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Log of field trip for Boy Scout leaders

1957

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UNIVERSITY OF WISCONSIN

WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY

G. F. Hanson
State Geologist

LOG OF FIELD TRIP

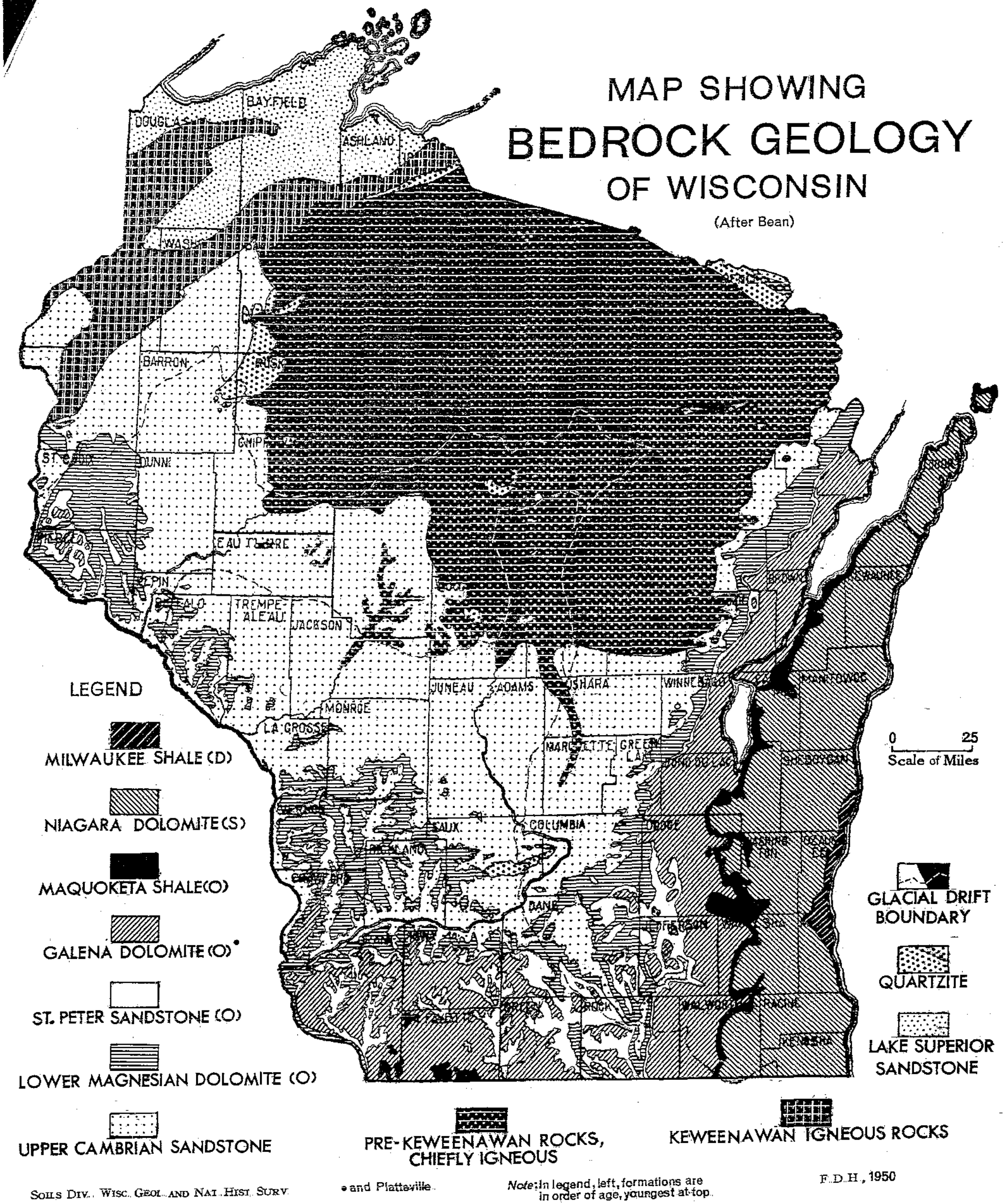
FOR

BOY SCOUT LEADERS

September 21, 1957

MAP SHOWING BEDROCK GEOLOGY OF WISCONSIN

(After Bean)

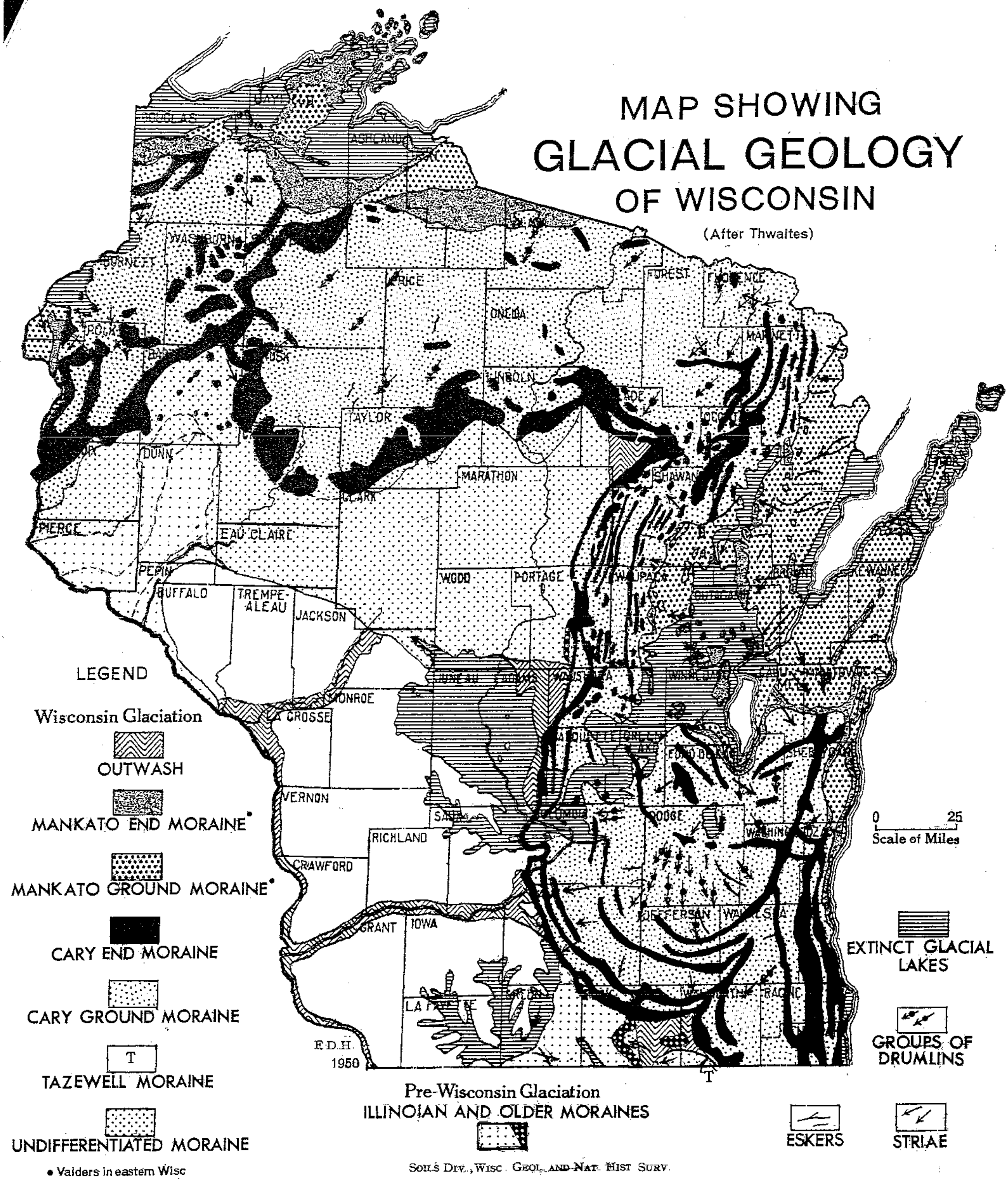


SOILS DIV., WISC. GEOL. AND NAT. HIST. SURV.

* and Platteville

Note: In legend, left, formations are in order of age, youngest at top.

F. D. H., 1950


MAP SHOWING
GLACIAL GEOLOGY
OF WISCONSIN
(After Thwaites)
LEGEND
Wisconsin Glaciation
OUTWASH
MANKATO END MORAINE•
MANKATO GROUND MORAINE•
CARY END MORAINE
CARY GROUND MORAINE
T
TAZEWELL MORAINE
UNDIFFERENTIATED MORAINE
• Valders in eastern Wisc
Pre-Wisconsin Glaciation
ILLINOIAN AND OLDER MORAINES
EXTINCT GLACIAL LAKES
GROUPS OF DRUMLINS
ESKERS
STRIAE
0 25
Scale of Miles
E.D.H.
1950
Soils Div., Wisc. Geol. and Nat. Hist. Surv.
BURNETT
POLK
PIERCE
DUNN
EAU CLAIRE
PEPIN
BUFFALO
TREMPE-
ALEAU
JACKSON
TAYLOR
MARATHON
CLARK
WOOD
PORTAGE
ONEIDA
FOREST
LINCOLN
MONROE
LA CROSSE
VERNON
RICHLAND
CRAWFORD
GRANT
IOWA
DODGE
JEFFERSON
KEWAUNEE
T

INTRODUCTION

Geology is the science that deals with the crust of the earth and the events that have formed and changed it over the millionsof years of geologic time.

To most people geology is synonymous with a study of rocks. This is akin to saying that medicine is a study of cells. While the body is made up of cells, the crust of the earth is made up of rocks; both are the fundamental units of construction hence must be studied, but within the science of geology there are as many branches and specialized fields as there are in that of medicine. The general geologist of fifty years ago is as rare today as is the general practitioner.

Fields of geology that will be touched upon today are:

Geomorphology - the study of the factors that have caused the development of the landscape.

Physical geology - the processes that are at work presently to modify the landscape.

Sedimentation - the study of transportation and deposition of sediments.

Glacial geology - the study of glacial deposits and glacial land forms.

Stratigraphy - the study of the sequence of the stratified sedimentary rocks.

Structural geology - the study of the effects of deformation on rocks.

Economic geology of non-metallic minerals - Limestone and silica sand quarries and gravel pits will be visited.

Paleontology - the study of fossils.

Last, but not least, we will touch upon Mineralogy and Petrology, i.e., the study of minerals and rock types.

ROAD LOG

ASSEMBLY - University Parking Lot 60

We are standing on what was once the bottom of Lake Mendota. The lake as we see it today is a very transitory geologic feature being steadily destroyed by the deposition of sediment from incoming streams and the encroachment of vegetation. The Willows Drive is a sandbar which was formed by wave action in shallow water and which cut off part of University Bay. Behind the bar a marsh developed which gradually became filled with vegetation. Today it is a cornfield.

The lake is the result of glaciation. Prior to this event (say some 40,000 years ago) the view would have been much like standing on the bluffs of the Mississippi. A river valley would lie some 250 feet below us bounded by craggy cliffs.

With the advent of glaciation the hillcrests were smoothed off, the valleys partially filled and the rivers dammed or diverted from their course. Within the glaciated portion of the state some hills may be caused by bedrock. These are called rock-cored hills. Such are the Shorewood Hills seen to the west. In many cases the hills are no more than mounds of "till" deposited by the glaciers. "Till" consists of an unassorted mixture of boulders, gravel, sand, silt and clay. Throughout the whole of the glaciated area, till is plastered over the surface of the bedrock in varying thicknesses.

"Ground moraine" is the term used to denote the till that was deposited under the ice. "Terminal moraine" is the till deposited at the margin of the ice front.

We will be travelling over ground moraine until we are almost at the first stop when we will pass over the terminal moraine of the Cary stage of Wisconsin glaciation.

Look carefully and note the rolling topography, subdued hills, "closed" depressions (i.e. pockets) in the landscape, some of which may contain ponds.

(Note: This is the result of continental glaciation when the ice covered even the highest hills and attained a thickness of some 10,000 feet. It is not to be confused with "alpine" glaciation, as seen in the Rockies, where the ice confined itself to the flanks of mountains and a completely different and very rugged landform resulted. Many books, asthe Scout Manual, illustrate only alpine glaciation.)

Tot. Mileage		
0.0		Proceed S. on Walnut St.
	(0.4)	
0.4		Turn right (west) on University Ave.
	(1.3)	
1.7		Coca-Cola bottling plant. Note quarry in rock cored hill on right.
	(2.6)	
4.3		Old bed of Lake Mendota on right
	(0.1)	
4.4		Enter Middleton. Note variety of glacially transported stones used to build the Lake View Motel.
	(1.3)	
5.7		Stop sign. Continue straight under underpass to beltline.
	(0.3)	

6.0 Turn right and enter beltline going south (Hwys. 12, 13, 14). Flat plain to north is lake bed of Glacial Lake Middleton.

(3.1)

Note the rolling topography.

9.1 Turn right on C.T.H. "S".

(3.6)

12.7 Beginning of terminal moraine topography

(1.0)

13.7 STOP NO. 1

(1.5)

We are standing just outside of the limits of glaciation. The Cary terminal moraine forms the hill over which we passed to the east. The "Driftless Area" is seen to the west and south. (Drift is an old term for till hence lack of drift indicates no glaciation). This area encompasses the southwestern quarter of Wisconsin and extends into Iowa and Illinois. It is unique in that it is surrounded by drift on all sides but escaped glaciation itself.

The level hill tops are due to a resistant cap of limestone of the Platteville formation. When streams cut below this level they encounter the St. Peter sandstone which is soft hence wide valleys develop. The Platteville is therefore termed a "ridge maker" and the St. Peter is a valley maker. In the Driftless area the nature of the bedrock is reflected in the topography. Gentle slopes develop on soft formations and steep slopes or cliffs on more resistant rocks.

Note the change in drainage pattern from that seen in the glaciated country. Here it is dendritic i.e. like the veins on a maple leaf. Every gully leads to a creek which leads to a stream which leads to a bigger stream thence to the Mississippi. There are no closed depressions or lakes. This is a classical example of the "mature" stage of the cycle of erosion.

15.2 STOP NO. 2

(1.0)

Outcrop of St. Peter sandstone. This consists, almost 100%, of quartz (silica) sand grains. Note the bedding and the way slightly harder (i.e. better cemented) beds stand out. Note how rapidly it is breaking down to sand again in spite of the fact it is some 400 million years old. Hence "age" do not make a solid rock. Rocks are held together by "cement" or recrystallization of the component minerals. Lime, silica and iron oxide are the more common cements.

It can readily be seen why this formation is classed as a "valley maker".

16.2 Enter Pine Bluff. Turn right (north) on C.T.H. "P".

(1.5)

17.7 Note topography. Flat summits of uplands.

(0.8)

18.5 Descend into valley cut in the St. Peter sandstone. Note rounded tops of hills on St. Peter to the right in contrast to the flat tops of limestone hills.

(1.6)

20.1 Turn left on Hwy. 14.

(2.[illegible])

22.4	(2.7)	Cut exposing Jordan, Lodi and St. Lawrence formations (Trempealeau) Ridges are capped with Prairie du Chien (Lower Magnesian) which often forms massive slump blocks.
25.1		Road cut exposing Franconia formation.
	(0.9)	
26.0		Enter Black Earth. Continue on Hwy. 14.
	(0.8)	
26.8		Note meanders in Black Earth Creek on right.
	(1.8)	
28.6		Turn right on Hwy. 78
	(5.0)	
33.6		Flood plain of Wisconsin River on left.
	(3.4)	
37.0		Junction U.S. 12. Turn left over Wisconsin River. Enter Sauk City.
	(5.6)	
42.6		Turn right on C.T.H. "Z".
	(1.2)	
43.8		Left on Hwy. 78.
	(0.6)	
44.4		Turn left.
	(0.5)	
44.9		Turn left on dirt road to gravel pit.

STOP 3.

Milwaukee R.R. gravel pit. We have briefly re-entered the glaciated area. The terminal moraine lies just to the east. The Baraboo hills to the north. To the west is the "outwash" terrace forming Sauk Prairie with the hills of the Driftless area in the background.

"Outwash" is till which has been sorted by the waters of the melting ice. The clay, sand, gravel, etc. which was mixed in the till now occurs in separate beds. Outwash is "stratified" (i.e. bedded). The size of the material in each bed is proportional to the strength of the current that transported it. What does this suggest about the currents that transported (or actually deposited) the St. Peter sandstone?

Note the large boulders and the coarseness of the gravel. Note the subangular shape and corners somewhat rounded by water transportation. Such glacially transported boulders are called "erratics". Some may have come from as far north as Canada.

Note the extreme variety of rock types. Gravel pits are the best places to collect different types of rocks.

Many of the limestone cobbles show "striae" (scratches) due to rubbing against other stones while being transported by the ice. These show that they have not been moved very far by water as this would have rounded them off and erased the striae very quickly.

Outwash sands and gravels are the most important single economic rock product of the state. Production is valued at about $20,000,000 per year and their abundance permits us to construct our highways at for less cost than in states where such material is lacking.

The cover of soil has not been derived from the outwash. It is "Loess". This is wind transported silt derived from the glacial deposits before they were "anchored" by vegetation. The result of "dust storms" 20,000 years ago. Loess forms a very fertile soil.

	(2.4)	Retrace route to U.S. 12. (Turn right at 45.4 and at 45.9).
47.3		Rejoin U. S. 12. Turn right.
	(5.6)	
52.9		Enter Baraboo quartzite range. Note tilted bedding.
	(2.1)	
55.0		Right turn on town road.
	(1.3)	
56.3		Left turn on town road.
	(0.4)	
56.7		STOP 4. Devil's Lake. Lunch.
		See page 20 of W.G.S. Bulletin 67, pp. 16 & 20 for write-up on Devils Lake.
56.7		Continue north on town road and follow 123 to Baraboo.
	(3.3)	
60.0		Cross Baraboo River.
	(0.6)	
60.6		Turn right on Hwy. 33 to Portage.
	(6.0)	
66.6		Quarry in quartzite - produces grinding pebbles.
	(1.1)	
67.7		Columbia County line.
	(8.4)	
76.1		On terrace of Wisconsin River.
	(1.1)	
77.2		Cross Wisconsin River. Enter Portage.
	(1.0)	
78.2		Turn right on Hwy. 51.
	(0.1)	
78.3	(4.2)	Pass over canal connecting Wisconsin River and Fox River drainage. The two rivers are separated by less than $1\frac{1}{4}$ miles of low swampy ground and yet water in the Fox is discharged to the Great Lakes and North Atlantic Ocean via the St. Lawrence River while the Wisconsin River discharges to the Gulf of Mexico via the Mississippi.
		Note the dikes along the river paralleling the highway. The question of the Wisconsin River breaking through here and joining the Fox drainage is often the subject of debate.
		STOP 5.
82.5	(8.0)	Portage Manley silica sand quarry. This pit produces silica sand from the Dresbach sandstone. Much of it goes to foundries for making moulds for castings. About 20% is used for glass. The sand is almost pure silica but an equally important factor is that the variation in grain size is wide enough to screen it into the many size fractions demanded by industry.
90.5	(8.2)	Enter Poynette. Compare again the topography here with that which you saw in the Driftless Area.

98.7		Enter Leeds.
	(8.4)	
107.1		Turn left on Hwy. 19 to Sun Prairie.
	(1.5)	
108.6		Enter Token Creek
	(3.7)	
112.3		Enter Sun Prairie.
	(0.7)	
113.0		Turn right on Hwy. 19.
	(0.2)	
113.2		Turn left on Cliff Street
	(0.1)	
113.3		Turn left on Hwy. 151.
	(2.8)	
116.1		Turn right on gravel road to quarry.

STOP 6

Platteville limestone quarry. This limestone is crushed for agricultural lime. It is of no value for building stone or concrete aggregate and is even inferior for surfacing dirt roads. This is due to the fact that it breaks down very quickly when exposed to weathering.

The formation is extremely fossiliferous in certain horizons and affords the best fossil collecting in the state.

The Platteville overlies the St. Peter formation with a thin and very variable formation, the Glenwood, in between. St. Pe er time was marked by a long period of quiet deposition of sandstone. The Platteville, and the formations above it, by the relatively uninterrupted deposition of limestone (or dolomite, a magnesium rich limestone). The Glenwood time between these formations represents a period of intense change. The deposition of sand, clay and lime alternated rapidly. The incoming seas eroded the underlying St. Peter. Even as the strata were deposited they were broken up, reworked and incorporated in the overlying deposits.

The Glenwood forms the floor of the quarry and may be exposed at the base of the limestone along the working face. Note how uneven is this erosional surface. This is called an "unconformity".

You will find Pyrite (iron sulfide - Fool's Gold) plentiful in the Glenwood. You will also find chert, a massive, cryptocrystalline form of silica. Much of this chert consists of very small circular concretions, like very small fish eggs, which are called "oolites". This indicates that this chert was precipitated out of the sea water chemically.

Although fossils are plentiful here you will have to look hard to find them. Some thin strata are composed almost entirely of fossils. Other areas are barren. Generally the thin beds at the top of the quarry are most fossiliferous. Weathering makes the fossils stand out. (Differential weathering.)