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Correspondence re: International Geological Conference - 16th session - 2. 1932-1933

Thwaites, F. T. (Fredrik Turville), 1883-1961

[s.l.]: [s.n.], 1932-1933

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Sept. 27, 1933

Mr. Paul Miller,
Iowa Geological Survey,
Iowa City, Iowa

Dear Mr. Miller:

I have been a long time answering yours of August 23 but have been away on several trips in the meantime.

The only thing which I would like for my records is the forty, section, township, and range location of each Iowa stop which we made. Roads have changed so since the map which I have was made that I could not find this information and I would like to have it for my file of photographs.

With regard to the photographs you can realize that in the haste of such an excursion one cannot take time to figure exposures. Much to my disgust (for I had thought that my experience was great enough to prevent such breaks) I underexposed several of the Iowa photographs and still worse a defect either in film or in developing clouded parts of the otherwise well exposed pictures of the loess-gambotil profiles south of Iowa City. The only really good photographs I obtained in the State were the two landscapes from Cemetery Hill. As you know the plan for a group photograph there fell through when some of the party went on ahead. I do not mean that any photographs were entire failures, simply there are not up to my usual grade. If you want any of the ten exposures I made in Iowa please let me know. I am going to have some reprints made soon. Cost is 6 cents each (I am now too hard up to give any away).

It is too bad you did not go on the rest of the trip which I think everyone found very interesting.

Sincerely,

F. T. Thwaites

16c

STATE OF IOWA
IOWA GEOLOGICAL SURVEY

JAMES H. LEES,
ASST. STATE GEOLOGIST
NELLIE E. NEWMAN,
SECRETARY

GEORGE F. KAY, DIRECTOR

IOWA CITY,

August 23, 1933

Prof. F.T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

My dear Prof. Thwaites:

Now that Excursion C-3 is over and no doubt you have had time to assemble your notes, photographs, and numerous other things, it would be a strange coincidence if there were not some locations, descriptions, or samples which were overlooked or not quite complete. If I can help you with any of these I would be glad to do so.

I have received letters from several of the group who expressed their sentiments regarding the excellence and scientific value of Excursion C-3 through Illinois, Iowa and Wisconsin.

I have wondered how your photographs came out. Blackwelder sent me a fine picture of several members of the group (Krumbein, Wellnitz, Newton, Leighton, Ekblaw, and *Gordon*). I was glad to get it as a sample of what he does with a Leica.

My only regret is that I was unable to take the rest of that trip.

Sincerely yours

Saul A. Miller

Int Congen

INTERNATIONAL GEOLOGICAL CONGRESS
MEMORANDUM FOR EXCURSION LEADERS

September 20, 1933.

Reports from all participants agree that all the excursions were completely successful. I believe that all our foreign guests appreciated our hospitality and certainly all with whom I have come in contact were most appreciative of the way in which the excursions were handled and the opportunity thus afforded them to gain some insight into the major problems of American geology.

The success of the excursions is primarily due to the volunteer services of the large number of American geologists who gave their time without recompense and in large part at considerable personal expense, to the planning of the excursions, the preparation of the guidebooks, the detailed rehearsal of each day's program, and finally as a result of this conscientious preparation, to the actual leadership of a successful excursion. On behalf of the Organization Committee, I wish to extend my sincere thanks to all of you for your cooperation.

Another factor in the success of the excursions was the assistance we received from local people in all parts of the country; mine superintendents; university authorities; officers of the Park and Forest Services; local civic organizations and many others. It is felt that these who aided greatly in the work should receive special letters of thanks. I would appreciate it therefore if you would send me the list of those outside our organization who have especially assisted your excursion. Please specify the service rendered in order that the letter may be something besides a formal acknowledgement.

The unexpectedly large membership of the Congress has nearly used up our supply of guidebooks so that it will not be generally

possible to send complimentary copies of the guidebooks to all who should receive them. However, although there are no more complete sets available, there are a few extra copies of certain guidebooks and where a good reason exists, it may be possible to send copies where special services have been rendered. Please do not promise any, however.

It is of course desirable to close the accounts as soon as possible and have them audited by the Geological Society of America which has furnished the funds. It is hoped that a practically complete statement of expenses incurred up to that time can be submitted at the meeting of the Council of the Society in October. If, therefore, there are still any items connected with your excursions which should properly be paid by the Congress, will you submit statements as soon as possible.

W. C. Mendenhall.
General Secretary
16th International Geological Congress.

150

Sept. 27, 1933

Dr. W. C. Mendenhall, General Secretary,
16th International Geological Congress,
U. S. Geological Survey,
Washington, D. C.

Dear Sir:

In reply to your memorandum of Sept. 20 I can only think of one person whose services at personal expense contributed greatly to the success of Excursion G-3 of which I was one of the State Leaders. This was Mr. L. R. Wilson of the Department of Botany, University of Wisconsin who came down at his own expense from Trout Lake, Vilas County, to Two Creeks to guide us around the interglacial Forest Bed at that locality. He is now sending copies of his recent thesis on this deposit to all members of the excursion. I always felt that I would like to be able to pay something at least toward this expense but was not in a position to offer to do so.

In logging the route of the excursion for a detailed mimeographed route guide similar to those of the Kansas Geological Society I was assisted by Carl Bays, Webster Grove, Missouri, a student at the University of Wisconsin and by my wife. The work of two other students was charged for in my expense account which has been paid.

Very truly yours,

F. T. Tinsaites, Lecturer in Geology

August 12, 1933

Dr. H. C. Ferguson, Assistant Secretary,
16th International Geological Congress,
U. S. Geological Survey,
Washington, D. C.

Dear Dr. Ferguson:

Enclosed please find statement of expenses incurred by me
in logging route for Excursion G-3, Glacial geology of the central states.

I went on this excursion and drove a car all the way.
Everything went off very well except for one meal in West Bend, Wisconsin.
I think that everyone found the trip well worth while. I prepared a mimeo-
graphed log of the Wisconsin portion which everyone found very useful
and, I hope, interesting as well. We were obliged to cut out the boat trip
at the Dells. Only a very few regreted this. At the Forest Bed Mr. L. R.
Wilson of the Botany Department acted as guide without any allowance for
expenses incurred in making the long trip down from where he is working at
Trout Lake, Wisconsin.

As my expenses ran below the estimate should I ask anything
for him?

Very truly yours,

F. T. Thwaites

16th International Geological Congress to F. T. Thwaites, Dr.

J. M. and Helen Trefethen, services in logging part of trip during excursions in glacial geology, April-May, 1933	\$5.00
July 6-7, 1933, Dane County line to Portage, 212 miles at 5 cents;	
July 25, 1933, Madison to Madison logging route from Hartford to Eagle, 214 miles at 5 cents per mile, total 426 miles	21.30
Total	<u>\$26.30</u>



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1932
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

April 18, 1933.

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Doctor Thwaites:

In reply to your letter of April 13:

We have no formal rules for expense accounts. A statement of expenses incurred with the larger items supported where convenient by receipts will be sufficient. For work with a car either gas or oil will be paid or if you prefer a flat rate of 5 cents a mile may be charged.

Will you, however, notify me before you incur any expenses on account of this excursion. So far we have had only one application for C-3 and while we have reason to expect that a sufficient number of applications will have been received before July 1, it is necessary that we keep in mind the possibility that the excursion may have to be cancelled.

I have requested that another guidebook be sent you. Please let me know if you do not receive it in a few days.

Cordially yours,

H. G. Ferguson

H. G. Ferguson,
Assistant Secretary, Organization Committee,
16th International Geological Congress.

DEPARTMENT OF
REGISTRATION AND EDUCATION
M. F. WALSH, DIRECTOR
SPRINGFIELD

321 645 CST 9 30 355 PM
515 16 days W. 5:10 9 PM
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STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

July 24, 1933

for Madison 5:10 P ar. Chi. 9:40 P
" Chi 5:40 P - mad 9:15 P
10 15 P 7:10 A

RR to Chicago
Tip. 2.60
Taxi tip 1.50
supper + tip .70
misc. 30
telegram 32
\$ 5.52

Professor F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Thwaites:

Your letter of July 21 addressed to Dr. Leighton has been referred to me for attention, in view of the fact that he has left to attend the Congress at Washington.

I am sorry that you have no definite information on the places where it is proposed to stop for lodgings and meals. It was our understanding that Mr. Becker, who was here last Fall to make the arrangements, would let you know what these arrangements were. I am sending you a copy of the itinerary which he sent us after he returned to Washington. If there are any corrections to be made in this they will have to be made promptly.

The members of the Congress who have registered for the C-3 excursion and who are coming directly from Washington will arrive in Chicago at 6:40 p.m., Central Standard Time, Sunday, July 30. Professor Bastin has made arrangements for these and others of the party to have lodgings at the Judson Court Dormitory, 1005 East 60th. Street. It is tentatively planned that that evening we will stop at Rosenwald Hall to see the mounted geologic map of the Chicago area which Bretz has made for our Survey and to hold there a pre-excursion conference. We shall have breakfast at 7 o'clock Monday morning and leave at 8 o'clock Chicago Daylight Savings Time. You can join us at any of these times; if you plan to stay in Chicago over night it may be best if you write directly to Professor E. S. Bastin to make sure that there will be a reservation for you. I have written him that you may wish to do so.

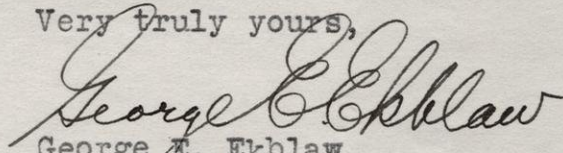
Professor F. T. Thwaites
Page 2.

July 24, 1933

It will be entirely agreeable to us if you drive one of our cars through Wisconsin. In fact we should appreciate it very much if you would be willing to drive one of the cars throughout the trip. If you do this your expenses throughout the trip will be paid as a driver and it will be possible to pay all of Dr. Bean's expenses in Wisconsin.

I do not know just what Dr. Leighton thinks about the boat trip at the Dells but personally I agree with you in being opposed to the idea. I believe that we had better plan not to do it unless there is considerable desire expressed among the members of the party to take it.

Very truly yours,



George E. Ekblaw
Geologist and Head
Areal & Engineering Geology Division

Excursion C-3
Meals and lodging cost

July 29	Midnight.	Leave Washington	
" 30	6:40 p.m. (Central Standard Time).	Arrive B. & O. 63rd St. Station, Chicago. Survey cars to Judson Court, Dormitory, University of Chicago.	
" 30	8:00? p.m. (Chicago Daylight Saving Time).	Conference at Rosenwald Hall.	
" 31	7:00 a.m. (Chicago Daylight Saving Time).	Breakfast at Dormitory.	
	8:00 a.m. (Chicago Daylight Saving Time).	Leave on excursion.	
" 31	Luncheon,	Imperial Hotel, Pontiac	.60
	Dinner		.70
	Room	"Royal", Canton, Ill.	1.50
Aug. 1	Breakfast		.45
	Lunch,	Ft. Madison	.50
	Dinner,	Home of G. F. Key	Free
	Room	) Dormitory of U. Of I., Iowa City	1.00
" 2	Breakfast)		.50
	Lunch	" ^{edney} Gleley" Independence, Ia.	
	Dinner	) "Old San" Prairie du Chien	.60
	Room		1.25
" 3	Breakfast)		.50
	Lunch,	Dodgeville, Wis. <i>Higbee Hotel</i>	.50
	Dinner	) University Club, Univ. of Wis.	
	Room		2.00
" 4	Breakfast)		
	Lunch	<i>Rail Hotel Portage</i>	.75

C-3 (continued)

Aug.	4	Dinner	)		.65
		Room	)	"Curtis" ^s Plymouth, Wis.	1.25
"	5	Breakfast	)	^	.40
		Lunch	)	Two Rivers <i>Hotel Hamilton</i>	.75
		Dinner	)		.40
		Room	)	"Geib", West Bend, Wis.	1.00
"	6	Breakfast	)		.40
		Lunch	)	at a house <i>Jefferson Home</i>	.75
		Dinner	)		.75
		Room	)	"Wayside" ^a Wolworth, Wis.	1.25
"	7	Breakfast	)		.50
		Lunch	)	"Fox" Elgin	.50
		Dinner)		
		Room	)	Dormitory, University of Chicago	
"	8	Breakfast)		
		Lunch	)	Exposition	.75
		Dinner	)	"	1.50

C O P Y

Ann Arbor, Mich., July 24, 1933.

Dear Dr. Alden:

Your letter of July 22 inclosing the chart of Pleistocene stages and substages came this morning. I note a few places in the chart that ought to be changed--

1. In the column for Upper Mississippi and Great Lakes region, after "U.S. Geological Survey," take out "Chamberlin, Leverett, et al" and insert "Alden".
2. In the column for Western Minnesota, Eastern Dakotas and NW. Iowa put "Iowan stage of Keewatin ice sheet" below "Sangamon interglacial stage," in place of the "?".
3. In Eastern Minnesota and NE. Iowa, put "?" above "Iowan stage of Keewatin ice sheet," thus throwing this Iowan into the same as the "Illinoian stage of Patrician ice sheet".

This will bring the columns 2 and 3 into harmony with your Eastern Montana and NW. North Dakota in making the Sangamon come later than the Iowan or Illinoian, for in the Minnesota-Iowa field the age of the Iowan is as undetermined as in Eastern Montana. It may be the same as the Illinoian.

I fear it is too late to get these corrections on the revised chart in time to be distributed to those who participate in Excursion C-3. But you can perhaps put them on a half dozen copies and mail them to Dr. Leighton to be handed to the men who take the excursion.

Very truly yours,

(Sgd.) Frank Leverett.



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

July 24, 1933.

Dr. F. T. Thwaites,
Dept. of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Doctro Thwaites:

Your money order for \$5.00 has been received. A formal receipt will be sent you later by the Treasurer.

It is my understanding that you are acting as leader for the portion of the C-3 excursion in the state of Wisconsin. For this portion, your expenses will, of course, be paid by the Congress. Your joining the excursion from Chicago, paying your own expenses for the portion outside of Wisconsin is, of course, a matter for Doctor Leighton's approval. I will ask him about it, since he is here at the Congress, and I am quite sure he will approve it. If this is done, no formal deposit will be necessary.

Yours truly,

H. G. Ferguson

H. G. Ferguson,
Associate Secretary, Organization Committee,
16th International Geological Congress.

P.S. just saw Dr Leighton + he approves

Trout Lake, Vilas Co.
Wisconsin.
July 26, 1933.

Mr. F. T. Thwaites,
R. D. 4, Madison, Wis.

Dear Mr. Thwaites:

Thank you for your recent letter. I have intended writing to you concerning a new exposure I found in the Forest Bed, but have been extremely busy here and unable to do much other than daily routine.

I showed Prof. Juday your letter and he has given his permission for me to leave camp for the trip to the Forest Bed. It will be possible for me to arrive there about 8 a.m. and clean up the exposure before the party arrives. It was in bad shape the last time I was there. The other exposure is on the north end of the county but not in Kewaunee County as those we saw two years ago. It is a hillside and has a very

complicated geology above the forest bed. The materials were of such a nature that I was not certain they were not outwash and not till. If you would handle the geology I could do a rather extensive piece of work with the plants and other remains. I think you will be greatly interested in the exposure. Some of the logs which I dug out were two feet in diameter.

I am sure Tommy will be glad he has a little brother especially as he reaches an age of playing and fighting. I have always been glad I had a younger brother at least as long as I did.

If there are any changes in your plans please let me know for I am functioning on a very close schedule.

With much appreciation,
Yours very truly,

L. R. Wilson

INTERNATIONAL GEOLOGICAL CONGRESS

16th Session.

July 24, 1933.

Mr. F. T. Thwaites
R.D. 4
Madison, Wisconsin

This will acknowledge the receipt of \$5.00 in payment of membership fee.

E B Mathews
alt

Treasurer.

July 27, 1933

Prof. E. S. Eastin,
Rosenwald Hall,
University of Chicago,
Chicago, Illinois

Dear Prof. Eastin:

I expect to go on the G-3 excursion of the International Geological Congress and would therefore like to arrange for a room at the Judson Court Dormitory for Sunday night when the rest of the party will be there. I do not expect to be there on the return but will take a train back to Madison as soon as we arrive.

Very truly yours,

F. K. Haines

July 27, 1933

Dr. George H. Ekblaw, Geologist,
State Geological Survey,
Urbana, Illinois

Dear Dr. Ekblaw:

In reply to yours of the 24th I will be glad to drive one of your cars from Chicago to Chicago. If the Congress is not carrying liability and property damage insurance on all cars please give me particulars of engine number, model, etc. so that I can take out insurance here.

I will leave Madison at 5:40 Sunday afternoon and spend the night at the dormitory although I will be too late for the conference.

I am writing Prof. Bastin for a room.

The lunch stops in Wisconsin were left until I had finished the log of the route. This was not done until this morning. Mr. Bean and I selected Hotel Higbee at Dodgeville for first day, Hotel Raulf, Portage for next day, Hotel Hamilton, Two Rivers for day after that. The last day in

Wisconsin we could find no hotel or in fact any regular eating place.

^{as}
I suggest either a box lunch or Mr. Bean suggests lunch at a private home in Eagle. He knows someone there who will take care of the party if notified in advance. I am not at all sure who is making reservations at hotels but

we were not asked to do this. I take it you will be on the trip.

Sincerely,

July 21, 1933

Dr. William G. Alden,
U. S. Geological Survey,
Washington, D. C.

Dear Dr. Alden:

It was with great regret that I learned through yours of July 5 that you would be unable to go on the Glacial Geology excursion. I had looked forward to discussing a lot of things with you and renewing old times. You know that we always regard your work on southeastern Wisconsin as a classic although I feel free to offer new hypotheses to explain certain things.

I have now logged all but a small part of the route of the excursion and will prepare a mimeographed description of the route. I have also a book of photographs. Had times been less hard I would have taken more while doing the logging but as this had to be delayed on account of the uncertainty of making the trip it so happened that weather conditions were most unfavorable on those days. The last ten days have been entirely taken up by cares incident to a new arrival in our family who just came home from the hospital today.

It is too bad that things are so hard at Washington but then they are just about as bad here with a 25 percent cut for the University all to be taken out of salaries. But let's hope for a change for the better before long!

With best regards,

Sincerely,

F. T. Thompson

July 21, 1933

Dr. M. M. Leighton, Chief,
State Geological Survey,
Urbana, Illinois

Dear Dr. Leighton:

Some time ago I received a letter from Dr. Aiden saying that he would not go on the glacial geology trip of the International Congress, also one from Dr. Furguson saying that you would communicate with me in regard to it.

This morning I talked over the matter with Mr. Bean. He states that he hopes to go over the Wisconsin part and if so will take train or bus to Prairie du Chien. I want very much to go over the entire trip. Furguson states that my expense in Wisconsin will be paid if alone or divided with Bean if both are there. The logging of the route is nearly completed. I will have the University prepare mimeographed copies of the route log. We have no definite information on places to stop at for nights and meals as that was all taken care of by the Washington people. I have secured permission to visit the Manitowoc clay pit. Permission to visit two commercial gravel pits can be secured at the time if needed. I do not care to furnish a car or to drive to Chicago. I can get a round trip ticket there if you will please advise me when and where to meet the party. However, on the Wisconsin part of the trip it might help (if agreeable to you) for me to drive a car and lead for I know just the spots to stop at and the best speeds at which to see the country. It would help if you could provide a long handled shovel. In paying expenses both Mr. Bean and I count on going home on the night in Madison.

One moot point is what to do at the much advertised but unimportant scientifically Dells of the Wisconsin. A boat trip would take over two hours on a day when 180 miles is scheduled. Personally I am opposed.

Sincerely,

July 21, 1933

Dr. H. G. Ferguson, Associate Secretary,
16th International Geological Congress,
U. S. Geological Survey,
Washington, D. C.

Dear Dr. Ferguson:

Reply to yours of June 30 has been delayed because of personal duties at home. Since then I have heard from Dr. Alden and through Mr. Bean from Dr. Leighton.

They do not seem to know anything about the hotel arrangements made last fall by an agent from Washington whose name I do not recall.

Logging of more important parts of the route has progressed to the point that stencils can be made (University expense). Part of one dy's run remains. So far I have covered in this work 212 miles. Also I had two of my glacial geology students log part of the route when on field trips. For this I promised to pay them \$5.00 if such were allowed. I estimate that the remainder of the logging may take 150 miles more. This will run considerably below the estimate of \$40.00 because I decided not to log in detail some of the longer runs where few if any stops are contemplated. Logging will follow style of the Kansas Geological Society guidebooks and I will add short remarks on subjects not covered in the Guidebook. I also hope to have Mr. L. R. Wilson who worked on the Forest Bed next the excursion at Two Creeks but did not promise him any reimbursement for expense. I have been unable to add to my collection of photographs for as luck would have it both days spent in the field logging were very thick foggy weather.

The advance copy of the guidebook came at last and I wish to thank you for it.

I am enclosing membership fee for the Congress. I want to go clear around with the party from Chicago to Chicago but as part of my expense will be paid am not sending any deposit. Please advise me in this regard.

Very truly yours,



INTERNATIONAL GEOLOGICAL CONGRESS
XVIth SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

June 30, 1933.

Professor F. T. Thwaites,
Dept. of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Professor Thwaites:

In reply to your letter of June 28:

The C-3 excursion will be carried through as planned. On account of the depression, the number has fallen below our expectations, but six are already registered, and as registration does not close until July 15, we are hopeful of obtaining a few additional members.

Owing to the reduced attendance, it will be impossible to be as liberal as we should like in allowances of expenses for leaders. It is doubtful whether we shall be able to pay Dr. Alden's expenses, but Dr. Leighton is leader of the excursion, and will accompany the party from Chicago. We are counting on the services of either you or Dr. Bean for the Wisconsin portion, and can, therefore, allow full expenses for one additional leader in Wisconsin. If desired, the expense allowance might be divided. Or, if the whole trip from Chicago is desired, we can adjust the fare to a nominal amount since the Wisconsin portion is such a large proportion of the excursion.

I am sorry about the guidebook, and am ordering another copy sent you, and also a copy of the Fourth Circular.

Will you send me a statement of expenses so far incurred in connection with the excursion?

Yours very truly,

H. G. Ferguson

H. G. Ferguson,
Associate Secretary, Organization Committee,
16th International Geological Congress.

July 22, 1933

Mr. L. R. Wilson,
1401 North Twentyfirst St.,
Superior, Wisconsin

Dear Wilson:

According to present plans the glacial geology excursion of the International Geological Congress will be held. I expect to go along as state leader. The program calls for reaching the Forest Bed not before 10 A. M. on Saturday, August 5. Exact schedule has not yet been arranged. We certainly would appreciate having you join us there. We pass through Manitowoc and Two Rivers both on trip out and back that day.

Please let me know if you can come.

Tommy now has a brother who was born on the tenth of this month. Therefore, I am kept pretty busy at home.

With best regards,

Sincerely,

F. T. Trawites, R. D. 4, Madison, Wis.

J. B. John, President & Genl. Mgr.

E. J. Maguire, Vice Pres. & Treasurer

Chas. C. West, Vice President

P. G. Dawson, Secretary



MEDUSA

Medusa Portland Cement Company

1002 Engineers Building

Cleveland, Ohio

April 24, 1933.

*Annual Capacity
3,000,000 Barrels*

*Plants at
Bay Bridge, Ohio
Toledo, Ohio
Dixon, Illinois
York, Pa.
Wampum, Pa.
Newaygo, Mich.
Manitowoc, Wis.*

Mr. F. T. Thwaites,
Science Hall,
Department of Geology,
University of Wisconsin,
Madison, Wisc.

Dear Sir:

Replying to your letter of the 21st inst. I beg to say that it is entirely agreeable to us for you to take your class in glacial geology to our Manitowoc Plant on Sunday, April 30th, and also the proposed excursion to the same point on August 6th, with the clear understanding that the persons making up these parties go on our premises at their own risk and we assume no liability for personal injury to any of them. We note that this they will do, according to your letter and we sincerely hope that none of them will experience any difficulty.

Very truly yours,

E. J. Maguire
Vice-President & Treasurer

EJM:S

"Concrete for Permanence"

LOG OF THE TWO RIVERS TRIP GLACIAL GEOLOGY

F.T. Thwaites in charge.

April 29, 1933.

Greenbank - Ply 6m ply-gravel pit 4 1/2 m

	Time	Mileage
Leave Science Hall	7.37 A.M.	000000 X 1937
Proceed up Langdon		.05
Right turn on Wisconsin Ave.		.70
Turn left on E. Gorham		.90
On crest of drumlin		1.40
Turn right on Few St.		2.10
Turn left on E. Johnson		2.15
Turn left on U.S. 151		4.00
Till cut in drumlin on right		4.45
Till cut in drumlin on right, shows some gravel		4.60
Scalloped drumlin on left		4.80
Mendota dolomite on left; rock hills right and left		7.10
Rock hills right and left		8.40
Faint recessional moraine skyline to left, crossed at		9.20
Turn left following U.S. Route 151 <i>in gravel</i>		13.50
Right and left Black River <i>outwash</i>		16.10
Black River hills		16.50
Loess in road cut on right		17.90
Stop: 8.35-8.43. (Columbus) for gas (\$1.07)		30.00
Note relation of drainage to drumlin; trellis pattern		33.40
Turn left onto Route 60		46.00
Turn right following Route 60		47.00
Turn right into gravel pit		47.60
46.8 1 Stop: 9.15-9.30 Esker <i>1015.1697</i>		47.90
47.1 2 Stop: 9.35-9.44 Drumlin cut; to see silt beds in till <i>1015.15 h6</i>		50.20
51.4 3 Stop: 9.53-10.02 Drowned drumlins in Hustisford Pond <i>1016.09 c6</i>		54.80
Turn right following Route 60		55.40
Turn left following Route 60		55.70
56.7 4 Stop: 10.15-10.40 Neosho esker <i>1017.19 h1</i>		60.50
Hartford stop light		68.35
Hartford well location		69.05
Turn right onto K. Note interlobate on left		69.70
67.6 5 Stop: 11.06-11.16; to view interlobate and outwash <i>1018.26 a8</i>		72.10
Turn left onto E and onto the interlobate		72.40 - <i>18.4</i>
Turn left onto town road		73.90 - <i>17.9</i>
70.2 6 Stop: 11.25-11.36 View of Sugar loaf knob (Powder Hill) <i>1018.25 h4</i>		74.90
70.5 7 Stop: 11.38-11.50 Powder Hill. To view gravel pit and moraine to east <i>1018.24 b4</i>		75.20 - <i>16.7 STOP 15 min</i>
Turn right onto Route 60		76.00 - <i>15.9</i>
Turn left onto J		77.10 - <i>14.9</i>
Stop: 11.55-12.45 Slinger, for lunch.		77.40
75.2 8 Stop: 12.53-1.06 Glacial stream, probably formed before ice melted		80.20 = <i>STOP 5 min</i>
Crevasse filling on right <i>1019.05 f8</i>		81.20
Island; crevasse filling on right 7		82.50 - <i>10.1</i>
76.0 9 Stop: 1.15-1.20 Good crevasse filling on left <i>1119.30 e2</i>		85.00 = <i>STOP 10 min</i>
180.0 10 Stop: 1.25-1.35 Glacial channel between moraines <i>1119.17 h8</i>		85.25 - <i>7.3</i>
Turn right onto Route 33		87.70
Turn left onto B		88.60 = <i>4.1</i>
Turn right onto town road		89.40 = <i>3.3</i>
Turn right onto town road		90.10
84.6 11 Stop: 1.47-2.10 Barton; to see large commercial gravel pit, <i>probably in a kame moraine (delta). Northern Co. pit. 1119.03 c4</i>		91.50
(This road has passed through a striking part of the moraine)		91.80
even Straight across concrete		91.5
Turn left onto Route 144		(166.3)
Turn left onto Rt 55		

*Barton 1,2
and left into town road*

Mileage	Notes
93.20	
99.70	160.2
100.10	159.8
100.30	159.6
101.80	= 158.1
102.30	= 157.6
103.00	
103.40	STOP 156.6
103.60	10 min
104.20	156.0
104.70	
106.10	- 154.1
106.50	
107.40	= 151.8
108.30	
108.80	2.5
109.10	3/10 sub 2.0
110.20	149.5
113.00	147.8
113.50	146.6
115.00	145.8
115.50	144.6
116.55	- 143.7
118.30	- 142.1
119.10	
119.20	= 141.2 STOP
120.40	- 140.0 Summit here 2
121.30	129.5 10 min
121.90	121.9
122.80	7.6
123.40	137.1
124.40	136.2
125.30	135.4
125.40	135.3
125.50	135.2
126.20	134.6
126.80	134.1
127.20	133.7
127.50	STOP 10 min
128.50	133.4 5 min
129.30	132.5 STOP 5 min
129.50	= 131.7
131.80	131.5
132.40	
133.00	4.5 10 min
133.20	4.7
133.80	5.3 Run 5 min
134.00	5.5
134.50	5.9
134.50	STOP 10 min
135.70	7.0
135.90	7.2 Run 20

Wrong route; back to Barton. Pick up Route 55 going north.

Turn right at Kewaskum onto Route 28

Turn left onto S

Note perfect kame on right *il Ealden*

Enter Fond du Lac Co

Turn right on S. (S becomes G)

A striking kame on right

Stop: 2.41-2.50 Kame cut by the road; good exposure on right

Terrace levels ahead

Turn left

Note outwash terrace scarp on right

Turn right following S

Extremely pitted topography

Left turn on S; enter Sheboygan Co.

Note good outwash terrace on both sides

Right turn into pit

Stop: 3.00-3.01 Gravel pit; no good exposure. Back to S

Stop: 3.05-3.06 Beechwood, for gas. Turn left onto A

Turn right following A

Turn left following A

Turn right following A

Turn left following A

Stop: 3.20-3.25 Parnell, for gas →

Turn left onto V

Turn right following V

Cut in crevasse filling

A striking kame on right

Turn right on V. Striking kame ahead at turn (McHullen Hill)

Cut in kame on left; coarse gravel, structure obscured by slides

Kames right and left

Turn right onto Route 67 (paved)

Turn left following 67

Pit on left in outwash terrace

Branches of interlobate right and left

Meet Route A

Well-marked outwash terrace

Turn left on A

Come up onto higher terrace

Flat-topped kame left

Well-marked terracing. Keep on A

Stop: 3.46-3.50 Summit of interlobate. Large kettle on left and right

right. Thwaites considers that the conical hills were ice

surrounded; the terraces, pitted outwash 15 20.23 e 8

Stop: 3.53-3.55 Ice contacts on west side of interlobate

Turn left on Route 23

Turn right on A

Interlobate on right

Turn right following A

Turn right

Stop: 4.09-4.25 At Moraine Sand and Gravel Co. pit to see gap

in moraine. Mullet River flows through it. (Delay here due

to rain.) 1521.06 e 6

Return to A, proceeding north

Turn right following A

Good view of moraine on left

Turn left on A

Stop: 4.30-4.37 To view Crystal Lake, a kettle lake 1621.31 a 3

Keep on A

Higher level terrace on left

96.9 12

117° #9.6 13

119° 121.4 14

122° 124.8 15

124° 126.1 16

1319.34 d 1

Plymouth w on 23 2m to P. N on P 2 1/2 m

56
37

Mileage

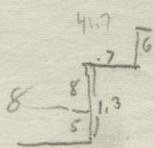
Turn right at R.R. station, heading east following A
 Pitted outwash well-developed
 Leave pitted outwash and come onto till---Michigan lobe
 Thin edge of red drift
 Stop: 4.56-5.12 Franklin gravel pit. Red till over gray till and
 gray gravel 16 22.30 h6
 Turn right on A
 Red till ground moraine
 Turn right following A
 Stop: 5.18-5.35 Gas (5 gas and 1 oil \$.98) Tel. 25¢ turn left
 Follow A crossing 32
 Turn right following A
 Morainial topography. Red till or possibly gray till beneath.
 North of the road
 Turn left onto U.S. Route 141
 Enter Manitowoc Co.
 Stop: 5.55-6.05 Left turn into gravel pit. Supposed Glenwood
 stage of beach, buried in red till 1723.17a,
 Follow Route 141 to Manitowoc
 Turn left on 21st Street follow over bridge to 18th
 Turn right on N.Y. Ave.
 Turn left onto Route 42
 Turn right following 42
 Two Rivers garage (\$.55)

4.3	137.50	8.7	subtract 2.0
5.0	138.00	9.2	
6.1	139.10	10.2	
8.6	141.60	12.5	
9.9	142.90	13.8	5.15 min
10.7	143.70	14.5	
14.9	147.90	18.5	
15.2	148.20	18.8	40 min
15.3	148.30	18.9	
16.3	149.30	19.8	
16.1	151.10	21.5	
19.6	152.60	22.8	
	155.80		24.7
26	159.00		5.15 min
41.9	174.90	43.7	
	176.20	45.0	50 min
	176.90	45.7	
44.5	177.50	46.2	
50.2	183.20	51.5	

April 30, 1933

Two Rivers. Leave garage 8.20 A.M. North on Route 42
 Right onto 17th Street 2nd St. Rt 42
 Turn left following East Street and Jackson
 Turn right onto 42.
 Straight onto 22nd Street
 Stop: 8.35-8.42 New ball park on left. Beach cut. Red till over
 silt and clay. Note barrier beach on left. Algonkian stage
 Turn left following telephone line
 Wrong road. Back to Algonkian beach road
 Turn left just south of creek
 Sand dunes on left
 Turn right, rejoin 42
 Turn right at Two Creeks
 Straight to lake shore
 Stop: 9.13-10.20 Forest bed. 2124.11a1
 Proceed back to 42
 Turn left on 42
 Moraine on right. Red till
 Cross moraine
 Keep on 42 through Two Rivers
 Stop: 10.53-10.57 Gray gravel overlain by red silt and clay and
 disturbed by red ice advance. Manitowoc 2024.17c7
 Back on 42
 Wrong road. Turn left on Huron St., proceed to 18th St. Turn left
 Turn right into clay pit 85.0
 Stop: 11.12-11.50 Medusa Portland Cement Co. Red till, varved
 clay and gray till 1923.24d2
 Proceed back to concrete
 Proceed on 21st St. to Washington Ave. Turn right on Washington(31)
 Follow 31

183.20			
183.40			5115
183.70			52.1
184.10			5 min exam
185.80			STOP 5 min 52.8
186.40			
186.70			subtract 2.3
187.00			54.7
187.30			30 min
188.45			56.1
197.40			64.5
198.30			65.4
198.40			1 hour 65.5
199.50			66.5
209.00			33 min exam
209.60			76.0
209.60			76.6
217.20			78.4 (5-20 min) 82.9
218.40			turn left on 42
219.30			218.5 subtract 3.1
220.00			10 min exam
220.80			85.0
221.70			85.8
222.20			86.3



132.0
134.0 17

17th out

147.0 449.0 18

169.8 171.8

170.1 172.1 1

183.7 186.0 2

201.2
203.5 3

217.8
turn at on = 83.5
New York Ave

218.5 = 84.2
turn left on
21st
204.0 4

2025.31a7

2124.11a1

2024.17c7

85.0

5-25 min

83.3
4.2
87.5

137.0 + 2.8

966

Mileage

Red till moraine
 Red till over gray till in road cut
 Turn right onto town road
 Morainial topography. Return to 31
 Note morainial topography on both sides
 Road cut left. Red till over gray
 Turn right just north of Valders Co. (148)
 Turn left
 Stop: 12.05-12.30 Quarry. Crossing striae NS and EW
 Return to main route 31 and proceed south
 Stop: 12.35-1.15 Lunch.
 Red till over gray in road cut
 Entering interlobate overridden with red drift
 Stop: 1.25-1.30 Interlobate
 (At this stop Thompson's speedometer reads 227.5)
 Note conical kame on left
 Turn left onto Route 32
 Turn right following 32
 Turn left following 32
 Stop: 1.54-1.58 6 gas and 1 oil \$1.10
 On left a good pit in outwash terrace
 Pitted outwash terrace
 Stop to consult map. Wrong road. Go back to Kiel
 Turn left onto Route 57
 Entering Sheboygan Co.
 Note extremely pitted topography
 Turn right onto A
 Follow A to Glenbeulah and Greenbush
 Arrive Greenbush 2.44. Stop for maps 2.44-2.45
 Right onto 23. Green Bay ground moraine
 Enter Fond du Lac Co.
 Gravel pit in kame on north side of road
 Turn right onto AA
 Stop: 3.06-3.15 Overridden Michigan lobe drumlins, with Niagara
 only in lower part, and Green Bay deposit with Galena pebbles
 on top.
 Reverse to AA
 Proceed west on AA
 Turn right onto town road
 Turn right onto town road
 Turn left onto town road
 Stop: 3.37-3.43 Drumlin with new tail to the east
 Turn left onto U
 Recessional moraine
 Turn right onto town road
 Red till
 Stop: 3.58-4.01 View over Niagara escarpment
 Turn left onto Q
 Stop: 4.02-4.07 Road cut on left shows Oshkosh beach gravel
 850 foot level (?) overlain by red drift
 Turn left onto 31
 810 foot beach on left
 Pit on right showing red till over beach gravel
 Bar of beach gravel on right--800 foot level
 Turn right at Peebles
 Turn left onto K
 Turn right onto 23
 Turn left into gravel pit
 Stop: 4.25-4.34 805 foot bar of Lake Oshkosh

92.6	225.60	89.5	Rain 30min
	228.70	92.4	
	230.50	(97.0)	
	=231.10	(97.0)	
	231.50	97.4	subtract 3.7
17	234.40	=	104.1
	234.90		100.6
	235.20		100.9
	235.70	S	25 min 101.4
	236.40		102.1
	238.20		103.8
	239.10		104.6
	242.00	25	107.3
	243.00		108.3
	244.20		109.4
	245.40		110.5
3.2	253.60		118.2
	254.00		118.6
	254.00		119.1
	254.70		
258.2	256.10		
254.0	258.20		
4.2	261.90		
	263.20		
	264.50		
5.9	267.80		
	275.20		
7.4	275.20		
11.9	280.00		
	283.50		
	286.80		
	287.10		
	287.80		
	288.20		
5.8	289.50		
288.9	291.00		
	292.40		
	292.90		
37.5	294.20		
35.9	295.80		
33.4	298.30		
	299.50		
	299.80		
	300.00		
	300.20		
31.4	300.30		
	300.40		
	300.70		
	302.80		
28.3	303.40		
26.9	304.80		
	307.10		
	307.40		

2193

222.0 5

40min

223.8 227.5 6

254.5 turn at into 57

257.9 269.0 7

263.5 8

268.8 280.5 9

269.2 280.9 10

275.8 287.5 11

X.937
 = 6.4%
 6.4% deduct

STOP 5 min
 243.00
 243.00
 15.5

35 min run
 261.9
 254.5
 7.4

Subtract
 261.9
 258.2
 3.7

Subtract 11.7
 289.50
 156.4
 155.8

36.9
 281.2
 158.8

331.7
 275.2
 55.9

331.7
 294.4
 148.4

26.5
 26.9
 144.2

119.0

Proceed back east to K and turn right on K going south
 Stop: 4.36-4.48 Beach(?) probably of gray drift; overlain by red till
 Proceed south on K
 Turn right onto T
 Turn left onto 41 at Court House
 Turn right onto 151 s of Court House
 Follow 151
 Morainial ridge at edge of red drift
 Outcrop of Galena ~~in~~ stream ~~at~~ Lamartine
 Note Niagara escarpment on left
 Esker on left
 Follow 151 left (Leave Congress route) *line about 535*
 Road cuts on both sides show excessively stony till
 Stop for gas : 6.00-6.05 4 gas and 1 oil 75¢
 Road follows axis of drumlin
 Arrive Science Hall 7.30 P.M.

	Mileage		
24.1	307.60	20.9	141.7
delayed	308.20	sub.	11.7
		22.0	141.0
1518.0703	308.80	21.4	140.4
	311.95		
	312.00	18.5	137.5
	315.40	15.3	134.3
47 min	319.80	11.2	130.2
	321.80	9.2	128.2
	324.80	6.5	125.5
✓ 6.9	331.70	0	119.0
	335.50	14.0	
	345.70		
	351.30		
	389.90		

276.6
 244.3 11

365.0
 353.3

44 1/2 hrs

353.3
 199.0
 84.0

 636.3 grand total

cost \$540 = .85 cents per mile

1st day - Wm

P. Qui Chien. Old Sanitarium.

Lunch → Dodgeville - Hotel Higbee.

Dinner ^{Lodging and breakfast.} University Club.

2nd day, Lunch Hotel Rolf - Portage.

Dinner Lodg + Breakfast at Curtiss Hotel
Plymouth.

3rd day Lunch Hotel Hamilton Two Rivers.

Dinner Lodg + Breakfast Hotel Geib
West Bend.

4th day

Lunch - Delafield Mrs Hughes.

Eagle Mrs Whitham.

Dinner - wayside Hotel Walworth

10	10
25	5
12	5
10	5
5	20
5	15 - 1 hr
10	40
15	15
15	50
5	95
20	2 hr 35 min
5	Time Paid.
20 to Delafield	5
(2 hr 42 min)	30
6) 162	60
12	10
	5
	13

LOG OF MONTICELLO TRIP GLACIAL GEOLOGY
 F.T. Thwaites in charge
 May 11, 1935

			Time	Mileage
		Leave Science Hall	1.07 P.M.	000000
		Proceed south on Park St.		
		Rock hill on left, of Madison sandstone capped by lower moraine		2.90
4.3	stop 1	Stop: 1.19-1.26 Wingra moraine over drumlins 0609.01 b5		4.60
		Stop: 1.32-1.35 Water for car		
		Turn right onto town road		6.00
		Road cut in Black River on left		8.40
8.7	2	Stop: 1.44-1.45 View of Milton moraine 0609.09 a3		9.30
		Turn left onto town road		9.80
9.3	3	Stop: 1.46-1.50 Lake sediments in front of Milton moraine 0609.17 h1		10.00
		St. Peter outcrop on left		11.20
		Turn left onto town road		11.50
11.3	4	Stop: 1.58-2.02 View over Milton and Johnstown moraines. Bed rock hill capped with Black River 0609.21 d5		12.00
		Turn right onto D		12.40
		Turn right following D		16.20
		Turn left on D		17.30
		Note Johnstown topography on right		
		Go straight leaving D		18.40
		Turn right into pit		18.50
17.3	5	Stop: 2.15-2.27 Alluvial fan from Johnstown moraine 0509.1795		18.50
		Proceed back to D and turn right on town road		18.90
17.9	6	Stop: 2.29-2.34 Cut in kame 0509.17 h3		19.10
		Turn right		19.40
19.2	7	Stop: 2.37-2.44 View of outside of Johnstown. Also Brooklyn moraine 0609.21 h8		20.60
20.9	8	Stop: 2.47-2.55 Illinoian drift 0509.28 d8		22.30
		Turn left (east)		22.70
22.3	9	Stop: 3.00-3.04 To view gorge cut through Black River ridge. Ice stood just to the east 0509.28 a1		23.80
		Turn right onto town road		24.70
		Pick up Route 92		26.60
25.8	10	Stop: 3.12-3.20 Brooklyn moraine. Pitted outwash between Brooklyn and Johnstown moraines 0409.10 e2		27.50
		Turn right following 92		27.90
		Turn left following 92		33.10
31.9	11	Stop: 3.33-3.40 To view Illinoian terminal moraine 0408.11 a5		34.00
		Turn around and proceed back to Dayton Center		
		Turn right following D		34.60
		Turn right following D		38.20
		Kame on right showing deeply weathered gravels		38.20
		Turn right onto C		39.70
40.5	12	Stop: 4.02-4.20 To view gorge in St. Peter and terminal of Illinoian		43.10
		Go straight leaving C 0308.08 h6		43.50
		Turn Left		43.90
		Turn right at R.R.		43.95
		Turn right		44.20
		Turn left onto Route 39		44.40
		Turn left following 39		45.50
		Leave 39, going straight		48.50
46.5	13	Stop: 4.35-4.40 To note crags formed since Illinoian. Glacial pebbles have been found on top of them 0308.28 b7		49.60
		Turn right		50.70
		Turn right		52.30
		Turn left onto 39		52.50
		Turn left on concrete 39		54.00

Mileage

Turn right through Monticello. Follow 39	54.50
Follow 39 through New Glarus	
Turn right onto 69	60.80
Turn right (detour)	75.00
Illinoian kames <i>on left and right</i>	75.50
Turn right onto 18 <i>at County Fair</i>	80.30
Edge of Milton moraine	83.40
Science Hall 6.05 P.M.	89.70

84.0



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

July 5, 1933.

Dr. F. T. Thwaites,
Geological Dept., University of Wisconsin,
Madison, Wisconsin.

Dear Doctor Thwaites:

I have received from Dr. H.G. Ferguson a copy of his letter of June 30 to you, concerning the Geological Congress and stating that the glacial excursion (C-3) will be carried through, and that six have registered for the trip thus far. Possibly a few more may register before July 15.

Owing to the conditions on the Federal Survey, the uncertainties as to geologic field work and the unsettled state of my private affairs, I probably can not take part in the glacial excursion. I have written Dr. Kay and Dr. Leighton to that effect and for them to go ahead with their plans with the idea that I will probably not be present. Dr. Leighton will be in charge of the excursion and he will let you know, if he has not already done so, as to what will be expected of you and Dr. Bean in Wisconsin.

I would like to keep in touch with the plans and will be glad to do anything I can to help at this end of the line, as I expect to be here in the office. I will probably not go out West on field work this season.

As you perhaps already know, there have been numerous changes in the personnel of the Survey. Besides the separation of numerous clerks and others from the Geologic Branch, the following have been retired: Messrs. Darton, Keith, Butts, Spencer, Richardson, Collier, Prindle, Calkins, Van Orstrand, and Steiger. I understand that Dr. Stanton continues as Chief Geologist, and Dr. David White is also retained to carry on his studies. I am glad to learn that I am not to be retired now, because of 30 years or more of service. I understand the matter of furloughs is not yet settled.

Very truly yours,

Geologist.

June 28, 1933

Dr. H. G. Ferguson, Assistant Secretary,
16th International Geological Congress,
Washington, D. C.

Dear Dr. Ferguson:

I have delayed in answering yours of April 18 to see if you are going through with Excursion G-3. While on trips in glacial geology we logged a considerable portion of the route in Wisconsin but I have not put this in final form or decided just what stops are possible and how long should be allotted to each one. It would take me three days to log the rest of the route. I also secured permission from the owners to visit the clay pit at Manitowish (if included). I also got Mr. L. R. Wilson who studied the Two Creeks Forest Bed to agree to be guide at that point without compensation. He can also distribute copies of his report for a small cost I suppose. I have mounted up a large book of photographs taken along the route, not as many as could be desired or all as good as I would have liked but the weather prohibited any work this year.

I should like to make the entire trip if I feel that I can afford it but it may turn out that I will be unable to go on any part of the trip unless it be when they go through Madison. It will, therefore, be necessary for me to prepare detailed instructions on the route and stops for the use of those who are fortunate enough to be able to go. I must know if the thing is going through at least two weeks before the date of starting, in order to finish this work.

No guide book ever arrived.

Very truly yours,

F. J. Thwaites

L.F. Fischer
2 Pages

GEOLOGY 143
GLACIAL GEOLOGY

Roster for field trips, 1932

Name	Duties	Reading first trip	second trip
<i>Berg</i> 1. Baker, G. L.	Historian	P.P. 106, 186-189 Janesville	P. P. 106, 317-322, red till
<i>Clark</i> Barton, T. F.	Driver	P.P. 106, 235-237, 269, 289, 308 Interlobate	P. P. 106, 326-331, Lake Chicago, early
<i>Forster</i> 2. Dent, G. C.	Shovel	P.P. 106, 209-212, 218-220, Johnstown moraine	P. P. 106331-339, Lake Chicago, late
<i>gray</i> 3. Hago, G. O.	Chemist	P. P. 34, 55-62 Eagle terraces	P. P. 106, 340-345, post-glacial
<i>Hay</i> 4. Hunzicker, V. J.	Sample grabber	J. of G., 31, 265-281, N.W. Illinois	P. P. 106, 310-317, red till of Lake Michigan
<i>Rever</i> 5. Isaacson, M. R.	Drillor	Wis. B.8, 75-77; P. P. 34, 50-52, Lake Geneva	P. P. 106, 324-326, Lake Oshkosh (Jean Nicolet)
<i>Thorn</i> 6. Randall, J. R.	Geographer shovel	Mon. 38, 131-140, 290-295, Iowan, Marengo moraine	Bull. 36, 223-239, Niagara escarpment
<i>Thompson</i> 7. Stiles, Marg.	Log keeper	P. P. 106, 138-140, 154, old drift E. Rock River	Ms. by Thwaites on Lake Oshkosh
<i>Trapp</i> 8. Strain, W. T.	Bar, growler	Bull. 273 U. S. G. S., drumlins	Wis. Bull. 17, 2-8, 56-61, beaches
<i>Trapp</i> 9. Turk, L. O.	Tool dresser	P. P. 106, 138-140, 155-160, old drift W. Rock River	Wis. Bull. 17, 41-42, 61-62, Forest Bed

Roommates

Barton-Dent Strain-Randall Baker-Hago Isaacson-Turk Durpee-Hunzicker

Seating

Everyone except the drivers has a number. Cars are also numbered. Take places in cars in numerical order. At each stop the low number moves one car ahead except in the leaders car where he moves to rear car. This will allow everyone to ride in the leading car part of the time. PLEASE REMEMBER YOUR NUMBER.

CAUTIONS

Please do not stop on pavement. Avoid getting out of left sides of cars. In case of accident do not mention that you are on a field trip. Do not discuss liability. Write down names of witnesses and the time. First aid kit in leaders car. Let's not have any accidents, however! Report complaints to the growler only.

1	5	5	6	6	7
2	6	2	7	5	8
3	7	3	8	3	9
4	8	4	9	4	1
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INTERNATIONAL GEOLOGICAL CONGRESS

Memorandum for Excursion Leaders

The following data particularly concern the leaders of the excursions. They may be of interest, however, to all connected with the excursions.

Membership in excursions

Applications. The number of applications thus far received is far below the figures indicated by the returns from the first and second circulars. For nearly all the excursions, however, we have received sufficient applications to justify giving the excursion, though we may have to revise our original plans and run some of the excursions on a somewhat different basis than originally planned. Individual leaders will be notified of whatever changes in plan are necessary.

The probable small size of the excursions has its redeeming features. In general, only those who are especially interested in the object of the excursion have enrolled, and an excursion consisting of a small group of specialists should be more profitable both to the leader and members of the excursion, than would a large crowd, many of whom are not seriously interested. On the other hand, there is the disadvantage that for small groups it will be impossible to allow the leader as many assistants as would otherwise be permissible.

Since every member of an excursion involves a loss to the Geological Society of America, excursion leaders should be careful to avoid even the appearance of "drumming up trade." The advantages of an excursion may and should be pointed out to students and others who will really profit by it, but we do not want, merely for the sake of additional numbers, to make the Society pay part expenses of those to whom a Congress excursion will be nothing more than a vacation trip.

Individual leaders will be notified of the numbers registered for their excursions when we take up the assignment of expense money for assistants.

Closing date for applications. It is stated in the fourth circular that no applications will be received for the A and B excursions after July 1 and for the C excursions after July 15. Where accommodations are available, we shall not be absolutely rigid in enforcing this rule and, if deserving applications are received after the dead-line, it may be possible to include them. Please do not give any publicity to the possibility that exceptions may be made, as we do not want possible members to hold off longer than they are doing at present. Moreover, we shall adjust the accommodations to be engaged to those who have registered by the date set.

Partial excursions. Wherever possible we are making special rates for any part of an excursion desired by members who are not able to take the complete excursion. These are figured below actual cost to the Congress and are open only to members of the International Geological Congress. Please refer any such requests to Mr. Becker or me for calculation of the rates to be charged.

Use of private automobiles. We have hitherto discouraged proposals for the use of private automobiles on the excursions, even by members of the Congress regularly enrolled in the excursions, as it was felt that this would be a nuisance to the leader and involve danger and difficulty on crowded roads where parking space was limited. For some of the excursions, registrations are so few that it may be desirable to relax this provision. Leaders should therefore use their judgment as to acceptance of offers of volunteer cars. Where such are accepted and considered to be of use in the management of the excursion, charges for gas and oil (or mileage at 5 cents a mile) may be billed to the Congress. The Geological Congress will not be responsible for any damages from the use of such private cars. All automobiles hired for the excursions, whether busses or private cars, must carry adequate insurance.

Irregular participation. A memorandum expressing the policy of the Organization Committee regarding irregular participation in the excursion has already been sent to leaders. It should be emphasized that leaders are authorized to accept such participation only when it seems to promise definite assistance to the excursion. Copies of the guidebooks and geologic maps can be supplied only to members of the Congress who have paid the registration fee.

Rehearsals

Some of the leaders have already completed the preliminary rehearsals for their excursions; others expect to do so shortly. It is expected that leaders of those bus excursions for which the number of applicants already insures the excursion and who do not live at too great a distance from the areas of the excursions, will go over the routes of their excursions in order to work out the time tables exactly, check up on all business arrangements, select suitable stopping places, cache specimens and fossils where long stops are undesirable and handle other details. It is realized that it would be very desirable that they should also have their assistants accompany them but, owing to the few registrations yet received, expenses of rehearsal can not be guaranteed except for the leader, unless prior authorization has been secured. It would be obviously absurd and unfair to the Society to pay the rehearsal expenses of a leader and 3 assistants for an excursion having only 3 or 4 members.

Financial arrangements

Cash advances. It is obvious that on the actual excursions leaders will have greater cash expenses than it is reasonable to ask them to advance. Although it is essential that arrangements be made with all hotels, restaurants, and transportation companies by which charges shall be billed direct to the Secretary, it is inevitable that there will be certain expenses, such as tips to drivers and waiters, which will have to be paid in cash by the leader. It is also essential that the leader should be supplied with sufficient cash to meet emergencies, such as advancing charges for medical care for members in case of accident or illness or for payments to be made

when there is a misunderstanding about charges to be billed to the Congress.

Our arrangements with the Geological Society provide for supervision and audit of expenses by the Society and therefore arrangements for advance can not be as informal as might otherwise be allowable. It is requested therefore that all excursion leaders submit, at least two weeks before the start of the excursion, a request for whatever cash is needed with a budget itemized as to expected needs as far as possible and accompanied by a receipt for the amount, dated ahead to the date of the beginning of the excursion. The necessary advances will then be made by the Treasurer, after approval by the General Secretary. A detailed account must be kept of such expenses and submitted with the return of the unexpended balance of the advance as soon as possible after the close of the excursion. The receipt will be returned as soon as the unexpended balance has been received and the expense account approved. A form of receipt is enclosed.

Expense accounts. For accounts of leaders, either on money advanced or where they are using their own funds, it is not necessary to follow all the formalities of state or government expense accounts. The accounts submitted should be clear and detailed and it is desirable that, where it does not cause special inconvenience, the larger items, such as hotel bills, should be supported by receipts. For use of a private car either cost of gas and oil or mileage at the rate of 5 cents a mile may be charged.

Charges on excursions. We are very anxious to simplify our accounts by arranging that all possible items shall be billed to the Secretary and the vouchers paid directly by the Treasurer. It would be well during the preliminary rehearsal to be sure that this is clearly understood by all concerned.

Charges incurred during the excursion can be paid promptly if they have the approval of the leader. If possible, the bill should be made out before the party leaves and the leader should check and indorse it. If this can not be done, he should give the creditor some such statement as "Approved for 21 meals at 50 cents each, total \$10.50, John Doe, Leader, A-10." and ask him to attach this to his bill. If any departure from the agreed scale of prices are found necessary, an explanation from the leader must accompany the bill.

It is possible that some of the charges appearing on the detailed statements already sent to excursion leaders may be changed as they were quoted on the basis of an expected larger number than will be realized. A final statement of costs will therefore be sent to leaders after definite reservations have been made and charges definitely fixed.

Meals in dining cars. It does not at present appear likely that we shall have enough registrations on the rail excursions to allow the use of special trains. We therefore plan to use special Pullmans attached to regular trains. This will involve meals in the regular diners. Arrangements are being made to allow members, on presentation of the membership cards, to sign their checks. The dining car steward will then bill the Congress through the Baltimore and Ohio for the total of each meal. It

will be necessary for the leader, prior to each meal, to make sure that this arrangement is understood and to ask the steward to tell the waiters that their tips will be taken care of by the leader, and after the meal to check and approve the total, and give the proper amount to the steward for distribution as tips to the waiters.

Railroad tickets. On rail excursions the leader will handle all railroad tickets for the members. As far as circumstances permit, group tickets will be used. There will be, in addition, special tickets for each excursion issued by the Congress. These are for the convenience of the leader and members and do not cover railroad fare.

Tips. All customary tips must be paid by the leader. Government travel regulations provide the following scale for individuals. This may be of assistance in estimating the amount of cash required.

Bell boys and maids at hotels not to exceed a total of 30 cents in any one day.

Porters, hand baggage, at stations, hotels, or residences, not to exceed 15 cents per piece or total payment of 25 cents. An additional 25 cents will be allowed for handling trunk when carried in addition to hand baggage.

Porters, baggage, at landings or wharves, 25 cents per piece.

Porters on chair or parlor cars, not to exceed 25 cents for each chair occupied.

Porters on sleeping cars, 25 cents for each 24 hours of travel or fraction thereof.

Waiters, not to exceed 60 cents per day.

This is believed to be a reasonable standard, possibly more liberal than absolutely necessary where large groups are concerned. It may of course be varied as circumstances require.

For meals, 10 per cent of the total bill and not less than 10 cents a person is a fair standard. This may be given to the head waiter or dining car steward for individual distribution.

At hotels it will probably be convenient to leave an appropriate sum with the manager or head porter for division among the staff. Tips at hotels should not exceed 10 per cent of the total bill.

Members of an excursion are, of course, free to give additional tips if they see fit, but if enquiry is made, they should be informed that individual tips are not necessary.

Check up of arrangements. We have tried to relieve the leaders from the nuisance of minor business arrangements by having as much of the detail as possible handled by Mr. R. C. Becker, our business manager. There are, however, certain features of every excursion which can best be handled by the leader and the lines of division between the Washington office and the leaders may not in all cases be perfectly clear. Please take up any doubtful points direct with Mr. Becker and be sure there is no chance for overlap or omission. If desired, Mr. Becker will probably be able to visit leaders living in the northeastern states prior to the excursions.

Members' identification. Each regularly enrolled member of an excursion will have not only his numbered card of membership in the Congress, but also a ticket entitling him to participation in the excursion. This is to be presented to the leader on joining the excursion and the stub retained by the member. If the ticket is endorsed "special," the special conditions, such as participation for only part of an excursion, will be noted on the back. Prior to the excursion, the leader will be furnished with a list of members, with notes of any special rates granted and instructions for meeting those who join en route. The leader should check members' tickets against this list. If there is any discrepancy, the members' word should be accepted and the discrepancy reported to the Washington office, by telegraph if any substantial amount is involved.

I note that several of the leaders and proposed assistants are not members of the Congress. There is no requirement that they join, but full sets of publications can be sent only to members.

Assistants

It is, of course, necessary to keep a fair ratio between the number of guides and assistants and the number of members taking the excursion. The plan suggested in my memorandum of February 18 seems to have met with general approval. The following scheme will therefore be followed, subject to modification as found necessary:

"For an excursion with 15 or less members, the expenses of a leader will be paid. For more than 15 and less than 25 members expenses will be allowed for the leader and one assistant. For over 25, additional assistants in the proportion of one to each additional 25 or major fraction. The financing will take the form of the apportionment of a certain amount to each leader, who will notify the Secretary how he wishes the division to be made, so that formal notice of individual allotments can be made from the Secretary's office. This will allow the leader considerable latitude in selection, since he can either allow full expenses for one or two or part for a larger number."

It is expected that, in most cases where an allotment covering part expenses has been made, the assistant receiving this will wish to have it credited against the fee for the whole excursion. Some of those who are to be assistant leaders have already sent in their advance deposits and for these, whatever expense allowance is made will be an additional credit against the fee for the excursion.

The expense allowance to the leader on the excursion will ordinarily take the form of a credit for the entire excursion, therefore no special accounting will be required for his own expenses. Similarly where the allowances to assistants cover parts of excursions no expense account need be submitted for the time during which he accompanies the excursion. If, however, any allowance is made for travel outside the excursion, as from home to starting point and return, an account for this portion must be submitted.

Guidebooks

It seems to involve fewest disadvantages to delay distribution of the guidebooks and the geologic map until close to the time for the excursions. This involves resisting a constantly increasing demand for advance copies. At present a guidebook will be furnished only where there is definite need for it in the preparatory work of the excursion. Authors will receive their "author's copies" when distribution begins.

It is planned at present to give sets to members of the pre-Congress excursions when they register prior to the excursions at Washington, New York, or San Francisco.

Those coming to the meeting only will receive their sets at Washington.

Sets will be sent to those who do not attend the session, after the close of the session, except that members who are registered for parts of excursions will receive theirs before joining the excursion.

Supplementary publications for excursions

It is expected that each member of an excursion will be provided with a mimeographed or printed supplement which will contain a list of members and whatever additional data are desired by the leader. Such data might appropriately include:

A detailed itinerary with time schedule for each day showing time of starting and arrival, names of hotels, time to be allowed at the more important stops, with reference to pages in guidebook.

Additional important general or geological information available since the printing of the guidebook. Copy should be kept as short as possible, no illustrations can be used.

Preparation of copy for these supplements (except membership lists) will be left entirely to the leader and copy should be sent in ample time to allow for preparation and printing before the start of the excursion.

Topographic maps and other publications, such as authors' separates, to be given members will be supplied to the leader prior to the start of the excursion.

Additional suggestions. Any additional suggestions received for the conduct of the excursions will be passed on promptly to the other leaders. If no further general memorandum is sent out prior to the excursions, please accept my thanks for the excellent work of preparation and best wishes for successful and profitable excursions.

Henry G. Ferguson

Associate Secretary.

_____, 1933

Received from the Treasurer, 16th International Geological Congress, the
sum of _____, \$ _____
constituting advance for anticipated cash payments on excursion _____ as
outlined in the accompanying budget. I agree to be personally responsible
for the proper care and expenditure of this advance and will return the
unexpended balance as soon as possible after the close of the excursion,
together with an itemized account of all sums expended.

STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

BOARD OF NATURAL RESOURCES
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STATE UNIVERSITY
DEAN CHARLES M. THOMPSON

April 15, 1933

Mr. F. T. Thwaites
Department of Geology
The University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

Thank you for the complimentary copy of your Diagrams Illustrating Glacial Geology. May I suggest that if you have need for one hundred or more copies of your work, the so-called offset process would probably be little more expensive than mimeographing and blueprinting and provides a much better reproduction?

So far as I know the bill for your expenses for logging the route for the International Geological Congress excursion C-1 should be submitted to Dr. Alden for approval and then he will submit it to the Congress for payment.

^{for me} I do not believe that there is any necessity or need to go over the route in Wisconsin before the excursion. The last information I had was that very few applications had been received for our excursion, so that we need not anticipate many cars. I would suggest that your log should not be too detailed so that the attendants can have time to read it as they ride and observe the features to which you call attention. Your idea of having a book of photographs seems excellent.

Yours very truly,

M. M. Leighton
Chief



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

March 22, 1933.

Dr. F.T. Thwaites,
University of Wisconsin,
Madison, Wis.

Dear Doctor Thwaites:

In reply to your letter of March 16:

I am including in the budget your estimate for preliminary work for the C-3 Excursion.

I think your suggestions of mimeographed logs, in so far as not covered by the guidebook itinerary and photographs, are excellent. It is likely that, for photographs of general interest to members of the Excursion, arrangements can be made to have prints furnished at the expense of the Geological Congress.

As I do not know whether you have received a copy of the guidebook, I am having one sent you under separate cover. Please do not give this too wide publicity, as we wish to delay distribution until close to the time of the Congress, and therefore must refuse all requests for advance copies.

I am hopeful that the "horners-in" will not be a serious problem on this Excursion. You may inform anyone interested that, for those who are unable to come to Washington, we have arranged a rate of \$40 from Chicago. This includes all expenses en route and is certainly as cheap as could be done by the unauthorized individual. We shall also be glad to figure out rates for any portion of the trip.

Very truly yours,

Assistant Secretary, Organization Committee,
16th International Geological Congress.

April 13, 1933

Mr. H. E. Ferguson, Assistant Secretary,
International Geological Congress,
Washington, D. C.

Dear Mr. Ferguson:

I wish to thank you for yours of March 22.

Please tell me what to do to have the expense account paid.

I will try to do this work soon after school ends in June, if not before.

The original intention was to do it only a few days before the excursion so as to take care of any detours which may be present but as highway work will be small in amount this year (so it seems now, at least) this will not matter.

The copy of the guidebook did not arrive. I will appreciate one to use with my class after we go over a large part of the route in this state.

I have written Dr. Leighton to see if he cares to go over the route in advance. It is possible that we can do something in this way but Mr. Bean gave me to understand that he does not intend to do anything in advance. I will try so far as possible to get permission of landowners where we have to leave the highways but in the hast of a field trip where a schedule must be kept it is entirely possible that some places will be omitted.

Very truly yours,

F. T. Thwaites, Lecturer in Geology

April 11, 1933

Dr. M. M. Leighton, Chief,
State Geological Survey,
Urbana, Illinois

Dear Dr. Leighton:

Enclosed please find complimentary copy of my ^DDiagrams Illustrating Glacial Geology for which you recently furnished some suggestions. They are, as stated, a Depression Substitute for a proposed text. I still have two possible means of publication for the latter which I will have to test out.

With regard to the International Geological Congress excursion I have been allowed \$40.00 for expense of logging the route beyond doing part of it during the course of my glacial geology class excursions.

Two questions then arise: (a) How will I render a bill for this, and (b) do you desire to go over part or all of the route in Wisconsin before the excursion.

I intend to make a detailed log including description of things at which no stop is possible and the running time. Estimates of length of time at each stop will have to be increased in proportion to number of cars because it takes time for all to come up and assemble. I will also try so far as time permits to secure permission of landowners at points where the party must trespass on private property. Most stops will be on public highways. I will also take photographs and make up a book from which members of the party can select any prints they desire. My original intention was to log the route with Mr. Bean a few days before the trip but from what he told me recently he evidently does not contemplate so doing and the entire burden will fall on me. With financial conditions as they will be by then it will be impossible for me to do much at my own expense and possibly I will not be able to go on the excursion at all.

Sincerely,

Aug. 1, 1932

Dr. M. M. Leighton, Chief,
State Geological Survey,
Ceramics Building,
Urbana, Illinois

Dear Dr. Leighton:

I have at hand a copy of a circular letter from Dr. Alden asking that I write you in regard to the proposed "Glacial Geology Excursion" for the International Geological Congress next summer.

Since all my notes on this subject are in my private files in Madison, I can do little from here. Nevertheless, I wish to make the following suggestions.

(1) The schedule for Aug. 4 is too short compared with that for the following day but was insisted upon by Mr. Bean. It is my personal feeling that the night should be at Baraboo or Wisconsin Dells.

(2) Last reports are that the hotel at Harvard, Illinois is not very good. Personally I would prefer either Delavan or Walworth Wisconsin. I always take classes to the latter where the hotel although lacking in modern finish is clean, comfortable, and reasonable in price.

(3) Owing to unforeseeable changes in highway construction programs it is impossible at this time to log the route in detail. It was the intention of Mr. Bean and myself to go over the route a week or so in advance and log it in the detail and manner which is so admirably done by the Kansas Geological Society before their field conferences. Their methods are well worthy of study.

(4) I wish to raise the question of the use of private cars instead of a bus with a truck to carry baggage ahead to the night stop. On the Kansas Society trip schedules were always closely kept and yet nobody's feelings were hurt even those of confirmed paleontologists: Several cars have a flexibility which cannot be attained by use of a bus, besides one can see the landscape much better.

(5) I favor evening meetings for discussion but no entertainment by local people. The latter is always boring.

(6) It is our intention (or was) to furnish a mimeographed guide and road log for Wisconsin as well as a book of photos from which members may order copies.

Sincerely

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work of the committee and the work of the committee. I mean to let you see the character of the work of the committee and the work of the committee. I mean to let you see the character of the work of the committee and the work of the committee.

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Wm. H. ...
...
...
Wm. H. ...

INTERNATIONAL GEOLOGICAL CONGRESS

July 30, 1932.

Dear friends:

I am inclosing to each of you a copy of Doctor Ferguson's "Memorandum for excursion chairmen," dated July 22. This will show the present status of plans for the excursions and the information which is desired for the preparation of the "third circular". Will you please, therefore, cooperate with Doctor Leighton, who will have general charge of the local arrangements and transportation for Excursion C-3, "Glacial geology of the central States." Please transmit very soon to Doctor Leighton any suggestions and available data on the cost and method of handling the excursion as a whole, or within the bounds of your several States. Doctor Leighton can then send me such information as Doctor Ferguson desires for his "third circular".

Responses so far received indicate the possibility that there may be 25 or 30 registrants for this excursion. Under present conditions, however, it is almost impossible to forecast how many of them (especially of the foreigners) will actually show up.

The proposed schedule is, in brief, as follows:

- July 30 (Sunday) 4:05 p.m. Leave Washington by railway.
- Aug. 1 9:00 a.m. Arrive Chicago and drive by bus to Canton, Ill.
- " 2 Canton, Ill., to Iowa City, Iowa.
- " 3 Iowa City, Iowa, to Prairie du Chien, Wis.
- " 4 Prairie du Chien to Madison, Wis.
- " 5 Madison to Plymouth, Wis., via Kilbourn.
- " 6 (Sunday) Plymouth to Manitowoc and south to West Bend, Wis.
- " 7 West Bend, Wis., to Harvard, Ill.
- " 8 Harvard to Chicago, Ill.
- " 9 Chicago and the World's Fair, leaving 11:00 p.m.
- " 10 Arrive Washington 7:00 p.m.

The schedule, as printed in the guidebook, indicates the bus routes, but does not specify the places at which night stops are to be made, so that changes from this daily schedule can be made, if necessary.

The Chicago Committee wishes that two days be allowed for Chicago and the World's Fair. These days could be August 9 and 10, if the added expense justifies it.

DEPARTMENT OF
REGISTRATION AND EDUCATION
M. F. WALSH, DIRECTOR
SPRINGFIELD

STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

August 4, 1932

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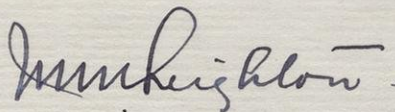
Dr. F. T. Thwaites
Allegheny School of Natural History
Allegheny State Park
Quaker Bridge, New York

Dear Dr. Thwaites:

Your kind letter of August 1 containing suggestions for the proposed "Glacial Geology Excursion" for the International Geological Congress has been received. Thank you for your helpful suggestions and comments.

With kind regards,

Very truly yours,



Chief

Would there be any advantage in putting the Chicago visit (either one or two days) at the beginning, rather than the end of C-3 Excursion?

Any persons registering to join the transcontinental excursion (C-1) at Chicago can leave there in the evening of August 8, arriving at San Francisco August 11.

Very truly yours,

W. C. Alden

Inclosure.

Copies of this letter sent to:

Drs. Leighton
Kay
Bean
Thwaites.

Geologist.

International Geological Congress

XVth Session, U.S.A., 1933

Washington, D.C.

February 18, 1933.

Memorandum for excursion leaders

Estimates for expenses to be incurred during the quarter beginning April 1, should reach this office not later than March 15 in order that the budget may be made up and submitted to the Council of the Geological Society of America for approval at its April meeting. It is assumed that a number of the leaders, who are not already thoroughly familiar with the routes to be traversed, will wish to rehearse their excursions in whole or in part shortly before the excursions are run.

Such rehearsals appear to be very desirable in order to check finally the time required for each day's trip, to determine the maximum allowance for stops and time of arrival at hotels and restaurants, and similar details. It would be well, of course, to postpone these rehearsals to as late a date as convenient in order to reduce the interval and therefore the possibility of change of conditions between the rehearsal and the actual excursion. Nevertheless, if possible the estimate of expenses should be included as of the quarter April to June, in order that we may have as early as practicable an idea of the expenses ahead of us. If specimens or fossils are to be broken out and cached in order to save time at stops, that becomes an added reason for delaying the rehearsal until fairly close to the time of the excursion. A point to be considered for several excursions is the possibility of shipping specimens, that may be collected by our guests and that might otherwise be a nuisance in the bus, from some halfway point. Please keep rehearsal expenses as low as possible.

There will shortly be sent to all chairmen of excursion committees a detailed statement of our understanding of what has been arranged regarding the hotels, restaurants, bus companies, etc. Please check this carefully when received and remind us if you do not receive it.

It is our expectation that all hotel, restaurant, bus, and similar charges will be billed to the Congress after approval by the excursion leader. This will relieve the leader of the necessity of carrying any considerable amount of cash. When you go over the route of your excursion it would be well to make sure that this arrangement is clearly understood. On the other hand, it will probably be necessary to advance a certain amount to leaders to cover necessary cash expenses, such as tips. If possible the approximate amount needed should be determined when the excursion is rehearsed, although formal estimate need not be made until the next quarter, when we shall know the approximate number on each excursion.

We should also like to know the desire of the excursion leaders as to the number of assistants definitely needed and their names. It is assumed that, if practicable from the standpoint of expense, the authors of sections of the guidebooks will be selected as guides in their areas. It will not be possible, however, to pay expenses of those who must come from a distance. Naturally the number of assistants must be to a large extent dependent on the number of those participating in the excursion and we can not make definite estimates of these numbers until close to the time of the excursion. The following tentative plan is suggested, more as a guide than a rigid scheme, since requirements will differ in different excursions:

For an excursion with 15 or less members, the expenses of a leader will be paid. For more than 15 and less than 25 members expenses will be allowed for the leader and one assistant. For over 25, additional assistants in the proportion of one to each additional 25 or major fraction. The financing will take the form of the apportionment of a certain amount to each leader who will notify the Secretary how he wishes the division to be made, so that formal notice of individual allotments can be made from the Secretary's office. This will allow the leader considerable latitude in selection since he can either allow full expenses for one or two or part for a larger number.

Since the issue of the third circular there has been a satisfactory flow of applications and it looks as though we will have a fairly large number in spite of the depression. As is to be expected, since excursion deposits are not required until much later, relatively few include deposits for the excursions. From those sent in and the inquiries received it seems likely that there will be sufficient applications to justify offering all the excursions that have been announced but that only a few will reach the limits set in the circular.

A rather disturbing feature is that several geologists have written asking that they be allowed to follow the excursions in their own cars without payment of the excursion fee. Presumably others intend to do this without the courtesy of a preliminary inquiry. The cooperation of all leaders is earnestly requested in aiding us to discourage such "bootlegging" as far as possible. Naturally we can not prevent people using the roads at the time of an excursion and the only method seems to be to appeal to the good taste of those who propose to thus "horn in" on the excursions. It will be readily seen what a nuisance a number of such extras would be to the leader of an excursion, particularly where following crowded roads. Moreover, the very favorable arrangements we have been able to make with bus companies and hotels are dependent on a reasonable number of regular participants and such "irregulars" reduce our chances of being able to meet the minimum requirement.

We have also received a number of perfectly reasonable requests from geologists who do not expect to be present at the Washington meeting, for permission to take parts of excursions, such as A-6 between Tulsa and Houston, C-3 and C-4 starting from Chicago, parts of the C-1 excursion, etc. These we expect to be able to meet, subject to the following conditions:

1. The membership fee in the Congress (which entitles the member to a set of guidebooks and the proceedings when issued) must of course be paid.

2. In the unlikely event that applications for an excursion exceed the number who can be accommodated, preference will be given to those taking the full excursion.

3. In estimating prices for such partial excursions either approximate cost will be charged, or the reduction below cost will be proportionately less than the reduction allowed on the whole excursion.

A few seem to think that the excursions are primarily for foreigners and that American geologists and students are not welcome on the excursions. Please aid us in correcting this impression. It is true that where applications exceed the limit for any excursion, foreigners will be given preference, but I do not think this restriction will be necessary and I am confident that we shall be able to accommodate every American geologist, at least in his second choice. We also welcome anyone interested, even if not a professional geologist or student.

Although applications will not be filled in the order in which they are received, we naturally appreciate receiving deposits for the excursions as early as possible. Will you, therefore, suggest to any intending member to whom payment of the 10 per cent deposit thus far in advance would be no hardship, that he send in his application promptly so that we do not have to handle everything in a rush during the last few days. Refund of the deposit will of course be made if unforeseen circumstances prevent participation in the excursion, and request for refund is made in ample time.

We hope to issue the fourth circular in March. This will contain chiefly details of interest to those who have decided to attend the Congress, such as hotel rates, passport regulations, changes in excursion prices, itineraries, etc., but will be sent out to others as well.

Since the issue of the third circular, additional economies in the excursions have been effected and it now looks as though we might be able to make still further reductions in the prices charged for the excursions. Will you, therefore, report promptly any new developments, such as offers of free meals and services, or any changes in estimated costs which should be taken into account in recalculating our figures.

We have arranged with the Shorham Hotel, Washington, D. C. to offer the following rates to members of the International Geological Congress at the time of the session -- double room with twin beds and bath \$4 per day (\$2 per person), single room and bath \$3. Our New York hotel will be the Taft, Seventh Ave. at Fiftieth Street, which offers the following rates -- double room with twin beds and bath \$4 per day, single room and bath \$2 per day. This information will appear in the next circular but is mentioned here to be passed on to inquirers.

Any suggestions as to information to be included in the next circular will be most welcome.

H. G. FERGUSON,

Assistant Secretary, Organization Committee,
16th International Geological Congress.

A few seem to think that the excursions are primarily for tourists and that American geologists and students are not welcome on the excursions. Please aid us in correcting this impression. It is true that where excursions exceed the limit for an excursion, travelers will be given preference, but I do not think this restriction will be necessary and I am confident that we shall be able to accommodate every American geologist, at least in his second choice. We also welcome anyone interested, even if not a professional geologist or student.

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We have arranged with the Statler Hotel, Washington, D. C., to offer the following rates to members of the International Geological Congress at the time of the session -- Double room with twin beds and bath \$4 per day (\$3 per person), single room and bath \$3. Our New York hotel will be the Statler, 30th Street, New York City, which offers the following rates -- Double room with twin beds and bath \$4 per day, single room and bath \$3 per day. The information will appear in the next circular but is mentioned here to be passed on to participants.

INTERNATIONAL GEOLOGICAL CONGRESS
XVth SESSION, U.S.A., 1933
U. S. Geological Survey, Washington, D. C.

July 22, 1932.

Memorandum for excursion chairmen

Place and date of meeting

Among the matters referred by the Organization Committee at its meeting on June 25, 1932, to the Executive Committee for decision were, the place at which the technical sessions of the International Geological Congress should be held, and the dates of the sessions and the excursions with a preference expressed for a date later in the summer of 1933 than that heretofore favored.

At the last meeting of the Executive Committee, held on July 9, it was voted to hold the technical sessions in Washington but to move the date to the latter part of July. Saturday, July 22, seems most desirable for the opening session. It was realized that this later date was less convenient for many of us and less desirable for most of the excursions before the Congress, but it was felt that as many of the Europeans would not be able to leave their universities until after July 1, the advantages of the change outweighed the disadvantages.

Status of the Congress

The Congress of the United States has failed to act on our request for authorization of a small appropriation for expenses of the Geological Congress. Had favorable action been taken we should have had official status which we now lack. It is thought, however, that this will not be a serious disadvantage as the State Department has informally indicated a willingness to transmit the invitation of the Organization Committee to foreign governments.

The Council of the G. S. A. has acted favorably on a resolution authorizing the Society to underwrite the expenses of the Geological Congress within limits. A vote of the membership of the Society will be taken shortly on this proposal. A favorable outcome of this vote is hoped for, but naturally commitments can not be undertaken until the result is known, probably by the middle or end of August.

Preparation of third circular

It will be necessary, in order to insure time for world-wide distribution of the third circular and for the correspondence that will follow

its distribution, to mail the circular not later than September, preferably earlier. It will therefore be necessary to have the itineraries fixed by this summer and all associate leaders selected. Whatever preliminary work may be necessary can be done without waiting for the result of the G. S. A. vote as long as no expenditure is involved. (Reasonable small items for gas and oil, transportation, etc., can be paid where necessary.)

I will shortly send to each excursion leader a rough draft of the itinerary and description of his excursion to serve as a basis for the preparation of copy for the circular.

Detailed arrangements for excursions

It is of course necessary that the excursions be carried out in the most economical manner as we must make every effort to bring them within the financial reach of as many as possible. Probably the present depression has the advantage that very favorable terms can be made with bus companies, hotels, and other services whose rates are not fixed by law. We plan, therefore, if the action of the G.S.A. is favorable, to secure the services of Mr. Raymond C. Becker, a geologist who has had some experience in transportation matters. If possible Mr. Becker will be sent out in August or September to visit those excursion chairmen, especially in the eastern States, to whom he can be of use, in order to assist them in making the most advantageous arrangements. If this plan is carried out you will be notified well in advance of the approximate date of Mr. Becker's visit and his time will be arranged, as far as possible, to suit your convenience. In the meantime it would be desirable to collect all possible data bearing on cost and desirability of the different services available for your excursion.

Expenses of leaders and assistants

It is expected that the Geological Congress will pay the expenses of each leader of an excursion. Naturally a reasonable number of assistants should be provided, but it does not seem likely that full expenses can be allowed to these. Possibly a fair basis would be to allow transportation and lodging (not subsistence) to assistants in the ratio of about one to each 20 expected participants. If thought best, an amount figured on this basis could be put at the disposal of each leader to be distributed by him in the manner which appears most equitable. No decision has been made in this matter and suggestions will be appreciated.

Local trips on C-1 excursion

The C-1 excursion is planned on a more elaborate basis than it would have been had we known a depression was to come and stay. However, since the guidebooks are all in press we do not want to make changes in the plans. (One major economy has been effected - making the Grand Canyon trip optional

to the Salt Lake trips. This will shorten the time to 30 days and save each participant \$80 to \$100.) It will therefore be necessary to economize as much as possible in the handling of these excursions. Offers of any free service should be encouraged and accepted, whether transportation or meals (except luncheons which waste daylight time). Since the cost of these local trips must be included in the price charged for the whole excursion I should like to get at least rough estimates of their probable cost. Such estimates should include all items of cost except railroad fares and meals taken on the train.

Topographic and geologic maps

Several excursion leaders have suggested that it would be desirable to have topographic and geologic maps of the region covered by the excursions available to the members. Probably for most excursions a set of topographic maps for each member would be merely a nuisance but a few such maps to each bus would be useful. Will you therefore send me a list of such maps as are desired and the number of copies of each?

Library for C-1 excursion

It is planned to have a small library, principally of Government publications, in the club car of the C-1 excursion. Will those associated in the leadership of this excursion send me a list of the publications desired in order that copies of those still in stock may be withdrawn and arrangements made for borrowing copies of those out of print?

Local committees

One excursion chairman has appointed a "hospitality committee" consisting of a group of citizens of the community prominent in politics, business, and mining, but not directly interested in geology. It is expected that members of this committee will render valuable service not only in welcoming the excursion, but in giving advice and assistance in making local arrangements and in raising money for any local entertainment that may be thought desirable. I do not know how far local conditions justify the extension of this arrangement but excursion chairmen can decide for themselves whether such committees would be of assistance to them or would be likely to absorb the time and energy of tired excursionists in entertainments and in other matters in which they are not interested. As stated in an earlier memorandum, entertainments not bearing directly on the purpose of the excursion should generally be avoided, and no formal luncheons (which use up valuable daylight) should be arranged.

H. G. FERGUSON,

Assistant Secretary, Organization Committee,
16th International Geological Congress.

Quaker Bridge, N. Y.,

July 11, 1932

Dr. W. C. Alden, Geologist,
U. S. Geological Survey,
Washington, D. C.

Dear Dr. Alden:

In reply to yours of June 29, just forwarded to me, I am in favor of meetings at New York or at least somewhere else than in Washington if they are at midsummer.

So far as I can see the change in date will make no difference to me. Somehow I simply cannot get myself to take the matter of the International Congress as a fact and not simply a hope! Maybe I am wrong, but I just can't make myself believe that there will really be such a thing or at least that any substantial number of European geologist will attend. But let's hope for an improvement before then!

I am working here this summer and so can stave off the worst of the Depression for a time. Elementary students are all missing so I expect to do some work on the outwash terraces with the three advanced students that I have. The school is about half normal. My family could not come because Tommy is too young for travel and life in camp.

You may be interested to know that Mr. Hansell who was laid off when funds were first cut is now Assistant State Geologist of Arkansas.

My text on glacial geology is not yet finished as the maps took longer than I expected. You may think some of them are rather bold assumptions but I think you will approve of the block diagrams. Dr. Leith wants me to have the book printed but as it is not done I have not made any definite arrangements.

Glacial studies in Wisconsin are at a standstill except when some students want to go out for a short time. I did two weeks work in Waushara County that way last year joining your area to mine.

Very truly yours,



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

June 29, 1932.

Dr. F. T. Thwaites,
University of Wisconsin,
Madison, Wisconsin.

Dear Dr. Thwaites:

I inclose herewith copy of a memorandum relating to the excursions of the International Geological Congress, 1933. Will you please let me know as soon as you can what effect you think such a shifting of time of Excursion (C-3), Glacial geology of the central States, would have on the excursion and your preference? So far as I myself am concerned a later date after the conference might interfere more with field work on the Federal Survey, supposing there are any funds for field work in 1933-1934; otherwise, I do not know that it will make any great difference.

I do not know that shifting the place of meeting of the Congress from Washington to New York City would have any particular effect on Excursion C-3 unless some preferred to drop it in favor of some excursion in the East. What do you think?

Very truly yours,

W. C. Alden
Geologist

Inclosure

INCLOSURE

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DEPARTMENT OF THE INTERIOR

COPY

INTERNATIONAL GEOLOGICAL CONGRESS

XVIth SESSION, U.S.A., 1933

General Secretary
U.S. Geological Survey, Washington, D.C.

June 28, 1932.

Memorandum for Excursion Chairmen:

At the meeting of the Organization Committee on June 25, it was decided to adhere to the plan of holding the 16th Session of the International Geological Congress in the summer of 1933, contingent, of course, on a favorable vote of the membership of the Geological Society of America on the allotment of funds. It was also voted to recommend to the Executive Committee that it restudy the question of a later date for the meeting (about the middle or end of July was suggested) in order that attendance from foreign universities, where session does not close until the end of June, may be made easier. An important factor in considering this change of date will be the effect upon the excursions and the preferences of excursion leaders. Will you therefore let me know promptly how this would affect the excursion under your charge. The Executive Committee will meet early to carry out the mandates of the Organization Committee so please reply as soon as possible.

In view of the facts that no government financial aid will be extended to the International Congress, and that the technical sessions may be held in midsummer when Washington is likely to be very hot, it is also desired to learn the opinion of the excursion chairmen as to the desirability, from the point of view of the excursions, of holding the technical meeting elsewhere than Washington, possibly New York. Such a change would involve some rearrangement of the excursions and if it is to be made, a decision must be reached promptly.

H. G. Ferguson,
Assistant Secretary, Organization Committee,
16th International Geological Congress.

March 16, 1933

Mr. H. G. Ferguson, Assistant Secretary,
Organization Committee,
16th International Geological Congress,
Washington, D. C.

Dear Sir:

Reply to your memorandum of Feb. 18 was delayed by the recent Moratorium which demanded a great deal of extra time from all of us. Yesterday, Mr. Bean, State Geologist, deputed me to answer.

Our intention was to log the route of the Excursion in Wisconsin as short a time before it occurs as possible and make mimeographed route logs for all members. I also intended to take photographs of important things along the route and have a book of prints from which members can select whatever they wish to purchase to be mailed later.

I will attend free of cost to logging the parts of the route which I cover this spring with my class, namely Waupun to Hartford and Delafield to south state line.

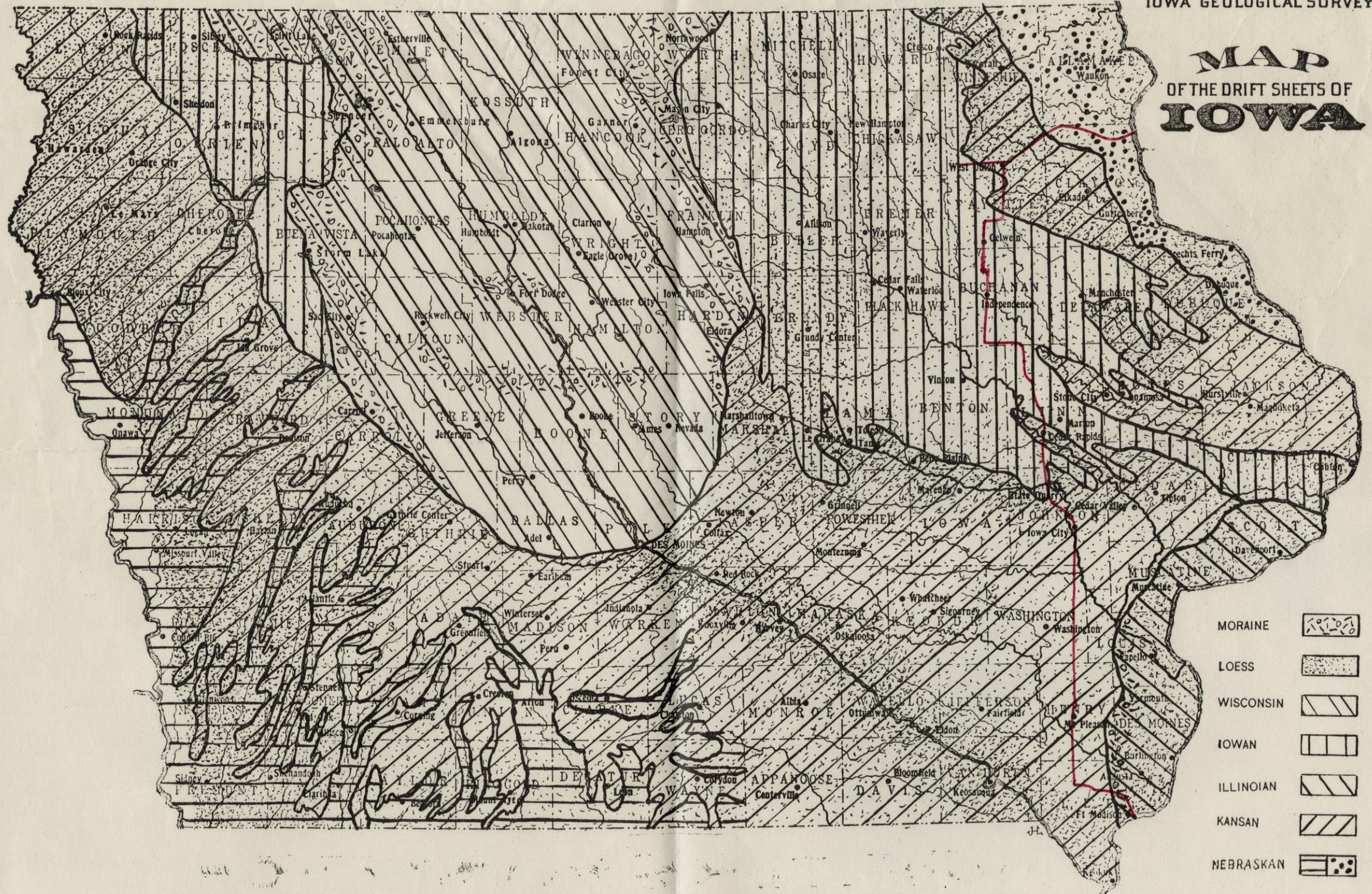
This leaves three parts to be covered later, Hartford to Delafield (about 30 miles), Prairie du Chien to Waupun (about 250 miles) and a section of not over 10 miles near Helenville. It will take over 400 miles of extra travel to reach the above but I can plan to do the work on single day trips and avoid hotel expense. As a grand total I estimate 700 miles at 5 cents per mile or \$35.00 to which should be added \$5.00 for extras not here foreseen making \$40.00 grand total.

With regard to "horners in" I suggest that in making arrangements for entry onto private lands we try to exclude such hangers on.

Very truly yours,

F. T. Thwaites
Lecturer in Geology

MAP OF THE DRIFT SHEETS OF IOWA



Members of Excursion C-3, 16th International Geol. Congress,
July-Aug., 1933

Ernst Arctevs 28 Beacon Ave., Auburn, Maine

L. T. Caldwell DeKalb, Illinois

W. C. Krumbein Dept. of Geology, University of Chicago

C. E. Gordon Amherst, Mass.

Nils G. Hörner, Geological Institut, Uppsala, Sweden

Wm. A. Newton, Geological Survey, Urbana, Ill.

Anna M. Wellnitz 90 Elwood Place, West New Brighton, Staten Island, N. Y.

Bernard B. Fallon 1305 Thomas St., S. E., Grand Rapids, Michigan

Irving B. Crosby 6 Beacon St., Boston, Mass

Robert H. Merrill Powers Bldg., Grand Rapids, Michigan

M. M. Leighton, Chief, State Geological Survey, Urbana, Illinois

George E. Ekblaw, Geologist, State Geological Survey, Urbana, Illinois

F. T. Thwaites, R. D. 4, Madison, Wisconsin

THE STATE UNIVERSITY OF IOWA
IOWA CITY

September 29, 1933.

Professor F.T. Thwaites
University of Wisconsin
Madison, Wisconsin.

My dear Professor Thwaites:

I was sorry to hear that your photographs did not turn out as well as they should but realize that you were taking them under adverse and changing weather conditions. I suppose that you received the print which I took of the Kansan gumbotil and loess section at location listed below as No.6 which was included in the envelope given out at the Lincoln hotel at Ft. Madison. If you failed to get this I would be glad to send you a copy and the negative will be on file here at the department so that at any time you might want a copy you could get it. I had some views taken from north of North Liberty in which you might be interested, that is listed as stop No.8.

Last Monday I learned of a Mammoth tusk which had been found in a gravel pit about four miles south of Hampton which is about 30 miles south of Mason City. I drove up to see it and determine the age of the gravel from which it was taken. It was one of the finest found in the state which I have seen, 11 feet and 7 inches long and complete except for being broken during collecting. It was taken from the Wisconsin outwash gravel.

I talked to Atwater for a while the other day, you will recall that he is taking his PhD at Wisconsin, and he plans to be here for some time yet.

I suppose that you will attend the meetings at Chicago this winter and that at least part of the summer group will have an opportunity to get together again.

Sincerely yours,



The views I mentioned were made after making some 50 photostats + the weak ones and solutions made poor results. I hesitate to send them but do not have time for more.

Oct. 13, 1933

Mr. Paul Miller,
Department of Geology,
University of Iowa,
Iowa City, Iowa

Dear Mr. Miller:

I wish to thank you greatly for yours of Sept. 29 with enclosed lists and photographs. I have the photograph given me at Fort Madison and was glad to learn where it was taken. Unfortunately both of my exposures at this locality show dark smudges the cause of which I cannot figure out. They are certainly neither light leaks nor fogging due to exposure of the film to light. Nor do I think they were due to touching in development. They may be due to defects in the film although such are very rare. I have been trying for a long time to get a pair of photographs of the same subject showing difference when the blue filter is used but every time I try such a comparison either something happens to the films or else the difference shown is less than that due to differences in printing! What I want them for is to use in a short paper on field photography for geologists which is now almost complete.

If things do not get much worse both Mrs. Twaites and I hope to go to the Chicago meetings. We did go to the Fair and are still solvent!

May I trouble you to pass on to the other members of your department the enclosed letters and papers so (as I have to do almost all my own letters) I will not have to address so many separate envelopes to the same place?

I am now starting a cooperative Wisconsin-Illinois-Missouri cross section similar to the cross section of the central United States that I worked on two years ago. We may run into more controversy than in dealing with the Pleistocene but I feel willing to take my chances on that. If it develops maybe it will help us from thinking so much about the Depression!

Sincerely,

F. T. Twaites

An enclosing a few extra prints which I have which may interest you. Code number is township, range (east), section (after decimalpoint), coordinates in 1/8ths of miles north and west of southeast corner (Illinois system).



INTERNATIONAL GEOLOGICAL CONGRESS
XVITH SESSION, U.S.A., 1933
GENERAL SECRETARY
U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C.

CABLE ADDRESS
INTERGEOL WASHINGTON

October 16, 1933.

Mrs. F. T. Thwaites
c/o Department of Geology
University of Wisconsin
Madison, Wisconsin.

My dear Mrs. Thwaites:

Permit me on behalf of the Council of the Sixteenth Session of the International Geological Congress to express my sincere thanks for the assistance you gave Professor Thwaites in the preparation of Excursion C-3.

It is generally assumed that only the men geologists of the country, who indeed contributed substantially to the value of the excursions, were responsible for their general success. However, my observations on the preparations and conduct of the trips has convinced me that very often a large share of credit should go properly to the geologists' wives who assisted very generously toward success.

It is therefore a great pleasure for me to thank you most sincerely for your efforts in the preparation of Excursion C-3 which was highly praised by all its members.

Cordially yours,

Waldemar Lindgren

Waldemar Lindgren
Chairman
16th International Geological Congress.



The Commonwealth of Massachusetts
Department of Education
Massachusetts State College

Please address your reply
to the signer of this letter.

Amherst

DEPARTMENT OF ENTOMOLOGY, ZOOLOGY, & GEOLOGY

October 25, 1933

Dr. F. T. Thwaites,
R. F. D. #4,
Madison, Wisconsin.

Dear Dr. Thwaites:

The photographs which I ordered from your collection on the C-3 excursion came through, and are very pleasing. I wish to thank you very much for the trouble of preparing these for me, and wish to acknowledge, too, receipt of the stamps which you returned as representing what you call overpayment on my part. I was hoping that you would accept the slight addition which I made to the nominal charge, let me say, in payment for trouble in handling the matter, if nothing more.

I was much interested in what you had to say in your letter about persistence of unsatisfactory conditions in Wisconsin. Judging from accounts in the papers things out your way, in Iowa, and so on, are far from being settled. I hope with you that soon matters will be adjusted to the satisfaction-- as far as ^{it is} possible to accomplish that now-- of the farmers in the Middle West.

I have just received from Mr. Wilson two papers, one on the Two Creeks Forest Bed, and one on the identity of Lycopodium porophilum. It is very kind of him to remember me and I am acknowledging on this mail receipt of his separates, which I shall look over with pleasure.

Cordially yours,

F. C. Gordon

CEG/D

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

The _____ 1/4 of the _____ 1/4 of Sec. _____ Tp. _____ R. _____

86
29
57

miles	Time	Desc.	add
29			57
29.1		Dance to Lane	
29.5	2:25	Turn left under RR "CJ F"	
30.05	2:29	" " on F	

30.3	2:30	Top E. Blue Mound <u>Stop</u>	
		View from top	

stop 15 min

Jurnat Ball Park.
Maquoketa dolin roadcut
Turn left.

30.5			
30.6	2:35	Sink hole on rt	
31.2	2:36	Turn left at S. U.S. 18	
35.1	2:44	Mt Moore	

35.4	2:44	Turn left on U.S. 18	
42.25	2:55	St Peter's swampment?	
42.9	2:56	Terminal Mar ahead on skyline	

43.2	2:57	St Peter's on rt.	
44.7	2:59	Sugar River	
45.0	3:00	Gorge ^{walk} up tracks	

stop 10 min 3:12 Leave gorge stop

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

The _____ 1/4 of the _____ 1/4 of Sec. _____ Tp. _____ R. _____

Miles	Time	Des
45.2 506	3:13	Old mo to left rock hill ahead
45.5	3:14	Cut in this old drift
46.0	3:14	Bean sign
46.05	3:15	Turn left at town road and stop.
458 104	3:20	Leave on terminal Valley to left carried drainage
46.8 add 6.6	3:22 strip 10 min	Cut in till - Stop Unglaciated till to W
47.3 1089	3:26	Turn left to leave Jer. Mot. Loess - covered top outwash pit to left
48.2 1098	3:28	Turn left.
48.4 10 min	3:29	Turn at on outwash Terrace

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

The _____ $\frac{1}{4}$ of the _____ $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

Miles	June	Des
48.9	3:31	Road follows base of J.M.
49.5 ^{61.6} _{11.1}	3:32	Stop skimming out letter J.M.
50.1 ^{11.7}	3:34	Turn left
50.3	3:35	Turn left
50.9 ¹⁵	3:37	St Peter's outcrop
51.6	3:40	Turn rt.
52.2 ^{113.3}	3:43	J.M. to st.
52.25	3:43	Turn rt
52.9 ^{114.5}	3:45	Turn left
	stop ^{10 min}	stop see 2 depressions shaded in by Moline
53.5	3:47	cross C.J. "S"
53.6 ^{3 min}	3:48	Sink hole where lake drains
55.0	3:52	Turn J.M.
	^{6 min}	J.M. again to right
117.0		{ cut in J.M. on road to st.
55.35	3:54	{ Stop ^{5 min}
55.55	3:55	{ Pt in outwash & drainage valley

change route

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

The _____ $\frac{1}{4}$ of the _____ $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

Miles	Time	Des
55.8	3:57	Turn right at St Peter
56.5	4:00	Turn left
56.8	4:01	Turn left
57.1	4:03	Enter outwash
	4:04	Stop at intersection
57.4	4:05	Turn right
57.4	4:05	Turn left
		Stop at gravel pit
		J. M. out right
57.85	4:06	Stop contour in hills in glaciated area
57.9-	4:07	Turn right on H 11
58.1	4:08	cross J. M. name

59.0	4:10	Turn right
59.05	4:11	Turn left
59.4	4:12	First turn right
60.35	4:16	Rejoins other route

" 55.35 Take out 5 miles
4 min to North

1.5

CO. REPORT NO. LOCATION NO.

DATE GEOLOGIST

The 1/4 of the 1/4 of Sec. Tp. R.

Miles	Time	Notes
61.3	4:21	1.5 2.1 Jiff IV
61.9	4:23	124.0 Progressal bridge
62.1	4:24	Rock cut on west
63.4	4:25	127.5 Recessional mor.
64.5	4:27	Retreat plain
65.4	4:29	124.5 also contact free head of lake Middleton

Are go west
1.5 m - 500
15 min
return

{ 5 gal gas.
4:30 - 4:32

66.3	4:33	middleton - e. bank
67.1	4:35	Turn on 12 th St. Enter middle moraine
68.5		the moraine
69.2	4:40	Leaving middle moraine
73.1	4:51	Park + U. Ave
Total up 77.9		

106.7 30 min to Madison
107.1 11:50 (Remnants of moraine at
Eroded outcrops to left)

73.1
31
42

5 gal gas

CO. REPORT NO. _____

LOCATION NO. _____

DATE _____

GEOLOGIST _____

The _____ $\frac{1}{4}$ of the _____ $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

Meters	Time	Place
82.85	11:04	U. Ave & Park
89.75	11:21	Turn st. on. 12
90.2	11:22	Pleasant Branch
90.8	11:24	Shore of Lake Middleton
91.5	11:25	Rock Hills on st
93.0	11:27	Thin dr. + rock hills
96.7 ^{13.8}	11:33	Pitted outwash in valley between rock hills
98.0	11:35	Gravel knolls above outwash plain
100 ^{17.1}	11:38	Divide - moraine deposit on top of rock hill. Blue Mound to left
101.8	11:41	Pitted outwash pl in valley
104.9	11:46	moraine deposits
105.65	11:47	Pitted outwash to left
106.4 ^{23.5}	11:48	gravel pit on left used for paving
106.7	11:49	Valley eroded in center of
107.1 ^{24.2}	11:50	Remnant of mor. to st. Eroded outwash to left

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

82.9 The _____ ¼ of the _____ ¼ of Sec. _____ Tp. _____ R. _____

Miles	Time	Des.
107.7	11:51	Descent to W's Ruin
108	11:52	W's Ruin
108.3	11:53	Turn st. off @ high
108.7	11:54	Road on top of W's Ruin
109.4 ^{26.5}	11:55	Stop Round Mt. + Blackhawk
110.5	11:58	Power Dam
110.6	11:59	Ascent of high into terrace
111.5 ^{27.6}	12:00	Turn off to Power Dam
111.85	12:02	Dam
111.85	12:40	Leave Dam
12.2 ^{29.3}	12:41	Rejoin 74 12
14.5 ^{31.6}	12:45	Orangeville tonight
15.35 ^{32.5}	12:46	Turn to left to town
15.75	12:47	Turn at school house
16.1 ^{33.2}	12:48	Kettle hole <u>stop</u>
	12:58	Leave. ket hole
16.6 ^{33.7}	12:51	Rejoin 12
18.5 ^{35.6}	12:54	Turn off on Z <u>stop</u>
		Allowed for
19.3	12:57	Pine hollow on left
19.9	12:59	Turn left on town road

outward

CO. REPORT NO. _____ LOCATION NO. _____

DATE _____ GEOLOGIST _____

-82.9 The $\frac{1}{4}$ of the $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

Miles Juma Pes

121.6 1:02
23.3 40.4 1:10

Devils Lake gets at
Stop on W. Taluff
return 135 with 20 min

24 41.1 1:44
24.2 41.3 1:46

Leave
Sumner Hook
J.M. 123

24.3 41.4 1:48
24.8 41.9 1:49

Turn left 159
J.M. J.M.

25.6 42.7 1:50
26.8 43.9 1:52

Jan 12

27.0 44.1 1:53
27.85 1:55

Top of Juma
Sewer straight
ahead

27.9
28.2 45.3 1:57
28.8 45.9 1:58

RR danger
Barishoo River
Reynolds straight

30.9
31.6
31.7

Top J.M. eroded
outwash ahead

Turn right onto road
Get out into outwash
Bury around
+ go back

Miles	Time	Notes
32.45	2:06	Repair 12 (take out 1.5)
36.2 ^{51.8}	2:12	Edge of delta
36.9	2:13	Well to left, gl. pebbles on top
38.2 ^{53.8}	2:15	Pell Creek (?) or Mirror Lake (?)
38.5	2:16	Belton Turnout on J.H.12.
38.8	2:16	Lake Belton on rt.
40.65 ^{56.7}	2:19	¹⁴⁹ / ₃₀ <u>Barred clay stop</u>
41.3	2:20	Turn st. on 13
41.8	2:22	Wis Tower
41.85	2:23	Keep left
42.0	2:24	Turn left on 13
	1 45	<u>stop + walk down to view</u>
42.85	2:25	Turn left on 13
44.6	2:29	Entrance Cold Water
45.5	2:32	1' to Elephant Back
49.0	3:00	Leave Turn left on 4. S 16

take out 45 miles

total 8.0 m

82.9
4.4

^{91.4} The $\frac{1}{4}$ of the $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

Miles	Time	Des
49.5 ^{54.1}	2:01	Turn right
51.0 ^{59.6}	3:05	Pd in road outwash
51.3	3:05	Top top, nos.
54.9 ^{63.5}	3:11	Selave
57.1 ^{65.7}	3:15	Delta in no <u>Stop</u>
58.2	3:16	" "
61	3:26	Gravel pit on left
67.1 ^{75.7}	3:30	Pitted outwash
68.6 ^{77.2}	3:35	<u>Portage</u>

~~40 miles to Warpen.~~

Total 212.1 miles (2 days)

160.6
 33 to Fox L 31 min
 68 Warpen 11
42

Trip machine - Portage 77.8
 Warpen 40
 W-Gears 56
 G-B-P 6

180 - days am

160.6
 82.85
77.8

rest day 167.5

DATE July 25, 1923 GEOLOGIST Ray

The 3 $\frac{1}{4}$ of the _____ $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

	Time	Mileage
Science Hall	9:47	3.4
Hartford (Junc. K & 60)	11:27	69.9
Stop	11:51	71.2
Junc K & E	11:35	72.6
Stop - ar.	11:38	73.7
Tentative stop - at hill crest just north of Church		
recess filling on right SW corner Sec. 235 T9N R19E		
	lv. 11:41	

Stop - to Photograph Holy Hill

	ar. 11:43	74.4
Photographs 1 - Holy Hill - looking		
Photo. 2 - looking SE Terraces SE.		
B1 -	13 min out	
Loc. 0918 3B1		
	lv. 11:56	

Lunch Stop	at 12:01	76.0
Junc. P & K,	40 min out	
	lv - 12:40	76.0

72.6
18.4
54.2

CO. REPORT NO. LOCATION NO.
DATE July 25, 1933 GEOLOGIST

The $\frac{1}{4}$ of the $\frac{1}{4}$ of Sec. Tp. R.

Stop - to view Holy Hill 23.5
ar. 12:45 - 58.2 77.7

Photograph 3 - Holy Hill
SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec ~~24~~²³ - T9N, R18E
lv. 12:51

Corner - Not Marked 12:58 - ^{25.7} 79.9
out in bouldery gravel T9N

Turn right - SW $\frac{1}{4}$ SW $\frac{1}{4}$ S ~~34~~ Sec. 34 R18E

Turn left - 1.01 80.1

proceed .3 mi 80.4

follow road to W

Turn left (S) 80.9

Turn right 81.2

Join Highway 83 28.2 82.4

North Lake - 1:14 84.0

Junction H 83 1:18 ^{31.3} - 85.5

STOP - pitted outwash in
Golf links

Turn right on H

CO. REPORT NO. _____ LOCATION NO. _____

DATE July 25 1932 GEOLOGIST _____

The _____ $\frac{1}{4}$ of the _____ $\frac{1}{4}$ of Sec. _____ Tp. _____ R. _____

June, with C. 1:24 87.4
turn left on C. (South)

Nashotah - 1:32 90.6
continue on C to Delafield

Delafield: 1:38 ^{553 = (39.2)} 93.4

June, C & 30

turn left (E) on 30

June 30 & 83 1:43 ^{40.9} 95.1
Turn Right (South) on 83

Stop in gravel pit on left up 1st Hill

June, 18-E-83-1:48 ^{44.0} 98.2
Turn Right (W) on U.S. 18. ^{44.4}

Old Railway Gravel Pit 98.6

CO. REPORT NO. LOCATION NO.

DATE GEOLOGIST

The 1/4 of the 1/4 of Sec. Tp. R.

(-54.2)

Old drainage outlet	44.7	98.9
Drainage outlet	45.4	99.6
Terrace edge	46.2	100.4
Terrace Edge	47.8	102.0

(past Waterville)

48.2

June 67083 - 1:55 - 102.4

Turn right on 67

Terrace to right side

June with 30 - 2:00 - 105.7

turn left on 30.

June, Ba 30 2:10 - 111.7

June, 30 & 90 2:12 112.8

Stop 2:16 ^{62.7} 114.9

Esker

Side trip at 2:16 115.1

Photograph - No. 4.

esker & drumlin topog.

lv. 2:24 115.7

rejoin highway 30

CO. REPORT NO. LOCATION NO.

DATE GEOLOGIST

The $\frac{1}{4}$ of the $\frac{1}{4}$ of Sec. Tp. R.

June 30 - 2:27 ^{1.4} ^{2.5} 117.5
Turn South ^{2.0} ^{out}

Error - side trip
Return to 30 2:35 120.5

June 30 & D - ^{63.2} ^(-57.8)
Turn left (South) 121.0

Stop - ^{2:36} ^{66.7}
an 2:42 - 124.5
Photograph 5 -

Drumlin profile
to right of road.
Stop just north of House
lv. 2:46 ^{67.6}

June D - U.S. 15 - 2:48 - 125.4

Turn left on 18 -
(East)

$2\frac{1}{4}$ miles

Turn South 2:53 ^{70.0} 127.8

right.

June with R ^{70.6} 128.4

Turn left on R,

121.0
63.2
57.8

----- CO. REPORT NO. ----- LOCATION NO. -----
DATE ----- GEOLOGIST -----

The $\frac{1}{4}$ of the $\frac{1}{4}$ of Sec. ----- Tp. ----- R. -----

Stop 2:55 ^{- 578} 128.7 ^{70.9}
Drumlin topography
to left - stop just
past curve

Rome - 2:59 ^{72.5} 130.3
June. P490
Turn right on 90 -
Interlobate moraine 32.3
visible to left

Stop ar. 3:09 ^{77.1} 134.9
Photograph 6
Interlobate profile
Sec 5 T5N
SW corner NE $\frac{1}{4}$ SW $\frac{1}{4}$ R16 E
View of Coppernong Marsh
lv. 3:12

Palmyra ar. 3:21 ^{81.8} 139.6
Turn left on 59
lv. 3:25 139.7

----- CO. REPORT NO. ----- LOCATION NO. -----

DATE ----- GEOLOGIST -----

The _____ 1/4 of the _____ 1/4 of Sec. _____ Tp. _____ R. _____

- 57.9 461

Enter Interlobate 144.0

Summit of Interlobate 145.4

No. 1 Terrace to East

Eagle 3:38 146.0

Junc. 99

Turn off on gravel road at 145.7 & pick up 99 in town

- 58. 88.9

2nd Terrace level 146.9

Junc. with NN. 89.7

3:42 147.7

Science Hall 210.6

5:31

Home - - - 214.0



Citizens Industrial Bank

OTTAWA AND PEARL

GRAND RAPIDS, MICHIGAN

Aug. 28. 1933-

Dear Dr Thwaites:—

I was awfully pleased to get your publication by mail today. I have found your "Development of the Theory of Multiple Glaciation" very comprehensive. It has placed several loose ends for me, and the bibliography is especially valuable. I will refer to it continually.

I spoke to Dr Wilson about obtaining a separate of his work on the "forest beds". I have lost his address. Can I reach him at the University later?

I had a most instructive field trip with you. I wish to express again my pleasure and profit with you in your state. I hope I can contact you often.

Very sincerely,

Bernard B. Fallon!

August 31, 1933

Miss Edith Townley, Assistant to the Chief,
State Geological Survey,
Urbana, Illinois

Dear Miss Townley:

In reply to yours of the 15th I did not know that the things which you kindly sent me were my personal property. If they were intended to be so I wish to thank you for sending them.

With regard to the acid bottle, I was not aware that such were provided for all cars. I drove No. 1. The only acid bottles that I saw on the trip were in the hands of the leaders.

Enclosed are photographs from my personal collection which were ordered by Dr. Leighton, Dr. Eklow, and Mr. Newton. Appropriate key lists are enclosed, also a complimentary copy of the group photograph for Dr. Leighton. A list of other pictures taken on the trip is enclosed in case anyone desires to get copies. I might add that all the photographs taken in Wisconsin were excellent but that several taken during the thick weather in western Illinois and northern Iowa were not up to my usual standard.

The separates sent by Dr. Leighton have arrived and I will write later to thank him.

The booklet ordered by Mr. Newton has been mailed under separate cover.

Very truly yours,

F. T. Flannery



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305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

August 15, 1933

Professor F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Professor Thwaites:

In checking over the Survey cars upon their return here we found in the car which you drove a map of the drift sheets of Iowa, an Iowa Road Map for 1931, and a photograph of an exposure of drift. I am returning these to you herewith.

I believe also that your car was furnished with an acid bottle but there was none in the car when it returned. If you find this bottle among your belongings, will you be good enough to return it to this office, as it is a part of our regular Survey equipment.

Very truly yours,

Enid Townley

Enid Townley
Assistant to the Chief

Encl.

Oct. 13, 1933

Dr. George F. Key,
Department of Geology,
University of Iowa,
Iowa City, Iowa

Dear Dr. Key:

I wish to thank you for the reprint of the paper of the Eldoran Epoch of the Pleistocene Period which came a few days ago.

I found the International Congress excursion both profitable and enjoyable despite the poor weather we had while in your state. I made so many contacts on that trip that my file of letters respecting it is still growing and has attained considerable thickness! At present, however, my attention is being turned away from the Pleistocene into stratigraphic studies. I have arranged for a cooperative Wisconsin-Illinois-Missouri cross section to help in correlation of the two classic sections of the older Paleozoics. That will mean a lot of study of well logs and outcrops and may serve to keep our minds off the Depression for a time! Meanwhile the glacial geology text languishes although we are trying to revise and retype it with several carbon copies.

Sincerely,

F. T. Twaiten



cong

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UNIVERSITY OF ILLINOIS CAMPUS

URBANA

September 7, 1933

Mr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Thwaites:

Thank you very much for sending me a copy of the group photograph taken during our recent field trip of the International Geological Congress. This is an excellent picture. I am also glad to have the other prints which you sent to me, and I appreciate your sending them.

With best wishes,

Very truly yours,
M. M. Leighton
Chief

Ernst Antevs

28 Beacon Ave.,
Auburn, Maine

Aug. 18, 1933

Professor F.T. Thwaites,
Univ. of Wisconsin.

Dear Professor Thwaites,

It gives me great pleasure to express my sincere appreciation for the Pleistocene excursion to the Middle West. I am very glad and thankful for this opportunity to see under your able guidance the driftless area and the classical glaciated region of southeastern Wisconsin. Cordial thanks!

Please extend my compliments and thanks to Dr. Bean.

Very sincerely yours,

Ernst Antevs

Ernst Antevs

P.S. The last day I lost my copy of your mimeographed guide. Could you kindly send me another copy?

LOG OF THE WALWORTH TRIP: GLACIAL GEOLOGY

F.T. Thwaites in charge.

April 22, 1933

Time Mileage
7.12 A.M. 000000

X937

Mileage	Description	Time	Mileage
0	Leave Madison, Science Hall	7.12 A.M.	000000
.1/2	Left Turn University Ave.		.15
.5	Right turn onto Basset St.		.50
.9	Left turn onto Wilson St.		1.00
1.6	Pick up Wisconsin Route 30		1.75
7.4	Limestone capped hill		7.90
8.0	Good drumlin on right		8.50
8.4	Drumlins right and left		9.00
8.5	Cottage Grove Esker		9.10
10.8	Low esker crosses road		11.60
11.7	Drumlins right and left		12.50
13.4	Note drumlin skyline on right		14.30
18.4	Excellent drumlin profile on right		19.70
20.3	Esker crosses road		21.70
23.0	Note good drumlin skyline ahead		24.60
24.2	Pitted outwash, both sides		25.80
25.6	Note Lakes Mills Moraine ahead		27.30
30.2	Esker on left		32.20
30.7	Black River Dolomite outcrops both sides of road		32.80
33.0	Note Drumline skyline on left		35.20
33.1	Drumlin Cut. Stop: 8.30-8.56 - 6 min		35.30
	(Road corner (2nd from) where Congress route joins) ^{read} 8 m 2 about 8:50		(43.45)
	Esker, Stop: 8.51-8.59 8 m 0716.17 e 7		45.05
	Pitted outwash from interlobate moraine		48.90
	Drumlin surrounded by outwash		51.10
	Island rising thru outwash		53.20
	Kettle hole: Stop: 9.17-9.25 8 m 0717.15 a 2		55.60
	Higher terrace on right		57.10
	Turn left into Cushing Memorial Park. Stop: 9.33-9.41 8 m 0718.18 a 5		57.90
	Back to Wisconsin Route 30 10 min		58.60
	Nagawicka Lake Stop: 9.48-9.58 Note outlet channel, and terraces about lake. 0718.20 f 1		60.30
	Turn right onto Wis. Route 83 13 min		61.00
	Gravel Pit; Stop 10.02-10.15 Outwash gravel - horizontal strat. 0718.21 a 4		61.35
	Stop: View down outlet channel, eroded thru terraces. 10.20-10.26 6		63.50
	Crevasse filling. Stop; 10.33-10.40 7 = 0618.17 h 2 0718.33 9 7		66.00
	Crevasse fillings and kettles on left		66.40
	Pitted upper terrace. Stop; 10.45-10.50 School Home 0618.30 9 1		68.70
	Stop; 10.56-11.09, Prairie View School on recessional moraine to note glacial channel to north and west. 13 0518.06 9 1		70.90
	Turn right onto route 99, on outwash terrace		74.60
	Niagara Limestone outcrops on both sides		74.90
	Turn left onto NN		75.80
	Stop: 11.21-11.28; Eagle Terraces (2nd. terrace) 7 0517.26 h 1		76.40
	Turn right onto NN (one of these routes must have been marked wrong)		77.10
	Pick up route 67 (straight ahead)		79.80
	Stop: 11.45-11.50: Terminal moraine rising thru outwash. 5 0416.14 d 1		85.60
	Turn right onto town road, on terminal moraine		86.50
	Stop: 11.53-12.00 Recessional Moraine of Delavan Lobe 7 0416.23 f 2		86.80
	Stop at Bird School for Lunch. 12.05-12.50 45		89.10
	Turn right onto H		89.10
	Turn left onto town road		89.70
	Stop: 1.00-1.10 inside edge of Elkhorne Moraine 10 old RR cut 0415.25 h 2		93.10
	Turn Right		93.10
	Stop: 1.12-1.40 Cut thru the Interlobate Moraine 28 0415.24 e 6		93.90

Congress
60.7 = 39.9
57.0 = 42.1
54.9 = 45.8
53.0 = 47.9
49.4
52.1
53.5
54.1
54.8
55.3 = 39.2

Delaware
40.4 = 57.1
41.0 = 57.3
41.2 = 59.5
43.4 = 61.8
62.1
64.2
66.4

118.7
Congress
89.7 = 71.0
90.2 = 71.5
90.9 = 72.2
93.4 = 74.7
98.7 = 80.0
99.6
100.0 = 81.3
102.1 = 83.4
102.7 = 84.0
105.9 = 87.2
106.7 = 88.0

add 18.7

omitted left turn onto 945

107.2 88.5
110.0 84.7

15 93.3

16 114.0 95.0
116.5

17 98.1
116.8

121.7 103.0

123.7 105.0

124.8 106.1

126.7 108.0

126.8 108.1

130.7 112.0

134.0 115.3

134.8 116.3

137.2 118.5

138.7 119.0

138.7 119.6

121.7 121.2

121.7 121.7

122.3 122.3

123.3 123.3

125.0 125.0

125.0 125.0

125.0 125.0

125.0 125.0

125.0 125.0

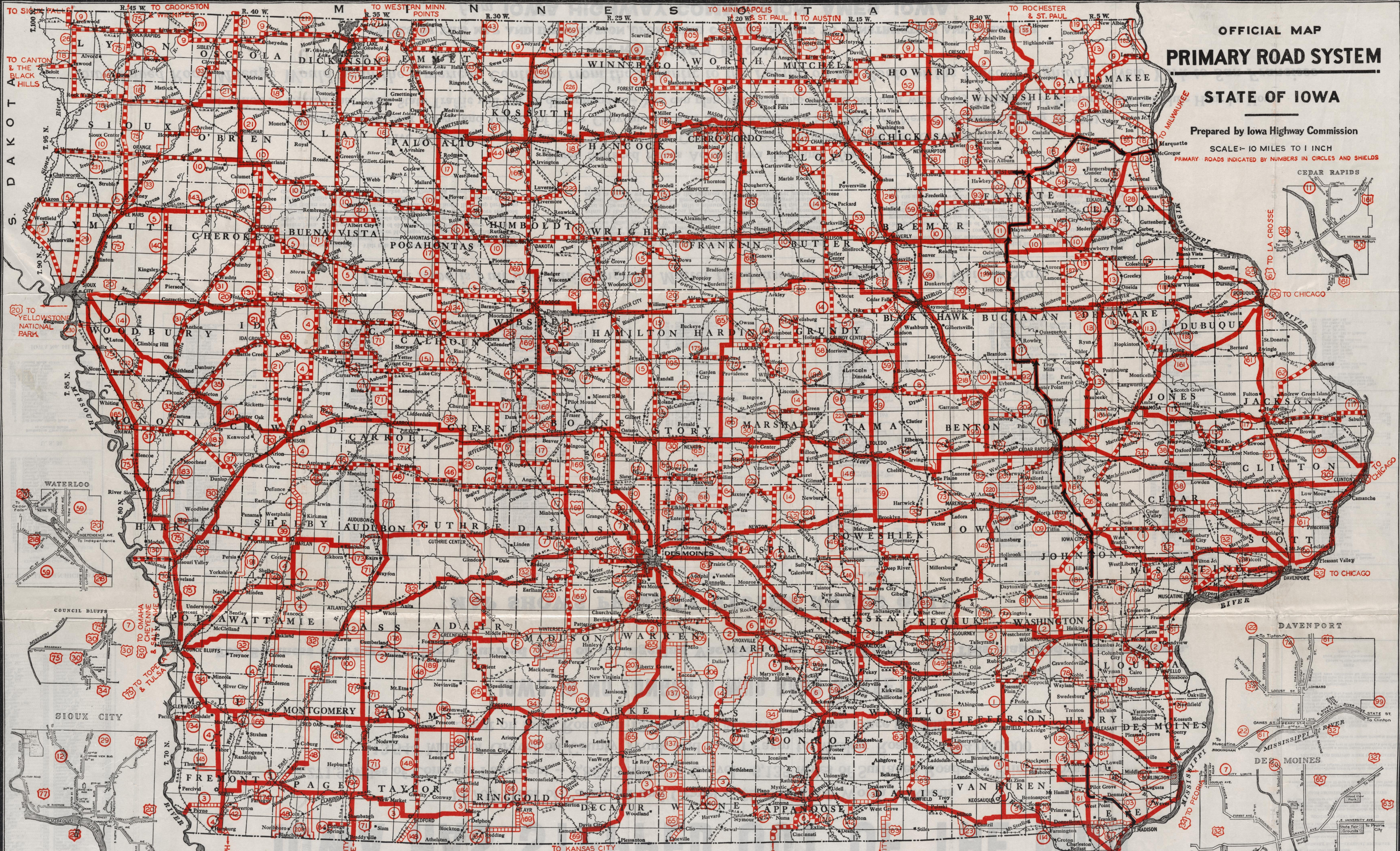
125.0 125.0

		Mileage
	Stop: 1.41-1.44 View of moraine, looking back.	94.40
	Stop for view of interlobate, also looking back. 1.45-152	94.60
	Turn right onto town road	97.40 -
	Cross interlobate (till exposed)	98.30
	Stop: 2.07-2.15; Outwash terrace between Johnstown and Milton gm	
	Moraines 0415.34 & 4	99.60 2.2
	Stop: 2.20-2.25 Outwash plain between Johnstown and Milton Moraines,	
	good view of both. Turn left onto 89. 5m	101.70 2.1
	0415.32 a4	104.40
	Go straight ahead, leaving 89,	104.50
	Stop: by church, to view junction of Darien and Johnstown Moraines	
	2.30-2.45 15 min 0315.17 a4	
	Turn left back onto route 89.	
	Stop: 2.46-254 Gas and oil. (\$1.22)	104.80
	Note Darien Moraine on left	107.00
	Road mounts Darien Moraine	109.70
	Turn left onto route 20	110.00
	Drainage outlet and outwash	111.60
	Turn right onto town road 13 min	112.00
	Stop: 3.08-3.21 Gravel pit, on left, which shows Darien Moraine	
	overlying outwash. 02 15.15 c4	113.10
	Right onto route 14	115.20
	Left onto route 89, on outwash plain, moraine on left.	115.30
	Fine view of Darien Moraine on left	117.80
	Ill. Drift with subdued drumlins on right	118.30
	Turn left onto town road	119.80
	Turn right onto route 36, ground moraine, Darien Moraine on right	123.40
	Stop: 3.45-4.15 Fontana Pit, Till on top of gravel, (both 3rd Wis.)	
	Good view of Lake Geneva Kettle 30 min 0116.15 h1	124.20
	Proceed west on 36	
	Turn left, leaving Darien Moraine and going onto outwash, on high-	
	way B (overhead wiring)	126.10
	Stop: 4.20-4.30 To note continuation of Darien Moraine. 10 min 0116.22 e1	126.60
	Proceed back west on B	
	Turn left onto town road (along Darien Moraine)	127.20
	Stop: 4.36-4.46 Red till on left	129.00
	Stop: 4.36-4.46 Marengo Ridge (2nd. Wis) 10 min 0116.34 d2	129.30
	Non-pitted outwash on right	129.50
	Turn left onto State Line Road	130.00
	Darien Gray till	130.60
	Top of Darien Moraine	131.50
	Turn around and proceed back west along State Line Road.	131.50
	Stop: 4.55-5.06 To examine road cut showing Darien (gray) till 11 min 0116.35	131.80
	(Stop for coffee: 5.11-5.20 a1	133.60
	Turn right onto 36	133.60
	Turn left onto County route B, across unpitted outwash	134.70
	Come up onto White Rock Moraine (?)	138.4
	Summit of White Rock Moraine (?)	139.40
	Subdued ridge at Sharon (part of White Rock Moraine(?))	141.60
	Turn right onto County trunk C	141.70
	Ill. Drumlins on left	143.70
	Turn right following route C	144.90
	Turn left on C Darien Moraine on Right	145.90
	Ill. Drumlin crossed by road	148.70
	Turn left onto 89	149.30
	Turtle Creek outlet of Darien Moraine	152.20
	Moraine to right (Darien)	
	Turn left onto 20 on outwash (6.00 P.M.)	154.10

	Mileage
Ill. Drift, leaving outwash (boundary indefinite)	156.30
Ill. Drumlins on left	157.60
Johnstown Moraine on right, road along Johnstown outwash.	157.80
Stop, Janesville, for gas and oil: 6.20-6.25 (\$0.90)	169.70
Turn left across second bridge.	170.50
Turn right onto 92	170.70
Turn right following 92	171.00
Hills to left rock hills (Black River and Galena) with thin Ill. drift.	171.90
Climb Johnstown Moraine	189.10
Crest " " (7.00 P.M.)	189.40
Stop for lunch: 7.08-7.35	195.10
199.0 Arrive Madison 8.10 P.M.	212.60

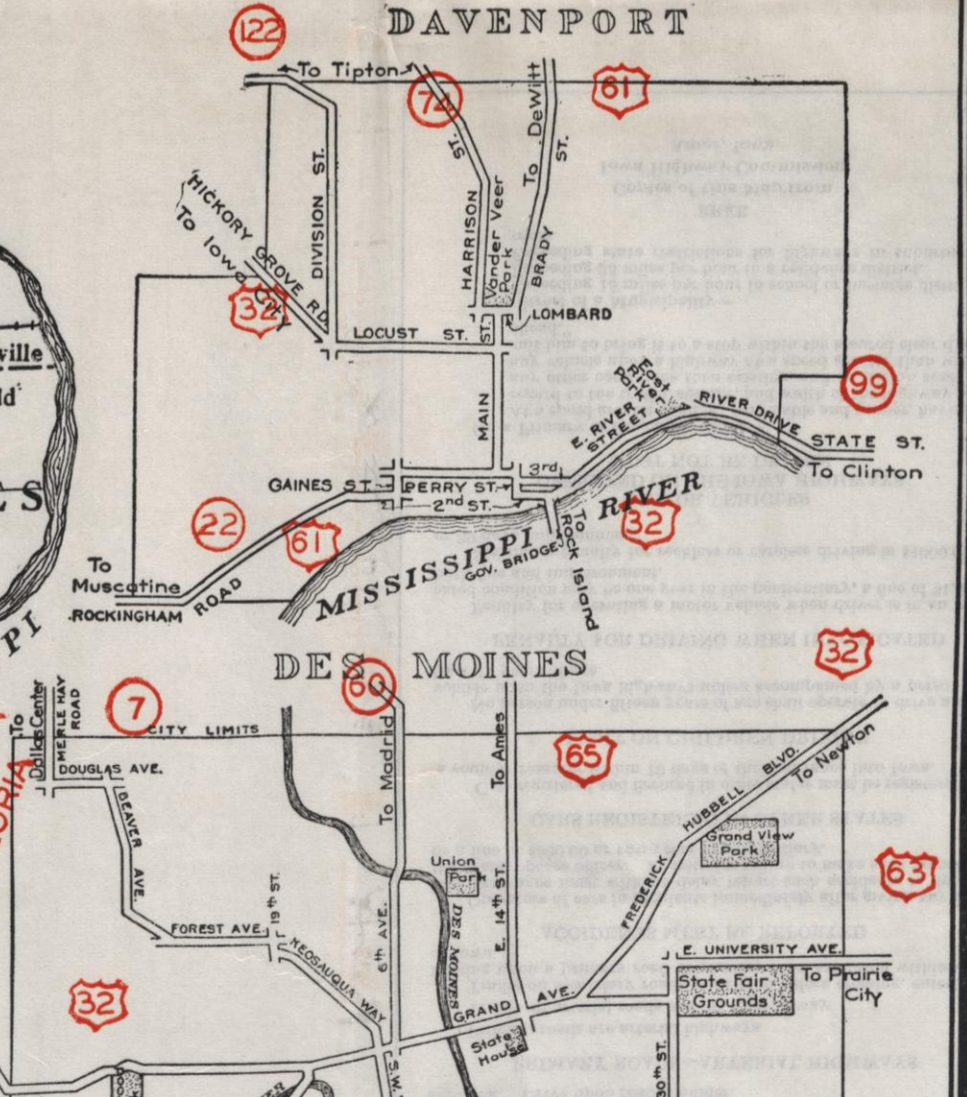
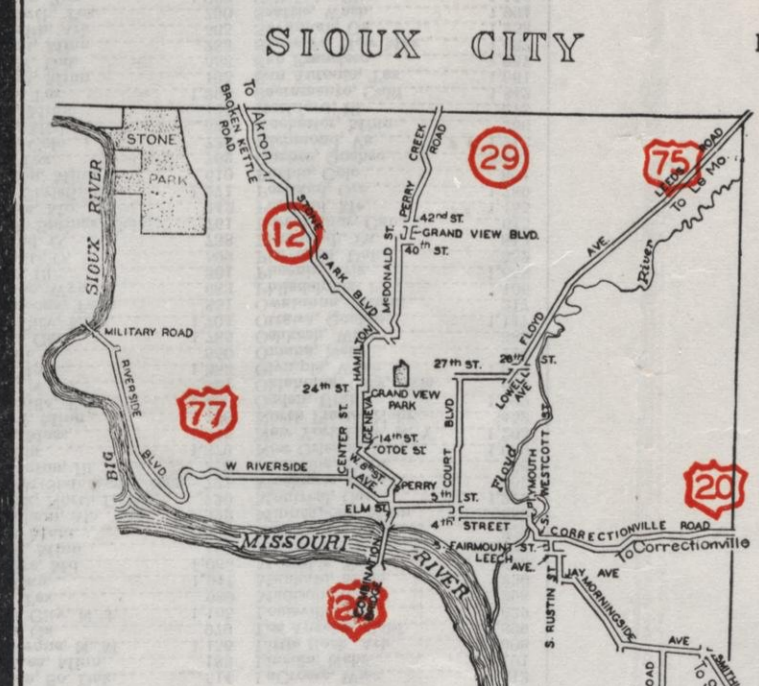
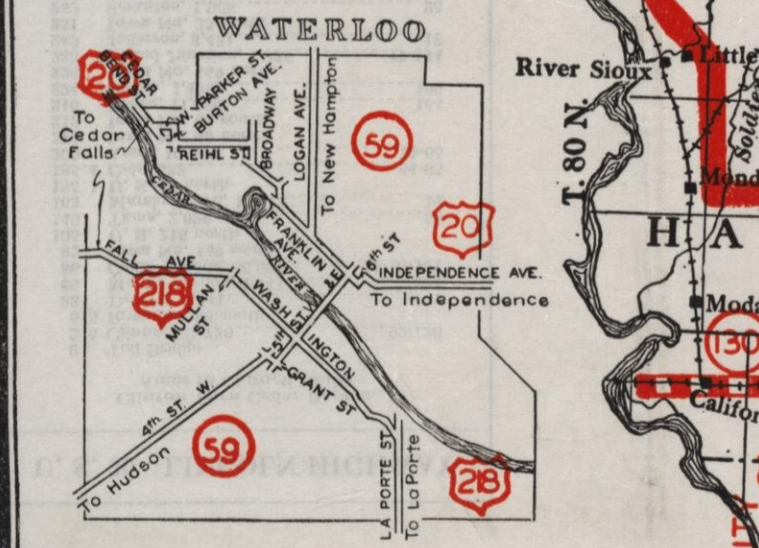
OFFICIAL MAP
PRIMARY ROAD SYSTEM
 STATE OF IOWA

Prepared by Iowa Highway Commission
 SCALE: 10 MILES TO 1 INCH
 PRIMARY ROADS INDICATED BY NUMBERS IN CIRCLES AND SHIELDS



CONDITION JAN. 1, 1931

PAVED	3,271.9	MILES
GRAVEL	2,863.3	"
PERMANENT	512.8	"
MAINTAINED	593.9	"
TOTAL PRIMARY SYSTEM	7,241.9	"



TO ST. JOSEPH
 TO KANSAS CITY & BATON ROUGE
 TO ST. JOSEPH
 TO U.S. 36 HANNIBAL & ST. JOSEPH
 TO JEFFERSON CITY & MEMPHIS
 TO ST. LOUIS & NEW ORLEANS

IOWA PRIMARY ROAD MAP 1931

Distances from Des Moines to Important Cities of United States, Canada and Mexico

Table listing distances from Des Moines to various cities in the United States, Canada, and Mexico. Includes cities like Aberdeen, S. Dak., Albert Lea, Minn., Albuquerque, N. Mex., etc.

IOWA HAS STEPPED OUT OF THE MUD

19,700 Miles of Pavement and Gravel -- \$200,000,000 Worth of Roads
3,271.9 Miles of Concrete Pavement -- 2,863.3 Miles of Gravel - 6,135 Miles of Surfaced Roads on Primary System
13,544 Miles of Gravel on County Trunk and Local Farm to Market Roads -- \$64,000,000 Spent on Iowa Roads in 1930 alone. Motorist, Get this, Once for All;

IOWA IS NO LONGER A MUD ROAD STATE!

For Business or Pleasure, for a Hurried Trip or a Lingering Vacation, Plan Your Route with This Map and These Mileages.

MAP SHOWS PRIMARY SYSTEM ROADS ONLY

A grid of 20 small tables, each representing a different highway route in Iowa. Each table lists route numbers, distances, and key locations. Examples include U.S. 30 - LINCOLN HIGHWAY, U.S. 20, U.S. 18, IOWA No. 9, U.S. 161, IOWA No. 59, U.S. 65, U.S. 71, IOWA No. 4, U.S. 34, U.S. 32, IOWA No. 10, U.S. 55, IOWA No. 169, U.S. 69, IOWA No. 17, U.S. 161, IOWA No. 11, U.S. 63, IOWA No. 171, U.S. 75, IOWA No. 13, U.S. 77, IOWA No. 15, U.S. 79, IOWA No. 16, U.S. 81, IOWA No. 18, U.S. 83, IOWA No. 19, U.S. 85, IOWA No. 20, U.S. 87, IOWA No. 21, U.S. 89, IOWA No. 22, U.S. 91, IOWA No. 23, U.S. 93, IOWA No. 24, U.S. 95, IOWA No. 25, U.S. 97, IOWA No. 26, U.S. 99, IOWA No. 27, U.S. 101, IOWA No. 28, U.S. 103, IOWA No. 29, U.S. 105, IOWA No. 30, U.S. 107, IOWA No. 31, U.S. 109, IOWA No. 32, U.S. 111, IOWA No. 33, U.S. 113, IOWA No. 34, U.S. 115, IOWA No. 35, U.S. 117, IOWA No. 36, U.S. 119, IOWA No. 37, U.S. 121, IOWA No. 38, U.S. 123, IOWA No. 39, U.S. 125, IOWA No. 40, U.S. 127, IOWA No. 41, U.S. 129, IOWA No. 42, U.S. 131, IOWA No. 43, U.S. 133, IOWA No. 44, U.S. 135, IOWA No. 45, U.S. 137, IOWA No. 46, U.S. 139, IOWA No. 47, U.S. 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Thwaites

ROUTE LOG FOR EXCURSION C-3, 16th INTERNATIONAL GEOLOGICAL CONGRESS
GLACIAL GEOLOGY OF THE CENTRAL STATES

Prepared by F. T. Thwaites, University of Wisconsin

Note: On account of the uncertainty in regard to carrying out the trip all of the route was not logged. Several cars were used and the mileage readings have not all been corrected. Data on the parts not logged were taken from topographical and highway maps. Drivers should reset speedometers from time to time as no two such instruments ever check exactly. The writer is personally responsible for all statements and opinions herein expressed. See Guide Book for interpretations held by U. S. Geological Survey.

August 3, 1933

- 0.0 Junction U. S. 18 and Wis. 27 in Prairie du Chien. Turn right, south, on 18.
7 min. run over very level sandy outwash plain of Wisconsin glaciation. Bluffs to left 560 ft. high, capped with Galena dolomite.
- 3.4 Bridgeport terrace on left. See Guidebook. Enter valley eroded in terrace.
- 3.7 STOP 1 10 min. Park cars in side road to left. Cut shows pebbly sand of 125 ft. terrace (740 A. T.) banked against side of Lower Magnesian dolomite bluff. This material in which the bedding dips east is probably a slack water deposit on downstream side of rock hill. It may be much younger than the highest or 190 ft. terrace. Proceed either on foot or in cars to visit new cuts in high terrace along U. S. 18. Shovel will be needed.
- 4.9 STOP 2 20 min. Discussion of Bridgeport terrace hypotheses. (a) Till of Kewatin glacier, (b) outwash from Kewatin glacier, (c) outwash down Wisconsin River at time when rock bottom was higher than at present. Under last hypothesis all traces of this level have been destroyed upstream where bed rock is sandstone instead of dolomite as it is here. An erosion interval then followed and the terrace was dissected before the 100-125 foot filling was deposited. These terraces were in turn eroded before the earliest Wisconsin glaciation. Attention should be directed to character of the pebbles and to direction of dip of foreset bedding. 30 min. run to next stop.
- 5.9 Junction with Wis. 60. Keep left on 60.
- 10.0 Leave Bridgeport terrace. The writer interprets several of the valleys in the terrace as superimposed on an older rock topography as a result of valley filling.
- 17.0 Wauzeka. Cars will leave main highway to pass gravel pits in old terrace deposits. STOP 3 here or on ridge 1 mile above. 15 min.
- 19.0 Mouth of Kickapoo Valley. Note "underfit" stream in small meanders on floodplain within huge entrenched or ingrown bonds. Higher up the valley some such bonds have been cut off probably as result of pre-Wisconsin valley filling. Such phenomena do not prove decreased volume of the Kickapoo but rather the change in conditions due to alluvial fill in response to blocking of outlet by glacial outwash.
- 20.0 STOP 4 Gravel pit at Porter School 20 min. This pit is in what the writer interprets as a terrace younger than the highest Bridgeport terrace. It is 75 to 100 feet above the river and moderately eroded. 15 min. run to next stop.
- 27.0 Bridgeport bridgehead. STOP 5 Climb Easter Rock 350 ft. high for discussion of terrace problem and physiography of Wisconsin Valley, 30 min. stop. 1 hr. 20 min. run to next stop.
Turn right onto U. S. 61 and cross terrace of Wisconsin River at Boscobel. Two Wisconsin terraces are present. The lower one is 12 to 15 ft. above the floodplain and was eroded from the higher terrace by the waters

from Glacial Lakes Oshkosh during the retreat of the Middle Wisconsin and during Late Wisconsin time. The higher terrace was deposited during the formation of the Middle Wisconsin.

Continuing south from Boscobel on 61 we ascend the course of Crooked Creek. As in all other tributaries which head in the Driftless Area, this valley was aggraded to meet in part at least the filling of outwash in the main stream which carried glacial drainage. Meandering on such fill has led to the formation of rapids and falls wherever the stream found itself superimposed on rock spurs when erosion of the filling permitted entrenchment.

The stratigraphic column south of Boscobel includes in ascending order the highly glauconitic Franconia sandstone (Cambrian), the yellow and red dolomitic siltstone and gray fine grained sandstone of the Trempealeau formation (Cambrian), whose top was formerly called Jordan, the gray dolomites of the Lower Magnesian group (Onondaga and Shakopee, Ordovician), the soft but crag-making St. Peter sandstone (Ordovician), the Platteville dolomite and limestone (Ordovician), and the Galena dolomite (Ordovician),

41.0 Fennimore. Turn left with U. S. 18. From here east the route follows the famous Military Ridge which is the crest of the Galena-Platteville Cuesta. The country is more rolling than is apparent to the eye, for the subequal elevation of the ridges blends in the distance into the semblance of a plain. This "plain" constantly retreats from the observer like a "will-o-the-wisp". As a matter of fact the upland is typical "dolomite topography." Note scarcity of sink holes. The steep-sided valleys occur only where erosion has cut through to the sandstones. Early geologists assumed that this upland was a remnant of a peneplain and that the same surface extended to the north beveling across the older formations. It is known, now that topographic maps have been made, that such is another illusion. There is really a marked series of dissected cuestas whose escarpments ring around the pre-Cambrian highland of northern Wisconsin. Similar uplands occur also on the Niagaran of Illinois and Iowa, the Lower Magnesian of Wisconsin and Minnesota, the Franconia sandstone in Wisconsin, and some of the shale horizons in the Eau Claire formation (Cambrian) of Wisconsin.

An important factor in their formation is the presence of clay or shale which acts as a roof in protecting the underlying rocks from weathering. The uplands on the dolomites bevel the formations to a slight degree, but this is a normal effect from the fact that the crests of the cuestas have been exposed to the weather much longer than have the vales where the overlying formation has been but recently removed. To ascribe every upland to former peneplanation requires too many peneplains each too closely controlled by geology to be credible. Besides, the same bench effect is noted within valleys wherever such cut down to the proper geologic horizon.

68.0 Dodgeville. Turn right and stop at Hotel Higbee for lunch. 45 min. Return to U. S. 18 and go east. 40 min. run to next stop.

86.0 Dane County line - detailed log begins.

86.5 Blue Mound. Turn left under R. R. on County Highway F.

87.0 Turn left up hill on F.

87.3 STOP 6 at entrance to Ball Park. 15 min.

Thence continue north on F.

87.8 STOP 7. 15 min. Discussion of peneplain problem. The view from here displays the reason for the early misconception of an all-embracing upland peneplain as the escarpment caused by the St. Peter sandstone (whose thickness varies greatly) is invisible from behind. Trowbridge abandoned this idea in favor of two peneplain levels. Of these the older (Dodgeville) accounts for the crests of the cuestas and for the level upland of the Baraboo Range (Huronian quartzite) which can be

soon from here. The lower surface (Lancaster) lies roughly 200 feet below and accounts for the upland on the Lower Magnesian north of here. It also occurs on the bluffs along Mississippi River and in the vale south of Military Ridge cuesta. Trowbridge regards the ridge north-east of Prairie du Chien between Mississippi and Kickapoo rivers as a "bridge" between the Dodgaville topoplain on the cuesta of Military Ridge and on the Magnesian cuesta to the north. Although recognizing the possibility of this explanation the writer begs to ask some questions: (a) How is it that there is no difference in degree of dissection of the Lancaster and Dodgville surfaces?, (b) How is it that at all points rock control is the dominant factor and is capable of explaining all the facts?, (c) How is it that one finds exactly the same type of topography down the back slope of every cuesta making a transition between the two upland surfaces?, (d) Why should an uncorroded remnant of the higher surface be left between two of the largest streams rather than far from streams?, and (e) How can the upland of the Baraboo Range be fitted into the picture? It may be added that the "topographic unconformity" between the upland and valley sides is everywhere capable of explanation by rock control and that the upland gravels and the rare ingrown boulders do not in themselves prove much. Turn cars around and return south on F. 30 min to next stop.

- 88.5 Turn left on town road.
- 88.6 Sink hole on right
- 89.2 Rejoin U. S. 18, keep ahead on 18.
- 100.2 St. Peter escarpment poorly developed as sandstone is thin here.
- 100.9 Terminal moraine ahead on skyline.
- 103.0 STOP 8. 10 min. Park cars just east of R. R. clear of pavement. Walk back and up track to see post-Illinoian rock gorge due to diversion of stream by Illinoian terminal moraine. Turn back to cars and continue on 18. 7 min. to next stop.
- 103.2 Illinoian terminal to left indistinguishable from rock hills.
- 103.5 Cut in old drift overlying disintegrated Lower Magnesian dolomite. DRIVE SLOW to see boulders in residium.
- 104.0 Johnstown Moraine east of stream. Continue on 18 to
- 104.8 Verona, there turn right onto Wis. 69 south on main street.
- 105.2 Turn half right with 69.
- 105.8 STOP 9 to see gravel pit in outwash just outside moraine of Middle Wisconsin. 10 min. 8 min to next stop. Turn cars around and retrace way out going west on 18 to edge of terminal.
- 107.6 Turn right into town road.
- 108.4 STOP 10 10 min. On crest of Johnstown Moraine. Unglaciaded or possibly old drift covered hill across ravine cut by marginal drainage. 10 min to next stop.
- 108.9 Turn left leaving terminal moraine. Loess-covered outwash terrace eroded by waters from east of endmoraine.
- 109.8 Turn left (west).
- 110.0 Turn right on outwash terrace soon reaching foot of terminal moraine.
- 111.1 STOP 11. 5 min. Drainage outlet through Johnstown Moraine. Continue ahead, 15 min to next stop.
- 111.7 Turn left. CAUTION: use second speed descending hill.
- 112.3 Turn right. St. Peter outcrop. This country unglaciaded.
- 113.3 Turn right and immediately left. Road relocated since map.
- 114.5 STOP 12. 10 min. 3 min to next stop. Depression enclosed by endmoraine.
- 115.1 CAUTION: cross main road, keep ahead.
- 115.2 STOP 13 To see underground outlet from depression. 3 min. 6 min. to next stop.
- 117.0 STOP 14. Cut in terminal moraine which here bends west into valley to north. Very bouldery till. 5 min. Turn right (north). CAUTION: use second speed on steep descent. 10 min to next stop. Continue to Wis. 11.
- 118.0 Turn left onto 11 and go west crossing low endmoraine (Johnstown).

119.5 Turn left into side road. STOP 15. 15 min. 35 min to end of day's run. From this point the contrast between the craggy hills of the Driftless Area and the smooth rock hills of the glaciated area is most striking. The endmoraine itself is, however, not very conspicuous as it is covered by outwash and eroded by drainage from farther east. Note boulder concentrate along the stream caused by waters from second or Milton Moraine. 2/10th mile down this road is a gravel pit in the outwash. For many years the Driftless Area has been held up to students as an example of what the adjacent glaciated country looked like before glaciation. It is necessary to realize that not all of the glaciated country originally had as rough topography as here. From East Blue Mound the contrast between the very dissected country north of Military Ridge and the dolomite uplands to the south is very clear. We must also distinguish between preglacial and pre-Wisconsin. Assuredly much erosion went on in the Driftless Area during the Pleistocene. However, most geologists do not agree with Trowbridge in thinking that the "Lancaster peneplain" was dissected almost entirely since Nebraskan time. Many years ago Chamberlin and Salisbury tried to measure the importance of glacial erosion in smoothing the glaciated area by comparing the average depth of residuum in the Driftless Area with the average depth of drift in the glaciated district. Although they seem to have underestimated the former the fact that much of the drift clearly was derived from comparatively fresh bed rock is conclusive evidence in favor of glacial removal of crags, ledges, and small hills. This fact is here demonstrated. On the other hand, the writer has always been conservative in accepting glacial erosion of large basins as at Madison or in the Great Lakes. Continental glaciers lacked the sloping basement of mountain glaciers. They were not ice rivers and active flow must have been confined to a marginal belt of possibly 150 miles. This belt of moving ice migrated outward during glacial expansion. The main advantage of a glacier over a stream in erosion is the plucking of large masses of broken bed rock. Abrasion must have been unimportant. Over much of the glaciated area considerable decomposed rock is left and the forms of the hills are not related to direction of ice movement. Turn cars around and return to 11.

rock

- 119.9 Turn right onto 11 and retrace route for some distance. Keep on 11.
- 121.0 Narrow place in valley is preglacial divide between Wisconsin and Rock basins. Glacial deposition moved the divide to east of Middleton.
- 122.5 Marked recessional moraine, part of Milton system. Ice must have still been moving to make this moraine. East of here valley is occupied by pitted outwash for several miles.
- 124.5 Ice contact face. Flat on left was site of postglacial Extinct Lake Middleton. (See again tomorrow.)
- 125.4 Middleton. East shore of lake. Pick up U. S. 12 and keep ahead.
- 126.2 Curve right with 12. Outer edge of main part of Milton Moraine.
- 127.3 Turn left off 12 on paved road. From here follow lake shore drive. Most of the hills are made of rock much of which is deeply weathered. This makes extensive glacial erosion of solid rock improbable. Maximum depth of drift near Madison 372 feet below lake level. Maximum depth of lakes 80 ft. Hills at the University are composed of sand and silt with some till on side toward lake. Appear to be a slumped or shoved deltaic moraine deposited when ice had shrunk into lake basins and may have become stagnant. Several hills in the city are perfect drumlins.
- 132.0 Night stop at University Club on State St.

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- 0.0 Corner of Park and University in Madison. Keep west on U. S. 12.
- 7.1 Turn right (north) in Middleton. 50 min. to first stop.
- 7.6 Cross Pheasant Branch. Postglacial stream piracy has drained Extinct Lake Middleton into Lake Mendota. Former outlet was to west to Wisconsin River. This process would in time restore the preglacial divide. Beyond the lake basin country is thinly drift-covered rock hills.
- 13.8 Pitted outwash plain in valley.
- 15.1 Gravel knolls of a higher outwash terrace or kame terrace.
- 17.1 Divide between Yahara and Wisconsin drainage. Note kettles on hill top. In such rough country the ice probably stagnated soon after reaching its maximum. It is difficult to trace any continuous moraines. In clear weather Blue Mounds may be seen on left.
- 18.9 Pitted outwash in valley. Some morainal deposits occur along the sides but rock control is dominant.
- 23.5 Gravel pit on left was used for paving U. S. 12.
- 23.8 Valley eroded in outwash by outlet of lakes to east.
- 24.2 Part of Johnstown moraine to right projecting above outwash which is here cut up by postglacial gullies.
- 24.8 Descend from high outwash terrace to Wisconsin River.
- 25.1 Wisconsin River. Note the sand bars.
- 25.4 Turn right at traffic light. (U. S. 12)
- 26.5 STOP 1. 3 min. View of terminal moraine across River, eroded outwash terraces, and unglaciated hills (Round Bluff and Blackhawk Bluff). 7 min. to next stop.
- 27.7 Ascended from terrace to high outwash level.
- 28.6 Turn right into private drive to dam of Wisconsin Power and Light Co. Johnstown moraine here crosses Wisconsin River and may be seen to left.
- 28.9 STOP 2 Park cars on gravel and walk to edge of bluff. Opposite is Blackhawk Bluff which was a nunatak at maximum of Middle Wisconsin. Descend stairs and see to right till of Johnstown Moraine overlying outwash. CAUTION, do not leave the stairs as slope has been planted to grass to check erosion. By going down the stairs and turning right at the plant an exposure of outwash may be seen in new pit. Weidman hold that this exposure of outwash under the moraine demonstrated that the terraces are of pre-Wisconsin age. MacClintock showed the error of this view. The dam is founded on sand and it has been a serious problem to prevent erosion from undermining it. 20 min. stop. Return to cars. 8 min to next stop.
- 29.3 Rejoin 12 and turn right. Follow 12.
- 31.6 Drainage outlet through moraine and stream channel in outwash well seen.
- 32.5 Turn left into town road.
- 32.9 Turn right at school house.
- 33.2 STOP 3. 5 min. Kettle in outwash with pond perched on silt. Note well drilled for late ex-Governor Phillip on west side. This well disclosed a layer of till below the outwash. This demonstrates a dual maximum of the Middle Wisconsin. At the first advance the ice locally went farther west than it did when the Johnstown Moraine was deposited. A block of ice was left here on retreat of the ice front. It was buried by outwash. The ice front retired several miles and the outwash seen at the dam was laid down. A readvance then resulted in the balance of movement and wastage which formed the Johnstown Moraine. The moraine of the earlier maximum is probably the Brooklyn Moraine which occurs south of Madison and was formerly correlated as probably Early Wisconsin. 5 min to next stop.
- 33.7 Rejoin 12. Keep ahead.
- 35.6 Turn right onto County Highway 2. STOP 4. 3 min. To north there is an alluvial fan at foot of Baraboo Bluffs of Huronian quartzite. The fan has been dissected and is covered with loess as is much of the

outwash. Similar gravels to those of the fan occur farther west and are known to be of pre-Wisconsin age.. 15 min. to next stop.

- 136.4 Pine Hollow on left, youthful gorge in quartzite in bottom of hanging valley. Cause of hanging doubtful, possibly cliff cutting of Cambrian sea.
- 37.0 Turn left. CAUTION: steep hill ahead, use gears.
- 40.4 STOP 4 35 min. Park cars close to right bank and walk to top of West Bluff overlooking Devils Lake. From this point the moraine can be seen at both ends of the Lake. History: (a) pre-Cambrian sedimentation, (b) pre-Cambrian mountain making, (c) pre-Cambrian peneplanation leaving quartzite as monadnocks and forming wide mature valleys in the bluffs such as that west of the Bluff, (d) Cambrian to Silurian sedimentation concealing quartzite entirely. (Blue Mound 1716 ft. here 1460.), (e) erosion by superimposed streams exhumed much of older topography and made new gorges with cliffy sides; gorge then 900 ft. deep, now 500, (f) early Pleistocene outwash filled gorge to about 100 feet below lake level, (g) Middle Wisconsin glacier split by bluffs to east closing in lake basin; water in lake once higher covering plains at both ends but no definite outflow channel known unless along ice front to northwest, (h) ice retired from northern part of moraine allowing waters to erode channel now followed by railway and reach level of Glacial Lake Baraboo, about 980, (i) present conditions. The level tops of the bluffs are parts of an extensive plain which varies from 1400 to 1500 feet elevation. Due to either (a) stream erosion or (b) marine planation during Paleozoic sedimentation. Time of formation either (a) pre-Cambrian subaerial peneplain, (b) Paleozoic marine plain, or (c) post-Paleozoic subaerial peneplain during removal of sediments. The writer favors marine theory because of (a) extreme flatness, (b) presence of coarse boulder conglomerate off edges of summit flats, (c) presence of residuum of Paleozoic formations on upland. The famous potholes on East Bluff were formed after deposition of Paleozoic sediments and before they were eroded away. The pre-Cambrian drainage at the lake was probably to north. Later a superimposed stream (Wisconsin River) widened and deepened this valley as shown by hanging valleys southeast of the lake. Return to cars. 30 min to next stop.
- 41.1 Terminal moraine crosses road and continues to northwest.
- 41.3 Join Wis. 123 (paved)
- 41.4 Turn left off 123 onto Wis. 159 and go west across terminal. From terminal can see in same view (a) terminal, (b) deltaic outwash plain, (c) pre-Cambrian mature topography on quartzite (exhumed), (d) gorge due to superimposed stream, (e) upland peneplain.
- 42.7 Join U. S. 12 and turn right (north). Unglaciaded rock ridge to west. Continue north over delta deposited by glacial streams in edge of Glacial Lake Baraboo.
- 43.9 Top of terminal moraine.
- 44.1 Leave 12 by keeping straight ahead down steep hill. CAUTION: dangerous R. R. crossing over main line of Chicago and Northwestern.
- 45.3 Rejoin 12 and keep straight ahead. Terminal moraine to left and ahead.
- 45.9 Top of terminal. Eroded edge of delta ahead.
- 51.8 Edge of delta whose top marks level of Glacial Lake Wisconsin in valley of Wisconsin River. Outlet to East Fork of Black River.
- 52.5 High hill to left has glacial pebbles on top above level of lake. Origin?
- 53.8 Artificial lake in post-Wisconsin gorge of Doll Creek.
- 54.1 Delton. Turn right with 12. Postglacial gorges. Farther on pass into preglacial topography in Eau Claire sandstone (Cambrian). Top of Eau Claire is marked bench caused by thin layer of shale.
- 56.2 STOP 5. Park cars at right under trees and walk to old clay pit. 10 min. to see varved clays of Glacial Lake Wisconsin. 5 min to next stop.

- 56.9 Turn right onto U. S. 16. Cross river and keep to left onto main street of Wisconsin Dells or Kilbourn.
- 57.6 Traffic light. Character of stop at the Dells is not settled. The full boat trip takes over two hours. The Dells owe their origin to the diversion of Wisconsin River by the Johnstown Moraine to the east. Proglacial course lay east of moraine. Here the river was superimposed on a spur of Eau Claire sandstone. Erosion has produced many striking scenic features especially where the sandstone is cross bedded but the geologic and physiographic features are by no means as varied as at Devils Lake. Continue east on U. S. 16. from STOP 6. 15 min to next.
- 58.1 Turn right with 16. Eroded deltaic outwash.
- 59.6 Gravel pit.
- 59.9 Top of Johnstown Moraine.
- 63.9 Leave terminal moraine and enter big swamp. As the ice front melted back from the Johnstown Moraine the level of Lake Wisconsin was maintained until the east end of the Baraboo quartzite bluffs was cleared. Then the waters fell to the level fixed by the top of the rock spur at the Dells. Erosion of this destroyed the last remnant of Lake Wisconsin and east of the moraine another body of water, Glacial Lake Oshkosh came into existence. This had its outlet where Wisconsin River crosses the moraines above Prairie du Sac.
- 65.7 STOP 7. 5 min. Foreset bedding in deltaic moraine deposited in glacial lake. The regular shape of this moraine (Milton?) suggests that the glacier was moving at time of formation. 20 min. to next.
- 66.8 Another deltaic moraine.
- 75.7 Pitted outwash plain at Portage indicates that level of Glacial Lake Oshkosh in Fox and Wolf valleys to north never exceeded this level of about 830 ft. Higher beaches are known to the north but the extent to which they have been deformed by postglacial earth movement and the extent to which they are the deposits of local lakes shut in by an irregular ice margin has not been determined. After the retreat of the Middle Wisconsin ice Lake Oshkosh ceased to exist. It was brought back again by the readvance of the Late Wisconsin. The beaches of this later lake have almost certainly not been deformed.
- 77.2 Portage. Route from here to Waupun not logged. Lunch at Hotel Raulf. For several miles east of Portage the route is over a pitted outwash plain apparently formed by drainage from isolated stagnant ice masses left in valleys to the east during the recession of the Middle Wisconsin. The paucity of moraines formed of till and therefore the product of moving ice strongly suggests that intervals of stagnation affected the ice sheet at least toward its edges. Such a condition could be brought about by lack of snowfall. Then the edge of the ice sheet would flow out until equilibrium was reached. Movement might be reinstated either by increased precipitation or by melting back of the margin to a steeper slope. About 1 hr. 45 min. to next stop. Highway 33 to Fox Lake.
- 107.0 Cross Green Lake Moraine.
- 108.0 Fox Lake. Leave 33 and pick up Wis. 68.
- 119.0 Waupun. Pick up U. S. 151, straight ahead. Between Waupun and Fond du Lac the route crosses the Waupun, Rush Lake, and St. Anna Moraines, an important group of recessional which are probably the product of a readvance of the Green Bay Lobe.
- 125.5 Esker on right
- 128.2 Note Niagara escarpment on right.
- 130.2 Lamartine. Outcrop of Galena dolomite in stream bed. Ridge to east is St. Anna Moraine.
- 134.3 Morainial ridge at border of red drift or Late Wisconsin. The red till probably mantles a ridge of the Middle Wisconsin gray till. The color which is so characteristic of the Late Wisconsin in this district is due to two factors: (a) during the recession red clays colored by drainage from the iron ranges of northern Michigan were deposited to be later

- plowed up by the ice making a very clayey till, and (b) the Late Wisconsin ice in this region came from the Patrician center and thus passed directly across some of the iron ranges. South of this ridge a glacial lake discharged to Rock River through Horicon Marsh which was then a lake.
- 137.5 Fond du Lac-traffic light. Turn left and then turn right at next corner onto County Highway T. We are now in bed of Lake Oshkosh.
- 140.4 Turn left (north) onto County Highway K.
- 141.0 STOP 7. 10 min. Gravel pit showing marginal deposits of Middle Wisconsin overlain by red clay of Later Glacial Lake Oshkosh and thin red till of Late Wisconsin. 2 min. to next stop.
- 141.7 Turn left onto Wis. 23.
- 141.9 Turn left into gravel pit for STOP 8 805 ft. bar of Later Lake Oshkosh showing red clay stain and lenses of perfectly assorted gravel. Bar must have been built by northerly winds blowing off ice. Return to road corners to east. 15 min to next stop.
- 142.1 Turn ^{left} north on K and go north along foot of Niagara escarpment. Note that springs on top of underlying shale have caused much post-glacial sliding.
- 144.2 Turn ~~right~~ onto Wisconsin 31.
- 144.5 Turn left at Peobles following 31. From here north the highway follows on or close to the 805 ft. beach of Later Lake Oshkosh. Maximum level of 830 ft. is not shown well here.
- 148.4 Turn right onto County Highway Q and make STOP 8 at top of steep rise. 10 min. The road gutter northeast of the house shows what seems to be beach gravel of Early Lake Oshkosh overlain by red till. Elevation about 850 but this deposit may not have been made in a lake which was joined to that which discharged at Portage. 1 min to next.
- 148.6 Turn right onto town road.
- 148.8 STOP 9. View from Niagara escarpment over lowland floored by Galena dolomite. The Richmond shale is concealed by drift. Note the straight and regular outline of the escarpment. Martin ascribes this to glacial erosion. The fact that the fissured dolomite lay on soft slippery shale offered an optimum condition for glacial erosion. The Niagara escarpment was very important in directing the glacial lobes although the Green Bay Lobe on the west overrode it for some miles. The fact that so insignificant a feature affected lobation seems to show that continental glaciers were not ice rivers but oozed out along the margin where the slope sufficient to permit of gravitational flow was maintained during growth of the ice sheet at least by radiating winds which brought snow to the margin plus deposits from impinging cyclonic storms. This fundamental difference from valley glaciers may well give us pause with regard to wholesale glacial erosion. 13 min. to next stop.
- 149.1 Edge of red till; gray drift beyond.
- 150.4 Turn left onto County Highway U.
- 152.6 Recessional moraine of Middle Wisconsin trending NE-SW.
- 154.0 Turn right (south) on town road.
- 155.3 STOP 10 5 min. The drumlins of this district trend both to SW and to S. The writer explains them as first formed by Early Wisconsin Lake Michigan lobe moving southwest. A movement of the source of ice to the west during Middle Wisconsin time caused the Green Bay Lobe to occupy the same district moving south to east of south. This reshaped many of the drumlins by a process in part erosion but mainly deposition. Drumlin east of stop has new tail built on. Important light is thus thrown on origin of drumlins and glacial erosion shown to be slight.
- 155.8 Turn right on town road. (10 min to next stop)^
- 156.4 Turn left on town road.
- 157.9 Turn left onto AA. Follow AA around curve to right.
- 159.7 STOP 11 On crest of overridden drumlin. 10 min. Further discussion of overridden drumlins. Lake Michigan part should have only Niagara pebbles

- 160.0 Turn left onto Wis. 23 and continue east. Cross several isolated patches of morainal drift, 35 min. to end of run.
- 171.1 Greenbush (detailed log ends) East of Greenbush we cross the famous Interlobate Moraine. Two different views of its origin have been held. The early geologists held it to be two opposed terminals formed by the respective lobes. Later students have thought of it as made in the reentrant angle between the lobes and not all at once. This later interpretation explains the gaps. Glacial drainage was confined between the lobes and thus the stony till was largely reworked into assorted deposits chiefly gravel. Buried ice masses later melted to make kettles. As the angle widened out the older deposits were terraced for the most part before the isolated ice masses had all melted. East of the summit several such terrace levels and an abandoned drainage channel are well shown.
- 177.1 Plymouth. Night at Gurtiss Hotel.

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- 0.0 Leave Plymouth on Wis. 23 retracing route taken yesterday.
- 2.0 Turn right onto County Highway P and soon ascend Interlobate.
- 4.5 STOP 1 Gravel Pit of Moraine Sand and Gravel Co. Note foreset bedding Mullet River here crosses through a gap. 10 min. from start. Stop 10 min. Continue on P under R. R. 5 min to next stop.
- 4.7 Pick up County Highway A and turn north on it.
- 5.3 Turn right with A.
- 5.5 Good view of moraine on left.
- 5.9 Turn left with A and make STOP 2 at top of grade. 5 min. View of Crystal Lake in kettle of pitted gravel terrace. 20 min to next stop.
- 7.0 Keep on A.
- 8.7 Elkhart Lake. Turn right at R. R. station heading east on A.
- 9.2 Pitted outwash well developed
- 10.2 Leave pitted outwash and enter till of Lake Michigan Lobe.
- 12.5 Thin edge of Late Wisconsin red till. No endmoraine.
- 13.8 STOP 3 Franklin gravel pit. Middle Wisconsin morainal gravel, overlain by gray till in turn buried by red till. 15 min. 40 min to next stop.
- 14.5 Turn right on A Red till ground moraine.
- 18.5 Turn right on A into village.
- 18.8 Turn left and cross Highway 32.
- 19.8 Turn right (east) on A.
- 21.5 Morainal topography to north possibly inherited from buried Middle Wisconsin terminal.
- 22.8 Turn left onto U. S. 141.
- 28.0 CAUTION: SLOW and close up for left turn at stop ahead.
- 28.7 Turn left into gravel pit south of Fisher Creek. STOP 4 15 min. Gravel underlying red till shows in part the assortment which is characteristic of beach deposits. May be Glenwood or pre-Glenwood beach of Early Lake Chicago formed during recession of Middle Wisconsin. Continue north on 141 into Manitowoc. 50 min. to next stop.
- 43.7 Turn left onto 21st. Street and go north across river.
- 45.0 Turn right (east) onto New York Ave.
- 45.7 Turn left (north) onto Wis. 42.
- 46.2 Turn right on 42 soon reaching shore of Lake Michigan. Much of the route to Two Rivers is along sandy beach with dunes.
- 51.0 Two Rivers continue on 42. Traffic lights.
- 52.1 Turn right on 42 on 22nd St. Now bridge. Continue east on 22nd.
- 52.8 STOP 5 New Ball Park. 5 min. 17 ft. beach of Lake Algonquin. Cut in bank in spring of 1933 showed red till overlying older silt and lake sand/ Continue ahead on town road, 30 min to next stop. Route follows barrier beach of Lake Nipissing (24 ft.).
- 54.7 Turn left just south of creek soon crossing line of sand dunes.
- 56.1 Turn right onto Wis. 42 and continue north over red till ground moraine. Flat topography partly due to older lake deposits below.
- 64.5 Turn right at Two Crooks onto town road.

- 65.4 Keep straight ahead down lane to lake shore. Park cars and walk south along beach. Note intercession of creek. 1 hour stop. The best exposures of the Forest Bed are nearly a half mile south. Some digging may be needed. STOP 6. 20 min to lunch stop.
- 66.5 Proceed back to 42 and turn south to Two Rivers. lunch at Hotel Hamilton. Continue on 42, 13 min run back to Manitowoc.
- 82.9 STOP 7. Gravel pits. Upper layers disturbed by ice but no red till. Later lake deposits unconformable above. 20 min. 10 min to next stop. Continue south on 42 into Manitowoc.
- 83.5 Turn right onto New York Ave.
- 84.2 Turn left and cross bridge and lowland.
- 85.0 Turn right into trail to clay pit.
- 85.8 STOP 8. Pit of Medusa Portland Cement Co. Permission to visit at own risk secured by F. T. Thwaites from Cleveland office. 25 min. Red till overlying varved clays (disturbed by shove) which lie on gray till. Return to 21st. St. and go south. 30 min to next stop.
- 86.3 Turn right onto Washington Ave., Wisconsin 31. Follow 31
- 89.5 Red till moraine
- 92.4 Red till over gray till in road cut showing that topography is inherited.
- 97.4 Morainal topography, gray till shows in places.
- 100.6 Turn right (north) onto Wis. 142. Continue north up rock hill.
- 100.9 Turn left just north of house on left.
- 101.4 STOP 9. 20 min. Crossing striae on Niagara dolomite. Reshaped drumlins. The Late Wisconsin ice which reached this locality must have crossed the Door County peninsula and then spread out westward over the lowland east of the Interlobate Moraine. 15 min to next stop. Return to 31.
- 102.1 Rejoin 31 and go southwest.
- 107.3 Entering interlobate moraine partly overridden by red till.
- 108.3 STOP 10. 5 min. See interlobate moraine. There is a gap to north. Beyond that the interlobate is all buried by red till. It stops in Kewaunee County about 30 miles to north. 45 min to next stop.
- 109.4 Note conical moulin kame on left, the first seen.
- 110.5 Turn left (south) onto Wisconsin 32. Leave Late Wisconsin drift.
- 118.2 Turn right with 32
- 118.6 Turn left with 32 across bridge. **Kiol.**
- 119.1 Turn right onto Wis. 57.
- 121.4 Extremely pitted topography of Interlobate.
- 124.6 Elkhart Lake. Turn right onto County Highway A. Retrace out route to
- 131.5 Greenbush. Turn left on Wis. 23.
- 131.7 Turn right onto County Highway A.
- 132.5 STOP 11. Ice contact face of Interlobate without till, suggesting temporary stagnation of ice. Continue on A. 5 min to next stop. 5 min.
- 133.4 STOP 12. Large kettle in summit of interlobate which is here a terrace. 10 min. To southwest is a moulin kame which must be older, possibly formed some distance back from ice margin. 15 min. to next stop.
- 133.7 Well marked terracing.
- 134.1 Kame with flat top on right.
- 134.6 Descend to a lower terrace.
- 135.2 Well-marked outwash terrace. Turn right onto Wis. 67 (paved).
- 136.2 Branches of interlobate both right and left.
- 138.7 Turn left onto County Highway V. From here south pass through a group of moulin kames.
- 140.0 STOP 13 10 min to see kames. 40 min to next stop.
- 141.2 Turn left on V, McMullin Hill.
- 142.1 Cut in crevasse filling, turn left following V
- 143.7 Parnell, turn right onto A.
- 144.6 Turn right with A.
- 145.1 Turn left with A.
- 146.6 Turn right with A.

- 147.1 Left with A.
- 149.5 Right with A. Beechwood.
- 151.8 Right on S. County line.
- 154.1 Left with S.
- 156.0 Turn right
- 156.6 STOP 14. 10 min. Cut in moulin (?) kame showing foreset bedding.
20 min to end of day.
- 157.6 Turn left on S.
- 159.6 Moulin kame on left illustrated by Aldon.
- 159.8 Turn right onto Wis. 28 at Kowaskun.
- 160.2 Turn left into Wis. 55. Go south.
- 167.5 West Bond, Hotel Goib.

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- 0.0 Go north on 55 to Barton retracing yesterday's route. 10 min to stop.
- 1.2 Barton, turn left into town road.
- 2.6 STOP 1 Pit of Northern Gravel Co. 25 min. Park cars off road and climb to top of strip dump. Foreset or slumped bedding. Return to cars and go on west through some very striking topography. 12 min. to next stop.
- 3.3 Turn left on town road.
- 4.1 Turn left onto County Highway B.
- 5.0 Turn right onto Wis. 33.
- 7.3 Turn left onto J. STOP 2, 10 min. to see glacial drainage channel, outwash terraces, and till interlobate to west. 5 min. to next stop.
- 10.1 STOP 3 5 min. Crevasse fillings to left including island. 15 min. to next stop.
- 14.9 Turn right onto Wis. 60. Interlobate here is nearly all gravel.
- 15.9 Turn left into town road. When fresh cuts showed gravel despite numerous boulders.
- 16.7 STOP 4. Sugar Loaf Hill, also known by other names. 15 min. Pit shows faulting in horizontally stratified sand and gravel. Apparently a moulin kame. Continue on town road. 15 min to next stop.
- 17.9 Turn right onto County Highway E. Descend ice contact face of interlobate. Gravel and till much mixed.
- 18.4 Turn left onto K. Ascend gradually to top of moraine. Crevasse filling to right suggest stagnant ice. Holy Hill soon seen to left.
- 23.5 STOP 5 5 min. to view Holy Hill from top of till interlobate.
20 min to next stop.
- 25.7 Sharp right turn up steep hill in bouldery gravel. Glacial drainage channel to left (Oconomowoc River) Here drainage from the Lake Michigan Lobe crossed the line of the Interlobate into Green Bay territory. There is no real Interlobate for several miles south of here.
- 25.9 Turn left on terrace.
- 26.2 Turn right
- 26.7 Turn left
- 27.0 Turn right and follow winding road through pitted outwash to
- 28.2 Turn ~~ref~~ into Wis. 83. Follow 83 through North Lake where there is a large gravel pit in end of terrace across pitted plain with till knoll.
- 31.3 STOP 6 5 min. Junction 83 and K. Much pitted outwash in golf links. Turn right onto K. 20 min to next stop.
- 33.2 Turn left onto County Highway C. Follow crevasse filling between Mouse and Okauchee Lakes. Pitted outwash with some till knolls?
- 39.2 Delafield, turn left onto Wis. 30. Hill to south formerly called Government Hill. Now the name Lapham Peak (after Lapham who lived near here) has been placed on this hill having been displaced by name Holy Hill where first applied.
- 40.4 STOP 7 Park cars at right and climb onto interurban track. Terraces along side of Lake Nagawicka show that ice block reached surface

- 10 min. 5 min. to next stop.
- 41.0 Turn right onto Wis. 83.
- 41.2 Park cars in gravel pit at left. STOP 8 15 min. Climb to top of pit to view glacial drainage outlets. At first water from Lake Michigan Lobe discharged to south. When ice block in Lake Nagawicka melted enough outlet changed to west for here the Green Bay ice melted first. This gave higher gradient and beheaded old channel. Lake Nagawicka ice block lasted until drainage had ceased. 5 min to next stop.
- 43.4 STOP 9 View of outwash terraces near Statesan. The number of such terraces is legion. As the ice retreated broadened successively lower and lower outlets became available. 35 min to next stop.
- 44.0 Turn right onto U. S. 18 and go west past old R. R. gravel pit in very bouldery gravel.
- 44.7 Drainage outlet previously seen. At first this discharged to south but later to west along Scuppernong Creek.
- 45.4 Drainage outlet.
- 46.2 Terrace edge.
- 47.8 Same
- 48.2 Turn right onto Wis. 67. Go north on lowest outwash plain past several lakes in kettles.
- 51.2 Turn left onto Wis. 30.
- 53.0 Island of terminal moraine rising through outwash.
- 57.0 Last of outwash. Enter drumlin area.
- 60.7 STOP 10. Esker between drumlins. 5 min. 10 min to next stop.
- 63.2 Turn left onto County Highway D and go south.
- 66.7 STOP 11 5 min to see drumlin topography. 10 min to next stop.
- 67.7 Turn left on U. S. 18. Continue east through fine drumlins and cross bridge over R. R. SLOW, sharp turn ahead.
- 70.0 Turn right and recess R. R. at grade. DANGER.
- 70.6 Pick up County Highway P and turn left.
- 70.9 STOP 12 2 min. Fine drumlins. 12 min to next stop.
- 72.5 Rome, Turn right into Wis. 90 and then left at west end of village.
- 77.1 STOP 13 on top of drumlin to see Interlobate Moraine face to southeast across Scuppernong Marsh. 5 min. 25 min to next stop.
- 81.8 Palmyra. Turn left onto Wis. 59. Continue northeast at foot of Interlobate.
- 86.1 Enter Interlobate.
- 87.5 Top of Interlobate. Highest or No. 1 terrace to east.
- 87.8 Turn off to right on gravel road, cross R. R. and pick up Wis. 99 on main street of Eagle. Continue east. Lunch stop here to be arranged.
- 88.9 Second terrace due to cutting away of glacial drainage outlet.
- 89.7 Turn right onto County Highway NN.
- 90.2 STOP 14. Discussion of terraces. 10 min. 15 min to next stop. The second gravel terrace was formed when now low drainage outlets, in part via Sugar Creek were opened to the south and drainage to the west was abandoned. It must be realized that stagnant ice masses were just as effective in this regard as living glaciers. All the terracing was accomplished rapidly before the ice blocks all melted.
- 90.9 Turn right.
- 93.4 Pick up Wis. 67 straight ahead.
- 98.7 STOP 15 5 min. 3 min to next stop. Recessional of Lake Michigan Lobe rises through outwash. Along this front the Lake Michigan (Delavan) ice retreated first and its territory was filled by outwash from the Green Bay ice. Continue ahead onto U. S. 12.
- 99.6 Turn right onto town road.
- 100.0 STOP 16. Walk into private road to left to top of hill. Fine view over pitted outwash plains with lakes from top of recessional moraine. 5 min. 15 min to next stop. Route over Heart Prairie which is an older terrace than that at Eagle.
- 102.1 Bird School. Turn right, North, onto County Highway H.

- 102.7 Turn left onto town road.
- 105.9 STOP 17. 5 min. Inside edge of Elkhorn Moraine where it joins the Interlobate. Old R. R. cut. 2 min to next stop. TURN RIGHT (north).
- 106.7 STOP 18. 30 min. Old R. R. cut through very stony till of Interlobate. Note that ground moraine on Green Bay side is much lower than Heart Prairie. 20 min to next stop.
- 107.2 Turn left onto County Highway P. Good view of cut just left.
- 110.0 Turn right onto town road. (west) Going west cross interlobate proper and enter on pitted plain between Johnstown and Milton Moraines.
- 114.0 STOP 19. 5 min. 5 min to next stop. Here see relation of Johnstown or endmoraine of Green Bay Lobe and Milton or first recessional. Turn left (south) onto Wis. 89. Going south cross Johnstown Moraine.
- 116.5 Go straight ahead leaving pavement.
- 116.8 STOP 20 at church. 5 min. 20 min to next stop. View of reentrant angle between Johnstown and Darion Moraines. In Aldon's reports the latter is regarded as the end moraine of a separate lobe, the Delavan, but present day mapping shows that this lobe was only a minor excrescence on the side of the Lake Michigan Lobe. Turn left and go through village of Richmond to rejoin 89. Follow 89 along border of Darion Moraine. Outwash to right somewhat eroded by glacial waters during ice recession from the Darion.
- 121.7 Turn left onto Wis. 20. Cross Darion Moraine and come into Turile Creek drainage outlet. At crossing of creek note gravel pit to left on slip off slope of curve.
- 123.7 Turn right onto town road on outwash terrace. This outlet was used during the formation of the two highest gravel terraces at Eagle.
- 124.8 STOP 21. 10 min. 25 min to next stop. Gravel pit on left, now closed showed till of moraine resting on outwash. Good view of outlet.
- 126.7 Darion; right onto Wis. 14.
- 126.8 Left onto 89 at traffic light. From here 89 follows the edge of the moraine. To right outwash plain is found most of the distance. The low hills farther west are subdued drumlins of Illinoian age which trend southwest. They demonstrate a much greater extent of the Lake Michigan or Illinois lobe than occurred later.
- 130.7 Turn left onto town road. Cross Darion moraine noting gray till.
- 134.0 Turn right onto Wis. 36 on ground moraine. Go south on 36. CAUTION: steep grade down into Fontana with stop at bottom.
- 134.8 Turn right into gravel pit. STOP 22. 5 min to next stop. Ask permission at office. Ascend side of pit seeing section. Good view of Lake Geneva from top. History of lake involves a dual maximum of the Middle Wisconsin. First till is concealed. Recession to east of Elkhorn left ice mass in proglacial valley where lake now is. This was largely buried by outwash. Then readvance to Darion Moraine left till on top. Melting made much "false moraine" around the lake. 30 min. stop here. Continue on 36.
- 137.2 After bad R. R. crossing (CAUTION), turn left on County Highway B.
- 138.7 Park cars east of overhead R. R. crossing and walk back for STOP 23. This view shows the reason for the early misinterpretation of the southern extension of the Darion Moraine. Aldon shows it curving back into Wisconsin to the east and joining the Valparaiso Moraine which Lovorott had mapped as the border of the Middle (Late) Wisconsin. Recent study has traced the West Chicago moraine northwesterly into the Darion crossing the older Maronge Moraine at a marked angle. The Darion's West Chicago is clearly an endmoraine of a substage as it is bordered by non-pitted outwash. It shows a marked westward shift of the center from which the ice came. This westward movement of source is marked from Illinoian time on and explains the changes in lobation for the lobe were mainly marginal features and the direction from which the ice approached local topographic features affected their shape. The change

also affected the color and nature of the tills. The Early Wisconsin till of Maronge Moraine is probably red because derived in part from the red beds at the base of the Niagara not far distant. The Darion till is gray and stony because it came from a different direction and the ice overrode outwash. The cause of the Late Wisconsin red till was discussed before. The westward progression of glacial activity is marked from the Illinoian to the Des Moines lobe. Exceptions are (a) the Iowan, if regarded as earliest Wisconsin, and (b) a Patrician readvance near Winnipeg which is later than the Keowatin advance. In Wisconsin, however, it seems to furnish a key by which the several Wisconsin substages can be separated. Reference should be made to the overridden drumlins near Fond du Lac. The new mapping, however, tends to minimize the Dolavan glacial lobe. 20 min. stop. Turn cars around and go west to

139.7 Walworth. Night at Wayside Hotel north side of park.

August 7, 1933

- 0.0 Leave Walworth on Wis. 89 south over non-pitted outwash. The White Rock Moraine at the border of the Wisconsin drift has not been discriminated in Wisconsin nor have the age relations of this marginal drift to the Maronge Moraine been studied. The fact that the outwash between the two is not pitted has little significance because the upper part of this deposit is certainly derived from the younger Darion-West Chicago Moraine of Middle Wisconsin age.
- 2.5 Big Foot Prairie-Wisconsin-Illinois state line.

Here the writer turns over the discussion to the Illinois geologists. He wishes in closing to make it clear that the statements herein given are to be regarded in the light of suggestions. They were based on ideas gained on field trips with students and have not been checked by detailed study.

F. T. Thwaites

July 26, 1933