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Correspondence re: Sparta-Tomah. 1917-1932

Thwaites, F. T. (Fredrik Turville), 1883-1961
[s.l.]: [s.n.], 1917-1932

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C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WASHINGTON

May 20, 1932.

Dr. W. H. Twenhofel, Chairman,
Division of Geology and Geography,
National Research Council,
2101 Constitution Avenue,
Washington, D. C.

My dear Doctor Twenhofel:

In accordance with the conclusions reached in the conference in my office this morning in which you, Colonel Martin, ^{and} Doctor Mansfield have participated, I am holding the manuscript on the Sparta and Tomah quadrangles, Wisconsin, subject to Colonel Martin's call. I understand it to be your desire, and the desire of your coauthors, to bring this manuscript up to date in a number of respects and to resubmit it to the Survey, when your revision may have been completed, for publication as a bulletin. This form of publication will give you more latitude than the folio form originally contemplated and will enable you to treat more fully such elements of the problems presented in the area, as in your judgment require fuller treatment than has been given them in the existing manuscript. I understand that since the original submission of this manuscript a certain amount of new material has come into your hands and perhaps somewhat different interpretations of facts already in hand may now be desirable.

With the manuscript, you will find comments made by those who have read it in its original form. You will give these comments such consideration as is appropriate, will utilize in your revision those of them that in your judgment are constructive and helpful, and naturally, as would any other author, disregard such as you, with your detailed knowledge of the region, find yourselves unable to accept.

If, after you have completed your revision, you desire, everything considered, to resubmit the manuscript to the Survey for publication as a bulletin, the Survey will be glad to receive it and to consider the possibility of its publication under the conditions that exist at that time.

Yours very cordially,

(Signed) W. C. Mendenhall
Director.

*This letter was never
finished - matter taken up
in conversation*

Prof. A.C. Trowbridge, Univ. of Iowa,

Dear Sir: I wish to thank you for the copy of your report on the erosion history of the Driftless Area. Since the departure of Major Martin from this state the work in that area has devolved upon me. As I have seen a great deal of the area and mapped parts of it in great detail I think I am justified in offering some criticisms of your paper.

I was much pleased with your discussion of the
~~One of the first things that strikes me is the matter of meanders.~~

It does not seem to me that entrenched meanders mean anything but that ^a the stream once had a broad floodplain and a less grade than at present.

~~This does mean two cycles of erosion but it does not prove a peneplain.~~

I have been thinking also about
~~Then too there is the matter of the comparative sizes of the supposed~~ ^{some} ~~meanders~~

intrenched meanders and those of the present stream. Many supposed cases of intrenched meanders seem to me to be entirely out of proportion

to the present stream. If they are really meanders this would seem to prove stream diversion. ~~XXXXXXXXXXXXXXXXXXXX~~ ~~The bends of Kickapoo River~~

~~do not look much like meanders to me nor does the bend near Benton.~~

With regard to the structure map on p. 59 I do not at all agree that there is an anticlinal axis near Galesville. The hypothetical contours north of that point ^{do not agree with my observations} ~~are entirely wrong.~~ At Fairchild, for instance, we actually are in the Eau Claire shales where the map would put the Lower Magnesian at the ^{at} ~~same~~ elevation. Throughout Trempeleau County the base of the limestone is at from 1150 to 1300 feet elevation. There are many previously unknown areas of that formation even as far east as Jackson County. There is a bend in the contours ^{it is true but} ~~no such pronounced axis as your map suggests.~~

I do not like the term "flat" as applied to the rolling uplands underlain by limestone. In hundreds of miles of travel on these uplands I have never seen more than a few square rods which are ^{literally} ~~truly~~ flat.

Very similar topography can be seen on the so-called Sparta Plain or ~~as it is known to us the~~ Franconia upland and even flatter areas are found on the two benches on the Eau Claire shales. The influence of shales in producing flats is a thing I never have seen fully recognized in text books. I think it works in two ways: first the shale acts as a roof protecting the rock below from percolating waters and second ^{washed} by holding ground water serves as a local lower limit to wind erosion. ^{hatched}

May not the shale flats of Illinois be of somewhat similar origin?

I object very strongly to the assumption that the Franconia upland is a peneplain. Shipton evidently did not know its true extent. It is present as a shelf all along the front of the western upland from Kilbourn to Chippewa River and also in every valley cut through the limestone to its horizon. In the Kickapoo valley, for instance, it is present as a bench down to near Readstown where the top of the Dresbach dips beneath water level. It is not present near Prairie du Sac for we have another formation, the Mazomanie replacing the Franconia ^{east of} ~~from~~ near Richland Center ~~east~~. The Mazo ^{is} is a cliff-maker and gives rise to quite different topography than does the softer Franconia with the micaceous shale at the base. The Franconia upland is well developed throughout Jackson and Trempeleau counties and ⁱⁿ ~~at~~ the eastern ^{line} outcrop of the formation locally exceeds 1400 feet elevation. It is a true structural plain since it fingers out along valleys which run back into the higher hills capped by the Lower Magnesian.

It seems to me that the test ^{of the peneplain} must ~~resort~~ in finding a break in slope between the upland ^{or} rolling ground as it is locally known by the inhabitants, and the steep sided valleys, which is not due either to the presence of hard layers or to the recency with which the stream has cut through to a soft stratum below. There ^{is} ~~are~~ certain evidences of such a break or topographic unconformity in ~~the~~ Sparta quadrangle where in the southwestern part the limestone sandstone contact is not at the

break in slope but some distance above it. It is to be noted, however, that the "clinkstone" at the top of the Madison is here absent, so that the shoulder on the hill may be due to ^{the} certain hard layers of dolomite above the cherty and porous base of the Lower Magnesian.

It would seem that this question should be further investigated. With regard to the ~~supposed~~ beveling of the formations by the upland surface I think it very ^{unfair} misleading to compare the thickness of limestone on a mere crag such as Castle Rock with that on a broad ridge. Must not the narrower area have been lowered more than the wide one in the same length of time?

The strata farthest from the cresta must have been more reduced by solution and erosion than those recently uncovered over

Another point is the ^{do not think} ~~so-called~~ wedges of weak strata between the cuestas. I ~~deny~~ that your diagram on p. 70 ^{shows} is what should be expected under conditions of a single erosion cycle. The soft ^{strata} recently uncovered by the recession of the hard layers are not removed at once but must persist for some considerable time thus forming a wedge.

Both Martin and I were over the Cashton-Prairie du Chien ridge and thought that there is a definite escarpment at the base of the Trenton.

The Lower Magnesian upland continues on the spurs on both sides of the Trenton upland as far south as ^{it extends} the formation reaches above stream level.

We also traversed the ridges from Tomah to Lime Ridge and ^{Tomah} to ~~XXXX~~ La Cross^e. I could never see any basis to consider the lower parts of these limestone capped ridges as belonging to a different plain than do the high parts. I take it that your evidence of an ~~inter~~ ^{inter} cuesta plain, or rather series of plains, rests almost wholly upon the fact that these areas are susceptible of having a plain passed through them.

I wish to raise the question however, of the validity of this assumption. It is natural for everyone to exaggerate the importance of differences in elevation as compared with horizontal distances, mainly because of the effort necessary to climb hills. In a country of low relief is it *not*

It is true that the thickness of residuum
is slight on the Galena-Trenton but it is
not on the more cherty Lower Magnesian. Well
records in the Sparta-Tomah area show 30 to
75 feet of broken up rock and residual clay.

Another point is the so-called wedges of weak strata between the
been now reduced by weathering. These were recently examined over
same length of time? The strata farther from the center must have

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It is natural for everyone to exaggerate the importance of differences
in elevation as compared with horizontal distances, mainly because of
the effort necessary to climb hills. In a country of low relief is it

For

geometrically possible to ~~have~~^{fit} an imperfect plane ~~through~~ almost anywhere? Another point I wish to raise is whether or not one can assume that any old plain could have survived the known warpings of Pleistocene time without being so changed as to be nearly unrecognizable? I wish to suggest, that some of the anomalous stream courses may be due not to two ^{worn} cycles but to persistence of the stream through a period of warping. It seems reasonably certain that all the uplift or warping did not take place at one time.

In your computations of the thickness of the eroded formations I do not think you are justified in assuming a uniform thickness over the wide areas from which some of them have been entirely removed. The thickness maps I have prepared for eastern Wisconsin and for the Sparta-Tomah area show rapid ^{and considerable} variations. The former existence of similar variations in the now eroded areas would ^{alter} throw many of the conclusions, sadly ~~out of joint~~.

The upland gravels (Windrow formation) are certainly a point in favor of the Dodgeville plain. They were ~~in fact~~ unknown to Martin when he wrote Bulletin 36. I have a paper, written in collaboration with Mr. Twenhofel, on these gravels ~~which is now in press~~. In it we have concluded that the ^{gravel} formations do not in themselves ^{have} mean a peneplain, ~~though~~ ^{however,} they do suggest two cycles of erosion. They could, ^{though} however, have originated through the normal shifting of divided during erosion. The figures I had ~~strongly~~ suggest that the surface on which the gravels rest declines to the ~~west or~~ southwest in the direction of the Iowa Cretaceous areas. I doubt, however, if in the case of such gentle slopes ^{that} one can safely draw any conclusion as to ^{beveling of other formations} the ~~direction of slope~~. To extend the Dodgeville plain to Texas seems to me most hazardous. On a ~~natural scale cross section~~, even supposing there has been no warping, one ~~could not possible tell the relation of two plains at such a distance~~

I am interested in your conclusion with regard to the high level terrace gravels but cannot agree with the explanation. In the first place ^{would not} this hypothesis ~~would~~ require the Wisconsin valley to have been a hanging valley above that of the Mississippi. ^{How} ~~There~~ ^{There otherwise} could have been ^{other} no relatively sudden removal of a limestone barrier at Bridgeport ~~but~~ ^{instead of} simply a migration of the limestone-sandstone boundary ^{down stream}. Furthermore, the terrace gravels are by no means confined to the area ^{mentioned} you have seen them in. Shipton overlooked large deposits in La Crosse valley and ^{small areas} scattering remnants are found in all the valleys to the north of that. I worked ~~all~~ last summer on this question and reached the conclusion that the gravels are the remnants of pre-Wisconsin outwash and the resulting ~~non-glacial~~ aggradation. ^{in the tributaries.} I think that the rock bottoms of the valleys were at that time considerably higher than immediately before the Wisconsin epoch though ^{some} most of the terrace remnants rest upon shelves that are due to rock structure. ^{many} Some of the rock terraces, however, cannot be thus explained and there are few or ^{if} any cases of stream diversions as are so commonly the result of deep valley filling.

In the matter of the age of the Driftless Area valleys I ~~also beg~~ to ~~differ~~ though I have not had as good an opportunity to study their relation to the older drifts as you have had. A comparison of post-Wisconsin erosion with the time necessary to make the ^{Driftless area} valleys and the far more impressive Central Plain of Wisconsin shows ~~at once~~ that the time since the last ice was ^{very slight} ~~a mere nothing~~ compared with the long period which made valleys 800 feet or more in depth in rock and stripped off the strata entirely from thousands of square miles. Now the question comes of the relation ^{to} of the older drifts. ~~It is admitted~~ ^{that} that the Kansan drift also rests upon the deeply eroded surface of the rocks. How much older then is the pre-Kansan? If the latter is pre-valley in age it would have to be ^{at least} ~~a~~ thousand times as ancient as the Kansan.

Does this seem possible?

either
 If this were the case, ^{no} pre-Kansan would ^{have} survived over large areas or we would have to assume that erosion was much more active in the Mississippi valley than in the Missouri. Furthermore, there is the fact that very old drift enters the Central Plain area of Wisconsin. Unfortunately the study of this area has never yielded any definite evidence as to the age of this drift. On the whole, I am inclined to agree with Leverett on the question of the age of the valleys.

In conclusion I would like to say that I dislike raising a controversy and have therefore suggested postponement of the report on the Sparta Tomah area until you had published your report, so that we could refer to it and give both aspects of the question. I think you have made out a case for the Dodgeville plain which is a thing I have always been ready to admit, but I am not ready to believe ^{accept} in the lower plain or in the Pleistocene age of the valleys.

~~not~~ I trust you will not be offended by the freedom with which I have pitched into your hypotheses. It is only by shooting holes in theories that we can progress. If you do any more work in the Driftless Area I would be glad to meet you in the field and go over some of these things more fully than could be done by letter.

Why should Cassin ledge survive?
 it is close to a big river

Paleozoic rocks aside from these, are all composed of quartzite. They comprise North Bluff near Grand Rapids, Necedah, and Baraboo Bluffs, and low hills near Waterloo. The Baraboo Bluffs are largest, being about thirty miles in length and reaching a height of 1400 feet above the surrounding Pre-Cambrian.

Still larger quartzite ridges are as yet completely buried in the Paleozoic rocks. It has been known for over twenty years that quartzite was found in the horizon of the "Galena-Trenton" limestone at Hartford. In 1918 a set of samples taken every five feet was presented to the State Geological Survey by the city authorities. The results of the examination of these are given in Fig. 4. It is now known that nearly if not all of the wells in the area bounded by Waterloo, Fond du Lac, Chilton, Menominee Falls, and Delavan strike Huronian rocks, either slate, iron formation, or quartzite. The topography of this old surface is very irregular, and the only known ^{Huronian} outcrops are those near Waterloo on the west side of the area. The quartzites make a veritable buried mountain range ^{rather a series of ranges} (Figs. 1 & 5) which runs in general parallel to the Lake Michigan basin. The term "Waterloo Range" is proposed ^{for the entire group} since the only known outcrops are near the village of that name. The highest points at Waterloo rise to an altitude of over 800 feet above ~~the~~ tide, this

Tabular outline for Geological Bulletin

Interpretation of quartzite

The Stratified Rocks.

comprise North Bluff near Grand Rapids, Necedah, and Baraboo Bluffs, and

~~low hills near Waterloo.~~

The Baraboo Bluffs are largest, being about

low hills near Waterloo. The Baraboo Bluffs are largest, being about

thirty miles in length and reaching a height of 1400 feet above the

The great erosion interval

surrounding Pre-Cambrian

Still larger quartzite outcrops are scattered in

Relation of erosion forms to which

the Paleozoic rocks. It has been known for over twenty years that

Possible basis on which - the Wisconsin formation

quartzite was found in the horizon of the Galena-Trenton limestone

glaciation effects of

at Hartford. In 1918 a set of sandstones every five feet was pre-

The older terrace

presented to the State Geological Survey by the city authorities. The re-

younger valley fill & loess

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The future -

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Appendix

Detailed sections of Palmyra & Waterville

Fond du Lac, Chilton, Menominee Falls, and Delavan strike horizontal rocks,

Evolutionary geology

The topography of this old

surface is very irregular, and the only known outcrops are those near

Waterloo on the west side of the area. The quartzites make a veritable

buried mountain range (Figs. 1 & 2) which runs in general parallel to the

Lake Michigan basin. The term "Waterloo Range" is proposed since the

only known outcrops are near the village of that name. The highest points

at Waterloo rise to an altitude of over 800 feet above the tide, this

Structure map p 59 -
Scale wrong - should be smaller than $\frac{1}{2,000,000}$

→ Error

The uplands - flat?? - limestone over - shale -
the shale of Eau Claire - Mag. near Galena etc.

Exaggeration of vertical relief.

Baraboo qtz - question of peneplanation? p 65

unreliability of dip deps on warped gently sloping
plane

Wedges of soft strata - p 83

relation to folds. p 77 - size of the folds exaggerated

Residual on upland p 73

Thickness of eroded rock unknown pp 74-75

Projection of Tertiary plane ??? pp 80, 83

Basin of Cretaceous p 83 ?

Spartan plain p 85 - known to be structural.
along river = L. m upland. - cite Carleton St. toward

Dip N of arch is wrong p 97

Post stream warping?

So called entrenched meanders are too big for
streams. Meanders do not occur peneplain. Streams
downs shown without scale. Part of woodedness due
to Pleistocene fill.

p 110 - Inglewood but untenable - W. R. over a hanging
valley. Rint of gravels.

p 124

age of peneplain - drift in valleys - central plain

Notes on Troubridge paper

tray for cards

81
71
78

1220 (70)

WAR DEPARTMENT
OFFICE OF THE CONSTRUCTING QUARTERMASTER.
Sparta, Wis.

November 7, 1917.

Mr. F. T. Thwaiter,
University of Wisconsin,
Madison, Wis.

Dear Sir:

Yours of November 1st. duly received. With reference to the Barometer, I will return same by express to-day.

I made several test of the wells but did not get as exact data as I would have desired. There is no doubt however that the rate of flow varies inversely with the height of Barometer.

Since you were here we have sunk another 8" well about 600 ft almost due west of the new pump house. The head of this latter well is about 9' above the ground at that point, and the flow is considerably greater than the first 8" well. The combined flow of the three wells is now about 400,000 gallons per day, so you see we have a good water supply. We have installed a 300 G.P.M. pump and the flow is great enough to supply it without suction on the wells.

Thanking you and Prof. Martin for the courtesies shown me,

I am.

Frederick L. Buck
Major Q.M. Corps.

N.B. Have just been ordered to a southern station and will leave in a few days.

Nov. 9, 1917.

Major Frederick L. Buck,
Constructing Quartermaster,
Sparta, Wisconsin.

Dear Sir:

Your letter of the 7th and the barometer have been received. Was very glad, indeed, to get your conclusion that the flow of the wells is effected by the barometric pressure. We have worked out that the source of the artesian water is not far distant, being beneath the hills to the east.

I would like to know if you saved any samples from the new well. I sent you some sacks, but if they were not used I would like very much to have them returned, if it is not too much trouble.

Very truly yours,

RTT/LMV

THE UNIVERSITY OF WISCONSIN
MADISON

DEPARTMENT OF GEOLOGY

July 5, 1918

To whom it may concern:

This envelope contains material prepared by F. T. Thwaites for a Folio describing the Sparta and Tomah Quadrangles. This work was started in 1916 under the direction of Lawrence Martin and carried on in 1917 by W. H. Twenhofel and the undersigned. The bulk of the field notes ^{for 1917} are in the possession of W. H. Twenhofel, who has also prepared a rough draft of the portion of the folio devoted to stratigraphy. Some notes are in the possession of Lawrence Martin; they deal almost wholly with the physiography of the area.

The enclosed material consists (1) of a manuscript of the introduction and sections on stratigraphy of Pleistocene deposits and Economic geology. There are also a tentative outline for a full report and lists of contemplated illustrations. (2) field maps, sections of exposures, and miscellaneous data, like the blue prints showing the discharge of La Crosse River and some streams with which it was to be compared.

The material outside of the envelope consists of three of my note books for 1916 and one loose-leaf book for 1917. The large geological maps are in a separate folder in the Planfile. Notes with regard to more field work on the dunes and terrace gravels are on the Pleistocene Geology map. Some of the culture changes noted on a separate map need more exact measurements than I made.

The entire east edge of the Sparta Quadrangle must be reengraved to make it fit the adjacent sheet. *The records of new wells at Cashon now being drilled should be considered.*

It was also my intention to do more work on the correlation of the terrace gravels and on the relation of the terraces to those of the Mississippi Valley.

F. T. Thwaites

DEPARTMENT OF GEOLOGY

GEORGE F. KAY
ARTHUR C. TROWBRIDGE
ABRAM O. THOMAS
RALPH W. CHANEY
JOSEPH J. RUNNER

JOHN CARVILLE, PHOTOGRAPHIC ASST.

THE STATE UNIVERSITY OF IOWA
IOWA CITY

Spartan Tomah

December 9, 1920.

Dr. F. T. Thwaites,
Science Hall,
The University of Wisconsin,
Madison, Wisconsin.

My dear Dr. Thwaites:

I am pleased to send to you under separate cover a copy of my paper on the erosional history of the Driftless area, as requested in your letter of the 6th. I am also sending a copy to Mr. Guy H. Smith.

When you have read this paper I shall be glad to receive your criticisms, especially in case there are points on which you do not agree with me.

Very truly yours,

A. C. Trowbridge

Trempealeau Wis Oct 15th 1920

Mr. L. J. Thwaites

Madison Wis.

Dear Mr. Thwaites.

Your of the 13th was received yesterday, and I am sending herewith that one of the two or three articles I have written on the subject which I consider most comprehensive, though not the one originally sent to Prof. Chamberlain. I am also sending my printed articles under separate covers.

I had in mind to send them when I returned from Madison but found much awaiting me, which has kept me rather busy.

In some years past my attention has been concentrated quite largely on the Pleistocene history of the region. It is a study of growing complexity, and while certain elements of the history seem reasonably well established, the history as a whole is still far from clear.

It is along this line that I should like more particularly to broaden my field of observation. I am planning during the winter to write an

where in which I shall endeavor to
state the problem. Such a statement
may be an aid in reaching a solution.

As to the age of the deposits described in
the inclosed article I am as yet in doubt.
I believe they antedate not only the late
but the early Wisconsin. But they certainly did
not stand at the beginning of the Pleistocene
history of the region.

I am wondering if Mr. Bennett's report on
this region has been issued. If so I failed to
see the notice I am rather anxious to see it.

Hoping that another season I may have
the pleasure of meeting you in Temperance
Sumner.

Very Truly Yours,
G. A. Smith.

Status of work on Sparta and Tomah Quadrangles, Jan., 1921.

The original plan of the work on the Sparta and Tomah Quadrangles was to have the field work done jointly by Martin, Twenhofel and me. A folio was then to be published by the U.S.G.S. under contract which expired some time in 1917. This folio was to be written jointly. The State educational bulletin was then to be written by Martin alone basing his work largely on the folio. I am not sure if anything on the fossils was contemplated but rather think not. Martin's ms. outline for this report according to my recollection was devoted mainly to a detailed description of the topographic features of the district, not to principles.

The portions of the folio originally assigned to Twenhofel and me have been advanced to the second copy. A few illustrations are partly prepared. The ^{final} areal maps have been barely started. Martin's part has been written by me in first draft. No start whatever has been made on the State report.

Field work still needed comprises: (1) completion of mapping of sand dunes and gravel terraces, (2) further well data, and (3) revision of unsatisfactory work by McKay. I estimate that two weeks will be needed for this work although possibly less time will suffice.

I urge the immediate completion of this work for the following reasons: (1) The area is a type of a large part of western Wisconsin, (2) if further delayed the persons who did the work will still further lose interest or some may be unable to go on with the work, (3) a considerable sum has already been expended and it will not take so very much more to get something out of this whereas at present no value has been received from the expenditure.

F. J. Hawley
Jan. 20, 1921

Status of work on Sparta and Trench Quarries, Jan., 1921.

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J. C. Swanton
Jan. 20, 1921

Sparta-Tomah Folio

Two 15' Quadrangles.

Geography

Geology, topography, drainage, climate, etc.

L.M.

Descriptive Geology

ProCambrian

L.M.

Paleozoic

WHP & PTT

Quaternary

LM

Structure

PTT

Geological History

ProCambrian

LM

Early Paleozoic

WHP

From St. Peter to Quaternary

LM

Quaternary

LM

Economic Geology

Building Material

PTT

Road Material

PTT

Water Resources

PTT

Soil

LM

Forests

LM

Human Geography

LM

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Jan. 20/1921

Feb. 23, 1921

Major Lawrence Martin,
State Department,
Washington, D. C.

Dear Martin:

I have just come across two large
drawers filled with maps which are your
personal property. If you will kindly
advise me what disposition to make of these,
I will endeavor to take care of them.

Sincerely yours,

FTT:JF

March 24, 1921.

Major Lawrence Martin
State Department,
Washington, D. C.

Dear Mr. Martin:

I have ready the manuscript of the Sparta Tomah folio with the exception of the part by Mr. Twenhofel, also copies of the geological map. If you are in a position to do any work on this within a month, I will send the same to you, but do not wish to lose the use of this material for an indefinite length of time if you are unable to work on it.

I received no reply to my letter of February 23 asking what disposition I should make of two large drawers of maps which I found in the lower hall. You doubtless overlooked these at the time of your visit Christmas. Unless you let me know to the contrary, I will box them up and send them to the storage warehouse with the rest of your property.

Trusting you are better and able to work on the Sparta area, I am

Very truly yours,

FTT-M

Geologist



DEPARTMENT OF STATE
WASHINGTON

April 4, 1921.

Mr. F. T. Thwaites,
Wisconsin Geological Survey,
Madison, Wisconsin.

My dear Thwaites:

I write to make a very belated acknowledgment of your two letters. My work in the State Department is much of it new and always urgent and I have been ill a great deal of the time since January, but this is no adequate reason for not having acknowledged your letters and I hope you will pardon me.

Thank you for sending me a copy of your paper on the gravel seam at Ripon. It appears to me to be an exceedingly good presentation of the problem and I congratulate you upon it. I was also interested in the map problem you have given your Glacial Geology class. It is very specific and not too difficult and has the advantage of bringing your students face to face with exactly the sort of interpretations that they must learn to base upon data gathered in the field.

I should be glad if you would be good enough to look over the maps in the two large drawers and to separate them into three sets. I would like to have you send me all the maps dealing with Glacier Bay, looking out especially for some manuscript maps or plane table sheets made by Professor Reid in 1890. The second group of maps you might sort out includes those bearing upon the geology and geography of Wisconsin, which you would like to retain in the Department of Geology, together with any other maps such as Coast Survey sheets which might be of use in instruction there. I should be glad if you would send me a list of the maps which you select for this purpose. The balance of the maps in these two drawers might be packed and go to the warehouse where my books are stored. Mr. Flick knows where these books are. I am afraid this will put you to a great deal of trouble but if you would be good enough to do this for me, I shall be greatly indebted to you.

I was very glad to learn that you have completed the draft of the manuscript of the Sparta-Tomah folio and of the geological map to accompany it. If you will send this to me at Room 381, State, War and Navy Building, by express, insured,

insured, I will go to work on it at once. I am glad that this folio is to be published soon. When do you anticipate that Professor Twenhofel's manuscript will be ready?

With warm regards, I am

Very sincerely yours,

Romane Martin

~~Glacier Bay~~

Levert's map of Merr.

Gettysburg maps

List of PT & Shumagin exercises

West route

Latoche Passage

Oiler Bay 3 copies

Gaitnean Channel

Tongass Narrows

Bays & harbor in SE Alaska

Lake Bay & approaches

Pr William Ed ^{4 copies} ~~Mopis~~ (diff scale) 8515, 8550, 8520, 8519
vvv

Revillagigedo Channel

Yakutat Bay 2 copies

Controller Bay 3 copies

PT Valdez 2 copies

Wrangell Strait

C St Elias to Shumagin Ids. 2 copies

Cook Inlet

Oiler Bay

April 7, 1921.

Major Lawrence Martin,
Room 381,
State War and Navy Building,
Washington, D. C.

Dear Mr. Martin:

I was glad to get your letter of April 4. I trust that you are better now and able to work. In regard to your maps I have gone through all that I can find and do not find any on Glacier Bay except some of the published charts. I have taken out some of the charts which were not marked and I am inclosing a list of them and a few other maps which I have kept out. If you want any of these, I will send them to you or include them with those which I will pack up.

I am sending under separate cover by registered mail my manuscript of the Sparta and Tomah Report. The portion by Mr. Twenhofel is not yet done. We have not written anything on the description of the Windrow Formation, but I think we can lift that from the paper on it which will soon be out. The section on peneplains needs entire revision. It was written by me in 1917 when I had not seen Trowbridge's paper. I am inclined to think that he has something of a case for the upper plain, but his statement that the Cashton - Prairie du Chien ridge levels the strata is not as conclusive as he thinks. I had Mr. Smith go over this at Christmas and we found that the usual escarpment is confused by high Pre-St. Peter hills of the Lower Magnesian. The point which supports Trowbridge's view, but which he did not make use of, is the break in slope in the Lower Magnesian which is noted in the southern part of the Sparta Quadrangle. That and the occurrence of the gravels are, I believe, the best evidences found within our area. I have no cognizance at all in his so-called Sparta Plain on the Franconia sandstone. He stated that this plain could be followed across the formation from Sparta to Grand Father Bluff at La Crosse. We know that this is not true, but that instead one can follow the plain at Portland through to the top of Grand Father Bluff. I think it would be well to tabulate these evidences and take them up separately so as to give a fair treatment to both sides of the argument. The fact that

L.M...2.

there is no topographical unconformity between uneroded areas on top of the hills and the erosion lines along the valleys is a point which should be brought out. Furthermore it should be emphasized that the old idea of the peneplains has now been abandoned and that Trowbridge's conception is of a plain which beveled the tops of the cuestas. This is quite different than the view put forward by Grant or Hershey.

When Dr. White of the U.S.G.S. was here, he suggested that the idea of a folio be abandoned and that the report be published as a bulletin. I think that this would be a good idea as it would allow somewhat more extended and freer discussion on the problems.

I am inclosing also the copies of the maps of the Sparta and Tomah area. These copies were made for road material purposes and hence are not complete. They do not show the Jordan sandstone or the St. Peter sandstone. I have not completed the field map of the Pleistocene formations, but can send you the preliminary map if you wish. I will try to get Mr. Twenhofel's manuscript to you before long.

We would like to have the maps back within a month as they are needed for road material work.

Yours very truly,

FTT-M

Geologist

List of Maps

Leverett's Ms. Map of Minnesota

Gettysburg Maps

List of Ft. Sheridan Exercises

Coast Charts

Latouche Passage

Drier Bay 3 copies

Gartineau Channell

Tongass Narrows

Bays & Harbors in SE Alaska

Lake Bay & Approaches

Port William Sound 7 copies (different scales)
8515..4 copies, 8550, 8520, 8519

Revillagigedo Channel

Yakutat Bay 2 copies

Controller Bay 3 copies

Port Valdez 2 copies

Wrangell Strait

C. St. Elias to Shumagin Fds. 2 copies

Cook Inlet

Drier Bay



DEPARTMENT OF STATE
WASHINGTON

April 15, 1921.

Mr. F. T. Thwaites,
Wisconsin Geological Survey,
Madison, Wisconsin.

My dear Fred:

I write to acknowledge your letter of April 7, and the registered package containing the geological maps and your manuscript. I have already begun to work on it and can see that you have done a great deal of hard work.

I am going to go to the Geological Survey and discuss the question as to whether this is to be a bulletin or folio and shall then write you further on that point. I am also making out a rather detailed table of contents of the whole publication and wish that you would send me your table of contents so that we may come to a complete agreement with Twenhofel and between ourselves as to exactly what sections each of us is to draft.

I

I thank you very much for sorting out the maps for me. You are entirely welcome to all of those on the list you sent me. I had a very strong impression that there was a set of original maps of Glacier Bay, which Professor Reid loaned me a number of years ago, and which I was anxious to return to him.

Very sincerely yours,

Ramsey Martin

April 20, 1921.

Major Lawrence Martin,
Department of State,
Washington, D. C.

Dear Mr. Martin:

In reply to yours of the 15th, I have talked the matter over with Professor Twenhofel. He says that any arrangement which you see fit to make will be agreeable to him. I have not made any table of contents for a bulletin; at least I do not seem to find any in the file, although I thought I had once made one. I would suggest that in the bulletin a less rigorous separation of description and geological history be made. I think that under each formation a paragraph entitled conditions of origin would be appropriate. The geological history section would then be reduced to a simple summary of the events.

I have not done anything further about boxing the maps. I am positive that there are no plane table sheets from Glacier Bay among those which I have sorted.

I will be able to go in the field the latter part of June to finish the field work at Sparta. I trust that we will be able to have the entire report out of the way shortly after that.

Yours very truly,

FTT-M

Geologist

June 2, 1921.

Major Lawrence Martin,
Room 381, State War & Navy Building,
Washington, D.C.

Dear Mr. Martin:

I have information that the manuscript for the Sparta-Tomah area must be in the hands of the U.S. Geological Survey by July 1st and am writing to see whether you have done anything as yet on the manuscript sent you. I have practically completed the manuscript on stratigraphy and geological history up to the Pleistocene. I am now preparing a tentative list of illustrations very much reduced in number from those formerly suggested. I have not, however, chosen any photographs as yet. I think the time has come when we ought to definitely decide on what maps are to be incorporated, and I would suggest a map showing all the areal geology but without structure contours. This ⁽¹⁾ would include also the Pleistocene formations, and a map showing the economic geology and artesian wells. On this map the structure contours would be placed. I do not know just what shape these maps have to be in when they go to the Survey. I understand that there is a new edition of the Sparta Quadrangle which fits the Tomah. Would it be possible for you to have some of these sent to us?

If you cannot do anything else, please look over and return the manuscript on the stratigraphy of the Pleistocene, leaving the section on geological history until later. In any event, it will be necessary to do about two weeks more field work, partly in checking up unsatisfactory work done before, and partly in getting additional data.

Yours very truly,

Geologist



DEPARTMENT OF STATE
WASHINGTON

June 7, 1921.

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

My dear Thwaites:

In your letter^{and June 2,} of April 20[^] you speak of going into the field the latter part of June. I hope you are going to continue with this plan so that your final field work at Sparta may be done early in the summer.

You have, undoubtedly, seen the telegram I sent to Hotchkiss and you will see a letter I am writing him to-day.

I shall probably not be able to send you my manuscript of the material I am writing myself until it has been submitted to the Geological Survey on June 30. What I am planning to do is to take the manuscript you sent me, which is excellent, and rearrange it somewhat, adding new sections on phases of physiography which I plan to discuss, and inserting Twenhofel's manuscript when that comes.

AS

As soon as the ^{U.S.} Geological Survey has ^{returned} ~~received~~ it, I shall send your copy to you and to Twenhofel for revision and shall go on revising my own sections so that we can have the whole folio out of the way before the summer is over. This will be your opportunity to insert any additions or corrections based upon your field work this month.

The reason for the change in date is that the United States Geological Survey has plenty of money, provided they expend it before July first, and hence they ask us for this manuscript on June 30 instead of September 30.

It has resulted in their offering to raise the ante from seven hundred dollars (\$700.00) to whatever we think we ought to have. I tentatively suggested nine hundred dollars (\$900.00) in my telegram to Hotchkiss, but if you and Twenhofel do not think that is enough, I think you could have still more.

I am ^{not} ~~greatly~~ excited about that phase of the matter anyway because there seems to be some doubt that I can get any money at all for my share of the work. I shall, of course, collect from Twenhofel, ^{who} ~~to~~ makes the contract, for such sums as ^{he} ~~he~~ expends for typing and any rough drafting.

I hope your mother is well.

Very sincerely,

Russell Martin

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON

June 21, 1921.

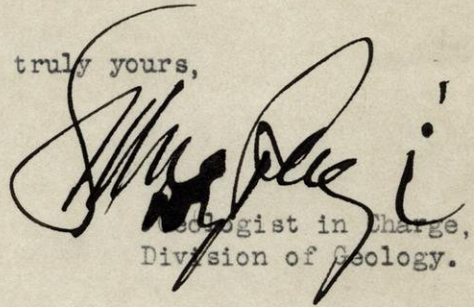
Prof. F. T. Thwaites,
Wisconsin Geological & Natural History Survey,
Madison, Wis.

Dear Professor Thwaites:

In response to your request of June 15:

Two copies of the new edition of the Sparta topographic
map are sent you today.

Very truly yours,



Geologist in Charge,
Division of Geology.

OFFICE OF THE
FOREIGN TRADE ADVISER

MEMORANDUM

....., 192

Dear Fred: Thank you very
much for helping Mrs
Martin to send my
trunk, and for all
your mother's and your
own courtesies to her
and to the children.
You are awfully kind.

L.M.



DEPARTMENT OF STATE
WASHINGTON

June 22, 1921.

Mr. F. T. Thwaites, Geologist,
Wisconsin Geological and Natural History Survey,
Madison, Wisconsin.

My dear Thwaites:

I have made very good progress on the manuscript of the ^{preliminary} ~~first~~ draft of the Sparta-Tomah folio, and shall be able to turn it over to the United States Geological Survey before the end of June, if you send me the manuscript on stratigraphy ^{and} geological history up to the Pleistocene, which you wrote me on June 2, you had practically completed. I shall not attempt to send you the manuscript which I have been revising and adding to, because there would be no time for you to look it over and return it before the end of the month, but I shall send you a carbon copy of it as soon as I submit it to the Survey, ~~and~~ I understand that they will return the original copy to me immediately after July 1, so that you and Twenhofel can criticize ~~what I have written and so that you can see~~ the new material I have inserted and

the ways I have modified the manuscript which I had previously from you. At that time I shall also go about a very complete ~~re~~revision of the whole thing. I may say in general that the manuscript you sent to me was exceedingly well done, and that I approved your treatment of practically all the topics, although I differed from you in many cases as to the language in which it was expressed.

As an exception to my statement that I shall not send you this manuscript until the end of the month, however, I am enclosing a copy of my revision of the first page. Upon this you will see that I have arranged the names of the authors in the order in which I think they should appear, and that I have added a long footnote giving credit to those who have helped us. To this footnote I think you should add the names of the students in the summer field course which I omitted.

If you will send this page back to me with any modifications which you, Twenhofel, and Hotchkiss think should be made, and will send me the additional manuscript ~~allud-~~ed to in your letter of June 2, I think we shall be quite

complete on this preliminary text.

I have asked the United States Geological Survey to send you five copies each of the 1919 edition of the Sparta quadrangle and of the edition of the Tomah quadrangle without the green for forests. You will find that these quadrangles fit each other.

I also enclose a page in your handwriting containing a list of corrections in the Tomah quadrangle. I expect ~~you~~ you have additions to make to this list and that you will have a similar list of corrections for the Sparta quadrangle. These can wait perfectly well until after July 1, but early this summer I think you should send me a complete set of such corrections for both quadrangles in order that we may submit them to the Geological Survey in advance of the submission of the final text of the folio.

With regard to the illustrations, I agree with you that we should have:

(1) a map showing ~~all~~ the areal geology, ~~but without structure contours and~~ including the Pleistocene formations;

(2) a map showing the economic geology and artesian wells, with structure contours;

(3) the eight illustrations listed on the enclosed sheet and a ^{small} number of additional illustrations which I will prepare at my leisure;

(4) a small number of very good photographs.

Any of these illustrations or photographs which you have ready you can send along with the manuscript you are supplying me, but if certain of them are lacking from the preliminary draft, the United States Geological Survey will not complain. In this connection, you might leave it to me to provide the Index map showing location which appears as number 1 in the accompanying list, as I shall have to use the new and approved boundaries of the physiographic provinces which the Geological Survey is now making standard.

I also suggest that when the final manuscript of the folio is submitted, we include a block diagram of the whole area, and that you make arrangements to have Professor Lobeck prepare this diagram for us, ^(with an insert which I will describe) if he is willing to do so. I may also say that I am planning to use a ^{portion} section of the relief map of Wisconsin which accompanied Bulletin XXXVI as the illustration showing the escarpments and terminal moraine, if I can get the Geological

Survey to reproduce it adequately.

Reverting to the map showing the areal geology, I suggest that unless you have already prepared a new pair of sheets for this purpose, you let me submit the colored copies of these two sheets which you sent me this spring, attaching a note which explains that the distribution of the Pleistocene formations ~~are~~^{is} to be added later. It will then only be necessary for you to send me two more copies of these sheets, colored to show the economic geology, artesian wells, and structure contours. If you have these ^{already} drawn up in rough form, it will be quite satisfactory to submit them with the preliminary manuscript and to supply the final copy later.

I am sorry that I have had to delay so long in writing you about these ^{matters.} ~~maps.~~ I think we are in general agreement about the method of handling most of the problems incidental to submitting this preliminary text, and it is my understanding that this preliminary text and the preliminary set of illustrations will not be examined critically, but will be merely looked over in the United States Geological Survey with the idea of criticizing our table of contents and returning the manuscript promptly for re-

vision and resubmission the latter part of the summer.

I hope this is all agreeable to you. Please tell me frankly, however, if there is anything you would prefer to have handled in some other manner.

With warm regards,

Very sincerely yours,

Lawrence Martin

DESCRIPTION OF THE SPARTA AND TOMAH QUADRANGLES

By F.T. Thwaites, W.H. Twenhofel, and Lawrence Martin.¹

INTRODUCTION.

General Relations of the Quadrangles.

The Sparta and Tomah quadrangles are bounded by parallels of 43° 45' and 44° ~~00'~~ and by meridians 90° 30' and 91° ~~00'~~, comprising part or all of townships 15 to 18 North, ranges 1 to 5 West, 4th principal meridian. Together the quadrangles include one-eighth of a "square degree," ^{of the earth's surface,} an area, in that latitude, of about 431 square miles. They are in the west-central part of Wisconsin (see fig. 1), in Monroe and La Crosse counties, 12 miles east of the Mississippi River. The quadrangles take their names from the principal city in each.

^{by}
[?] ¹ Surveyed (in cooperation with) the State of Wisconsin during the summers of 1908, 1916, and 1917. The authors were assisted in the field work at various times by Ralph Wood, Walter ^H Schoewe, C. M. ^{Ewers} Bond, , and F.W. McKay. For data presented during field conferences the authors are indebted to Dr. E. O. Ulrich of the U.S. National Museum, Dr. W. O. Hotchkiss, State Geologist, ^{and Prof. E. F. Bean, Assistant State Geologist} of Wisconsin, and to several geologists who have studied this area and whose publications are referred to in the footnotes of this folio. Messrs. Ulrich, Hotchkiss, and Bean, ~~and Mr. O.W. Wheelwright~~ have examined the manuscript of the folio, critically, and have made many valuable suggestions. To Dr. Ulrich, especially, the authors are indebted for the many features of the type section here presented (and for a number of the names of geologic formations). The text of the folio has been written chiefly by Mr. Thwaites.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON

June 23, 1921

Mr. F.T. Thwaites,
Wisconsin Geological and Natural History Survey,
Madison, Wisconsin.

Dear Mr. Thwaites:

There are inclosed two copies of an agreement for the Sparta and Tomah folio. Please execute both copies and return to this office immediately in order that the transaction may be completed before June 30.

The text of the manuscript was received to-day.

Very truly yours,

David White
Chief Geologist.

2 Inclosures.

June 24, 1921.

Major Lawrence Martin,
State War and Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

Yours of the 22d came after I had shipped you the copy of our manuscript. In regard to the footnote giving credit to those who helped in field work, I would suggest leaving out entirely the names of the students and of Mr. F. W. McKay for the reason that the students' work was all checked by me personally and their notes were not used. McKay also did not do enough work to be worthy of having his name in the report. Practically all of his work had to be done over again.

With regard to the list of corrections on the Tomah Quadrangle, I have prepared a map of each of the quadrangles showing all changes in culture. Now the expense of making these changes will be quite considerable and some of them require more accurate measurements than I made at the time. If you will kindly take this matter up with the Survey and see definitely if they are willing to make the changes for the folio edition, then I will take a plane table into the field and make some accurate maps of road relocations, ~~in the new railroad.~~ If they will not do this, then there is no object in my spending the time on it. I do not feel like sending you the list of corrections until I have been in the field again. There are doubtless a great many changes at Camp Robinson, possibly the war department has a map on file of this camp.

In regard to the maps I do not feel justified in recommending two complete maps if we are going to put the Pleistocene on to the areal geology map. The economic geology is not of sufficient importance, in my opinion, to warrant a separate map. I think that a note in the legend will be sufficient. The structure contours are also of practically no economic importance and I think can be shown very much more effectively in a text cut. The artesian wells may be shown on the areal geology map without interfering with other information. I have drawn up a new list

L.M....2.

of illustrations using some photographs, but have nothing ready to send along at the present time.

With regard to the block diagram, I had also decided that we must have one. Professor Lobeck is in the East for the entire summer and will not be in position to touch any work of this kind for a very long time. Mr. G. H. Smith, who is doing work here in the summer school, turned out an excellent diagram of part of the new Kendall Quadrangle and I have been suggesting that he try his hand on this more ambitious project. If successful, I will pay him out of the \$900.00.

I cannot agree to using any portion of the relief map of Wisconsin in the Sparta and Tomah Quadrangles, unless it is cut off at their northern boundary. North of that it is so inaccurate that I could ^{not} agree to its publication at this time. I would much rather make a new drawing from the topographic information now at hand.

I think it will be all right for you to submit the two areal geology maps that you now have with notes saying that they will be modified to show other information. I have nothing here which I can spare to submit. I have engaged draftsmen to start work on Monday on final maps and this work we will pay for out of the \$900.00.

I regret that I have not more of ^{the} illustrations made to send, but I have used many of our extra prints of photographs in illustrating my report on last summer's work and it will take some two or three weeks to get new ones. Most of the photographs which I selected were used in Mr. Smith's thesis and I think are fully as good as we have need for. If you think it necessary, however, I will try to get some one with a plate camera to take some and believe that you have notes on the places that are to be taken.

I trust my criticisms will be satisfactory to you. I am rather holding off on account of uncertainty of what sort of material will be allowed to go through for a folio. I presume we will know this as soon as the manuscript is returned.

I turned over your maps to Mr. Flick for storage about two days ago. I still have, however, a large photograph of the Columbia Glacier which used to be in your house. This is now hanging in the museum. If you wish this stored, please let me know and I will look after it.

Yours very truly,

FTT-M

Geologist



DEPARTMENT OF STATE
WASHINGTON

June 29, 1921.

My dear Fred:

I am sending you, under separate cover by registered mail, a package containing the preliminary manuscript of the Sparta-Tomah Folio, which I turned over to the United States Geological Survey yesterday. Last Saturday Mr. David White handed me the manuscript which you had sent directly to him and asked that I annotate or add to it in any ways I thought desirable.

Accordingly, I compared it with the copies of the same papers which you had previously sent me and transferred all the corrections. I then substituted the new draft which I had prepared during the last two weeks and this is the manuscript I turned over to the Geological Survey yesterday. The copy I am sending you is exactly like it except that there are no illustrations.

Mr. Paige

Mr. F. T. Thwaites, Geologist,
Wisconsin Geological and Natural History Survey,
Madison, Wisconsin.

Mr. Paige expressed himself as being exceedingly well satisfied with the form in which the manuscript was presented and said that he would approve a voucher immediately for payment to you. He will also return the manuscript and illustrations to me on or shortly after July 1st.

When you read over this manuscript you are going to be greatly shocked! I warn you that you had better get in bed before you open the package and provide yourself with a large quantity of smelling salts. The reason for this prediction is that I have taken great liberties with your text. First of all I added such short sections as Previous Studies (pages 5-7), Climate and Vegetation (pages 15-16), as well as a great ^{deal} on physiography.

Here and there I also added references to literature which I thought you would want to include. For example, you said nothing about the data on ^{the} pre-Cambrian presented in Volume IV of the "Geology of Wisconsin." You said nothing about the observations

of

of Chamberlain on the gravels ^{at} of Devil's Lake in 1874, or about the description of the Rockville Conglomerate by McGee in 1879 and 1891, or about the summary of knowledge regarding these gravels which Alden published in 1918.

There were some awful sentences in your first draft. For example, on pages 89 - 90 is a sentence with 85 words; and, after getting all out of breath and falling in a faint, I revived slightly and broke it up into a number of short clauses. No doubt I have written some equally awful sentences in the new material.

In a good many places the manuscript was not in proper form for a folio of the United States Geological Survey. One of the many illustrations is on page 108 where I added the headings 'Paleozoic Era' and 'Cambrian Period'.

I caught you on quite a good many inaccuracies.

For

For example, on page 85 I changed the date of ^athe publication from 1903 to 1892. Again on page 152 I changed the localities of ~~the~~ two power plants from La Crosse to Sparta.

I regard all of these as matters which you and Professor Twenhofel would naturally have caught if you had not had to hurry so in submitting this manuscript. I have no doubt that you will find similar slips of mine in the new pages I have added.

As to the statement in one of your letters that some of your colleagues think we have gone too deeply into theoretical questions, such as conditions of origin of the sediments and the question of the existence of p^leneplains, I do not agree; and I think we can leave this matter to the ^{U.S.} Geological Survey for decision. I have felt on the whole that your treatment of the work of Trowbridge was fair and dispassionate, and I congratulate you upon a very ~~perfective~~ ^{ef} discussion

of that

of that particular problem. I shall go over it again with great care after the manuscript comes back from the Geological Survey and shall probably add some sentences here and there in the interest of politeness and force.

I think that you ought to congratulate yourself that you have done an exceedingly good piece of work. Your discussion of Economic Geology, for example, is very good indeed and so is what you and Twenhofel have written about the Paleozoic formations.

There remains only the question as to whether separate sections of this folio should appear under the general authorship on the first page, or whether separate sections shall be marked as having been written by one or two of us separately. I am on the whole inclined to let the whole thing stand as a publication by all three of us without a sub-division of authorship. It appears to me that this is extremely desirable, particularly as I do

not

not see where it is possible to draw the line between your contribution and the contribution of Twenhofel on stratigraphy and geologic history. I received an impression from Messrs. David White and Paige that they rather preferred a single statement of authorship, but if either or both of you, or Mr. Hotchkiss, feel as if the authorship ought to be divided, I shall not insist on my point of view.

In this connection I want to bring up another matter. I notice on page 74 that you and Twenhofel intend publishing a paper on ^{the} Windrow Formations. If this were only to be an abstract of the paper presented before the Geographical Society of America, I should see no objection, but if you contemplate publishing a full description of the problems presented by these upland gravels, I should like to participate in the authorship of the paper. After all, it was you and I who discovered the ^{type} locality of the consolidated ^{material} ~~portion~~ within the two quadrangles, and, as I remember it, we did so before * Twenhofel joined us in the field. Moreover, you

and

* i.e., 'one year anterior', (as T. C. C. would say).

and I together made a good many of the original discoveries and studies of the other localities where the quartz and chert pebbles occur, and I think that all three of us are in general accord regarding the interpretation of the problem.

Please let me know frankly what you and Twenhofel feel about this matter.

I take this occasion to congratulate you upon the completion of an exceedingly creditable piece of ~~geographical~~^{geological} work. You, personally, have done much more, both in the field and in the office, than either of the other two of us, and it is for this reason that I feel you should be the senior author of the folio.

Sincerely yours,

Lawrence Martin)

July 2, 1921.

Major Lawrence Martin,
State War & Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

Your letter of June 29 and the manuscript arrived today and I am answering at once without as yet having gone over the manuscript in detail. With regard to your pencil note, I have never seen a copy of the Dells quadrangle on the scale of 1 - 4800. You had once a photolithographed copy, but I think that was a smaller scale than this. Anyway I could not find it.

I was not greatly shocked by finding what suggestions you had made. I knew that certain subjects had been omitted entirely. I first started to write without using any foot notes whatever, this being the custom in many of the folios. Later I began to put them in, but never finished the job. I would like to suggest that you get a copy of the pamphlet on Suggestions to Authors which is furnished by the Geological Survey, so that we can get all foot notes, etc. in the proper form.

In regard to the references on gravels the Rockville conglomerate is not part of the Windrow Formation. I was there in 1919 and it did not take me long to come to that conclusion. I also omitted the reference to particular localities outside of this district as these are taken up elsewhere. I quite recognized that there were many inaccuracies, such as the confusion of the name of the town and the name of the river at Sparta. The treatment of the peneplain question is the one on which Twenhofel disagreed most violently. He is very thick with Trowbridge as they are working on problems in sedimentation; hence his solicitude. In conversation Trowbridge made the statement to me that the uplands below Castle Rock are continuous with the top of Grand Dad Bluff at La Crosse. I flatly denied this and he had to back down. We must be very careful to state specifically

L.M....2.

some of these matters, so that there will be no chance of misunderstanding about the facts.

I did not write any of the portion about the Paleozoic. This is ~~only~~^{partly} Twenhofel's work, but I think that your suggestion to put the whole thing down as done by the three authors will be entirely satisfactory.

With regard to the paper on the Windrow Formation. This was written in 1919 without any thought of slighting your work. You at that time were apparently permanently out of this sort of business. Most of the work in the field was done by me. I visited Iowa twice and have traveled something like 2,000 miles in the study of this formation. We, therefore, did not feel like holding up the matter until the folio was done, as we saw no chance of getting you to work on it, not to do any more field work. The work you did at Windrow Bluff and Devils Lake has been acknowledged in the paper. All that Twenhofel did was to examine the fossils and work on some of the report on the theoretical questions. He also introduced it before the Geological Society. Twenhofel is now away, but if you wish, I will try to have the paper held up although it is now in type. I do not even know the name of the man who is responsible for it at the present stage.

I follow with a few suggestions I have noted in working over the manuscript. The table of rain fall is the first thing. Are you going to make this or shall I? I can do it all right.

I think that it should be stated that not all of the Pleistocene formations are shown on the map.

With regard to the section on military ~~geography~~^{geology}, I trust that you are going to do that. I certainly have not the data at present on it to construct such a map as you have outlined. If it has to be done in the field, then I would like to know very shortly and make arrangements accordingly.

With regard to the terraces of the Mississippi, I fail to see the necessity of putting much space into their description. They only indirectly affect the location of the terraces within the quadrangles. I found that the terraces in each of the valleys which enter the Mississippi are different and that this difference is very largely due to the presence of rock ledges at different places at different elevations. It is probable that some of the terraces of the Mississippi valley are affected by rock ledges, such as those at Rock Island. I would therefore suggest that this material be condensed, although, of course, it is interesting.

With regard to the age of Glacial Lake Wisconsin, I note a tendency to confuse the gravel terraces at Tomah with deltas deposited in the lake. These gravel terraces antedate the lake clays which may be seen resting upon them at points outside of our area. Gravels are also found far out in the central plain near Valley Junction in such conditions as to show that they had been deeply eroded long before the time of the Glacial Lake Wisconsin to which we commonly refer. If there was a Glacial Lake Wisconsin at the time of these terraces, we have no record of it.

I do not feel that we are in a position to map all the springs, interesting as that would be. I have records wherever I worked, but a portion of the area covered by Twenhofel was not mapped in as much detail. I can dig some of this out of his notes, but he kept no map notes whatever as we did; hence it would be very difficult.

In regard to the relief map, I would suggest a block diagram or a contour map for the large sized map showing the general relief of the area. As I noted before, the model of Wisconsin is too inaccurate to be useful. It was made before we had recognized the double character of the escarpment and before we had any data on the hills near Millston. We now have fairly complete information on these places. I am trying to get Mr. Smith to work on a block diagram of the entire area, but he has not started.

I have Miss Whitbeck at work checking notes and working on maps, so that we ought to be able to make pretty good progress.

With regard to the cut of pebbles and fossils from the Windrow formation, we have better specimens here than Shipton. We had better omit the section of the well at Cashton since we have so many illustrations and it is outside of the area. Could you see Dr. Ulrich about the possibility of using some of his photographs of fossils. They need not necessarily be of specimens from within the area. I wonder if you would be willing to add to Twenhofel's list of fossils. I would not like to ask him to do anything which would hold up the folio, but I know that it will go through his hands and that a fuss will be raised about the incorrectness of some of these lists.

Another matter which I noted is that the introduction to the section on geography needs some revision. It will also be necessary to have a map showing the location of the large number of places outside the area which are mentioned. I think it would be a good thing to check up and see that every geographical name mentioned is shown

on some map, also to see that obscure locations are indicated with reference to some more prominent locality; for instance when we mention a small place like Middle Ridge, I think we ought to say that it is in the southern part of the Sparta Quadrangle or something like that.

I note that you added a section about the growing of ginseng. This was a very prominent industry when we were there in 1916. In 1920 the huge gardens had been entirely dismantled, so that our notice ought to be placed in the past tense.

These are all the corrections I have noted up to date, but I will make notes on the manuscript and return it to you before long so that we can reach a final agreement about some of these points.

I hope to go into the field during the first and second weeks of July, but may have to postpone it until after the middle of the month. As our appropriation bill has failed for the work which I was going to have done, it is probable that I will have the entire summer to work on this problem.

Yours very truly,

FTT-M

Geologist



DEPARTMENT OF STATE
WASHINGTON

July 9, 1921.

My dear Fred:

I was glad to learn from your letter of July 2 that you were not more greatly shocked by my maltreatment of your manuscript.

I have already asked the Geological Survey to send you their pamphlets containing Suggestions to authors and Directions for the preparations of illustrations.

If you will prepare the table on rainfall, etc., I shall be greatly obliged. I am writing a short discussion of military geology which I shall submit for your criticism. I hope to make it short and to have the legend of the accompanying map very complete.

I will ask Ulrich for photographs of fossils. Regarding the Windrow formations, I still feel that I should like to be one of the authors
of

Mr. F. T. Thwaites, Geologist,
Wisconsin Geological Survey,
Madison, Wisconsin.

of this ~~separate~~ paper if it is not too late. Why don't you write to Hovey, inquiring just what the status of this publication is; and would it not be a good idea to send me a copy of your manuscript, ~~for~~ ^{or} the galley proof? I really feel that I did as much on that problem as Twenhofel. If you were going to publish this paper alone, I should not think of raising this question.

You will be interested to know that after Paige had read the manuscript submitted to him on June 28, he told me on July 1, when I asked him whether this manuscript contained too much discussion of the origin of sediments or too much on the question of possible peneplains, that the U. S. Geological Survey wants ideas in its folios and that he personally did not regard the discussion of these topics as too long or out of place. He also said that he was strong for the inclusion of ^a short discussion of military geology of the Sparta ^{Target} Range. I promised that we would return
the

- 3 -

the revised manuscript to him on October 1 with
the illustrations complete.

I hope all this meets with your approval.

With warm regards,

Very sincerely yours,

Ramona Martin)

July 14, 1921.

Major Lawrence Martin,
State War & Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

Your letter of July 9 is at hand. I will make the table of rainfall, etc. I am glad to note that you are going to do the portion on military geology as I would not feel competent to do it without some instruction. I am writing Twenhofel regarding the paper on the Windrow Formation as I am not a member of the society and have no right to ask any favors of them. I have no copy available of the manuscript as I cut up the only one and incorporated parts of it in the folio manuscript. That is what accounts for the omission of mention of many of the occurrences outside of the quadrangles. I also omitted the list of fossils as they would make the report too long.

I will say again that at the time we wrote this paper it seemed to be impossible to get you to do any work on it and it was still an open question whether you would be able to do anything on the completion of the folio. We thought it was advisable to publish on some of these special topics in advance of the folio publication so that reference could be made to fuller discussions elsewhere. I spent last summer on a study of the terrace gravels and would have published a report, but for the fact that Paul McClintock is working on the same question and I understand ^{his} prepared to publish on it very shortly. As my views differ from his, I had to hold up ^{my} the report.

Yours very truly,

FTT-M

Geologist

July 15, 1921.

Mr. W. H. Twenhofel,
Crow Indian Agency,
Montana.

Dear Mr. Twenhofel:

I am making fair progress on the folio and have had several letters from Martin as well as a copy of his revised manuscript. He is making a fuss about the article on the Windrow Formation and thinks that he should have been included as one of the authors. He wished me to take the matter up with you. I feel, however, that he has no just cause for complaint inasmuch as nine tenths of the work has been done since he left the state and until the last few months it has been impossible to get him to do any work on this problem. I am not able to take any action on the matter as I am not a member of the Geological Society, but will leave the matter to you entirely. I have not talked over the matter with Mr. Hotchkiss as he has been away, and Mr. Bean takes the same stand as I do. ^{but}

Yours very truly,

FTT-M

Geologist

August 3, 1921.

Major Lawrence Martin,
Room 381,
State War and Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

In looking over my files of stuff that have been packed away, I find that I have a copy of the article on the Windrow Formation which was sent to the Geological Society. I had thought that this had been sent back with the proof, but was mistaken. I have had a letter from Twenhofel saying that he will hold up the article if you insist on it. I wish to assure you that we do not intend any discourtesy in going ahead with this and leaving you out. At the time we did it, it seemed impossible to get you to do anything on it and rather than hold it up indefinitely, we went ahead. Were you not at the Boston meeting when the abstract of the article was presented, Christmas 1919? Twenhofel thinks that you were there. The work which I have done especially for this comprised an expedition to Iowa in 1919 to Rockville and Waukon, a second expedition in 1920 to Mitchell County and Guthrie County, a total of 1100 miles, also considerable exploration in Trempealeau and Buffalo counties as well as elsewhere. I, therefore, feel that the work done since your departure from this state is a great deal greater than what was accomplished before.

I have virtually completed the preliminary work on the geological maps, but cannot finish until after I return from the field which may not be until September. I have not done any work on the manuscript further than when I wrote you last. I hope to have Dr. Ulrich go with me in the field for a day or so and settle the question as to whether or not the Eau Claire occurs in the bottoms of the valleys. Shales of Eau Claire age outcrop only a few miles to the west and I am rather inclined to think that the Dresbach is only about 80' thick throughout the entire district.

L.M...2.

This will necessitate considerable additional work when I return from the field. I have had all the drawings completed with the exception of the one showing the variations of climate. After talking with Mr. Miller, I find that it will be necessary for him to get some of the data for me. If you can get this more readily in Washington, then perhaps it would be best for you to do this.

I have received the \$900.00. If you have any bills which should be paid out of this for typewriting or drafting, please send them to me and I will take care of them. After all charges of this nature are met, I will divide the remaining sum into three equal parts to be divided between the three authors unless some other arrangement is desired by you. I have not paid any attention to any agreement which may have been reached by Twenhofel and you in 1917 as that was under a different contract. I believe that this arrangement is satisfactory to Twenhofel and I am writing him to that effect.

It is possible that I may have to pay the expenses of a trip to the field out of the \$900.00. If so, I shall only charge actual paid out expenses with nothing for my salary or for depreciation of the car. I hope, however, that the State Survey will be able to pay for this work which I estimate will cost with salary included about \$200.00.

I have submitted the manuscript at present to Dr. Ulrich who is here, but have not heard from him on it. I also submitted it to Dr. Leith who seemed very much pleased with it.

Yours very truly,

FTT-M

Geologist

August 3, 1921.

Mr. W. H. Twenhofel,
Crow Agency, Montana.

Dear Mr. Twenhofel:

Your letter of the 25th is at hand. I have not taken any action in the matter of the article on the Windrow Formation, except to talk it over with Bean and Hotchkiss. Their judgment is that we are all right in going ahead with it. I will, however, see if we have not a manuscript which we can send to Martin. As I remember it, he did some reading on this subject in the winter of 1916-1917; but otherwise I should judge that we have done at least twenty times as much work as he did. I

I understand that according to our conversation it is agreeable to have me pay what expense is necessary out of the \$900.00 and then divide the remainder into three equal parts. I do not intend to recognize any previous agreement which may have been reached at the time a contract was drawn with Martin as I have nothing to do with this agreement.

I have not been able to learn of any second hand typewriter though I tried to get one that I knew of.

Yours very truly,

FTT:M

Geologist

P.S. Your letter of July 31 just received. I was under the impression that I had told you that I was making the contract as the matter had to be hurried through before July 1, and it was impossible to reach you before that time. I have the \$900.00 in the bank. I trust this is satisfactory.

How Agency, Mont.

July 25, 1921

Mr. F. T. Thwaites,
Madison, his cousin;

My dear Mr. Thwaites:-

Thanks for
the information relating to
the folio. I will send you the
graphs for the sands as soon
as I can find time & pre-
pare them. This will proba-
bly be in the very near future
as the high pressure work is
about over.

I do not care one way or
the other about the Hudson
article, but I think it is
a little late to make changes.
Is it not true that Martin
knew about our article? He
was at Boston when I pre-
sented a summary of the
results and did he not
see the manuscript at
one time? I can hardly

The matter
in the matter
to him and if
your judgment
should be included
joint author, write or
write me at Crow Agency
and I will take the matter
up with Hovey. I, however,
fail to see where Martin
comes in. The credit for most
of this work is yours and as
you are the senior author,
you should decide.

I am having a fine
summer. I am driving
a Buick Touring six and
sleeping in the field - a
different place each night.
I also am learning many
things I did not know
before - frost - Pleistocene
erosion, semi-arid topography.
Big Horn and Bad Forks
mountain topography
and north west glaciations

I certainly
more along
in the future

If you can
on a good seed
underwood type
we know.

Very truly yours,
W.A. Trenchard

Wagon 1521

July 31, 1921

Hull,

Dear Mr. Trenchard:
I have a graph and
will be a graph with
more - chords in
the - chords.

Dear Mr. Thwaites,
I have the pleasure
to acknowledge the
receipt of your
letter of the 29th
inst. in relation
to the above
mentioned
manuscript.
I am, Sir,
Very truly
Yours,
W. H. Thwaites

W. H. Thwaites
July 31, 1921.

Thwaites,
Hall,
London.

Dear Mr. Thwaites:-

Enclosed you will find graphs and description of three more sounds which I trust you would include with my portion of the manuscript. As the manuscript is to be returned to the author shortly after being handed in, the incorporation of the graphs on the plan can be may be postponed.

It was my understanding that I was to make the contract with the Survey. As this has not yet been consummated, it might be wise to see about the matter.

The matter relating to Martin's portion of the fund provided for the preparation could be arranged by our making him a present of a lump sum for his services in which respect I think we should be extremely liberal.

W. H. Thwaites

August 5, 1921.

Mr. R. C. Lentz,
Mayville, Wisconsin.

Dear Mr. Lentz:

If you have no other work for the rest of the summer, I would be glad if you would let me know as I will need an assistant for about two weeks. The pay would not be very much, but I thought possibly you might be interested. I could only pay about \$35.00 ^{or maybe more} for the two weeks work, which would be in the Sparta region and possibly some in the north.

Please let me know as soon as possible as I must get out into the field next week.

Yours very truly,

FTT-M

Geologist

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Ann Arbor Mich. Sept. 6 1921

Dear Mr. Shwaites: I have been reading with much interest the paper on the Windom Formation by yourself and Prof. Swenhofel in the Bulletin U.S.G. I think you have scored a good point in calling attention to the evidence that this formation is not one that is in keeping with a plain but on the contrary seems to call for considerable relief in the bordering land to induce vigorous stream work.

As to the likelihood that remnants of valley floors as old as the Cretaceous can be preserved, I would call your attention to the occurrence of an oyster bed on the Mesabi Iron Range near Coleraine that is of Niobrara age ^(as identified by Sardison). There is perhaps an acre of it preserved. It is at an altitude of about 1300 feet. This bed is probably near the shore of the Cretaceous sea. Its preservation seems fully as remarkable as the preservation of the gravel of the Windom Formation.

I think Swinburn has nothing on which to base his interpretation that the valleys of the Driftless Area are younger than the Nebraskan glaciation. To the south of the Driftless Area the Nebraskan fills the Mississippi valley as low down as the lowest part of the rock floor 125 feet or so below the present stream. Above it the Kansan and the Illinoian are present, thus giving the full series.

I took upon this in a paper soon to appear in Journal of Geology.

Very truly yours,
Frank Leverett.

Hotel Becker

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HARDIN, MONTANA, Aug. 9 1924

Mr. F. T. Thurston,
Madison, Wisconsin.

My dear Mr. Thurston:-

Any arrangement you
make is likely to be satisfactory to me. I
favor treating Martin as liberally as
possible, both as to publication and the
the remuneration. He has been a good
friend of yours and I consider him
one of mine.

I shall be in my office on the
morning of September 19 and we can
then consider such matters as
require attention.

Sincerely yours,
W. A. Brewster

September 21, 1921.

Dr. E. O. Ulrich,
New National Museum,
Washington, D.C.

Dear Dr. Ulrich:

I completed the field work at Sparta, but I am sorry to report that I did not see my way clear to getting over to Osceola. The distances are so great that when I was paying my own expenses, I could not make it.

With regard to the division between the Eau Claire and the Dresbach in the Sparta region, I had tentatively decided on drawing the boundary 250 feet below the Franconia, but this would make the outcrop at West Salem lie very close to the top of the Eau Claire. If your study shows that this is not the case and that it lies some distance in the Eau Claire, the only other horizon which I could suggest is a ferruginous formation approximately 100 feet below the Franconia. I would like very much to get your judgment as to which of these lines is the correct one, as I wish to finish the maps at an early date.

While in Sparta, I secured samples of a deep hole which started 200 feet below the Franconia and extended 220 feet deeper. This hole showed scarcely a trace of shale, but simply fine grained sandstones with traces of clay. These occurred at approximately 250 feet below the Franconia and again near the bottom of the hole. It was quite clear, therefore, that the shales are relatively local in extent and that no very great confidence can be placed in them.

I have just secured another set of samples from a deep well near Racine and I am making blue prints of several other records which I will send you when they are done.

Yours very truly,

September 21, 1921.

Major Lawrence Martin,
Room 381,
State War & Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

I am writing you as I have not heard anything about the folio for a long time. I put in six strenuous days at Sparta and cleaned up the field work as far as is reasonable to expect. Of course one could go on finding terrace gravels beneath the covering of loess as long as he cared to dig or drill holes, but I wish anyone joy who attempts this. I will have completed the maps in a few days and all of the illustrations will be in shape excepting the block diagrams and the geological map of the surrounding country. I have Mr. Smith working on a block diagram of the quadrangles, but I am not very well satisfied with it. Now that Mr. Lobeck is back, I may negotiate with him for one, if not both of the block diagrams. I have some more photographs and think we now have a satisfactory set of views. On the whole I favor drawings and diagrams rather than the landscapes and was, therefore, inclined to cut the latter to a minimum. Please let me know just what you have done, what illustrations you plan, and something about when we will have the final manuscript ready to revise.

Dr. Ulrich tells me that we must call all the strata below level about 100' lower than the wormstone the Eau Claire formation. I must take this matter up with him more fully before I complete the maps.

Trusting to hear from you as to your progress,
I am

Yours very truly,

FTT-M

Geologist

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON

September 29, 1921.

Mr. F. T. Thwaites,
Science Hall,
University of Wisconsin,
Madison, Wis.

Dear Mr. Thwaites:

Yours of the 21st duly to hand. This is the first opportunity I have had to look up the information required in the matter of the position of the Salem outcrops in the Eau Claire formation. I had some of the material from Salem prepared and find three zones of the formation represented in the collections. The top one at the bridge and mill proves to have distinctly Upper Eau Claire fauna, so that we must assume that the beds there exposed are pretty near the top of the Eau Claire. This conclusion thus falls in line with your intention of drawing the boundary between the Dresbach and the Eau Claire at about 250 feet below the Franconia.

As to the information now brought out by the new well in Sparta, which shows but little shale in any part of the Eau Claire equivalent, I take it to be in line with the facts usually found in relation to this matter. In other words the Eau Claire shows less and less of shale in its composition as we proceed eastward from the western outcrops of the formation, the area under Sparta approximating in character the conditions prevailing at Black River Falls and farther east where the Eau Claire is represented by thin bedded sandstone with very few and thin clay beds.

I am sorry that circumstances prevented you from making a trip to Osceola, as any further information tending to remove the present difficulties in that area would have been welcomed. Of course, your reasons for not making the trip are quite sufficient for not having done so.

Sincerely yours,

E. D. Ulrich



DEPARTMENT OF STATE
WASHINGTON

October 5, 1921.

Mr. F. T. Thwaites,
Wisconsin Geological Survey,
Madison, Wisconsin.

My dear Thwaites:

I write to acknowledge with thanks and congratulations your excellent paper on the Wind~~e~~row formation. I am sorry that I bothered you about it at a time when it was in the process of publication and quite understand your reason for treating the authorship in the way which you have. Please consider the matter as entirely settled.

I am glad to get your letter and know that you were able to finish up the field work in the Sparta area. I suppose you will find it more satisfactory to have the block diagram drawn by Professor Lobeck.

I have not been able to do very much on the manuscript of the folio, but I am trying now to finish it up in order that it may be transmitted for editing as soon as you and Twenhofel are through with your parts.

Work in the State Department is exceedingly strenuous just now and I have been in bad and increasingly worse health all summer, so that I have been unable to work at all in the evenings. I planned to do quite a good deal on the manuscript of the folio during the month I was in Williamstown, but the course of study I gave and the voluntary job of editing the lectures of my Hungarian friend, Count Teleki, occupied nearly all of my time.

In the near future, I shall send you some bills for stenographic help in the copying of the manuscript of the folio which I hope you will be willing to pay out of the editorial fund. I am not sure yet whether my government relations will let me take any money for myself, but I am trying to find out and, in any event, shall be glad to be reimbursed for expenses for type-writing and postage.

Very sincerely yours,

Lawrence Martin

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON

October 6, 1921.

Mr. F. T. Thwaites,
Geological and Natural History Survey,
Madison, Wisconsin.

Dear Mr. Thwaites:

In reply to your letter of September 30 to Mr. White, who is at present out of the city:

So far as appears from the records, the material for the Sparta-Tomah Folio was due June 30 and was technically delivered on that date. In the absence of Mr. White I am unable to find any additional agreement regarding the time of the delivery of the revised manuscript.

I thank you for the blue print giving record of the deep well at Wamsutter, Wyoming, which has been noted by the geologists interested in this section and filed. We shall be pleased to learn whether the record represents the samples as determined by you or whether it is the driller's record.

Very truly yours,

J. L. Ransome

Acting Chief Geologist.

October 7, 1921.

Mr. Sidney Paige,
United States Geological Survey,
Washington, D.C.

Dear Sir:

I wish to inquire regarding the status of the Sparta-Tomah Folio of Wisconsin for which I have been paid, but have not yet finished the work. This folio is being written in conjunction with Professors Twenhofel and Martin. The latter was in charge of the Washington end of the work, but I have heard nothing from him since August and have been unable to get replies to letters.

In one of Mr. Martin's letters he said he promised you that the work would be all done on October 1. I have in my possession a copy of his preliminary manuscript, but if the original of the manuscript was returned to him as he said it would be, I have not seen it. I have completed the geological maps but without colors. Please advise me if it is advisable to color the maps. I have not done so because I was under the impression it might be necessary to reproduce some of them photographically. If, however, the transfers are made by drafting, then I will color them.

I have prepared my portion of the zinc cut illustrations in pretty good shape and have left the lettering in pencil with the idea that possibly they could be used without redrafting. If, however, this cannot be done and you insist on redrafting everything, I will put in the lettering in ink.

I am preparing two block diagrams, one detailed, the other one of the entire region. I thought that the latter might look better if done as a shaded map looking like a photograph of a relief model, but we have no one here who can do that kind of work. Would the Survey be willing to undertake the making of such a drawing from the rough one which I have prepared?

Mr. Martin stated that he was going to prepare more illustrations, but I have seen nothing of them.

S.P...2.

With regard to photographic illustrations, do you desire the negatives or should I send positive prints. I thought possibly you could use contrast prints which would be better for half-tones than those which we have, but if you do not use prints of this character, I will send those which I have.

As I am to be the senior author and the contract was in my name, I would like to have an opportunity of examining all of the material before it is finally accepted in order to secure uniformity.

I will very greatly appreciate any advice on these points, but had nothing to do with the promise of October 1. I think, however, that I can have everything done by the end of this month.

Yours very truly,

FTT-M

Geologist

Dear Sir:

Enclosed are 10 copies of the report on the geology of the area around the town of ...

Very truly yours,
[Signature]

October 1, 1957

~~Hickman~~
~~Knickerbocker~~
~~Burton~~
~~Hamilton~~
~~Wells~~
~~Bogardus~~

~~McKenna~~
~~Marshall~~

October 10, 1921.

Major Lawrence Martin,
Room 381,
State War and Navy Building,
Washington, D. C.

Dear Mr. Martin:

Yours of October 5 is at hand. I am sorry to hear that your health has been no better, for I had heard that you were all right again. Mr. Twenhofel and I are virtually through with our parts, especially as mine is not very clearly separated from yours. I have some new data on the old terrace gravels to add and have suggested some cutting of extraneous matter which does not relate specifically to the area in question. I particularly refer to the discussion of the terraces of the Mississippi River. My work has shown that these have a very indirect influence on the terraces of the Sparta Quadrangle. The latter are controlled entirely by the rock ledges at West Salem and Angelo. I did not know until this season that the rock crosses the river at the latter point. I, therefore, do not think that very much space should be given to the subject of terraces.

I have fixed up the discrimination of the Eau Claire with Dr. Ulrich and we are all agreed to place its upper boundary 250 feet below the Franconia, which makes just one small outcrop at Angelo. Mr. Twenhofel, however, desires to call the Eau Claire simply a member of the Dresbach formation. This matter remains still to be adjusted.

I will be glad to pay the bills for typewriting. I would like to have your manuscript and illustrations submitted to us so that we can have the entire material together and secure uniformity. If you wish to see our illustrations, I have virtually all of them done and can forward them to you. I could retain blue prints and would then not have to have them sent back again. However, I am holding them until I hear definitely in what form this material should be submitted. We will arrange about the division of the funds later and doubtless reach some satisfactory agreement.

Yours very truly,

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

WASHINGTON.

October 28, 1921.

Mr. F. T. Thwaites, Geologist,
Geological and Natural History Survey,
Madison, Wisconsin.

Dear Mr. Thwaites:

In reply to your letter of October 7:

Mr. Martin informs me that shortly he will send to you a revised carbon copy of the manuscript now in your hands.

Regarding your geologic maps, if you will send them to this office I will see that they are photographed and that copies are returned to you for coloring, as colored maps are necessary for the work.

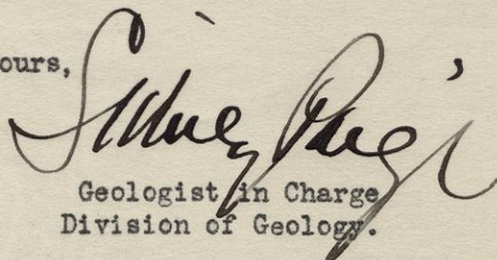
We will attend to the lettering on the zinc cut illustrations if you will send the same here.

The drawings of the block diagrams can be sent here in the rough and finished drawings will be made.

Good prints for photographic illustrations should be all that are needed. If they are too imperfect to use we will inform you.

If there is anything further that I can do in this matter please advise me.

Very truly yours,


Geologist in Charge
Division of Geology.

Tenah Wisconsin

November 14 1921

H, B, Aldrich Esq
University of Wisconsin
Madison Wis.

My Dear Mr Aldrich:

Your letter of October 19 last received and I want
of
to thank you for your veryfull explanation , and causes that produed
the samples sent you. I am sending another and diferent spaplmen, a
intended to get still another to send , but weather prevented.
I will say to start with , that I grew to manhood in new settlement
in Michigan where 'Olegies , and Universities were unknown, and not
untill some 40 years ago did I become interested in such matters.
I am almost seventy seven now and if I get any where along these la
lines I will have to ask a great many questions. Hope I will not ~~be~~
tire you.

This vicinity is rich in Geological deposits and to begin with I wi
tell you some of them.

*See 4,
17-1W*
Some forty years ago a Mr Howard was drilling a well on fair ground
west of town, . I do not know the diferent strata drilled through ~~it~~
but at depth of forty feet he found a tamarac log . Sand so far as I
knew.) Later in drilling a well north of town , they found first
*See 33.
18-1W* peat , then sand, then at sixteen feet blue clay. then sand and a
tamarac log,. Mr D Crowley tells me that in drilling wells on the
ridge south of here they found clay a down at from ten to fifty feet
then sandstone , then thirty to forty feet , sand, then limestone and
also struck layers of iron stone , in water level soft, Above water
very hard. And now here comes the most wonderful of all:

*See 5,
18-1E* (In drilling a well on Wyatts cranbery marsh near Valley junction , ~~h~~
the first six feet was peat, then sand three feet. then alternate ~~h~~
layers of sand and peat as indicated by the material pumped up fifty
feet, *found wild rice* then no more peat, all sand various colors. Seventy feet coarse
sand , plenty water. Eighty four feet struck oak tree and stoped
drilling,,

You have a young man in your class from here Mr Wells Anderson. If you will bring your class here next summer Mr Anderson and myself will give you a busy time for as long as you care to stay. Besides the Geology part of it we might interest you in ancient mound builders work, as there is some of their mounds left. there are also some mounds on low marsh land that I have been interested in for some time. My time is at the earvice of your class as long as you find it of value to them. This letter is long enough so will close.

Respectfully your

A. E. Hollister

Temah Wisconsin. November 23 1921

F. M. Thwaites Geologist

Madison Wisconsin.

Dear Sir: Your letter of November 16 at hand and in reply will say. Well no one is on section four, Town 17 North Range one west, Well no two is on Section 33 Town no 18 north range one west, Well No three is on section No five range one East fourth meridian, About one fourth mile west of well no one is a wet marsh, with mounds running parallel with stream only a few rods away. These mounds begin at hard land on the north and occur at short distances to hard land farther south, then crossing hard land for half mile are found again on wet marsh on west side of creek and extending at same intervals to hard land farther south. Two miles west is a high ridge covered with oak timber. This all in Lemonweir river valley. Crossing this hard wood ridge we come to the LaCrosse river valley,, this valley being mostly grey (Jack) pine barrens. The soil a fine loose sand. The government in sinking a well at Camp McCoy found the same loose sand down 130 feet, the last time I was there. Do not know how deep they went or what they found lower down. Do not know of any one to refer you to as the men who put down wells no one and two are dead. I have talked with Mr D Crowley who put down No three many times in the last few years and always get something new. I just went to see Mr Crowley to ask him if he ever found any animal fossils in these marsh lands, and he tells me he did not, and no shells, but in working on the ridge lands south of Temah he found shells in crevices in the rocks and at one place found what they thought to be a petrified frog.

Hope this may be of benefit to you. Am at your service at any time.

Respectfully Yours.

F. M. Thwaites

December 7, 1921.

Major Lawrence Martin,
Room 381, State War & Navy Bldg.,
Washington, D.C.

Dear Mr. Martin:

Yours of the third is at hand. I am very sorry to hear that you are no better. I do not know whom my informant was, but it was some one who had seen you at Williams, Massachusetts, who told me that you were all right.

I will get busy and revise the manuscript which I have and have a copy typed here. Please do not be afraid that we are putting you out on the authorship - nothing is farther from our intentions - but the matter has hung fire so long and as I have been already paid for the work, I feel that it is time to get some action. If you will concentrate on the section on military geology which has not been written, I will look after the footnotes and other similar revision of the text which I have. I feel rather inclined to cut the bibliography in reference to previous investigations and simply refer to your bulletin on Wisconsin. I do this in line with the style of other folios which in few cases go very deeply into the work of others.

Dr. Lobeck has finished a pencil copy of the block diagram and I think you will be pleased with it. I may not, however, be able to get him to do a diagram of the entire district, in which case I will try to get a survey man to try his hand at a drawing which would resemble a photograph of a model. Mr. Paige says that they can do this.

I am very sorry to learn that you will be unable to share in the payment. I do not quite see why this is inasmuch as I would be paying you and not the government.

I will send you the illustrations that we have with the manuscript. I did not secure any more photographs to amount to much at Sparta, but I think there would still be a chance to get some. As mentioned before, I feel rather adverse to many photographs, but would prefer drawings and diagrams.

L.M...2.

Photographs often show a detail in the foreground more prominently than the important features in the background. If possible, I could get Dr. Lobeck to work over some of our photographs into line drawings which would print very well in the text, whereas I think that photographs would not print very well on their text paper. I would like to know what your reaction is on this. Shall I send the manuscript direct to Mr. Paige, or through your hands?

Yours very truly,

FTT-M

Geologist

P.S. After talking with Professor Twenhofel we thought that no government law can prevent our making you a present of your share of the \$900.00 after expenses are deducted.

Do you not write for the papers? I notice your name on many articles for the State Journal and it would seem strange that there are two men by exactly the same name in Washington.

Could you sent me the bills which you have incurred in connection with this work before January 1, as I wish to try to pay up all expenses by that date in order to deduct them in income tax returns?

*and he says you
as it is
over it
conditions
I have just
the*

DEPARTMENT
WASH

DEPARTMENT OF STATE
WASHINGTON

Dec. 3, 1921.

Dear Thwaites

I have just been talking to Paige and he says you can turn in the folio MS just as it is and ~~that~~ he will give me a chance to go over it and insert corrections and slight additions after their review & editals go over it and before it goes back to you for final reading. I think ~~this is best.~~ I shant have but two or three illustrations that you havent provided for. I have done quite a little work but am not

through yet. If I could work nights and Sundays as I used to I should have finished long ago. I dont know who tells you about my health but he evidently knows more about it than I do. I hope he is right in his prophesy. As a matter of fact I was never in worse health.

It is a shame to have delayed you so long but if you will do as Paige suggests then you can feel ~~that~~ progress is being made toward publication. It doesnt look as if I could share in the payment, but I do want to share in the authorship, particularly as I did not in the upland gravel paper.

Very sincerely yours,

Lawrence Martin

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

December 16, 1921.

Mr. F. T. Thwaites,
Geological and Natural History Survey,
Madison, Wisconsin.

Dear Mr. Thwaites:-

Your letter of September 30, which I find in the files awaiting my attention, appears to have been correctly answered by Doctor Ransome, Acting Chief Geologist, October 6.

Doctor Martin was to do some additional work in elaboration of his contribution. Possibly after he has finished his part, you will want to look over the manuscript to attend to adjustments, etc.

If you did not receive the blue print of the log of the well at Wamsutter, Wyoming, please advise me.

Very truly yours,

David White
Chief Geologist.

RAILROAD COMMISSION
OF WISCONSIN
MADISON

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SERVICE C. B. HAYDEN
TRAFFIC R. V. ADAMS

IN REPLY PLEASE REFER TO FILE NO. 855-CAH

December 16, 1921.

ADDRESS ALL COMMUNICATIONS TO THE COMMISSION

GEOLOGICAL AND NATURAL HISTORY SURVEY,
Mr. F.T. Thwaites, Geologist,
Madison, Wisconsin.

Gentlemen:

I have your favor of December twelfth regarding the Wilton dam in Monroe County.

The operated head at this dam is about ten feet, and there are two wheels installed, one of 25 h.p. and the other of 10 h.p., making a total of 35 h.p.

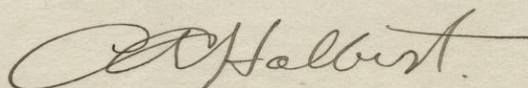
According to our records there are eight dams in all in Monroe County. The local name and the general location of these dams is as follows:

Cataract Dam, located at Cataract, on Big Creek.
Leon Dam, located at Leon, on the Little La Crosse River.
Angelo Dam, located at Angelo, on the La Crosse River.
Bunnell's Dam, located in the city of Sparta, on Beaver Creek
City Mills Dam, located a couple of miles southeast of the city of Sparta, on Farmers Valley Creek
Gilman Dam, located just south or on the southern edge of the city of Sparta, on the La Crosse River.
Vogel Dam, located at Wilton, on the east branch of the Kickapoo River.
The so-called Paper Mill Dam, which is now used for electric purposes, located in the city of Sparta, on the La Crosse River.

We have quite complete information concerning all of these dams, including photographs, etc.

Yours very truly,

RAILROAD COMMISSION OF WISCONSIN,



CAH/f

Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WASHINGTON
C O P Y

March 19, 1926.

Memorandum on Sparta-Tomah folio

I have read, with care, the section on the military geology of the Sparta Target Range intended to be a part of the Sparta-Tomah Folio, Wisc. My editorial suggestions are numerous and are recorded on the tissue carbon.

I believe that this discussion contains valuable matter which will add much to the folio and will give it great utility in the instruction of troops. In view of the fact that the area contains few mineral deposits and the justification for its publication is largely in a practical way the application of geological knowledge to military operations and instruction should not be overlooked.

However, I believe that the author should discuss in detail each of the unconsolidated formations in the same way that he has discussed the military applications of geology for the St. Lawrence formation, Franconia sandstone, and Dresbach sandstone.

(Signed) Kirk Bryan, Geologist.

*I do not
favor publication
of this section by
Survey
H. D. M.
G. R. M.*

C O P Y

April 1, 1926.

Memorandum in regard to the manuscript on ground water in the Sparta-Tomah, Wisconsin, geologic folio.

This manuscript was carefully examined and technically edited by Mr. Kirk Bryan. He has revised the manuscript extensively, but it should be understood by the authors that his changes are only in the nature of suggestions and with no idea of finality.

The artesian conditions, as described for this area, are similar to what has been found in other parts of the large Paleozoic artesian basin of this region. The suggestion made on page 168 that the highlands are intake areas for artesian water by percolation through overlying rocks where the artesian aquifer does not outcrop agrees with what has been found in other areas. The suggestion was first made by T. C. Chamberlain in the 5th Annual Report and was developed by me in Water-Supply Paper 256, and to some extent in later reports. It is commonly found that on the uplands the water level in a deep well goes lower and lower as the well reaches successively lower formations, whereas in the lowlands the flowing wells are obtained in the deeper formations, the overlying formations being either dissected or with water under too slight pressure to rise to the surface. In many places the head of the water from the deep formations, relative to sea level, is higher in the uplands than in the lowlands even though the uplands are in the opposite direction from the outcrops of the artesian aquifer.

These conditions are illustrated in this manuscript. However, I question whether the conditions are so extreme as shown for the Sorge well in Figure 21. According to this figure, and the manuscript, the Dresbach sandstone is only partly saturated and contains a true water table with the water in the overlying formations perched. If this is correct, the Dresbach sandstone in this locality has no artesian pressure whatever, and the conditions must change rather radically from here to other localities where this sandstone yields artesian flows. I question whether there is any true water table, or whether the overlying water is truly perched. I think the conditions are more likely to be what I have called "semi-perched" in Water-Supply Paper 494. I wonder how well authenticated the data are on which the diagram in Figure 21 is based.

The term "artesian gradient" is used in a double sense, -- meaning the ratio of the change in head to the horizontal distance, and also in the sense in which the term "grade" is commonly used, such as a railroad grade. The latter use, although perhaps not entirely incorrect, is an unusual usage which tends to confuse the manuscript. The term "artesian gradient" is itself a rather ambiguous expression. The terms "pressure gradient of the artesian water" and "hydraulic profile" would seem to no better express the two ideas involved.

In the legend "artesian well" apparently means a flowing well; the expression should be "flowing well" or "artesian flowing well." Unfortunately in earlier folios the expression "artesian well" has been used for nonflowing wells, which may not be incorrect but is misleading.

The expression "artesian area" is also ambiguous and has been used with various meanings. Instead of "limit of artesian area", say "limit of area of artesian flow". Could this area be better shown on the map with a pattern superimposed on a color?

"Artesian contours" is also a vague expression. I would say "Lines showing height above sea level to which the artesian water will rise in wells," or else use a technical term such as "isopiestic lines".

In some places on the maps there is rather a wide disagreement between "artesian contours" and "topography" and "areas of artesian flow". Could these be more closely adjusted? Obviously, the most uncertain of these three are the so-called artesian contours because the wells probably do not all end in the same stratum, and moreover, there may be loss ~~and~~ of head by leakage, as is explained in the manuscript.

(Signed) O. E. Meinzer,
Geologist in Charge,
Division of Ground Waters.

C O P Y

Memorandum on manuscript of

Sparta-Tomah, Wisconsin, Geologic folio.

Surface water supplies page 173.

The point of measurement of La Crosse River should be stated. I presume it is the gaging station near West Salem, drainage area, 412 square miles. Records have been collected at this point since December 1913. A summary of the records for 9 years, 1914 to 1923, is published in Second Report of the Railroad Commission of Wisconsin on Water Powers. These records show that flow was below 200 second-feet for nearly 18 per cent of the time during the 9 years ending September 30, 1923. The minimum flow during the period was 100 second-feet, which occurred in December, 1922, and in February, 1923. The maximum daily discharge was 2,830 second-feet in February, 1922. The yearly runoff in inches ranges from 8.6 inches in 1923 to 11.9 inches in 1918 and averages 10.3 inches for the 9 years. The statement in manuscript probably should read "between 10 and 11 inches".

(Signed) G. C. Stevens
April 2, 1926.

Hwaiter

316 - Wis.

November 16, 1926.

X ref - 038.4

Memorandum to the Acting Chief Geologist:

The accompanying material including text, maps, and other illustrations for the Sparta-Tomah folio in the driftless area of Wisconsin has been examined by me and appears to be suitable for folio publication after further criticism. It should be examined by Mr. Ulrich and later by the Committee on Geologic Names and the Physiographic Committee. The material is being transmitted to you for such references.

My examination of the material, although a preliminary one, has required considerable time in rearranging and eliminating some of the manuscript. I am not in favor of the Survey's publication of the full section on the Military Reservation. It seems to me that the reports issued by the Geologic Branch need not discuss so fully military matters, unless the reports giving such a full treatment are published by the War Department. After the Sparta-Tomah material has been examined by all the critics I desire to give it a final careful reading before it is sent to the authors for further consideration and necessary changes.

Hugh D. Miser
Geologist in charge,
Section of Areal Geology.

HM-S&S

- To Chief Geologist - 11/17/26
- To Mr. Ulrich - 11/17/26
- To Mr. Miser - 2/21/27
- To Mr. Alden - 3/1/27
- Returned to Mr. Miser - 3/3/27
- To Com. on Geol. Names - 3/4/27
- To Physiographic Committee -- 2/20/28
- To Chief Geol. with attached memo from Mr. Campbell, dated Jan. 19, 1929 - 2/8/29
- To Mr. Mansfield - 3/25/29
- To Chief Geologist - 3/25/29

TO OPEN FILES -- March 22, 1930.

Jan. 19, 1929.

Memorandum to the Chief Geol. regarding the manuscript for the Sparta-Tomah, Wisc., folio.

Some time ago I took up this manuscript to examine it for the Physiographic Committee, but found it so unsatisfactory that I thought nothing short of complete revision would put it in shape for Survey publication.

Recently, however, Mr. Lawrence Martin called at the Survey in regard to the manuscript and he offered to withdraw it and, after some modification, to submit it to the State Geologist who, he says, is anxious to publish it.

As I feel sure that in its present condition it will not pass the Survey critics, and as there is little prospect of having it completely revised by the authors, I recommend that the Survey return the manuscript to Lawrence Martin with permission to have it published by some other organization. This will relieve us of a serious obligation and permit the material to be published and made available to those interested in this part of the State.

M. R. CAMPBELL

Chairman, Physiographic Committee.

C O P Y

Report on manuscript for the Sparta-Tomah folio.

By E. O. Ulrich.

Feb. 21, 1927.

TO WHOM IT MAY CONCERN:

Nearly three months have passed since this manuscript and illustrations came into my hands with a request from Mr. Miser for critical reading and comment. Shortly after its receipt it was read, and the reading left an unfavorable impression. Fearing I might be prejudiced I laid it aside for a second reading after the holidays. Other duties delayed this till late in January, when Mr. Ira Edwards of the Wisconsin Survey, who has devoted the past three field seasons to a painstaking survey of the adjacent Kendall and Marston quadrangles and is thoroughly competent to speak of the lower Paleozoic stratigraphy and faunas of Wisconsin, arrived in Washington to continue his work with me on the Cambrian faunas of the Upper Mississippi Valley. After my second reading of the manuscript I asked Mr. Edwards to do so also. His reaction being essentially as my own, the following comments on the folio manuscript and illustrations may be accepted as consisting of views held in common by us.

On my own account permit me to say that in view of the fact that the Wisconsin State Survey has completed the survey of the two quadrangles next to the east of the Tomah quadrangles and that the report on these is being written in an up-to-date manner I question if the Federal Survey can afford to publish the Sparta-Tomah folio without very considerable modification of matter now in it.

To begin with, this manuscript contains much that does not seem fit to form part of a Survey folio; also many definite statements concerning speculative matters on which the authors were not then qualified to speak with authority. They had neither the physical nor the faunal data required to gain a proper conception of local conditions in Paleozoic ages. On the other hand the manuscript lacks much available information concerning Wisconsin Paleozoic stratigraphy and history that ought to be in it.

The descriptions of the Cretaceous ? and Pleistocene deposits are in great detail, and we have no improvements to offer concerning these. Likewise the parts of the geologic history dealing with these later periods seem uncommonly good and show considerable original work and thought. So far as known to us no published account brings together so much reasonable matter relating to the history of the development of the present topography. We agree thoroughly with the conception of cuesta formation as herein outlined and not with the too generally accepted view that the benches and ridges are remains of former pane-

I believe the
should be put
in the discarded
material, since the
Geol. Survey. Com. has
evaluated suggestions
in mss. A. W. Mearns

plains.

It follows then that our criticism pertains almost entirely to those parts of the manuscript which deal with the stratigraphy, structure, and geologic history of the Paleozoic formations. As regards the mapping of the formations we have no evidence warranting complaint except, as will appear presently, the neglect to discriminate the Mazomanie formation. However, in this case the oversight and resulting confusion may be pardoned because at the time of their work in these quadrangles it was thought that this formation did not extend into their area.

Lower Paleozoic Stratigraphy

In general the descriptions of the formations need amplification by the addition of stratigraphic details and a consideration of the paleontology involved. The facts given can be applied only in the most general manner and are often so misleading that there is danger in using them as guides for field work. In view of the obvious neglect of Paleontology one can not avoid questioning the authors' exact identification of the several subdivisions of the formations. In fact it seems doubtful in many cases that any definite boundary was recognized as defining the limits of a formation. Their composite section in no way adequately represents the present state of knowledge concerning the Upper Cambrian of the Upper Mississippi Valley.

In the case of the Dresbach formation no upper boundary is designated in spite of the fact that a considerable unconformity is determinable in almost every exposure. As a result some 40 feet of Ironton sandstone, which in the prevailing classification makes the basal member of the Franconia formation, has been included as the upper part of the Dresbach even in the typical sections cited.

The overlying parts of the Franconia formation are treated with even poorer understanding. The five principal divisions of the Franconia have been correctly divided on lithologic criteria; but the authors failed entirely to observe that beds distinguished by me under the name Mazomanie formation and which closely simulate but succeed the two uppermost of the Franconia members are present over a considerable part of the area mapped by them.

Coming to details our criticism of the treatment of the Franconia may be given as follows:

(1) The discussion of the Ironton member is entirely inadequate. There is no mention of it as being the initial sediment in a newly warped basin; no notice of the geographic or stratigraphic distribution of the fossil-bearing strata; no recognition that there are fossil-bearing strata in it and that it is a marine deposit and not a beach or continental deposit as the underlying true Dresbach almost certainly is.

(2) The section dealing with the micaceous shale can be enlarged to about three times its present size by the insertion of the palaeontological facts necessary for an understanding of the geologic history recorded here.

(3). The lithology of the lower greensand is well described, and a few fossils are listed. But there is no mention of the considerable number that are really diagnostic of these beds.

(4) The two following members, the yellow sandstone and the upper greensand, have been confused with the similar beds which here represent the Mazomanie formation. As a rule, especially in the western half of the State, the Mazomanie is not readily distinguished from the next underlying members of the Franconia without recourse to fossil evidence. As the authors made little or no use of this readily procurable means the repetition and confusion of the two superposed and really quite distinct pairs of beds was never suspected.

(5) The list of fossils given for the Franconia formation is entirely useless.

(6) For the reason stated above there is no consideration of the Mazomanie formation as such.

The description of the Trempleau or St. Lawrence formation, as it is called in this manuscript, is not up to present information even as regards the lithology and sequence of its members. Moreover, the brief list of fossils is very inaccurate, and there is no suggestion that the various faunas are restricted to certain beds. Nor is there any discussion of the geographic distribution of the several members included in this formation.

The upper part of the Jordan formation being unfossiliferous may therefore be said to be treated more completely than any of the Cambrian beds. But even in this instance improvement is readily possible and desirable.

The existence of the Madison formation is questioned in spite of the fact that the unconformity at its base is the most strongly marked break in the entire series of rocks in this region. In the section given by the authors the conglomerate marking this unconformity is noted, but its existence apparently meant nothing to the observers. Close inspection probably would have revealed the presence of fossils characteristic of this formation in its type locality as it has in the adjoining Kendall quadrangle and in nearby Richland center area.

The Oneota dolomite is described in a way that corresponds to the characteristics shown by it in the adjoining Kendall quadrangle. How-

ever, the probable statement that the overlying Shakopee formation is entirely absent from this area is rendered somewhat unsafe by the fact that the lower part of this formation was observed by us at Cashton only three or four miles south of the border of the Sparta quadrangle.

Structure

In general the geologic structure corresponds with what is to be expected. It is true that the anticlinal structures run nearly at right angles to those on the adjoining sheet, but this is probably correct as the summits of the ridges seem to indicate the direction of the anticlinal folds and these summits also turn at right angles to their course farther east. The amount of folding is also of about the amount determined on the Kendall and Mauston sheets, hence may be accepted as correct. However, the statement that the origin of the folds was contemporaneous with that of the rocks requires some qualification. That some at least of these minor anticlines were formed long after the consolidation of the rock is indicated by the fact that the variations in the thickness of the beds often has no apparent relation to the present structure of the region. So far as observed by us there is no great change in the thickness of the beds throughout the two quadrangles. In fact most of the variations noted by the authors in the Franconia as mapped by them are ~~due~~ occasioned by the failure to recognize the similar overlying beds of the Mazomanie. Whatever other variations are present seem due to the oscillations of the old pre-Cambrian axis of central Wisconsin rather than to the minor warping of the flanks of that axis.

Paleozoic part of the geologic history

The geologic history of the Cambrian period is so general as to be of no value. There is no consideration of the Paleogeography of the time; of the direction of invasion; or of the variations of the extent of the seas which are responsible for the various rock formations of the Cambrian. One gets the impression that this deposition occurred in a single sea which dried up once in a while and then reappeared after a hard rain. The fact that the shoreline of at least one of these invasions actually crossed the quadrangles in question is not even hinted.

Respectfully submitted

(Signed) E. O. Ulrich

Feb. 21, 1927.

Sparta-Tomas Bulletin

Notes by W. C. Alden, Feb., 1927.

Fig. 1. Instead of map of physiographic provinces of whole U. S., use part of larger map with subdivisions and put names on. Use latest revision available at time of publication and revise title in accordance therewith.

- P. 5. Revise title of fig. 2.
P. 12. " " " " 3.
P. 15. Insert title.
P. 16. Where is table of rainfall?
P. 83. Windrow formation, Cretaceous or Tertiary?
P. 89. Looks to me like desert polish on such pebbles as I found on the Baraboo bluffs and in Mitchell County, Iowa. In Floyd County, Iowa, are remnants of friable sandstone overlying Devonian. I think the pebbles here are also polished. Similar pebbles are abundant in Cretaceous conglomerates of the Rocky Mountains in Wyoming and Montana. The older drifts in Iowa contain much of such polished material. Even if originally from Cretaceous conglomerate, the pebbles may have been rehandled by Tertiary streams repeatedly before the valley cutting.
P. 95. Slight change.
P. 96. See insert suggested
P. 97. Is the most of the loess of Wisconsin age here?
P.107. Is the highest gravel terrace on the Mississippi River Wisconsin outwash?
P.113. Main loess in Ill. and Ia. pre-Wisconsin.
P.129. I think there is some reason for thinking the gravel in northeastern Iowa similar to the Windrow gravel was deposited on a plain or in broad valleys rather than in narrow, steep, sharp valleys, and especially if these are regarded as of Cretaceous age.
P.141. The conclusion is stated somewhat better at top of p. 141, especially as applied to the Sparta-Tomah region. I suspect that such things as the Bridgeport terrace near the mouth of the Wisconsin River, and some things in northeastern Iowa, indicate that there has been more than one cycle of erosion. It should be remembered that peneplain (not peneplane) does not mean a flat or even nearly flat plain. Don't forget the pene. The type peneplain of central Massachusetts never was devoid of relief.
P.147. Suggest insert re time estimate.
P.149. " slight changes.
PP.150- " " "

Pp. 153-155. I have not examined the gravel terraces along Mississippi River, and I have not the data at hand for a positive statement, but I am wondering if the upper gravel terrace remnants there are not of pre-Wisconsin age. I think such upper terraces on tributaries in northeastern Iowa are of pre-Wisconsin age, some of them probably Iowan. If that is correct, may not the Qht loess-covered terrace in the Sparta-Thomas area also be pre-Wisconsin as well as the older (Qot) terraces? (Ask Leverett).

P. 156. Is not Qot the high terrace at Tomah, or is Qht referred to as being graded up to Lake Wisconsin? The statement is ambiguous. Was there a pre-Wisconsin Lake Wisconsin?

Notes on Sparta Quadrangle

by G. R. Mansfield

I agree with Miser that the section on the military geology of the Sparta Target Range should not be included in this bulletin. Figure 6, which relates to that section should also be omitted. Possibly this material, if presented in suitable form, might be acceptable to "The Military Engineer".

I question the value of Figs. 9, 10, 11, 12 and 16, which relate to the mechanical analyses of specimens from different formations. This matter is in general discussed so briefly as scarcely to warrant five illustrations. On the other hand, a full discussion would not be appropriate for a bulletin such as this, when no special problem is presented on which these data would have any particular bearing. Presumably these data might be of interest in ground-water problems but such problems are in general beyond the scope of this report and are not presented in any detailed way.

Figure 8 is useful in showing the border of the Driftless Area and the general location of pre-Cambrian areas together with the location of certain streams and towns to which reference is made in the text. Little use is made of the general geology and most of it could be omitted and the figure greatly simplified.

Figure 3 is practically only a detail of Figure 2 and could also be omitted but some names should be transferred from Fig. 3 to Fig. 2, and some other names added. Possibly Fig. 8 and Fig. 2 could be combined without any essential loss.

Pages 2-3. This section could well be made over into an abstract or summary of the report as a whole -- something that the report now lacks.

Page 8 - authors would better bring review up to date.

- 13 - Fig. 4 does not well illustrate idea of "double valleys".
- 14 - Editorial suggestion
- 16 - Table lacking
- 21 - Colluvium not much used (?) by Survey
- 24 - Note on fig. 8.
- 61 - Billingsella ?
- 74 - Calcareous, presumably
- 109 - Omit analysis and some accompanying matter.
- 111 - Greater clay content ?
- 113 - Shows it
- 114 - What is 8
- 118 - Two comments
- 119 - Three comments

Page 120 -Relative thickness, etc.
124 - In some places
137 - Solely ?
139 - Complete list of symbols
140 - Two comments
145 - Supported ?
146 - See note
147 - Substitute
151 - Apparent disagreement
152 - Two comments
153 - Two comments
154 - Location of Neshonoc
156 - + See Fig. 8; editorial suggestion
157 - Two queries
159 - Dele or explain "etc."
161 - Doubtful statement needs qualification
162 - Deletion ?
164 - See note
165 - Filthy
166 - Two suggestions
168 - Almost
172 - Bed rock ?
173 - Two comments
173^e-174 Agreement needed
177 - Into

Copy to E. F. Bean

May 23, 1932.

Dr. W. C. Mendenhall,
Director, U. S. Geological Survey,
Interior Building,
Washington, D. C.

My dear Mendenhall:

This is to acknowledge my receipt of your letter of May 20, with respect to the bulletin on the geology of the Sparta and Tomah quadrangles, Wisconsin, and to express my belief that Dr. Thwaites, the senior author of the folio, who should also be the senior author of the bulletin, will agree to the general plan which Twenhofel and I have worked out with you on his behalf and our own.*

Your cordiality and cooperation in connection with this transaction are highly appreciated.

Very sincerely yours,

(Signed)
Lawrence Mearns

LM:CG

* & that of the
A. H. S. Geol. & Nat. Hist. Surv. (I should
have said) since you paid for the field work)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON

JUN -3 1932

Dr. E. F. Bean, Director,
Geological and Natural History Survey,
Madison, Wisconsin.

Dear Doctor Bean:

The other day at the instance of Doctor Twenhofel and Colonel Martin a conference was held here with these gentlemen and Mr. G. R. Mansfield to consider the status of the report by Thwaites, Twenhofel, and Martin on the Sparta and Tomah quadrangles, Wisconsin. The results of this conference are indicated in the inclosed copy of a letter written to Doctor Twenhofel shortly afterward. I think you may desire this copy as a record of the present status of the matter.

Yours very cordially,

W. C. Cushman

Director.

Inclosure 229702.

Personal +
Confidential
Sparta - Omaha
Quest.

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TELEPHONE SERVICE RECORD

Dear Bean: Date _____ Hour _____ What is the status

Received by _____ of your old Bull. 36?

From _____ If not all printed, bound,

Subject: _____ and distributed, (or otherwise
unfeasible), I'd like to

introduce a reference to

1. Answered by _____

2. Referred to:

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss _____

Mr. _____

Loyal Duane's paper
on ~~the~~ "The

~~book~~ "Geographic Regions

of Wisconsin" (Annals

Assoc. Amer. Geog. Soc., VII,

22, 1932, pp. 55-56) I. Put
it at the end of chapter I.

I nearly burst

3. Cleared _____ with combinations of

key and tags, last Friday. If you
had my been there!

If Henry and I were having a
chat with Nordaallee about

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(2)

TELEPHONE SERVICE RECORD

Date..... Hour.....

Received by.....

From old Sparta - Tomah. I builtSubject: a fire under Twenny a few
weeks ago as Fred has
probably told you. The

1. Answered by.....

2. Referred to: outcome was that

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss.....

Mr.....

it is to be published
as a bulletin and
that I'm to head off
by revising the physiography
a little, and then back

3. Cleared.....

to Thwaites. Shoot me any
dope you have that will be
helpful, please.My month was due to

TELEPHONE SERVICE RECORD

Mansfield is having

Date _____ Hour _____

Received by read ^{along to us} the whole of Ulrich's

From detailed explanation as to

Subject: Why the report should never be published. It

hit W.H.T. pretty hard

1. Answered by _____

2. Referred to: in places & at

- Miss Banks
- Dr. Brigham
- Miss Egli
- Miss Gilluly
- Mr. Johnson
- Col. Martin
- Mr. Norbeck
- Mr. Tate
- Miss _____
- Mr. _____

times, for Uncle Edward was blunt, rough, and specific. Tenny's pet ^{of recent years} (that alibi) ~~physiog-~~ reply held up the

ans off - repeated

3. Cleared _____

(publication) was completely ruined by 4 facts. It was not considered necessary to have Mansfield read ~~them~~ Campbell's physiographic suggestions to us & to

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4

TELEPHONE SERVICE RECORD

Date _____ Hour _____
Mendenhall, (2) it was

Received by _____ explained that Compton

From _____ had never read the whole

Subject: discussion of physiography
though, (3) I was advised
not to go see him,

1. Answered by _____ as I suggested my doing,

2. Referred to: (prior to revising the

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss _____

Mr. _____

MS), & (4) was told
by Mendenhall to feel free
to ignore his
criticisms if they
did not appeal to3. Cleared _____ me. Of course I shall consider
each one carefully, & ask Thurston to do so.

My rage during this

conference was based on three

things: (1) Tenny was crude &

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5

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urgently to the Director

TELEPHONE SERVICE RECORD

(as he always is, unconsci-

Date _____ Hour _____

Received by only, & at times, damn it).

From _____

Subject:

② He flatly refused to

take the folio over with

Ulrich (which is a mistake;

& you may want to make him do it;

1. Answered by _____

2. Referred to: E. O. U. has his

Miss Banks hobbies & rides 'em

Dr. Brigham

Miss Egli HARD; but so does

Miss Gilluly

Mr. Johnson Twenny & not vastly

Col. Martin less experience; in

Mr. Norbeck

Mr. Tate

Miss _____

Mr. _____ their application to

3. Cleared _____

our physiographic phenomena

I'd rather trust Thwaites

and your choice between Twenny's

own theories & Ulrich's than

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TELEPHONE SERVICE RECORD

Date..... Hour.....

Received by to first Twenny's, -From backed up by other WisconsinSubject: Stratigraphers & paleontologists).1. Answered by (3) He calmly proposed2. Referred to: to Nendoball that he would like

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss.....

Mr.....

3. Cleared evidently to do some ofTwenny's work in filling ~~the~~ the lacunae pointed out by(Ulrich) I merely murmured that Thwaites & I might like to

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⑦

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TELEPHONE SERVICE RECORD

Date..... Hour.....

Received by.....

From

consider that matter, &

Subject:

Mendenhall, who saw the

point at over, spoke of
possibly having
chapters by individual

1. Answered by

authors, but Twining

2. Referred to:

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss.....

Mr.....

Hie thinks he's going
to wish of new

authors on this bulletin.

You'll back me

up, I hope, & encourage

3. Cleared

Fred to do so. This

Sparta-Towah folio was originally
invented by Hotch & you & me
at some such thing. Fred did
the bulk of the field work. We

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⑧

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TELEPHONE SERVICE RECORD

Date..... Hour.....

Received by two took in Twenty, afterFrom the field work was well under way and
while he was stuckSubject: met behind the ears
(in Wis. geology). And I'll

1. Answered by.....

2. Referred to:

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss.....

Mr.....

be goddamned if
he's going to
submerge Thwaites,
the senior expert, be it remembered,
(or another one in
paleontologists).

3. Cleared.....

My rage was soon
over but my determination
remains; & I'm ashamed to have to
be ashamed of a Wisconsin professor.
Show Fred this letter, if

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⑨

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TELEPHONE SERVICE RECORD

Date _____ Hour _____

Received by you think he can retainFrom its source in discretionSubject: in strict confidence, &
not burst. And with1. Answered by me what you think about2. Referred to: it all.

Miss Banks

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss _____

Mr. _____

3. Cleared to publication.

With warm regards to your
family, the Dept. Geol., & yourself

AM.

TELEPHONE SERVICE RECORD

Date..... Hour.....

Received by.....

From P.S. We didnt mess up

Subject: the maps in ^{no.} Bee. 36 ~~36~~

to show everybody's new ideas of
the limits of the Driftless Area,
but for this Sparks-Tomah

1. Answered by.....

2. Referred to: U.S.G.S. bulletin 9

Miss Banks think we showed.

Dr. Brigham

Miss Egli

Miss Gilluly

Mr. Johnson

Col. Martin

Mr. Norbeck

Mr. Tate

Miss.....

Mr.....

Can't you get
F.T.T. to compile it (the
whole, not just the Wisconsin portion)
on large scale? He
knows much more about
the glacial geology of the

3. Cleared Middle West today than
Floverett or Maeder or your Illinois,
Iowa, & Minnesota neighbors.

I mustn't forget to pay you
that bet I owe you.