Correspondence - R. F. Flint. 1941

41 Roby Road,
Madison, Wis.,
Jan. 30, 1941

Dr. Richard Foster Flint,
Dept. of Geological Science,
Yale University,
New Haven, Connecticut

Dear Flint:

Your circular of Jan. 25 and my blueprint maps are at hand. You did not need to return these as I kept other copies and the originals.

My first reaction on reading the reprot with its drastic changes in conventions and base scale was to resign at once. I particularly object to the change in representation of moraines which is exactly what we decided against at Minneapolis and which made all my work in vain. I thought that I demonstrated that at 60 miles to the inch no other symbol than a single line is practicable. I also object to having to redraft all the map on the small scale of 40 miles to the inch on a base WITHOUT COUNTY LINES. This task would take so much time and eye strain that I simply cannot undertake it.

Another point I wish to make is that it is in most exposures impossible to tell for sure which of two directions of striae is the older. For this reason I do not like to commit myself by a symbol.

I also object strongly to turning in a colored map of which I can keep no copy.

With regard to Exhibit B I fail to find any note of the big gap in northern Wisconsin. Filling of this gap would take several field seasons and cost a lot for aerial photos as well as travel.

I did some work on Project 2 in 1932 and hope Apfel and MacClintock have better luck than I did in solving it!

I beg to suggest that Project 5 is in fact impossible of solution. It rests upon the assumption that the Old Red Drift of Minnesota is really Illinoian. It has no areal connection and the material as well as topography is so different from the type Illinoian that direct comparison is well-nigh impossible. The Hampton moraine looks to me much too fresh to be Illinoian. If anything the relations may simply prove that the extra-morainic drift of Wisconsin is Iowan and not Illinoian! F. D. Hole worked last summer on this problem and reports that the soil profile outside the moraine is the same as inside where topography is the same. The erosional topography outside the moraine is inherited from underlying deposits (in part an older drift) and is not postglacial. Hole's father died last fall and he has taken his place at Earlham College. He will get leave for next year to get his degree here but that apparently means no more field work on this problem to carry it over to Minnesota. I would be glad to advise with Gould on this project IF HE WANTSME TO. I have just driven across the area to see what it looks like. My feeling is that solution will depend on study of the soil profiles.

Cant you get someone to copy Leverett's maps of Minnesota and Michigan? I feel as if I was wasting my time in doing that kind of work. I can furnish definite contributions for Wisconsin where I have checked Alden in the field but very little in the other states. I dont want you to think I am a quitter but there are limits to what I can get time for. After all it is your project and my part is only a minor one so I cant neglect my other projects.

I did come down with the flu on the Monday and was in bed most of last week

Sec 27 - 32 - 28 E Terminal moraine = MO

Sec 5 - 31 - 28 E Striae S - 10 E ✓

copied.

Sec 7 T 33 - 30 E TM = MO

7 . 31 - 28 E S - 15 - E no

9 . 31 - 28 E S - 15 E no

24 . 31 - 27 E S - 10 E ✓

7 - 30 - 27 E S - 10 - W ✓

34 - 29 - 26 E S - 20 - E ✓

18 - 28 - 26 E S - 20 - 25 E ✓

6 - 27 - 26 E S - 60 - E. poor no

6 - 27 - 26 E S - 60 E 2nd S - 60 W, 3rd N - S ✓

1 - 27 - 25 E S - 25 - E cant show ✓

1 - 27 - 25 E S - 22 - 25 E, cant show ✓

21 - 27 - 25 S - 20 - E ✓

15 - 24 - 20 E S - 35 - 30 - W Birch creek, here

4 - 21 - 19 E S - 10 - E greenleaf ✓

25 - 20 - 20 E S - 40 - E Bullion ✓

3, 6 - 20 - 18 E S - 35 - W OK ✓

6 - 19 - 22 E S - 5 E ~~Valders~~ ? ✓

32 19 - 22 E { S - 10 E Cary 2 ✓
S - 75 W 1 pre-Cary
N - 85 - W 3 Valders

~~10 - 14 - 17 E~~

10 - 14 - 17 E S - 5 - 10 - E alden area

4 to 5 m N of Escanaba, much N - S striae

Shale section Lot. 8 Southbridge

Shale, dol layer	12
Dolomite	1/2
Shale, brown ?	17
Dolomite	2
	3.5
Shale, brown	

Dolomite	1
Shale, brown	27
Lake level	

YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

Jan 15 1941

Dear Thwaites,

Your letter is very disturbing because it is highly important that you should be here. Not only do your maps cover several important States, but your discussion will be urgently needed in certain correlation problems. While sympathizing fully with difficulties at home, I urge you to make every effort to come. We will do our best to make you comfortable while you are here.

In haste

Flint

Richard Foster Flint
yale University
New Haven Conn.

your letter at hand sorry illness
at home prevents coming
T Thwaites

41 Roby Road,

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Your letter of the 15th arrived this morning. I wired you at once "Your letter at hand sorry illness at home prevents coming"

I feel very badly over how things turned out. All week we had from one to three persons in the house ill in bed. Then Wednesday night Mrs. Thwaites was taken down and was still in bed this morning although better now. Several of the youngsters are still ailing and it is quite likely that I will fall a victim to the flu any moment.

Now two years ago I had an attack of bronchial trouble following my oldest boy who had it first. I lost eight weeks and both of us still feel some of the after effects. If I should get another--well, it would just be the end. Add to this the fact that I have not felt right for over a month, in fact really much of the fall, and you can see why I hesitated about traveling alone. When Mrs. Thwaites was taken ill that naturally ended all plans.

We were both looking forward to the trip for it would be a vacation to get away from the three "wild Indians" as we sometimes call the boys (the oldest is only 9).

But then I feel sure that the war will delay completion of the project besides that gap in northwestern Wisconsin is not going to be filled in a hurry. That will need field work and one of the big expenses is for aerial photos which cost 25 to 30 cents a print. That is hard country to work without them and so far now two geologists agree worth a cent. I simply do not know what to advise but am confident we will have to wait more work by Hole to clear up the correlation of the extra-morainic drifts in central Wisconsin. At present that is even a worse mess. When so far as the correlation of the substages of the Wisconsin in the north that is anybody's guess and will remain so for a long time. When you go west (or if you go) I would be glad to show you what we are up against in this state. Any discussion of these matters at present would simply get nowhere.

The maps ought tobe checked by Leverett if possible. Some of the moraine trends shown do not make sense now.

Sincerely,

xxxxxxxx 41 Roby Road,

Jan. 12, 1941

Prof. Richard Foster Flint,
Dept. of Geologic Science,
Yale University,
New Haven, Connecticut

Dear Flint:

I was unable to start on the glacial maps until after Christmas so rushed them through from all available material I felt at all sure of. In the morning I will get blueprints made and will mail copies to you so that in case I should not get to the meeting you will have something.

My present plan is to arrive at 9:25 Saturday morning and to be accompanied by Mrs. Thwaites. Could you kindly arrange for room with bath at a hotel. I will pay for this and will telegraph you in case we do not come. I have not been feeling at all well since Christmas and now one of my boys is ill so we simply cannot be sure of anything.

My sources were for Wisconsin: Alden Prof. Paper 106, my unpublished report on northeastern Wisconsin, my Vilas Co. report, a thesis by J. T. Mathieson, R. T. Chamberlin for St. Croix Dalles region, and some scattered notes of the State Survey which I could depend on. I could not check Leverett in Prof. Paper 154 very well so left that in pencil. For Michigan I used Leverett Mon. 53 and Prof. Paper 154 modifing this a bit where I have checked it.
For Minnesota I also depended mainly on Leverett in Prof. Papers 161 and 154 with some data from Cooper (Minnesota Bull. 26) I could not find the east boundary of the Iowa so left that out for the present(Sardeson does not accept it, you know).

My main difficulty aside from northwestern Wisconsin is the Wisconsin substages which just do not check in the north country. Last summer I had a student, F. D. Hole from Earlham College, working on the extra-morainic drift. You will note that I do not accept Weidman's drifts nor his supposed extension of the Driftless Area north along the Wisconsin Valley. Some recent soil work by Lewis Nelson shows that there is a thin drift throughout much if not all of this area. I failed to show till at the mouth of the Wisconsin as per MacClintock although now converted to his view of the reversal of that river. I also want to call attention to the non-linear moraine patches which are in many cases pitted outwash in part overridden (so I think). I put middle of arrows at point of observation, see crossing striae

Hoping I get there, Sincerely

No.____________________ **4766**

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Date Ordered 1/13/41 Wanted ____________ Delivered ____________

Kind of Work	No. Wanted	No. Plates	Size of Plates	Rate	Price	Remarks
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						Pd. 1/13/41 11 am.
				Total cost of work	.45	

Glan Ivey

White = White Prints or Blue-line Prints BP = Blue Prints
Pos. = Photostat Positives VD = Van Dykes
Neg. = Photostat Negatives Oil = Oiling Charge

PLEASE PAY BOOKKEEPER IN ROOM 103

YALE UNIVERSITY
New Haven, Connecticut

Letter No. 6 December 13, 1940

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint).

Dear Thwaites,

1. Detailed plans for the next meeting.

In accordance with the answers to the questionnaire in my Letter No. 4, and with the results announced in Letter No. 5, the next meeting of the Committee will be held in New Haven, on Saturday and Sunday, January 18 and 19, 1941. The Research Council has appropriated $500.00 for travel expense. This will guarantee coach travel for all members, and will, I think, provide a substantial contribution toward the additional cost of Pullman travel for more distant members who wish to make use of it. Two members have stated definitely that they can not come (although they will be represented by maps), and I am trying to arrange for housing free of cost within the University for at least several of the group. In these ways we may be able to save enough to defray almost the whole extra cost of Pullman, but at this date I can not guarantee this. Refunds of expenses will be made by check from Washington, on presentation of vouchers which will be supplied at the meeting.

Our conferences will be held in Kirtland Hall, 2 Hillhouse Avenue, New Haven, beginning on Saturday morning at 10 o'clock, and continuing through Sunday afternoon. Arrangements will be made for group luncheons on Saturday and Sunday, and for a group dinner on Saturday, in different parts of the University. Dr. Bucher, Chairman of the Division of Geology and Geography of the National Research Council, is hoping to be present at our meeting.

No doubt most members will be arriving on Saturday morning trains, but we can arrange to accommodate those who wish to arrive in time to spend Friday night.

A postcard questionnaire is inclosed. Please return it immediately, as arrangements will depend on the replies. When these are in hand, I shall inform you individually about living arrangements.

In addition to your preliminary manuscript map, will you kindly bring a list of the published references and the names of contributors of unpublished data used in compiling your map? It would make for efficiency in the conferences if you would list the questions you wish to raise with the group, or with individual members of the group, regarding (1) correlation problems, (2) map conventions, (3) sources of additional information, and (4) other matters.

Hoping for a nearly full attendance, and looking forward to a very stimulating and profitable discussion,

Sincerely yours,

Richard Foster Flint

Richard Foster Flint,
Chairman

Incl.

Mr. F. T. Thwaites

YALE UNIVERSITY
New Haven, Connecticut

Letter No. 5

September 7, 1940

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint).

1. Addition to membership

I am very glad to announce that since the last letter was sent out in May, Dr. Laurence M. Gould has accepted membership on the Committee, with assignment to the Local Cordilleran Areas of Glaciation in the United States. All the regions laid out at our first meeting are now assigned.

2. Time and place of next meeting

As might have been expected, the members expressed a wide divergence of choice, in response to the questionnaire sent out in May. Tabulation of results shows that, considering first and second choices, the vote is split three ways, almost exactly evenly, among (1) Austin, (2) New Haven on the weekend following Thanksgiving, and (3) New Haven in the second half of January.

Careful estimate of cost indicates that in view of the very small number of members willing to pay their own expenses to Austin, it will be quite impossible to transport the Committee to Austin. This is readily understood if the areal distribution of members is visualized. Eleven are located in the Northeast; the remaining five are in the Middle West.

Accordingly our finances oblige us to hold the meeting in New Haven. Although the vote is evenly divided between November and January, certain members doubt their ability to complete their preliminary maps by November, and ask for the January date. For this reason it seems best to select the latter. I suggest Saturday and Sunday, January 18 and 19, 1941, as suitable dates, least likely to interfere seriously with academic schedules.

I have asked the Research Council for a grant of $500.00 (the largest figure it seemed likely we would get) to cover the cost of the meeting. There are 15 members (exclusive of the chairman whose expense will be nil) to be provided for. After consultation with the local railroad rate clerk I find that this sum will be adequate to pay the railroad fare of each member at the coach rate, meals enroute, and board and lodging in New Haven on a two-in-a-room basis. I regret that we can not stretch our funds to cover more luxurious travel; I can only hope the value of our project will seem to justify any discomforts that may be entailed. Should any member not attend the meeting, the surplus thereby created will be applied pro rata toward defraying the additional cost of Pullman travel incurred by any members who wish to travel by Pullman.

As a result of informal discussion with members who are already well along with the drafting of their preliminary maps, I am convinced that the meeting will involve much valuable discussion, will define a number of problems of correlation, and will permit us to crystallize our ideas on the best methods of representing features on the map. For maximum mutual benefit it is essential that we have full attendance, and I sincerely hope that in spite of our financial inability to meet in Austin, every member will make the sacrifice of time necessary for coming.

3. Specimen maps

In response to a request by two members, Thwaites has kindly taken the time to prepare a rough draft of a map showing the type of features we propose to show, for one area (the State of Wisconsin), on a scale of about 45 miles to the inch. This map demonstrates that it is possible to show such features clearly on a small scale, even where the features are as numerous and closely spaced as they are in Wisconsin. I shall be glad to send this map for inspection to any member who requests it.

I also have a beautifully drafted manuscript map of the drift sheets of the United States, scale about 40 miles to the inch, compiled from published sources, and prepared by O. A. Ljungstedt and generously loaned to the Committee by him. It shows that skillful drafting can make clear an abundance of information drafted to a relatively small scale. This map will be exhibited at the January meeting of the Committee.

With good wishes,

Sincerely yours,

Richard Foster Flint

Richard Foster Flint,
Chairman

New York Office
Engineering Societies Building, 29 West 39th Street

Cable Address
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

June 29, 1940

TO THE MEMBERS OF COMMITTEES, DIVISION OF GEOLOGY AND GEOGRAPHY

My dear Mr. Thwaites:

During the year 1939-40, you have been a member of the Committee on

* GLACIAL MAP OF NORTH AMERICA.

If a written report for the Committee of which you are a member was presented at the annual meeting of the Division, held on April 27, a copy of it has either been mailed to you, is enclosed at this time, is sent under separate cover, or will be sent to you after it has been mimeographed. # A copy is enclosed of my report as Division Chairman. It is expected that the complete report of the Division for 1939-40 will be ready for distribution in the autumn, together with the complete annual reports of the Committees on Sedimentation and the Measurement of Geologic Time. The Annual Report of the Division for 1938-39 was distributed during the year, together with the other reports (issued in mimeographed form) mentioned on page 8 of the enclosed Chairman's report. Additional copies of these reports may be secured from the office of the Division.

The membership of the Committees of the Division for the coming year is indicated on the enclosed list. For changes in personnel, discontinuance of certain committees or additions to membership of present ones, see pages 3-5 of the enclosed report.

As indicated on the enclosed list of Members of the Division for the coming year, 1940-41, Walter H. Bucher has been appointed Chairman of the Division (three-year appointment), and Richard Hartshorne, Vice-Chairman (one-year appointment). The latter is in charge of the geographic interests of the Division. In addition to the appointment of new members of constituent societies for the three-year term beginning July 1, 1940 (Wilmot H. Bradley, W. S. Burbank, Richard Hartshorne and A. I. Levorsen), Walter H. Bucher has been appointed as the new Member at Large for the same period. Of the thirteen members, six have been appointed to serve as the Executive Committee of

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* Committee continued for 1940-41 with the same personnel as this year and the addition of Laurence M. Gould.

\# Committee report (Appendix E) enclosed.

the Division: W. H. Bucher and Richard Hartshorne, Chairman and Vice Chairman, ex officio; Norman L. Bowen, Wilmot H. Bradley, Charles B. Hitchcock, and A. I. Levorsen. The present arrangement of non-resident Chairmen of Divisions of the Research Council also continues.

The last meeting of the year of the Administrative Committee of the Research Council was held on June 8, at which time confirmation was given to the membership of the Division and its Committees for the coming year, as previously approved by the Executive Committee or the Division at the annual meeting. The next meeting of the Administrative Committee will be held early in October, at which time new business or projects from the different divisions of the Research Council will be considered. New business or projects of the Divisions need to be approved first by the Executive Committees of the Divisions concerned. Therefore, if you wish to present any new business or projects on behalf of the Division, please send them to Dr. Bucher for consideration and presentation to the Executive Committee of the Division in September. Correspondence may be sent to the Division office in Washington during the summer, and will be forwarded to Dr. Bucher or held, as seems best, by the Secretary of the Division, Miss Johnson, or by someone else during her vacation, probably in August.

I wish to take this opportunity to thank you for your cooperation and service during the past year, and to hope that your interest and cooperation in the work of the Division will continue during the coming years under the chairmanship of Professor Bucher.

Sincerely yours,

Chester R. Longwell

Chester R. Longwell,
Chairman, Division of
Geology and Geography

CRL:J

Enclosures
Reports
Membership lists

APPENDIX E

REPORT OF THE COMMITTEE ON GLACIAL MAP OF NORTH AMERICA

April, 1940

The Committee was organized in October 1939 and held its first meeting, attended by six members, on December 28 and 29, 1939, in Minneapolis. This meeting was devoted largely to discussion of features to be shown, conventions for showing them, allocation of regions to individual members, and means of gathering unpublished data. General agreement was reached on each of these matters. It was the unanimous opinion of the members that as far as possible, the map should show facts rather than interpretations, and that areas in which information is not available or is unreliable, should be left blank.

The present allocation of regions among committee members is as follows:

Canada	Bostock, Norman, Nichols, and Young
Newfoundland	MacClintock
Alaska	Capps
United States	
New England	Goldthwait
New Jersey and Pennsylvania	MacClintock
New York	Apfel
Ohio, Indiana, and northern Kentucky	White
Illinois	Leighton
Michigan, Wisconsin, and Minnesota	Thwaites
Iowa, Missouri, Kansas, and Nebraska	Kay
North Dakota, South Dakota, and Montana	Alden
Northern Idaho and Washington	Flint
Local Cordilleran areas south of the main glaciation	Not yet assigned
Distribution of loess	Apfel

A meeting of the Canadian members with the chairman was held in Ottawa on February 8 and 9, 1940, to consider the special problems involved in gathering Canadian glacial data. This part of the committee's work is under the direct supervision of Dr. G. A. Young, Chief Geologist, The Geological Survey of Canada.

A meeting of the two members from the U. S. Geological Survey with the chairman was held in Washington on March 19, 1940, to consider various

problems connected with the map. The chairman also had a very profitable conference with Lawrence Martin, Chief, Division of Maps, Library of Congress, regarding the representation of various features.

At these meetings plans were made for the completion of preliminary regional maps, each showing the data already available in published form, and the more readily available unpublished information. The maps will be exhibited to the committee and discussed at a meeting to be held in December 1940. It is anticipated that the final regional maps will require a considerable longer time for completion.

Suggestions for the map and contributions of unpublished information will be welcome at any time. The latter should be sent direct to the persons responsible for the regions to which they refer.

Richard Foster Flint,
Chairman

Committee Members

W. C. Alden
E. T. Apfel
H. S. Bostock
S. R. Capps
J. W. Goldthwait
G. F. Kay
M. M. Leighton
Frank Leverett
Paul MacClintock
D. A. Nichols
G. W. H. Norman
F. T. Thwaites
G. W. White
G. A. Young

NATIONAL RESEARCH COUNCIL - WASHINGTON, D. C.

ORGANIZATION OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

July 1, 1940 - June 30, 1941

OFFICERS

Chairman, Walter H. Bucher
Vice-Chairman, Richard Hartshorne

EXECUTIVE COMMITTEE

Walter H. Bucher, Chairman	Richard Hartshorne, Vice-Chairman
Norman L. Bowen	Charles B. Hitchcock
Wilmot H. Bradley	A. I. Levorsen

- - - - - -

MEMBERS OF THE DIVISION

Representatives of Societies

Geological Society of America
Stephen R. Capps (41)*
Wilmot H. Bradley (43)

Mineralogical Society of America
George Tunell (42)

Paleontological Society
Charles E. Resser (41)

Association of American Geographers
C. Warren Thornthwaite (41)
Richard Hartshorne (43)

American Geographical Society
Charles B. Hitchcock (42)

Society of Economic Geologists
W. S. Burbank (43)

American Association of Petroleum Geologists
A. I. Levorsen (43)

American Ceramic Society
Robert B. Sosman (42)

Members at Large

Norman L. Bowen (41)
Charles C. Colby (42)
Walter H. Bucher (43)

- - - - -

(For Committees and Representatives, see separate list)

* Date of expiration of term of office.

NATIONAL RESEARCH COUNCIL

COMMITTEES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, 1940-1941

(July 1, 1940)

Executive Committee

Walter H. Bucher, Chairman	Norman L. Bowen	Charles B. Hitchcock
Richard Hartshorne, Vice-Chrm.	Wilmot H. Bradley	A. I. Levorsen

Advisory Committee to the Division

Walter H. Bucher, Chairman	Arthur Keith	Edward B. Mathews
Edson S. Bastin	Andrew C. Lawson	W. H. Twenhofel
Nevin M. Fenneman	Chester R. Longwell	

Advisory Committee on National Research Council Post-Doctorate Fellowships in Geology, Paleontology, and Physical Geography

Walter H. Bucher, Chairman	Stephen R. Capps	Louis B. Slichter
Richard Hartshorne, Vice-Chrm.	James Gilluly	Robert B. Sosman
Edson S. Bastin	John B. Reeside, Jr.	C. Warren Thornthwaite

National Committee of the United States, International Geographical Union

C. H. Birdseye, Chairman	Preston E. James	Lawrence Martin
S. Whittemore Boggs	W. L. G. Joerg	John K. Wright

Technical Committees

1. Committee on Basic Geographical Data and Techniques

Charles M. Davis, Chairman	Robert S. Platt	C. Warren Thornthwaite
G. Donald Hudson	L. R. Schoenmann	

2. Committee on Coöperation with the Bureau of the Census

John K. Wright, Chairman	W. L. G. Joerg	C. Warren Thornthwaite
O. E. Baker	Lawrence Martin	
Stanley D. Dodge	Guy-Harold Smith	

3. Committee on Coöperation with the Soil Survey

Wellington D. Jones, Chairman	W. Elmer Ekblaw	L. R. Schoenmann

4. Committee on Density Currents (Interdivisional)

Herbert N. Eaton, Chairman	C. S. Howard	H. Peters
J. H. Bodine	Major A. B. Jones	C. S. Scofield
Reginald A. Daly	Chancey Juday	F. P. Shepard
C. C. Elder	Robert T. Knapp	J. K. G. Silvey
M. M. Ellis	L. M. Lawson	H. U. Sverdrup
N. C. Grover	W. C. Lowdermilk	C. P. Vetter
Raymond A. Hill	G. C. Dobson (alternate)	A. H. Wiebe
P. V. Hodges		

5. Committee on Geographic Research

Preston E. James, Chairman	Charles C. Colby	J. Russell Whitaker
S. Whittemore Boggs	Richard Hartshorne	Derwent Whittlesey
Ralph H. Brown		

6. Committee on Geographical Studies of Mineral Distribution

L. F. Thomas, Chairman	John W. Frey	J. Russell Whitaker
Charles H. Behre, Jr.	Walter H. Voskuil	

7. Committee on Geologic Research

Norman L. Bowen, Chairman	A. I. Levorsen	T. S. Lovering
Walter H. Bucher	Chester R. Longwell	T. Wayland Vaughan

8. Committee on Glacial Map of North America

R. F. Flint, Chairman	J. W. Goldthwait	Paul MacClintock
W. C. Alden	L. M. Gould	D. A. Nichols
E. T. Apfel	G. F. Kay	G. W. H. Norman
H. S. Bostock	M. M. Leighton	F. T. Thwaites
S. R. Capps	Frank Leverett	G. W. White
		G. A. Young

9. Committee on Landforms

C. Warren Thornthwaite, Chairman
(Members to be appointed later)

10. Committee on the Measurement of Geologic Time

Alfred C. Lane, Chairman	Frank L. Hess	W. J. Mead
John Putnam Marble, Vice-Chrm.	Arthur Holmes	Charles S. Piggot
Gregory P. Baxter	Adolph Knopf	T. L. Walker
H. V. Ellsworth	A. F. Kovarik	Roger C. Wells

11. Committee on Micropaleontology

Joseph A. Cushman, Chairman	Henry V. Howe	Helen J. Plummer
Carey Croneis	B. F. Howell	T. Wayland Vaughan
Alva C. Ellisor	Raymond C. Moore	W. P. Woodring
G. Dallas Hanna	M. L. Natland	

12. Committee on Paleobotany

Charles B. Read, Chairman	H. D. MacGinitie	J. M. Schopf
Erling Dorf		

13. Committee on Problems of Ore Deposition

T. S. Lovering, Chairman	B. S. Butler	John W. Gruner
C. H. Behre, Jr.	W. S. Burbank	Adolph Knopf

14. Committee on Research in Areas of International Concern

Derwent Whittlesey, Chairman	S. Whittemore Boggs	Robert S. Platt
John B. Appleton	Charles C. Colby	

15. Committee on Sedimentation

Parker D. Trask, Chairman	H. B. Milner	A. C. Trowbridge
Carl B. Brown	F. J. Pettijohn	W. H. Twenhofel
Carl W. Correns	R. Dana Russell	T. Wayland Vaughan
Ralph E. Grim	Henry C. Stetson	Chester K. Wentworth
W. C. Krumbein	L. G. Straub	
P. D. Krynine	Allen C. Tester	

16. Committee on Stratigraphy

Carl O. Dunbar, Chairman	Edwin Kirk	Charles K. Swartz
G. Arthur Cooper	Raymond C. Moore	W. H. Twenhofel
Carey Croneis	John B. Reeside, Jr.	C. E. Weaver
B. F. Howell	L. W. Stephenson	

17. Committee on Tectonics

Chester R. Longwell, Chrm.	D. F. Hewett	George W. Stose
Philip B. King, Vice-Chrm.	Eleanora B. Knopf	W. T. Thom, Jr.
Charles H. Behre, Jr.	A. I. Levorsen	A. C. Waters
William Bowie	T. S. Lovering	Eldred D. Wilson
Walter H. Bucher	George R. Mansfield	A. O. Woodford
Eugene Callaghan	W. H. Monroe	

- - - - -

REPRESENTATIVES OF THE DIVISION ON:

Advisory Council of the Federal Board of Surveys and Maps -
Clarence E. Batschelet

Committee D-5 on Coal and Coke, American Society for Testing Materials--
Taisia Stadnichenko

Note: The Chairman of the Division is, ex officio, a member of all Committees of the Division.

(For Members of the Division, see separate page)

REPORT OF THE CHAIRMAN OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

FOR THE YEAR 1939-1940 *

Chester R. Longwell

Activities of Executive Officers

Since the Chairman and Vice Chairman serve on a non-resident basis, most of their divisional work during the year was carried on by correspondence, largely through the Secretary, Miss Johnson. The Chairman made five trips to Washington to attend bimonthly meetings of the Administrative Committee of the Research Council; in addition, he attended the meeting of the Fellowships Board on March 16, the meeting of the Executive Board on April 24, a special meeting of the Fellowships Board on April 25, and the annual meeting of the Division on April 27. He took part in a meeting of the Committee on the Measurement of Geologic Time held in Cambridge, January 27; spent April 9, 10, and 11 at the meetings of the American Association of Petroleum Geologists in Chicago, to help lead a discussion on the Tectonic Map of the United States; and on May 16 and 17 attended sessions of the 8th American Science Congress in Washington, as a delegate representing the National Research Council and the Geological Society of America.

The officers have given all possible attention to the programs of committees, and have attempted to stimulate and facilitate the work of the committees, which in the last analysis is the work of the Division.

Grants for Committee Conferences

Committee on Measurement of Geologic Time
For travel and other expenses in connection with a meeting held in Cambridge, January 27 - - - - - - - - - - - - - $135.00
(To this was added an unexpended balance of about $100 from last year, held available for the committee.)

Committee on Glacial Map of North America
To cover travel expenses of one member to a meeting held in Minneapolis in December, and to enable the Chairman, R. F. Flint, to hold conferences with members in Ottawa and Washington - $160.00

Committee on Research in Earth Sciences, Geologic Section
Used to cover travel expenses of members in attending a meeting of the committee held in Washington, April 26 - - $ 75.00

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* Presented at the Annual Meeting of the Division, National Research Council, Washington, D. C., April 27, 1940, and since revised to date (June 30, 1940).

(Grants continued)

Committee on Tectonics

To pay expenses of Chairman and Vice Chairman to A.A.P.G. meetings in Chicago in April for conference on the Tectonic Map of the United States - $125.00

Committee on Research in the Earth Sciences, Geographic Section

(a) Travel expenses of the Vice Chairman of the Division, Preston E. James, in conducting a preliminary survey of personnel in the South in connection with problems of land use in the Cotton Belt - $100.00

(b) Balance of $157.80 from previous grant of $500 made to certain Geographic committees for a Knoxville Conference in May, 1939, used for further conference at Ann Arbor, April 13-14, 1940 - ($157.80)

Post-Doctorate Fellowships

The committee for this year was organized with the thought of having a majority of the members in the East, for a possible meeting to discuss candidates for fellowships. The committee consisted of the following members:

Chester R. Longwell (ex officio), Chairman
Preston E. James (ex officio)
Edson S. Bastin
Eliot Blackwelder
Stephen R. Capps
John B. Reeside, Jr.
Louis B. Slichter
Robert B. Sosman
C. Warren Thornthwaite.

Following new rules adopted by the Fellowships Board for this year, applications closed December 15, 1939, were studied by the committee in January and February, and were finally acted on by the Board, March 16. Only candidates who had taken the Ph.D. degree at least a year before December 15 were encouraged to apply. As a result, there were only five applications in Geology and Geography (as compared to eleven last year), of whom two were candidates for reappointment, and two others had not completed work for the doctor's degree. Because of the small number of applicants, a meeting of the committee was not deemed necessary. However, each of the applicants who appeared to be a suitable candidate was interviewed by at least one member of the committee. Four of five applicants were recommended, and the Board awarded fellowships to these four, as follows:

John Nathaniel Adkins (reappointed) - to continue geophysical studies at the Massachusetts Institute of Technology - - - $2000

Daniel I. Axelrod (reappointed) - to continue paleobotanical studies at the U. S. National Museum - - - - - - - - - - - - $2000

Max Demorest - to continue his study of the mineralogy of glacial ice at Yale University - - - - - - - - - - - - - - - - $2000

Felix W. McBryde - to study results of field work done in Honduras, at the Texas Agricultural Experiment Station (later changed to the California Agricultural Experiment Station) - $2000.

Since most members of the Advisory Committee on Fellowships served this year for the first time, few changes were made in the membership for the coming year. The new Chairman and Vice Chairman of the Division - Walter H. Bucher and Richard Hartshorne - will replace the outgoing executive officers as ex officio committee members; and Eliot Blackwelder, who has had three years of active service on the committee, will be replaced by James Gilluly, of the University of California at Los Angeles.

Changes in Technical Committees and Representations

The following committees have completed their programs and are discontinued at the end of this fiscal year:

Committee on Conservation of the Scientific Results of Drilling, W. H. Twenhofel, Chairman

Committee on Geographic Classification of Surface Configuration, V. C. Finch, Chairman

Committee on Government Mapping Agencies, H. M. Leppard, Chairman

Committee on Preparation of a Handbook of Physical Constants of Geological Materials (Interdivisional), Francis Birch, Chairman. This committee has completed the manuscript of the Handbook, which has been accepted by the Geological Society of America for publication during the year.

Committee on Processes of Ore Deposition, W. H. Newhouse, Chairman. This committee has completed the manuscript of a book entitled, "Relations of Ore Deposits to Structural Features", by a number of authors. Negotiations are still under way with publishers but no arrangement for publication has been completed.

In addition, the Correspondent on Shoreline Studies in California - U. S. Grant, 4th, has asked to have his connection with the Division discontinued, because of lack of time.

The following committees have been reorganized for the coming year:

Committee on Research in the Earth Sciences has been separated into the Committee on Geologic Research, Norman L. Bowen, Chairman, and the Committee on Geographic Research, Preston E. James, Chairman. It was felt that the two sections of the former committee had no common interests, and that they would function more effectively as separate committees. *

Committee on Paleobotany: Dr. Roland W. Brown resigned as chairman, and the committee has been reorganized under the chairmanship of Charles B. Read. *

The Committee on Classification of Coal, of the American Society for Testing Materials, has completed its program and has been discontinued. However, Miss Taisia Stadnichenko, who represented the Division on that committee will continue to serve in much the same capacity in Committee D-5 on Coal and Coke of the American Society for Testing Materials.

The following new committees have been set up during the year:

Committee on Glacial Map of North America, R. F. Flint, Chairman. *

Committee on Cooperation with the Soil Survey, Wellington D. Jones, Chairman. *

Committee on Problems of Ore Deposition, T. S. Lovering, Chairman. *

Committee on Landforms, C. Warren Thornthwaite, Chairman. *

In addition to the technical committees just listed, the following served as members of the Nominating Committee during 1939-40:

Parker D. Trask, Chairman
George Tunell
Derwent Whittlesey
C. R. Longwell, ex officio
Ross G. Harrison, ex officio.

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* For Complete Membership of the Division and its Committees for 1940-1941, see four-page list dated July 1, 1940.

Changes and additions of personnel in other committees (a) during the year, or (b) for the coming year*, are as follows:

(a) Committee on Glacial Map of North America: Four additional members, E. T. Apfel, J. W. Goldthwait, M. M. Leighton, G. W. White, and D. A. Nichols of the Canadian Geological Survey, to replace J. T. Wilson, resigned, to enter war service.

Committee on Research in the Earth Sciences (Geographic Section): Four additional members, John B. Appleton, George B. Cressey, Guy-Harold Smith, Stanley D. Dodge.

Committee on Conservation of the Scientific Results of Drilling: Resignation of Captain Lucius D. Clay, due to transfer from Washington.

Committee on Density Currents: Addition of Major A. B. Jones.

Committee on Sedimentation: Addition of W. C. Krumbein.

(b) Executive Committee: (New membership, see Committee list of July 1, '40)

Advisory Committee (composed of past Division Chairmen): Addition of C. R. Longwell.

Committee on Post-Doctorate Fellowships: Three new members, W. H. Bucher, Richard Hartshorne, James Gilluly, to replace C. R. Longwell, P. E. James, and Eliot Blackwelder.

Committee on Glacial Map of North America: Addition of Laurence M. Gould.

Committee on Measurement of Geologic Time: Addition of W. J. Mead.

Committee on Micropaleontology: Addition of T. Wayland Vaughan.

Committee on Sedimentation: Addition of Allen C. Tester.

Committee on Tectonics: Addition of A. O. Woodford, to replace R. D. Reed, deceased.

Representative of the Division on the Advisory Council of the Board of Surveys and Maps of the Federal Government: Clarence E. Batschelet to replace C. W. Thornthwaite.

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* See footnote on page 4.

Foreign Scholars in the United States

In an attempt to help arrange lecture appointments for distinguished foreign geologists and geographers in this country, the Chairman published two notices in Science, inviting these scholars to register with the Division, and suggesting that departments of geology and geography wishing to arrange such lectures get in touch with the Divisional office. A small list of lecturers resulted, and a few departments sent inquiries. However, the real purpose of the effort - to help scholars in need and to institute a useful lecture service - has not been successful.

Classification of Geologists and Geographers

The Committee on Geographic Research has sent a questionnaire to geographers throughout the country, to obtain information that may be used in case of a national emergency. A similar questionnaire is being planned for geologists; but the large number of men in geology makes the task difficult. Preliminary steps have been taken to enlist the aid of the larger geological societies in making a classification and registry that will be fairly complete.

Activities of Committees

Besides the committee conferences previously noted, several committees held meetings in conjunction with the annual meetings of the Geological Society of America and the Association of American Geographers during the Christmas holidays, or at the time of the annual meeting of the Division in April. The programs and accomplishments of the several committees are stated in the reports submitted by the Chairmen (see following list), and will be included in the bound Annual Report of the Division for the year, 1939-40 (Appendices A-T). Most of these Committee reports are available for distribution as separates at this time.

Geologic Reports

Appendix		Chairmen
(A)	Processes of Ore Deposition	W. H. Newhouse
(B)	Micropaleontology	Jos. A. Cushman
(C)	Paleobotany	Roland W. Brown
(D)	Sedimentation	Parker D. Trask
(E)	Glacial Map of North America	R. F. Flint
(F)	Tectonics	C. R. Longwell
(G)	Measurement of Geologic Time	Alfred C. Lane
(H)	Density Currents	Herbert N. Eaton
(I)	Handbook of Physical Constants of Geol. Materials	Francis Birch
(J)	Stratigraphy	Carl O. Dunbar
(K)	Conservation of the Scientific Results of Drilling	W. H. Twenhofel
(L)	Research in the Earth Sciences, Geologic Section	Norman L. Bowen

Geographic Reports

Appendix		Chairmen
(M)	Basic Geographical Data and Techniques	Charles M. Davis
(N)	Geographical Studies of Mineral Distribution	L. F. Thomas
(O)	Cooperation with the Bureau of the Census	John K. Wright
(P)	Geographic Classification of Surface Configuration	V. C. Finch
(Q)	Research in Areas of International Concern	Derwent Whittlesey
(R)	Outline of "A Study of the Cotton Belt Problems"	Preston E. James
(S)	Research Committee, Geographic Section	Richard Hartshorne
(T)	International Geographical Union, National Committee	C. H. Birdseye

Special Reports

(U)	Coal Classification Comm., Amer. Soc. Testing Materials	T. Stadnichenko
(V)	Board of Surveys and Maps, Advisory Council	C. W. Thornthwaite
(W)	Research Program, American Geographical Society	John K. Wright
(X)	Research Program, Amer. Assoc. of Petroleum Geologists	F. H. Lahee

Acknowledgments

During the three years of his service, the Chairman has had full and generous cooperation from members, officers, and committees of the Division. A volunteer organization such as this must depend heavily on the spontaneous interest and friendly team-work of its personnel. At the close of his term the Chairman wishes to pay tribute to and express his gratitude for the fine spirit of helpfulness that has contributed much to the achievement of the Division and has made pleasant the duties of the chairmanship.

Obituary

The Division records with deep regret the death during the past year of four of its colleagues:

Dr. Donald C. Barton - July 8, 1939
Prof. W. A. Tarr - July 28, 1939
Prof. Waldemar Lindgren - November 3, 1939
Dr. Ralph D. Reed - January 29, 1940.

Dr. Lindgren was Chairman of the Division during the year 1927-28, and a Committee Chairman or member of one or more committees for many years; Dr. Barton was a Division member during 1934-37 and a member of the Fellowship Committee for the three years, 1936-39; Dr. Tarr has been a member of the Committee on Sedimentation, and Dr. Reed of the Committee on Tectonics, for many years. Further details are given in the memorial tributes presented in their honor at the annual meeting of the Division, and quoted in full in the minutes of that meeting.

Publications of the Division

At the present time most of the reports of the Division are issued in mimeographed form. During the year 1939-40, the following new reports have been issued:

(Mimeographed) *

Report of the Committee on Sedimentation for 1938-39 - Parker D. Trask, Chairman. September, 1939. 102 pages.

Report of the Committee on Measurement of Geologic Time for 1938-39 - Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chairman. September, 1939. 114 pages.

Annual Report of the Division of Geology and Geography, National Research Council, for the Year 1938-39 - Chester R. Longwell, Chairman. (With Committee Reports, Appendices A - W). December, 1939. 200 pages.

1939-1940 Committee Reports or Special Reports (Appendices A-X), and the Report of the Chairman of the Division of Geology and Geography, Chester R. Longwell, for the year 1939-40. (To be included in the bound Annual Report of the Division for 1939-40.)

Committee Reports of the Division Published by Other Organizations during 1939-40

(Printed)

Recent Marine Sediments. A Symposium edited by Parker D. Trask, and prepared under the auspices of the Committee on Sedimentation (1939). vi + 736 pages. 139 illustrations. Book sold only by the publishers, The American Association of Petroleum Geologists, Box 979, Tulsa, Oklahoma. Price $5.00, (To A.A.P.G. Members and Associates, Colleges and Libraries, $4.00.)

Contributions to a Knowledge of the Lead and Zinc Deposits of the Mississippi Valley Region. Edited by Edson S. Bastin. (Report of the Subcommittee of the Committee on Processes of Ore Deposition.) Published by The Geological Society of America, Special Papers, No. 24 (1939). 156 pages, 4 plates, 27 figures. $1.00. (Sold only by the publishers, G. S. A., 419 West 117th Street, New York, N. Y.)

* For cost, see next page.

Continuation of Physics of the Earth Series
(Issued under auspices of the Division
of Physical Sciences)

Physics of the Earth. VII. Internal Constitution of the Earth. Edited by Beno Gutenberg. Contributors: L. H. Adams, Reginald A. Daly, B. Gutenberg, Harold Jeffreys, Walter D. Lambert, James B. Macelwane,S.J., C. F. Richter, C. E. Van Orstrand, H. S. Washington. Published by the McGraw-Hill Book Co., Inc., New York (1939). 413 pages. $5.00. (Book sold only by the publishers.)

Physics of the Earth. VIII. Terrestrial Magnetism and Electricity. Edited by J. A. Fleming. Contributors: J. Bartels, L. V. Berkner, J. A. Fleming, O. H. Gish, H. D. Harradon, C. A. Heiland, E. O. Hulburt, H. F. Johnston, H. E. McComb, A. G. McNish, W. J. Rooney, B. F. J. Schonland, O. W. Torreson, L. Vegard. Published by the McGraw-Hill Book Co., Inc., New York (1939). 778 pages. $8.00. (Book sold only by the publishers.)

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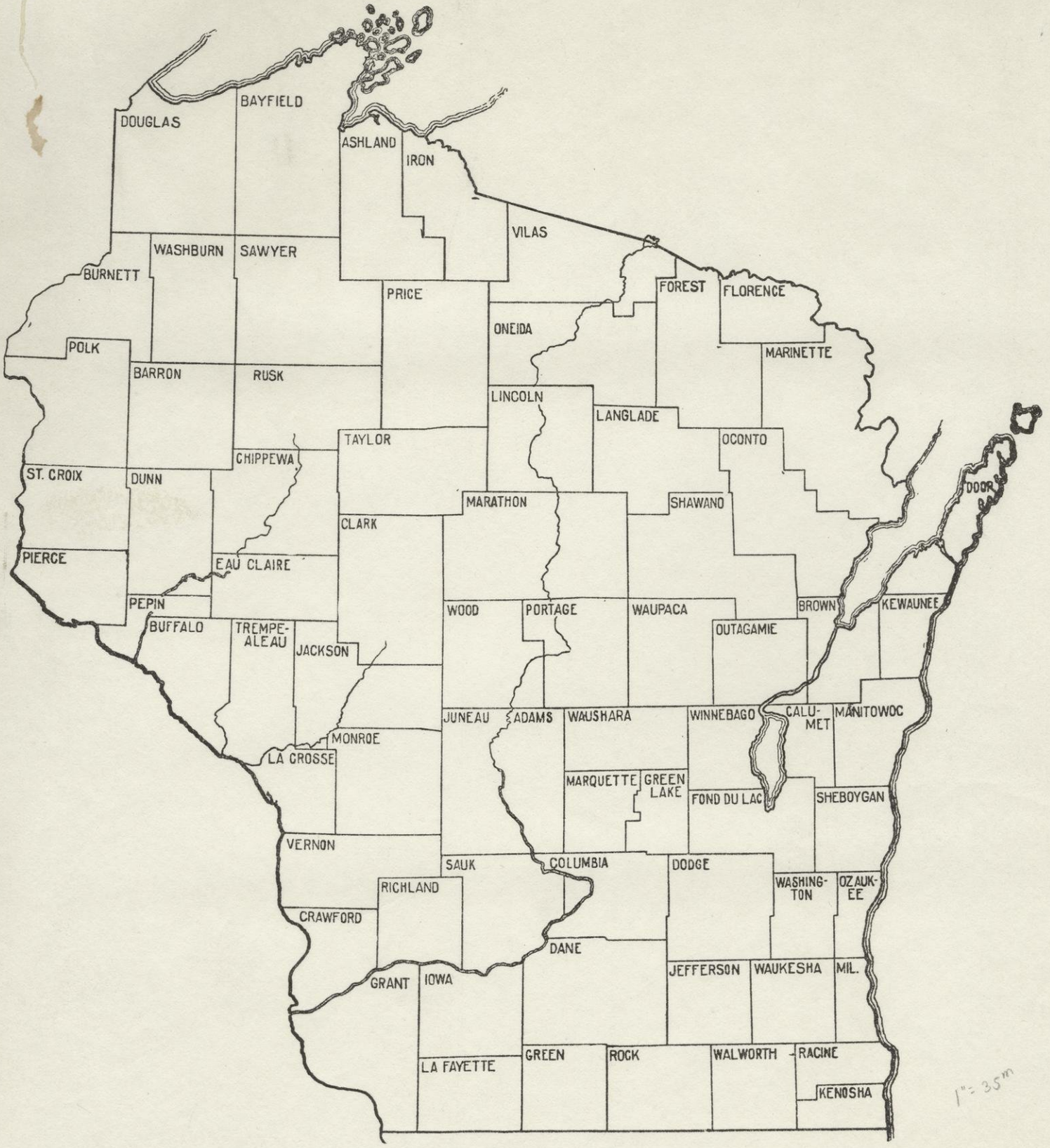
* The mimeographed reports mentioned on the previous page are distributed without charge to Division and Committee members desiring them, but those not connected with the Division are asked to send 15¢ in stamps (not coin) to cover approximate postal and handling charges for any one bound mimeographed report and 5¢ in postage for each additional bound report requested, or to request that the reports be sent Express Collect. A complete list of available National Research Council publications (printed and mimeographed) of interest to Geologists or Geographers may be secured from the office of the Division of Geology and Geography, National Research Council, 2101 Constitution Avenue, Washington, D. C. (Latest list issued by the Division - February 15, 1940.)

In accordance with a policy approved this spring - mimeographed reports of the Division will be sent only on individual request (i.e. not in response to group orders for college classes) since editions are limited and are intended primarily for research workers who have special interest in the particular subjects.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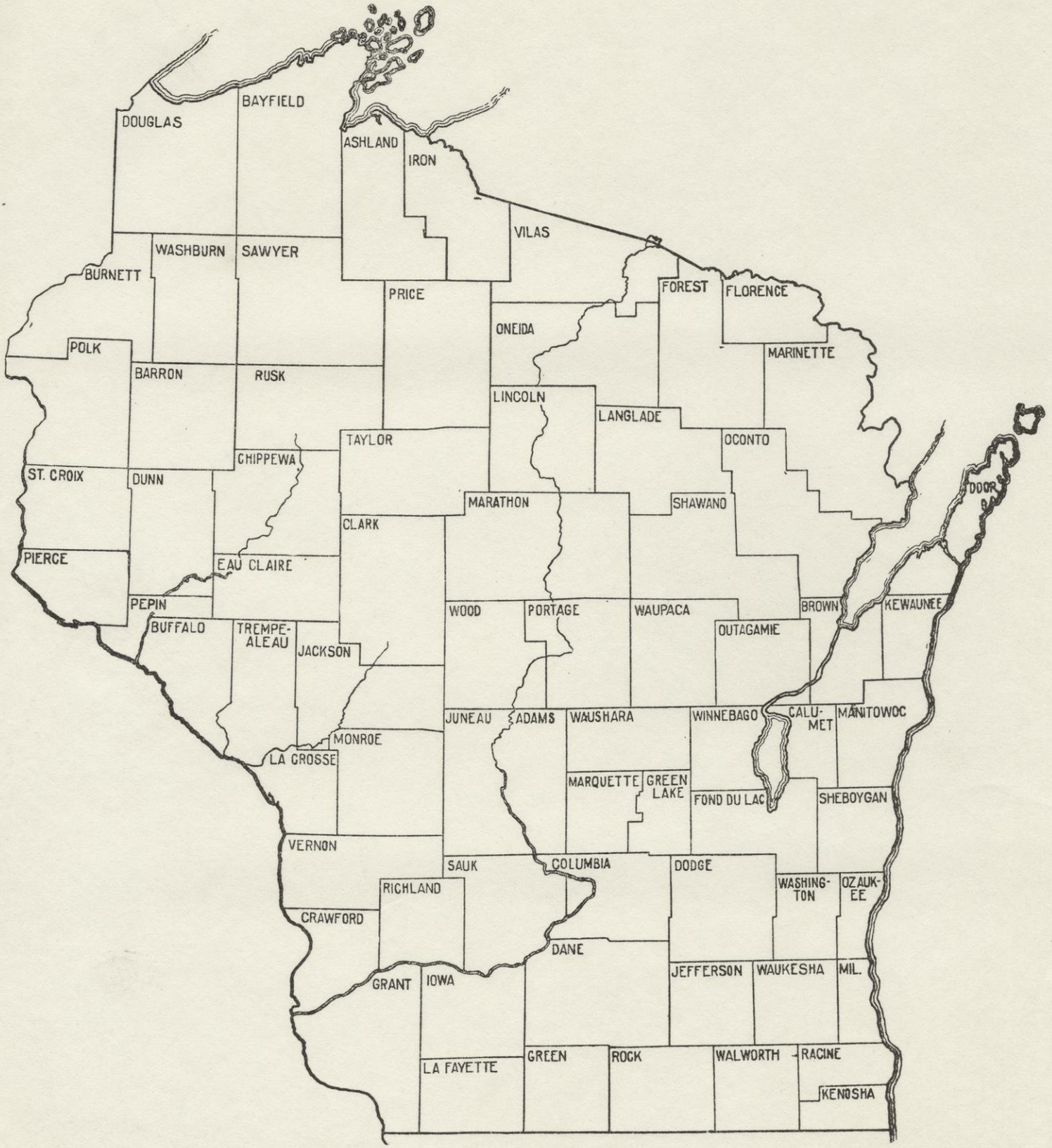
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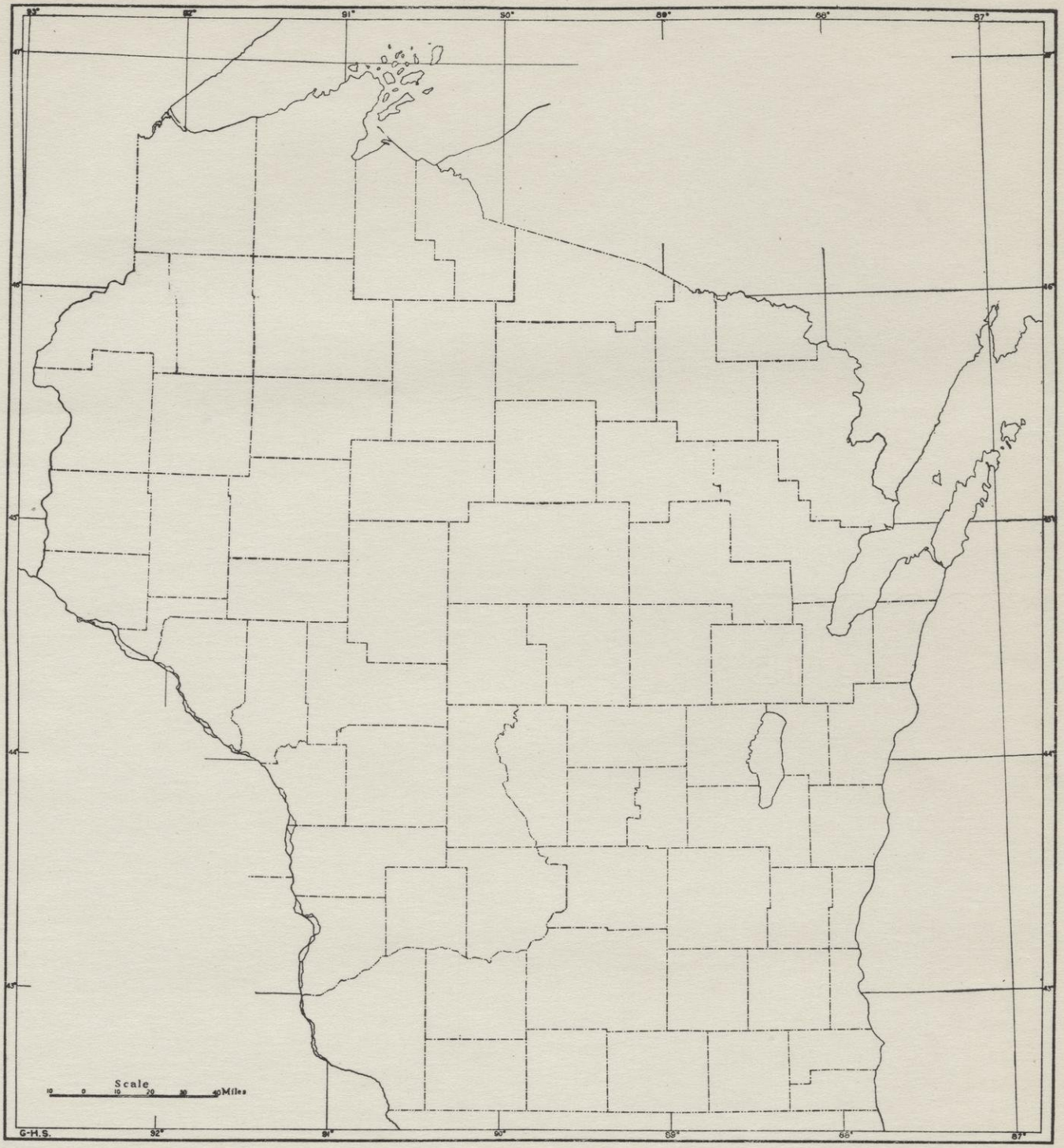
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41 Roby Road,

Aug. 5, 1940

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

I think I informed you on a postcard some time ago of what happened after yours of March 28 came. In short short I was unable to attend to the matter until school was out in June and then I learned that you were in Washington. This I am sending to await your return from the field.

After school was over I let the matter ride until the rush of getting out illustrations for the report on northeastern Wisconsin let up a bit. Not the least of my troubles was to find a base mapwhich showed county lines. As it was it took a full day to get out the sketch I am enclosing. I forebear comment on it for it speaks for itself. I simply could not make anything out of the hodgepodge in northwestern Wisconsin where so many of differing degees of training and of interest have tried their hands!

With humblest apologies,

Sincerely,

YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

March 28, 1940

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

Many thanks for the information on the rise of the upper limit of the drift near Baraboo. I have never been there, and I hope some time to see that remarkable district.

During the recent Washington conference mentioned in the inclosed circular letter, both Alden and Matthes expressed doubt as to the amount of detail that could be shown on a scale of 50 or 60 miles to the inch, although Capps felt confident that adequate detail could be shown. I quoted your opinion, expressed in correspondence and at our Minneapolis meeting, that such a scale was adequate even for the rather complicated features in Wisconsin. They asked me whether you would be willing to prepare a sort of demonstration map of a part of Wisconsin (using as a base, say, Renshawe's shaded physical map of the United States, which is about 50 miles to the inch), showing 2 or more drift borders, striae, drumlin axes, end moraines, and possibly glacial lake boundaries. I am writing now to ask whether you would be willing to do this. It would be a great service to the Committee, in that I know the successful demonstration would spur Alden, never a fast mover, to proceed with his contribution. It could also be sent around to other members of the Committee

If you would undertake this favor, would you send it to me as soon as you conveniently can, and I will circularize the Committee with it, beginning with Alden, and eventually returning it to you. Many thanks for your help.

Sincerely,

Flint
Richard Foster Flint

Letter No. 3.

YALE UNIVERSITY

New Haven, Connecticut

March 29, 1940

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA: Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint):

Dear Thwaites,

1. The National Research Council has confirmed the nomination of the following to membership in the Committee:

E. T. Apfel, Syracuse University
J. W. Goldthwait, Dartmouth College
M. M. Leighton, Illinois Geological Survey
D. A. Nichols, Geological Survey of Canada (to replace J. T. Wilson, resigned)
G. W. White, University of New Hampshire

2. Dr. Leighton has agreed to become responsible for the Illinois data, not yet assigned at the time the last letter was sent out on January 22.

3. I had a very encouraging conference with the Canadian members of the Committee (Messrs. Bostock, Nichols, Norman, and Young) in Ottawa on February 8 and 9, to consider the special problems involved in assembling the Canadian glacial data. Dr. Young, who is directing the work of the Canadian members of the Committee, stated that with the probability of help from other members of the staff of the Geological Survey of Canada, preliminary maps of Canadian glacial features could probably be furnished at the time of the next Committee meeting in December 1940. The amount of unpublished material available at the Survey is impressive.

4. On March 19 I had a conference with the U. S. Geological Survey members of the Committee (Messrs. Alden and Capps) in Washington. Mr. F. E. Matthes also participated. Problems of representation and scale were discussed. It was learned that essentially the only unpublished data in the Survey files pertain to New England. With the permission of the Chief Geologist, this information will be made available for incorporation in the map. The suggestion was made that the preliminary manuscript maps be prepared on a base with scale of the order of 1:1,000,000 rather than 1:500,000, so as to avoid the necessity of eliminating much information when the map is redrafted to final scale. In some regions this may be very desirable, and I wish to draw attention to it while leaving the choice of scale to the individual judgment of each member.

5. In the Ottawa and Washington conferences, the desirability of keeping full reference to all published and unpublished sources of information was strongly emphasized. The opinion seems to be general that these sources ought to be published in connection with the final map.

6. As the situation now stands, the assignment of individual regions to members is as follows:

CANADA	Bostock, Nichols, Norman, Young (supervisor)
NEWFOUNDLAND	MacClintock
ALASKA	Capps

UNITED STATES	
New England	Goldthwait
New Jersey and Pennsylvania	MacClintock
New York	Apfel
Ohio, Indiana, & northern Kentucky	White
Illinois	Leighton
Michigan, Wisconsin, & Minnesota	Thwaites
Iowa, Missouri, Kansas, & Nebraska	Kay
North Dakota, South Dakota, & Montana	Alden
Northern Idaho, & Washington	Flint
Local Cordilleran areas in the U. S.	Not yet assigned
Distribution of loess	Apfel

7. I have already spent some time on my compilation of Washington and Idaho data. On the basis of this experience, I urge the members to begin on their compilations as soon as possible, both because collecting and checking published references takes time, and because the job necessitates correspondence in gathering unpublished information.

8. For the information of Canadian members, I record the fact that four published American maps give data on striae in Canada. These are:

Upham, W., U. S. Geol. Survey, Monogr. 25, 1895, Pl. 16, opp. p. 110.
Dana, J. D., Manual of Geology, New York, 1895, foll. p. 944.
Leverett, F., U. S. Geol. Survey, Monogr. 38, 1899, Pl. 1, foll. p. 2.
Chamberlin, T. C., & Salisbury, R. D., Geology, vol. 3, 1906, Fig. 470, p. 331.

Please do not hesitate to call on me wherever I can be helpful in matters concerned with the compilations. I consider it a part of my job to act as clearing house and, if necessary, liaison officer, during the periods between our meetings.

With good wishes for the work of compilation,

Sincerely yours,

Flint

Richard Foster Flint,
Chairman

Oct 19, 39

Dear Thwaites,

Thanks for your prompt + very helpful comments. Only one point is not clear: which map in your Outline do you refer to as showing all outwash? Is it some separate map not bound into the book?

I think we are going to have much good material for discussion.

Sincerely,

Flint

NEW HAVEN
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Mr. F. T. Thwaites
41 Roby Road
Madison
Wis.

NEW HAVEN
OCT 19
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1939
CONN.

March 12, 1940

Prof. Richard Foster Flint,
Dept. of Geological Science,
Yale University,
New Haven, Connecticut

Dear Flint:

Reply to yours of the 4th had to wait until I could go to the library. Thank you for the correction of the instructions. I must confess that seeing as this is the busiest part of the year I have not done anything on the compilation of the new map except to send you a copy of one of the illustrations for the report on northeastern Wisconsin. The big map for that is, however, almost done so compilation from it is easy. I am glad to get out of having to do Illinois as Leighton can doubtless supply corrections from material not available here. I am figuring on doing some field work in northwestern Wisconsin possibly the latter part of the summer. I hope that with the aerials and what ground surveys are available I can check up very rapidly. I am working on a new type of stereoscope which will, I hope, facilitate mapping direct from the photos.

With regard to Devils Lake the first reference to the course of the moraine is in Bull. 5 of the Wisconsin Survey by Salisbury and Atwood. This is quoted by Alden in Prof. Paper 106 on pp. 214-215. However, the elevations used have been proved to be decidely in erro. I tablulated today the following: from west of Baraboo to Point Sauk assumed at 1620 a rise of 620 feet in 6½ miles; from Devils Lake to Point Sauk 560 feet in 3½ miles; from Devils Lake to Devils Nose 370 feet in one mile; from south side of quartzite to Devils Nose 470 feet in two miles; from south side to Point Sauk 660 feet in 4½ miles.

All of the glacial margin with the exception of the parts on very steep valley walls is marked by a moraine ridge on top of which is a trail worn by the feet of generations of geology students! I used the crest of this ridge for both elevations and distances. The elevation of Point Sauk has not been checked nor has that west of Baraboo but the others were taken from maps made by my students with telescopic alidade and plane table. Have not you ever seen the view of the moraine from East Bluff where the difference in vegetation makes it stand out like a diagram? I go up there in a month with a class of 29 to do topographic mapping for eight days. This year we will have aerial photos to help us.

With best regards,

Sincerely,

F. T. Thwaites

YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

March 4, 1940

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

Dr. Leighton, having accepted membership on the Committee on Glacial Map of North America, has agreed to furnish the map of Illinois. This releases you from responsibility concerning Illinois, but I want to thank you for the offer you made to undertake that work should it have been necessary.

Regarding your query dated January 25: No. 8 on the sheet of map conventions attached to my circular letter of January 22 should read: "...boundaries inclosing areal convention where underlying drift sheet is concealed."

In your Outline of Glacial Geology, 1939, p. 17, you cite inferred marginal slopes on a former ice sheet near Baraboo. Would you refer me to the published source, if any? If the information is unpublished, I would be interested to learn whether (a) Wisconsin ice is inferred, (b) the evidence consists of drift or erosional features, and (c) you consider the figure a close approximation or merely a minimum that may be well below the actual former ice surface. This is all just a matter of curiosity, as I have been collecting similar data wherever I could find them. I have published some figures for northeastern Washington in my paper Pleistocene drift border in eastern Washington, 1937, p. 227-228.

I hope you are finding the task of compilation to be not too much of a burden.

With good wishes,

Sincerely,

Flint
Richard Foster Flint

MR. THWAITES - Committee Member.

NEW YORK OFFICE
Engineering Societies Building, 29 West 39th Street

CABLE ADDRESS
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

February 26, 1940

TO MEMBERS OF THE DIVISION OF GEOLOGY AND GEOGRAPHY AND ITS COMMITTEES

Enclosed is a copy of the latest list of "Publications of the National Research Council of Interest to Geologists or Geographers", and on pages 4-5 is given the table of contents of the Annual Report of the Division for 1938-39, which it is expected will be ready for distribution within a few weeks. Copies of the annual report will be sent to Division members and Committee chairmen, and will be sent to Committee members who indicate their desire for the report by filling in and returning the enclosed postal card. Copies of the reports of Committees of which you were a member during 1938-39 were previously sent you either during the summer or fall. The titles of the latest bound mimeographed reports of the Division are given on pages 3-4 of the enclosed list, and include the 1938-39 reports of the Committees on (1) Sedimentation, and (2) Measurement of Geologic Time.

Enclosed are lists of the membership of the Division and its Committees as constituted to date. One new geologic committee was organized last fall, that on Glacial Map of North America, R. F. Flint, Chairman.

For several years, the Annual Meeting of the Division has been held in Washington on the last Saturday in April, following the meetings of the National Academy of Sciences and the American Geographical Union. The meetings of the National Academy and the American Geophysical Union this year will be held during the week of April 21-27, and it therefore seems advisable to hold the annual meeting of the Division on Saturday, April 27, 1940, beginning at 9:30 a.m.

In order that the short Committee reports, and summaries or abstracts of the longer ones, may be mimeographed and distributed in advance of the annual meeting, Committee Chairmen are asked to transmit their reports, or if more than a couple pages, summaries of a page or less, by April first. Since only a short time remains before April first, it is urged that serious thought be given by Committee Chairmen to the preparation of these reports at an early date. At the time the summary report is sent in, the Division Chairman wishes to know each Committee Chairman's recommendation regarding continuance or discontinuance of his Committee, and, if continuance is recommended, whether or not any change in personnel is desirable. As most of you know, it is the policy of the Division to give a new committee a three-year term to accomplish its task, after which it should take stock of its accomplishments to see whether a definite need can be filled by its continuance. If so, it should be continued; if not, it should be discontinued to make way for new committees

with definite programs. It is also urged that the committees be composed of active members who are willing to share in the work, and if it seems advisable to reorganize the personnel from time to time in order to accomplish more active membership, that this matter be given serious consideration by the Committee Chairmen.

Some Committee Chairmen find it desirable to hold a meeting of their committees in Washington about the time of the annual meeting. Although the Division is not able to assist in the expense of such meetings, it is usually found that several members of a committee are in Washington at that time, and a brief meeting can be held during the luncheon hour of the annual meeting if no other time seems available. (A Washington member of the committee concerned is usually willing to make the necessary arrangements for such a luncheon meeting.) A request for Conference funds for committee meetings of exceptional importance may also be made by Committee Chairmen in consulation with the Division Chairman. Requests for any such funds would have to be acted upon by the National Research Council at its Administrative Committee meeting to be held April 6, and since a certain amount of preliminary consideration is first needed on the part of the Executive Committee of the Division, it is urged that any Committee Chairmen contemplating asking for funds for important committee meetings to be held in April send in their requests to me by March 25.

In addition to Division Members and Committee Chairmen, Committee Members are cordially invited to attend the annual meeting of the Division. The Division cannot, however, assist in the payment of traveling expenses to any except the Division Members and the Committee Chairmen. At a little later date further details will be sent regarding the annual meeting on April 29, and the subscription dinner to be held following the meeting (except to out-of-town Committee members who are welcome, but probably will not be able to come and thus not be interested in further details).

Sincerely yours,

Chester R. Longwell

CRL:J

Enclosures

Chester R. Longwell,
Chairman, Division of
Geology and Geography

P.S. You may be interested in knowing that the Fellowship Committee of the Division is now giving consideration to applications for Post-Doctorate Fellowships of the National Research Council in the fields of Geology, Paleontology, and Physical Geography. Announcement of final awards in all fields can probably be made at the annual meeting of the Division, or possibly earlier. The closing date for receipt of applications for the year 1940-41 was December 15, 1939.

NATIONAL RESEARCH COUNCIL - WASHINGTON, D. C.

ORGANIZATION OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

July 1, 1939 - June 30, 1940

OFFICERS

Chairman, Chester R. Longwell
Vice-Chairman, Preston E. James

EXECUTIVE COMMITTEE

Chester R. Longwell, Chairman	Preston E. James, Vice-Chairman
Edson S. Bastin	Charles C. Colby
Stephen R. Capps	George Tunell

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MEMBERS OF THE DIVISION

Representatives of Societies

Geological Society of America
John L. Rich (40)*
Stephen R. Capps (41)

Mineralogical Society of America
George Tunell (42)

Paleontological Society
Charles E. Resser (41)

Association of American Geographers
Preston E. James (40)
C. Warren Thornthwaite (41)

American Geographical Society
Charles B. Hitchcock (42)

Society of Economic Geologists
Edson S. Bastin (40)

American Association of Petroleum Geologists
Frederic H. Lahee (40)

American Ceramic Society
Robert B. Sosman (42)

Members at Large

Norman L. Bowen (41)
Charles C. Colby (42)
Chester R. Longwell (40)

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(For Committees and Representatives, see separate list)

* Date of expiration of term of office.

NATIONAL RESEARCH COUNCIL

COMMITTEES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, 1939-1940 #

Executive Committee

Chester R. Longwell, Chairman	Edson S. Bastin	Charles C. Colby
Preston E. James, Vice-Chairman	Stephen R. Capps	George Tunell

Advisory Committee to the Division

Chester R. Longwell, Chairman	Arthur Keith	Edward B. Mathews
Edson S. Bastin	Andrew C. Lawson	W. H. Twenhofel
Nevin M. Fenneman	* Waldemar Lindgren	

Advisory Committee on National Research Council Post-Doctorate Fellowships in Geology, Paleontology, and Physical Geography

Chester R. Longwell, Chairman	Eliot Blackwelder	Louis B. Slichter
Preston E. James, Vice-Chairman	Stephen R. Capps	Robert B. Sosman
Edson S. Bastin	John B. Reeside, Jr.	C. Warren Thornthwaite

National Committee of the United States, International Geographical Union

C. H. Birdseye, Chairman	Preston E. James	Lawrence Martin
S. Whittemore Boggs	W. L. G. Joerg	John K. Wright

Technical Committees

1. Committee on Basic Geographical Data and Techniques

Charles M. Davis, Chairman	Robert S. Platt	C. Warren Thornthwaite
G. Donald Hudson	L. R. Schoenmann	

2. Committee on Conservation of the Scientific Results of Drilling

W. H. Twenhofel, Chairman	F. H. Lahee	E. K. Sellards
T. M. Broderick	H. S. McQueen	W. T. Thom, Jr.
Marcus A. Hanna	O. E. Meinzer	L. E. Workman

3. Committee on Cooperation with the Bureau of the Census

John K. Wright, Chairman	W. L. G. Joerg	C. Warren Thornthwaite
O. E. Baker	Lawrence Martin	
Stanley D. Dodge	Guy-Harold Smith	

4. Committee on Density Currents (Interdivisional)

Herbert N. Eaton, Chairman	C. S. Howard	H. Peters
J. H. Bodine	Chancey Juday	C. S. Scofield
Reginald A. Daly	Major A. B. Jones	F. P. Shepard
C. C. Elder	Robert T. Knapp	J. K. G. Silvey
M. M. Ellis	L. M. Lawson	H. U. Sverdrup
N. C. Grover	W. C. Lowdermilk	C. P. Vetter
Raymond A. Hill	(alternate)-	A. H. Wiebe
P. V. Hodges	G. C. Dobson	

As of February 24, 1940.

* Deceased.

5. Committee on Geographic Classification of Surface Configuration

V. C. Finch, Chairman	Samuel N. Dicken	Guy-Harold Smith
Kirk Bryan	Richard Joel Russell	C. Warren Thornthwaite
George B. Cressey		

6. Committee on Geographical Studies of Mineral Distribution

L. F. Thomas, Chairman	John W. Frey	J. Russell Whitaker
Charles H. Behre, Jr.	Walter H. Voskuil	

7. Committee on Glacial Map of North America

R. F. Flint, Chairman	J. W. Goldthwait	D. A. Nichols
W. C. Alden	G. F. Kay	G. W. H. Norman
E. T. Apfel	M. M. Leighton	F. T. Thwaites
H. S. Bostock	Frank Leverett	G. W. White
S. R. Capps	Paul MacClintock	G. A. Young

8. Committee on Government Mapping Agencies

H. M. Leppard, Chairman	Charles B. Hitchcock	Guy-Harold Smith

9. Committee on the Measurement of Geologic Time

Alfred C. Lane, Chairman	Frank L. Hess	*Waldemar Lindgren
John Putnam Marble, Vice-Chrm.	Arthur Holmes	Charles S. Piggot
Gregory P. Baxter	Adolph Knopf	T. L. Walker
H. V. Ellsworth	A. F. Kovarik	Roger C. Wells

10. Committee on Micropaleontology

Joseph A. Cushman, Chairman	Henry V. Howe	Helen J. Plummer
Carey Croneis	B. F. Howell	W. P. Woodring
Alva C. Ellisor	Raymond C. Moore	
G. Dallas Hanna	M. L. Natland	

11. Committee on Paleobotany

Roland W. Brown, Chairman	Erling Dorf	Herbert L. Mason
Chester A. Arnold		

12. Committee on Preparation of a Handbook of Physical Constants of Geological Materials (Interdivisional)

Francis Birch, Chairman	H. Cecil Spicer	H. H. Willard
J. F. Schairer		

13. Committee on Processes of Ore Deposition

W. H. Newhouse, Chairman	B. S. Butler	* Waldemar Lindgren
Edson S. Bastin	L. C. Graton	G. F. Loughlin
Charles H. Behre, Jr.	D. F. Hewett	T. S. Lovering
W. S. Burbank		

14. Committee on Research in Areas of International Concern

Derwent Whittlesey, Chairman	S. Whittemore Boggs	Robert S. Platt
John B. Appleton	Charles C. Colby	

* Deceased.

15. Committee on Research in the Earth Sciences

Norman L. Bowen, Chairman	Preston E. James	Robert S. Platt
Richard Hartshorne, Vice-Chrm.	A. I. Levorsen	T. Wayland Vaughan
Ralph H. Brown	Chester R. Longwell	Derwent Whittlesey
Charles C. Colby	T. S. Lovering	
Robert B. Hall	Lawrence Martin	

16. Committee on Sedimentation

Parker D. Trask, Chairman	H. B. Milner	* W. A. Tarr
Carl B. Brown	F. J. Pettijohn	A. C. Trowbridge
Carl W. Correns	R. Dana Russell	W. H. Twenhofel
Ralph E. Grim	Henry C. Stetson	T. Wayland Vaughan
W. C. Krumbein	L. G. Straub	Chester K. Wentworth
P. D. Krynine		

17. Committee on Stratigraphy

Carl O. Dunbar, Chairman	Edwin Kirk	Charles K. Swartz
G. Arthur Cooper	Raymond C. Moore	W. H. Twenhofel
Carey Croneis	John B. Reeside, Jr.	C. E. Weaver
B. F. Howell	L. W. Stephenson	

18. Committee on Tectonics

Chester R. Longwell, Chairman	D. F. Hewett	* Ralph D. Reed
Philip B. King, Vice-Chairman	Eleanora B. Knopf	George W. Stose
Charles H. Behre, Jr.	A. I. Levorsen	W. T. Thom, Jr.
William Bowie	T. S. Lovering	A. C. Waters
Walter H. Bucher	George R. Mansfield	Eldred Wilson
Eugene Callaghan	W. H. Monroe	

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Correspondent on Shoreline Studies in California - U. S. Grant, 4th.

REPRESENTATIVES OF THE DIVISION ON:

Advisory Council of the Federal Board of Surveys and Maps -
C. Warren Thornthwaite

Committee on Classification of Coal, American Society for Testing Materials -
Taisia Stadnichenko

* Deceased.

Note: The Chairman of the Division is, ex officio, a member of all Committees of the Division.

(For Membership of the Division, see separate page.)

PUBLICATIONS OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
OF INTEREST TO GEOLOGISTS OR GEOGRAPHERS *

February 15, 1940

Bulletin Series (Printed)

No.

36. Catalogue of published bibliographies in geology, 1896-1920. Compiled by Edward B. Mathews. October, 1923. 228 pages. $0.15. #

51. Radioactivity. A. F. Kovarik and L. W. McKeehan. Second printing. With additions and corrections. March, 1929. 203 p. $2.50.

70. Report on studies of mean sea-level. Report of the Committee on Shoreline Investigations. Douglas Johnson. July, 1929. 50 p. $0.50.

77. Physics of the Earth. I. Volcanology. Day, Friedlaender, Jaggar and Sapper. February, 1931. vii + 77 p. Cloth, $1.00.

78. Physics of the Earth. II. The figure of the Earth. Rude, Doodson, Schureman, Marmer, Lambert, Bowie, Reid, Swick, Barton, Parkhurst, Dutton, Avers, Hodgson, Schlesinger and Brown. February, 1931. vi+286 p. Paper, $3.00; cloth, $3.50.

80. Physics of the Earth. IV. The age of the Earth. Knopf, Schuchert, Kovarik, Holmes and Brown. June, 1931. vi + 487 p. Paper, $4.50; cloth, $5.00.

82. List of seismological stations of the world. Second Edition. H. E. McComb and Clarence J. West. April, 1931. 119 p. $1.50.

85. Physics of the Earth. V. Oceanography. Heck, Littlehales, Collett, Thompson, Robinson, Patton, Marmer, McEwen, Schumacher, Soule, Parker, Iselin, Brooks, Huntsman and Schuchert. June, 1932. vi + 581 p. Cloth, $5.00.

88. Summary information on the state geological surveys and the United States Geological Survey. Compiled under the direction of the National Research Council Committee on State Geological Surveys. By M. M. Leighton. November, 1932. 136 p. $1.00.

89. Report of the Committee on Sedimentation, 1930-1932. Prepared under the auspices of the Division of Geology and Geography, National Research Council. November, 1932. 229 p. $1.00. (Contains also the first report of the Committee on Accessory Minerals of Crystalline Rocks, A.N.Winchell, Chairman, and "The classification and terminology of the pyroclastic rocks" by Chester K. Wentworth and Howel Williams.)

90. Physics of the Earth. VI. Seismology. Macelwane, Wood, Reid, Anderson and Byerly. October, 1933. 223 p. Paper, $2.00; cloth, $2.50.

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* Only those reports listed that are still available.
\# Reduced price covers estimated cost of postage and handling only.

No.

94. Fellowships and scholarships for advanced work in science and technology. Third edition. Callie Hull & Clarence J. West. June, 1934. 194 p. $1.00.

95. Funds available in the United States for the support and encouragement of research in science and its technologies. Third edition. Callie Hull and Clarence J. West. June, 1934. 162 p. $1.00.

98. Report of the Committee on Sedimentation, 1932-1934. Prepared under the auspices of the Division of Geology and Geography, National Research Council. July, 1935. 246 p. $1.00. (Includes "The terminology of coarse sediments" by C. K. Wentworth, with notes by P. G. H. Boswell.)

101. Handbook of scientific and technical societies and institutions of the United States and Canada. Third edition. United States section compiled by Callie Hull. Canadian section compiled by S. J. Cook and E. R. Berry. October, 1937. 284 p. Paper, $3.00.

102. Industrial research laboratories of the United States, including consulting research laboratories. Sixth edition. Compiled by Callie Hull. December, 1938. 270 p. Cloth, $3.00.

Reprint and Circular Series (also printed)

27. List of manuscript bibliographies in geology and geography. Compiled by Homer P. Little. February, 1922. 17 p. $0.25.

43. Functions of the Division of Geology and Geography of the National Research Council. Nevin M. Fenneman. December, 1922. 7 p. $0.20.

92. Report of the Committee on Sedimentation, 1928-1929. Prepared under the auspices of the Division of Geology and Geography. May, 1930. 122 p. $1.00.

98. Report of the Committee on Sedimentation, 1929-1930. Prepared under the auspices of the Division of Geology and Geography. July, 1931. 97 p. $1.00.

100. In quest of glacial man. A plan of cooperation between excavators and the representatives of the sciences of man and of the earth. Madison Bentley. August, 1931. 20 p. $0.40.

105. Doctorates conferred in the sciences by American universities, 1932-1933. Compiled by Callie Hull and Clarence J. West. August, 1933. 63 p. $0.50.

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A complete list of the publications in the Bulletin and Reprint and Circular Series will be furnished on request. Orders, accompanied by remittance, should be addressed to NATIONAL RESEARCH COUNCIL, Washington, D. C.

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For information regarding the Transactions of the American Geophysical Union, address inquiries to: The General Secretary, American Geophysical Union, 5241 Broad Branch Road, Northwest, Washington, D. C.

OTHER PRINTED PUBLICATIONS ORIGINALLY ISSUED UNDER THE AUSPICES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.

ANNOTATED BIBLIOGRAPHY OF ECONOMIC GEOLOGY. Originally prepared under the auspices of the Committee on Economic Geology, Waldemar Lindgren, Chairman. Annual Volumes I-XII (1) issued to date. Remittances should be made payable to the Economic Geology Publishing Company, and sent to W. S. Bayley, University of Illinois, Urbana, Illinois. Subscriptions $5.00 per year in the United States and U. S. Possessions. (Sponsorship of this bibliography transferred on July 1, 1936 by the National Research Council to the Society of Economic Geologists.)

TREATISE ON SEDIMENTATION. Second edition, completely revised (1932). Prepared under the auspices of the Committee on Sedimentation, W. H. Twenhofel, Chairman. xxvi + 914 pages. 121 illustrations. Price $8.00. Book sold only by the publishers, The Williams and Wilkins Company, Baltimore, U. S. A.

RECENT MARINE SEDIMENTS. A SYMPOSIUM edited by Parker D. Trask, and prepared under the auspices of the Committee on Sedimentation (1939). vi + 736 pages. 139 illustrations. Book sold only by the publishers, The American Association of Petroleum Geologists, Box 979, Tulsa, Oklahoma. Price $5.00. (To A.A.P.G. Members and Associates, Colleges and Libraries, $4.00).

MILITARY GEOLOGY AND TOPOGRAPHY. Herbert E. Gregory, Editor. 1918. 281 pages. Book sold by the publishers, Yale University Press, New Haven, Conn. $1.25.

RECENT REPORTS OF THE DIVISION OF GEOLOGY AND GEOGRAPHY (STILL AVAILABLE) ISSUED IN BOUND MIMEOGRAPHED FORM

(No charge, unless so stated, except stamps to cover approximate postage and handling. 15¢ for any one report, and 5¢ for each additional bound report; or ask to have the reports sent Express Collect.)

REPORTS OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME - Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chairman. (1) May 2, 1936 (87 pages); (2) May 1, 1937 (77 pages); (3) April 30, 1938 (123 pages); (4) April 29,1939 (114 pages); and (5) Reprint of the 1933, 1934 and 1935 reports, bound in one volume (225 pages). (Supply of earlier reports exhausted.)

REPORTS OF THE COMMITTEE ON SEDIMENTATION - Parker D. Trask, Chairman. (1) for 1935-36, with report also of the Subcommittee on "Terminology of Medium-Grained Sediments" by Victor T. Allen. (Issued September, 1936). 47 pages. (2) for 1936-37, with "Terminology of the Fine-Grained Mechanical Sediments" by W. H. Twenhofel. (Issued October, 1937). 128 pages. (3) for 1937-38 with "Terminology of the Chemical Siliceous Sediments" by W. A. Tarr. (Issued Septeber, 1938). 114 pages. (4) for 1938-39. 102 pages. (Issued September, 1939). (Earlier reports printed. See Bulletins 89 & 98; Reprint & Circular Series, Nos. 92 & 98.)

REPORTS OF THE COMMITTEE ON PALEOECOLOGY - W. H. Twenhofel, Chairman.
(1) for 1935-36. (Issued October, 1936). 64 pages.
(2) for 1936-37. (Issued December, 1937). 63 pages. (Final report.)

BATHOLITH COMMITTEE REPORTS ("Re-run" editions, 1938) - Frank F. Grout, Chairman.
(1) 1933, "Problems of the Batholiths" (59 pages); (2) 1935, "Annotations of Selected Papers on the Mechanics of Igneous Invasion" (54 pages), and (3) 1935, "Comments on Magmatic Stoping" (47 pages).

REPORT OF THE COMMITTEE ON STRUCTURAL PETROLOGY, 1937 - T. S. Lovering, Chairman. (Issued October, 1938). 103 pages. (Final report of this Committee.)

SUGGESTIONS CONCERNING DESIRABLE LINES OF RESEARCH IN THE FIELDS OF GEOLOGY AND GEOGRAPHY. Edited by Edson S. Bastin for Physical Geology, Carl O. Dunbar for Paleontology and Stratigraphy, and Robert S. Platt for Geography. (Issued December, 1936). 83 pages.

REPORT OF THE INTERDIVISIONAL COMMITTEE ON BORDERLAND FIELDS BETWEEN GEOLOGY, PHYSICS AND CHEMISTRY, 1937. T. S. Lovering, Chairman. (Issued March, 1938). 73 pages. (Final report of this Committee.)

ANNUAL REPORT OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, Washington, D. C., for the year 1938-1939. Contains list of Members of the Division and its Committees, Minutes of Annual Meeting, Chairman's Report (Chester R. Longwell), and reports from Committee Chairmen for the following committees: (Appendices A-W): (A few copies left of Annual Report for 1936-1937, and 1937-38, but only file copies left of most of the Annual Reports for previous years.)

1938-1939 Committee Reports (Geologic)

		Pages
(A)	Measurement of Geologic Time (preliminary)* - A. C. Lane, Chairman	10
(B)	Sedimentation (preliminary)* - Parker D. Trask	10
(C)	Paleobotany - Roland W. Brown	24
(D)	Micropaleontology - Joseph A. Cushman	9
(E)	Conservation of the Scientific Results of Drilling - W. H. Twenhofel	15
(F)	Processes of Ore Deposition - W. H. Newhouse	1
(G)	Handbook of Physical Constants of Geological Materials - F. Birch	1
(H)	Density Currents - Herbert E. Eaton	6
(I)	Stratigraphy - Carl O. Dunbar	1
(J)	Tectonics - Chester R. Longwell	1
(K)	Research Committee, Geologic Section - Norman L. Bowen	25

Geographic Reports

(L)	Cooperation with the Bureau of the Census - John K. Wright	1
(M)	Geographic Classification of Surface Configuration - V. C. Finch	5
(N)	Research in Areas of International Concern - Derwent Whittlesey	2

Bound Annual Report of the Division, 1938-39, expected to be ready for distribution in March, 1940. * Complete report issued separately (see page 3).

1938-1939 Geographic Committee Reports (continued)

		Pages
(O)	Basic Geographical Data and Techniques - Charles W. Davis	5
(P)	Geographical Studies of Mineral Distribution - L. F. Thomas	1
(Q)	International Geographical Union, National Comm. - W. L. G. Joerg	4
(R)	Research Committee, Geographic Section - P. E. James (Acting)	15

Special Reports

(S)	Board of Surveys and Maps - C. W. Thornthwaite	1
(T)	Water Well Drillers Association - O. E. Meinzer	2
(U)	Coal Classification Committee, A. S. T. M. - Taisia Stadnichenko	1
(V)	Research Program, American Geographical Society - John K. Wright	2
(W)	Research Program, Amer. Assoc. of Petroleum Geologists - F. H. Lahee	3

(Separates of Appendices A-W available)

SPECIAL "CAREER" PAMPHLETS

"Geology as a Profession" by H. P. Little. (Revised and issued June, 1938) 5

"Geography as a Profession" by H. P. Little. (With revisions by W. Elmer Ekblaw.) (Issued June, 1938) 3

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Requests for mimeographed reports should be addressed to the Division of Geology and Geography, National Research Council, 2101 Constitution Avenue, Washington, D. C. (See page 3 regarding postage asked to cover mailing and handling charges.)

Orders for printed reports in the Bulletin and Reprint and Circular Series, accompanied by remittance, should be addressed to NATIONAL RESEARCH COUNCIL, (Publications Office), 2101 Constitution Avenue, Washington, D. C. (See pages 1-2 for list of reports and prices.)

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Letter No. 2

YALE UNIVERSITY
New Haven, Connecticut

January 22, 1940

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA: Messrs. Alden, Bostock, Capps, Kay, Leverett, MacClintock, Norman, Thwaites, Young (and Flint)

The first meeting of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA was held in the Hotel Nicollet, Minneapolis, on December 28 and continued on December 29, 1939. Bostock, Kay, MacClintock, Thwaites, and Flint were present, and E. T. Apfel was present also by special request. The resignation of Wilson is very regretfully accepted, as he has left the Geological Survey of Canada to join the military service. The following statements represent a condensed summary of the sense of the meeting:

1. The map is to represent facts rather than interpretations, and as far as possible it is to show by changes in the conventions used, the degree of certainty with which a feature (for example, the margin of a drift sheet) is known. Unknown areas are to be left blank; not filled with interpolated information.

2. The scale of the final map is provisionally considered as of the order of 60 miles to the inch (this for general guidance in compilation). Individual manuscript regional maps are to be on bases judged most suitable by the compilers; for the United States, U.S.G.S. base maps of the States on a scale of about 16 miles to the inch will generally be satisfactory.

3. The base map should be designed primarily for ready location and orientation of the glacial features. It should include a rather fine latitude-longitude grid, State and Provincial boundaries, main drainage lines, cities and main towns, and generalized topographic contours with an interval of 2000 feet. The contours are primarily for defining mountain masses in western North America.

4. The glacial data shown will include, as a minimum:
   a. Limits of the several drift sheets
   b. Locations of significant interglacial exposures with verbal footnote references to the character and date (if known) of each.
   c. Directions of ice flow inferred from (1) striae, (2) boulder trains, (3) drumlin axes, the three types to be differentiated and each individual reading to be shown except where close spacing makes this impossible. Distinction should be made between upland data, and valley data indicating control of ice flow by the local topography.
   d. End-(terminal-) moraine ridges (position of ridge crest only). Correlations to be avoided except where wide agreement has been reached.
   e. Outwash, only in the region south of the outermost drift sheet.
   f. Distribution of the recognized Sangamon and Peorian loess sheets in the central States (to be shown on a small-scale subsidiary map).
   g. Areas covered by the larger recognized late-glacial lakes, as inferred from bottom deposits and shore features. Facies differences in the sediments are not to be shown.
   h. Limits of marine overlap along the Atlantic coast (including the St. Lawrence lowland) and in northern Canada.
   i. Areas in northern Canada essentially free of drift or other mantle.
   j. Esker systems, including those as small as the scale will permit.
   k. Areas of glacier ice now present in North America.

5. The allocation of unit areas to Committee members, after long discussion, was provisionally made as follows:

a. CANADA
To be divided among the Canadian members according to their best judgment, under the general supervision of Young.

b. NEWFOUNDLAND	MacClintock
c. ALASKA	Capps
d. UNITED STATES	
New England	J. W. Goldthwait
New Jersey and Pennsylvania	MacClintock
New York	Apfel
Ohio, Indiana, and northern Kentucky	White
Illinois	(Not yet assigned)
Michigan, Wisconsin, Minnesota	Thwaites
Iowa, Missouri, Kansas, Nebraska	Kay and assistant
North Dakota, South Dakota, Montana	Alden
Northern Idaho and Washington	Flint
Local Cordilleran areas in the United States	(Not yet assigned)
Distribution of loess	Apfel

6. Published sources are to be drawn upon first, followed by unpublished additions and other changes. A full list of sources, both published and unpublished, is to be kept by each compiler for future reference. Each compiler will clear his results with the State or Provincial surveys concerned, and a general plan for obtaining unpublished data available in the U. S. Geological Survey will be attempted by the Chairman and submitted to the members in due course.

7. The American members of the Committee were unanimous in believing that each could compile all the published data and the readily available unpublished data on the areas assigned, for submission in December 1940. It was recognized that for the completion of these maps, much more time would be needed, but that the preliminary maps would provide a valuable basis for discussion a year hence. It was further understood that owing to the far smaller proportion of published data on Canadian areas, and to war conditions in Canada, preliminary Canadian contributions might be delayed considerably beyond this time.

8. During the discussion, it became apparent that a number of matters of correlation, important to an understanding of Pleistocene history but not suitable for mapping because of their controversial character, would probably have to be dealt with by some kind of verbal comment or discussion. It was agreed that members should be left free to treat such matters in this way if they so desire.

9. It was realized that field conferences and possibly joint publication might be the outcome of some of these matters of correlation in dispute.

10. Whereas each member should be left free to represent the features on his map as seems best to him, nevertheless a list of suggested conventions was worked out to act as a preliminary basis of uniformity, and to be followed as far as reasonably possible. The list is attached to this letter.

I expect to visit both Ottawa and Washington within the next few weeks, in order to learn just what unpublished material is on file in the Canadian and United States Geological Surveys, and how it can be made available to Committee members. A report on this matter will follow.

Professor E. T. Apfel of Syracuse University, Professor J. Walter Goldthwait of Dartmouth College, and Professor George W. White of the University of New Hampshire are being nominated to the National Research Council for appointment to our Committee.

Hoping that work on the preliminary maps can be got under way in the near future,

Sincerely yours,

Richard Foster Flint

Richard Foster Flint,
Chairman

GLACIAL MAP OF NORTH AMERICA

Preliminary List of Conventions Suggested at Committee Meeting, December, 1939.

(Attached to Letter No. 2)

1. Areas covered by the several drift sheets - to be delimited by boundaries:
   Continuous line: well known. Broken line: fairly well known.
   Dotted line: not well known.

2. Interglacial zones: Any convenient symbol, accompanied by footnote reference.

3. Striae  (distal point located at position of feature)

4. Boulder train 

5. Drumlin axes (group) 

6. End (terminal) moraine  (colored line, continuous or broken according to degree of knowledge).

7. Esker system 

8. Former glacial lakes and marine limits (Boundaries only, where underlying drift sheet is known; boundaries inclosing areal convention where concealed.)

xxxxxxx 41 Roby Road,

Jan. 25, 1940

Prof. Richard Foster Flint,
Dept. of Geology, Yale University,
New Haven, Connecticut

Dear Prof. Flint:

Your circular of Jan. 22 is at hand.

In the morning I will mail you a blueprint of the general index map for my report on northeastern Wisconsin showing method of representing moraines. I delayed sending this until I had time to make some changes in the legend.

In making comments I might add that there are large areas in Minnesota, northern Michigan, and northeastern Wisconsin which are practically bare rock.

I do not get the idea at the end of '--"boundaries inclosing areal convention where concealed."

I do not think that I mentioned the fact that there is a large terra incognita in northwestern Wisconsin which really should have some field work or at least study of the air photos. I will not be able to undertake this until after I get the present report on northeastern Wisconsin done but am putting a student on to the extra-morainic drifts in the spring.

Sincerely,

Letter No. 4.

YALE UNIVERSITY

New Haven, Connecticut

May 9, 1940

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA: Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint).

Dear Mr. Thwaites,

1. On April 27, at the annual meeting of the Division of Geology and Geography, National Research Council, in Washington, I reported rather fully on our project and on what we have done to date. Several good suggestions were made by various individuals during and after the meeting, and the project was strongly commended.

2. The December, 1940, meeting of the Geological Society of America is to be held in Austin, Texas. The news of this decision is unwelcome so far as the plans of our committee are concerned, in that it will not be possible to secure sufficient travel funds to carry committee members to so distant a point. Since a conference with full attendance is nearly imperative at our next general meeting, at which we will exhibit and discuss our preliminary regional maps, the question arises whether it would not be better to plan our meeting for another place and date. Accordingly I am taking this opportunity to get an expression of opinion, and am inclosing a return postcard for an early reply. Will you please indicate on it your choices, in order of preference, of the following suggested plans:

Plan 1. Meeting at Austin December 26-28, 1940, with the understanding that only a fraction of the travel costs incurred can be paid out of committee funds.

Plan 2. Meeting at New Haven or some other fairly central point
(a) The Friday and Saturday immediately following Thanksgiving Day, 1940.
(b) December 20 and 21, 1940.
(c) A weekend in the second half of January, 1941.
(d) Some other date (please specify details).

Discussion and suggestions will, of course, be welcome.

Awaiting your early reply, and with good wishes for the continuation of your compilation,

Sincerely yours,

Richard Foster Flint

Richard Foster Flint,
Chairman

postcard reply
May 13, 40

Incl.

Dr. Richard Foster Flint,
Dept. of Geology,
Yale University,
New Haven, Connecticut

Dear Dr. Flint:

In reply to your postcard of the 19th I Maield you this moring a black line print of the original of the map which was published on a half scale in the 1937 and 1939 eiditions of the "Outline." The published scale is about 1.3 inches to 100 miles and shows the detail very nicely. In fact, were colors used it could essily be smaller. Some changes were made between the first and second eiditons notably in nortra Wisconsin where I have a student at work on his Doctors thesis. I have provisional y recognized Weidman's Third Drift as Iowan as I think he used to hold at one time. It is possible, however, that later work may extend the border of this drift. We are using rhe soil profile method for correlation with good results.

If you have not the last edition of the "Outline" I suggrst that you have your library order one as there are a n8mber of important changes,

Best regards,

Sincerely,

NEW YORK OFFICE
Engineering Societies Building, 29 West 39th Street

CABLE ADDRESS
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

October 10, 1939

Mr. F. T. Thwaites,
41 Roby Road,
Madison, Wisconsin

Dear Mr. Thwaites:

It gives me pleasure to inform you that the National Research Council at its meeting held October 7, approved the appointment of a new Committee of the Division of Geology and Geography on Glacial Map of North America, with personnel as follows:

R. F. Flint, Chairman - Yale University, New Haven, Connecticut
W. C. Alden - U. S. Geological Survey of Canada, Ottawa, Ontario
H. S. Bostock - Geological Survey of Canada, Ottawa, Ontario
S. R. Capps - U. S. Geological Survey, Washington, D. C.
G. F. Kay - State University of Iowa, Iowa City, Iowa
Frank Leverett - 1724 South University Avenue, Ann Arbor, Michigan
Paul MacClintock - Princeton University, Princeton, New Jersey
G. W. H. Norman - Geological Survey of Canada, Ottawa, Ontario
F. T. Thwaites - 41 Roby Road, Madison, Wisconsin
J. T. Wilson - Geological Survey of Canada, Ottawa, Ontario
G. A. Young - Geological Survey of Canada, Ottawa, Ontario.

Through Professor Flint you will be kept informed regarding the Committee's program of work.

For your information, mimeographed lists are enclosed giving the membership of the Division and of its Committees as constituted to date.

The Annual Report of the Division for the past year, 1938-39, is expected to be ready for distribution in bound form in November. At that time opportunity will be given Committee members to state whether they wish to be sent copies of the complete report or only of special reports in which they may be interested. Enclosed is the Publications List of the Division, dated February 15, 1939. A new list will probably be ready for distribution next month. Please note that the list contains both printed and mimeographed reports. The printed reports in the Bulletin and Reprint & Circular Series are sold by the Publications Office; the mimeographed reports are distributed by the office of the Division. If you wish any of the bound mimeographed reports we will be glad to send them to you without charge, if still available.

Sincerely yours,

Chester R. Longwell

Chester R. Longwell,
Chairman, Division of
Geology and Geography

CRL:J
Enclosure

NATIONAL RESEARCH COUNCIL - WASHINGTON, D. C.

ORGANIZATION OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

July 1, 1939 - June 30, 1940

OFFICERS

Chairman, Chester R. Longwell
Vice-Chairman, Preston E. James

EXECUTIVE COMMITTEE

Chester R. Longwell, Chairman
Preston E. James, Vice-Chairman
Edson S. Bastin
Charles C. Colby
Stephen R. Capps
George Tunell

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MEMBERS OF THE DIVISION

Representatives of Societies

Geological Society of America
John L. Rich (40)*
Stephen R. Capps (41)

Mineralogical Society of America
George Tunell (42)

Paleontological Society
Charles E. Resser (41)

Association of American Geographers
Preston E. James (40)
C. Warren Thornthwaite (41)

American Geographical Society
Charles B. Hitchcock (42)

Society of Economic Geologists
Edson S. Bastin (40)

American Association of Petroleum Geologists
Frederic H. Lahee (40)

American Ceramic Society
Robert B. Sosman (42)

Members at Large

Norman L. Bowen (41)
Charles C. Colby (42)
Chester R. Longwell (40)

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(For Committees and Representatives, see separate list)

* Date of expiration of term of office.

NATIONAL RESEARCH COUNCIL

COMMITTEES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, 1939-1940

(July 1, 1939) *

Executive Committee

Chester R. Longwell, Chairman	Edson S. Bastin	Charles C. Colby
Preston E. James, Vice-Chairman	Stephen R. Capps	George Tunell

Advisory Committee to the Division

Chester R. Longwell, Chairman	Arthur Keith	Edward B. Mathews
Edson S. Bastin	Andrew C. Lawson	W. H. Twenhofel
Nevin M. Fenneman	Waldemar Lindgren	

Advisory Committee on National Research Council Post-Doctorate Fellowships in Geology, Paleontology, and Physical Geography

Chester R. Longwell, Chairman	Eliot Blackwelder	Louis B. Slichter
Preston E. James, Vice-Chairman	Stephen R. Capps	Robert B. Sosman
Edson S. Bastin	John B. Reeside, Jr.	C. Warren Thornthwaite

National Committee of the United States, International Geographical Union

C. H. Birdseye, Chairman	Preston E. James	Lawrence Martin
S. Whittemore Boggs	W. L. G. Joerg	John K. Wright

Technical Committees

1. Committee on Basic Geographical Data and Techniques

Charles M. Davis, Chairman	Robert S. Platt	C. Warren Thornthwaite
G. Donald Hudson	L. R. Schoenmann	

2. Committee on Conservation of the Scientific Results of Drilling

W. H. Twenhofel, Chairman	F. H. Lahee	W. T. Thom, Jr.
T. M. Broderick	H. S. McQueen	L. E. Workman
Capt. Lucius D. Clay	O. E. Meinzer	
Marcus A. Hanna	E. H. Sellards	

3. Committee on Cooperation with the Bureau of the Census

John K. Wright, Chairman	W. L. G. Joerg	C. Warren Thornthwaite
O. E. Baker	Lawrence Martin	
Stanley D. Dodge	Guy-Harold Smith	

4. Committee on Density Currents (Interdivisional)

Herbert N. Eaton, Chairman	C. S. Howard	C. S. Scofield
J. H. Bodine	Chancey Juday	F. P. Shepard
Reginald A. Daly	Robert T. Knapp	J. K. G. Silvey
C. C. Elder	L. M. Lawson	~~Col. W. A. Snow~~
M. M. Ellis	W. C. Lowdermilk	H. U. Sverdrup
N. C. Grover	(alternate)	C. P. Vetter
Raymond A. Hill	G. C. Dobson	A. H. Wiebe
P. V. Hodges	H. Peters	Major A. B. Jones

* With additions as of October 7, 1939.

5. Committee on Geographic Classification of Surface Configuration

V. C. Finch, Chairman	Samuel N. Dicken	Guy-Harold Smith
Kirk Bryan	Richard Joel Russell	C. Warren Thornthwaite
George B. Cressey		

6. Committee on Geographical Studies of Mineral Distribution

L. F. Thomas, Chairman	John W. Frey	Walter H. Voskuil
Charles H. Behre, Jr.	J. Russell Whitaker	

7. Committee on Government Mapping Agencies

H. M. Leppard, Chairman	Guy-Harold Smith	Charles B. Hitchcock

8. Committee on the Measurement of Geological Time

Alfred C. Lane, Chairman	Frank L. Hess	Waldemar Lindgren
John Putnam Marble, Vice Chrm.	Arthur Holmes	Charles S. Piggot
Gregory P. Baxter	Adolph Knopf	T. L. Walker
H. V. Ellsworth	A. F. Kovarik	Roger C. Wells

9. Committee on Micropaleontology

Joseph A. Cushman, Chairman	Henry V. Howe	Helen J. Plummer
Carey Croneis	B. F. Howell	W. P. Woodring
Alva C. Ellisor	Raymond C. Moore	
G. Dallas Hanna	M. L. Natland	

10. Committee on Paleobotany

Roland W. Brown, Chairman	Erling Dorf	Herbert L. Mason
Chester A. Arnold		

11. Committee on Preparation of a Handbook of Physical Constants of Geological Materials (Interdivisional)

Francis Birch, Chairman	H. Cecil Spicer	H. H. Willard
J. F. Schairer		

12. Committee on Processes of Ore Deposition

W. H. Newhouse, Chairman	B. S. Butler	Waldemar Lindgren
Edson S. Bastin	L. C. Graton	G. F. Loughlin
Charles H. Behre, Jr.	D. F. Hewett	T. S. Lovering
W. S. Burbank		

13. Committee on Research in Areas of International Concern

Derwent Whittlesey, Chairman	S. Whittemore Boggs	Robert S. Platt
John B. Appleton	Charles C. Colby	

14. Committee on Research in the Earth Sciences

Norman L. Bowen, Chairman	Preston E. James	Robert S. Platt
Richard Hartshorne, Vice-Chrm.	A. I. Levorsen	T. Wayland Vaughan
Ralph H. Brown	Chester R. Longwell	Derwent Whittlesey
Charles C. Colby	T. S. Lovering	
Robert B. Hall	Lawrence Martin	

15. Committee on Sedimentation

Parker D. Trask, Chairman	H. B. Milner	~~W. A. Tarr~~ deceased
Carl B. Brown	F. J. Pettijohn	A. C. Trowbridge
Carl W. Correns	R. Dana Russell	W. H. Twenhofel
P. D. Krynine	Henry C. Stetson	T. Wayland Vaughan
Ralph E. Grim	L. G. Straub	Chester K. Wentworth

16. Committee on Stratigraphy

Carl O. Dunbar, Chairman	Edwin Kirk	Charles K. Swartz
G. Arthur Cooper	Raymond C. Moore	W. H. Twenhofel
Carey Croneis	John B. Reeside, Jr.	C. E. Weaver
B. F. Howell	L. W. Stephenson	

17. Committee on Tectonics

Chester R. Longwell, Chairman	D. F. Hewett	Ralph D. Reed
Philip B. King, Vice-Chairman	Eleanora B. Knopf	George W. Stose
Charles H. Behre, Jr.	A. I. Levorsen	W. T. Thom, Jr.
William Bowie	T. S. Lovering	A. C. Waters
Walter H. Bucher	George R. Mansfield	Eldred Wilson
Eugene Callaghan	W. H. Monroe	

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Correspondent on Shoreline Studies in California - U. S. Grant, 4th.

REPRESENTATIVES OF THE DIVISION ON:

Advisory Council of the Federal Board of Surveys and Maps -
C. Warren Thornthwaite

Committee on Classification of Coal, American Society for Testing Materials -
Taisia Stadnichenko

Note: The Chairman of the Division is, ex officio, a member of all Committees of the Division.

(For Members of the Division, see separate page)

NEW COMMITTEE

18. Committee on Glacial Map of North America

R. F. Flint, Chairman	G. F. Kay	F. T. Thwaites
W. C. Alden	Frank Leverett	J. T. Wilson
H. S. Bostock	Paul MacClintock	G. A. Young
S. R. Capps	G. W. H. Norman	

(New list expected to be issued in November, 1939)

PUBLICATIONS OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
OF INTEREST TO GEOLOGISTS OR GEOGRAPHERS*

February 15, 1939

Bulletin Series (Printed)

No.

36. Catalogue of published bibliographies in geology, 1896-1920. Compiled by Edward B. Mathews. October, 1923. 228 pages. $0.15.#

44. The continental shelf off the coast of California. Andrew C. Lawson. April, 1924. 23 p. $0.15.#

46. The geological implications of the doctrine of isostasy. Andrew C. Lawson. June, 1924. 22 p. $0.15.#

51. Radioactivity. A. F. Kovarik and L. W. McKeehan. Second printing. With additions and corrections. March, 1929. 203 p. $2.50.

70. Report on studies of mean sea-level. Report of the Committee on Shoreline Investigations. Douglas Johnson. July, 1929. 50 p. $0.50.

77. Physics of the Earth. I. Volcanology. Day, Friedlaender, Jaggar and Sapper. February, 1931. vii + 77 p. Cloth, $1.00.

78. Physics of the Earth. II. The figure of the Earth. Rude, Doodson, Schureman, Marmer, Lambert, Bowie, Reid, Swick, Barton, Parkhurst, Dutton, Avers, Hodgson, Schlesinger and Brown. February, 1931. vi+286 p. Paper, $3.00; cloth, $3.50.

80. Physics of the Earth. IV. The age of the Earth. Knopf, Schuchert, Kovarik, Holmes and Brown. June, 1931. vi + 487 p. Paper, $4.50; cloth, $5.00.

82. List of seismological stations of the world. Second Edition. H. E. McComb and Clarence J. West. April, 1931. 119 p. $1.50.

85. Physics of the Earth. V. Oceanography. Heck, Littlehales, Collett, Thompson, Robinson, Patton, Marmer, McEwen, Schumacher, Soule, Parker, Iselin, Brooks, Huntsman and Schuchert. June, 1932. vi + 581 p. Cloth, $5.00

88. Summary information on the state geological surveys and the United States Geological Survey. Compiled under the direction of the National Research Council Committee on State Geological Surveys. By M. M. Leighton. November, 1932. 136 p. $1.00.

89. Report of the Committee on Sedimentation, 1930-1932. Prepared under the auspices of the Division of Geology and Geography, National Research Council. November, 1932. 229 p. $1.00. (Contains also the first report of the Committee on Accessory Minerals of Crystalline Rocks, A.N.Winchell, Chairman, and "The classification and terminology of the pyroclastic rocks" by Chester K. Wentworth and Howel Williams.)

90. Physics of the Earth. VI. Seismology. Macelwane, Wood, Reid, Anderson and Byerly. October, 1933. 223 p. Paper, $2.00; cloth, $2.50.

* Only those listed which are still available.
\# Reduced price covers estimated cost of postage and handling only.

No.

94. Fellowships and scholarships for advanced work in science and technology. Third edition. Callie Hull & Clarence J. West. June, 1934. 194 p. $1.00.

95. Funds available in the United States for the support and encouragement of research in science and its technologies. Third edition. Callie Hull and Clarence J. West. June, 1934. 162 p. $1.00.

98. Report of the Committee on Sedimentation, 1932-1934. Prepared under the auspices of the Division of Geology and Geography, National Research Council. July, 1935. 246 p. $1.00. (Includes "The terminology of coarse sediments" by C. K. Wentworth, with notes by P. G. H. Boswell.)

101. Handbook of scientific and technical societies and institutions of the United States and Canada. Third edition. United States section compiled by Callie Hull. Canadian section compiled by S. J. Cook and E. R. Berry. October, 1937. 284 p. Paper, $3.00.

102. Industrial research laboratories of the United States, including consulting research laboratories. Sixth edition. Compiled by Callie Hull. December, 1938. 270 p. Paper $2.50; cloth, $3.00.

Reprint and Circular Series (also printed)

11. A survey of research problems in geophysics. Prepared by Chairmen of Sections of the American Geophysical Union. October, 1920. 57 p. $0.60.

27. List of manuscript bibliographies in geology and geography. Compiled by Homer P. Little. February, 1922. 17 p. $0.25.

37. Recent geographical work in Europe. W. L. G. Joerg. July, 1922. 54 p. $0.50.

43. Functions of the Division of Geology and Geography of the National Research Council. Nevin M. Fenneman. December, 1922. 7 p. $0.20.

92. Report of the Committee on Sedimentation, 1928-1929. Prepared under the auspices of the Division of Geology and Geography. May, 1930. 122 p. $1.00.

98. Report of the Committee on Sedimentation, 1929-1930. Prepared under the auspices of the Division of Geology and Geography. July, 1931. 97 p. $1.00.

100. In quest of glacial man. A plan of cooperation between excavators and the representatives of the sciences of man and of the earth. Madison Bentley. August, 1931. 20 p. $0.40.

105. Doctorates conferred in the sciences by American universities, 1932-1933. Compiled by Callie Hull and Clarence J. West. August, 1933. 63 p. $0.50.

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A complete list of the publications in the Bulletin and Reprint and Circular Series will be furnished on request. Orders, accompanied by remittance, should be addressed to NATIONAL RESEARCH COUNCIL, Washington, D. C.

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For information regarding the Transactions of the American Geophysical Union, address inquiries to: The General Secretary, American Geophysical Union, 5241 Broad Branch Road, Northwest, Washington, D. C.

OTHER PRINTED PUBLICATIONS ORIGINALLY ISSUED UNDER THE AUSPICES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.

ANNOTATED BIBLIOGRAPHY OF ECONOMIC GEOLOGY. Originally prepared under the auspices of the Committee on Economic Geology, Waldemar Lindgren, Chairman. Annual Volumes I-XI(1) issued to date. Remittances should be made payable to the Economic Geology Publishing Company, and sent to W. S. Bayley, University of Illinois, Urbana, Illinois. Subscriptions $5.00 per year in the United States and U. S. Possessions. (Sponsorship of this bibliography transferred on July 1, 1936 by the National Research Council to the Society of Economic Geologists.)

TREATISE ON SEDIMENTATION. Second edition, completely revised (1932). Prepared under the auspices of the Committee on Sedimentation, W. H. Twenhofel, Chairman. xxvi + 914 pages. 121 illustrations. Price $8.00. Book sold only by the publishers, The Williams and Wilkins Company, Baltimore, U. S. A.

COLOR CHART for the description of Sedimentary Rocks. Prepared under the auspices of the Committee on Sedimentation by Marcus I. Goldman and H. E. Merwin. Two plates and explanatory sheet. Printed by A. Hoen and Co. of Baltimore in 1928. Single copies 75¢, five copies $3.50, obtainable from the Division of Geology and Geography, National Research Council, Washington, D. C.

MILITARY GEOLOGY AND TOPOGRAPHY. Herbert E. Gregory, Editor. 1918. 281 pages. Book sold by the publishers, Yale University Press, New Haven, Conn. $1.25.

RECENT REPORTS OF THE DIVISION OF GEOLOGY AND GEOGRAPHY (STILL AVAILABLE) ISSUED IN BOUND MIMEOGRAPHED FORM

(No charge, unless so stated, except stamps to cover approximate postage and handling. 15¢ for any one report, and 5¢ for each additional bound report; or ask to have the reports sent Express Collect.)

REPORTS OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME - Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chairman. (1) May 2, 1936 (87 pages); (2) May 1, 1937 (77 pages); (3) April 30, 1938 (123 pages); and (4) Reprint of the 1933, 1934 and 1935 reports, bound in one volume (225 pages). (Supply of earlier reports exhausted.)

REPORTS OF THE COMMITTEE ON SEDIMENTATION - Parker D. Trask, Chairman. (1) for 1935-36, with report also of the Subcommittee on "Terminology of Medium-Grained Sediments" by Victor T. Allen. (Issued September, 1936). 47 pages. (2) for 1936-37, with "Terminology of the Fine-Grained Mechanical Sediments" by W. H. Twenhofel. (Issued October, 1937). 128 pages. (3) for 1937-38 with "Terminology of the Chemical Siliceous Sediments" by W. A. Tarr. (Issued September, 1938). 114 pages. (Earlier reports printed. See Bulletins 89 & 98; Reprint & Circular Series, Nos. 92 & 98.)

REPORTS OF THE COMMITTEE ON PALEOECOLOGY - W. H. Twenhofel, Chairman.
(1) for 1935-36. (Issued October, 1936). 64 pages.
(2) for 1936-37. (Issued December, 1937). 63 pages. (Final report.)

BATHOLITH COMMITTEE REPORTS ("Re-run" editions, 1938) - Frank F. Grout, Chairman. (1) 1933, "Problems of the Batholiths" (59 pages); (2) 1935, "Annotations of Selected Papers on the Mechanics of Igneous Invasion" (54 pages), and (3) 1935, "Comments on Magmatic Stoping" (47 pages).

REPORT OF THE COMMITTEE ON STRUCTURAL PETROLOGY, 1937 - T. S. Lovering, Chairman. (Issued October, 1938). 103 pages. (Final report of this Committee.)

SUGGESTIONS CONCERNING DESIRABLE LINES OF RESEARCH IN THE FIELDS OF GEOLOGY AND GEOGRAPHY. Edited by Edson S. Bastin for Physical Geology, Carl O. Dunbar for Paleontology and Stratigraphy, and Robert S. Platt for Geography. (Issued December, 1936). 83 pages.

REPORT OF THE INTERDIVISIONAL COMMITTEE ON BORDERLAND FIELDS BETWEEN GEOLOGY, PHYSICS AND CHEMISTRY, 1937. T. S. Lovering, Chairman. (Issued March, 1938). 73 pages. (Final report of this Committee.)

CATALOGUE OF SMALL-SCALE GEOLOGIC MAPS useful for broader regional studies with chief emphasis on modern maps. (Preliminary edition). North America, Alaska, Canada, United States, Mexico, Central America and West Indies. Prepared by Walter H. Bucher and a staff of contributors under the auspices of the Committee on Tectonics, G. R. Mansfield, Chairman. 1933. 138 pages. Price - $1.00.

ANNUAL REPORT OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, Washington, D. C., for the year 1937-1938. Contains list of Members of the Division and its Committees, Minutes of Annual Meeting, Chairman's Report (Chester R. Longwell), and reports from Committee Chairmen for the following committees:(Appendices A-Z): (A few copies left of Annual Report for 1936-1937, but only file copies left of most of the Annual Reports for previous years.)

1937-1938 Committee Reports

		Pages
(A)	Sedimentation (preliminary)* - Parker D. Trask, Chairman	8
(B)	Accessory Minerals (final report) - Alexander N. Winchell	12
(C)	Micropaleontology - Joseph A. Cushman	7
(D)	Paleobotany - Roland W. Brown	25
(E)	Density Currents - Herbert N. Eaton	12
(F)	Preparation of a Handbook of Physical Constants of Geological Materials - Francis Birch (preliminary)**	1
(G)	Stratigraphy (progress report) - Carl O. Dunbar	1
(H)	Tectonics (progress report) - Chester R. Longwell	1
(I)	Processes of Ore Deposition (progress report) - W. H. Newhouse	2

(continued)

1937-1938 Committee Reports (continued)

*Complete report issued separately (see pages 3,4)
**Complete report to be issued later.

(Separates of Appendices A-Y available)

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Requests for mimeographed reports should be addressed to the Division of Geology and Geography, National Research Council, 2101 Constitution Avenue, Washington, D. C.

Oct. 17, 1939

Dr. Richard Foster Flint,
Dept. of Geology,
Yale University,
New Haven, Connecticut

Dear Dr. Flint:

In reply to yours of the 14th I am intending despite a proable 25 percent pay cut to go to Minneapolis.

In respect to your suggestions I want first to register objection to showing too much as did so many of the older foreign maps.

A1. Is all right.
A2. I am afraid of this but see the data on some of my maps in the "Outline". Possibly type localites alone should be shown.
A3. The trouble with striae is that they are in many places not the product of the last ice. Yet in Canada they are about all that could be shown in the hard rock country so I do not want to object. Boulder trains would, clutter up the map too much except where there is no other data.
A4. Drumlins are so small that individual units could not be shown, If somebody can think up a good conventional sign indicating trends it would help.
A5, 6, 7, Have no comments

B1. My map in the outline shows all outwash. If you will study it you may get a different idea than from maps which omit it. I urge that as much as possible be shown. Along major rivers leading from the ice what is mapped as outwash is really floodplain in part concealing outwash. It is hard to find accurate maps which discriminate and still harder to map if it is separated.
B2. I would like to see loess shown as an overprint of lines or dots provided there are not too many other data. But maybe it would be best to leave it to a separte project on another map.
B3. I could stand the omission of isobases quite well. I think they would look better on another map.
B4. Would not figures giving elevation of lowest cirquest be simpler and quite as effective?
B5. Readvances are too numerous and complicated even where known to permit of showing them.
B6. I feel that this is undesirable unless in New England.

I am decidedly opposed to too large a map. Please note the amount of detail I was able to show on my map which was in black and white only.

Am bending every effort to get the report on northeastern Wisconsin out of the way. I certainly wish we knew northwestern Wisconsin half as well!

Sincerely,

Letter No. 1

YALE UNIVERSITY

New Haven, Connecticut

October 14, 1939

To Members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA

Dear Mr. Thwaites,

You have no doubt been informed by letter from Dr. Longwell that our committee has been formally set up. Without much question the most convenient time and place for our first meeting will be Minneapolis late in December, in connection with the G.S.A. meetings, which would normally be attended by a number of us, aside from the interests of the present Committee. May I ask you to let me know before Nov. 1:

(1) Whether you expect to attend our Committee meeting.

(2) Whether you would be attending the G.S.A. meeting anyway.

(3) Should your answer to (2) be negative, please furnish a close estimate of the minimum funds you would need to enable you to attend our meeting, so that I can advise the Research Council and if possible obtain defrayment of expenses in so far as attendance may be impossible otherwise.

The agenda of the first meeting will necessarily consist principally of the scope of our map, the technique of its preparation, and the preliminary delimitation of regions for which individual members will take responsibility. In order to reduce the time required for preliminaries at the meeting, it seems almost necessary to indicate here some of the suggestions that have already been informally made, and to ask the members for critical comments on them and, most important, for additional suggestions, so that I can arrange them logically for full discussion at the meeting. This will give us something tangible to criticise as a group and to alter as we see fit.

Suggestions

A. Features to be shown

1. The areas covered by the several drift sheets.
2. Locations of interglacial deposits. (How can these best be shown where covered with younger deposits?)
3. Striae, boulder trains, drumlin axes, etc., and/or directions of glacier flow inferred from these features.
4. Distribution of drumlins.
5. End- (terminal) moraines and related features recording synchronous glacier termini.
6. Discrimination between broad ice sheets and local valley glaciers, including the local glaciers of the Cordilleran region.
7. Inferred positions of centers from which ice sheets radiated.

B. Features that can be shown less easily (ought we to attempt them at all?)

1. Outwash in the extraglacial regions.
2. Distribution of loess.
3. Isobases on warped sea- and lake-surface planes where known.
4. Contours on the Pleistocene snow limit (snowline) in the Cordilleran region as inferred from cirque altitudes.
5. Readvances of glacier termini inferred otherwise than from end moraines.
6. Distribution of "kame fields" (areas of ice-contact stratified drift).

C. Approximate size of final map.

Presumably the map should embrace Alaska, Newfoundland, Canada including Arctic Canada, most of Greenland, and the United States south at least to about lat. 37°. Would some variety of polyconic projection seem best?

At 40 miles to the inch (approximately the scale used in the Geologic Map of the United States) such a map would measure about 105" x 80", involving unwieldy size as well as great reproduction cost. At 50 miles to the inch, the map would measure about 84" x 62"; at 60 miles to the inch (the scale used in the Physical Map of Canada, 1928), the dimensions would be 67" x 50", and New York State, for example, would measure only 5 inches from east to west.

D. Method of work.

The most efficient plan seems to be to ask each member to take responsibility for a region or regions, collecting the data agreed upon by the group from published and unpublished sources, and plotting them on a convenient base, on a scale considerably larger than the contemplated final draft. The regional maps would be studied and criticized by the Committee members, redrafted on a single base, further studied and finally passed upon by the Committee with a view to publication. Variations in this plan, or alternative plans, should be considered.

E. Delimitation of regions to be assigned to members.

If some form of regional plan is adopted, a distribution of regions is here suggested so that changes and adjustments in it can be made after the members have given thought to it. No doubt further subdivision will prove necessary in some instances:

1. Canada
   - Maritime Provinces, southern Quebec, southern Ontario
   - Canadian Shield
   - Great Plains
   - Cordillera and Yukon
   - Arctic lands
2. Newfoundland
3. Alaska
4. United States
   - New England, New Jersey, New York, Pennsylvania
   - Ohio, Indiana, northern Kentucky, Michigan (S. peninsula), Illinois
   - Iowa, Missouri, Kansas, Nebraska
   - Wisconsin, Michigan (N. peninsula), Minnesota
   - North Dakota, South Dakota, Montana
   - Idaho, Washington
   - Local Cordilleran areas

F. Membership.

Undoubtedly we shall want to increase the membership somewhat; yet it seems wise to maintain our number at the minimum consistent with adequate coverage of the field. Suggestions of additional names, in the light of the foregoing list of regions, will be welcome at any time.

Will each member undertake to comment on the foregoing suggestions, as fully as he feels inclined, and using corresponding numbers for convenience, sending his comments and additional suggestions to me not later than Nov. 1, so that I can arrange them in a docket for discussion at the meeting?

In conclusion, a few statements for the general information of the Committee seem called for:

(a) It appears likely that the proportion of unpublished to published material available for our use relating to the United States will be small as compared with the proportion relating to Canada. Responsibility for gathering new material may therefore fall with disproportionate weight upon our Canadian members. This is particularly unfortunate in view of official duties that may fall upon them as a result of the war; we can only hope that inasmuch as the large bulk of the unpublished data is centralized in Ottawa, means will be found for recording the information on master maps.

(b) Conflicting interpretations and correlations of drift sheets will constitute future difficulties, no doubt. Presumably the member responsible for a region will have to defend the correlations implied by his map, and obtain majority approval of them.

(c) Relations with State and Provincial surveys must be maintained. Probably each member will establish contact with any such organizations within his region, for the purpose both of securing data for them and of clearing the manuscript map with them when prepared, so that the master map will be as nearly as possible consistent with the views and usages, not only of the United States and Canadian surveys, but with the State and Provincial surveys as well.

(d) I should like to emphasize that the Committee is not contemplating the preparation of a map for exhibition or teaching purposes. Undoubtedly the map will be in demand for teaching use, but the prime objective in preparing it is to record our glacial knowledge to date, so that relationships of the drift, especially as between the United States and Canada, and of the ice-sheet "centers," etc. may appear which are now only suspected or wholly unknown. The success of our project rests to no small degree on the completeness of cooperation between Canadian and American members of the Committee.

Awaiting your early reply, and looking forward to our first meeting, I am

Yours very truly,

Richard Foster Flint

Richard Foster Flint, Chairman.

xxxxx xx 41 Roby Road,

Sept. 18, 1939

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

In reply to yours of the 6th I certainly will be glad to do what I can in regard to the proposed map.

You probably are familiar with the map I compiled for the last two editions of the "Outline of Glacial Geology" The second edition (1939) of this shows considerable changes in central Wisconsin and I still have a student at work there. We are greatly extending the Wisconsin outside the recognized moraine on the basis not only of constructional features but also the shallow soil profile. We think this drift is probably Iowan and it may well include the debatable red drift of eastern Minnesota which was called Illinoian by Leverett. For the present I am regarding the border of Weidman's Third Drift as the border of the Wisconsin but this may be much extended

With best regards,

Sincerely,

YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

September 6, 1939

Mr. Fredrik T. Thwaites
Science Hall
Madison, Wisconsin

My dear Thwaites,

For some time there has been under discussion the preparation of a glacial map of North America which would make generally available the mass of scattered glacial data, in part unpublished, and in part the by-product of field studies primarily non-glacial, so that study of the relations thus made clear can lead to further investigation of glacial problems. A secondary objective, for which, however, there is a definite demand, is the publication of a reliable record of our knowledge of North American areal glacial geology, for general reference by geologists, ecologists, geographers, and other interested scientists.

The U. S. Geological Survey and the Geological Survey of Canada have agreed to participate in the project, which likewise has the cordial approval of Dr. Laurence Martin, Chief of the Division of Maps, Library of Congress, and Dr. C. R. Longwell, Chairman of the Division of Geology and Geography, National Research Council.

Accordingly it has been decided to set up under the National Research Council a committee somewhat analogous to the committee which for some time has been preparing a tectonic map of North America. This arrangement probably will make it possible to secure some funds to help defray travelling expenses in connection with meetings, and also possibly drafting costs, etc. Each member of the committee would be chosen on a basis of his knowledge, or access to knowledge, of the glacial features of a specific region. Each member would be expected to assemble the data for, and prepare a large-scale map of, his region. When prepared, the regional maps would be subjected to extensive group conference and discussion to insure maximum accuracy. Eventually the data would be transferred to a single base covering the United States, Canada, Alaska, and Newfoundland, and would be subjected to wide criticism in preparation for publication on a final scale possibly of the order of 40 miles to the inch.

The selection of data to be shown on the map would be decided by the committee, as far as possible at its first meeting. Presumably the data would include at least (a) areas covered by the several drift sheets, (b) locations of interglacial deposits, (c) discrimination between broad ice sheets and local glaciers in mountain valleys, (d) inferred directions of ice flow, (e) inferred positions of centers from which ice sheets last radiated, and (f) features (such as end- or terminal moraines) recording approximately synchronous glacier termini. It is not contemplated to show detailed features, as this obviously would demand a base map of unworkable size even were the data available for the greater part of the glaciated region.

It is quite possible that the most significant unpublished data will be forthcoming from Canadian areas, inasmuch as the publication of Canadian data has thus far been proportionately much less than the publication of data from the United States. For some parts of the United States the work may consist of little more than the drafting of existing published data on a suitable scale, with only minor changes.

Your knowledge of the western Great Lakes region as well as your interest and experience in glacial mapping would be of great value to the committee, and I therefore hope you will be willing to serve. If you give us your acceptance, I will transmit your name to the Research Council, which is anxious to act as soon as possible. Probably the first meeting will be held in Minneapolis in December. Meanwhile, any suggestions you might offer would be much appreciated.

Very sincerely yours,

Richard Foster Flint

Richard Foster Flint

YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

February 15, 1941

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

I was very glad to have your letter of February 10; it seems to me the matters that were in question are pretty largely clearing up. I really think you need have no fear that the end-moraine convention will be changed again, because the decision to make the existing change was unanimous, after careful discussion, and all the members present seemed wholly satisfied. It was pointed out, however, that some moraines, small or poorly known, might have to be shown by lines (perhaps hatched) representing the distal toe. I should think you might quite appropriately use this convention in those places where it seems to you better to do so.

I have read with interest, and return herewith, Hole's report on western Wisconsin. It opens up a promising prospect for straightening out the age relations in that region, and I hope he succeeds in furthering his work next summer. Gould writes from Arizona that he will be working in southeastern Minnesota in August; no doubt he will write you about the cooperation that seems to me essential for satisfactory regional correlation.

I think you can rest assured that no further changes in the map conventions (beyond a few minor additions of no general importance) will be made, and I am sure you will be impressed with the results at Boston next December. Our work (not mine!) is coming in for high praise from the National Research Council, where it is realized that we all share the credit equally.

With best wishes,

Sincerely,

Incl.

Flint
Richard Foster Flint

Please return, F. T. Thwaites

Some Observations Of The Glacial Drifts North Of The Driftless Area In Wisconsin.

by Francis Doan Hole.

Being a paper presented at the Indiana Academy of Science, Autumn Meeting, 1940, at Ball State Teachers College, Muncie, Ind.

North Central Wisconsin is a gently rolling plain which slopes south and is somewhat dissected in the vicinities of the Wisconsin and Black Rivers. Outcrops are of pre-Cambrian crystallines in the northern portion, and of Cambrian sandstones, siltstones and clays in the southern portion. Except for an east-west strip about ten miles wide on the south, these rocks are covered with a mantle of glacial drift which averages about ten feet in thickness. The northern part of the area is crossed by a strip, five miles wide, of rugged hills which consist of glacial deposits and which constitute the "Terminal Moraine" of the Cary substage of the Wisconsin drift.

Glacial geologists have found it difficult to determine the age of the "border drift" which lies south of the terminal moraine and north of the Driftless Area. Previous work in this and adjacent regions has been done by Samuel Weidman (1), Frank Leverett (2), F.T.Thwaites (3), John Mathiesen (4), and Lewis Nelson (5). Weidman distinguished, largely on the basis of topography, three border drifts, the southermost of which he considered the oldest, and all of which he thought to be older than the terminal moraine and the drift north of it. They were, in order: "First Drift", almost wholly on sandstone and extremely dissected; "Second Drift", thicker but devoid of kettles, although bordered by a moraine between Marshfield and Neilsville; "Third Drift", like the Second Drift, but showing a few kettles and knolls, mainly gravel. Leverett concluded that the extra-morainic drift is chiefly Illinoian, although he recognized some extensions

of Wisconsin drift south of the terminal moraine. His field maps are on file in the office of the Wisconsin Geological Survey at Madison. In a letter to F.T.Thwaites, he suggested that there may be only one border drift, and that soil profiles are probably the most reliable critereon. Thwaites and Mathiesen suggested that there are two border drifts in adjacent Northwestern Wisconsin, the younger of which, lying farthest north, is probably Iowan, judging from the pitted outwash which characterizes it; Nelson is the only one of the investigators, named above, who has depended on other criteria besides the critereon of topography. He concluded that the Marathon silt loam in North Central Wisconsin developed from the Colby silt loam, which occurs on all the border drifts distinguished by Weidman, and which also occurs north of the terminal moraine.

The writer made observations, summarized below, of the soil profiles in this area in July and August, 1940. Alteration of drift, sources of drift, and stratigraphy of drift are the objects of the present study.

1. Calcareous drift was found in this border drift and in the terminal moraine, which were hitherto believed to be non-calcareous. A strip of drift which is calcareous at from three to fourteen feet lies on both the First and Second Drifts of Weidman in the vicinities of Auburndale and Marshfield. The conclusion suggested is that the calcareous drift cannot be older than Iowan.

2. The reddish brown color of the drift near Marshfield has been considered proof of great age of the drift. Reddish brown and bluish grey clays and silts were observed interbedded with cross-bedded sandstone, and several cuts in drift showed

reddish brown and bluish grey tills irregularly interpenetrating. North of Marshfield, reddish brown till was found near valleys, while dull brown till lay on the uplands. The conclusions suggested are as follows: the red color of some of this drift is inherited from materials, and some brought about under conditions of good drainage. Drift of the terminal moraine is probably red because Lake Superior basin clays and silts were red. The excessive stoniness of that till may indicate a separate readvance of the ice which moved about due south.

3. Of the four soil series significant in this study, the Colby, and the Marathon which developed from it, are the most important. The A and B_1 horizons of the Colby soil have been observed on calcareous drift, on noncalcareous drift, on columnar reddish brown clay loam of the B_2 horizon, on non-columnar sandy loam, on residual granite "gravel", and on reddish brown drift north of the terminal moraine. The conclusion suggested is that the drift north and south of the terminal moraine is apparently all young.

4. At the State Agricultural Experiment Station at Marshfield there is a black soil buried about fifteen feet beneath calcareous drift. The conclusion suggested is that a series of older till, sand, gravel, and clay underlies the calcareous drift.

5. One observation indicates that the disintegration of the granite in the vicinity of the Wisconsin River Valley has taken place since the till was deposited, although considerable alteration had doubtless occurred before.

Mechanical and chemical analyses in the laboratory, and further field investigation are necessary to throw light on many problems. Is the erosional topography due primarily to bed rock control?

Has a glacial readvance brought northern drift to overlie calcareous drift from another direction? Can columnar structure develop in the B_2 horizon of a soil as young as the above suggested conclusions make the Colby silt loam? Is the light brown soil on the quartzite Rib Mountain (relief,800 feet) loess or weathered till?

****

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YALE UNIVERSITY
DEPARTMENT OF GEOLOGICAL SCIENCES

NEW HAVEN, CONNECTICUT

February 5, 1941

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

Your letter of January 30 has been received, and I have read it with care and sympathy. I fully appreciate your point of view, and I can only say that I think it springs largely from the unfortunate fact that you could not be present at our meeting and therefore that two or three points have been misunderstood.

Before the meeting I had no thought of altering the moraine convention, but before it was over I was convinced, along with every member present, that the two-dimensional representation not only would make the map more valuable, but could easily be drafted on the 60-mile scale. Leighton was the original proponent of the change, and there was ample evidence to support him. As I say, there was no disagreement at the end, and I am sure you would have agreed had you been here.

As to the smaller scale, I think we all expected to redraft final copies of our regional maps for use by the draftsman of the final map. The base to be used by us does include county lines. Your part of it was sent you on the same day as the circular letter, and I believe that leaving it unopened, you assumed it was your blueprint maps.

I realize that the region you kindly offered to be responsible for, exhibits more intricacy of detail than many others, and therefore the compiling and drafting job falls rather heavily on you. With regard to the map of Michigan, probably you know that Leverett is preparing a new edition of it for publication -- with what degree of revision I do not know -- and it is possible that by writing him you could get him to have it drafted to the 40-mile scale by someone at Ann Arbor under his supervision. None of us has any drafting aid, as far as I know, but if you feel unequal to reducing the Minnesota map I am willing to help you myself. I am not bad at the drafting board. I regret that you feel the whole project to be mine and your part to be minor. I feel the project is a large cooperative undertaking, and an unusually successful one, with each man fully responsible for a share of the continent.

I agree with you about crossing striae. The symbol is to be used only where relative age is clear, and it was introduced at the request of the Canadians who say they have repeated use for it.

If you can have your completed map photographed, you can color the photograph for your own file. Actually, however, the map will probably be in your possession until the final draftsman is ready for it, and it can be returned to you after he has finished with it.

Regarding Exhibit B, we listed only those projects that could be discussed in detail by members present at the meeting. That is why northern Wisconsin was not included.

I have advised Apfel and MacClintock that you may be in a position to aid them in their proposed Project 2, and I have written Gould suggesting that he communicate with you regarding Project 5. Certainly cooperation in that matter is essential.

Thank you for everything you have done. Your maps were exhibited and discussed very favorably, and everyone was sorry you could not be present. I am glad you have finally got the better of the grippe, and hope your family will encounter no more bad luck.

Sincerely,

Flint

Richard Foster Flint

41 Roby Road,

Feb. 10, 1941

Dr. Richard Foster Flint,
Dept. of Geolgoical Sciences,
Yale University,
New Haven Connecticut

Dear Flint:

Reply to yours of the 5th was delayed by more illness. After recovering from the flu I caught a bad cold My oldest boy had the same experience also so things have been rather upset again.

The mistake about the maps would not have happened if I had been all right. When the roll came Mrs. Thwaites said "your maps have come back". Thinking she had opened the package I put it up on the shelf with the originals and gave it no further examination. I am very sorry for the oversight.

With regard to the project I think we all realize that the chairman always gets the lion's share of credit. I do not in any way object to this but it naturally comes to mind when apportionment of time must be made. If I am unjust in this I greatly regret making the statement.

I want to state again, however, that I once submitted both types of maps to you. Mine in the "Outline" shows moraines full width albeit generalized and on a very small scale. I like the other system better for use with students as it gives a much clearer picture. I fully expected you to say it was Leighton who demanded the change as I could see it had tobe someone from a clay till state. In stony till-outwash areas moraine borders are much more elusive. There is the ever-present danger of confusion with pitted outwash especially where overridden. I have in mind the conditions at Devils Lake where on the quartzite the moraine is only a stones throw across. On the lowland to the south Alden shows a width of several miles. I have often studied this phenomenon both from exposures and in views from the bluff and from the air. It is evidently a case of overridden outwash. Now this is a case where a generalized line is much more real than an attempt to map knobs and kettles as did Alden. But if you want to follow the style I did for the Outline all right.

What gave me pause was the fact that if plans were change changed might they not be again altered?

I have a letter from Hole stating that although he must try to get his degree in another year he hopes to put in two weeks in the field this summer and then continue afterward toward a final solution of the problem. He is a very careful worked and experienced in soils which is a rare phenomenon, at least here. I feel and Leverett has agreed with me that this approach to the problem of long-distance correlation of drifts may lead to very important results. I am sending enclosed a copy of Hole's preliminary report on his work last summer. Will you kindly return it to me when you have finished with it?

With regard to the admitted Wisconsin drift north of Hole's area I am in no position to ask for aid from the Geological Society. My northeastern project was to have been finished in 1934. I got an extension to 1936 and then could file nothing but a temporary and admittedly unsatisfactory report unfit for publication. The illustrations are at last done and the final draft may be started soon. But with such a record I just do not have the nerve to ask for aid. We do not have many students who wish to do glacial work for the doctorate and less mature students are not worth backing as the sad crazy-quilt of "Mineral Land Classification" maps compiled by Bean bears witness. Study of the air photos in the office is in vain. We must have ground control and take a set of photos into the field as well. The lowest price I could get was 25 cents a print and each print only nets some two square miles. I have not dared make an estimate of the entire sum.

With regard to Apfel and MacClintock I filed a report on my work with Adams. He also has manuscript reports on the two quadrangles which include Allegany State Park. Again I wonder if soil profile work might help.

Hole and I would be glad to cooperate with Gould if he desires it. At the time I was over there about a year ago he said he had never paid any attention to the matter.

I am in hopes that next summer when northeastern Wisconsin is cleared away I will have time to draft what I can of both Wisconsin and Minnesota waiting meantime for Leverett's new version of Michigan. But I just do not want to do a lot of work and then find plans changed so it has to be done over again!

Sincerely,

Mr. Thwaites

YALE UNIVERSITY
New Haven, Connecticut

Letter No. 8 April 17, 1941

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint):

1. I have received letters from several members of the Committee expressing their appreciation of the stimulating discussion that formed an important part of our meeting of January 18 and 19. As long as we are being stimulated to this extent by mutual attrition, we are doing more than merely compiling a map.

Dr. Bucher also heartily congratulated our Committee on the progress of its work, and arranged for copies of our Letter No. 7 to be distributed to the chairmen of the seventeen technical committees of the N.R.C.

2. Field projects.

As far as I can learn, all the field projects contemplated for this summer are to be carried out. In addition, White is planning a project on drift-border mapping and glacial stratigraphy in Ohio, and J H. Bretz and W. D. Jones of the University of Chicago have been encouraged by our compilation to plan a summer field project in mapping moraines and other drift features in the Keewatin field in western Canada. Thwaites and Gould are planning a field conference on problems of the Iowan drift.

3. Other activities by members.

Gould has set an unusual example by arranging his current tour of the far west so as to visit universities, State surveys, and other sources of unpublished data for his regional map. Few of us will be able to gather data in this efficient way, but it is fortunate that the region of local Cordilleran glaciation, which is complex and presents peculiar problems, can be handled thus.

Leverett has been lending advice and help to several other members of the Committee.

Advice from Ottawa is that the Canadian compilation is going steadily forward, thanks in considerable part to patient and time-consuming plotting by Nichols.

Apfel has codified a series of guiding principles for the compilation of the loess map, and is proceeding with the work.

Late in March I visited Capps and Alden in Washington, and I expect to visit Ottawa in May before the Canadian members leave for the field.

4. Publicity.

An explanation of our project was published in Science, vol. 93, March 28, 1941, p. 303-305. A copy is inclosed for your file. You will note that names of members and their regional map areas are given, so that volunteer information can be sent direct to the proper compiler. Results of this publicity have already materialized in at least one instance.

5. Annual Meeting of the N.R.C. will be held in Washington on May 3. Members of our Committee are welcome, and I understand that at least a few expect to be present.

6. Special Program at December Meeting.

Following suggestions made at our last meeting, I have obtained the cordial cooperation of the Geological Society in arranging for a special Session on Glacial Geology as part of the regular scientific sessions of the Society in Boston next December. It is suggested that the program consist of two parts: (1) a series of papers by members of our Committee, setting forth the glacial relations and outstanding problems in various parts of the continent, and (2) a selected group of research papers in glacial geology. The papers in the first series would be limited to 10 minutes each and would be best illustrated by Kodachrome slides made from the regional manuscript maps. Each of the authors would supply a regular 250-word abstract and a 500-word press release, but would not be asked to prepare anything further for publication. The papers in the second series would be selected from the regular offerings sent in by members of our Committee and by others.

I would much appreciate having expressions of opinion from members in regard to this Boston program. Criticisms and suggestions would be welcome, particularly adverse comments. If there is any member from whom I do not hear in the near future, I shall assume that he has no objection to speaking for 10 minutes on his regional map, and shall proceed accordingly. I am arranging for adequate wall space for the exhibit of our standard-scale regional maps at this meeting. Our own Committee meeting will, of course, be held independently of the sessional program.

7. Chicago Meeting.

The University of Chicago is celebrating its semicentennial in September with a series of important scientific sessions, one of which will be a two-day geologic program under the joint auspices of the G.S.A., Section E of the A.A.A.S., and the University. The two general subjects of discussion will be geophysical problems and glacial geology. Several papers will be given and an extensive round-table discussion, of a type not possible at ordinary G.S.A. meetings, is being arranged. One of our members (Leighton), as Chairman of Section E, will be present in a presiding capacity, and at least some others of us are planning to attend. This looks like an unusual opportunity for members of our Committee to contact other glacial geologists and to benefit by unusual discussion. The mid-western place of meeting will doubtless bring together a number of persons who will not attend the Boston meeting in December.

8. Base Map Data.

I shall be able to say more about the base map after having visited Ottawa next month. I can report, however, that from data kindly supplied by the U. S. Coast and Geodetic Survey I have had plotted on 1:2,500,000, submarine form lines at 1000-foot intervals off the Pacific Coast between Lat. 33° and Lat. 49°.

The contours on the land surface are a problem because they may obscure the glacial data in areas of great relief and steep slopes. The easiest source from which to plot these contours on the regional maps consists of the Regional Aeronautical Charts, scale 1:1,000,000, contour interval 1000 feet, published by the Department of Commerce, Washington.

9. Glacial Data.

The opinion seems to be general that we should follow a very conservative policy in representing the accuracy of our knowledge; that is, that we should use continuous boundary lines only where the basic information is of quadrangle grade or its equivalent.

Regarding the conventions used, Bostock thinks that small existing glaciers, even where numerous, should be shown by symbols that indicate their actual distribution instead of by a verbal statement. This seems like a good amendment, and attention is called to it even though it will probably find use chiefly in the Canadian Cordillera.

Apfel suggests limiting the mapping of glacial lakes to those now represented by bottom deposits of significant area and depth, on the ground that it would reduce confusing detail and would add to the areal-geologic significance of the map. I agree with this proposal, and, if the other members have no objection, I suggest we adopt it.

Gould recommends a conventional symbol for very small scattered areas of glaciation in the mountains of the Southwest. Since the additional symbol would appear only in Gould's regional map, I suggest we leave the matter to his judgment.

The list of published references and contributors of unpublished data for each regional map should, I think, be exhibited with each map in Boston, so that full credit for data supplied will be publicized from the start. I believe the resulting good will is far more important than the small effort involved in preparing the lists. These lists should be in compact form, to conserve wall space, and the maps themselves can be exhibited underneath cellophane to protect the colors from moisture.

For the information of members interested in plotting from air mosaics, or in using air photographs on field projects: An index map, "Extent of Aerial Photography, March 1, 1941" is published free by the U. S. Dept. of Agriculture, Office of Land Use Coordination, Washington. It shows that most of the United States has been photographed, and that nearly all the results are available.

10. Dr. N. L. Bowen of the University of Chicago suggests that we consider the possibility of preparing a "Walt Disney" of the glacial history of North America -- an animated cartoon with a definite time and space scale, showing the advance and retreat of the glaciers and the development of the Great Lakes. This is an interesting suggestion, and whereas we will all agree that we have our hands full at the moment, this is something that might be feasible in the future. I would welcome any comments on it that you may care to make, and would pass them on to Dr. Bowen.

Sincerely yours,

Richard Foster Flint

Richard Foster Flint

P.S. Please take special note of Section 6, paragraph 2, and reply soon if you wish to comment.

May 7, 1941

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Your circular of April 17 arrived while I was on the annual mapping trip to Devils Lake so that reply was delayed until now.

Of course I would be glad to give a talk at Boston next winter but the future is so uncertain with the strong probability of war that I do not see how I can promise definitely.

I will be unable to touch the maps until after school is out and the northeastern Wisconsin paper is sent to Aldrich. I'll try to place this next on the job sheet but one can never tell when some rush job may displace it.

Sincerely,

YALE UNIVERSITY
New Haven, Connecticut

April 17, 1941

Dear Thwaites,

Perhaps the best arrangement for the 10-minute papers at Boston would be something like this:

1. Eastern Canada ---- One of the Canadian members
2. New England, New Jersey, New York, Pennsylvania ---- MacClintock
3. South-central region (Illinois, Iowa, Indiana) ---- Leighton
4. North-central region (Michigan, Wisconsin, Minnesota) ---- Thwaites
5. North-western region ---- Flint
6. Western Canada ---- One of the Canadian members
7. Local Cordilleran glaciation ---- Gould

Would you be willing to speak on the general features and outstanding problems of the composite region for which your name is suggested? Any suggestions for a better arrangement of regions or speakers will be welcome.

Sincerely,

Dick Flint
Richard Foster Flint

June 3, 1941

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Thank you for the photostats of your maps of Washington, Idaho, and Montana which came a few days ago. They look very well.

As soon as school is over I plan to finish my northeastern Wisconsin report and then start on my maps. The first job would have been done now but our maid quit and Mrs. Thwaites now has no time for typing. All the boys are going to Summer School so I hope we can finish it then.

Best regards,

Sincerely,

PUBLICATIONS OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
OF INTEREST TO GEOLOGISTS OR GEOGRAPHERS *

February 15, 1941

Bulletin Series (Printed)

No.

36. Catalogue of published bibliographies in geology, 1896-1920. Compiled by Edward B. Mathews. October, 1923. 228 pages. $0.15.**

51. Radioactivity. A. F. Kovarik and L. W. McKeehan. Second printing. With additions and corrections. March, 1929. 203 p. $2.50.

70. Report on studies of mean sea-level. Report of the Committee on Shoreline Investigations. Douglas Johnson. July, 1929. 50 p. $0.50.

77. Physics of the Earth. I. Volcanology. Day, Friedlaender, Jaggar and Sapper. February, 1931. 77 p. Cloth, $1.00.

78. Physics of the Earth. II. The figure of the Earth. Rude, Doodson, Schureman, Marmer, Lambert, Bowie, Reid, Swick, Barton, Parkhurst, Dutton, Avers, Hodgson, Schlesinger and Brown. February, 1931. 286 p. Paper, $3.00; cloth, $3.50.

80. Physics of the Earth. IV. The age of the Earth. Knopf, Schuchert, Kovarik, Holmes and Brown. June, 1931. 487 p. Paper, $4.50; cloth $5.00.

82. List of seismological stations of the world. Second Edition. H. E. McComb and Clarence J. West. April, 1931. 119 p. $1.50.

85. Physics of the Earth. V. Oceanography. Heck, Littlehales, Collett, Thompson, Robinson, Patton, Marmer, McEwen, Schumacher, Soule, Parker, Iselin, Brooks, Huntsman and Schuchert. June, 1932. 581 p. Cloth, $5.00.

88. Summary information on the state geological surveys and the United States Geological Survey. Compiled under the direction of the National Research Council Committee on State Geological Surveys. By M. M. Leighton. November, 1932. 136 p. $1.00.

89. Report of the Committee on Sedimentation, 1930-1932. Prepared under the auspices of the Division of Geology and Geography, National Research Council. November, 1932. 229 p. $1.00. (Contains also the first report of the Committee on Accessory Minerals of Crystalline Rocks, A.N.Winchell, Chairman, and "The classification and terminology of the pyroclastic rocks" by Chester K. Wentowrth and Howel Williams.)

#90. Physics of the Earth. VI. Seismology. Macelwane, Wood, Reid, Anderson and Byerly. October, 1933. 223 p. Paper, $2.00; cloth, $2.50.

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* Only those reports listed that are still available.
** Reduced price covers estimated cost of postage and handling only.
# See page 6 of this list for Nos. VII and VIII in this Physics of the Earth Series.

No.

94. Fellowships and scholarships for advanced work in science and technology. Third edition. Callie Hull & Clarence J. West. June, 1934. 194 p. $1.00.

95. Funds available in the United States for the support and encouragement of research in science and its technologies. Third edition. Callie Hull and Clarence J. West. June, 1934. 162 p. $1.00.

98. Report of the Committee on Sedimentation, 1932-1934. Prepared under the auspices of the Division of Geology and Geography, National Research Council. July, 1935. 246 p. $1.00. (Includes "The terminology of coarse sediments" by C. K. Wentworth, with notes by P. G. H. Boswell.)

104. Industrial research laboratories of the United States, including consulting research laboratories. Seventh edition. Compiled by Callie Hull. December, 1940. 371 p. Cloth, $3.50.

Reprint and Circular Series (also printed)

27. List of manuscript bibliographies in geology and geography. Compiled by Homer P. Little. February, 1922. 17 p. $0.25.

43. Functions of the Division of Geology and Geography of the National Research Council. Nevin M. Fenneman. December, 1922. 7 p. $0.20.

92. Report of the Committee on Sedimentation, 1928-1929. Prepared under the auspices of the Division of Geology and Geography. May, 1930. 122 p. $1.00.

98. Report of the Committee on Sedimentation, 1929-1930. Prepared under the auspices of the Division of Geology and Geography. July, 1931. 97 p. $1.00.

100. In quest of glacial man. A plan of cooperation between excavators and the representatives of the sciences of man and of the earth. Madison Bentley. August, 1931. 20 p. $0.40.

105. Doctorates conferred in the sciences by American universities, 1932-1933. Compiled by Callie Hull and Clarence J. West. August, 1933. 63 p. $0.50. (See page 6 of this list for later information on this subject.)

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A complete list of the publications in the Bulletin and Reprint and Circular Series will be furnished on request. Orders, accompanied by remittance, should be addressed to NATIONAL RESEARCH COUNCIL, Washington, D. C.

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For information regarding the Transactions of the American Geophysical Union, address inquiries to: The General Secretary, American Geophysical Union, 5241 Broad Branch Road, Northwest, Washington, D. C.

OTHER PRINTED PUBLICATIONS ISSUED WITH THE SPONSORSHIP OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.

(These publications are not distributed by the National Research Council, but may be obtained from the commercial publisher.)

ANNOTATED BIBLIOGRAPHY OF ECONOMIC GEOLOGY. Originally prepared under the auspices of the Committee on Economic Geology, Waldemar Lindgren, Chairman. Annual Volumes I-XII (2) issued to date (with XIII (1) in press). Remittances should be made payable to the Economic Geology Publishing Company, and sent to W. S. Bayley, University of Illinois, Urbana, Illinois. Subscriptions $5.00 per year in the United States and U. S. Possessions. (Sponsorship of this bibliography transferred on July 1, 1936 by the National Research Council to the Society of Economic Geologists.)

TREATISE ON SEDIMENTATION. Second edition, completely revised (1932). Prepared under the auspices of the Committee on Sedimentation, W. H. Twenhofel, Chairman. xxvi + 914 pages. 121 illustrations. Price $8.00. Book sold only by the publishers, The Williams and Wilkins Company, Baltimore, U.S.A.

RECENT MARINE SEDIMENTS. A SYMPOSIUM edited by Parker D. Trask, and prepared under the auspices of the Committee on Sedimentation (1939). vi + 736 pages. 139 illustrations. Book sold only by the publishers, The American Association of Petroleum Geologists, Box 979, Tulsa, Oklahoma. Price $5.00. (To A.A.P.G. Members and Associates, Colleges and Libraries, $4.00).

CONTRIBUTIONS TO A KNOWLEDGE OF THE LEAD AND ZINC DEPOSITS OF THE MISSISSIPPI VALLEY REGION. Edited by Edson S. Bastin. The Geological Society of America, Special Papers, No. 24. 1939. 156 pages, 4 plates, 27 figures. $1.00. (Report of Subcommittee of the Committee on Processes of Ore Deposition.) Report sold only by the Society, 419 West 117th St., New York, N.Y.

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MILITARY GEOLOGY AND TOPOGRAPHY. Herbert E. Gregory, Editor. 1918. 281 pages. Book sold only by the publishers, Yale University Press, New Haven, Conn. $1.25.

RECENT REPORTS OF THE DIVISION OF GEOLOGY AND GEOGRAPHY (STILL AVAILABLE) ISSUED IN BOUND MIMEOGRAPHED FORM

(No charge, unless so stated, except stamps to cover estimated cost of postage and handling. 15¢ for any one report, and 5¢ for each additional bound report; or ask to have the reports sent Express Collect.)

REPORTS OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME - Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chairman. (1) May 2, 1936 (87 pages); (2) May 1, 1937 (77 pages); (3) April 30, 1938 (123 pages); (4) April 29, 1939 (114 pages); and (5) April 27, 1940 (141 pages). (Supply of earlier reports exhausted.)

(list continued on page 4)

REPORTS OF THE COMMITTEE ON SEDIMENTATION - Parker D. Trask, Chairman. (1) for 1935-36, with report also of the Subcommittee on "Terminology of Medium-Grained Sediments" by Victor T. Allen. (Issued September, 1936). 47 pages. (2) for 1936-37, with "Terminology of the Fine-Grained Mechanical Sediments" by W. H. Twenhofel. (Issued October, 1937). 128 pages. (3) for 1937-38 with "Terminology of the Chemical Siliceous Sediments" by W. A. Tarr. (Issued September, 1938). 114 pages. (4) for 1938-39. 102 pp. (Issued September, 1939). (5) for 1939-40. 121 pages. (Issued December, 1940). (Earlier reports printed. See Bulletins Nos. 89 & 98; Reprint & Circular Series, Nos. 92 & 98.)

REPORTS OF THE COMMITTEE ON PALEOECOLOGY - W. H. Twenhofel, Chairman. (1) for 1935-36. (Issued October, 1936). 64 pages. (2) for 1936-37. (Issued December, 1937). 63 pages. (Final report.)

BATHOLITH COMMITTEE REPORTS ("Re-run" editions, 1938) - Frank F. Grout, Chairman. (1) 1935, "Annotations of Selected Papers on the Mechanics of Igneous Invasion" (54 pages), and (2) 1935, "Comments on Magmatic Stoping" (47 pages). (Final reports.)

REPORT OF THE COMMITTEE ON STRUCTURAL PETROLOGY, 1937 - T. S. Lovering, Chairman. (Issued October, 1938). 103 pages. (Final report.)

SUGGESTIONS CONCERNING DESIRABLE LINES OF RESEARCH IN THE FIELDS OF GEOLOGY AND GEOGRAPHY. Edited by Edson S. Bastin for Physical Geology, Carl O. Dunbar for Paleontology and Stratigraphy, and Robert S. Platt for Geography. (Issued December, 1936). 83 pages.

REPORT OF THE INTERDIVISIONAL COMMITTEE ON BORDERLAND FIELDS BETWEEN GEOLOGY, PHYSICS AND CHEMISTRY, 1937. T. S. Lovering, Chairman. (Issued March, 1938). 73 pages. (Final report.)

ANNUAL REPORT OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL, Washington, D. C., for the year 1939-1940. Contains list of Members of the Division and its Committees, Minutes of Annual Meeting, Chairman's Report (Chester R. Longwell), and reports from Committee Chairmen for the following committees: (Appendices A-T). (A few copies left of Annual Report for 1936-1937, 1937-38, and 1938-39, but only file copies left of the Annual Reports for previous years.)

1939-1940 Committee Reports (Geologic)

		Pages
(A)	Processes of Ore Deposition - W. H. Newhouse, Chairman	1
(B)	Micropaleontology - Joseph A. Cushman	11
(C)	Paleobotany - Roland W. Brown	25
(D)	Sedimentation (preliminary)* - Parker D. Trask	6
(E)	Glacial Map of North America - R. F. Flint	2
(F)	Tectonics - Chester R. Longwell	1
(G)	Measurement of Geologic Time (preliminary)* - A. C. Lane	4

Bound Annual Report of the Division, 1939-40, expected to be ready for distribution in March, 1941. * Complete report issued separately.

1939-1940 Geologic Committee Reports (continued)

		Pages
(H)	Density Currents - Herbert N. Eaton	7
(I)	Handbook of Physical Constants of Geological Materials - F. Birch	6
(J)	Stratigraphy - Carl O. Dunbar	1
(K)	Conservation of the Scientific Results of Drilling - W. H. Twenhofel	2
(L)	Research in the Earth Sciences, Geologic Section - Norman L. Bowen	4

Geographic Reports

(M)	Basic Geographical Data and Techniques - Charles W. Davis	2
(N)	Geographical Studies of Mineral Distribution - L. F. Thomas	1
(O)	Cooperation with the Bureau of the Census - John K. Wright	2
(P)	Geographic Classification of Surface Configuration - V. C. Finch	1
(Q)	Research in Areas of International Concern - Derwent Whittlesey	3
(R)	Outline of "A Study of the Cotton Belt Problems" - P. E. James	2
(S)	Research Committee, Geographic Section - Richard Hartshorne	2
(T)	International Geographical Union, National Comm. - C. H. Birdseye	1

Special Reports

(U)	Coal Classification Committee, A.S.T.M. - Taisia Stadnichenko	1
(V)	Board of Surveys and Maps, Advisory Council - C. W. Thornthwaite	2
(W)	Research Program, American Geographical Society - John K. Wright	2
(X)	Research Program, Amer. Assoc. of Petroleum Geologists - F. H. Lahee	3

(Separates of Appendices A-X available)

SPECIAL "CAREER" PAMPHLETS

"Geology as a Profession" by H. P. Little. (Revised and issued, June 1938) 5
"Geography as a Profession" by H. P. Little. (With revisions by W. Elmer Ekblaw.) (Issued June 1838) 3

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* Requests for mimeographed reports should be addressed to the Division of Geology and Geography, National Research Council, 2101 Constitution Avenue, Washington, D. C. (See page 3 regarding postage asked to cover mailing and handling charges.)

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* Note: In accordance with a policy approved by the Executive Committee of the Division in 1940, mimeographed reports of the Division will be sent only on individual request (i.e. not in response to group orders for college classes) since editions are limited and are intended primarily for research workers who have special interest in the particular subjects.

(over)

CONTINUATION OF PHYSICS OF THE EARTH SERIES

(These two books sold only by the Publisher,
McGraw-Hill Book Company, Inc., New York.)

Physics of the Earth. VII. Internal Constitution of the Earth.
Edited by Beno Gutenberg. Contributors: L. H. Adams, Reginald A. Daly, B. Gutenberg, Harold Jeffreys, Walter D. Lambert, James B. Macelwane,S.J., C. F. Richter, C. E. Van Orstrand, H. S. Washington. McGraw-Hill Book Co., Inc. 1939. 413 pages. $5.00.

Physics of the Earth. VIII. Terrestrial Magnetism and Electricity.
Edited by J. A. Fleming. Contributors: J. Bartels, L. V. Berkner, J. A. Fleming, O. H. Gish, H. D. Harradon, C. A. Heiland, E. O. Hulburt, H. F. Johnston, H. E. McComb, A. G. McNish, W. J. Rooney, B. F. J. Schonland, O. W. Torreson, L. Vegard. McGraw-Hill Book Co., Inc. 1939. 778 pages. $8.00.

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CONTINUATION OF INFORMATION ON DOCTORAL DISSERTATIONS

Published by The H. W. Wilson Co., New York
(Reports sold only by the Publisher)

Doctoral Dissertations Accepted by American Universities.
No. 1, 1933-34; published every year since. Price $2.00 each.
H. W. Wilson Co.

NATIONAL RESEARCH COUNCIL - WASHINGTON, D. C.

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(For Committees and Representatives, see separate list)

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Derwent Whittlesey, Chairman	S. Whittemore Boggs	Robert S. Platt
John B. Appleton	Charles Colby	

15. Committee on Sedimentation

Parker D. Trask, Chairman	H. B. Milner	A. C. Trowbridge
Carl B. Brown	F. J. Pettijohn	W. H. Twenhofel
Carl W. Correns	R. Dana Russell	T. Wayland Vaughan
Ralph E. Grim	Henry C. Stetson	Chester K. Wentworth
W. C. Krumbein	L. G. Straub	
P. D. Krynine	Allen C. Tester	

16. Committee on Stratigraphy

Carl O. Dunbar, Chairman	Edwin Kirk	Charles K. Swartz
G. Arthur Cooper	Raymond C. Moore	W. H. Twenhofel
Carey Croneis	John B. Reeside, Jr.	C. E. Weaver
B. F. Howell	L. W. Stephenson	

17. Committee on Tectonics

Chester R. Longwell, Chrm.	D. F. Hewett	George W. Stose
Philip B. King, Vice-Chrm.	Eleanora B. Knopf	W. T. Thom, Jr.
Charles H. Behre, Jr.	A. I. Levorsen	A. C. Waters
* William Bowie	T. S. Lovering	Eldred D. Wilson
Walter H. Bucher	George R. Mansfield	A. O. Woodford
Eugene Callaghan	W. H. Monroo	

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REPRESENTATIVES OF THE DIVISION ON:

Advisory Council of the Federal Board of Surveys and Maps -
Clarence E. Batschelet

Committee D-5 on Coal and Coke, American Society for Testing Materials--
Taisia Stadnichenko

* Deceased.

Note: The Chairman of the Division is, ex officio, a member of all Committees of the Division.

(For Members of the Division, see separate page)

MR. THWAITES - Committee Member.

NEW YORK OFFICE
Engineering Societies Building, 29 West 39th Street

CABLE ADDRESS
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

March 7, 1941

TO MEMBERS OF THE DIVISION OF GEOLOGY AND GEOGRAPHY AND ITS COMMITTEES

Enclosed is a copy of the latest list of "Publications of the National Research Council of Interest to Geologists or Geographers", and on pages 4-5 is given the table of contents of the Annual Report of the Division for 1939-40, which it is expected will be ready for distribution within a few weeks. Copies of the annual report will be sent to Division members and Committee chairmen, and will be sent to Committee members who indicate their desire for the report by filling in and returning the enclosed postal card. Copies of the reports of Committees of which you were a member during 1939-40 were previously sent you either during the summer or fall. The titles of the latest bound mimeographed reports of the Division are given on pages 3-4 of the enclosed list, and include the 1939-40 reports of the Committees on (1) Measurement of Geologic Time, and (2) Sedimentation.

Enclosed are lists of the membership of the Division and its Committees as constituted to date.

For several years, the Annual Meeting of the Division has been held in Washington on the last Saturday in April or the first Saturday in May, following the meetings of the National Academy of Sciences and the American Geophysical Union. The meeting of the National Academy and the American Geophysical Union this year will be held during the week of April 27-May 3, and it therefore seems advisable to hold the annual meeting of the Division on Saturday, May 3, 1941, beginning at 9:30 a.m.

In order that the short Committee reports, and summaries or abstracts of the longer ones, may be mimeographed and distributed in advance of the annual meeting, Committee Chairmen are asked to transmit their reports, or if more than a couple pages, summaries of a page or less, by April first. Since only a short time remains before April first, it is urged that serious thought be given by Committee Chairmen to the preparation of these reports at an early date. At the time the summary report is sent in, the Division Chairman wishes to know each Committee Chairman's recommendation regarding continuance or discontinuance of his Committee, and, if continuance is recommended, whether or not any change in personnel is desirable. As most of you know, it is the policy of the Division to give a new committee a three-year term to accomplish its task, after which it should take stock of its accomplishments to see whether a definite need can be filled by its continuance. If so, it should be continued; if not, it should be discontinued to make way for new committees

with definite programs. It is also urged that the committees be composed of active members who are willing to share in the work, and if it seems advisable to reorganize the personnel from time to time in order to accomplish more active membership, that this matter be given serious consideration by the Committee Chairmen.

Some Committee Chairmen find it desirable to hold a meeting of their committees in Washington about the time of the annual meeting. Although the Division is not able to assist in the expense of such meetings, it is usually found that several members of a committee are in Washington at that time, and a brief meeting can be held during the luncheon hour of the annual meeting if no other time seems available. (A Washington member of the committee concerned is usually willing to make the necessary arrangements for such a luncheon meeting.) A request for Conference funds for committee meetings of exceptional importance may also be made by Committee Chairmen in consultation with the Division Chairman. Requests for any such funds would have to be acted upon by the National Research Council at its Administrative Committee meeting to be held April 5, and since a certain amount of preliminary consideration is first needed on the part of the Executive Committee of the Division, it is urged that any Committee Chairmen contemplating asking for funds for important committee meetings to be held in April send in their requests to me by March 22.

In addition to Division Members and Committee Chairmen, Committee Members are cordially invited to attend the annual meeting of the Division. The Division cannot, however, assist in the payment of traveling expenses to any except Division Members and the Committee Chairmen. At a little later date further details will be sent regarding the annual meeting on May 3, and the subscription dinner to be held following the meeting (except to out-of-town Committee members who are welcome, but probably will not be able to come and thus not be interested in further details unless word is sent us to that effect).

Sincerely yours,

Walter H. Bucher

Walter H. Bucher,
Chairman, Division of
Geology and Geography

WHB:J

Enclosures

P.S. You may be interested in knowing that the Fellowship Committee of the Division has been giving consideration to applications for Post-Doctorate Fellowships of the National Research Council in the fields of Geology, Paleontology, and Physical Geography. Announcement of final awards in all fields can probably be made at the annual meeting of the Division, or perhaps earlier. The closing date for receipt of applications for the year 1941-42 was December 31, 1940.

New York Office
Engineering Societies Building, 29 West 39th Street

Cable Address
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

June 30, 1941

TO THE MEMBERS OF COMMITTEES, DIVISION OF GEOLOGY AND GEOGRAPHY

My dear Mr. Thwaites:

During the year 1940-41, you have been a member of the Committee on

* GLACIAL MAP OF NORTH AMERICA.

If a written report for the Committee of which you are a member was presented at the annual meeting of the Division, held on May 3, a copy of it has either been mailed to you, is enclosed at this time, is sent under separate cover, or will be sent to you after it has been mimeographed. # A copy is enclosed of my report as Division Chairman. It is expected that the complete report of the Division for 1940-41 will be ready for distribution in the autumn, together with the complete annual reports of the Committees on (1) Measurement of Geologic Time, (2) Sedimentation, and (3) Ecology of Marine Organisms. The Annual Report of the Division for 1939-40 was distributed during the year, together with the other reports (issued in mimeographed form) mentioned on page 17 of the enclosed Chairman's report. Additional copies of these reports may be secured from the office of the Division.

The membership of the Committees of the Division for the coming year is indicated on the enclosed list. For a record of changes in personnel, discontinuance of certain committees or additions to membership of present ones, see pages 8-9 of the enclosed report.

As indicated on the enclosed list of Members of the Division for the coming year, 1940-1941, Richard Hartshorne has been reappointed as Vice-Chairman of the Division, and is in charge of its geographic interests. In addition to the appointment of new members of constituent societies for the three-year term beginning July 1, 1941 (G. Arthur Cooper, T. S. Lovering, and Richard J. Russell), Joseph T. Singewald, Jr. has been appointed as the new Member at Large for the same period. Of the thirteen members, six have been appointed to serve as the Executive Committee of the Division, as follows:

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* Committee continued for 1941-42 with the same personnel.

Committee report (Appendix G) enclosed.

W. H. Bucher and Richard Hartshorne, Chairman and Vice-Chairman, ex officio: Wilmot H. Bradley, Charles C. Colby, A. I. Levorsen, and T. S. Lovering. The present arrangement of non-resident Chairmen of Divisions of the Research Council continues in most instances, as it does in this Division.

The last meeting of the year of the Administrative Committee of the Research Council was held on June 7, at which time confirmation was given to the membership of the Division and its Committees for the coming year, as previously approved by the Executive Committee of the Division. The next meeting of the Administrative Committee will probably be held early in October, at which time new business, projects and requests for travel funds from the different divisions of the Research Council will be considered. (Urgent business can be presented to the Administrative Committee in the interval by correspondence vote.) New business, projects and requests,of the Division must be approved first by the Executive Committees of the Division concerned. Therefore, if you wish to present any of these* on behalf of the Division, please send them to me for consideration and presentation to the Executive Committee of the Division preferably in September. Correspondence may be sent to the Division office in Washington during the summer, and will be forwarded to me in the West, or held, as seems best, by the Secretary of the Division, Miss Johnson, or by someone else during her vacation, probably in August.

I wish to take this opportunity to thank you for your cooperation and service during the past year, and to wish you a pleasant and profitable summer season,

Sincerely yours,

Walter H. Bucher

WHB:J

Enclosures

Walter H. Bucher,
Chairman, Division of
Geology and Geography

* Your attention is called to the list of "Topics for Discussion at the Annual Meeting and Later", included on pages 10-13 of the enclosed Chairman's report.

APPENDIX G

REPORT OF COMMITTEE ON GLACIAL MAP OF NORTH AMERICA

May 3, 1941

Meetings

The Committee held one meeting during the year, on January 18-19, 1941, in New Haven. Those present were: Apfel, Goldthwait, Gould, Kay, Leighton, MacClintock, Nichols, Norman, and Flint. W. H. Bucher sat with the Committee during the second day. Seventeen hours were spent in demonstration and very stimulating discussion of the preliminary regional maps submitted by members according to the assignments agreed upon at the December, 1939, meeting, and published in the Report of the Committee for 1939-40.

Progress of Work

During the year the principal task in hand - the preparation of a detailed Glacial Map of North America - has advanced more rapidly than had been expected, as appeared from a survey of the maps submitted at the meeting. These were on a scale of 1:1,000,000 for regions within the United States, and on various scales for Canadian regions. Compilations for all but three States were submitted by the American members, and a progress map submitted by the Canadian members showed that compilations to date cover 80 to 90 percent of Canada. The Canadian data are remarkable in the high percentage of hitherto unpublished material they include, not only as to glacial features but also as to Arctic coasts, topographic form lines, and distribution of existing glaciers, assembled for the first time. The energetic and closely coordinated work of the Canadian group caused wide comment.

The compilations submitted for regions within the United States include virtually all the published material and, in addition, the more readily available unpublished data. Many contacts with sources of data have already been established.

The discussion centered chiefly around three problems: (1) correlation; (2) features to be shown on the map and standard conventions for showing them; (3) field projects shown to be desirable by the assemblage of data on the preliminary maps. Fifteen such projects were defined. At least seven of these are expected to be undertaken during the summer of 1941 by members of the Committee and their associates, and the results of some of them should fill significant gaps in the map.

Publicity

The work of the Committee was advertised at the Austin meeting of the Geological Society of America in December 1940 by a paper by E. T. Apfel, and by a map exhibit. A statement of the Committee's project together with

a request for contributions appeared in Science, vol. 93, 1941, pp. 303-305. These two advertisements have already elicited contributions of unpublished data from widely scattered sources.

Next Meeting

It is proposed to hold the next meeting of the Committee, in December 1941, at Boston, in connection with the meeting of the Geological Society. For this meeting regional maps on uniform scales of 1:2,500,000 (U. S.) and about 1:2,500,000 or 1:3,800,000 (Canada) will be prepared, with all conventions fully standardized. These, together with a map of the loess in preparation by E. T. Apfel, and certain other maps, will form the basis of a public exhibit at that time.

It is proposed further that a group of related papers on glacial subjects shall form a part of the Society's program at this meeting, and that full discussion of them will be provided for. The Committee's map project should benefit considerably from these transactions.

Features Shown on Map

It is expected that after all the available data have been assembled, they will be drafted on to a single base map of North America on a scale of approximately 1:3,800,000, and that the final map, when published, will be on this scale. In addition to the several drift sheets, the following features will be shown on the map:

Striae
Two sets of crossing striae of different dates
Drumlins (by groups)
Eskers
Boulder trains
Directions of glacier flow down mountain valleys
End (terminal) moraines
Isolated boulders beyond the drift sheets
Outwash in nonglaciated areas
Glacial and extraglacial lakes
Glacial marine areas
Existing glaciers
Occurrence of interglacial and interstadial features
Occurrence of pre-Wisconsin drift in Cordilleran areas
Occurrence of varved sediments where not mappable as a body
Occurrence of glacial-marine deposits where not mappable as a body

New Members

Since the last report, Laurence M. Gould has been added to the list of Committee members, and has progressed far in the preparation of a map of the local Cordilleran areas of glaciation south of the main glaciation.

Richard Foster Flint, Chairman

Committee Members

W. C. Alden
E. T. Apfel
H. S. Bostock
S. R. Capps
J. W. Goldthwait
L. M. Gould
G. F. Kay
M. M. Leighton
Frank Leverett
Paul MacClintock
D. A. Nichols
G. W. H. Norman
F. T. Thwaites
G. W. White
G. A. Young

NATIONAL RESEARCH COUNCIL - WASHINGTON, D. C.

ORGANIZATION OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

July 1, 1941 - June 30, 1942

OFFICERS

Chairman, Walter H. Bucher
Vice-Chairman, Richard Hartshorne

EXECUTIVE COMMITTEE

Walter H. Bucher, Chairman	Richard Hartshorne Vice-Chairman
Wilmot H. Bradley	A. I. Levorsen
Charles C. Colby	T. S. Lovering

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MEMBERS OF THE DIVISION

Representatives of Societies

Geological Society of America
Wilmot H. Bradley (43)*
T. S. Lovering (44)

Mineralogical Society of America
George Tunell (42)

Paleontological Society
G. Arthur Cooper (44)

Association of American Geographers
Richard Hartshorne (43)
Richard J. Russell (44)

American Geographical Society
Charles B. Hitchcock (42)

Society of Economic Geologists
W. S. Burbank (43)

American Association of Petroleum Geologists
A. I. Levorsen (43)

American Ceramic Society
Robert B. Sosman (42)

Members at Large

Charles C. Colby (42)
Walter H. Bucher (43)
Joseph T. Singewald, Jr. (44)

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(For Committees and Representatives, see separate list)

* Date of expiration of term of office.

NATIONAL RESEARCH COUNCIL

COMMITTEES OF THE DIVISION OF GEOLOGY AND GEOGRAPHY, 1941-1942

July 1, 1941

Executive Committee

Walter H. Bucher, Chairman	Wilmot H. Bradley	A. I. Levorsen
Richard Hartshorne, Vice-Chrm.	Charles C. Colby	T. S. Lovering

Advisory Committee to the Division (Present and Former Chairmen)

Walter H. Bucher, Chairman	Arthur Keith	
Edson S. Bastin	Andrew C. Lawson	Edward B. Mathews
Nevin M. Fenneman	Chester R. Longwell	W. H. Twenhofel

Advisory Committee on National Research Council Post-Doctorate Fellowships in Geology, Paleontology, and Physical Geography

Walter H. Bucher, Chairman	Stephen R. Capps	Louis B. Slichter
Richard Hartshorne, Vice-Chrm.	James Gilluly	Robert B. Sosman
Edson S. Bastin	John B. Reeside, Jr.	C. W. Thornthwaite

National Committee of the United States, International Geographical Union

_____, Chairman	Preston E. James	Lawrence Martin
S. Whittemore Boggs	W. L. G. Joerg	John K. Wright

Technical Committees

1. Committee on Authors' Abstracts
   Marcus I. Goldman, Chairman (Members to be appointed later)

2. Committee on Coöperation with the Bureau of the Census

John K. Wright, Chairman	W. L. G. Joerg	Guy-Harold Smith
O. E. Baker	Lawrence Martin	C. W. Thornthwaite
Stanley D. Dodge		

3. Committee on Coöperation with the Soil Survey

Wellington D. Jones, Chairman	W. Elmer Ekblaw	L. R. Schoenmann

4. Committee on Density Currents

Herbert N. Eaton, Chairman	P. V. Hodges	C. S. Scofield
J. H. Bodine	C. S. Howard	F. P. Shepard
Reginald A. Daly	Lt. Col. A. B. Jones	J. K. G. Silvey
C. C. Elder	Chancey Juday	H. U. Sverdrup
M. M. Ellis	Robert T. Knapp	C. P. Vetter
N. C. Grover	L. M. Lawson	A. H. Wiebe
Raymond A. Hill	W. C. Lowdermilk (G. C. Dobson, alternate)	

Subcommittee on Elephant Butte Reservoir
C. S. Scofield, Chairman

Subcommittee on Lake Mead
C. P. Vetter, Chairman

5. Committee on Ecology of Marine Organisms

Harry S. Ladd, Chairman	Remington Kellogg	F. W. Rolshausen
C. H. Edmondson	Kenneth E. Lohman	Henry C. Stetson
Gordon Gunter	Roger Revelle	T. Wayland Vaughan

6. Committee on Geographical Field Training

K. C. McMurry, Chairman	G. Donald Hudson	Glenn T. Trewartha
George B. Cressey	Wellington D. Jones	J. O. Veatch

7. Committee on Geographic Research

Preston E. James, Chairman	Ralph H. Brown	Richard Hartshorne
S. Whittemore Boggs	Charles C. Colby	J. Russell Whitaker
		Derwent Whittlesey

Subcommittee on Southern Studies Project
Preston E. James, Chairman

Subcommittee on Census of Professional Geographers
W. L. G. Joerg, Chairman

Subcommittee on Geographical Research in New York State
Eric H. Faigle, Chairman

8. Committee on Geography of Mineral Producing Areas

Lewis F. Thomas, Chairman	John W. Frey	Clifford M. Zierer
Charles H. Behre, Jr.	Walter H. Voskuil	

9. Committee on Geologic Research

Wilmot H. Bradley, Chairman	A. I. Levorsen	T. S. Lovering
Walter H. Bucher	Chester R. Longwell	T. Wayland Vaughan

Subcommittee on Petroleum Geology
A. I. Levorsen, Chairman

Subcommittee on the Geology of Ceramic Raw Materials
Herbert Insley, Chairman

Subcommittee on Meteorites
W. F. Foshag, Chairman

10. Committee on Glacial Map of North America

R. F. Flint, Chairman	J. W. Goldthwait	D. A. Nichols
W. C. Alden	L. M. Gould	G. W. H. Norman
E. T. Apfel	G. F. Kay	F. T. Thwaites
H. S. Bostock	M. M. Leighton	G. W. White
S. R. Capps	Frank Leverett	G. A. Young
	Paul MacClintock	

11. Committee on Landforms
George B. Cressey, Chairman
(Members to be appointed later)

12. Committee on Latin American Studies
Preston E. James, Chairman
Joseph T. Singewald, Jr.

13. Committee on the Measurement of Geologic Time

Alfred C. Lane, Chairman	Frank L. Hess	W. J. Mead
J. P. Marble, Vice-Chrm.	Arthur Holmes	Charles S. Piggot
Gregory P. Baxter	Adolph Knopf	Roger C. Wells
H. V. Ellsworth	A. F. Kovarik	

14. Committee on Micropaleontology

Joseph A. Cushman, Chairman	Henry V. Howe	Helen J. Plummer
Carey Croneis	B. F. Howell	T. Wayland Vaughan
Alva C. Ellisor	Raymond C. Moore	W. P. Woodring
G. Dallas Hanna	M. L. Natland	

15. Committee on Paleobotany

Charles B. Read, Chairman	H. D. MacGinitie	J. M. Schopf
Erling Dorf		

16. Committee on Problems of Ore Deposits

T. S. Lovering, Chairman	W. S. Burbank	Earl Ingerson
L. H. Adams	Ralph Cannon	Adolph Knopf
C. H. Behre, Jr.	Michael Fleischer	Edwin T. McKnight
B. S. Butler	John W. Gruner	

17. Committee on Research in Areas of International Concern

Derwent Whittlesey, Chairman	Charles C. Colby	Robert S. Platt
John B. Appleton	Richard Hartshorne	Gilbert White
S. Whittemore Boggs	Preston E. James	

18. Committee on Sedimentation

Parker D. Trask, Chairman	P. D. Krynine	Henry C. Stetson
Carl B. Brown	H. B. Milner	L. G. Straub
Carl W. Correns	F. J. Pettijohn	Allen C. Tester
Ralph E. Grim	R. Dana Russell	A. C. Trowbridge
W. C. Krumbein	F. W. Rolshausen	T. Wayland Vaughan
		W. H. Twenhofel

Subcommittee on Diagenesis
Ralph E. Grim, Chairman

Subcommittee on Compilation of Statistical Data on Sediments
W. C. Krumbein, Chairman

Subcommittee on Finance
Parker D. Trask, Chairman

19. Committee on Stratigraphy

Carl O. Dunbar, Chairman
G. Arthur Cooper
Carey Croneis
B. F. Howell
Edwin Kirk
Raymond C. Moore

(Each Committee member serves as the Chairman of a Subcommittee devoted to the special study of a distinct system).

John B. Reeside, Jr.
L. W. Stephenson
Charles K. Swartz
W. H. Twenhofel
C. E. Weaver

20. Committee on Tectonics

Chester R. Longwell, Chairman
Philip B. King, Vice-Chrm.
Charles H. Behre, Jr.
Walter H. Bucher
Eugene Callaghan
D. F. Hewett
Eleanora B. Knopf
A. I. Levorsen
T. S. Lovering
George B. Mansfield
W. H. Monroe
George W. Stose
W. T. Thom, Jr.
A. C. Waters
Eldred D. Wilson
A. O. Woodford

REPRESENTATIVES OF THE DIVISION ON -

Advisory Council of the Federal Board of Surveys and Maps
Clarence E. Batschelet

Committee D-5 on Coal and Coke, American Society for Testing Materials
Taisia Stadnichenko

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Note: The Chairman of the Division is, ex officio, a member of all Committees of the Division.

(For Members of the Division, see separate page)

REPORT OF THE CHAIRMAN OF THE DIVISION OF GEOLOGY AND GEOGRAPHY

FOR THE YEAR 1940-1941 *

Walter H. Bucher

The National Research Council and this Division in the Present Emergency

A. Throughout the nation, the past year has stood under the shadow of the present emergency. Action everywhere has been dominated by measures taken in the interest of defense. It was to be expected that the National Research Council which was created as an advisory body to the Government during the first World War, would again resume a leading role in its original function. When a new agency, the National Defense Research Committee was created under the leadership of Dr. Vannevar Bush, it seemed at first as if this meant that the National Research Council had been put on the side lines as one that has grown impotent in the short span of twenty years. Fortunately, this is not true. The present position of the National Research Council does correspond essentially to its original function. The need for a new agency has grown out of the unique industrial character of modern warfare. Men of science are needed urgently, not only for discovery in basic scientific knowledge but also in connection with innumerable problems of technical improvement and of standardization of industrial processes. The N.D.R.C. stands between the men of action in the industries and the men of abstract research who constitute the personnel of the N.R.C. It sizes up the problems as they arise and finds the proper agencies to handle them: some go to especially qualified individuals; others too large to be handled by one man go to committees of the N.R.C.; others to industrial laboratories or government bureaus. The Divisions of Physics, Chemistry, Engineering, Biology, and Psychology of the N.R.C. are already doing a large amount of specially financed research in connection with the present emergency.

B. How the Division of Geology and Geography can prove useful in the national effort has been the question that confronted the Chairman from the day on which he took over his office. One action had been called for: we were to make a check list of all geologists in the United States. Dr. Longwell had already given a good deal of thought and time to the making of a questionnaire (see last year's Chairman's report, page 6). He and the present chairman consulted on it at length and then entered into correspondence with the Geological Society of America and the American Association of Petroleum Geologists concerning the contents of the questionnaires and the mechanics of distributing and collecting them. Both organizations were ready to cooperate to the fullest. Dr. James, as Vice-Chairman of the Division, had already begun sending out the geographers' own questionnaire.

When we were well under way, we received word to stop and await orders, as the Government was about to create a comprehensive "National Roster of Scientific and Specialized Personnel" in the United States. We obeyed and waited.

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* Presented at the Annual Meeting of the Division, National Research Council, Washington, D. C., May 3, 1941, and since revised to date (June 30, 1941).

Dr. Nicholas, the representative of the National Research Council on the Roster, asked Dr. Aldrich to prepare a check-list of the subdivisions of Geology as a basis for classification in the National Roster. The Geological Society had only recently, in connection with the fiftieth anniversary of its existence, made a careful survey of the whole field of geology and was, therefore, perhaps the logical source of information. Drs. Berkey and Aldrich called upon the present chairman for collaboration in the drafting of the check list. As we sat down to the task, we were quite unfamiliar with the machinery in which the check list was to be used, and unaware of the degree of refinement that would be necessary to make the Roster thoroughly effective. But two visits to the headquarters of the Roster during its formative stages showed the speaker that there also the full realization of the complexity of the fields that were to be covered came only slowly. The deficiencies of the geological classification sheet are those of an early effort, based on the assumption that speedy completion of the task was more important than far-reaching refinement of classification. We would probably turn out a more highly specialized classification today, but the speaker is not certain that it would prove correspondingly more useful. For ultimately the success of the Roster will depend on the functioning of the other part of its organization.

This consists in the evaluation of the lists of names that the Roster can furnish upon specific inquiry. The task of evaluating the lists is entrusted to so-called "evaluating committees". A number of these was created at the outset for the major fields of geology. As the complexity of the possible tasks of such committees was more and more realized, it became clear that it was neither possible nor necessary to create enough committees in advance to provide for all possible contingencies. After consultation, a valuable suggestion made by Mr. Levorsen was finally adopted. Arrangements were made by the chairman with the presidents and secretaries of the leading societies representing the different fields of geology and geography, according to which they will create in each individual case a small committee consisting of men best qualified to evaluate the names of geologists or geographers required for a specific task. This will be done at short notice by telephone or wire as need arises. It is hoped that this flexible and sensitive arrangement will counteract the lack of refinement in the classification of geologists in the Roster.

C. One question above all loomed large in the present emergency: In what ways can the geologist's training and skills be utilized in actual warfare and in preparation for it? The contributions of the geologist to the trench warfare of the last World War have been recorded in many papers. But the new, highly mobile warfare of our day requires new skills and techniques. It seemed paramount to the speaker that a quick inquiry be made into the most recent German literature on military geology, since the successes of the German army seemed to indicate a far-reaching utilization of all available new tools and skills. At the speaker's request, Mr. Kurt Lowe, one of the graduate students at Columbia University, assembled a partial bibliography of the more recent German publications on military geology. About the same time and unknown to the speaker, Miss Genevieve Cobb, librarian in the Department of Geology at Princeton University, prepared a bibliography of Military Geology at the suggestion of Dr. Erling Dorf. Through Dr. Field, this bibliography was offered to our Division for its use. The two partial bibliographies

have been turned over to Miss Marie Siegrist, who combined them and made a search for additional titles to create a partial bibliography of the German and English literature on Military Geology since the last World War. Miss Siegrist's services were made available to the Division by the Geological Society of America which has also declared its willingness to publish the bibliography as a contribution to national defense. It will be ready for distribution this summer.

A cursory study of some of this literature and conferences with many men who are familiar with the problem, soon convinced the speaker that the geologist can contribute materially to the war effort essentially in two ways:

1. In the search for an exploitation of strategic minerals. This function can be fulfilled effectively only through the agencies of the Federal Survey and some of the State Surveys. As is well-known, this work is being pushed vigorously and competently. At present, our Division can not aid in this effort.

2. As technical adviser attached to the major and minor headquaters where he will function in the same manner in which he is effective in connection with civilian engineering enterprises, such as dam construction, tunneling or mining. His advice is especially needed where questions of surface and groundwater supply are involved, whether it be for purposes of water supply or to decide if a given road that crosses lowlands can be counted on to be passable in wet weather.

During the World War the allied armies led in the introduction of geologists into military ranks as technical advisers. This connection was discontinued with the advent of peace. It should be reestablished. Here, the Division may help, as far as the speaker can see, in two ways:

(a) By setting forth, in a brief, well-written account (pamphlet) what the geologist has accomplished in the last war as adviser to military headquarters, as a commissioned member of the military organization. Steps have been taken by the chairman to secure one of our leading authorities as author of such a publication.

(b) By establishing contact with military men for the purpose of acquainting them especially with the geologist's special skill in reading and interpreting not only maps, but above all vertical air pictures. One such contact has been established recently. The chairman is contemplating the creation of a small committee of men especially experienced in the work with air photographs whose services will be available to Army men interested in this possible use of geological training.

In his attempt to orient himself in this question of military geology, the chairman has consulted with many of his colleagues to whom he wishes to express his gratitude. Five men to whom he is especially indebted for much time and wise counsel, the chairman wishes to name: Drs. C. P. Berkey, Douglas Johnson, A. I. Levorsen, Sidney Paige, and J. W. Greig.

WORK OF THE DIVISION

Grants for Committee Conferences

A. GEOLOGY:

(1) Committee on Problems of Ore Deposition -
T. S. Lovering, Chairman.
Travel expenses in connection with an organization meeting of the Committee, held in Washington, D.C., Oct. 24-25,1940 ... $300.00
(Unexpended balance of $99.70 returned to the General Conference Fund).

(2) Committee on the Measurement of Geologic Time -
Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chrm.
For travel and certain incidental expenses in connection with a meeting of the Committee, held in Boston, Mass., Oct. 28, 1940 ..... $200.00
(Unexpended balance of $65.07 returned to the General Fund).

(3) Committee on Glacial Map of North America -
Richard Foster Flint, Chairman.
For travel and certain incidental expenses in connection with a meeting of the Committee, held in New Haven, Conn., Jan. 18-19, 1941 ..... $500.00
(Balance of $113.37 remaining after this conference allowed for use of the Chairman in making a trip to Ottawa, May 9-13, 1941, for a conference with Canadian members of the Committee, and for drafting of the map).
(Unexpended balance of $51.00 from the $113.37 returned to the General Conference Fund).

B. GEOGRAPHY:

(4) Committee on Geographic Research -
Preston E. James, Chairman.
For travel and certain incidental expenses in connection with a conference on the "Southern Studies Project", held at Nashville, Tenn., Oct. 25-26, 1940 ..... $500.00
(Unexpended balance of $115.25 returned to the General Conference Fund).

TOTAL ALLOTTED for Conferences held during 1940-41... $1500.00
TOTAL REVERTED (unused balances) 331.02

(5) Subcommittee on Southern Studies Project (Committee on Geographic Research) - Preston E. James, Chairman.
Travel expenses of the Chairman in visiting research centers in the Southern States during the summer of 1941, in the interests of this project, for the purpose of checking on the work of the participants ..... $ 150.00.

Post-Doctorate Fellowships

"The National Research Council has been entrusted by the Rockefeller Foundation with appropriations to provide for a limited number of post-doctorate fellowships for the purpose of promoting fundamental research in science primarily in educational and research institutions of the United States. These fellowships are awarded to persons who have demonstrated a high order of ability in research for the purpose of enabling them to obtain additional experience in research at institutions which make adequate provision for effective prosecution of research. Applicants are eligible for appointment who are citizens of the United States or of Canada and, as a rule, who are under 35 years of age and have fulfilled all requirements for the doctor's degree not later than the close of the calendar year in which their applications are filed, or who have had training equivalent to that represented by the doctor's degree."

"In addition to fellowships in the general fields of medicine maintained by the Rockefeller Foundation, *** fellowships in the following subjects are administered by the National Research Fellowship Board in the Natural Sciences: Physics, astronomy, chemistry, mathematics, geology, paleontology, physical geography, botany, zoology, agriculture, forestry, anthropology, and psychology".

"When requested to do so, the Board is ready to consider entering into cooperation with universities in the support of participating fellowships by providing a part-time research fellowship in connection with a part-time university instructorship." (Quoted from "Organization and Members, 1940-1941", pamphlet of the N.R.C., Dec. 1940, page 83. Underlining added here.)

Under an arrangement which began in 1936, the awarding of these fellowships in all except the medical sciences has been placed in the hands of a single Board, composed for 1940-41, of the following:

Dr. Ross G. Harrison, ex officio, Chairman of the N.R.C.
Prof. Roger Adams
President Isaiah Bowman
Prof. M. H. Jacobs
Dr. Frank B. Jewett, ex officio, President, National Academy of Sciences
Dr. Max Mason

The Board has complete freedom to allocate the fellowships according to the ability of the applicant and the seeming importance of his problem, with only secondary consideration of the field of science involved. The Fellowship Board, however, indicated its desire that the several Divisions of the Council assist them by becoming responsible for the preliminary rating of the applications. Advisory Fellowship Committees were therefore appointed in the several Divisions with in each case the Chairman of the Division functioning as Chairman of the Committee. The Committee appointed for the Division of Geology and Geography for 1940-41 is as follows:

Walter H. Bucher, Chairman, ex officio
Richard Hartshorne, Vice-Chairman, ex officio
Edson S. Bastin
Stephen R. Capps
James Gilluly
John B. Reeside, Jr.
Louis B. Slichter
Robert B. Sosman
C. Warren Thornthwaite

The same members have been reappointed for next year since they have served on this committee for two years or less, and all have indicated their willingness to serve another year.

Since the participation of our Division in these fellowships, beginning in 1936-37, the following number of applications has been received in the fields of Geology and Geography, and the following awards made:

No. of Applicants	Awarded N.R.C. Fellowships for Years	
(1936-37) - 13	(1937-38) - 2:	James F. Bell John R. Schultz
(1937-38) - 6	(1938-39) - 3:	J. F. Bell (reappointment) Arthur F. Hagner Raymond B. Montgomery
(1938-39) - 11	(1939-40) - 4:	John N. Adkins Daniel I. Axelrod John B. Peterson George P. Woollard
(1939-40) - 5	(1940-41) - 4:	J. N. Adkins (reappointment) D. I. Axelrod (reappointment) Max Demorest Felix W. McBryde
(1940-41) - 5	(1941-42) - 1:	Hubert K. Stephenson

As indicated above, only five applications in the field of geology and geography were received this year, and but one appointment made, that for:

Hubert K. Stephenson (Ph.D., Princeton, 1940) - to continue his study of the magnetic properties of minerals, at the Massachusetts Institute of Technology - - - - - - - - - - - - - - - - - - $2,200.00.

The Chairman deplores what seems to him an unintelligible lack of interest among geologists in the National Research Fellowships. These fellowships carry stipends of from $1800 to $2400 a year. Their award is made according to high

standards and carries unquestionable prestige. They should be eagerly sought by the best of our young men in many institutions.

Instead, out of a large number - probably at least 100 - post-graduate students in Geology in the United States, only 5 men applied this year,and of these applications only one met the requirements concerning general training and specific fitness of the applicant and significance of the project submitted. Last year, four out of five applications were granted. There is no reason for doubting that we could have matched that record this year if we had had an equal number of competently prepared candidates with significant projects. Lack of broad training in the basic sciences stood out glaringly among this year's applicants. Departments of Geology which permit students to take course after course in geology without securing at the same time or having secured beforehand a sound basic training in mathematics, physics and chemistry bear a heavy responsibility.1/

The chairman urges geologists and geographers everywhere in the United States to call the attention of outstanding young geologists and geographers to the possibilities of the National Research Council Fellowships. At the same time, he must point to the need of checking carefully the prospective applicant's general scientific and special geologic training and the scope and significance of the project he wishes to submit. We should have this year a materially larger number of applicants, each of undoubted breadth and depth of training, unless, of course, the military developments again drain the arteries of our educational system of the red blood of youth.

In connection with the "mechanics" of awarding the fellowships, it may be of interest to mention that the closing date for receipt of applications this past year was December 31, 1940 (with probably a corresponding date for the coming year). Following preparation of the material, the applications were considered by the Division's Fellowship Committee during parts of January and February, and recommendations made for information of the Fellowship Board which met on March 15, 1941. Due mainly to the scattered location of the 9 members of the Division's Fellowship Committee, and the few applications to be considered, a meeting of the committee was not deemed necessary, and consideration and rating of the applications was conducted by correspondence - a none too satisfactory procedure in view of considerable diversity of opinion.

Out of 91 applications considered by the National Research Fellowship Board in the Natural Sciences at its annual meeting on March 15, 26 appointments were made for next year, including two reappointments and two participating fellowships, totalling approximately $50,000. The Board has available $60,000 a year for these fellowships from the Rockefeller Foundation.

1/ Attention is called to the recent report of the Special Committee on College Curricula of the A.A.P.G. (Bull. A.A.P.G., vol. 25, 1941, pp. 969-972).

Changes in Committees and Personnel (authorized for the coming year, or made during the current year*)

A. General:

1. Executive Committee
   Charles C. Colby (replacing Charles B. Hitchcock)
   T. S. Lovering (replacing Norman L. Bowen)

2. Member at Large for 1941-1944
   Joseph T. Singewald, Jr. (replacing Norman L. Bowen)

3. Representatives of Constituent Societies for 1941-1944
   T. S. Lovering (Geological Society of America)
   replacing Stephen R. Capps
   G. Arthur Cooper (Paleontological Society)
   replacing Charles E. Resser
   Richard J. Russell (Association of American Geographers)
   replacing C. Warren Thornthwaite.

B. Technical Committees:

1. One Committee was discontinued on recommendation of its chairman, Charles M.Davis - Committee on Basic Geographical Data and Techniques.

2. Four new Committees were established:

(1) Committee on Ecology of Marine Organisms, Harry S. Ladd, chairman (formerly a subcommittee of the Committee on Geologic Research).

(2) Committee on Authors' Abstracts, Marcus I. Goldman, chairman (members, not more than 3, to be selected by chairman).

(3) Committee on Latin American Studies (joint committee of geologists and geographers): Preston E. James, chairman; J. T. Singewald, Jr.

* (4) Committee on Geographical Field Training, K. C. McMurry, chairman: Members - George B. Cressey, G. Donald Hudson, Wellington D. Jones, Glenn T. Trewartha, J. O. Veatch.

3. Name of one Committee changed:

Committee on Geography of Mineral Producing Areas (formerly, Committee on Geographical Studies of Mineral Distribution).

4. Changes in Personnel of other Committees:

(1) Committee on Geologic Research - Wilmot H. Bradley, new chairman.

Herbert Insley, new chairman of Subcommittee on the Geology of Ceramic Raw Materials.

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* Organized in spring of 1941.

(2) Committee on Sedimentation:
Resigned: Chester K. Wentworth
New member: F. W. Rolshausen.

(3) Committee on the Measurement of Geologic Time:
Resigned: T. L. Walker.

* (4) Committee on Problems of Ore Deposits:
New members: L. H. Adams, Ralph Cannon, Michael Fleischer, Earl Ingerson, Edwin T. McKnight.

(5) Committee on Geographic Research:
New Chairmen of Subcommittees:
Preston E. James - Southern Studies Project
W. L. G. Joerg - Census of Professional Geographers
Eric H. Faigle (replacing George B. Cressey) - Geographical Research in New York State.

(6) Committee on Density Currents:
Resigned: H. Peters.

(7) Committee on Ecology of Marine Organisms (formerly a subcommittee, see above)
New member : Gordon Gunter.

(8) Committee on Geography of Mineral Producing Areas (formerly Committee on Geographical Studies of Mineral Distribution):
Resigned: J. Russell Whitaker
New member: Clifford M. Zierer.

(9) Committee on Landforms:
Resigned: C. W. Thornthwaite, former chairman
New chairman: George B. Cressey (members to be chosen by him).

(10) Committee on Research in Areas of International Concern:
New members: Richard Hartshorne, P. E. James, Gilbert White.

(11) National Committee of the United States, International Geographical Union:
New chairman to be appointed, following death of former chairman, C. H. Birdseye.

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* New members appointed during current year, 1940-41.

Note: For complete membership of the Division and its Committees for 1941-1942, see 5-page list dated July 1, 1941.

Disposal of Drilling Records

The Committee on the Conservation of Scientific Results of Drilling was discontinued on June 30, 1940. A large amount of material, maps and graphic data, some of considerable potential value, had been received through the cooperation of the U. S. Army Engineers and was left in the hands of the former chairmen of the Committee and in the Washington office of the Division. The present Division chairman corresponded with the Army Engineers, thanking them for their cooperation and asking them to send in the future the records of their drilling operations to the various State Geological Survey offices. Then all the records were assembled at the Washington office, checked and reassorted, and then distributed to the offices of the Geological Surveys in the States concerned. A total of about 25 rolls of maps and packages was sent to 20 states.

Activities of the Committees and the Annual Meeting

The Annual Meeting of the Division serves two purposes: (1) to give a perspective of work carried on and purposes achieved by the committees during the preceding year, and (2) to counsel together concerning the current needs in all fields of geology and geography.

Since the continued and growing usefulness of our Division depends to a large degree on such counseling, and since at most scientific meetings, too little time is allowed for it, this phase of the Annual Meeting, held on May 3, was given first place on the program. It was introduced by brief reports from (1) the planning committee of the Division (Bowen), and (2) the planning committees of leading organizations: the American Association of Petroleum Geologists (Levorsen), the American Geophysical Union (Field), and the Geological Society of America (Rubey).

To these the chairman added a list of "Topics for discussion at the meeting and later". This was distributed in mimeographed form and was read by him with brief comments. The meeting was then given over to a free discussion which was concluded after the noon recess.

The chairman's list of items for discussion follows:

I. PERSONNEL

1. Advice to students entering college or adjusting course in order to become "geologists" (i.e. ultimately men working in field geology, geophysics, geochemistry, and "geobiology" or paleontology).

   Should be prepared jointly with biological sciences; should urge basic training in mathematics, physics, and chemistry, concurrent with one course each year in chosen field, and with freshman requirements in humanities and social sciences; sample curriculum should be given; "if 'your' college does not allow such a curriculum, go elsewhere."

2. Find exceptional young men, help train them in deliberate effort to create the personnel

   (a) in fields threatened with neglect (e.g. stratigraphic paleontology of systems; specialists in important groups, e.g., graptolites; colloidal chemistry in geology; many aspects of geophysics).

   (b) in entirely new fields: submarine geomorphology.

3. Secure fellowships for highly advanced men who wish to spend one or two years studying in a related field (e.g. stratigraphic paleontologist in modern marine ecology; geophysicist in nuclear physics, etc.).

4. Help men with exceptional training in "borderland sciences" to find university positions that offer security and chance to continue active research (partly in standard units of geology).

5. Interest suitable universities in establishing new chairs (e.g., engineering geology; geophysics; meteorology).

6. Create and issue an annual (or biennial) catalogue of departments of geology, North and South American universities; State and Federal surveys; learned societies; scientific collections, etc. in the fields of geology, paleontology, and geophysics. Extend if desired and when feasible to the rest of the world, superseding the former "Geologen Kalender", the last issue of which is dated 1937.

II. MATERIALS

1. Bibliographies

   (a) United States. What can be done to secure publication of the 10-year volume ending with 1938 and the one due since?

   (b) Paleontology

   Importance of continuous supply of bibliographic information on changing nomenclature and additions to systems; need for joint consideration of possibilities.

2. Instruments

(a) Secure and disseminate information on best available instruments, i.e., stereoscopic study of vertical aerial photographs; microfilm reading devices, etc.

(b) Contemplate supplying young men with indispensable instruments in cases where the men are being deliberately trained to work in underdeveloped fields of knowledge.

3. Create and keep up-to-date a list of areas chosen by candidates for Ph.D. degrees as subjects for thesis field work.
Purpose: Avoid duplication and annoyance.

III. PROJECTS

A. Large possibilities of studies in Latin America.

B. General Projects

1. Mineralogy - Petrography:

(a) Radioactive minerals ("Age of the Earth").

(b) Atlas of X-ray patterns, e.g.,Dow Chemical Co.'s Catalogue, chiefly of artificial compounds; Boldyrev and others: Roentgenographic Determiner of Minerals, Vols. I & II; Leningrad Mining Institute - about 300 pages of data. (References given by Drs. Bell and Tunell).

2. Topography and Geomorphology:

(a) Geomorphology of tectonically active regions.

(b) Geomorphology of Mexico; volcanic Central America, etc.

3. Stratigraphy:

(a) Systematic study of relative merits of methods of correlation by means of fossils.

(b) Tables of correlation.

(c) Catalogue of formation names: Supplements to Miss Wilmarth's valuable volumes.

4. Sedimentation:

Systematic sedimentary and ecological analysis of typical environments: e.g., mangrove swamps; large kelp areas: Lake Maracaibo, etc., including systematic plotting of figures for grain size (medians, etc.); eventually Rann of Cutch; Gulf of Carpentaria.

5. Invertebrate and Vertebrate Paleontology:

Possibilities of creating:

(a) Simplified methods of writing species description to reduce cost of publication, without sacrificing precision in wording. (Should ultimately be undertaken by joint committee of Paleozoology and Zoology and Paleobotany and Botany).

(b) Marine Ecology - should eventually grow into Interdivisional Committee. At present, attention is called to the "Committee on the Ecology of Animal Populations" of the Division of Biology and Agriculture.

(c) Paleontologists in Europe, both in England and on the Continent, have given much thought to the seeming conflict between evolution as seen by the geneticist and by the paleontologist. Steps should be taken to bring together in this country paleontologists, vertebrate and invertebrate, with geneticists, comparative anatomists, etc. for a systematic analysis of facts and a clear statement of the limits to which each group of investigators finds it possible to accept the conclusions of the others.

6. Geology of Ore Bodies: See Lovering's Committee. (Appendix J)

7. Structural Geology:

(a) Comparative studies of sedimentary-structural history of typical and comparable "geosynclines".

(b) Systematic studies of orogenic units, assembling structural knowledge on suitable scale to cover larger regions.

8. Engineering Geology:

Is it not about time that an authentic volume be collected to set forth in concise, impressive manner a carefully chosen series of case histories of typical engineering projects in which the geologist's advice has been as important to the blue printing of the project as the engineer's? Not a textbook, nor a handbook, but a book of case histories.

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The discussion of research programs in the field of Geography and of the needs in this far-flung, complicated field of synthesis of knowledge from the natural and social sciences, did not take place before the Division as a whole. As in former years, the Geographers, who were exceptionally well represented at this meeting, withdrew to a separate room. A brief summary of

their deliberations, as well as of the work of specific committees, was later presented to the whole Division by the Vice-Chairman for Geography, Dr. Richard Hartshorne.

The reports of the geological committees were presented to the geological members by their respective chairmen. The following list of all reports presented will serve as a survey of activities and as a key to the summaries of these reports which are presented in the Appendix (note serial letters). They make further references by the chairman superfluous.

(Quoted from Agenda of the Annual Meeting, May 3, 1941)

DISCUSSION OF EXISTING AND POSSIBLE FUTURE RESEARCH PROGRAMS IN THE FIELD OF GEOLOGY

		Chairmen	Appendix
1.	Committee on Geologic Research, N.R.C.	Bowen	A
2.	Research Program, Amer. Assoc. of Petroleum Geol..	Levorsen	B
3.	Research Program, American Geophysical Union	Field	*
4.	Research Program, G.S.A. ..... (Rubey reporting for	Bucher)	*

REPORTS OF GEOLOGICAL COMMITTEES WITH DEFINITE PROGRAMS

1.	Sedimentation	Trask	C
2.	Stratigraphy	Dunbar	D
3.	Measurement of Geologic Time	Lane-Marble	E
4.	Tectonics	Longwell-King	F
5.	Glacial Map of North America	Flint	G
6.	Paleobotany	Read	H
7.	Micropaleontology	Cushman	I
8.	Problems of Ore Deposits	Lovering	J
9.	Density Currents	Eaton	K

DISCUSSION OF RESEARCH PROGRAMS IN THE FIELD OF GEOGRAPHY

1.	Committee on Geographic Research, N.R.C.	James	L
2.	Research Program, American Geographical Society...	Wright	M

REPORTS OF GEOGRAPHICAL COMMITTEES WITH DEFINITE PROGRAMS

1.	Research in Areas of International Concern	Whittlesey	N
2.	Basic Geographical Data and Techniques	Davis	O
3.	Landforms	Thornthwaite	-

REPORTS OF COMMITTEES WITH LIAISON, ADVISORY AND EDUCATIONAL FUNCTIONS

1.	Comm. D-5 on Coal and Coke, A.S.T.M.	Stadnichenko	P
2.	Coöperation with the Bureau of the Census	Wright	Q
3.	Advisory Council, Federal Board of Surveys & Maps.	Batschelet	R
4.	Coöperation with the Soil Survey	Jones	S
5.	Geographical Field Training	McMurry	T
6.	Geographical Studies of Mineral Distribution	Thomas	U
7.	International Geographical Union, National Comm...	Birdseye	-

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* reports to be included in the Minutes.

Finally, the chairman wishes to mention two large works to which we have been looking forward:

(1) The handbook of "Physical Constants of Geological Materials" is now being published by the Geological Society of America. It was prepared under the direction of Dr. Francis Birch (Harvard University) as Chairman of an Interdivisional Committee under sponsorship of the Division of Geology and Geography of the National Research Council.

(2) The manuscript of a volume on Hydrology of the Physics of the Earth Series, has been brought practically to completion this year, the author, Dr. O. E. Meinzer, advises the chairman. This series is being issued under sponsorhsip of the Division of Physical Sciences of the National Research Council.

Acknowledgments

The Chairman wishes to acknowledge with grateful appreciation the fine cooperation and service rendered during the year by members of the Division and its Committees. He has particularly in mind the effective work of the members of the Executive and Fellowship Committees, as well as the work of the Chairmen and Subcommittee Chairmen. The written reports of the latter speak for themselves.

Obituary

The Division records with deep regret the death during the past year of two of its colleagues:

Dr. William Bowie - August 28, 1940
(member of the Committee on Tectonics).

* Col. Claude H. Birdseye - May 30, 1941
(Chairman, National Committee of the United States, International Geographical Union).

At the annual meeting, the following Memorial Tribute was presented in honor of Dr. Bowie by Dr. Fred J. Wright, who was associated with him as a member of the Division's former Committee on Improvements of Methods in Gravity Measurement:

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* Colonel Birdseye's death occurred after the annual meeting of the Division. The Chairman, on behalf of the Division, has written Mrs. Birdseye, expressing sympathy, and a memorial tribute in his honor will be presented at the next divisional meeting.

Memorial Tribute to Dr. William Bowie *

"Important contributions to science are made by men of quite different types and interests. At the one extreme is the individual of extraordinary ability who works best alone on problems of his own choosing and, as a pioneer, explores the possibilities of new fields and through generalization discovers relations common to several fields, thereby increasing knowledge of basic principles in each field. At the other extreme is the man well trained in science and of engaging and enthusiastic personality who obtains co-operation in attack on problems of large scope that require for solution the combined efforts of men from quite different branches of science. At present the greater part of research work in science is done by experts from various fields who work together on problems of mutual interest. We find this true in universities, in research organizations, and in industrial groups.

"The late Dr. William Bowie was preeminently a co-operative worker. He liked people and was able, by reason of his genial personality and good judgement, to obtain and stimulate team-work on many problems connected with geodesy and allied sciences, especially geology. His enthusiasm, coupled with common sense and the ability to express ideas clearly, made him a valuable member of any organization. As a result, he served on many committees and took a prominent part in many engineering and scientific societies. Alhough by training and experience an engineer and administrator, he had keen appreciation of scientific problems and of appropriate methods for their solution. Successor to Dr. J. F. Hayford as Chief of the Division of Geodesy of the United States Coast and Geodetic Survey, he carried forward its gravity work and the application of the results of gravity measurements to the formulation of a more exact expression for the figure of the earth. He encouraged gravity work and was instrumental in interesting geologists in the theory of isostasy and its significance in orogenic processes.

"Dr. Bowie worked with others easily and gave generously of his time and energy to problems outside his own field. This cordial co-operation between the United States Coast and Geodetic Survey and other groups led to the solution of many problems that otherwise would not have been possible. For example, knowledge of the dynamics of earthquake movements along fault structures in California was greatly advanced by the series of precise position measurements, made by the Survey under his direction, of selected points on the two sides of certain fault planes. These observations proved that the magnitude of these movements increased as the fault plane was approached and continued to do so, until the strain became so great that the rock masses could no longer withstand the accumulated stresses and earthquake movement, following rupture, resulted.

"The Division of Geology and Geography was served by Dr. Bowie in several capacities; as member of the Committee on Tectonics (1935-1940); as Chairman of the Committee on Testing of Isostasy in the Basin Ranges (1924-1934); and as Chairman of the Committee on Improvements of Methods in Gravity Measurement (1924-1932). He was a member of the Division of Physical Sciences (1920-1933) and Chairman of several of its committees. He was a member of the American

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* Written and presented by Dr. Fred. E. Wright (Annual Meeting, Division of Geology and Geography, National Research Council, Washington, D.C., May 3, 1941).

Geophysical Union (1919-1940) and its Chairman (1919-1922; 1929-1932); he was President of the International Union of Geodesy and Geophysics (1933-1936).

"'Whatsoever a man soweth, that shall he also reap.' Dr. Bowie received recognition both in this country and abroad for his brilliant constructive work and leadership in geodesy. He won many friends inside and outside his own professional field who admired him for his human qualities and his desire to be of service to others. He gave unstintingly of himself and reaped full measure of friendship, honor, and a well rounded life."

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Publications of the Division

At the present time most of the reports of the Division are issued in mimeographed form. During the year 1939-40, the following new reports have been issued:

Report of the Committee on the Measurement of Geologic Time for 1939-40: Alfred C. Lane, Chairman; John Putnam Marble, Vice-Chairman. September, 1940. 141 pages.

Report of the Committee on Sedimentation for 1939-40: Parker D. Trask, Chairman. December, 1940. 121 pages.

Annual Report of the Division of Geology and Geography, National Research Council, for the Year 1939-40: Chester R. Longwell, Chairman. (With Committee Reports, Appendices A-X). December, 1940.

1940-1941 Committee Reports or Special Reports (Appendices A-U), and the Report of the Chairman of the Division of Geology and Geography, Walter H. Bucher, for the year 1940-41. (To be included in the bound Annual Report of the Division for 1940-41).

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The mimeographed reports mentioned above are distributed without charge to Division and Committee members desiring them, but those not connected with the Division are asked to send 15¢ in stamps (not coin) to cover approximate postal and handling charges for any one bound mimeographed report and 5¢ in postage for each additional bound report requested, or to request that reports be sent Express Collect. A complete list of available National Research Council publications (printed and mimeographed) of interest to Geologists or Geographers may be secured from the office of the Division of Geology and Geography, National Research Council, 2101 Constitution Avenue, Washington, D. C. (Latest list issued by the Division - February 15, 1941).

In accordance with a policy approved last year - mimeographed reports of the Division will be sent only on individual request (i.e. not in response to group orders for college classes) since editions are limited and are intended primarily for research workers who have special interest in the particular subjects.

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YALE UNIVERSITY
New Haven, Connecticut

September 5, 1941

Letter No. 9

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint):

1. Activities of the Chairman

At the annual meeting of the National Research Council in Washington on May 3 I reported on our progress for the year and exhibited a sample colored glacial map of Washington and Northern Idaho on the 40-mile base together with the sheet of map conventions we adopted last January. The material was well received, and the vice-chairman of the Committee on Tectonics asked our permission to make use of our depth contouring for the map they are preparing.

On May 10-12 I had long conferences with our Canadian members at the Geological Survey in Ottawa, with results indicated elsewhere in this letter.

Since the date of my last letter I have drafted, or have had drafted from published data a topographic map of Iceland, a glacial map of Iceland, a glacial map of Greenland, and a small glacial map of the Northern Hemisphere, in addition to the depth-contour maps reported earlier. All these will be incorporated in the final map.

2. The Base Map.

At the Ottawa conference (Bostock, Nichols, Norman, Young, Flint) and in subsequent correspondence, it was agreed that the base projection for the final map shall be on a conformal conic projection with standard parallels at 45° and 78° (maximum error +5.2%, at lat. 83°). The scale will be 40 miles to 1 inch so as to approximate the scale of the map of the U. S. we are now using, and so that the drainage detail will not have to be readjusted when the map is reduced to the published scale of 60 miles to 1 inch.

The projection is being calculated and plotted by the Bureau of Geology and Topography, Ottawa, the sheets with latitude-longitude grid being supplied to Nichols. Under his direction a draftswoman employed in Ottawa by our Committee began on July 1 to plot the shorelines, contours, drainage, culture, and glacial data on these sheets. Employment of the draftswoman, in order to release Nichols for nearly full-time editing and supervision of the final map, has been made possible by a generous contribution from the American Geographical Society of $1000, in return for which that Society will be given a credit line on the printed map, and receives the right to print additional copies of the map for its Fellows.

After the next meeting of the Committee, the several maps of the States are to be turned over to our draftswoman for plotting on the final base.

These matters could not await a meeting of the full Committee, and I hope their solution will meet with general approval.

3. Chicago Conference.

No doubt all members have received programs of the Chicago conference to be held September 26. As this will afford an almost essential opportunity to take a load off our next regular meeting by enabling us to iron out matters of local correlation, may I ask that everyone who can possibly be present bring with him his own map in shape for public exhibition, and also his personal agenda, and plan to stay in Chicago during the 27th? A meeting place at the University will be arranged for.

4. Boston Meeting of the G.S.A.

Dr. Bucher advises us strongly against holding our next meeting of the full Committee in connection with the Boston meeting of the Geological Society, on December 29-31, and hesitates to recommend the allocation of travel funds for the purpose. He believes that members would be too tired or too distracted by other matters to give sufficiently long or complete attention to Committee problems. Judging from the time we used in New Haven last January, without finishing our agenda, I am inclined to defer to Dr. Bucher's experience and judgment. In consequence, if there are no serious objections from other members, I suggest that we have a meeting in Boston only of such members as will be there for other reasons, thereby again reducing our agenda as far as possible.

As stated in my Letter No. 9, page 2, and in G.S.A. Information Circular No. 31, the Boston meeting will include a special joint session on Glacial Geology, probably on Monday afternoon, arranged in co-operation with our Committee. We plan to offer about six brief regional papers, together covering the map, illustrated with lantern-slide views of various sections of the map, and consuming about 70 minutes, with 30 minutes allowed for discussion. No publication other than the regular abstracts is contemplated. In addition, other glacial papers from the regular offerings will be included in the program.

5. Plans for Next Committee Meeting.

I propose further, with the approval of Dr. Bucher, that we tentatively plan a full meeting of the Committee to be held in New Haven on January 17 and 18, 1942. This date seemed to offer minimum inconvenience in 1941. If you object to it, please let me know at once.

6. Field Projects.

Apfel, Gould, Kay (with C. D. Holmes), MacClintock, White, and Flint (with Max Demorest and A. L. Washburn) have been engaged on the several field projects discussed earlier. In addition, Goldthwait (with L. Goldthwait) has been making a study of the tills of New Hampshire, and C. S. Denny has been making a similar study with the object of determining the number of tills (1 or 2) commonly exposed in New Hampshire. J H. Bretz has been mapping moraines and other drift-border features in eastern Alberta.

7. Glacial Data.

Nichols has adopted the method, where striae are congested, of plotting the striae in the middles of 22 1/2° octants with the number of striae readings in each octant recorded. This is necessary, for example, in one area where 655 striae occur in an area 1/3" x 1/8" in size on the scale of our final map. Perhaps this method can be used in New Jersey and other crowded places.

Sincerely yours,

Richard Foster Flint

Richard Foster Flint, Chairman.

September 5, 1941

Mr. Fredrik T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

With regard to the exposition of our Glacial Map of North America at Boston on December 29, mentioned in my Committee Letter No. 9 sent you recently:

After consultation with various members of the Committee, I should like to suggest the following program:

	Glacial Map of North America	Minutes
1. Flint:	General Introduction (5); Northwestern United States (10).	15
2. Gould:	Cordilleran United States.	10
3. Kay and Gould /Kay to be speaker/:	West-Central United States (Mo-Ia-Wis-Minn).	10
4. Leighton and Thwaites /Thwaites to be speaker/:	East-Central United States (Ill-Ind-Mich-Ohio).	10
5. MacClintock:	Northeastern United States (Pa-NY-NJ-N.England).	10
6 (and 7?) * :	Canada (in one or 2 parts).	15-20
	Total	70-75
	Discussion	30
	Total	100-105

No publication other than the regular 250-word abstract unless speaker desires otherwise. Slides, preferably kodachrome photos of regional maps to illustrate each contribution.

* Speaker (or speakers) to be designated by Dr. Young.

Your name is included in this list. Will you undertake to be responsible (or jointly responsible with another member, as the case may be) for the paper indicated? Please let me know, if possible within one week, so that I can make arrangements accordingly. Please note in Letter No. 9 that the Committee will probably not hold a full meeting until January and that consequently expenses to Boston will ~~therefore~~ not be paid by the National Research Council.

Abstract blanks will be sent out by the G.S.A. and will need to be sent to me by their authors (by the senior authors of joint papers) for editing and transmission prior to October 15.

The Geological Society is counting on us for the successful carrying out of this program. With a hearty response from members we can make it a really great success.

Sincerely yours,

Richard Foster Flint
Richard Foster Flint

P.S. It was Leighton's suggestion that he and you team up. He will be in Dallas; so the paper would be given by you

Points to take up with FLINT

Maps arrived wrinkled due to slip between two layers. Not possible to

get new copies during summer.

Directions in re line patterns are far from clear. It says make lines and yet to wash in colors. This is impossible and does not check with photostats which show ink lines over a light washed color. In case of Mankato drift it is not practicalbbe to make the lines heavy inside the moraines so compromised. Do not like ink lines across moraines.

Moraines in lake bottoms have been outlined as per Leverett but not colored Is this right?

The choice of same color for Eskers and Striae was unfortunate as they are hard to separate. Symbol for old striae hard to read and hard to determine in first place. Not all striae are product of last ice!

Valders drift not yet proved same age as Mankato.

If we had time to study aerials could get more drumlins in northwestern Wisconsin also fix many morainal areas. Map checks well in field so far.

Nebraskan? drift of Southeastern Minnesota not all shown as not on Leverett map.

Boundaries of extra-morainic drift in Wisconsin ?

Absolutely impossible to attend a January meeting in New Haven.
Hole will prepare part of Boston paper

REMARKS ON THE MAPS SHOWING DRIFTS OF MINNESOTA, WISCONSIN, AND MICHIGAN, COMPILED IN 1941 by F. T. Thwaites

Wisconsin Drifts in Wisconsin

The map follows Alden with a few modifications based upon field work by Thwaites. The Brooklyn moraine is classed as Cary because of the presence of pitted outwash within it and the lobation which is so like that of the younger Johnstown moraine. Some areas mapped as terminal moraine by Alden are here excluded, for examination of cuts shows them to be pitted outwash. Mapping of northeastern Wisconsin follows work by Thwaites which has been submitted to the Geological Society of America for publication. Parts of northern and northwestern Wisconsin are based on published maps by Thwaites, R. T. Chamberlin Leverett, and H. R. Aldrich as well as on unpublished data by Hanners, Hansell, Aldrich, Bean, and Bertrand. The continuity of the Cary moraine has been demonstrated and it appears to be the product of Labradorian ice as far west as the reentrant in Barron County west of which the ice came from the Patrician center.

The work of Wilson on the Two Creeks Forest Bed marked an important step in subdivision of the Wisconsin stage of glaciation. Owing to the fact that the connection of the red till of northeastern Wisconsin above the Forest Bed with the Mankato Keewatin drift of Minnesota is through the poorly settled parts of Wisconsin and Minnesota Thwaites urges that equivalence is not proved. He suggests the new term Valders for the red drift of the Lake Michigan lobe. Evidence collected by Cooper in Minnesota suggests a less time interval between the Mankato and Cary in that state than does the Forest Bed in Wisconsin.

Illinoian drift of southern Wisconsin

Buell's work on boulder trains resulted in a complex subdivision of the drifts of southern Wisconsin. Alden decided that there is only one age of drift outside the Cary moraine and correlated this as Illinoian.

Certainly there is a gradual transition from the little eroded drift east of Rock River to the thinly drift-covered hills along the margin. Throughout this area postglacial rock gorges of mature aspect occur although steep slopes obscure the evidence of weathering.

The extra-morainic drifts of central Wisconsin

The first attempt to subdivide the glacial drift outside of the rugged Cary moraines of central Wisconsin north of the Driftless Area was that published by Weidman in 1907. This author wisely denoted the different ages of drift by numbers as they had not been traced into drifts of recognized age. The thin marginal drift which overlies the Cambrian sandstones he called First. A ridge between Neillsville and Marshfield he regarded as the terminal moraine of the Second Drift. Scattered gravel knolls overlying this drift he regarded as his Third Drift somewhat older than the great belt of terminal moraine to the north. Weidman did not recognize the presence of glacial outwash and did not map in detail any of the area inside the moraine. For this reason his maps were disregarded by Thwaites. In 1913 Weidman appears to have changed his views for an abstract then published gives three pre-morainic drifts: pre-Kansan, Kansan, and early Wisconsin discriminated largely on the basis of relative amounts of drift. In 1917 Weidman left the Wisconsin Survey and submitted a manuscript in which another version was stated as follows: Kansan till, Illinoian weathered gravels with little till, Iowan unweathered gravels with erosional topography, and Early Wisconsin fresh gravels with constructional topography. In 1923 Leverett restudied the area and deposited some maps with the Wisconsin Survey which were in part followed; some of these were published both by Antevs and by Leverett. These agree in showing a considerable fringe of Wisconsin (Cary) drift outside the moraine and in correlating much of the drift south of that as Illinoian. In 1937 Mathiesen worked on the drift of the reentrant in Barron County. He placed much of the drift

outside of the major terminals as the product of an early Cary advance . Outside that he suggested that the little eroded drift is Iowan on account of the young soils and ~~iiiiiii~~ presence of unpitted outwash along the streams which carried Wisconsin drainage. He made no attempt to correlate the drift to the south which is very thin.

In 1940 Hole began work on the drifts in the vicinity of Marshfield using the criterion of soil development. It was early discovered that the till of this region is calcareous at depths of 3 to 11 feet but the source of the carbonate was not determined. A buried soil separates this drift from still older depostits. He found that the Colby-Spencer soils which were discriminated because of the mottled subsoil are not characteristic of any particular age of drift. They reflect the results of poor subsoil drainage and are largely developed in silt which overlies drift both outside and inside the rugged terminal moraine. The moderate depth of carbonate leaching, however, suggests that the Marshfield till is no older than Iowan. The supposed Marshfield moraine is now interpreted as a preglacial rock divide, a view suggested first by Bean. Work by Nelson of the Wisconsin College of Agriculture has demonstrated that the "Driftless Area" mapped by Weidman along the valley of Wisconsin River south of Wausau was actually glaciated but that thin drift plus the nature of the bed rock combined to make the soils different (Marathon instead of Colby). This discovery makes it possible that the calcareous drift came from the northeast. The sandstone crags near Neillsville which Martin regarded as nunataks may have developed since Iowan time although it is possible that the border of that till extended such a short distance south of them that Martin was correct and not Weidman.

Holes work is continuing. Deep boring with a posthole augur is being used to provide accurate samples and obtain data on buried soils. It is now realized that correlation of tills by color and contents is in this region fraught with grave chance for error. So little is known

of the bed rock geology of northern Wisconsin on account of the drift cover that the sources of stones is uncertain. Colors are confused by weathering conditions and the presence of lake clays in the drift. Nevertheless it is hoped that further stratigraphic and physiographic studies may result in definite correlations of the drifts. It is very difficult to evaluate the effect of the Cambrian sandstone both on composition and erosion of the drift so that considerable time will be needed to reach final results.

Minnesota

The mapping in Minnesota follows that of Leverett with two exceptions. First, Lake Grantsburg is shown on authority of Cooper. Second, the Illinoian drift of Dakota County is omitted as work by Gould demonstrates that it was overridden by Iowan till.

Michigan

Michigan is mapped just as shown by Leverett with some minor alterations in the limits of the substages of Wisconsin drift given by the same author in correspondence.

Works to which reference was made in drawing maps.

Michigan

Leverett, Frank, and Taylor, F. B. (1915) The Pleistocene of Indiana and Michigan and the history of the Great Lakes U. S. Geol. Survey Mon. 53

Minnesota

(1935)
Cooper, W. S., The history of the upper Mississippi River in late Wisconsin and postglacial time Minnesota Geol. Survey Bull. 26

Gould, L. M. (1941) The Illinoian-Iowan drift complex of Dakota County, Minnesota (abstract of paper presented at University of Chicago, Sept. 26, 1941)

Wisconsin

(1918)

Alden, W. C. Quaternary geology of southeastern Wisconsin U. S. Geol. Survey Prof. Paper 106

Aldrich, H. R. (1934) Lenglade County, resources and utilization Univ. of Wis. Extension Service, Special Circular

(1929)

Antevs, Ernst Werr of the Pleistocene glaciations Geol. Soc. Am., Bull., vol. 40, pp. 631-720

Buell, I. M. (1895) Bowlder trains from the outcrops of the Waterloo quartzite Wisconsin Acad. Sic., Trans., vol. 10, pp. 485-509

(1905)

Chamberlin, R. T., Glacial features of the St. Croix Dalles region, Jour. Geology, vol. 13, pp. 239-256

Chamberlin, R. T. (1910) Older drifts in the St. Croix region Jour. Geology, vol. 18, pp. 542-548

Hole, F. D. (1941) Some observations of the glacial drifts north of the Driftless Area Indiana Acad. Sci., Proc., vol. 50, pp. 142-143

Leverett, Frank (1929) Moraines and shoreline of the Lake Superior region U; S. Geol. Survey Prof. Paper 154 A

MacClintock, Paul (1923) The Pleistocene history of the lower Wisconsin River Jour. Geology, vol. 30, pp. 673-689

Martin, Lawrence (1916) Physical geography of Wisconsin Wisconsin Geol. and Nat. History Survey Bull. 36, pp. 314-315, 378-380

Mathiesen, J. T., (1940) The Pleistocene of part of northwestern Wisconsin Wisconsin Acad. Sci., Arts Trans., vol. 32, pp. 251-272

Thwaites, F. T. (1929) Glacial geology of part of Vilas County, Wisconsin Wisconsin Acad. Sci., Trans., vol. 24, pp. 109-135

Weidman, Samuel (1907) The geology of north central Wisconsin Wisconsin Geol. and Nat. Hist. Survey Bull. 16, pp. 433-871, 621-631

Weidman, Samuel (1913) Pleistocene succession in Wisconsin (abstract) Geol. Soc. Am., Bull., vol. 23, pp. 697-698; Science, vol. 37, pp. 456-457

Whitson, A. R., and others (1916) Reconnoissance soil survey of north part of north central Wisconsin Wisconsin Geol. and Nat. Hist. Survey Bull. 50

Whitson, A. R. (1927) Soils of Wisconsin Wisconsin Geol. and Nat. Hist. Survey Bull. 68

(1932)

Wilson, L. R., The Two Creeks forest bed, Manitowoc County, Wisconsin Wisconsin Acad. Sic., Trans, vol. 27, pp. 31-46, 1932

Wilson, L. R., (1936) Further studies of the Two Creeks forest bed, Manitowoc County, Wisconsin Torr. Bot. Club., Bull., vol. 63, pp. 317-325

Theses on file in library of University of Wisconsin by Kenneth Bertrand, L. B. Nelson, A. J. Manners, J. M. Mansell, R. E. Max Murphy

Maps, notes and manuscripts in ~~their~~ files of Wisconsin Geological Survey by E. F. Bean, H. R. Aldrich, and F. T. Thwaites

Field work by F. D. Hole and F. T. Thwaites

Reare forgive pencil; our secretary is
out ill. I hope you will ful you
can lend the weight of your name to
this "exhibition program".

Oct 13, 41

Mr. F. T. Thwaites 41 Roby Rd Madison Wisc

Dear Thwaites,

I feel sure there is a misunderstanding between us as to the scope of the 10-minute papers we hope to give in Boston. They are only intended to give geologists an idea of what we are trying to do, and are not at all aimed at discussing problems, or indeed anything, in detail. ~~The~~ I feel sure our project will mean more to those not actively engaged on it if we show them a few colored slides (2 x 2 inches, by the way) of representative areas, just so they can see what can be represented on the scale we are using. ¶ I am not interested in abstracts any more than you are, but it is a GSA rule that we must submit them for any paper. ¶ As for being off our "home beats" MacClintock's demonstration will include New England, about which he knows little, & mine will include the Dakotas & Montana, about which I know still less. But the colored slides will show the general layout, & I plan to say very little beyond mere general description.

~~You no~~

I do hope that in view of these facts you will feel you can conscientiously participate, and thus add prestige to the undertaking. It seems to me that your knowledge of the middle western region would make your name an almost necessary feature of the program so

far as that region is concerned. Leighton and White are ready to lend their names if you will be responsible for the presentation. If later you should find it impossible to get to Boston, I would try to arrange for a substitute speaker.

Sincerely yours,

Richard F. Flint

P.S. A special delivery has just arrived from Kay suggesting he & Gould cover Mo., Ia., Kan., Neb., & perhaps the Dakota, & that you cover Wisc., Minn., Mich., Ill., Ind., Ohio, Ky., speaking for yourself, Leighton, & White. Any arrangement that is OK with you and Kay suits me. Actually, in 10 minutes, you can hardly do more than show the slides & point out what the conventions are!

Oct. 16, 1941

Prof. Richard Foster Flint,
Dept. of Geological Sciences,
Yale, University,
New Haven, Connecticut

Dear Flint:

I wish to thank you for letter mailed Ovt. 13.

No. I am afraid the answer will have to be the same. I have no definite plans to go to Boston for in view of the tax situation I do not like to spare the sum needed. Had orginal plans for a conference been adhered to I would probably have made the sacrifice but now it does not seem necessary. As far as talking about the slides goes I fail to see why you can not do it. If you wish to also use my name that is all right as I have furnished you with the dope on the present situation in this state to use in preparing an abstract.

I finished the map today and took it to be photo-stated. The problem of getting a Kodachrome slide, however, is still unsettled. Would it not be better to send you the map via express and then you will be having several made and so can get it in. Please advise me if this is O. K. I have heard nothing from Kay.

The fitting of my map to adjoining ones can only be done as final drafting progresses. Most of the failure to fit will be due to minor errors in estimating positions As editor you can pass judgment on relative accuracy and detail

Sincerely,

41 Roby Road

Prof. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Under separate cover I am sending you photostat and blueprint positive copy of my map. I wrote you before of my troubles in getting a Kodachrome slide and am awaiting your orders. In respect to the map I tried my best to follow your instructions but they were far from clear on several points. I did not color moraines where submerged by lakes although Hole told me you wanted this. I felt it looked better the other way. You will realize when you see the original how the inland state borders make coloring difficult and the effect of wrinkles which was made worse by use of water to spread the crayon colors. However, I trust that I have copy which can be used for drafting without much editing. If you want more copies to send to others I can have them made from the oiled copy I have kept or you can oil the one you have. I have sent a blueprint to Kay.

I am afraid you will be calling me a quitter for not coming to Boston but I feel that under the present conditions attendance from the west will be scant. For this reason it seems unreasonable to make the long and expensive journey just to talk a few minutes. I did write an abstract the other night but changed my mind and cast it aside uncopied. If you care to use some of the data I sent you (Kay returned his copy) giving credit to me that will give you the use of my name without any need for me going there. I have already explained that I cannot get off to go to New Haven in January much as I would like to go and join in the discussion.

Thank you for the reprints of "Pleistocene strandlines: a rejoinder", Ozark segment of Mississippi River", and "Glacial geology". I have a revised version of the buried pre-Cambrian out but have no envelopes to send them it as yet. Will put a copy in with the maps.

Please remember that althoug I am willing and anxious to help along with the glacial map project there are limits to my strength as well as to my financial resources.

Sincerely,

Oct. 21, 1941

Dean G. F. Kay,
Dept. of Geology,
University of Iowa,
Iowa City, Iowa

Dear Dean Kay:

I wish to thank you for your letter of the 15th and for the copy of the report on gravels.

Although I greatly appreciated your kindness in releasing the subject of Wisconsin to me again it is quite impossible to go to Boston this year. The fact that Flint postponed the discussion until a time I could not get away made the financial sacrifice unwise just to show some slides. Also I so dislike abstracts that I do not wish to put my name to one and one must be furnished. I did in fact write one after your letter came but decided against it and never made a final copy.

Enclosed is blueprint copy of my map which you may find useful both in matching and in preparing your talk.

I hope you will not think I am a quitter for refusing to take part in the proposed talks. But there are limits to what is reasonable to ask of one in these days of high taxes. Besides I can stand just so much physical strain and no more. A trip so far just to talk a few minutes would certainly not pay.

Sincerely,

THE STATE UNIVERSITY OF IOWA
IOWA CITY
DEPARTMENT OF GEOLOGY

October 15, 1941

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

My dear Thwaites:

Thank you for your "Remarks on the Maps Showing Drifts of Minnesota, Wisconsin, and Michigan, Compiled in 1941". Since I received this material I have been in correspondence with Dr. Flint. I wrote a letter to him as follows:

"My dear Flint:

The North Central States can be divided logically into the East Central States and the West Central States. The East Central States would include Illinois, Wisconsin, Michigan, Indiana and Ohio. The West Central States would include Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota and North Dakota. I have been preparing my abstract in accordance with the plan which you submitted to us September 5, and later modifications made by you, myself and Gould at Chicago. In conferring with Thwaites, I find that he has included Michigan as well as Minnesota in his area. In our Chicago conference our understanding was that Gould would be responsible for the Cordilleran United States and that Thwaites and I would be responsible for Missouri, Iowa, Wisconsin, Minnesota, Kansas and Nebraska. Leighton, Thwaites and White were to be responsible for Illinois, Indiana, Michigan and Ohio. After having made careful analysis of the whole situation, it seems to me that a better basis can be worked out for the distribution of responsibilities for the abstracts. Would it not be better to have Kay and Gould assigned to the West Central States with the understanding that this area includes the states mentioned above as belonging to the West Central States, and that Leighton, Thwaites and White prepare the abstract for the East Central States which includes the states which were mentioned as belonging to this area.

If this plan would be agreeable to you, then Gould and I would immediately prepare our abstract on our area. This would relieve Thwaites from our area and place him where he could discuss Wisconsin more logically than when Wisconsin is included in the West Central States area. I realize that I am dealing here only with the abstract which must be submitted to you if possible not later than October 15.

We will have to deal with the question of the lantern slides after that date but early enough for the Boston meeting."

In response to this letter Flint states that this arrangement is entirely agreeable to him and that I should correspond with you regarding the shift on the understanding that Leighton, yourself and White will now include Wisconsin and Michigan in your area.

I am returning to you the material which you forwarded to me.

Gould and I will prepare an abstract of 250 words on Minnesota, Iowa, Missouri, Kansas, Nebraska, North and South Dakota.

Hoping that this re-distribution will be entirely satisfactory to you, I am,

Yours very sincerely,

G. F. Kay

GFK:RS

Minnesota

Mapping in Minnesota follows that of Leverett with exception of the extension of Glacial Lake Grantsburg as defined by Cooper, and the revisions found by Gould. The discrimination of the border of the Iowan is ~~after material in~~ follows the text of Leverett's report for no such line is shown on his maps. There may be some scattered drift in the area there denoted as Driftless and this drift may be of Nebraskan age as suggested in Iowa.

Works to which reference is made. ~~Gould's mapping is followed~~

Frank Leverett Quaternary geology of Minnesota--- U. S. Geol. Survey Prof. Paper 161, 1932

C

W. S. Cooper The history of the upper Mississippi River in late Wisconsin and postglacial time Minnesota Geol. Survey Bull. 26, 1935

L. M. Gould The Illinoian-Iowan drift complex of Dakota County, Minnesota (abstract of paper presented at Chicago, Ill., Sept. 26, 1941)

Michigan

Mapping in Michigan follows that of Leverett with some minor modifications offered by the same author in correspondence

Frank Leverett and F. B. Taylor The Pleistocene of Indiana and Michigan and the history of the Great lakes U. S. Geol. Survey Mon. 53, 1915

Remarks on the maps showing drifts of Minnesota, Wisconsin and Michigan compiled in 1941

F. T. Thwaites

The extra-morainic drifts of central Wisconsin

The first serious attempt to study the glacial drift outside of the rugged moraines of Wisconsin age was that of Weidman which was published in 1907. This author wisely denoted the several ages of drift by numbers as he realized that correlation with recognized drifts was uncertain. The First Drift he described as thin and devoid of moraines. The Second Drift was bordered by a moraine near Marshfield. The Third Drift occured in patches (mainly composed of gravel knolls). In 1913 Weidman published somewhat different conclusions as a result of work farther west. Three pre-moraine drifts were recongnized and discriminated largely on the basis of relative thicknesses. These comprised, pre-Kansan, Kansan, and Early Wisconsin. In 1917 Weidman left the Wisconsin Survey and submitted a manuscript which was never published. It it he discriminated: Kansan till: Illinoian weathered gravels; Iowan fresh gravels; Early Wisconsin fresh gravels with kettles. In 1937 J. T. Mathiesen worked on the drift of Barron County and confirmed some of Weidman's conclusions. This author divided the drift outside the main moraine into a fringe of pitted outwash with small morainal patches of essentiallly the same age as the moraine (presumably Cary) and outside this an older till within which the outwash is unpitted which he suggested might be of Iowan age. The very thin drift outside this latter area he could not correlate.

In 1940 Hole began work on the drifts using the criterion of soil development. It was early discovered that the till of the Marshfield region is calcareous at a depth of a few feet and that it is separated by a buried soil from still older drift. It was found that the Colby-Spencer soils which were supposed to be characteristic of the extra-morainic drift and to be very old are largely developed in a silt which overlies both the gray-brown drift south of the moraine and the red drift within it. Discrimination of this soil series was mainly on the basis of a mottled

subsoil ~~ix~~ which obviously is not a valid criterion of age but is simply the result of poor subsoil drainage. The absence of any approach to a gumbotil even on the flattest areas and the moderate depth of leaching ~~which is~~ (not known to exceed 11 feet in till) suggest that the drift around Marshfield is no older than Iowan. Recent study by Hole and Nelson demonstrate that the ~~supposedly unglaciated~~ "driftless" area along Wisconsin River south of Wausau was in fact glaciated and that the difference in soil is attibutable to the rougher topography than farther west and to the nature of the bed rock. ~~Study~~ Studies by Hole and by Bean have demonstrated that the supposed moraine between Marshfield and Neilsville is simply a divide largely composed of sandstone hills. The sandstone crags near Neilsville which Martin regarded as nunataks ~~may~~ might have been such during Iowan time although the border of this calcareous till which may have been derived ~~come~~ from the dolomite area of northern Michigan by Labardorian southwest moving ice, has not yet been fixed. There ~~may be~~ possibly is a fringe of older drift still ~~outside the gray-borwn calcareous till~~. but the effect of ~~distance that the ice transgressed from the pre-Cambrian crystallines onto~~ the Cambrian sandstones is a most confusing factor. Deep boring with a post hole augur is in progress to ~~check some of the~~ obtain data on the till below the zone of weathering. and or buried soils. in central Wisconsin Discrimination of drifts either by relative amounts of different rocks ~~and~~ or by color is fraught with difficulty because so little is known of the bed rock geology of northern Wisconsin on account of the continuous mantle of drift. In western Wisconsin, however, it seems likely that these criteria may aid in solving the problem of correlation. Red coloration seems common adjacent to gravels thus being very confusing and Red Lake clays are readily mistaken for Till. Soils maps by Whitson were extensively used in the compilation.

Illinoian drift of southern Wisconsin

The trianglular patch of Illinoian drift in southern Wisconsin was mapped by Alden following a much more complex subdivision proposed by Buell. This district varies from gently rolling country with abundant drumlins east of Rock River by a gradual transition westward to very thinly drift-covered rock hills, ~~along the western margin~~. Throughout the area are gravel knolls for the most part devoid of definitely constructional topography and many instances of drainage diversions due to drift accumulation. These took place ~~occured~~ so long ago that the rock valleys of postglacial ~~age~~ are relatively mature. However, no gumbotil has been discovered and the average depth of weathering is little greater than on the Wisconsin drift to the north.

Wisconsin drift.

In drawing the map Thwaites followed the mapping of Alden with a few modifications based on his own work. The Brooklyn moraines is now classed as Cary because of the presence of pitted outwash within it and of the similar lobation. Some areas of irregular outline classed as moraines by Alden are here classed as ~~being~~ pitted outwash. Mapping of northeastern Wisconsin follows ~~unpublished~~ work by Thwaites which has been submitted to the Geological Society of America for publication. Parts of northern Wisconsin follow published work of Thwaites, ~~and~~ Leverett and R.T. Chamberlin, as well as unpublished work by Hanners and Bertrand. The continuity of the Cary terminal moraine is now known. Most of the drift is of Labradorian origin except for the Patrician red drift of far western Wisconsin. A large part of the mapping of northwestern Wisconsin was adapted from surveys under the direction of Bean. The east-west moraines south of Lake Superior suggest a Patrician readvance but in the parts which have been studied in detail they grade into pitted outwash to the south with no evidence of a time lapse.

The work of Wilson on the Two Creeks Forst Bed marks a step in advance in knowledge of the subdivisions of the Wisconsin drift. Thwaites suggests that the correlation of Alden's red drift in northeastern Wisconsin

with Leighton's Mankato Kewaunee drift in Minnesota is uncertain and urges that a new term Valders be employed until relations can be definitely established in the unsettled regions of northern Wisconsin and Minnesota.

Works to which reference is made.

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I. M. Buell Bowlder trains from the outcrops of the Waterloo quartzite area Wisconsin Acad. Sci., Trans., vol. 10, pp. 485-509, 1895

Chamberlin, R. T., Glacial features of the St. Croix Dalles region Jour. Geology, vol. 13, pp. 238-256, 1905

W. C. Alden Quaternary geology of southeastern Wisconsin U. S. Geol. Survey Prof. Paper 106, 1918

Leverett, Frank Moraines and shorelines of the Lake Superior region U. S. Geol. Survey Prof. Paper 154, 1929

L R Wilson The Two Creeks forest bed Manitowoc County Wisconsin, Wisconsin Acad. Sci., Trans, vol 27, pp 31-46, 1932

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F. T. Thwaites glacial geology of part of Vilas County, Wisconsin Wisc. Acad. Sci., Trans. vol 24, pp 109-125, 1929

F. D. Hole Some observations of the Glacial drifts north of the Driftless Area in Wisconsin Indiana Acad. Sci, Proc. vol 50, pp 142-143, 1941

J. T. Mathiesen The Pleistocene of part of northwestern Wisconsin Wisconsin Acad. Sci., Proc. vol 32, pp 251-272, 1940

Oct. 8. 1941

Prof. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

I did not take time to answer yours of Sept. 29 before because I felt that my desire to be left off the program at Boston was made clear in my letter which crossed.

Enclosed please find notes and list of references on my map also copy of letter to Kay explaining why I simply cannot m eet your request. I sent the map to Chicago by messenger but simply would not send it otherwise. By the way do you wish a 2 X 2 slide or a full size one. If the former I would have to wait a chance to get it onto a film with some others but larger size could be taken on cut film, I think, provided they have some in stock which I have not checked yet. I cannot possibly promise any lantern slides before Christmas. I will send the slide to you. It will be made by the University photographer and will be the property of the University, unless you direct otherwise.

I still hope to get to Boston but remain firm in declining to talk on an area where I have done no work to speak of. Hole now thinks he will finish his field work next summer.

With best regards,

Sincerely,

YALE UNIVERSITY
DEPARTMENT OF GEOLOGY

NEW HAVEN, CONNECTICUT

September 29, 1941

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

We were all disappointed that you were unable to come to Chicago but were glad that Hole was present to represent you. I understand from him that your present plan is to go to Boston in December but not to New Haven in January. After talking with Kay and Leighton I sent a message to you via Hole which I want now to confirm. The proposed program for Boston, contained in my letter of September 5, is now revised as follows:

3. Kay [speaker] and Thwaites: West-Central U. S. (Mo-Ia-Kan-Neb-Wisc-Minn).

4. Leighton, Thwaites [speaker], and White: East-Central U.S. (Ill-Ind-Mich-O-Ky).

Will you participate as indicated? This would mean you would send your Wisconsin-Minnesota map, or a kodachrome slide of it, to Kay, who has agreed to prepare the paper and abstract for Paper #3, and would obtain from Lehighton and White slides of their areas, and would send me an abstract for Paper #4 by October 15. Leighton has indicated he would like to cooperate with you in this way.

Your map looked very fine and was carefully studied by all of us. The results, when the mosaic is assembled, are going to be very pretty.

Please let me know your reaction at once, so that if you are not to be in Boston I can ask White to assume responsibility for Paper #4.

Sincerely,

Richard Foster Flint
Richard Foster Flint

Oct. 6, 1941

Dean G. W. Kay,
State University of Iowa,
Iowa City, Iowa

Dear Dean Kay:

In reply to yours of Sept. 30 I am sending you some notes which you may use in preparing your proposed abstract.

With regard to the colored slide it is simply out of the question at this time. The map is not done and cannot be until the steam heat is on to shrink the paper. Then we have to wait our turn at the photographers and then wait while they send the negative to Rochester for development. I am sorry, but we also must work on a system of "priorities" and this project cannot justly be placed ahead of more pressing matters. I hope to have the slide for the Boston meetings. If I have a photostat before that will send it to you otherwise will send the slide to Flint.

Please note my correct name and initials.

With best regards,

Sincerely,

Fredrik T. Thwaites

THE STATE UNIVERSITY OF IOWA
IOWA CITY
DEPARTMENT OF GEOLOGY

September 30, 1941

Dr. Frank W. Thwaites
University of Wisconsin
Madison, Wisconsin

My dear Thwaites:

As Dr. Flint no doubt has told you, you and I are being asked to prepare a 250 word abstract in relation to the glacial map of the west-central United States. As you know, this will be used at the Boston meeting of the Geological Society of America. I have been asked to be the speaker at this time with regard to our area.

Will you please forward to me, if possible not later than October 8, a kodochrome latern slide of your Wisconsin-Minnesota glacial map. Also, a 100 word abstract of your two states to be used by me in making up the 250 word abstract involving the several states.

With kindest regards,

Yours very sincerely,

G. F. Kay

G. F. Kay

Sept. 18, 1941

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Your circular of Sept. 5 is at hand.

I regret that it is impossible for me to come to the Chicago meetings much as I would like to. But recitations start on Sept. 24 here and I just have not the nerve to ask to get away. Twenhofel feels the same. I rather doubt that anyone here will be able to attend.

Now as to Boston both Mrs. Thwaites and I would like to attend the meetings but as to going back to New Haven only two weeks later I would not be able to get leave under such circumstances. Twenhofel says he would not approve such a request as he sees no reason for not setting matters either during the meetings or just after. I fear it will have to be just one and I certainly prefer the time of the meetings.

After the report of northeastern Wisconsin was sent in (no report on its reception as yet) I devoted my time to drawing the maps assigned to me. This is nearly done in so far as information is available. I did a little field work in Bayfield County but the floods prevented more. 15 inches of rain in a day and a half does not help a geologist! Went Hole and I had field conferences with Gould, Dr. Vessel of the U. S. soil survey, Mathiesen who started on Hole's problem, and Dr. Nelson of the State Department of Agriculture. I think the problem of the pre-moraine drifts is now well under control although far from finished. Hole has undertaken some borings to find buried soils. One is 30 feet deep, the other 27 both can be deepened if necessary. He plans others but now school is opening and work has been discontinued.

With regard to a paper I am a great objector to abstracts for I regard them as out of keeping with real science. Too often they simply represent attempts to stake a claim to a project with no real intention of developing it. However, if that is what you want and I am able to come to Boston I will be glad to explain the map as is and the methods being used by Hole and myself to get more satisfactory results. If I should be unable to come to Boston I will send you manuscript and slides. But under no circumstances will I make two trips. This is not a matter of expense, but of getting off from the University. There was so much abuse of leave in the past by some of the geologists who went out on private work that the Dean is hard to convince!

The map looks very nice but I sure do not like using water to wash in colors. Gasoline works much better for it does not swell the paper. I had a terrible time with the maps you sent for they were all wrinkled. I soaked them off and remounted on cardboard but even now it is hard to keep them smooth. I did not know how to get a new copy of the base during the summer. Let's hope this turns out all right one the heat is on for the winter and drys the paper.

Sincerely,

Sept. 27, 1941

Prof. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Francis Hole has just been in on his return from Chicago and gave me some notes among them a request to write Leighton at once. However, I see no point in doing so.

First, I do not care to prepare any abstract for publication because I see no reason for it.

Second, it is not possible to be sure that I can attend the Boston meetingsespecially as there is to be no conference on the glacial map.

Third, I do not want to present any talk on areas I have not studied myself. True, I have done a little work in Illinois but feel that others know much more about that state than I do. I will be glad to get a colored slide of my map provided the cost is reasonable as I suppose it is. With Hole's aid on the problem he is engaged on I will supply some notes to explain the map but NOT FOR PUBLICATION. As explained before I have a strong aversion to "abstracts" and the idea does not sit well with me. If you want anything of the sort published I much prefer that someone else take the onus of placing his name on it.

Fourth, I simply could not apply for leave to go to a January conference especially if I did go to Boston. The reaction of almost everyone is simply:"Why didn't you discuss that while at Boston?" Trowbofel says he will not approve any request for leave at that time. However, I now feel very doubtful of going to Boston at all.

All things considered I greatly prefer that you leave me out of the program entirely except that I will try my best to get you a slide by the time of the meeting. I cannot promise anything for Oct. 15.

I am sorry I was unable to come to Chicago but again any request for leave so early in the semester when noone else was going would have been most inopportune and would almost certainly have been declined if I had dared make it.

I want also to make it clear that anything we show now on the extra-morainic drifts of Wisconsin is just pure guess work and it will be several years before final results can be expected. This is one of the good reasons for declining to put anything into print just now. The compilation of northwestern Wisconsin from various sources is also tentative.

Sincerely,

3. Kay & Thwaites [Kay speaks] West-Cent U.S.
(Mo., Ia., Neb., Kans., Wis., Minn.)

4. Leighton, Thwaites, & White [Thwaites speaker]
E-Cent U.S. (Ill., Ind., O., Mich., Ky.)

Write to Leighton at once, mailing a carbon to Flint, stating: —

1. Whether or not Thwaites will be at Boston to speak
2. Whether Thwaites or Leighton will prepare the abstract, slide, and outline of the 10-minute, general presentation of the glacial geology of this area.

Abstract due Oct. 15
in Flint's hands.

YALE UNIVERSITY
DEPARTMENT OF GEOLOGY

NEW HAVEN, CONNECTICUT

October 21, 1941

Mr. Fredrik T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

I am sorry that you do not wish to prepare an abstract for representation in our Boston map-demonstration program. The title for the East-Central States will be included in the program under joint authorship of Leighton, Thwaites, and White, since you are kind enough to permit the use of your name.

I have completed the kodachrome photographing of my own maps; so I would not be able to handle the photographing of yours as you suggested.

Yours sincerely,

Richard Foster Flint
Richard Foster Flint

DEPARTMENT OF
REGISTRATION AND EDUCATION
FRANK G. THOMPSON, DIRECTOR
SPRINGFIELD

STATE OF ILLINOIS
DWIGHT H. GREEN, GOVERNOR
STATE GEOLOGICAL SURVEY DIVISION
M. M. LEIGHTON, CHIEF
100 NATURAL RESOURCES BUILDING
UNIVERSITY OF ILLINOIS CAMPUS
URBANA

BOARD OF NATURAL RESOURCES
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STATE UNIVERSITY
PRESIDENT ARTHUR CUTTS WILLARD

October 23, 1941

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

Dear Thwaites:

I have a letter from Flint asking me to forward to him a 250 word abstract of the 10 minute paper on that part of the glacial map of North America covering Wisconsin, Michigan, Ohio, Indiana, and Illinois, in time for him to send it to the G.S.A. before November 1. In order that I may have your ideas, would you send me at once a rough draft of an abstract such as you would prepare covering the problems as you see them of this area.

Best regards,

Very truly yours,

M. M. Leighton

M. M. Leighton
Chief

Dr. M. M. Leighton, Chief,
State Geological Survey
Natural Resources Bldg.,
Urbana, Illinois

Dear Dr. Leighton:

In reply to yours of the 23rd I am sending in this letter (1) blueprint copy of my map, and (3) notes on the map which were prepared for Kay but refused by him. He turned Wisconsin back to me but by then I had decided both to remain away from Boston and not to prepare any abstract on my own. I do not approve of publication of abstracts and I also strongly objected to the change of date for the conference to a time when I cannot possibly go. When there was to be no conference at Boston much of the reason for going was at once removed and I declined to spend so much just to show a slide!

I have been unable to arrange for the Kodachrome slide asked by Flint on account to excessive cost if only one is ordered. Flint refuses to make one so this part of the program is very likely to fail entirely. Possibly you may have some suggestion. I have had so much grief over this project that I just do not feel like taking on any more. Between a change in conventions after the maps were done, maps spoiled in delivery, and ambiguous directions I have had about all I can take.

You are at liberty to use any of the material in the notes and I will not even ask that I be a joint author. In fact, I would just as soon not be.

Sincerely,

Glacial maps of Minnesota, Wisconsin, and Michigan

F. T. Thwaites, 1941

Mapping of Minnesota and Michigan follows that of Leverett with ~~very~~ only minor changes. The eastern half of Wisconsin is based upon work by Alden and Thwaites. The only changes in the ~~work of~~ map by the former are ~~change~~ transfer of certain areas from moraine to pitted outwash. Aside from Vilas County and some other small areas in northwestern Wisconsin, the Wisconsin drift mapping is a compilation of various unpublished sources. It is apparent that not all the geologists who worked in this region used the same criteria, especially in the separation of terminal moraine from pitted outwash and drumlins. Soils maps were used in some areas; Linear areas of the heavier soils in very rugged topography were interpreted as terminal moraines.

Outside the terminal moraine the problem of drift correlation and mapping is still chaotic. Weidman's published maps do not check with as later statements and were therefore disregarded. Work by Hole and Mathiesen suggests that there is a considerable area of relatively fresh drift, mainly calcareous, which may be Iowan. South of this in northwestern Wisconsin ia a red drift which is probably Illinoian. The border shown, however, is most uncertain following certain divisions on soil maps. Below the red drift is an older gray till, correlated as Kansan by Weidman. A forest bed ~~in~~ at Woodville may separate this drift from a still older one. Hole's work is continuing with a study of soil profiles combined with stratigraphic data obtained from posthole auger borings. It is hoped that definite results can be obtained in the near future. a buried soil at Hamburg has thus been sampled

YALE UNIVERSITY
New Haven, Connecticut

F. T. THWAITES

Letter No. 7 January 25, 1941

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint):

1. Report on the January, 1941, meeting.

The meeting held in New Haven on January 18-19 was successful even beyond expectation. Those present were: Apfel, Goldthwait, Gould, Kay, Leighton, MacClintock, Nichols, Norman, and Flint. In addition, Max Demorest, National Research Council Fellow in glaciology, sat with the Committee during both days, and Walter H. Bucher, Chairman of the Division of Geology and Geography, during Sunday. The Canadian Survey sent only two of its four members by prearrangement, Capps is temporarily in Brazil, and Leverett, Thwaites, and White were absent on account of illness. A total of 17 hours was spent in demonstration and stimulating discussion, many minor disagreements -- all that appeared -- were eliminated, and conventions and procedure were formulated. The amount of material compiled was, I think, a pleasant surprise to all. In particular the energetic progress made by the Canadian group under the direction of Dr. Young caused wide comment, especially in view of the unpublished condition of most of the source data.

Apfel reported on the presentation by him of our project at the Austin meeting of the G.S.A. The presentation prompted several offers of unpublished data for the map.

The greater part of the time was occupied in presentation and discussion of the regional maps. It was generally agreed that more detail could be shown on them than had been thought possible. The Canadians offered a progress map showing that 90 percent of the data from north of latitude 60°, and 80 percent from south of that latitude, have already been compiled. Many members of the Survey are contributing to it. Compilations for Quebec, Nova Scotia, Ontario, Yukon, and Arctic Canada were shown. The letter was especially impressive in that much of the base information such as coasts, form lines, and details of distribution of existing glaciers, as well as the extent of Pleistocene marine deposits, is new, having never been published. For much of this material we are indebted to Nichols.

Goldthwait's report was accompanied by an excellent mimeographed bibliography and list of points for discussion. Gould also offered an extensive bibliography on his complex area. Bostock sent a helpful written report, and both Thwaites and Capps were represented by map compilations. Leverett sent a discussion of the Iowan drift which was read at his request and discussed. Kay offered maps of two loess sheets in Iowa to supplement the loess map prepared by Apfel. Apfel also offered an interesting map of New York showing source references for the various features mapped. Flint presented two maps of Washington and northern Idaho, on 16- and 40-mile scales respectively, to demonstrate the effect of reduction.

A most impressive exhibit was the 40-mile manuscript glacial map of the United States recently prepared by O. A. Ljungstedt and kindly lent by him to the Committee. After the meeting it was taken to Ottawa for exhibit at the Survey.

It was decided to hold the next meeting at Boston in December, 1941, in connection with the G.S.A., and to exhibit final drafts of the regional manuscript maps in the G.S.A. meetings, probably in connection with a Pleistocene symposium to be suggested to the Program Committee of the G.S.A.

The Committee drew up a list of the more important problems which appeared capable of probable solution in the near future, and recommended that field projects be undertaken on certain of them during the summer of 1941. A list of these is attached hereto as Exhibit A. The Committee voted group support to any application made to the Projects Committee of the G.S.A. for financial aid on any of these projects.

It was agreed that the regional manuscript maps for exhibit and discussion in December 1941 were to be plotted on a uniform scale of 40 miles to the inch for the United States, and 40 or 60 miles to the inch for Canada. I will undertake to see that a suitable base map is sent each member within the next few days. This will assure uniformity of scale.

To assure uniformity of plotting, and to reduce the expense of drafting on to the ultimate base, it was decided to adopt a uniform scheme of colors, symbols, and other conventions, and to adhere to them rigidly, so that the regional maps can be fitted together into a uniform whole. The only departure from unity will be in the base-map projections, which at this stage will not be the same for the United States as for Canada. The scheme of conventions, worked out in detail (incidentally with valuable help from Bucher) is attached hereto as Exhibit B.

Considerable attention was given to the problem of a base map. Lt. Paul Smith of the U. S. Coast and Geodetic Survey recommends a Lambert conformal conic projection, which is very nearly equal-area in character and whose conformality permits direct plotting of striae and other symbols whose orientations must be exact. Fortunately the base now nearing completion in the Geological Survey of Canada, in preparation for the forthcoming Geologic Map of Canada, meets these requirements. It includes the whole of the Arctic Islands of Canada and extends south to lat. 40°. On this map, the areal distortion is zero at Lat. 45°, and at no place is it more than a few percent. Nichols and Norman were requested to inquire in Ottawa whether a plotting of this map, on a scale of 60 miles to the inch, with a southward addition extending to 37° Lat., and plottings of western Alaska, Greenland, and Iceland, could be furnished the Committee by the Geological Survey of Canada, with the understanding that financing of the final drafting of the geology, the engraving, and the printing, would be sought in the United States. There was general agreement that such a base map on a 60-mile scale would exactly meet our requirements. The inset map of the United States to show the distribution of the loess would be on a scale of approximately 300 miles to the inch, and would be added later.

The base map will be provided with submarine contours or form lines at 500, 1000, and every 1000 feet for Canada by Nichols, and for the United States from data to be supplied by the U. S. Coast and Geodetic Survey through the interest of Lt. Smith.

Contours or form lines at 500, 1000, 1500, and 2000 feet for eastern Canada and at 1000, 2000, and every 2000 feet for western Canada will be provided by Nichols. Contours or form lines in the United States at 1000, 2000, and every 2000 feet will be provided by the compilers for their individual regions, using published topographic maps where available.

General decisions on procedure between now and the December meeting were:

1. Include in the final regional maps all available unpublished information and clear the regional maps with State and Provincial surveys and individuals. Safeguard unpublished information where necessary.

2. Give careful thought to the relative accuracy of position of the mapped contacts, and pursue a conservative policy in the adoption of continuous, broken, and dotted lines. This is essential for map unity.

3. Each regional map is to have its own complete columnar section and legend. When the regional maps are put together, some consolidation can be effected, but final columns will differ somewhat for different sections of the continent.

4. Where conventions are inadequate, verbal statements may be lettered on the maps.

5. Rigid adherence to the symbols and color scheme adopted (for simplicity and contrast) is essential if the regional maps are to constitute a unit when pasted together. Areas of no information to be left blank.

6. Inset map of loess is to show drift borders within limits of its scale.

7. Legends are to be accompanied by necessary footnotes. It is understood that ultimately these may be published in a separate pamphlet.

8. Full reference to all published and unpublished sources of information is to accompany each regional map. For uniformity, the form of citation should follow current G.S.A. style.

If I have failed to report all of our decisions, or if additional questions occur to you, please let me know. Meanwhile we are far on our way, and with full cooperation of every member, our hope for a completed manuscript map of North America by December 1941 is practically assured.

Sincerely yours,

Richard Foster Flint

Richard Foster Flint,
Chairman

Exhibits A and B attached

Exhibit A

Map conventions Adopted January 19, 1941

(This supersedes the scheme adopted in December, 1939.)

Base data

1. Existing lake and marine shores — black line, with 2 or 3 conventional fine black lines offshore; main areas of lakes and sea blank.
2. Existing drainage — black, in reasonable detail.
3. Submarine contours and form lines — blue ink.
4. Contours and form lines on the land — brown ink.
5. Latitude and longitude grid — 2°.
6. State and Provincial boundaries; chief cities and towns. No county lines nor county names.

Geologic data

Striae. (Arrow 3/16" long in dark-blue ink. Center of shaft to be at actual location of feature.)

Two sets of crossing striae. (The earlier set is represented by a broken arrow shaft.)
(Striae are to be grouped into a single symbol where space demands it, but number is to be omitted.)

Drumlins. (Dark-blue arrow 3/16" long with solid ellipse in center of shaft, which denotes actual location of feature.)
(Boundaries of drumlin fields not to be shown).

Eskers. (Dark-blue single lines). (Actual size).

Boulder trains. (Dotted dark-blue lines). (Actual size).

Directions of glacier flow down mountain valleys. (Dark-blue curved arrow, of appropriate size). (Ice divides not to be shown).

End (terminal) moraines. (Map actual area covered, and use same color as related drift sheet, but with heavier application of pencil to give darker shade.) (Where width unknown, use single line along distal toe.)

Boundaries of drifts to be black-ink lines, continuous, broken, or dotted, according to accuracy of knowledge.

Areal colors. (Numbers refer to Faber's "Mongol" pencil colors. These are water soluble and should be washed according to directions. Areas of large lakes should not be colored.)

866 Wisconsin drift (undifferentiated).

866 " " : Mankato (Fine vertical stripes 1/16" apart). Valders 1/8"

862 " " : Cary Valders

863 " " : Tazewell

888 " " : Iowan

848 Illinoian drift and probable correlatives.

867 Kansan " " " "

867 Nebraskan " " " " (Fine vertical stripes 1/16" apart).

\+ Isolated boulders beyond the drift sheets. (Dark-blue "plus" sign; arms 1/16" long, for each boulder or group).

819 Outwash in nonglaciated areas. (Do not use ink boundaries unless limits are known.)

845 Glacial and extraglacial lakes. (Fine horizontal stripes 1/16" apart). (Outlets, where known, to be indicated by small blue arrow in direction of flow.)

845 Glacial marine areas. (Fine vertical stripes 1/16" apart). (Spot elevations on highest features to be added where known.)
(Drift-sheet ground colors are to be omitted beneath the above two conventions.)

865 Existing glaciers. (Where too small for individual mapping, print "Many small existing glaciers".)

▲ Occurrence of interglacial and interstadial features. (Black solid triangle, 1/8" on a side).

(5) Occurrence of pre-Wisconsin drift in Cordilleran areas (Footnote reference).

⊖ Occurrence of varved sediments where unmappable as a body. (Light blue).

Φ Occurrence of glacial-marine deposits where unmappable as a body. (Light blue).

819 845 848 862 863 865 866 867 888

Exhibit B

FIELD PROBLEMS CAPABLE OF SOLUTION IN THE NEAR FUTURE
FOR THE BENEFIT OF THE GLACIAL MAP OF NORTH AMERICA.

Formulated by the Committee on Glacial Map of North America
January 19, 1941.

1. Character, date, and upper limit of glaciation on Gaspé Peninsula, Quebec. (This is an area of disagreement as to whether highlands were glaciated.) [Flint, Demorest, Washburn project, Summer 1941].

2. Correlation of the drifts of the Salamanca reentrant, N.Y.-Pa. (Essential to establish correlation between N.J.-E.Pa. and W.Pa.-Ohio. [Apfel-MacClintock joint project, Summer 1941].

3. Tracing of the Nebraskan-Kansan drift contact in N.E. Missouri. (The position of this major contact is not known even approximately.) [Kay and associate (C.D. Holmes?), project, Summer 1941].

4. Age and relationships of the Iroquois Moraine in N.E. Illinois and W. Indiana. (Needed to determine intra-Wisconsin stadial relationship). [Leighton and associate (W.D. Thornbury?), project, Summer 1941?].

5. Stratigraphy of the Iowan drift in S.E. Minnesota. (The key area where Iowan rests on Illinoian drift). [Gould project, Summer 1941].

6. Origin of the scattered boulders beyond the drift sheets in N. Kentucky, S.E. and W-central Missouri, and Kansas. [---- ?]

7. Stratigraphy of the loess outside the area of the drifts. [Apfel project, in part a compilation of unpublished data from several known sources].

8. Textural, mineralogical, and thickness variations in the loess across the Mississippi basin. [Apfel project].

9. Position of the upper late-glacial marine limit in the St. Lawrence lowland. [Goldthwait and others?]

10. Possible twofold subdivision of the Wisconsin drift in eastern New England and in the Catskill region. [Field conference of Committee members with J. L. Rich in the Catskills arranged by Flint for May, 1941, and another projected in eastern Massachusetts].

11. Relation of the drift borders at the junction of the Harbor Hill and Ronkonkoma ridges on Long Island. [MacClintock project, 1941].

12. Mapping of glacial features in valleys on the west slope of the Cascade Mountains in N.W. Washington. [J.H. Mackin?]

13. Mapping of end moraines through the southwestern part of N. Y. [Apfel project].

14. Determination of Kansan drift border in the vicinity of the Kansas-Nebraska boundary.
[Kay will arrange field conference with Schoewe, Lugn, and Graham to settle the position.]

GLACIAL MAP OF MONTANA

Compiled by R. F. Flint (eastern Montana) and W. C. Alden (western Montana)
May 1941.

LEGEND

- Existing glaciers
- Outwash outside the glaciated areas (Includes areas eroded by meltwater streams)
- Glacial lakes (Thick blue arrows indicate outlets, where known)
- Wisconsin end moraine
- Wisconsin drift (undifferentiated)
- Iowan (or Illinoian?) end moraine
- Iowan (or Illinoian?) drift
- Kansan (or Nebraskan?) drift
- ③ Occurrence of pre-Wisconsin drift (Numbers refer to footnotes)
- Glacial striae (Center of shaft indicates locality)
- Long axes of drumlins (Generalized by groups)
- Boulder trains
- Direction of flow of former valley glacier

SOURCES OF DATA

Published

W. C. Alden

Unpublished

W. C. Alden, A. G. Alpha, R. Gibson, J. T. Pardee

GLACIAL MAP OF WASHINGTON AND NORTHERN IDAHO

Compiled by R. F. Flint, April 1941

LEGEND

- Existing glaciers
- Outwash outside the glaciated areas (Includes areas eroded by meltwater streams, and extraglacial lakes)
- Glacial lakes
- End moraine
- Wisconsin drift (undifferentiated) (Includes Vashon in Puget Trough; Wisconsin and "Spokane" farther east)
- Limits of glaciation (Continuous line = closely determined; broken line = fairly well known; dotted line = approximate only)
- Glacial striae (Center of shaft indicates locality)
- Long axes of drumlins (generalized by groups)
- Boulder trains
- Direction of flow of former valley glacier
- ▲ Occurrence of interglacial or interstadial deposits
- ② Occurrence of pre-Wisconsin(?) drift (Numbers refer to footnotes)
- Occurrence of varved glacial sediments

SOURCES OF DATA

Published

I. S. Allison, A. L. Anderson, J H. Bretz, F. C. Calkins, M. R. Campbell, R. A. Daly, W. M. Davis, E. W. Ellis, R. F. Flint, G. H. Garrey, H. P. Hansen, W. H. Irwin, V.R.D. Kirkham, P. D. Krynine, J. H. Mackin, O. E. Meinzer, B. M. Page, J. T. Pardee, A. M. Piper, I. C. Russell, R. D. Salisbury, A. T. Schwennesen, G. O. Smith, J. B. Umpleby, A. C. Waters, B. Willis.

Unpublished

J. D. Barksdale, W. F. G. Bennett, H. E. Culver, R. F. Flint, S. W. Hobbs, H. T. Gisborne, W. H. Irwin, J. H. Mackin, C. L. Park, Jr., W. C. Alden.

GLACIAL MAP
OF
WISCONSIN

Compiled by F. T. Thwaites, December, 1941

LEGEND

Outwash in unglaciated area

Glacial lakes
(Thick blue arrows indicate outlets, where known)(submerged moraines outlined)

Wisconsin end moraine (undifferentiated) (Valders?)
etc.

Wisconsin ground moraine, (undifferentiated) (Valders?)

Wisconsin Valders end moraine (overridden older moraine)

Wisconsin Valders ground moraine, etc.

Wisconsin Cary end moraine

Wisconsin Cary ground moraine, etc.

Wisconsin Tazewell end moraine

Wisconsin Tazewell ground moraine

Iowan drift

Illinoian end moraine

Illinoian ground moraine

Kansan drift

Nebraskan drift

Glacial striae (Center of shaft indicates locality)(older broken)

Long axes of drumlins (Generalized by groups)

SOURCES OF DATA

Published

W. C. Alden, H. R. Aldrich, R. T. Chamberlin, F. D. Hole, Frank Leverett, Pual MacClintock, J. T. Mathiesen, F. T. Thwaites, L. R. Wilson, A. R. Whitson

Unpublished

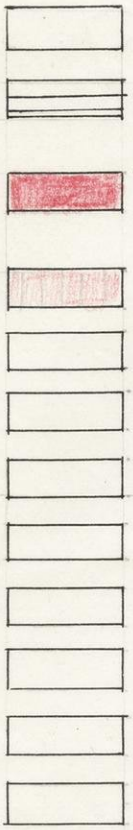
E. F. Bean, Kenneth Bertrand, A. J. Hanners, J. M. Hansell, F. D. Hole, R. E. Murphy, L. B. Nelson, F. T. Thwaites

Void

GLACIAL MAP
OF
MINNESOTA

Compiled by F. T. Thwaites, December, 1941

LEGEND



Outwash in unglaciated areas

Glacial lakes
(Thick blue arrows indicate outlets, where known) (submerged moraines outlined)

Wisconsin Mankato endmoraine (gray drift)
(Keewatin)

Wisconsin Mankato ground moraine, etc. (gray drift)

Wisconsin end moraine (undifferentiated) (Valders?)

Wisconsin ground moraine, etc. (undifferentiated) (Valders?)

Wisconsin Cary endmoraine (red drift)

Wisconsin Cary ground moraine, etc. (red drift)

Iowan end moraine

Iowan ground moraine, etc.

Kansan drift

Nebraskan drift

Glacial striae (Center of shaft indicates locality) (older broken)

Long axes of drumlins (generalized by groups)

SOURCES OF DATA

Published

W. S. Cooper, Frank Leverett

Unpublished

L. M. Gould

GLACIAL MAP OF MICHIGAN

Compiled by F. T. Thwaites, December, 1941

LEGEND

Glacial lakes
(Thick blue arrows indicate outlets) (submerged moraines outlined)

Wisconsin Valders endmoraine (Port Huron)

Wisconsin Valders ground moraine, etc. (Port Huron)

Wisconsin Cary endmoraine

Wisconsin Cary ground moraine, etc.

Wisconsin Tazewell end moraine

Wisconsin Tazewell ground moraine, etc.

Glacial striae (Center of shaft indicates locality) (older broken)

Log axes of drumlins (Generalized by groups)

SOURCES OF DATA

Published

S. G. Bergquist, Frank Leverett

Unpublished

F. T. Thwaites

41 Roby Road,
Madison, Wis.,
Nov. 17, 1941

Prof. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

Your cirucular of Nov. 8 is at hand, I failed to find any postcard so will favor you with another letter of which you probably think you have had too many already!

The only exhibit I can send you is the original map the size of which you know already. Do you want it then? If so, please advise me and I will send it via express together with Kodachrome slide for use at the meeting. It would not have to be returned.

I got a good slide when it occurred to me that the botanists are taking colored photographs all the time. They proved glad to do the job in return for keeping a slide for their use. I also kept one for our department and the total outlay was only 20 cents which I paid.

I put my legend right on the map so it could be photographed. However, if I get time I will make another copy on letter size paper as per your request. I tried to follow your style of typography as exactly as possible. You already have full list of references arranged for each state. I see no point in making three separate legends.in my case.

I see no need for other footnotes than the one on the map in respect to correlation of drifts in north-central Wisconsin.

So far as names go we might put on Two Creeks.but that is all.

Wilson is working on interglacial material from Marshfield but has no final report as yet. Hole and I are designing a special bit with which to drill deeper test holes by increasing speed of drilling.

I cannot use the pre-Wisconsin undifferentiated color. Our problem is mainly is it Iowan or is it older?

There still appears no prospect of my going either to Boston or to New Haven. I do not quite like the idea of such haste under war conditions.

Withbest regards,

Sincerely,

my
XXX

Dr. Thwaites.

NEW YORK OFFICE
Engineering Societies Building, 29 West 39th Street

CABLE ADDRESS
NARECO, Washington, D. C.

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE, WASHINGTON, D. C.

Established in 1916 by the National Academy of Sciences under its Congressional Charter and organized with the cooperation of the National Scientific and Technical Societies of the United States

November 14, 1941

MEMORANDUM INVITING SUGGESTIONS IN CONNECTION WITH THE WORK OF THE COMMITTEE ON LANDFORMS DIVISION OF GEOLOGY AND GEOGRAPHY

Geomorphology has both its dynamic and descriptive aspects. The former is related to geology and the latter to geography, but neither can be isolated. Consideration has long been given to the cycle of erosion and more recently to slope forming processes. Less attention has been devoted to the quantitative description and cartographic representation of land forms. There is no agreement as to the angle and length of slope or the local and relative relief of hills, plateaus, etc. Furthermore, most physical maps fail to give a meaningful picture of land form. The size of the area considered introduces further variations.

This committee is concerned with the terminology and mapping of surface configuration in its geographic aspects, and invites suggestions concerning the problem and its solution. The next meeting will be held during the Christmas holidays in 1941. Meanwhile, it is suggested that you send your comments to the Chairman of the Committee (Department of Geology and Geography, Syracuse University, New York).

The following bibliography lists various approaches to the question.

Reinecke, Leopold — "Average Regional Slope, A Criterion for the Subdivision of Old Erosion Surfaces" Journal of Geology, XXIV (1916), 27-46.

Rich, John L. — "A Graphic Method of Determining the Average Inclination of a Land Surface from a Contour Map" Trans. Ill. Acad. Sci., IX (1916), 195-199.

James, Preston — "On the Treatment of Surface Features in Regional Studies" Annals, Assoc. Amer. Geog., XXVII (1927), 213-228.

Wentworth, Chester — "A Simplified Method of Determining the Average Slope of Land Surfaces" Amer. Jour. of Sci., XX, 5 Series, (1930), 184-194.

Smith, Guy-Harold — "The Relative Relief of Ohio" Geog. Rev., XXV (1935), 272-284.

Veatch, J. O. — "Graphic and Quantitative Comparisons of Land Types" Jour. Amer. Soc. Agronomy, XXXVII (1935), 505-510.

Glendinning, Robert — "The Slope and Slope-Direction Map" Mich. Acad. Sci., Arts and Letters, XXII (1936), 359-364.

Raisz, Erwin and Henry, Joyce — "An Average Slope Map of Southern New England" Geog. Rev., XXVII (1937), 467-472.

Cressey, George B. — "The Land Forms of Chekiang" Annals, Assoc. Amer. Geog., XXVIII (1938), 259-276.

Cozzens, Arthur B. — "An Angle of Slope Scale" Jour. of Geomorphology, III (1940), 52-56.

Wolfanger, Louis A. — "Landform Types" Michigan State College, Agricultural Experiment Station Technical Bulletin 175, (February 1941). Reviewed in the Geographical Review, XXXI (1941), 682-683.

Trewartha, Glenn T. and Smith, Guy-Harold — "Surface Configuration of the Driftless Cuestaform Hill Land" Annals, Assoc. Amer. Geog., XXXI (1941), 25-45.

Howard, Arthur D. and Spock, L. E. — "Classification of Landforms" Journal of Geomorphology, III (1940), 332-345.

Committee Members

Wallace W. Atwood, Jr.	Clark University
Arthur B. Cozzens	University of Illinois
Robert M. Glendinning	University of California
Henry M. Kendall	University of Michigan
Erwin Raisz	Harvard University
C. F. Stewart Sharpe	Soil Conservation Service
Louis A. Wolfanger	Michigan State College

George B. Cressey, Chairman
Syracuse University

R. T. THWAITES


BRITISH COLUMBI
125°
124°
123°
122°
121°
Okanogan Lake
Kelowna
Harrison Lake
Vancouver
New Westminster
Nanaimo
Fraser River
Similkameen River
Kettle River
Lower Arrow L
Kootenai Lake
Nelson
Cranb
Grand Forks
VANCOUVER ISLAND
STRAIT OF GEORGIA
JUAN DE FUCA STRAIT
Cape Flattery
Cape Alava
VICTORIA
SAN JUAN
Friday Harbor
Anacortes
Bellingham
WHATCOM
SKAGIT
Mount Vernon
Coupeville
Port Townsend
Port Angeles
CLALLAM
SNOHOMISH
Everett
OKANOGAN
Okanogan
FERRY
Republic
STEVENS
Colville
PEND OREILLE
Newport
BOUNDARY
Bonners Ferry
Priest L
BONNER
Sandpoint
Pend Oreille Lake
Destruction I.
JEFFERSON
CHELAN
DOUGLAS
Waterville
KITSAP
Bremerton
SEATTLE
Port Orchard
WASHINGTON
Spokane
SPOKANE
Davenport
Coeur d'Alene
KOOTENAI
Kellogg
Wallace
SHOSHONE
St Maries
BENEWAH
Pt Grenville
GRAYS HARBOR
MASON
Shelton
Wenatchee
Ephrata
GRANT
Auburn
Tacoma
Puyallup
Hoquiam
Aberdeen
OLYMPIA
THURSTON
Montesano
PIERCE
KITTITAS
Ellensburg
Ritzville
ADAMS
WHITMAN
Colfax
RAINIER NATIONAL PARK
Raymond
South Bend
Willapa Bay
Centralia
Chehalis
PACIFIC
LEWIS
Cowlitz River
Naches R
Yakima
YAKIMA
FRANKLIN
Pomeroy
GARFIELD
Cape Disappointment
WAHKIAKUM
Cathlamet
COWLITZ
Kelso
SKAMANIA
COLUMBIA
Dayton
Asotin
ASOTIN
Pasco
Prosser
BENTON
WALLA WALLA
Walla Walla
CLARK
Vancouver
Stevenson
KLICKITAT
Goldendale
COLUMBIA RIVER

GLACIAL MAP
OF
MINNESOTA

Compiled by F. T. Thwaites, December, 1941

LEGEND

Outwash in unglaciated areas

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(Thick blue arrows indicate outlets, where known) (submerged moraines outlined)

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Nebraskan drift

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Unpublished

L. M. Gould

GLACIAL MAP OF WISCONSIN

Compiled by F. T. Thwaites, December, 1941

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Unpublished

E. F. Bean, Kenneth Bertrand, A. J. Hanners, J. M. Hansell, F. D. Hole, R. E. Mauphy, L. B. Nelson, F. T. Thwaites

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SOURCES OF DATA

Published

S. G. Bergquist, Frank Leverett

Unpublished

F. T. Thwaites

YALE UNIVERSITY
New Haven, Connecticut

Letter No. 10 November 8, 1941

To members of the COMMITTEE ON GLACIAL MAP OF NORTH AMERICA:
Messrs. Alden, Apfel, Bostock, Capps, Goldthwait, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, Norman, Thwaites, White, Young (and Flint):

1. Chicago meeting.

The glacial symposium held at the University of Chicago on September 26 was highly successful. As many as 125 persons were present, including the following members of our committee: Apfel, Gould, Kay, Leighton, Leverett, MacClintock, Nichols, and Flint. A meeting of the committee was held on September 27; considerable adjustment and clarification were accomplished.

2. Boston meeting.

The program sponsored jointly by the G.S.A. and our committee, scheduled for December 29 in Boston, and described in the current G.S.A. circular, will afford a splendid opportunity for the demonstration of our project and for discussion and criticism of our map on the 40-mile scale. During the G.S.A. meeting our map will be exhibited. Exhibition of certain Canadian sections of the map is already arranged for. It would be ideal if the maps of all of the States could be completed before Christmas and either brought to Boston or sent to me at New Haven. Please let me know on the inclosed postcard, as soon as possible, whether you will (a) bring to Boston, or (b) send to me at New Haven before Christmas, exhibit material, and if so, (c) approximate number of square feet of space you will require. I will provide cellophane for the protection of exhibits.

Let us plan to meet near the Room Clerk's window of the Hotel Statler on Tuesday, Dec. 30, immediately at the close of the morning session, and have lunch as a group. At that time we can arrange for a subsequent meeting of those in Boston if we find such a meeting would be desirable.

3. New Haven meeting.

The next — and probably the last — meeting of the full committee will be held at New Haven on January 17 and 18, 1942, to exhibit and discuss the completed 40-mile maps. Through Dr. Bucher I have obtained $500 from the N.R.C. to defray traveling expenses. As transportation costs are up 5% over last year, and as preliminary indications are that attendance will be even larger than last year, only transportation at the round-trip coach rate, plus meals, and all expenses in New Haven, can be guaranteed. Expenses beyond this amount will be paid pro rata only to the extent of the funds available.

In view of the fact that the N.R.C. is paying our expenses to accomplish an important piece of work demanding group discussion, may I ask that every member attending this meeting consider himself obligated to be present for the full two days?

4. Instructions for completing the regional maps.

The 40-mile maps, as complete as existing information permits, must be in New Haven on January 17-18, so that the Committee can make the necessary final adjustments between adjacent States, adopt regional legend columns, and accomplish

final editing, and so that a Canadian member can take all maps to Ottawa at the close of the meeting, to be transferred to the final base. Our drafting fund of $1000 will be exhausted by June 30. Hence the transfer must be completed before that date. As the time between January 18 and June 30 is very short for so great a task, it is absolutely essential that every compiler do his part to lighten the heavy burden of drafting supervision now carried by Nichols, by rigidly observing these points:

A. Follow the sheet of conventions adopted by the Committee January 19, 1941 (with subsequent additions in committee letters) exactly.

B. Be sure all conventions, especially contacts, are clear and not ambiguous. The draftswoman must not have to stop to ask time-consuming questions.

C. Accompany each map (preferably each separate State) with a legend on a separate sheet, 8 1/2 x 11 inches, arranged as nearly as possible in the order adopted January 19, 1941, and with all colors correct. (See photostatic sample mailed to members last spring.)

D. Place on a separate sheet of the same size the footnotes referred to on the map. These should be carefully worded and very concise. I offer two examples, taken from the compilation for Washington:

① b. Pre-Vashon (Admiralty of Willis?) drift extending locally 7 miles beyond Vashon drift border. Depth of oxidation 7'-10'. Stones have weathered rind 1/8"—1/4" thick.
a. Doubtfully, a still older drift.

② ▲ Type locality of Puyallup interglacial beds (Willis, 1898, p. 145). Sand, gravel, clay (in part marine) and peat. Stratigraphic position = post-Admiralty, pre-Vashon (Wisconsin?). Inferred time interval and climate based on degree of oxidation.

Each interglacial or interstadial occurrence anywhere, and each occurrence of pre-Wisconsin drift in Cordilleran areas, should be footnoted.

E. On each legend sheet list alphabetically (by name of individual only) the sources of information used in compiling the map. List published sources first; then unpublished sources. (See photostatic sample.)

F. The footnotes and sources of information must be grouped by individual States, not by groups of States, in order that they may be printed alphabetically by States on the final map. (Compare the Geologic Map of the United States, 1932.) In this respect the photostatic sample should not be followed.

G. If you wish the names or initials of localities whose names have a glacial-stratigraphic significance (i.e., Mankato; Yarmouth; Altamont) to be included on the base map, bring with you a list of such names, arranged in order of importance, for your region.

H. Gould finds need for an additional color to represent pre-Wisconsin glaciation (undifferentiated). He proposes to use Mongol pencil #853. Will any who find a similar need please use this color?

The cooperation of nearly every member hitherto has been nothing short of superb. If the above suggestions are followed to the letter, we shall accomplish the near-miracle (thanks to the remarkable efforts being put forth in Ottawa) of having our map finished on the final base, ready for inspection and reproduction in due course, on June 30. Anyone familiar with precision drafting processes will know that that will have been a remarkable accomplishment.

Sincerely yours,

Richard Foster Flint

Richard Foster Flint, Chairman

P.S. I have received from the U. S. Geological Survey a copy of the base map of the United States, scale 1:2,500,000, with coastline, drainage, and culture (including railroads) printed in pale blue on drawing paper. Anyone wishing the part of this map that covers his region may have it on request.

Nov. 28, 1941

Dr. S. G. Bergquist,
Michigan State College,
East Lansing, Michigan

Dear Dr. Bergquist:

I was just about to close the books on my part of the glacial map of North America being prepared under directio of R. F. Flint when it occured to me that you had published several maps of the glacial geology of parts of northern Michigan which should be more accurate than the old maps by Leverett. On checking my files and the departmental library I found only maps of Alger, Luce, and Schoolcraft counties which you sent me and in Pub. 40 of the State Survey.

I found a note of another on Iron County which I can get from the main library but it occured to me that possibly there are others of which we have no record. Preliminary check shows considerable differences between your maps and any of Leveretts which are by the way, not all the same. I do not want to send in the job until I have checked all newere sources so will be glad to hear from you on the extent of your work.

Sincerely,

RAILWAY EXPRESS AGENCY

C

INCORPORATED

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1. The provisions of this receipt shall inure to the benefit of and be binding upon the consignor, the consignee and all carriers handling this shipment and shall apply to any reconsignment, or return thereof.

2. In consideration of the rate charged for carrying said property, which is dependent upon the value thereof and is based upon an agreed valuation of not exceeding fifty dollars for any shipment of 100 pounds or less and not exceeding fifty cents per pound, actual weight, for any shipment in excess of 100 pounds, unless a greater value is declared at the time of shipment, the shipper agrees that the company shall not be liable in any event for more than fifty dollars for any shipment of 100 pounds or less, or for more than fifty cents per pound, actual weight, for any shipment weighing more than 100 pounds, unless a greater value is stated herein. Unless a greater value is declared and stated herein the shipper agrees that the value of the shipment is as last above set out and that the liability of the company shall in no event exceed such value.

3. Unless caused by its own negligence or that of its agents, the company shall not be liable for—

- a Difference in weight or quantity caused by shrinkage, leakage, or evaporation.
- b The death, injury, or escape of live freight.
- c Loss of money, bullion, bonds, coupons, jewelry, precious stones, valuable papers, or other matter of extraordinary value, unless such articles are enumerated in the receipt.

4. Unless caused in whole or in part by its own negligence or that of its agents, the company shall not be liable for loss, damage or delay caused by—

- a The act or default of the shipper or owner.
- b The nature of the property, or defect or inherent vice therein.
- c Improper or insufficient packing, securing, or addressing.
- d The Act of God, public enemies, authority of law, quarantine, riots, strikes, perils of navigation, the hazards or dangers incident to a state of war, or occurrence in customs warehouse.
- e The examination by, or partial delivery to the consignee of C O D shipments.
- f Delivery under instructions of consignor or consignee at stations where there is no agent of the company after such shipments have been left at such stations.

5. Packages containing fragile articles or articles consisting wholly or in part of glass must be so marked and be packed so as to insure safe transportation by express with ordinary care.

6. When consigned to a place at which the express company has no office, shipments must be marked with the name of the express station at which delivery will be accepted or be marked with forwarding directions if to go beyond the express company's line by a carrier other than an express company. If not so marked shipments will be refused.

7. As conditions precedent to recovery claims must be made in writing to the originating or delivering carrier within nine months after delivery of the property or, in case of failure to make delivery, then within nine months and fifteen days after date of shipment; and suits shall be instituted only within two years and one day after the date when notice in writing is given by the carrier to the claimant that the carrier has disallowed the claim or any part or parts thereof.

8. If any C. O. D. is not paid within thirty days after notice of non-delivery has been mailed to the shipper the company may at its option return the property to the consignor.

9. Free delivery will not be made at points where the company maintains no delivery service; at points where delivery service is maintained free delivery will not be made at addresses beyond the established and published delivery limits.

Special Additional Provisions as to Shipments Forwarded by Vessel from the United States to Places in Foreign Countries.

10. If the destination specified in this receipt is in a foreign country, the property covered hereby shall, as to transit over ocean routes and by their foreign connections to such destination, be subject to all the terms and conditions of the receipts or bills of lading of ocean carriers as accepted by the company for the shipment, and of foreign carriers participating in the transportation, and as to such transit is accepted for transportation and delivery subject to the acts, ladings, laws, regulations, and customs of oversea and foreign carriers, custodians, and governments, their employees and agents.

11. The company shall not be liable for any loss, damage, or delay to said shipments over ocean routes and their foreign connections, the destination of which is in a foreign country, occurring outside the boundaries of the United States, which may be occasioned by any such acts, ladings, laws, regulations, or customs. Claims for loss, damage or delay must be made in writing to the carrier at the port of export or to the carrier issuing this receipt, within nine months after delivery of the property at said port or in case of failure to make such delivery then within nine months and fifteen days after date of shipment; and claims so made against said delivering or issuing carrier shall be deemed to have been made against any carrier which may be liable hereunder. Suits shall be instituted only within two years and one day after the date when notice in writing is given by the carrier to the claimant that the carrier has disallowed the claim or any part or parts thereof. Where claims are not so made, and/or suits are not instituted thereon in accordance with the foregoing provisions, the carrier shall not be liable.

12. It is hereby agreed that the property destined to such foreign countries, and assessable with foreign governmental or customs duties, taxes or charges, may be stopped in transit at foreign ports, frontiers or depositories, and there held pending examination, assessments and payments, and such duties and charges, when advanced by the company shall become a lien on the property.

To Destination Office: New Haven Conn.

Consignee: Dr Richard Foster Flint

Enter Date Shipped: 12-12 1941

Street Address or Non Agency Destination: Geol Dept. Yale Univ

Receipt Number: Nº 5392

Name of Forwarding Office: (636-P) Madison, Wis. (W)

Pieces	Article	Description	Declared Value	Value Charges
Pe	Maps.		50 —	
			Weight: 2	Express Charges: 30
				Total: 30

Shipper: F. T. Thwaites

Class | Paid Beyond | C. O. D.

Shipper's Street Address: 41 Roby Road

PREPAID (Original)

Scale or Rate | Verified by | C. O. D. Service Charge Write in YES or NO: X

SHIPPER'S PREPAID RECEIPT

(Form 5083)

NOTE—The Company will not pay over $50, in case of loss, or 50 cents per pound, actual weight, for any shipment in excess of 100 pounds, unless a greater value is declared and charges for such greater value paid.

RAILWAY EXPRESS AGENCY

INCORPORATED

Received shipment described hereon, subject to the Classifications and Tariffs in effect on the date hereof, value herein declared by Shipper to be that entered in space hereon reading "Declared Value," which the Company agrees to carry upon the terms and conditions printed hereon, to which the Shipper agrees and as evidence thereof accepts this receipt.

Higgins | Number Pieces: 1 | Hour: 10:10 a M

For the Company

1

YALE UNIVERSITY
DEPARTMENT OF GEOLOGY

NEW HAVEN, CONNECTICUT

November 19, 1941

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

I gladly accept your offer of your map and kodachrome slide for use at Boston. If you will send them to me, together with the separate legend, footnotes and references (which must be separate and arranged by States for editor's and typesetter's copy) I shall retain them, after the Boston meeting, for use at the New Haven meeting on January 17-18.

I have noted your suggestion that Two Creeks might well be included as a place name on the base map.

Yours sincerely,

Richard Foster Flint
Richard Foster Flint

Dec. 13, 1941

Dr. S. G. Bergquist,
Dept. of Geology and Geography,
Michigan State College,
East Lansing, Michigan

Dear Dr. Bergquist:

Thank you for your letter of the 5th. I made changes in Leverett's mapping in the four counties of northern Michigan to accord with you results. My map is on the scale of 40 miles to the inch and the project calls for a completion scale of 60 miles. For this reason little detail can be shown. The manuscript map has been sent to Flint but I fear the completion of the project will have tobe postponed "for the duration". Anyhow, I do not expect to touch it again for some time. I hope my report on northeastern Wisconsin does not have to be put off.

With best regards,

Sincerely,

MICHIGAN STATE COLLEGE
OF AGRICULTURE AND APPLIED SCIENCE
EAST LANSING

APPLIED SCIENCE DIVISION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

December 5, 1941

My dear Dr. Thwaites:

I have your letter of November 28 and in reply wish to say that my glacial work in the Northern Peninsula has been confined to four counties, namely: Iron, Luce, Alger, and Schoolcraft. Several years ago I worked out the surface geology of Montmorency county and last summer did some detailed field work in the northern tier of counties in the Southern Peninsula including Emmet, Cheboygan and Presque Isle counties.

If I can supply you with any material that will be of assistance in your work do not hesitate to call on me.

With best wishes and regards, I am

Sincerely,

S. G. Bergquist

S. G. Bergquist
Head of Department

Dr. F. T. Thwaites, Geologist
41 Roby Road
Madison, Wisconsin

SGB:EK

Dec. 13, 1941

Dr. Richard Foster Flint,
Dept. of Geological Sciences,
Yale University,
New Haven, Connecticut

Dear Flint:

As per yours of Nov. 19 I sent you my map yesterday with Kodachrome slide and three state legends enclosed. Some minor changes ~~were made~~ in four counties of northern Michigan were made after it was photographed. I do not know why I forgot about Bergquist's work but had been assured by Leverett that his work was the best! The missing references are:

Bergquist, S. G., Glacial geology of Iron County, Michigan. Michigan Acad. Sci., Papers, vol. 16, pp. 363-372, 1932

Bergquist, S. G., The Pleistocene history of the Tahquamenon and Manistique drainage region of the Northern Peninsula of Michigan. Michigan Geol. Survey, Pub. 40, 17-137, 1937

I did not know just what you wanted as "references" so will leave final form to you. I forgot to place the name "Two Creeks" on the map but you can do that. It is on the shore of Lake Michigan just at the north line of Manitowoc County.

I followed your directions as well as I could understand them except that I declined to color submerged moraines. Also I do not like the term "undifferentiated" to include all drift other than end moraine. I changed this to "ground moraine, etc."

If the package fails to reach you or is damaged please advise me as soon as possible.

I imagine the completion of the job will have to be postponed "for the duration".

Sincerely,

41 Roby Road,
Madison, Wis.,
Jan. 12, 1942

Prof. Richard Foster Flint,
Dept. of Geology,
Yale University,
New Haven, Connecticut

Dear Flint:

Yours of the 10th is at hand. I do not think I approve of such lengthy notes. They are entirely out of line with notes on moraines, etc which seem fully as important.

The note on Two Creeks is all right except that I have suggested the name Valders for the till above. In his second ppper Wilson suggested that this may be a pioneer flora and not a climax so would mean little about climate.

The Marshfield locality consists of peat or peaty soil under till and resting on sandy clay. Wilson is studying the pollen.

The Woodville locality is described by Leverett(1932) as peat between Kansan and Nebraskan tills. I have not seen this place.

The Faribault, Minnesota, locality is described by Leverett as a mucky soil between Kansan and Nebraskan tills.

The locality near Forest Junction, Wisconsin is exactly like that at Two Creeks and was described by Lawson who was not a geologist but called himself an historian. I have collected spruce logs here but saw no peat. Natural gas was formerly found in these deposits.

I am farid I have not drawn these up just as you wish them but am fighting off an attack of neurelgia (my old enemy of many years standing) tonight while Mrs. Thwaites is at the hospital studying nursing. At first I thiunght I just could not write but feeling a little better tried it. The boys had been using this typewriter hence some of the trouble with it!

I wish you would read my letter before this to the meeting. Sorry I cannot be there but this is the week for students to make out second semester programs. Hole has taken off his tires and battery to save them for field work next summer. I am now preparing a course in aerial mapping for part of a course in military geology. What will be next we do not know but many of the students have left or will soon leave for the war. Shortage of tires will surely curtail field trips but I will try to meet the problems as they come up.

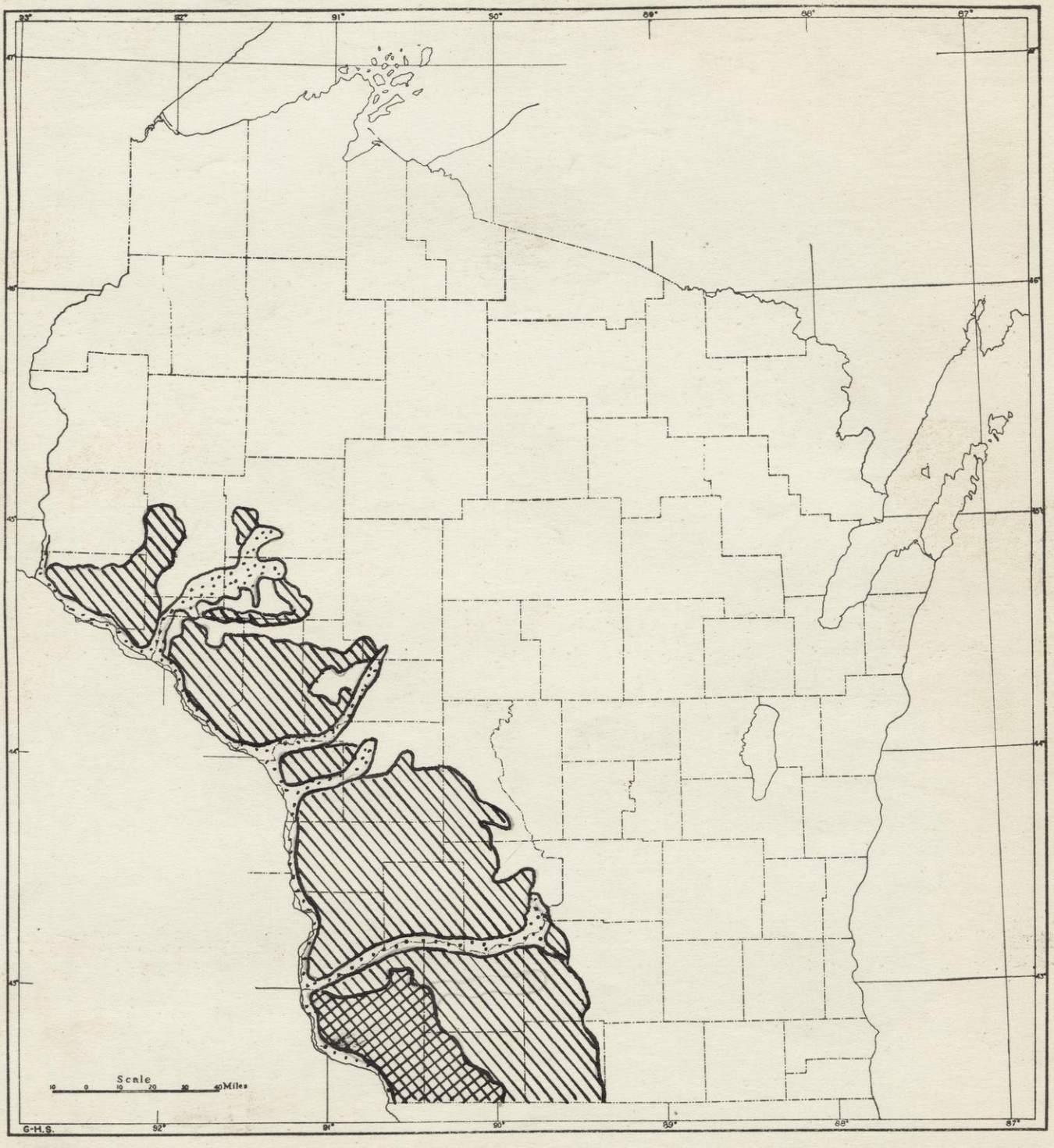
Sincerely,

AA approximate percentage of loess soils in Drift less Area of Wisoonsin

Knox, Clinton, Dodgeville, Dubuque, Tama, Baxter series

County	
Buffalo	47.6%
Crawford	44.1
Dane	17.5
Green	62.1
Iowa	62.9
Jackson	18.9
Juneau	15.4
LaCrosse	44.0
Monroe	62.0
Pierce	41.4
Sauk	28.0
Trempealeau	13.7
Vernon	49.2

No maps for Grant, Lafayette, Richland



ALLUVIAL

LOESS 50% +

LOESS 25-50%

F. T. THWAITES, JAN., 1942

YALE UNIVERSITY
DEPARTMENT OF GEOLOGY

NEW HAVEN, CONNECTICUT

January 10, 1942

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

In reply to your letter of January 6, I think the footnote references to the interglacial or interstadial localities in Wisconsin ought to be phrased by you so they will meet with your approval. I suggest the type of wording used in other footnotes recently submitted:

1 At Two Creeks: silty peat, overlying Cary drift and overlain by Mankato(?) till, and including remains of Picea, mosses, and aquatic mollusks. A climate colder than the present climate is suggested. (Wilson, 1932).

Will you please supply, before the 17th, footnotes for the four localities (including the one not described in detail)? I will draft the corresponding numbers on your map.

I will lay before the Committee next week your views on the continuation of the Committee's work, and will report the reaction to you.

Sincerely,

Flint

Richard Foster Flint

Jan. 12, 1942

Prof. Earl T. Apfel,
Dept. of Geology and Geography,
Syracuse University,
Syracuse, New York

Dear Apfel:

Yours of the 8th and enclosed map are at hand. Today I compiled the enclosed map with aid of Bean and Hole. It is based on the general soil map of Wisconsin by Whitson with some alterations by us. The quantitative estimates of area covered by loess are very crude guesses. I left out the area of Colby (Spencer) soils which contains considerable loess on the ground that it is probably less than 25 percent. You must realize that there is so much hillside and valley bottom in the Driftless Area which greatly reduces the proportion underlain by loess.

I note that your map in Iowa is much less detailed than that by Marbutt. I have myself seen areas south of Des Moines which have no loess. Also I though that there is no loess on the Mankato drift. Would it not be a good idea to also show sand dunes especially those of the Great. Plains.

Sorry, the the authorities will not allow me to go to New Haven. This is the week for students to make out second semester programs. Anyway, I am strongly urging the postponement of the map "for the duration"

Sincerely,

SYRACUSE UNIVERSITY
SYRACUSE, NEW YORK

DEPARTMENT OF
GEOLOGY AND GEOGRAPHY
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EARL T. APFEL
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JAMES E. MAYNARD
JOSEPH A. RUSSELL
JOHN G. BROUGHTON

January 8, 1942

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

Dear Thwaites:

Herewith is a copy of a manuscript map showing the distribution of the loess deposits in the middle west. It is in error in some parts, and I suspect you can provide corrections for the distribution in Wisconsin on the following basis.

The areas which are covered to an extent of half or more with loess are to be indicated as having general loess cover. Any area where two loesses are found superimposed are to be separately indicated. Of course the boundaries must be somewhat generalized, and small areas will probably have to be omitted in order to give the map uniform value in different parts.

Such comments as you care to make on the mode of representation or the basis for the separation of different loess characteristics will be appreciated.

I look forward to seeing you shortly at New Haven.

Sincerely
Earl T. Apfel
Earl T. Apfel

eta/rsp

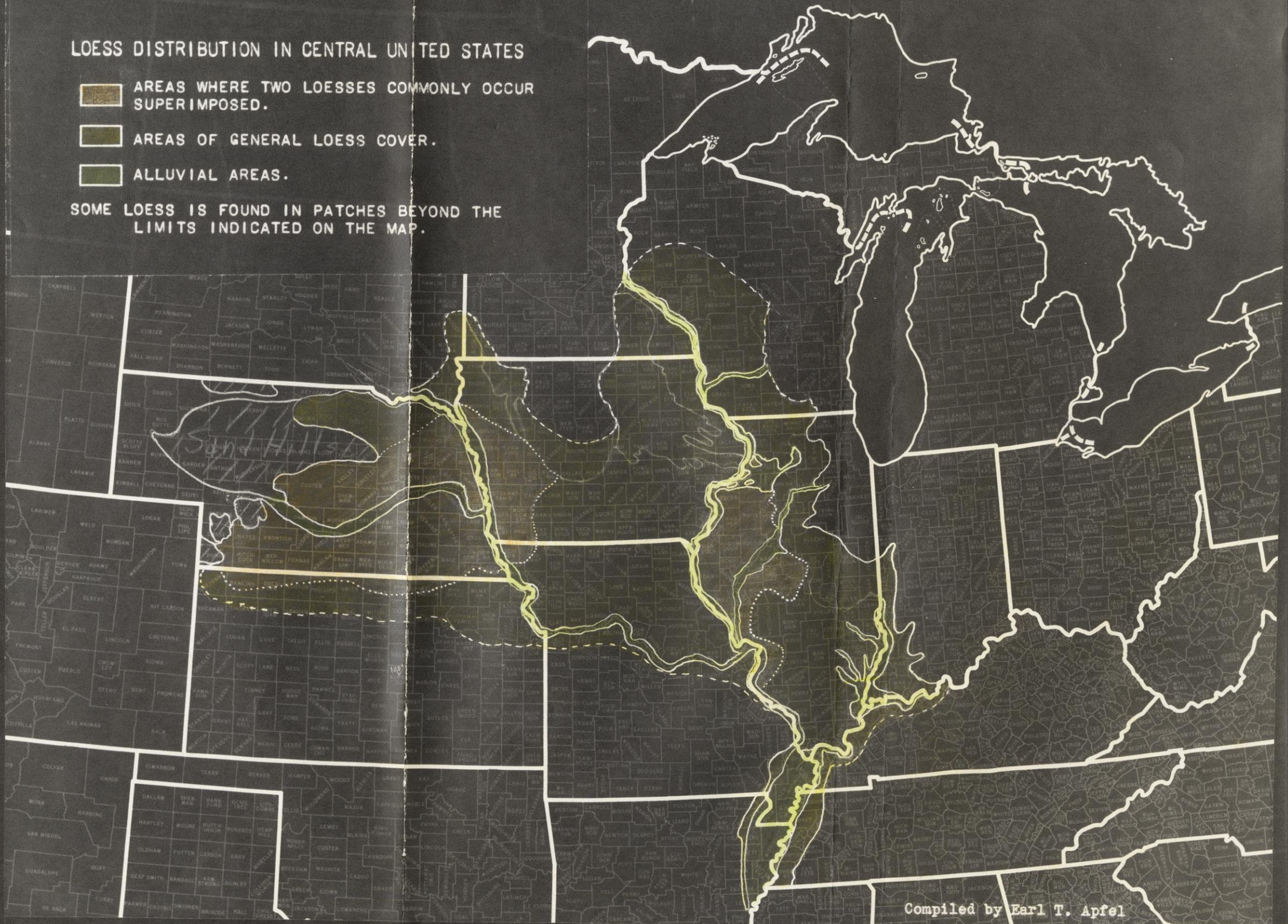
LOESS DISTRIBUTION IN CENTRAL UNITED STATES

AREAS WHERE TWO LOESSES COMMONLY OCCUR SUPERIMPOSED.

AREAS OF GENERAL LOESS COVER.

ALLUVIAL AREAS.

SOME LOESS IS FOUND IN PATCHES BEYOND THE LIMITS INDICATED ON THE MAP.



Compiled by Earl T. Apfel

YALE UNIVERSITY
DEPARTMENT OF GEOLOGY

NEW HAVEN, CONNECTICUT

December 23, 1941

Mr. F. T. Thwaites
41 Roby Road
Madison, Wisconsin

Dear Thwaites,

Your letter of December 13, and the package containing map, legends, and slide have reached me safely. The map certainly looks impressive, and ought to make very legible copy for the draftswoman in Ottawa.

You will have noted from page 4 of the G.S.A. program that all my attempts to get a paper on the East-central States read were frustrated. However, your kodachrome slide looks so well that I am going to have it inserted in one of the other papers, just for display effect, with the statement that none of the authors was able to be present to explain it. I hope this will meet with your approval.

The legend sheets for the individual States are very helpful, and will aid correlations with adjacent regions at our meeting in January.

The drafting of the final manuscript map is proceeding steadily in Ottawa, and there is every reason to believe that it will be substantially completed by June 30 and that final editing and publication will follow in due course without any serious delay that we can now foresee.

I am really very sorry that you can not be in New Haven on January 17-18 to give us the benefit of your opinion on many matters that are certain to arise. Perhaps you can help us by letter on some points that will become defined at the meeting.

With best Christmas wishes,

Sincerely,

Richard Foster Flint
Richard Foster Flint

P.S. Will you send me, as soon as convenient, copy for the footnote explanations of the interglacial or interstadial deposits shown on the map but not included on the legend sheets? (See my Letter #10, p. 2).

THE UNIVERSITY OF WISCONSIN

To Professor F. T. Thwaites Madison, Wisconsin 10 January 1941

Your request to be absent from Madison from January 17 to noon, January 20

is approved.

(Signature) J. C. Bellenger
Dean.