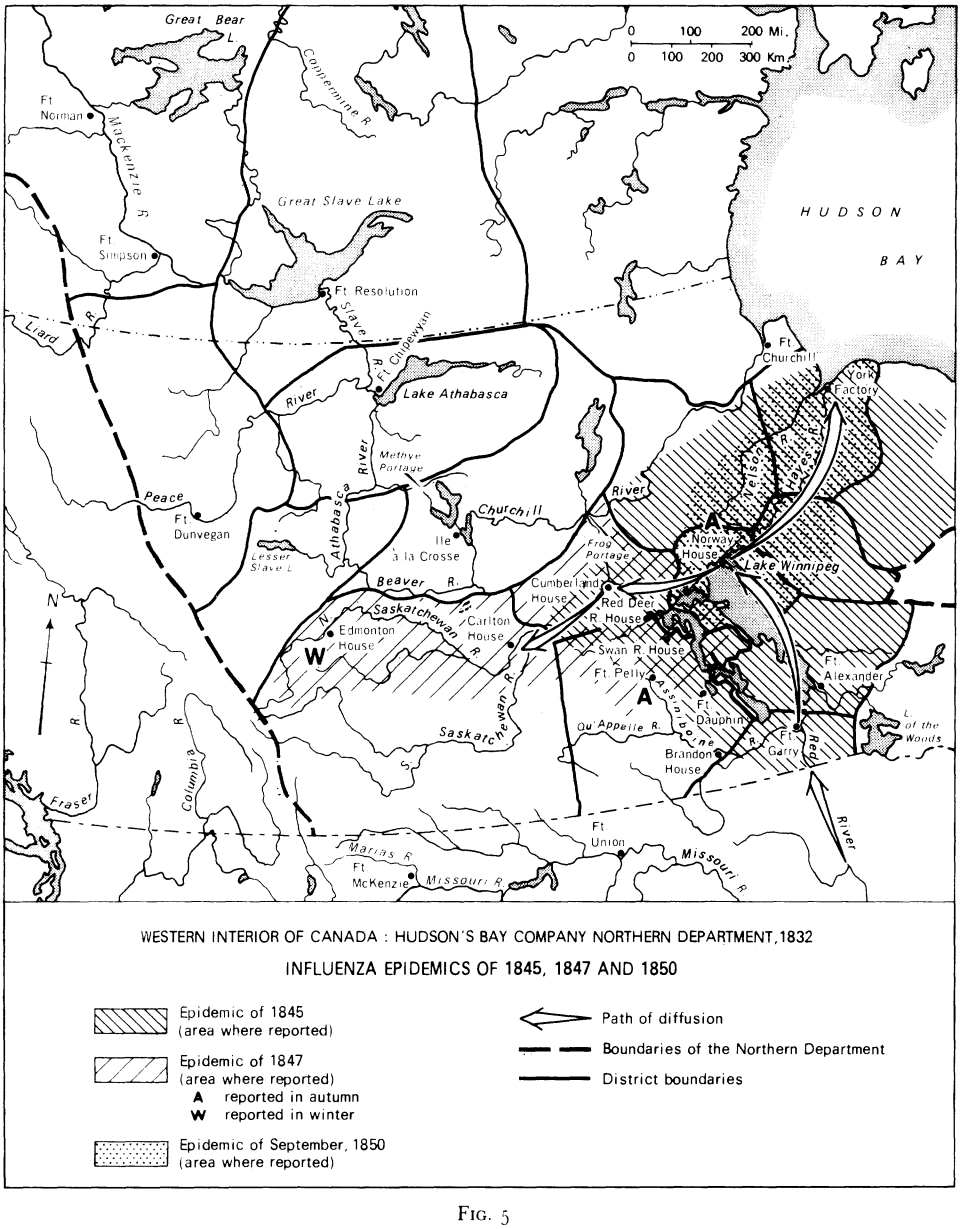

FIG. 5

Alexander were said to be sick with influenza.[20] To the northwest, the epidemic spread as far as Ile à la Crosse, in the English River District. It apparently reached that area in September, for between the 21st and the 26th the Ile à la Crosse journal indicates that many Indians were sick and refused to leave the post.[21] The records from Forts Chipewyan, Dunvegan, and Edmonton contain no references to

[20] Simpson Inward, Nicol Finalyson, Fort Alexander, Dec. 1, 1843, HBC D 5/9, p. 313.
[21] Ile à la Crosse Journal, 1843, HBC B 89/a/22, p. 29.

widespread sickness during the summer, autumn, or winter, so the epidemic does not seem to have extended beyond the English River District.

During the summer of 1845, influenza hit sections of the Northern Department for the fourth time in ten years (Fig. 5). According to the York Factory journals, the disease was first contracted by the boat crews of the Red River colony in the spring. These crews carried it northward to Norway House and York Factory. Influenza was widespread in the vicinity of Norway House by mid-July, and an Indian died from the illness at that post on the 21st of that month. From then until August 29 the disease is mentioned frequently in the journal. That no reference is made to it thereafter suggests the epidemic had subsided.

Influenza apparently did not reach York Factory until mid-July, for it was first mentioned in the post journal on the 17th of the month: "In the afternoon four Oxford House boats received cargoes [they had arrived on the 15th]...and took their departure....The Crews of these boats are generally affected with Influenza, a disease prevalent this summer among the Natives and servants in the low country."[22] On July 19, just four days after this Oxford House brigade arrived, a servant at York Factory was reported sick with influenza. Two days later, four more were sick; the disease began to spread. The rapidity with which this epidemic diffused to the area around the post led Hargrave to write: "The disease,—Influenza—broke out...and although on two previous occasions of a similar nature I had witnessed more mortality, at no time within these last twenty years did the contagion spread so widely or produce such effects upon the physical strength of the convalescents."[23] Not until the first week of September did the outbreak begin to subside in the area around York Factory.[24]

Although the debilitating effects of the epidemic brought the freighting business between York Factory and Norway House to a virtual standstill in late July and August, Hargrave indicated that the sickness did not interfere with the inland brigades.[25] The fact that most of the brigades had left for the interior before the disease reached epidemic proportions may explain why it does not appear to have spread to the English River area or to other districts to the northwest. Why the epidemic did not spread to the Saskatchewan District is not clear, however. One Saskatchewan brigade left Norway House on July 28, and many of the crewmen were sick. Thus the disease was carried into the district, even though it did not cause an epidemic.

In 1846 influenza was reported again in the English River, Athabasca, and Great Slave districts, but the symptoms that fur traders diagnosed as influenza may have been complications resulting from measles, which was prevalent that year. The following year, however, influenza did make its appearance once more, this time primarily in the Saskatchewan Valley and the lands to the south (Fig. 5). According to Ross, a "severe" epidemic broke out in the Norway District in the autumn.[26] From there it spread to the west and southwest. William Todd reported that influenza was also widespread around Fort Pelly in the Swan River District in autumn, affecting Plains and Woodland Indians alike.[27] A letter from John Harriott at Edmonton House indicates the epidemic reached that area in early winter and that its effects

[22] York Factory Journal, 1845, HBC B 239/a/161, p. 47.
[23] Simpson Inward, James Hargrave, York Factory, Aug. 10, 1845, HBC D 5/14, p. 253.
[24] Simpson Inward, James Hargrave, York Factory, Sept. 8, 1845, HBC D 5/15, p. 39.
[25] Simpson Inward, James Hargrave, York Factory, Aug. 10, 1845, HBC D 5/14, p. 253.
[26] Simpson Inward, Don Ross, Norway House, Dec. 10, 1847, HBC D 5/19, p. 629.
[27] Simpson Inward, William Todd, Fort Pelly, Apr. 23, 1848, HBC D 5/22, p. 169.

were felt most strongly in the parkland area. No other posts reported the disease, so it appears to have been confined to the area shown in Figure 5.

In the autumn of 1850, the sixth outbreak of influenza in twenty years took place. As on three preceding occasions, it appeared almost simultaneously at York Factory and Norway House in the month of September.[28] Like the epidemic of 1847 it was relatively localized and seems to have been confined mostly to the York, Norway, and contiguous districts (Fig. 5). The epidemic probably did not spread more widely because it broke out in autumn, after most of the transport business had been completed.

The mortality rates from the various influenza epidemics varied considerably. In 1835, eight Indians at York Factory died and two children of employees at Norway House succumbed.[29] The York journal reveals that the post's medical doctor made daily visits to the lodges of nearby Indians to administer medicine. It adds that his efforts and the food supplies sent out from the post to aid the weakened Indians helped to reduce the death toll. Although the loss of life thus appears to have been moderate in these two districts and to have been confined mostly to the young and the old, particularly women, it seems to have been much greater in the Saskatchewan area. There the "prevalent sickness carried off so many," mostly Woodland Cree and Assiniboine; that Rowand, who was in charge of the district, expected it to seriously reduce the fur returns from the region.[30] The toll was also high in the English River District, where at least forty or fifty Indians perished.[31] The loss of life in the Athabasca and Peace River districts, said to be great, led the journalist of Fort Chipewyan to remark that "the present distressing situation of the Indians is without parallel during my thirty-six years residence among them."[32] Even though the record of fatalities is incomplete, most of the victims again appear to have been women and children.

The influenza epidemic of 1837 seems to have been much milder and reportedly produced no fatalities around Fort Simpson or in the Athabasca District. Loss of life was widespread only in the vicinity of Fort Dunvegan, in the upper Peace River Valley.[33] The toll there may have been boosted by malnutrition, for food was in short supply that year. Similarly, the influenza epidemics of 1843, 1845, 1847, and 1850 were relatively mild and caused few deaths. However, the death rates for the influenza epidemics of 1843 and 1845 may have been underestimated, because other illnesses, such as scarlet fever in 1843 and whooping cough and perhaps dysentery in 1845, were prevalent in the Manitoba lowlands. Most of the deaths reported in those two years were attributed to these other illnesses.

Scarlet Fever

Scarlet fever is caused by streptococci. Significantly, an attack of scarlet fever does not confer immunity to the victim; on the other hand, the typical scarlet fever

[28] Simpson Inward, Don Ross, Norway House, Nov. 27, 1850, HBC D 5/25, p. 253; and Simpson Inward, James Hargrave, York Factory, Dec. 1, 1850, HBC D 5/25, p. 298.

[29] York Factory Journal, 1834–1835, HBC 239/a/148, pp. 60–62; and Norway House Journal, 1835, HBC B 154/2/26, pp. 9–16.

[30] Simpson Inward, John Rowand, Edmonton House, Dec. 31, 1835, HBC D 5/4, p. 143.

[31] Simpson Inward, Roderick Mackenzie, Ile à la Crosse, Jan. 10, 1836, HBC D 5/4, p. 152.

[32] Fort Chipewyan Journal, 1835–1836, HBC B 39/a/31, p. 71.

[33] Simpson Inward, McPherson, Fort Simpson, Nov. 27, 1837, HBC D 5/4, p. 346; and Fort Dunvegan Journal, 1838, HBC B 56/a/6, p. 4.

symptoms of early high fever, redness of the throat and tonsils, and a blotchy red rash, are rarely observed twice in the same individual. Rather, repeated attacks usually produce other responses, such as strep throat. Thus the first outbreaks of the disease in the early nineteenth-century Canadian West could have been identified easily, but subsequent visitations of the fever would be more difficult to diagnose and thus may not have been recorded. Also, although scarlet fever is communicable, it rarely occurs in epidemic form.[34]

The epidemic of 1843 was probably the first occurrence of scarlet fever in the Canadian West for at least a generation, because most of the people afflicted by it had readily identifiable symptoms. The disease seems to have appeared first among the Red River colonists in mid-summer and to have persisted there until December.[35] By late summer it had spread among the Indians along the lower Winnipeg River in the vicinity of Fort Alexander. In October it broke out among the Indians along the Berens River on the eastern shore of Lake Winnipeg when they came to pick up their winter supplies.[36] Whether the disease reached the Norway or Island Lake districts is not clear. Ross's letters from Norway House to Governor Simpson indicate that influenza was common in his district as well as to the south and to the northeast. He also mentioned the scarlet fever epidemic in the Red River and Berens River areas. Presumably, if the fever had been present in his district he would have said so. Given the lack of references to scarlet fever and given the fact the disease is less contagious than influenza or measles, it probably was localized in the Red River and Winnipeg districts of southeastern Manitoba. Even so, loss of life was reportedly heavy among Indians and Europeans alike in the affected area. Mortality rates were not spread evenly over the populations, however, and the victims were usually children.[37]

Measles

The epidemic of measles that began in 1846 lasted almost a year in the Northern Department (Fig. 6). Like the influenza epidemic of 1835, its effects were widely felt. Measles is a viral disease, one of the most communicable known.[38] The disease causes an inflammation of the mucous membrance of the nose and air passages within ten days of contact. Three or four days after these symptoms are manifest, a rash appears on the face, abdomen, and extremities. It generally attacks children under the age of fifteen, but when the disease is introduced into a population not previously exposed, an extremely high proportion of people of all ages, often more than 90 percent, will contract it.[39]

The measles epidemic of 1846 first appeared in the Red River area in the early summer. Again the boat brigades seem to have been the primary carriers. On June 7 four boats arrived at Norway House from Red River, and Ross reported that the crews were sick with measles.[40] He quickly loaded their canoes and sent them on to York Factory, hoping to avoid the contagion. The same day the Methey Portage brigade arrived from Ile à la Crosse and remained for two days. On the 9th, boats

[34] Jacques M. May, M.D.: The Ecology of Human Disease (*A.G.S. Studies in Medical Geogr. No. 1;* MD Publications, Inc., New York, 1958), p. 252.
[35] Simpson Inward, Nicol Finlayson, Fort Alexander, Dec. 1, 1843, HBC D 5/9, p. 313.
[36] *Ibid.*
[37] *Ibid.*
[38] May, Ecology of Human Disease [see footnote 34 above], p. 264.
[39] *Ibid.*, pp. 264–265.
[40] Norway House Journal, 1846, HBC B 154/a/46, p. 3.

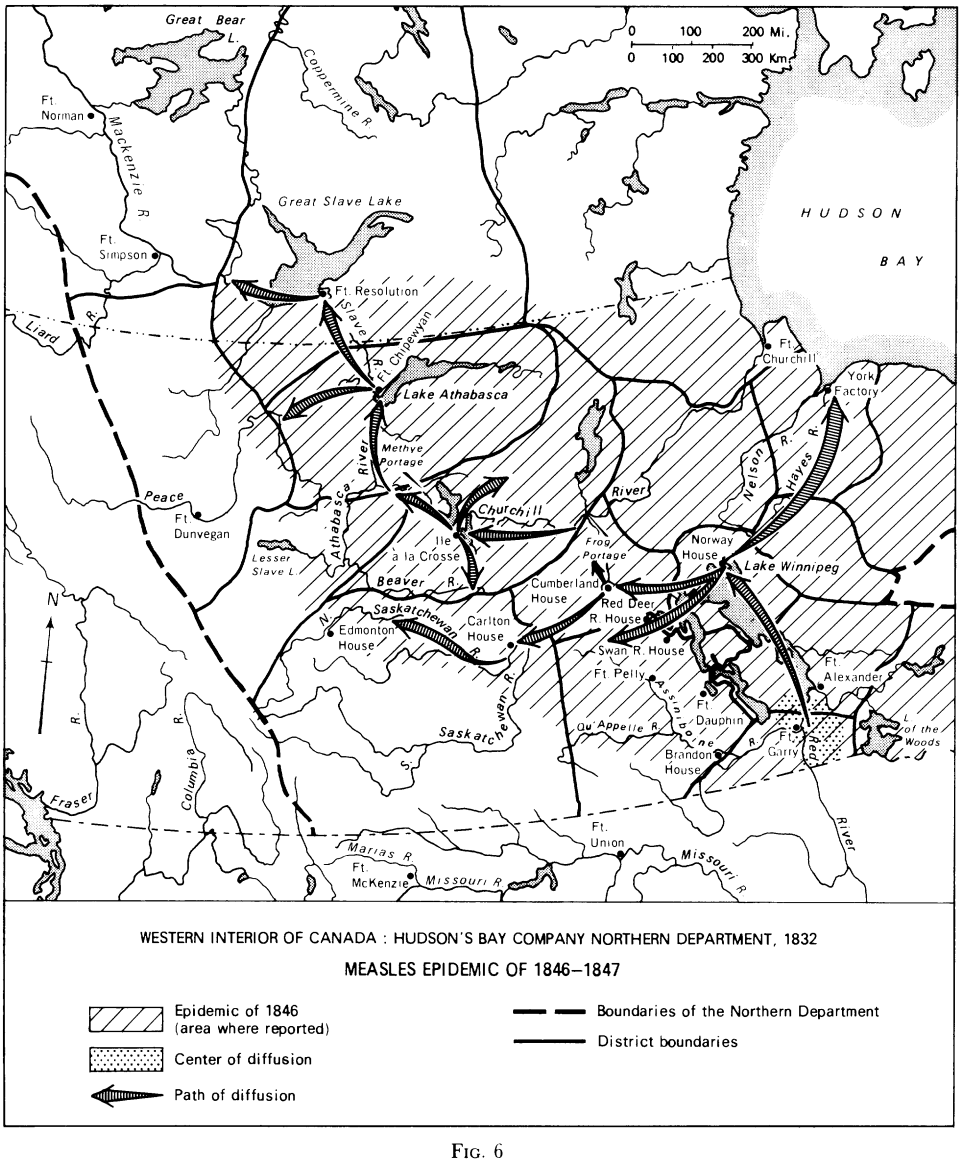

FIG. 6

from Rainy Lake arrived. All of these crews were healthy. On the 13th all of the district Indians arrived to trade, and in the afternoon a boat came in from the Berens River. On June 17, Ross reported that several of his men were sick with measles. This happened ten days after their first exposure to the disease and thus corresponds closely to the normal incubation period for the illness.[41] The same day the English River brigade arrived at Norway House and informed Ross that eighteen of the men of the Methey Portage brigade, which they had passed on the way, were sick with measles.

[41] *Ibid.*, p. 4.

Measles were now widespread from Norway House to York Factory and southward to the Red River colony. Meanwhile, other brigades continued to arrive at Norway House: the Saskatchewan on June 26, the Swan River on July 8, the Athabasca on July 15, and two more from the Red River on July 25 and August 4. All were exposed to the disease for varying lengths of time and then departed for home, usually with some of the men suffering from the illness.

Initially the disease appears to have spread most rapidly northeastward from the center of diffusion. This is not surprising, however. Until midsummer most crews were heading for Norway House and/or for York Factory. Westward and northwestward expansion of the epidemic accelerated as the crews left for home. As the arrival-departure information for Norway House indicates, this began in mid-July. On July 29 half of the men stationed at Cumberland House were said to be sick from measles.[42] Considering the incubation period for the disease, the post would have been exposed as early as July 19, perhaps by the Athabasca brigade that had left Norway House on July 16. By August 9 measles was widespread around Carlton House, suggesting that the population there had been exposed at least as early as the first of the month.

Because of the greater travel distances, the disease spread to the north of the Saskatchewan River more slowly. Roderick Mackenzie indicated that the outfit from York Factory did not arrive at Ile à la Crosse until September 10. This was later than normal, owing to the debilitating effects which the measles had on the crews. When the brigade arrived, he reported, "We found nearly the whole of our Chipewyans in camp here apparently in good health." But, "early in October the Measles and Influenza broke out violently among our unfortunate Indians."[43] Mackenzie's observations thus leave little doubt that the Ile à la Crosse brigade carried the disease into the English River District.

Farther to the north, the Athabasca brigade arrived at Fort Chipewyan on September 17. Measles among the crews was again cited as the reason for their late arrival.[44] On September 29, boats were dispatched to Forts Vermilion and Dunvegan in the Peace River Valley to the west and to Forts Resolution and Simpson to the north. On December 3 some of the men at Fort Chipewyan were sick with the measles and influenza. A week earlier a Chipewyan had complained that sickness was widespread among them in their winter camps. The disease was not specified, but in all probability the Indians were suffering from measles.

Measles apparently did not spread westward to the Peace River area that winter, for a letter from Fort Chipewyan dated December 24 stated that everyone there was enjoying good health. Similarly, the epidemic does not seem to have diffused northward to the Indians in the upper Mackenzie District. A probable explanation is that the disease had so delayed the crews that they did not arrive at Fort Simpson until after the Indians had completed their autumn trading and had scattered to their winter camps. Somewhat surprisingly, it does not appear to have affected the men at Fort Simpson either that winter or the following summer.

The measles epidemic of 1846–1847 was not only widespread but also took a heavy toll of life among all ages. On August 10, Hargrave reported that thirty-one Indians had died around York Factory, including "only those in the immediate vicinity and

[42] Simpson Inward, Colin Campbell, Cumberland House, July 29, 1846, HBC D 5/18, p. 85.
[43] Simpson Inward, Roderick Mackenzie, Ile à la Crosse, Jan. 12, 1847, HBC D 5/19, p. 65.
[44] Fort Chipewyan Journal, 1846, HBC B 39/a/42. p. 21.

buried by the company's Servants."[45] Nicol Finlayson dispatched a letter to Governor Simpson from Fort Alexander on August 3 in which he remarked that "sickness had made such ravage among the natives this summer, and the last which has more the appearance of a pestilence than an epidemic."[46] Similar reports came from the Red River, Norway House, and Oxford House. The loss of life and the debility of the survivors was such that the company was unable to find enough able-bodied men to take the boats to the Red River, Norway, Oxford, and York districts.[47] The disease had equally devastating results in other areas, and with the exception of the smallpox epidemic of 1838, the measles epidemic seems to have produced the highest mortality rate.

Judging from the information provided by Hargrave at York Factory, it may be that many of the deaths resulted not directly from measles but from subsequent complications. Commenting on the heavy loss of life, he observed that "inflammation of the heart and of the chest generally followed the disease that originally attacked them, and the greatest mortality resulted from that cause."[48] Measles can produce serious consequences that affects the respiratory system, the ears, and the brain.[49] Hargrave's observation indicates that the Indians were prone to the first of these sequelae. As has been noted, the records of Ile à la Crosse, Fort Chipewyan, and Fort Resolution all reveal that influenza broke out along with measles in 1846. The coughing and respiratory troubles reported as influenza may well have been complications associated with the measles.

Smallpox

Smallpox was undoubtedly one of the most dreaded of all European diseases to which the Indians were exposed. It broke out in the Northern Department in 1837 (Fig. 7). Initial symptoms of smallpox are fever, chills, headaches, and prostration, which continue for three or four days. The temperature then begins to fall, and a rash appears and evolves into a number of pustules. Crusts form and the scabs finally fall off about the end of the third week. Smallpox varies from a mild disease with a fatality rate of less than 1 percent to a severe condition with a fatality rate of 30 percent or more. The severity of a given epidemic is directly proportional to the residual immunity of the population and therefore decreases over time after exposure.[50] The epidemic of 1837 was the first major outbreak in the Northern Department since 1780. Consequently, it is not surprising that many of the Indian groups who contracted the disease suffered terrible losses. The fur traders estimated that the Indians, chiefly Assiniboine, Blood, Sarsee, Piegan, Blackfoot, and Gros Ventre, lost up to three-quarters of their populations.[51]

Figure 7 traces the diffusion of the epidemic. Significantly, the pattern is similar in most respects to two other smallpox epidemics that struck the Northern Department

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[45] Simpson Inward, James Hargrave, York Factory, Aug. 10, 1846, HBC D 5/18, p. 180.
[46] Simpson Inward, Nicol Finlayson, Fort Alexander, Aug. 3, 1846, HBC D 5/18, p. 105.
[47] Simpson Inward, James Hargrave, York Factory, Aug. 10, 1846, HBC D 5/18, p. 180.
[48] *Ibid.*
[49] May, Ecology of Human Disease [see footnote 34 above], p. 264.
[50] Jacques M. May, M.D., edit.: Studies in Disease Ecology (*A.G.S. Studies in Medical Geogr. No. 2;* Hafner Publishing Co., Inc., New York, 1961), pp. 1–4.
[51] Ray, Indians in the Fur Trade [see footnote 2 above], p. 188.

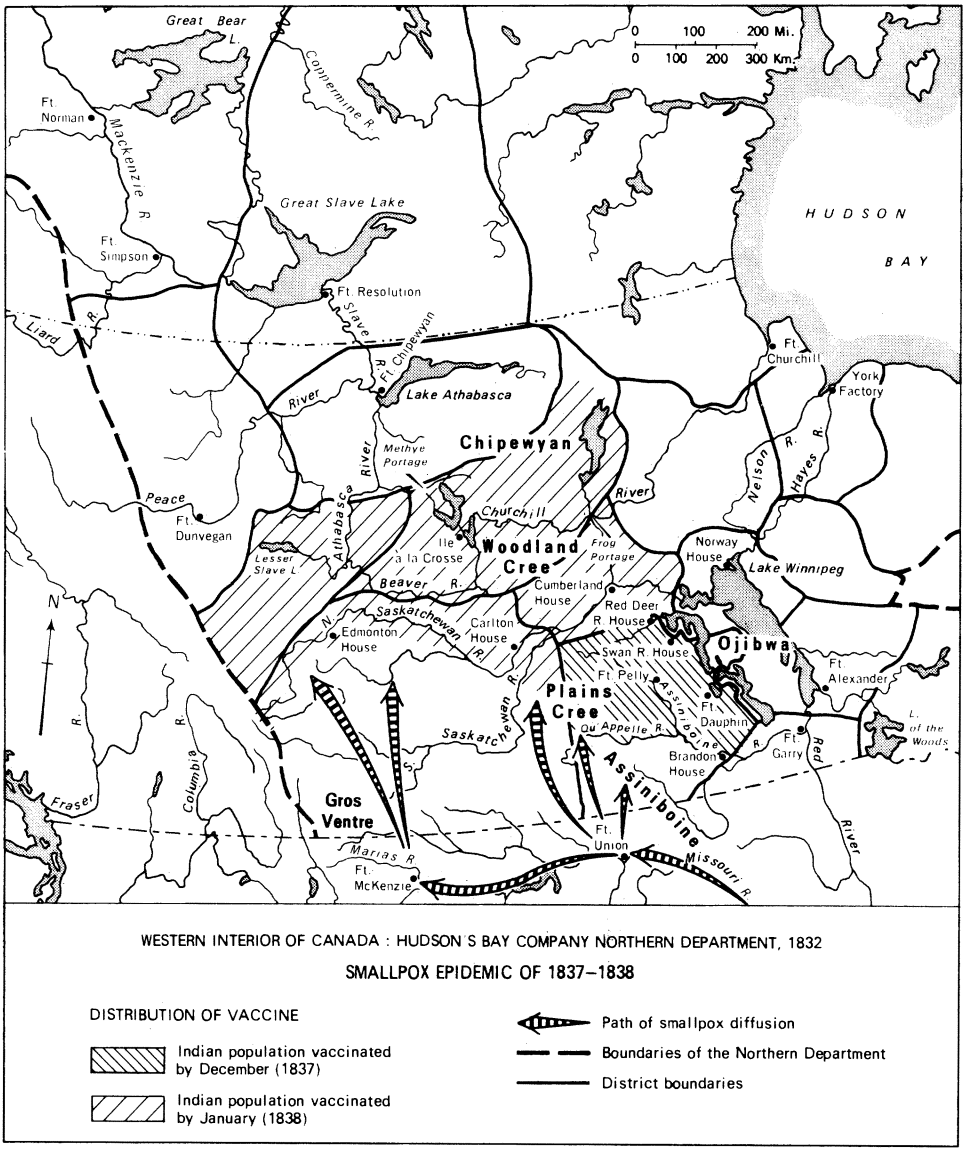

FIG. 7

in 1780 and 1869.[52] Furthermore, it contrasts sharply with the patterns outlined for the influenza, scarlet fever, and measles epidemics. The smallpox epidemic first broke out in June, 1837, at Fort Union. The source of the contagion was an American Fur Company supply boat that had been dispatched from St. Louis. When it arrived at Fort Union, one man on board was suffering from smallpox. Although the American Fur Company traders attempted to prevent the spread of the disease in the vicinity of the post, their efforts failed. A party of more than 1,000 Indians ignored warnings to

[52] *Ibid.*, pp. 107 and 191.

stay away from the fort, and they contracted smallpox soon after their arrival. Only 150 survived.[53]

The epidemic was transmitted farther up the Missouri River valley by another supply boat of the American Fur Company. Shortly after the steamboat had arrived at Fort Union a longboat was sent on to Fort McKenzie, on the Marias River a short distance upstream from its confluence with the Missouri River. The crew of the longboat became ill shortly after leaving Fort Union, and an attempt was made to quarantine them in the vicinity of the Judith River. However, a party of more than five thousand Blackfoot and Piegan, who were waiting at Fort McKenzie to trade, insisted that the supply boat proceed. Trade began as soon as the boat arrived, and shortly thereafter the Blackfoot and Piegan fell victim to the epidemic.[54]

Smallpox was quickly carried northward into the Northern Department by the equestrian Assiniboine, Cree, Blood, Blackfoot, Gros Ventre, and Piegan Indians, who fled in the misguided belief that they could run away from contagion. By autumn the disease was reported in the Qu'Appele River valley, and by November it had reached the Indians living in the parklands along the North Saskatchewan River between Carlton House and Edmonton House. Further diffusion of the epidemic to the east and north was arrested by an extensive vaccination program of the Hudson's Bay Company, so the Woodland Indians escaped the ravages of the disease.[55]

The Trading Network and the Diffusion of Disease

Outbreaks of contagious diseases that affected populations in two or more districts occurred nine times between 1830 and 1850. In addition, several other, more localized, epidemics occurred.[56] In most instances the Hudson's Bay Company boat brigades served as the primary carriers of the diseases. With the exception of the smallpox epidemic of 1837, the process was essentially one of hierarchical diffusion, similar to what one would expect in a well-developed central place system.[57]

The key position of certain posts, such as Norway House and York Factory, in the transport system no doubt accounts in part for the greater frequency of disease experienced there. Indeed, the Norway District appears to have been the most unhealthy, with ten different epidemics. Norway District was also the most central location, in frequent contact with the west, northwest, northeast, and south. The ecological situation of Norway House and York Factory may also have been important, for both were situated in marshy lowland areas.

The timing of the outbreak of a disease was clearly critical in determining how widely it diffused. Generally, epidemics that began in midwinter remained relatively

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[53] Edwin T. Denig: Five Indian Tribes of the Upper Missouri (edited by John C. Ewers; Univ. of Oklahoma Press, Norman, 1961), p. 71.

[54] Arthur J. Ray: Smallpox: The Epidemic of 1837–38, *The Beaver,* Autumn, 1975, pp. 8–13.

[55] Ray, Indians in the Fur Trade [see footnote 2 above], pp. 188–189.

[56] Most of these illnesses were confined to a single district and produced few fatalities. Many cannot be identified because descriptions of symptoms are insufficient. For instance, "sore eyes" were common in the western English District during the autumn and winter of 1844 and in the northern Saskatchewan District in January, 1840. In December, 1840, many Indians in the Norway District suffered from "putrid fever." Identifiable but localized epidemics included three outbreaks of whooping cough, one in the Nelson River District in 1834, one in the Norway District in 1843, and one in the Ile à la Crosse area in 1845; mumps, in the York District in 1841 and in the Ile à la Crosse region in 1844; and dysentery, in the Norway District in 1845 and 1846.

[57] Gerald F. Pyle: The Diffusion of Cholera in the United States in the Nineteenth Century, *Geogr. Analysis,* Vol. 1, 1969, pp. 59–75.

localized because the Indians had little contact with the posts, because they were widely dispersed, and because traffic between districts was minimal. On the other hand, if an epidemic erupted in midsummer it generally spread rapidly, especially if it was highly contagious. At this time of the year, Indians gathered together in larger encampments, visited the trading houses frequently, and there was a high volume of boat and canoe traffic between districts.

Diseases were less frequent in the peripheral areas, such as the Mackenzie River and Great Slave Lake districts, which were so distant from the usual point of origin in Manitoba that the brigades did not arrive until early winter, or later in epidemic years owing to the debilitating effects of disease on the crews. By that time the local Indians often had already dispersed to their winter camps. Thus the timing of transmission also helped to reduce the prevalence of disease in the northernmost areas. Elsewhere, large trading parties of Indians would await the arrival of the supply boats. During the trading that followed, the Indians often contracted disease and spread it to the hinterlands of the posts as they fanned out to their winter hunting grounds.

The smallpox epidemic of 1837–1838 was an exception to the general pattern. Rather than breaking out in the York Factory–Norway House–Red River area, it erupted in the Missouri River valley. Initial transmission was via American Fur Company supply boats, but subsequent dispersal was caused by the northward flight of Indians who sought to escape from the dreaded disease. The disease failed to diffuse through the network of woodland posts of the Hudson's Bay Company because of the vaccination program which the company carried out as a countermeasure.

The impact of these repeated epidemics on the population growth rates of the various districts has not been dealt with in detail here, for information regarding losses of life is still sketchy. The epidemics of influenza in 1835, of smallpox in 1837, and of measles in 1846–1847 caused heavy losses in areas affected; most other epidemics were said to have taken light to moderate tolls. Verification or refinement of these general statements, however, must await meticulous analysis of the population estimates and tallies taken at various times.