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Wisconsinan Glaciation of Northern Aroostook County, Maine

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TRIP B-8

WISCONSINAN GLACIATION OF NORTHERN AROOSTOOK COUNTY, MAINE

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Introduction

The purpose of this trip is to examine multiple till exposures, stratigraphic relationships, and glacially overridden deposits which permit an interpretation of the mode of till emplacement of late Wisconsinan deglaciation in northern Maine. We will make a west to east transect (Fig. 1, St. Francis to Grand Isle) along the southern bank of the St. John River where Wisconsinan glacial deposits are readily observable.
Maps: St. Francis,Winterville, Eagle Lake, Fort Kent, Frenchville, Grand Isle, Van Buren, 15 minute series.

Stratigraphy

Surficial stratigraphic units have been mapped along the Maine side of the St. John River and yield evidence for two distinct glacial phases represented by two tills and associated outwash. The upper, or Van Buren Till, is the surface unit in northern Aroostook County. This till terminates at,and is included in,a moraine complex extending discontinuously from St. Francis to Grand Falls, N.B. (Fig. 1). Underlying the Van Buren Till at several localities along the St. John River, the St. Francis Till records an earlier event.

Lithology and Provenance

These two tills and their associated outwash deposits contain different lithologies. The Van Buren drift is characterized by inclusions of Canadian Shield Precambrian granite gneiss clasts (varying between 2 to 5%) and other exotics. The St. Francis drift is almost totally supported by the local and extensive Seboomook Formation of Devonian age (Fig. 2). No granite gneiss inclusions have been identified in the

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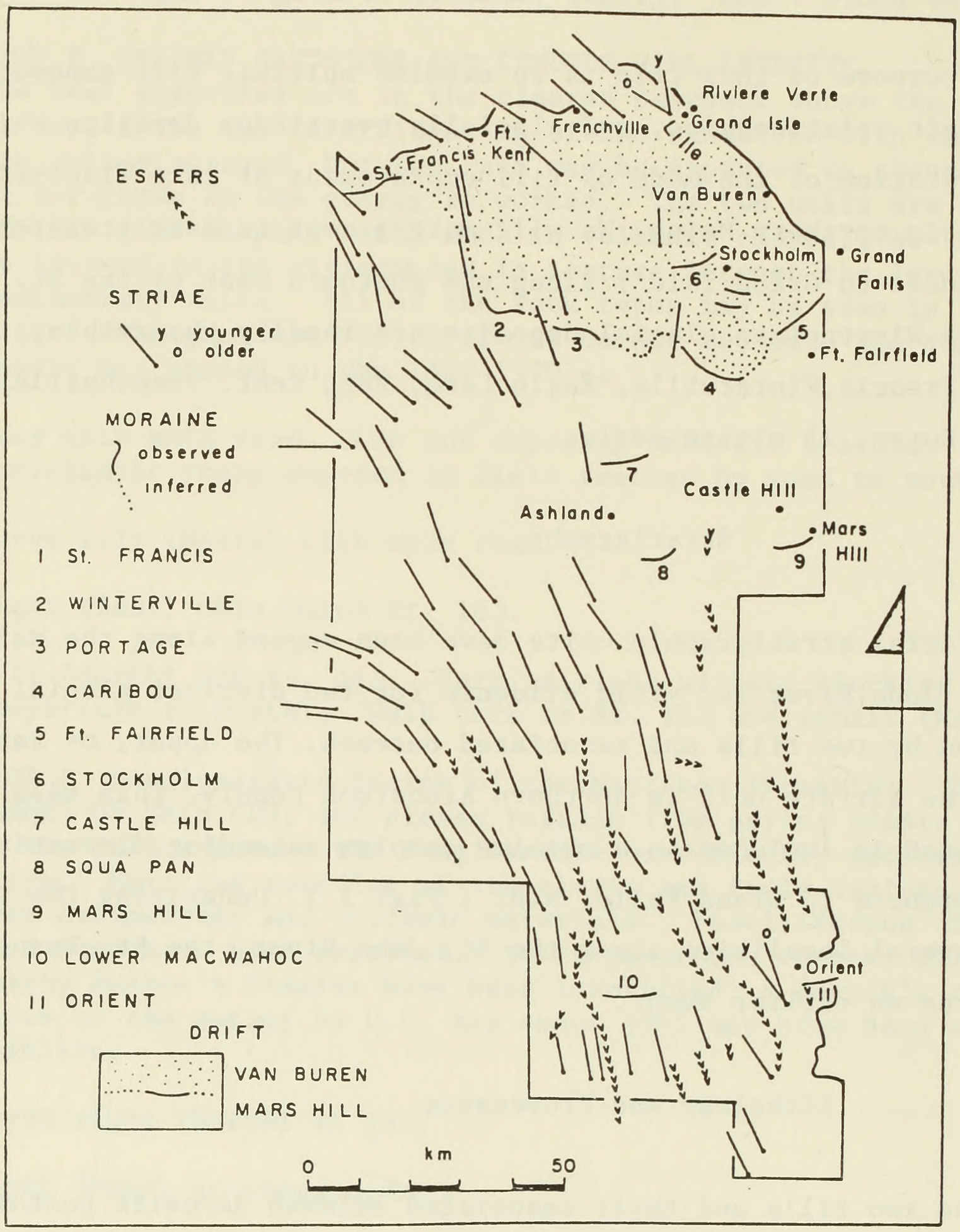

Fig. 1. Generalized surficial geology of Aroostook County.

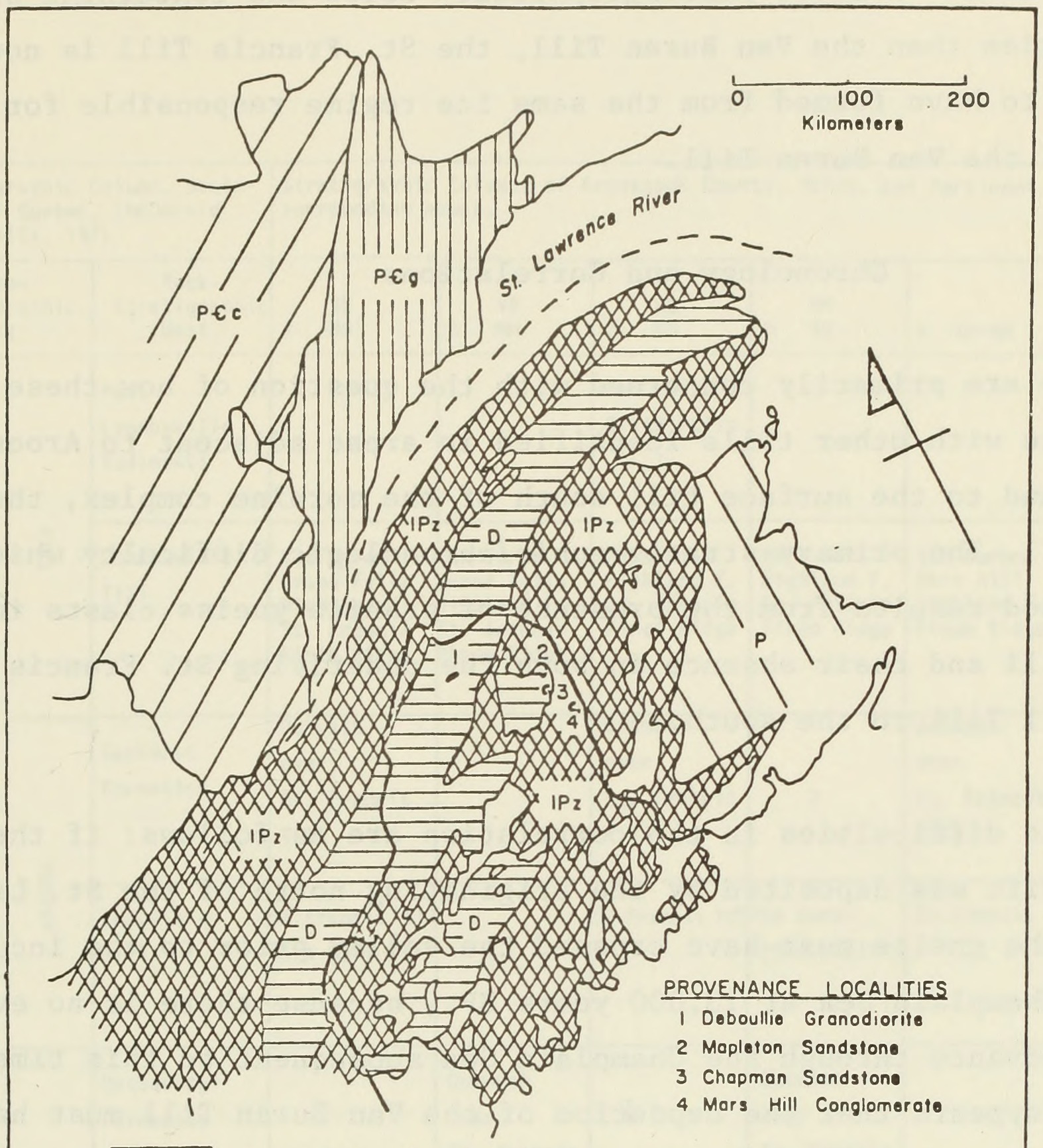

Fig. 2. Generalized geologic map of northern Maine and adjacent Canada.

St. Francis drift. Erratics, glacial striations, and landforms indicate that the Van Buren Till was emplaced by ice moving in a southeasterly direction. Till fabric of the St. Francis Till suggests lateral east-west movement. Located stratigraphically below and containing different lithologies than the Van Buren Till, the St. Francis Till is not considered to have formed from the same ice regime responsible for the deposition of the Van Buren Till.

Chronology and Correlations

We are primarily concerned with the question of how these two tills correlate with other tills identified in areas adjacent to Aroostook County and to the surface till south of the moraine complex, the Mars Hill Till. The primary stratigraphic/chronologic difficulty which is recognized results from the presence of granite gneiss clasts in the Van Buren Till and their absence in both the underlying St. Francis Till and Mars Hill Till to the south.

The difficulties in the correlation are as follows: if the Van Buren drift was deposited by ice originating north of the St. Lawrence River, the gneiss must have crossed the valley prior to the incursion of the Champlain Sea at 13,000 years BP., because there is no evidence of an ice advance through the Champlain Sea subsequent to this time. However, it also appears that the deposition of the Van Buren Till must have occurred after the formation of the coastal moraine belt at Pineo Ridge at about 12,700 years BP. because Aroostook County was almost certainly covered with ice until deglaciation followed the deposition of the coastal moraines. It would thus appear that the Van Buren Till is older than 13,000 years BP., but younger than 12,700 years BP. Even if the opening of the Champlain Sea and the deposition of the coastal moraine belt are judged to be synchronous, it is still difficult to explain the transportation of the granite gneiss to the Van Buren area by an ordinary re-advance of ice from north of the St. Lawrence Valley.

Fig. 3 shows possible correlations of Aroostook County deposits and surrounding area deposits with the stratigraphy of southeastern Quebec. The time constraints imposed on the correlations are those discussed

Stratigraphic Column, Southeastern Quebec, (McDonald and Shilts, 1971		Stratigraphic Columns of Aroostook County, Maine, and Pertinent surrounding areas.				
Time-Stratigraphic Unit		Rock-Stratigraphic Unit	A VB MH	B VB MH	C VB MH	D MH VB	E VB=MH
Wisconsinan Stage	late	Post Lennoxville Sediments			Van Buren Grand Falls ?		
		Lennoxville Till	Van Buren Grand Falls Highland F. St. Antonin Pineo Ridge	Van Buren Grand Falls Highland F. St. Antonin Pineo Ridge	Mars Hill Highland F. St. Antonin Pineo Ridge	Mars Hill Highland F. St. Antonin Pineo Ridge	Van Buren Mars Hill Highland F. Pineo Ridge
	middle	Gayhurst Formation	Outwash over St. Francis Till		Outwash over St. Francis Till	?	Outwash over St. Francis Till
		Chaudière Till	St.Francis Till Mars Hill Till		St.Francis Till	Van Buren Grand Falls	St.Francis Till
	early	Massawippi Formation		Outwash over St. Francis Till		Outwash over St. Francis Till	
		Johnville Till		St. Francis Till		St. Francis Till	

Fig. 3. Till correlation chart.

above and the date of 12,700 years BP. for the formation of the Highland Front Moraine in Quebec. (See, Introduction,Outline of the Pleistocene geology of northern Maine and adjacent Canada, this volume). Overrun sediments along the southern bank of the St. John River Valley and stratigraphic relationships indicate that the Van Buren Till is younger than the St. Francis Till at the localities where they are juxtaposed. If both the Van Buren Till and the Mars Hill Till are interpreted as being approximately the same age (Column E, Fig. 3) and both correlative to the Lennoxville Till of Quebec, then the time restriction imposed by the opening of the St. Lawrence Valley to the Champlain Sea becomes a manageable problem.

Because of markedly different sediment parameters between the two surface till units, and other considerations, the Van Buren and Mars Hill Tills are interpreted as having been deposited penecontemporaneously as the result of coalescing ice sheets (Genes and Newman, 1979) or, as the result of the thermal regime existing within a single ice mass (Hughes, pers. comm.).

References

Genes, A.N., and Newman, W.A., 1979, Late Wisconsinan glaciation of Aroostook County, Maine: Geol. Soc. America Abst., Northeast Section, p.36.

Itinerary

Mileage

0 Assembly point for the trip is at the IGA parking lot, Fort Kent (Junction of routes 11, 1, 161). Starting time 8: A.M. Turn west out of parking lot on to route 161.

0.4 American customs on right

0.6 St. John River flood control project on right constructed by U.S. Army Corps of Engineers.

1.5 Flood plain of the St. John River. Note terraces and incised outwash deposits.

5.3 Crossing the St. John town line.

6.6 On left is the farm of Sylvio Martin, seed potato farmer. No tresspassing without permission.

13.6 Outcrops of Seboomook Formation on left. This slate underlies most of the field trip area.

18.6 Rankin Rapids campground on right.

19.9 Entering the St. Francis Moraine complex. Some bedrock is evident, however, most of the hills are not bedrock cored.

21.9 Chamberlain general store on left. Ernie Chamberlain was intrumental in trailblazing for the lumber companies in years past and is one of the well known residents of Aroostook County.

22.2 Stop 1. Park along highway. Walk down path behind cabin to the St. John River. Walk east (crossing a small stream) approximately 200 yards.

This locality (Golden Rapids) exhibits the entire section of known Wisconsinan glacial stratigraphy in northern Maine. Resting on bedrock outcrop of the Seboomook Formation is the compact, silty to clayey, dark grey St. Francis Till, 3-3.5 meters thick. Clasts in this till are almost wholly derived from the underlying slate. Associated outwash, 5 meters thick, is lithologically similiar to the till it overlies. No granite gneiss occurs in this till or outwash. Above the outwash is the Van Buren Till which is clayey to silty, compact, and buff to dark brown. This till and its associated outwash contains clasts of granite gneiss and other exotics. The St. Francis and Van Buren Tills, where they are juxtaposed, are separated by a barely discernible boulder pavement which consists of Seboomook Formation clasts. Near the top of the section (across the road from where the cars are parked) a third till occurs , capped by yet another thin outwash deposit. Because of this singular occurrence and similiar lithologic constitution, this till is assumed to be part of the Van Buren Till (ablation facies or slight fluctuation?) and not reflective of a separate stratigraphic event. As slumping has occurred at various places at this locality, care should be exercized in examining the section.

Return to cars promptly. Reverse direction and head east.

22.4 Note outwash on left. This is the upper outwash of the stratigraphic section seen on stop 1. The outwash contains granite gneiss clasts.

22.6 Sand dune field on left. (Stop, time permitting).

24.1 Stop 2. Kame complex. Turn right into pit.

We are standing at the distal margin of the St. Francis Moraine complex. This large kame, some 80' high is in contact with a thick sequence of Van Buren Till immediately to the west. Because of excavation, good exposures show beds dipping outward around the entire perimeter of the deposit. The lithologies contained at this locality are those associated with Van Buren Tills and outwash deposits.Granite gneiss clasts in excess of half a meter have been found at this site.

Return to cars. Turn right out of pit and continue east.

24.3 The dirt road on the right between the two green houses (green in 1979) extends through the St. Francis Moraine complex for approximately one half mile. Pitted, hummocky, morainal topography characterizes this region. West of this hummocky moraine outwash extends to the St. John River and caps the Van Buren Till seen at stop 1.

26.3 Stop 3. Turn left into Rankin Rapids campground. Drive 0.1 mile to the large boulder at the end of the road. Go down the path to the St. John River.

Directly at the base of the path is an exposure of the St. Francis Till overlain by outwash of the Van Buren Till. Note the absence of granite gneiss or " colorful " lithology of the St. Francis Till. At times of low flow of the St. John River, it is possible to see the St. Francis Till resting directly on the Seboomook Formation (approximately 50 meters to the east). Here, till fabrics yield a strong 90° maximum.

Return to cars and return to main road (route 161).

26.5 Proceed east on route 161.

29.1 St. Francis town line.

45.1 Continue on route 161 east towards Madawaska. Fort Kent Blockhouse on left. The blockhouse marks the formal termination of canoe trips along the famed Allagash River.

45.7 Junction. Continue on route 1 toward Madawaska.

54.7 Frenchville town line.

54.9 Turn right just before the white house with the barn which is about to fall down.

55.1 Stop 4. Watch out for trucks-this is an active pit.

Excavation has destroyed much of this section, but relationships are still clearly visible. Proglacial (?) Van Buren outwash

has been overridden resulting in recumbent folding and thrust faulting on a large scale. Photographs of the original section will be available if the pit is virtually destroyed by the time we get there. This locality is directly north of the Caribou Moraine (to be visited on trip C - 6) and is thought to represent the event responsible for the formation of the moraine.

Return to cars and return to the main road.

55.4 Proceed south on route 1.

58.6 Turn right onto road to northern Aroostook Airport.

58.7 Turn right at sign to airport. Continue on main road.

62.4 Take left fork by stop sign. Long Lake is on the right. Continue on main road.

64.9 Take right on Grand Isle road just before the EXXON sign in front of the general store.

71.9 Take right at four corners. White house on hill to the right. Across from the white house is a two striation locality (possible stop).

75.2 Turn left at main road. Entering Lille sign to the right.

75.4 Stop 5. Turn left into gravel pit. Light green house just before entering the pit.

Here, the Van Buren Till, 3-5 meters thick, has overridden outwash deposits associated with the St. Francis Till. The outwash is rasped, torn, and large inclusions of the underlying deposit is included within the overlying Van Buren Till.

Return to cars and head for home.

End of Trip