Jany 8th 1868 – Specimens of fish teeth sent to Mr. St. John

1	Petalodus destructor –	1 Sp. Rockbluff
1	Diplodus	Rulo Neb.
2	Cladodus	Rockford
1	Cladodus (fragment)	Rockbluff
1	Ctenoptychius	Bellevue Neb

Meek

of the method proposed, and not

ages & Periods, as follows:

Age

11. Chemung Period
    - 11a. Portage Epoch
    - 11b. Chemung Epoch
12. Catskill Period

Carboniferous Age

13. Subcarboniferous Period
    - 13a. Lower – (Black Limestone Shale, Burlington Limestone, Encrinital Limestone of Mo., Silicious beds of Penn.
    - 13b. Upper. Lower Archimedes & beds above
14. Carboniferous Period
    - 14a. Ep. of Millstone Grit
    - 14b. " Lower Coal Measures
    - 14c. " Upper Coal Measures
15. Permian Period

Reptilian Age.

16. Triassic Period
17. Jurassic Period
18. Cretaceous Period

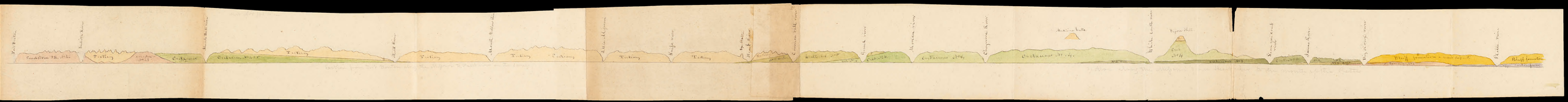
Mammalian Age.

19. Tertiary Period
    - 19a. Claiborne Epoch, or Ep. of Lower Eocene
    - 19b. Vicksburg Epoch or Ep. of Upper Eocene
    - 19c. Yorktown Epoch or Ep. of Miocene
    - ? 19d Ep. of Pliocene
20. Post-Tertiary Period.

on the

be omitted

Cretaceous


Pine Ridge
Cambridge Pt. 1784
Indian River
Trotting
Cambridge 1784
Indian Bluff Creek
Cockaseum 1784
Trotting
Bluff River
Trotting
Alcock Bluff Creek
Trotting
Trotting
Little Cypress
Trotting
Bluff River
Trotting
Big Cypress
Bluff Creek
Cockaseum Bluff Creek
Cockaseum 1784
Cabin Creek
Cabin Creek
Alcovy Creek
Cockaseum 1784
Alcovy Creek
Cockaseum 1784
Alcovy Creek
Cockaseum 1784

on the Cretaceous & Tertiary
The numbers might as well
be omitted.

This is intended as a specimen of the method proposed, and not as accurate in geology. —

The numbers refer to the ages & Periods, as follows:

1. Azoic Age

Silurian age.

Lower Silurian

2. Potsdam Period
   - 2a. Epoch of the Potsdam Sandstone
   - 2b. Epoch of the Calc. Sandrock
3. Trenton Period
   - 3a. Epoch of Chazy L.
   - 3b. " Birdseye L.
   - 3c. " Black River L.
   - 3d. " Trenton L.
4. Hudson Period
   - 4a. Epoch of Utica Slate
   - 4b. " Hudson R. Gr.

Upper Silurian

5. Niagara Period
   - 5a. Epoch of Oneida Conglom.
   - 5b. " of Medina Sandstone
   - 5c. " Clinton Gr.
   - 5d. " Niagara Gr.
6. Onondaga Period
7. Lower Helderberg Period

Devonian age.

Lower Devonian

8. Oriskany Period
   - 8a Ep. of Orisk. Sand.
   - 8b. " Cauda-Galli G.
9. Upper Helderberg Period
   - 9a Ep. of Schoharie G.
   - 9b. " Upper Helderberg
   - ? 9c. " Corniferous

Upper Devonian

10. Hamilton Period
    - 10a. Ep. of Marcellus shale
    - 10b " Hamilton Gr.
    - 10c " Genesee Slate

Carboniferous age.

11. Chemung Period
    - 11a. Portage Epoch
    - 11b. Chemung Epoch
12. Catskill Period

Reptilian age.

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    - 13a. Lower (Black Lingula Shale, Burlington Limestone, Encrinital Limestone of Mo., Silicious beds of Tenn.
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    - 19a. Claiborne Epoch, or Ep. of Lower Eocene
    - 19b. Vicksburg Epoch or Ep. of Upper Eocene
    - 19c. Yorktown Epoch or Ep. of Miocene
    - ? 19d Ep. of Pliocene
20. Post-Tertiary Period.

The plan consists of —

1. Numbers for each Period, according to the Table — These numbers will not change ~~be changed~~ ~~be changed~~, whatever the changes that may take place hereafter in American Geology. The lettering for epochs may differ in different regions.

2. Distinguishing the ages by a difference of Color. — I propose for the Azoic Carmine — the Silurian purple — the Devonian, burnt Sienna — the Carboniferous, blue — the first two Periods of the Reptilian Age, a brownish red (Dragon's blood is used); the last, or Cretaceous Period, green — the Tertiary, yellow. — There is no objection to changing if it is thought best.

3. making a heavy black line as the limits of the ages —

4. a heavy dotted line thus -------, as the limits between the Periods

5. a fine dotted line, as the limits of the Epochs, thus ....., when it is thought best to insert these. They are on the regions 13 & 5 & 19.

6. Distinguishing the Lower & Upper Silurian by ~~no~~ lining the Lower thus ///// — the Upper thus \\\\\ ; also the Upper Devonian from the Lower (making this division for the convenience of the map) by lining the Lower thus |||||||| , & the Upper ≡≡≡

7. Distinguishing the Periods in the Lower Silurian by making the lining of the Potsdam very close, & thereby dark; of the Trenton, less close; of the Hudson much less close and thereby quite light. The lining in the Specimen is of this kind, but the distances between the lines are made too great for the engraving. — So for the Upper Silurian, the same distinctions between the three Periods in order. — So also a like distinction for the Devonian, between the regions 8 & 9, and between 10, 11, 12. There is no need of any lining on no 12 and so it is left in the Specimen.

8. Distinguishing the Carboniferous Periods as in the Specimen.

9. On 16, 17 no lining seems to be necessary; but it can be used on one of them if best. For the Eastern Trenton-Jurassic — the Color is all that would be required.

10. For the Cretaceous & Tertiary ~~only~~ Color alone is necessary.

11. The boundaries of the States had better be inserted but not their names. Also the larger rivers & some names of places of geological interest.

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Meek

Prisconaria Con.
Am. Coneh. III, 10, 1867
Coal M. Little Stringer Co. Ken

Pet Bunn's Bibliography of Am. Conch. for Mr. Scarborough

Schizodus cuneatus, Mc H.
Up Coal M. Posey Co.
Northern Ills about same horizon as Springfield coal
Seems to be the same species
by Smith & S. Kopicka

Colon Pl Hawin, Smith, Springfield
Coal No Western collection

T 2

all

Memorandum July 11th 1867

Recd. from Mr. Haley on a note Mr. Scarb. holds against him for $200 left with me for collection $446 — in March 1859 —

Also from Mr. Scarborough Aug 4th 1862 one hundred dollars and Ap. 26th 1862, two hundred dollars - and ~~Ap. 26th 1862~~ May 1863 - $125-50. but on note held against him.

Rec'd on at St Joseph - $
$200 - from Mr. Scarb
1867

Washington May 17th 1867

Started for Chicago at 7 o'clk A.M.

Arrived at Chicago, 9 o'clk P.M. Saturday 18th. Started from Chicago Monday evening at 10½ o'clk for Iowa City where we arrived Tuesday 21st at 12 o'clk M.

Saw in Dr White's collection, a fine specimen of Pl. hemisphaericus Shumard, showing the upper parts. The 2 terminals have each a very prominent or distinct white tegument or protection (?) [illegible] Each of these infoldings in each of the [illegible] sloping sides ~~two~~ can be seen [illegible] above which each cone is made up of a double series of pieces like [illegible] 14 in whole, [illegible] closely together on each side and can be traced up [illegible] the upper [illegible] [illegible] Arthrocanthus is more [illegible] I do not know if [illegible] Brown has the same kind of [illegible] Also Pl. [illegible] I am now [illegible] that these [illegible] differ [illegible] the cones [illegible]

White's sp. is from Mo. [illegible] you [illegible]

Some in Dr. White's collection good speci-
mens of the Shell (Pecten) figured by Lamarck
as ~~this~~ Ann. Hanomanni: they are the
same as M. Swallowi, M.&C. Others
preserved specimens display a very light
ribbed & strong marginal point indications
of very fine radiating striae. Some of
the specimens agree well with Lamarck's figure
others are a little more lobed in form
White, and Jordan's [illegible]
a true Pecten.

White has also in his collection [illegible]
from Fossil figures of ~~C. [illegible]~~
Spondylus Gabbi, Meek. Numerous specimens
in White's collection agree well with this figure.
Some of the same species have been recognized
in the Cretaceous, and Dr. [illegible] thinks that
it may be a true Gabbi.

The fine valve of the Gill genus called
Pecten Cosmopolitus has a prominent mesial line
extending from the umbo to the [illegible]
Prof. Meek's Fossil is closely [illegible] to
some of the Pecten [illegible]

Thursd. May 20. 67

Left Fort at 7 this morning with [illegible]
Mr. Gill and the Sol. [illegible], in camp we got
Came on best part of the way [illegible]
Hanchem Bend [illegible] Stopped for
the night at 2 miles [illegible] 5 P.M. [illegible]
we are here on the Silurian Limestone, strata
is rocks dip [illegible] some granulations of Sand
Stone, N.W. [illegible] Bluff [illegible] Based on a
[illegible] and is [illegible]. Air rather cool

Friday morning 21.

Morning clear, with a [illegible] breeze
Country been [illegible] since we left the
[illegible] - the beautiful grassy bottoms and
everything in the most [illegible] order. Soil
not so black as prairie land [illegible] - mostly
prairie - with a good deal of timber [illegible]
bottoms - [illegible] on most of the [illegible]
some [illegible] Shallow, [illegible]
Came to the Rest of Montgomery [illegible]
[illegible] where we camped for the night [illegible]
[illegible] distance [illegible] Montgomery, [illegible]
[illegible] with [illegible] [illegible]
[illegible] new forest [illegible]

[illegible] lighter in color and more sandy – more
[illegible] with shattering oaks and other timber.
[illegible] some Pigeons, Snipes, Ducks and
[illegible] – saw at a distance the common
gray squirrel and [illegible] the same size but
with [illegible] and [illegible] tail. [illegible]
[illegible] Indians [illegible]
[illegible] Miller [illegible]
[illegible]
[illegible]

Saturday Eve, 25 [illegible]

[illegible]

[illegible]

The Capt. left 2 days S.W. Got a tolerable good
bed [illegible] of Rest.

At Peoria, Mahaska Co. Iowa, we
saw outcrops of St. Louis Li. 70 to 90 feet below
summit of country. It is quarried for building
purposes, and a mass was having [illegible] with
caps &c. at the [illegible], we collected here Spirifer
Keokuk, a small Productus, a Hallonia
a Trilobite (Phillipsia?) a Glyphocella
Allorisma &c. Some of the layers appear
to be oolitic.

Came on and camped near Skunk river.
The country here is exceedingly beautiful and
very rich – slope gentle, with rich alluvial
bottoms – beautiful elm – & other trees along
the streams and little groves.

Sunday May 26

Morning clear and pleasant. Had an excellent
breakfast on Baked Prairie Squirrel, killed at
noon. Killed yesterday.

[illegible] at 2 o'clk A. Stopped at Skunk river
[illegible] so that we had to cross nearly half a
mile from shore to the bridge, along an embankment
(not bridge-work) [illegible] on east side) high

[illegible] to the bridge. Horses stalled and fell down in water. So that Mr. St. Jo[illegible] and Mr. White had to get out and wade in the water. After unhitching and attaching a long rope to the tongue of the wagon we managed to allow the horses to stand on firm bottom, the poles to float and we pulled them ashore. After crossing we proceeded on some 3 miles to a point some ~~three~~ two miles and a half up Pelican, where we saw outcrops of the St Jo[illegible] Limestone showing the following strata.

6	Soil	
5	Coal M. Sandstone [illegible]	2 5/12 ft
4	Shaly [illegible]	2 ft 3
3	Coal [illegible]	1 ft
2	Shaly [illegible]	2 ft [illegible]
1	Rhynchonella &c.	

At one place I saw 7 or 8 inches of black slate, I supposed interstratified in the S. Coal M. It thinks it holds a position below 102. Only a foot or so of slate and sandstone exposed and it seems to be overlaid by red shale & yellow sandstone not the Mammoth Ledge. Fossils are quite abundant and found in a good condition in the clay No 4, from which we collected quite a lot.

Came on 1½ m. S.W. of Pella where we saw other outcrops of the upper St Louis Lime like those already mention, where we collected numerous fossils from the same clay No 4. The Rhynchonella is abundant in these St Louis beds between Grand R. Otter Creek by Mr. White and Mr. St. John all these lies from Sight Nov. 19 to here.

Monday 29th

Had a very strong East wind last night with a little rain. Cloudy this morning with a strong cold east wind making it very raw cold.

Came on to the [illegible] Co. Rd. [illegible] saw an outcrop of sandstone on a little creek not shown on the Iowa map of the [illegible] Co. the sandstone as compared by Limestone there

10 ft	Gray Limestone
2 ft	Fine sandstone
	Limestone upon bottom

St Louis group

Left morning Sight (Cloud) Dep 6 5.(25)

Came through a dry ling gain with an East bound to Louisville the capital of Illinois County where we took dinner at a hotel, at 1½ o'clock P.M.

Sec. 3. White Bread Creek

3 M. N. Knoxville

Black shale of no [illegible] of [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

Black [illegible] shale with [illegible] black shale [illegible]

No fossils here along near the base of [illegible] except the loose clay and fragments of [illegible] crystal selenite, which probably came down from the blk. laminated shale No 3. [illegible] [illegible] [illegible]

4th Sect. At Andersons Mill
3/2 W. of St. Charles Madison Co. Iow
Copied from Dr White

8	Blue shale with ferruginous concretions	4 feet
7	Impure limestone (Prairie argillaceous)	1½
6	Black shale	6 in
5	Dark blue shale	6 in
4	Coal	6 in
3	Black carbonaceous	8 feet
2	Coal	9 in
1	Blue shale	3

Nos. 1 & 2 of this collection of fossil commonly
Marginifera lineata, Sp. Schlotheimi, Mark. Flemes
cornuta, Productus Nebraskensis, P. cora, Lamp
P. semireticulata, Pecten, Aviculopecten occidentalis, Bellerophon
Meekella striatocostata, Sp. Allorisma
subcuneata, M. W. & P. Gyroceras Illinoiense, Longispira, Smith
Pecten Morrow County, Ohio, Aviculopecten M. Hart.
Nos. 3 & 4 White Shale the exact line of the upper number
of the seam Coal Measures

Thursday May 30th. 1867

Section 5. at Montrose fr. Dr Yates ne.

		Drift - clay with a few small pebbles of granite and other boulders	feet 15.66
	16.	Thin bedded yellowish buff limestone	1.
	15	Marly clay - Attenuated in great numbers, Cyathocrinus, Amphipora, Massive oolitic Rhynchonella, and Bryozoa Fenestrata, Cyathocrinus, Chaetetes	4.
	14		0.
Upper Marmaton	13	Regularly oolitic massive limestone with nearly parallel Marginifera, Productus, Sp. camerat. Marginifera, Fenestrata semistria, Rhynchonella, Spirifer cyclopecten, Cyathocrinus, Cidaris Rallii, Myalina perattenuata, M. subquadrata	12
	12	Black bituminous shale	2.
	11	Compact arenaceous limestone Whitish and gray, joint with bands of chert. Same fossils as No 13	34.
	10	Black bituminous shale like No 12	2½
	9	Concret. Nearly homogeneous	

69

Westfort Sec. Cont.

7	Siliceous and sometimes micaceous and finely arenaceous layers	60
6	Compact S. with concretions.	15
		2
	Total like No. 9. Chonetes Carvilliana, Hemipronites spiriferoides. Productus Cora, P. Costatus, P. Nebraskensis, P. gallatinensis	16½
6	Dark cool	½
5	Light bluish marble	2
4	Shale, very fragmentary or massive S. Cryptocrinites, Oth. ord. Fish remains and fragments. Sp. Lepidodus, Edestus minor, Plates Orthacanthus, Petalodus, Ctenoptychius, &c.	5
3	Bluish and reddish Clay	6
2	Arenaceous bed, lower quartz layer, sometimes rifflé marks. N. Mexico quartzite on the weathering for Coal M	7½
		219
1.	Dark crystal arenaceous S. some c. Not Sec. Andrews	

Westfort Sec. Middle

Cont.

Came on 13 m. East of S. from Winslow — much of the distance over a high level Prairie country commonly occupied by grass farms. This level country is underlaid by the Winterset beds of upper Coal M. which we again saw in crossing the valley of Scantons Fork of Middle river. In crossing this broad plateau we, rise over the divide between the waters flowing towards the Des Moines and those flowing to the Missouri.

The light colored limestone marbles so forming west of the Winterset section — that is No 7 above look very like portions of Prof. Swallows lower Permian on the Kansas and Cottonwood rivers in Kansas, and seem I think about that horizon.

Killed 3 Rabbits, 1 partridge and 2 doves today.

Friday, Aug. 7th.

Cloudy all day, and threatening a little rain. With south breeze this morning.

Section (6) at Carters on Grand River, ~~[illegible]~~ Union Co. 5 m. S. from Afton.

Dirt. Bluish yellow marlite — 3 ft.

Yellowish earthy limestone with marlite partings. Sp. cornuta, Crinoid stems. Sp. Hamilt. Orth. oneida, Atrypa reticularis, Eurycrinus, Cyathocrinus, Scutella (Echinarachnius) parma, Sp. Allocrinus, Allagecrinus, Ch. verrucularis, Phillipsia, Sp. Spirifer macrocostatus, Sp. Pleurodictyum, Pred. longissimus — 2 ft.

Bluish marlite — 2

Black fissile shale, with Aviculopecten rectilateralis, Sp. — 2½

Bluish gray shale, alternating with thin layers of bluish hard darkening lime, with the following fossils: — Pred. Prattianus, Sp. Allocrinus, P. punctatus, Avicula Sp. Occident, A. Mamma, Edmondia, Bellerophon 2 sp., Myalina

subquadrata, Schizodus, Pseudomonotis Lida (See Hausburg's list), Goniatites, Cyphinima, Gomphia longissima.

Dr. White has found Pseudomonotis at the same horizon also in Page Co.

Specimens of this section are in connection in the Polydactinia bed of the Hamilton Sp. Nat., with Marcous Sp. C. at Sta. Nat.

Saturday June 1st.

Morning cloudy, rain of yesterday passed off in a cool wind. Drove out [illegible] through a fine tract of corn — roads [illegible] very impassable on account of storm of [illegible] South down at first. Continued [illegible] until about 1 o'clock P.M. when the clouds [illegible] Country beautiful and [illegible] with [illegible] [illegible] I [illegible] the [illegible] [illegible] [illegible]

with grass and crossing from the level Prairie
upon us. Dr White & Collector Gardner then rode
They came on the open Prairie. We met the first
[illegible] we crossed it. When it fell [illegible]
[illegible] plenty of game
[illegible] have plenty of game
[illegible] we had caught the [illegible]
[illegible]
[illegible] Gardner [illegible]
[illegible] Gardner [illegible]
[illegible] we arrived at a Church
[illegible] called the Mormon [illegible]
[illegible] Mormons

Bill 6 miles

Monday June 2

Very bright and rather cool with N. West
wind — Some clouded over but clouds with
[illegible] Gardner for breakfast — dark
and very good meal. After breakfast came on
[illegible] beautiful rolling Prairie with [illegible]
[illegible] we arrived at a Church
[illegible] called the Mormon [illegible]
[illegible] Mormons

seems to be somewhat upon the plan of the Shaker
[illegible], properly speaking communism with them. They are Chris-
tians in name. They first settled at Nauvoo, Ill. on
the site of the Mormons but failing in that they
were compelled to move out and come to this place
[illegible] settlement. They now number about 40 families of
[illegible] average [illegible] Mormons are
poor and small. They should [illegible] to make form
a village, but [illegible] more [illegible] for the
[illegible] of a [illegible]. The President or
Chief [illegible] of the Church seemed [illegible]
about the village [illegible] [illegible]
flowers. He [illegible] a [illegible] [illegible]
of cultivation. The [illegible] [illegible]
library of miscellaneous [illegible] [illegible]
They are [illegible] English, [illegible]
[illegible] the brighter [illegible]
[illegible] the men wore [illegible] [illegible]
[illegible] cotton frocks with [illegible] [illegible]
[illegible] and [illegible] while others [illegible]
[illegible] other [illegible] [illegible]. They have [illegible]
[illegible] of good [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] 50 per [illegible] [illegible]

Monday June 3d 1867 (clear A and M.)

Left at Quincy 35 M. N. of after-
noon and arrived at Quincy 20 M. with many
fossils we had spent on the way.

Black Shale	2 in
Coal	2 in

[illegible] of coal [illegible] underlain below
the bed of Black Shale, at a general
stage of [illegible].

Am strongly inclined to think that the
same as the Spring fork Ill. bed, and
Dr. [illegible] thinks it the same horizon as
Ark. & Indiana [illegible] the same time
I contain many of the same fossils found in
Nebraska City, in which bed, Dr. [illegible] expects
to go.

Spent one day in Quincy [illegible]
[illegible] the [illegible] rocks and collected many of the same
fossils found at that place. Some bed, with a
deep [illegible] the west of town.

[illegible] & at Trenton Montgomery Co. we
came to a place where an opening had been made near
the [illegible] of a long [illegible] above the
surface of the country, [illegible] a bright red [illegible]

(with specks of mica) mix. slight mottling of whole clay)
to be used as a wet sand. About 6 feet of the
clay was uncovered, though the excavation did not
reach its bottom. Immediately above this there is
an ash colored clay, contrasting strongly with the red.
below which there is a clay of white color
Of the latter there may be at least 40 feet
there judging from the appearance made in the
side of the hill above. [illegible] many
round pieces. Dr. Hayes was clear in his opinion
some distance under the upper red, and that they
immediately underlie the Coal & sandstone
probably of Cretaceous age. I am inclined to
think that the same clays underlie the
Coal Sandstone in Kansas and [illegible]
Sandstone and Flint in the [illegible]

Some Red Sand stone occurs at Grand Island
just north of the Oak. [illegible] S. [illegible] from
[illegible] also in N. H. Fremont Co. Also in
Cass Co. just N. of Edna [illegible] N. of
[illegible] also at Lewis and
Clark below on [illegible] also
in Jackson Co. 12 M. N.E. [illegible]
[illegible] Co.
[illegible]

[illegible] Rolling Prairie almost entirely within
[illegible] E. N. Robertson on Red O. There is
[illegible] timber. All the rolling Prairie land has
[illegible] necessarily gentle graceful slopes. [illegible]
[illegible] covered with the fresh green
[illegible] present
[illegible] sweet odor of fragrance.

[illegible] complement a very pleasing
[illegible] view of the scene from [illegible]
[illegible] Red. [illegible] sunset, [illegible]
[illegible] clouds ~~are~~ were very [illegible]
[illegible] colder [illegible]

Monday June 4th 1867

Morning clear and quite warm with
not a breeze. [illegible] Mr. N. E. of Red Creek
[illegible] slight overlay of light colored Li-
[illegible] about [illegible]
[illegible] — mostly low and slender
[illegible] hemiphacta, [illegible] Ostrea,
Rhynchonella [illegible], sp. camerata, Pentamerus
oblongus, sp. plicatomorus, sp. Kentuckensis
[illegible] Beside these occur the
[illegible] on the same [illegible] at 11 to 12 feet
[illegible] sec.

About [illegible] of Mr. D. of west fork Land Creek
and near 50 rod bounds
[illegible] at a point on side of hill, an out crop of
soft light grayish more or less [illegible] (fine grained quartzose)
stone 5 to 10 feet [illegible], with a southerly dip. Clear cold
Spring of water issues at the base, indicating the
presence of clay in the hills.

Dr. White thinks this Sandstone [illegible]
He says he is sure it is not intercalated in
the Coal Measures but that it has taken
the place of the Limestone. [illegible] the
Limestone mentioned on the last page.
Saw no fossils in it or other evidence of
its age.

¼ m. nearly north of the last mentioned
locality, within the town of Red Oak, is another
place, at about the same horizon (only about
35 ft above the Mahaska) where an opening
has been made in the side of the hill into a
[illegible] yellow coarse [illegible] sandstone
in places converted to iron. Saw in this
[illegible] of impressions. Recent heavy
dirt covers, and hence [illegible] of the
Mahaska sec. The old Stony [illegible]

Feather brook and Stream from P.O. is well as a point, and there is a mill for sawing at Eco Oak. It seems to form a pretty cheap site for farm.

Stopped for the night about 1 mile west of the junction of Boyer creek and Nishnabotna River. Here is a small but rich, and it is literally well improved, mostly the fences being made of wire fastened to oak posts 12 feet apart. Timber mostly frame and border along the streams. In all this region we have seen, but few farms have level of fresh sing the surface is rolling with long gentle slopes. Land is rich and tolerable. In consequence of long gentle slopes, in the broad Nish Valley of Nishnabotna, it is very marked. Stand on one side and look more than 20 or 30 feet above the valley, the view is grand and sublime. It seems the valley from beyond it be fine is very beautiful. The course of the stream is all of these broad valleys is marked by a well of green trees. These valleys do not empty into the stream up to overhang of the higher land. Think it is often difficult to say

where the valley ends and the high land begins. The highest part of the County here does not apparently more than 100 feet above the stream. Wells have to go to 90 feet deep through nothing but drift and sand. 25 White stands where is not more than 25 to 30 feet fall in the distance from bank to the north. Price 25 to 30 per acre improved land.

Tuesday June 5th 1867

Mr. Duff overcast with thin clouds with a gentle S. E. breeze. After breakfast came on warm to a very down be the beauties of Iowa, situated on the high Prairie country. All around the appearance of a settlement in New England. Houses good for two, and better houses than most of our new settlements in the west. Soon after leaving we came to a woodland and began to descend in the valley following down a small stream in a direction S W. Crossed we reach the bottom of the little valley opening to the west of that of the Nishnabotna. After we stopped over noon to lunch. Quite warm today.

Could not follow the valley down to the Nishnabotna but had to ascend the hills again and go on the river some distance. After going

about two miles north along a backbone ridge, we caught the first glimpse of the Mississippi valley and the hills on the Iowa or west side, but could not see the river for the trees along its margin. Between this belt of timber and the bluffs upon which we were standing, there is a very wide, flat, descending slightly back to the bluffs along the base of which it is occupied by large pond called Lake Wanborne-se. Between this and the bluffs, or eastward along the base of the bluffs, we saw numerous masses of cale-tufa, formed by springs issuing from the bluffs, in motion. The bluffs here are near three hundred feet in height, very steep, and washed into numerous ridges or ravines with deep cells like, with more or less timber and at least only occupied by Prairie. To the head of the point is the village (Lake Wabonse) and opposite a little new village we call the following section

Sec. 8. near Lake Wabonse

~~Ste~~. Iowa

		feet
	Loess with	
2		28
	probably some drift	
		15
1	Massive heavy bedded Ls. with the fossils mentioned below	

The limestone was and shows has some short thick partings, and in general the fossils in it are, Fenestella large branching Monticulipora, Cyathocrinites (large [illegible]) Ped. Nebrascensis, Myalina subquadrata, Aviculopecten occidentalis, large [illegible] with E. pentangulatus, large Pinna, [illegible] Sinuity, Pleurotomaria, very with elevated central [illegible] in front [illegible] and [illegible] Bellerophon [illegible] Minnesota, [illegible], Platy [illegible] to [illegible].

Dip [illegible] a mile [illegible] feet [illegible] the level of sea [illegible]

half high in the bluffs, and following
the line of bluffs, with slight pitch down below
the mouth of the Mo. Valley, west 3 m. further
down the line gradually to about 70 to 80 feet;
showing a reverse of the dip. Both of these dips
are probably local.

Thickness of Coal

Section 9th at Wilson's Cement Co. 1 m.
W. S. of st. from Atl. City in a straight line
Bluffs over 200 feet

39	Fine bedded yellowish impure limestone	2 ft
38	Iron limestone	2 ft
37	Yellow marly shale	1½ ft
36	Black coal shale	1½ ft
35	Brown shale	1½ ft
34	Black coal shale	1 ft
33	Bluish shale with gastropoda	1½ ft
32	Rotten impure coal	1 in
31	Ist Bluish shale fine flag with fossil pecten & other fossils	3½ ft
30	Compact bluish limestone with shaly partings	1 ft
29	Yellowish, Concretionary, Argillaceous impure with bluish marble	6 ft
28	Light gray or white shale with [illegible]	[illegible]

27	Micaceous	6 ft
26	Compact do	½
25	Light yellowish indurated marl	4 ft
14	Yellowish siliceous limestone with flaky micas	2½
13	Yellowish earthy shale with concretionary masses of do	3 ft
12	Compact do	1 ft
11	Yellowish earthy shale	2 ft
10	Heavy bedded light gray limestone with shell fossils	3 ft
9	Bluish shale	6 in
8	Soft yellowish siliceous limestone containing Fusulina	1 ft 6 in
7	Compact heavy bedded light limest. with marly partings	1 ft 6 in
6	Bluish marlite	1½ ft
5	Compact limest.	9 in
4	Bluish marlite	2½ ft
3	Compact bluish do. with small concretions	2 ft
2	Bluish marlite	4 ft
1	Bluish fine gr. micaceous sandstone	1 ft.

No 7 of this section is the same as No 1 of Sec. 8. We collected from it the following fossils: —

No. 22 is the same as the coal of Lawrence, see p. 16. and from the shale above it we collected the following fossils. Norman then to be the same shales seen over the Lima Creek. — Selenipora [illegible] Bandonia, Eurymyalina, [illegible] Spirifer [illegible], Leptaena, Nemorchis [illegible] Fenestella, Polypheamopora & Lioclemma.

Arrived at Nebraska City at 2 O'clk P.M. Friday June 8th

Section 10th Bluff at Nebraska city

10	Loess	80 to 90
No 9.	Yellowish gray micaceous sandstone with a laminated structure or in thin layers with ripple marked surfaces	10 ft
8	Yellowish ash colored and drab laminated clays	18 ft +

+ the lower 12 to 15 inches of No 9 sometimes becomes very hard like quartzite

Bed B of Marcou

No 7	Bluish gray, argillo-calcareous hard band weathering to rusty col. with many fossils	3/4 ft
Bluish gray & Reddish brown, bluish and No. 6	ash colored clays, indurated. The ash colored most laminated. Bellerophon carinatus, Lingula, Shale, Nucula &c	20 ft
No 5.	Four thin layers as above as No 4, with intercalation more shale in many clays	2 ft
No 4.	Bed hard gray limestone	1 ft
No 3	Bluish and green impure Lit. with partings Drab shales and clay, with shells, Crinoids &c Dolomite & fossiliferous	8 ft
No 2.	Brown or dark colored nodule	4 ft
No 1	Brown gritty, ferruginous indurated Clay, with fine specks mica	4 ft

The following is a list of the fossils collected from No. 3 & 4. and from a quarry about a 1/4 of a mile west from the Mo. on a little creek, at a point called Rockford: — Productus semireticulatus, P. Nebrascensis, P. costatus, P. longispinus? Athyris subtilita, Chonetes mucronata, Spiriferina

hemiplicata, Martinia planoconvexa, Meekella striatocostata, Hemipronites crenistria, Euomphalus rugosus, Retzia Mormonii, Spirifer Kentuckensis, Retzia osagensis (= I. Utahensis), Petalodus, Deltoid tooth Pleurotomaria &c

Dec. 11th Mr. Morton's shaft into the beds exposed immediately above it

For section immediately above the shaft see p. 75 – dec. 26.

	Earthy Ls. with Spirifera & Productus	2 ft
	coal	[illegible]
	arch. col. clay	3 ft
	Ash col clay	3 ft
7 of shaft – 1 of Ist. Mo.	Bluish gray indurated marly li ~~or calc. clay~~ with fragments fossils	1 ft. 18 in
1, 2 & 3	Green state colored, or reddish	
4 & 5	calc. indurated clay or marlite	2 ft. 4 in
6, 7 & 8	Grayish or dark colored or white indurated – few little gastropods near base	8 ft
9	Dark gray or col. ~~limestone~~ or marlite or soft limestone	– 10 in
10 & 11	Grayish drab indurated marlite	

(Shaft sec. continued)

31	Mottled grayish and reddish
12, 13, 14, 15 & 16	or chocolate colored marble
17	Grayish clay or marble, with sp. Planocarmerins
18	Harder do. in thin layers
19	
20	Gray and reddish limestone
21 & 22	Dove colored indurated marble
23	Greenish indurated clay with marks of slippin together
24	Bluish gray very fine marble
25 & 26	Harder do
27	Gray mfs. arg. limestone 2 ft. below top of shaft.
28	Gray marble
29 & 30	Greenish gray marble
31	Fine grained gray indurated marble
32, 33, 34 and 35	Reddish and chocolate col. marbles 12 ft
36 & 37	Laminated gritty layer, with white quartz - red dark gray
38	Slight bluish gray fine grained laminated layer with specks of mica

This ~~Sub~~ section passed through in the shaft. I consider the same as the equivalent of the Sub. 2½ landing below the upper arenaceous member, though it extends deeper than that of the landing the whole thickness passed through in the shaft being

Arrived at the St Kearney station a little before sunset. Sub drifter had some nice Antelope. Saw numerous Prairie Dogs this evening

~~Section~~

Shaft section continued

No. 39	Fine bluish red marble	4
" 40	Hard bluish arg. limest. conch. fracture - some calc. spar	18 inches 2 feet
41	Black slate, columnite	8 feet
42	White barite rough fract.	3 feet
43	Hard bluish red marble or cal. clay	

Saturday June 9th

Sep. 12, at Burnett's Mill 3 miles N.E. of Nebraska city. Base feet 1263 ft. above the Missouri

Slope Bluffs — 90 to 100

No 3	Hard siliceous limestone with alternating layers of bluish gray color and when weathered showing laminated structure Cont. Fusulina, Spirifer cameratus, Sp. Polypora, Rhynch. utah, Product longisp. Pecten occidentalis, Chonetes mesoloba, Chonetes incurvata, Chonetes, Fenestella, Rhombopora, Rhombopora	20 ft
No 2	Ash colored clay	3 ft
No 1	Hard drab soft argil. [illegible] thick above. Fossils Chonetes, Chonetes, Chaetomya, Spirifer [illegible] (abundant)	

No 1 continued	Product. Prattianus, P. Nebrascensis, S. cameratus, Chonetes mucronatus, Fragments crinoids, Asp. Cyath., Hemisphaerion, Hyalinia subsp. nov., Aviculop. occid., Pseudomonotis Hawni.	8 in
	Greenish indurated crumbling clay of which there is exposed	2 feet

Mr. Marcou makes the section the same as the lower part of the exposure at the Nebraska City landing, and I am much inclined to view it as coming in at about that horizon, or at least below the micaceous sandstone ~~at~~ the top of ~~the bluffs above~~ the Nebraska City section.

At short distance S. of Burnett's mill saw on the side of a slope 70 to 80 feet above the summit of the country, a large smooth mass of red granite. It rises about 100 or 12 feet above the soil, and is estimated to contain not less than 1000 cubic feet, and has [illegible] of [illegible] down [illegible] the hill side. Some other masses [illegible] [illegible] on the other side of the hill.

These masses are evidently contemporaneous, in condition, as they show planes of stratification, and even streaks including laminae. The whole angular, and some are big enough, though at one place they point two or 3 ft above the soil, the surface is polished by the rubbing of the Buffaloes, and later in the Orbit of the farmers. Prob. no Buffalo will ever touch it again to the end of time. These blocks present a very striking appearance as they lie here on the surface so far from any similar rock in place. If these erratics spoke what a history they could recall. They doubtless were transported by floating ice from Southern Minnesota.

Sunday June 10th

Starting with South E. wind. The bluffs would have seem to be S.E. on nearly all sides, and the bottom would have in some places 2 miles wide or big land between the bluffs. The rocks are strong and unfossiliferous. Yesterday we had a hard rain with a N. wind.

Monday June 11th

Mr White and party concluded to accompany us to Omaha with his team and camp fixtures. After laying in a supply of provisions started at 11 o'clk, and came on up to Wyoming. Saw here the following

Section 13. at Wyoming

7	Soil	
6	Pipe clay some and Red clay below - in pole about	4 feet
5	Hard impure gray Silicous Limestone. Fusulina.	2 feet
4	Ash colored clay	3½ ft.
3	Massive, hard silicous, Stone-stone (impure), more arg. below. Spirifer, Allorisma, Pinna peracuta Shumard	4 ft
2	Laminated bluish ashcolored clay	5 ft
1	Red gritty clay, passing down into soft red sandstone, micaceous ripple marked, and concretionary	9 ft

All these beds seem to be inclined a little southward or down the river. Saw no fossils in No 1. or 2. In No 3 found a long under smooth Pinna peracuta Shumard, a large Allorisma, &c.

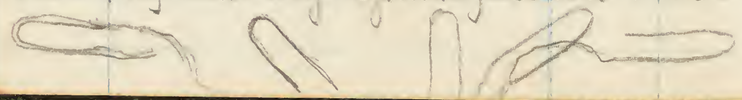
Schizodus, Chonetes, crinoid joints.

In No 4, Productus semireticulatus, McKilla striato-costata, Chonetes immorata, Syntrichasma hemiplicata, Hemiprionites crenistria, Sp. cameratus, Productus longispinus, Sp. Kentuckensis, Sp. planocomus, Athyris subtilita, Columns crinoids.

In No 5 Crinoid joints, Syntrichasma Hemiplicata, Fusulina, small gasteropods.

In No 6. Found Product. semireticulatus, Synth. hemiplicat, Athyris subtilita, Chonetes immorata, Productus nebrascensis, Martinia planoconvexa, Hemiprionites crenistria, Sp. Kentuckensis, Rhynch. utah, Bellerophon carbonarius, Machrochaetes, Bowsh. ingersus, Ericoor. or Cyathocr.

On the surface of No. 3, some very curious markings were seen, like the steel of plants or the track of some mollusk. As seen on weathered surfaces they were cavities, but it was evident that they were filled with arenaceous material that had weathered out. They were very regularly curved thus



but each limb of the curved part is about 5/8 inch wide, and very uniform in breadth as well as in the curve.

Came on about 2 m. beyond Nyong and camped in a school House.

Tuesday June 12.

Morning bright and clear. In coming towards Plattsmouth saw on sec. 12 T. 11, R. 13. in a valley estimated to be 90 to 100 ft below the summit of the country the following

— Sec. 14. —

Slope 90 to 100 ft

Slope with loose fragments of limestone containing Cyathophyllum planum, many specimens of Productus Prattianus, P. Nebrascensis and Bellerophon

Massive light col. ss. with Schizodus, Chonetes, Bellerophon, Crinoids, Myalina occidentalis, Schizoporella, [illegible] 4 ft

Clay? not exposed 4 ft

Limestone of light color with many fossils

See page 63 & 64

Section 15 Plattsmouth.

8	Slope	
7	Debris of broken up light col. lr. a bluish clay and sandy material with millions of Fusulina, ~~Retzia~~ & a few Retzia Mormoni &c	25 to 30 ft seen
6	Hard siliceous lr. in beds with apparently shaly clay partings, containing many fossils	9 feet
5	Ash colored shaly calcareous clays with fossils	2 feet
4	Black shale. Somewhat like shaly coal below, but becoming bluish colored above	2 ft
3	Soft arenaceous red clay, becoming gray and sandy clay	3 ft
2	Shaly and more compact beds of light grayish impure limestone with partings and intercalations of clay all very fossiliferous	2 ft
1	Red and bluish clay, the former predominating	9 feet

See p. 63 & 64

From No. 2, 5, & 6 (the fossils from these two beds having fallen out we could not ascertain exactly in which of these beds particular species occur though they all came from these several beds). Productus semireticulatus, P. costatus, P. prattenianus (Aequicostatus), P. longispinus, P. Nebraskensis, P. punctatus, Athyris subtilita, Spirifer centronatus, Sp. camaratus, S. rockymontanus, S. planoconvexus, Allorisma, Schizodus, Pecten arcuatus, P. occidentalis, minuscule, Crotalocrinus, Edmondia, Bryozoa.

From 8, we collected numerous Fusulina, Retzia mormoni, Sp. camaratus, Omitted Bot.

Mr Marson did not see the lower 4 of the first 3 see May but I at any rate by those information or upon them in his section I can scarcely doubt but most of the all of the fossils shown above No. 1, and all of that all of that seen at Weeping

~~Bluff below & above the Neb. City Sec. although the afternoon place these latter rocks, Rec'd the Neb. City rock~~

Wednesday 13th June

Section 16, (5 m. above Pacific City, Iowa)

Loess hills, 250 feet

2	Massive yellowish siliceous limst. with some calc spar. Productus costatus, P. Nebrascensis, Sp. Cameratus, Meekella striato-costata, Athyris subtenuicata, Pecten circulatus, Pinna peracuta, Prod. Prattianus	5 ft
1	Dark nearly black calc. shaly with splitting, and cont. some very hard layers. Chonetes mucronat, Nat. planoconvexa	3½ ft seen

Prairie bottom about 12 ft above Ma

Six or seven miles above Council Bluffs at Mynsters or Morris, on the Iowa side Dr White saw at the base of the bluffs an exposure of 1st. feet limestone, the lower part of which was massive and agree in its lithological characters and fossils with No 2 of the last section, and the part (8 or 10 feet) whiter and in part leopardy-colitic. Beneath the outcrop, at the very base of the bluff, some one had dug out some black shale, of the same kind as No 1, last sec.

Dr White has identified these beds of limestone at various points eastward, and he has satisfied himself that it holds about the same position as No 11 to 13 of the Winterset section. He found in the same corral (see of Indian under White Vol. I.) that contains the Cryptocanthia bed of Winterset sec.

Camped for the night 1½ miles above Council Bluffs, at the base of a bluff 100 ft high composed apparently entirely of loess. The highest bluffs here seem to rise about 150 ft. above the Mo., being nearly 100 ft lower than those in the region of Neb. City. Plum

decrease of the elevation of the country here above the Mo. as we ascend the river, is not due to the thinning of the Strata, but to the dipping of the Coal rock, as we ascend the river.

Thursday June 14th

Morning cloudy & cloudy – a little thunder about sunrise with a south breeze; and a rainbow in the east. All up early to prepare to go over to Omaha city in order to start out to the east of the Pacific Rail Road at the junction of the N.E. Fork. Mr White goes out with us and Mr Hess his assistant. Mr. L. John on to survey some of the N.W. counties of Iowa.

Boring at Omaha City in bottom 22 feet above the Missouri

1	Black soil	20	feet
2	Sand and Lime rock	10	ft
3	Slate rather with coal	5	ft
4	Fire clay	8	—
5	Lime rock	16	—
6	Fire clay	1	ft
7	Shale & Lime rock	5	—
8	Green sand slate	7	—
9	Sand rock with soft seams	11	—
10	Lime rock	29	feet
11	Magn Lime rock	5	—
12	Coal slate	6	—
13	Sand and Lime rock	10	—
14	Slate	4	—
15	Lime rock with soft seams	17	—
16	Fire slate with hard layers	31	—
17	Sand rock	4	—
18	Lime rock	3	—
19	Blue slate	40	—
20	Lime rock	24	—
21	Soap stone with hard layers lime rock 15 in thick	25	—
22	Coal slate	7	—
23	Fire clay	4	—
24	Lime rock	35	—
25	Soap stone	5	—
26	Lime and sand rock with seams of flint	6	ft
27	Black slate	3	—
28	Gray soapstone	13	—
29	Yellow soapstone	20	ft
30	Lime rock	2	—
31		15	—

Section 17. Omaha 3½ m. below the middle of the town. Same the following section.

Soil 2 to 3 ft
Sloping back up
100 to 150 ft

	Drift consisting of some good clay & sand with a few pebbles and boulders. Some shows fossil pollen sand with oblique marks of deposition	6 ft 5 ft 4 ft
3	Hard grayish, earthy limestone in layers 4 to 10 inches thick with some flinty nodules and arenaceous clay partings. Bot. Crotalus, C. Caffeanus, P. Ingens, P. semicticulatus, P. punctatus, Rectinaria, C. Camerata, Aff. subtilitas, Cyath. Rosiphaericus, Fucoidings, Serpula, Arenaceoides, Mollusca and plants, Cteno[illegible]	3½ 6 in 2 ft
2	Bluish argillaceous li. in layers 4 to 6 inch, with softer partings	8 ft 4 ft
1	Black shale thickness not so known at Missouri	

No 1, 2 + 3 of the foregoing sec. is evidently the same as No 2 + 3 of the former (p. 43)

The bottom of No. 2 of this sec. is probably not more than 7 or 8 feet above the surface of the river at low water.

Friday June 15th.

Started at 1 this morning to the end of the Union Pacific R. R. at 5 o'clk with Dr White & Mr. Gall, the company furnishing us with a free pass out and back. Missouri River town longitudinal freight cars – only one passenger car – 9 passengers including Mr Mr. G. and myself – one little girl – no women.

Dined at 12 o'clk I. M. at a new village called North Bend in Platte valley. Heard of coal being found under sandstone in bluff on S. side of the Platte opposite here. Dated to be 1½ feet thick. Smithsonian Cretaceous No 1.

At half past one reached Columbus 91 miles from Omaha. East of Platte valley is gen. rich and supporting desc

grow the prairie grass. Valley very wide — apparently 8 or 12 miles. Slopes so far on rt. side very gentle, and the high country visible apparently not more than 30 to 60 feet above the valley — All Prairie excepting a narrow belt of small trees along the river.

At six o'clk P. M. arrived at Grand Island, a wooding and watering station on the R. R. 157 M. from Omaha. A village is also commenced here, consisting of a few stores, eating houses, ~~& machine shops~~ & locomotive houses, etc. The soil here is rather thin and sandy with sand and few pebbles; evidently dry. Have seen no boulders in any part of Platte valley. Saw no Loess this side of the neighborhood of Soup river, and near there there is a change in the appearance of the Prairie grass and other plants which are shorter and thinner this side. On the north w. side of Soup Fork the soil seems to be as rich and fertile as in Iowa and Mo. Just here at Grand Island village (which is 2 M. from the river) and for 20 or 30 M. back on the road towards Omaha, the surface slopes almost imperceptibly for 10 or 12 miles on the north side of the river to the immediate bank of the same. The R. R. runs on this slope which is so nearly level as to cause almost no grading whatever. This long slope is bounded on the N. by a low range of bluffs barely visible from the village. Country total-ly destitute of trees excepting immediately along the Platte and some of the other long streams. Said to be too dry here for very successful farming. Water in wells here alkaline, also in the ditches along the road said to be alkaline, but that from the well that supplies the Engines tastes fresh to me. on floor of a public room

Slept at Grand Island, meals 20 cts. Ad.

Saturday June 16th

Morning hazy with thunder & lightning. Come on to Platte, a new station — 290 miles from Omaha — Hotel — Eating houses — saloons, Depots — cows houses &c — gr. in quantities

of fresh R. R. Iron, timber, &c. Breakfasted here and started on at 12 m. Cleared up at about 8 o'clk.

Near the 310 mile post, on to 5. Platte saw out crops of reddish rock in regular strata on both sides of the Platte 12 to 15 feet above the level of the river. Had no opportunity to examine it, but was informed that it is a calcareous sandstone.

The soil continues thin and sandy, an subsoil here sand with pebbles. Much sand seen on the hills. Saw an Antelope on the train.

Some rocks seen cropping out of the valley along the north side, rising gradually on the hills as we ascend. At one place near 330 miles for Omaha, the were seen 40 to 50 feet above river forming almost continuous appearance for a mile of country in sight more than a mile and 30 feet above river, with gentle slopes. No trees were along margin of the river only willow shrubs. At 3 45 m. for Omaha the same light colored strata rose to near 60 feet in height and seem to consist mostly of the bluffs to near the summit. Two continuous until we passed the 365 m. and [illegible]

Large quantities of grain in boxes and bales exposed to the weather at Kearney

after which we saw only low exposures, apparently of loose coherent material. Was very anxious to examine these exposures, but could not do so, as the train did not stop except for a few minutes at a time. Scarce a mile within 200 or 300 yds of the cars have been passed along the Rail Road but apparently of the same material were composed of coarse grains of sand and some small quartz pebbles cemented apparently by calcareous matter — the rock being friable and not much indurated. Have no doubt but these outcrops belong to the Bad Land Group.

On arriving at the end of the road only found the tents of a small party of Military (officers, Sent. Sherman and staff) and the huts of the laborers. So we could obtain no accommodations without going on 15 miles farther in open wagons exposed to a chilly wind, and as we were not prepared with overcoats, we concluded to return on the train to North Platte village. Regretted very much that we could not go on to the village (Deliverance) which is in the corner [illegible]

of Colorado, merely to be able to say we had visited that Territory. There was also some danger of Indians.

Started back on the train at 7½ o'clk P. M. (Gen. Sherman came on in our car). The night was chilly enough as I was without an overcoat, I should have been very uncomfortable had it not been for the kindness of the Conductor who loaned me a Buffalo robe. I spent the night as comfortable as could be expected & slept tolerable well. Arrived back at N. Platte Village at 5 o'clk A.M. wearied, dirty and of course hungry, as we had ate nothing since yesterday at 9 o'clk A.M. Rained hard during the night, and still raining with thunder and lightning as we arrived at N. Platte.

Sunday Morning 17

Shaving up and looks like we would have a bright day. We will have to remain until 1 o'clk P.M. tomorrow, before we can start back to Omaha. Some clouds, with a strong rather cool and unpleasant north wind all day. A little fire would have been comfortable.

* Some had been attacked and several persons killed within a few miles of the ever of the road but a short time previously, so that there was alarms on all the lines.

~~the town~~ doors all day. Whitish saline efflorescence seen in place on the surface of the ground here, and for some distance back between here and Grand Island — more abundant however, west of here, to the end of the road.

Spent the day very pleasantly, the wind being too strong and too cool to walk out much. While we are far from pleasant in the small crowded Hotel, not much gaiety to be seen here. The town is not elevated more than ten or 12 feet above the Platte, and situated between the two branches of that river, about 2 m. from each, with an almost imperceptible slope to each, affording good grounds for sewers. Soil sandy — subsoil sand and small pebbles. On south side of the Platte, a little below the junction of the two branches, there are hills apparently 150 to 200 feet above the river & continue for some distance down, and support scattering cedars. These hills look in the distance much like the Loess hills along the Mo. in the region of Omaha and Nebraska City, but they are probably Tertiary. Had no opportunity to examine the geology of the country. Similar hills seen on the N. Platte 60 or 70 m. above this month. Do not know

whether the country becomes lower, further up the N. Platte, as on the S. I cannot yet suppose it are. Here in the broad valley of the Platte, I am told they strike good water at from 2 to 8 feet from the surface. Tasted it at the Rail R. water tank and found it good.

Monday June 18th

Lovely cool last night, but no frost in morning. Clear and pleasant, with a light N.W. breeze. Started back to Omaha at 1 o'clk P.M. Day very pleasant. Soon after crossing the N. Platte saw an Antelope and continued to see others, until we came 2 hours run we counted 18. Some of the were within 150 yds of the Train at a time which they seemed to graze with great astonishment, and intense curiosity. Some fired twice at one with a revolver, but without hitting it.

Tuesday June 19th

Arrived at Omaha this morning at 8 o'clk with Dr White and Dr Gill. Dr. H. Hardy on his way home after breakfast. ~~Dr Gill to Washington at 10 o'clk in the evening~~. Spent the day in getting

ready to start into the field with Dr Hayden. All Ready in time to start out and camp just below Omaha.

Wednesday June 20th

Morning cloudy with slight sprinkle of rain and distant thunder in west. Wind fr. South. Gill started for Washington this morning at 9 o'clk. — Bellevue —

We did not get ready to leave Omaha until 11 o'clk A.M. and only came on down to Bellevue today. Were caught in a hard shower of rain before reaching Bellevue.

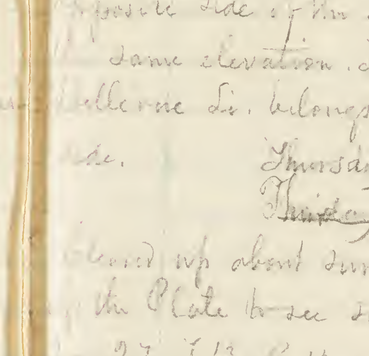
River too high to see the exposure here, but we are to have some Helix some heads of the bricks took from the quarry prepared for shipping to Lincoln show only 8 or 10 feet of the rock in exposure at low water — that three or four feet is hard brittle limestone, above which some 20 feet of rather separates it from a hard white limestone.

From the fragments taken from the exposure we saw Prod. cotatus, P. longispinus? Productus sp., Ath. subtilita and a few fossils. The rock is quite hard and brittle, white and blue in colour. Fracture rough, sometimes im-

– fossil – very subconchoidal in places, and more splintery in others. Fusulina rather rare, but distinctly seen.

The lower bed is as hard and more massive than the other – has a yellowish tinge on weathering surfaces and joints, but more gray on fresh fractures – more conchoidal even free from joints and cracks. Contains same fossils as the upper bed, but Fusulina more abundant. The impressions here are considerable as follows:

(18th Sec. Bellerne):



No 13 in bed of coal is said to have been seen in place at the foot of Bluff above No 2 of the foregoing section, but we did not see it in spring. It may have been only shale, so it is probable that same bed seen under

a bed of Ls. at the base of the Bluff on the opposite side of the Ms. (See Sec p. 14) at about same elevation. This would indicate that the Bellerne Ls. belongs below that seen on the Iowa side.

Thursday
~~Friday~~ June 20th

Cloud up about sunrise – wind south. Rode to the Platte to see some specimens of rock. On 27, T. 13, R. 13. Saw

Section No 19. (3 m. up the Platte N. side)

No 5	Slope down and 2 ft. or more	100 ft
No 4	Massive light grayish Oolitic Ls. with Fusulina. Upper surface planed up by glacial agencies. Strike ranging 10° W. of South	3 ft.
6 ft. clay		
No 3	Hard more yellowish bed limestone, with some flints and shaly pockets above. Prod. rationianus, Ath. subtilita.	2½ ft
No 2	Whitish hard Ls. some now 6 to 8 ft. under water just above Sullivan – Brittle, in layers of various thickness with red colored shaly partings. Fusulina, Sp. camerata, S. kentuckensis, Prod. costat. P. longisp. Archaeocidaris, Cyathocr. burlingtonensis, Prod. Arkansasensis, Phrygozoa, Corals &c. Chonetes Verneuil.	6 feet
No 1	Ash col. marly indurated material. Chonetes verneuil. C. mucronata, Orthis carbonaria, Ath. subtilis, Sp. camerat. S. kentuckensis, Cyathocrinus, Phrygozoa, Fusulina, P. vita	4 ft.
	Sandstone	1/3 ft
	Black slate intervening in ash col. Clay	1/3 ft
	Shaly ash col. coloring below No 1.	3 feet

The base of this Bluff is on a level with the Platte valley, which cannot be more than two or 3 ft. above the present level of the Missouri at the mouth of the Platte, the former river being now some 8 or 9 ft. above its medium height. This locality is 5 m. in a direction from 20° to W. of S. from Bellevue, and about 1 m. N. of Saranac City.

Quarter of a mile S. of W. from the last locality, on Mr. John H. Duclos's place, saw an exposure where the upper oolitic and Fusulina bed rises 50 feet above the Platte valley. It is here in three layers of about 15 inches each and still shows its oolitic structure but contains greater numbers of Fusulina; also saw a it some fine specimens Myalina subquadrata, Bellerophon crassus & the sublitata.

The whole upper surface of this bed is planed off by glacial agencies, almost perfectly plane, so that when quarried for sills or caps the upper side is ready dressed for use, even in the best cut stone work. The strias are perfectly parallel

so far as could be seen, and range No. 10° E, (S 10 W.). As far as the quarry has extended in (about 15 feet by 30 to forty yards the whole upper surface is thus planed off, and I have no doubt but acres of area here are in the same condition. These beds show a distinct dip of 2° or 3° to N. or N.E. a little E of N.

I also saw here a 6 foot bed of greenish ash col. clay between this bed and No 3 of the last section, that does not occur there, or may have been cut away by the slipping down by erosion.

From the bed No 1. of the last sec. collected here, in addition to the fossils found there the following: Terebratula Missouriensis, Prod. Nebrascensis, P. symmetricus (?), Sp. Lineatus (small), Chetes hemisphericus.

From 1/4 to 1/2 mile farther along the bluffs, where the beds rise some higher and excavations made for lime kilns had an opportunity to see lower beds

showing the following section -
Mr. Spence's land — Loss 150 ft

Section 20.

Sandy Drift — 30 ft

No 3 Sec. 19. — 3 to 4 ft

No 1 of Sec. 19, shown 4 feet

No 10	Very hard dark gray compact Li.	8 inch
No 9	~~Dark, or black shale~~ Gray and ash col indurated marly material	2 ft
No 8	Black shale	4 inch
No 7	Ash gray indurated clay or marl with a dark seam near base	14 inc.
No 6	Hard limestone like No	6 in
No 5	Grayish ash col. somewhat laminated a little soft material	2½ ft
No 4	Bluish indurated crumbling clay or marl, stained at base a little reddish purple. Floor uneven	3 ft
No 3	Indurated asy. bluish ash col. rock stained a little purple above and above but becoming harder and in thicker beds below, with partings, and irregular layers of soft yellowish marly material containing numerous fossils, such as: Chonetes mucronatus, C. verneuiliana, Hemipronites crassitesta, Sp. comensis, Prod. Sugmunst. S. Neb. Sp. Kentuckensis, Cyath. hemisphæricus &c	7½
No 2	Black Shale	5 to 6 in

No 1	Very Hard bluish compact arg. li. Conch. fract.	1 foot

The base of this sec. is about 20 feet above the Platte Valley, and probably 25 ft above the present level of the Missouri

One of the workmen tells me he saw some red layers a few inches thick intercalated in ash colored material below No 1 of this sec. None of the beds below the upper Limestone equivalent of No 3 of sec. 19 seem to be quarried for li. The workmen tells me that with the exception of some thin layers (9, 6 &c) none of the beds below the upper one will make lime.

As the upper li. of this sec. (No 2 sec 19) is the same as that just under water above Bellevue, it is here elevated about 45 feet above the Mo. and, about 6½ to 7 miles, about 20° W. of S. from the locality 1 m. above Bellevue there is evidently a dip of 8 or 9 feet here to the mile N. or N. E or ~~N.W.~~ S.E.

These outcrops are said to continue along for 10 or 15 m. farther S. of W

Friday
~~Saturday~~ 21st.

Cloudy and a little rain at 6 o'clk. A.M.

Quarter mile farther up the river than the Quarry at Bellevue Landing (N). Saw

Section 21 — Prairie Bottom

6	Ash col. calc. some parts hard, splitting in slab → gray & yellowish on weathered surfaces	2½ ft. sec.
5	Ash col. clay	1 ft.
4	Somewhat dark shale perhaps black somewhat	1½ ft.
3	Ash col. & greenish clay	2½ ft.
2	Soft yellowish, slightly gritty layer or seam, passing up into harder layer	2½ ft.
1	Very hard sheafrock gray & black gray beds ~~set~~ traces white (Gnoulin) structure. Same as 4 sec. 19.	2½ ft. sec.

Below this now under water more compact Black rock is quarried, with, Sp. Camerotus, S. Kentuckiensis, Atr. sub. & Prod. longisp. being the same quarried down at Landing. The beds just here show a slight S. dip, but a wonderfully local.

30 to 40 yards farther up (N) a bed of very hard dark somewhat carbonaceous limestone

about 2 foot thick crops out, apparently 5 or 7 feet above No 6, of the last sec. Just under this a bed of coal, said to be tolerable good, and 21 inches thick, was opened, dark shale under it. ~~We did not see it~~ saw it in place. Saw in overlying limestone Sp. Camerotus, Prod. longispinus, P. rogersi, Aviculopecten occidentalis, fragments large Myalina, Phillipsia (tail). Also Gnoulina. In the dark shale Bryozoa, Also in limestone Sp. Monocoryphus (1 open) Tooth Ctenoptychius. Chonetes mesolobus.

Quarter m. farther N. along same bluff saw a hard dark gray limestone much like that overlying the 2 inch bed of coal (but very massive) mentioned above, cropping out of the side of the hill. It is about 2 feet thick and holds a position 5 or 6 ft above that overlying the coal. Some one has drifted in under it in search of coal which was not found. The space between this bed, and that overlying the coal is occupied by somewhat laminated ash col. and bluish clay. All this and all of Sec 21 down to No 1 exposure

comes just above N 05 of Sec 19

Came on to Plattsmouth, by crossing over into Iowa at Bellevue, and going down the Mo. Flats and crossing over again at Plattsmouth. Had to do this on account of the Platte being so high that we could not cross to Platte into the main stream to be ferried over. In the way we had to travel 12 miles to go about 6. Had much trouble to find the way, there being many roads, sloughs and swampy places to avoid but ~~stuck~~ and had to unload in the middle of mud and water. Reached Plattsmouth much fatigued at 5 o'clk P. M. Cloudy with a slight sprinkling of rain at sunset

Saturday June 22.

Morning clear and very warm. As the section of the rocks at this place taken by me as we went up, and noted on p. 39 of this note book was taken in great haste, and owing to the falling down of the beds it was very difficult to get a satisfactory section, I came back upon purpose mainly to review it. I am now satisfied ~~we~~ have it correct as given on the opposite page, as I saw every bed in its place clearly

Section 22. (Plattsmouth)

		Loess sloping off	70 to 80 feet on average
		Drift	10 feet seen
8	Fossiliferous / Fossiliferous	Hard yellowish and lighter grayish limestone in heavy and some thinner layers, with two intercalated layers 8 to 12 inch, of ash colored clay with nullipores, fossiliferous	10 to 12 feet
7		Hard light gray layers thinner than those above, with concretions and shaly partings	8 to 10 feet
6		Ash colored clay with fossils	3 feet
5	Blk. Shale	~~Dark~~ Dark gray & black laminated shales	18 inches
4		Red clay	6 in.
3	Drift	Yellowish soft, or loose sand	3 to 4 ft
2		Layers limestone 2 to 12 inches thick with ~~the~~ marly or ash colored clay partings; passing down into ash colored marly clay with thin flat pieces limestone. Numerous fossils, particularly in the marly material. Prod. semiradiatus, P. longispinus, P. Nebraskensis, P. punctatus, P. aequicostatus, Hem. concentricus, Sp. Brancoenemus, Schenonema? Gyrotr. hemisphericus, Corals etc	10 ft
1a	Drift	Greenish clay - no fossils	12 in
1b		Brownish red clay, with shine particles (perhaps mica). Below Red with some greenish	10 feet seen

At the base of this exposure amongst the other, perhaps fallen from above. I saw some yellowish and variegated limestone rocks unlike any of the lower beds examined and agreeing well with the upper

part of No 8 from which I broke Avicula-pecten occidentalis, Pecten auriculatus, Small Atrypa reticularis, Bentys Timbermanii?, Macrodontis? rotundus, V. Product. Nebrascensis. Also saw in its Pinna pennata Aforesaid.

It is evident Mr Meek has not see Nos 4 or 5 of the foregoing. He also has too small a space between No 2 of this sec. and the Fusulina beds. This is partly filled with No 2, 3 & 4.

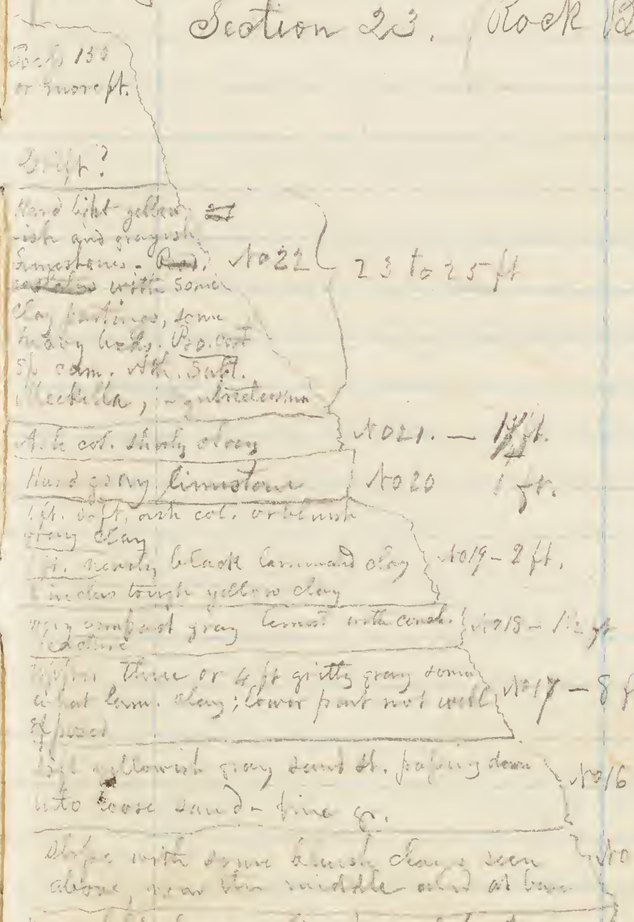
He seems to have seen some lower beds of brown and red clay, with a thin layer of limestone that now covered by water.

The bed 3, consists of rock loose sand that at first though the outcrops must be ~~[illegible]~~ sand that had fallen from the drift or bluff, above, but I dug in at several places some distance apart along the bluff and found it directly under No 4. It was from examining a drift excavation 10 to 12 feet in under the other side, however, that I was completely satisfied that it really belongs to the series. This drift was made in search of coal that the dark shale No 5, was supposed to indicate

Sunday June 23.

Morning somewhat cloudy; warm, with South W. wind. Went down to the Bluff and took the following section

Section 23. (Rock Bluff)



Rock Bluff sec. con.

No 13a	Hard lt. gray li with little bodies lik Cyathina. Allorisma	No 13(a) 2 ft.
No 12	Bluish ash col. clay with many Gyantoph. (Lag) some sp. Camerotoes, Leptaleur! hemispheriens 5 to six in. purple band 2½ ft below top	1½ ft
No 11	Hard light gray li. some coral as above, Allopora, Fusulina	1 ft.
No 10	7 ft bluish ash col clay 20 in. Blk. lam. shale 5 ft. bluish clay	13½ ft
No 9	Massive heavy bed light yellowish li. with some light col. flints, coral common above Allorisma, Pinna perradiata, St. carn. Pstalodus distinctor, bed lighter and more shaly in	5 ft
No 8	Hard nearly black arg. li.	2 ft
No 7	Black lam. shale. sp. planocon.	1½ ft.
No 6	Bluish ash col. shaly clay with chalky concretion, chonet. minor, sp. planoc., with ... Gyath. hemisphe, Lag, Normani Phynch nitu? sp. Pentalobatus, Strepts. Grouat. Eugraine?	5½ ft
No 5	Hard very light gray li. with oolitic looking particles	15 in.
No 4	Dark col clays 2½ inches Fusulina Bluish arg. col. clay 3 in	5½ inch
No 3	Massive solid hard light col nearly white limest, many Fusulina perforated with curious cavities	5 ft
No 2	Soft ash col. shaly clay - numerous Fusulina	8 to 12 inches
No 1	Massive hard light gray limestone with some dark flints - many Fusulina, sp. C gan. P. rogersi, P. omnitro, C. prometelus, C. Level of the Bluff coal at ...	10 ft

I think No 9. of this sec represents one of the Bellevue beds now under water, and that 8 and the beds below are the same as the upper part of the Plattsmouth sec. This bed 9, and the dark rock and Black shale below are also evidently the same seen over opposite Belle vue. There is evidently a downward inclination here, and a rise at Plattsmouth

Mr. Marcou makes this exposure 60 feet thick, but according to my measurements it is not 40 the 100 feet of rock, as from

After completing my examinations at Rock Bluff, came on to Cedar Bluff on Weeping Water, 5 m. in a direct line from the Missouri, and about 12 or 13 from Nebraska City.

Camped on a beautiful grassy spot elevated some 40 to 50 feet above the S. branch of Weeping Water, near a clear pebbly spring

A little back of us on the other side (W. or N.) creek the line of the upper Coal measures, crops out of the smooth grassy slope near the summit of the hills, and as seen forming a ridge

2 to 3 feet thick above, with many large (fallen) masses strewed along the slope just below, all presenting a dark gray appearance on the weathered surfaces, the remind one very much of the outcrops of the same rocks seen along Smoky Hill river above Fort Riley in Kansas. The general features of the country are also very similar, being beautiful rolling Prairies, with timber along the streams.

In this limestone region the water is very good, there being many cool clear springs issuing from the rocks near the base of the Hills. At Rock Bluff, as well as at Bellevue a mile above the village, at places where drifts have been dug into the shales and clays beneath ledges of limestone fine springs of clear cool water are found. One of these is in face of the cliff, some 40 or 50 feet above its base at Rock Bluff. These springs are entirely free from sulphate of iron, alum &c. so frequently found in springs of the Coal measures.

Saw no Grasshoppers north of Platte River, nor east that stream as far as I went

(about 400 miles), nor south of the Platte, in numbers to injure vegetation, until south of this place (keeping water). Rain, thunder & light (during day)

Monday June 24

This morning clear and pleasant. I took the following

Section 24

25	Hard light gray and yellowish limestone, in rather thick beds. Fossils Ath. Solit. Crinoid col. Good building stone	5 ft
24	Light yellowish gray, or ash col. li. rather soft, some parts harder - rather impure. In low irreg. layers of varied thickness	8 ft
23	Greenish blue clay	1½ ft
22	Lighter grayish li. more impure and less compact than 21	8 in.
21	Lam. clay. Green above darker below	18 in.
20	Hard light gray limest.	26 in.
19	Clay, with some which ~~hard~~ ~~is hard~~ ~~li.~~ below, li. above ~~into soft imp. li. ~~	8 in
18	Often 18 inches below soft a vesicular material. Soft light yellowish ash co. Sandstone - some parts impure & laminated. May occupy pt. of the slope below	12 ft.
17	Slope, showing only at lower part greenish lam. clay 4 ft up.	15 ft
16	~~(Which a) green clay~~ Brownish red. clay	3 ft.
15	Ash col. dry yellowish clays, with reddish mod. marl, or soft imp. limestone	6 to 8 ft

Cedar Bluff Sec. Cont.

14	Brownish red clay	3 ft
13	Green clay, or ash col. calc. with (dog) coral, chunks of cam. rock	1 ft
12	Hard bluish gray, or whitish ash col. limest. with same coral as above; green clay partings.	2 ft
11	Greenish and yellow clays	3 ft
10	Reddish brown clay with a 4 in band of green	3/2 ft
9	Green crumbling clay	14 in
8	Yellow clay, with yel. calc. concretions	1 ft
7	Hard bluish gray li. more pure than 12	15 in
6	Soft bluish green clay (15 in at base)	8 ft
5	Light grayish shale or clay with a streak of black above	1 ft
4	Black laminated shale	26 in
3	Dark bluish Carg. li	18 in
2	Soft arg. li. or ind. marl.	18 in
1	Dark bluish gray arg. li.	8 in seen

Strata 5, 7, and 9 to 12 inclusive, 12 miles N.E. Wheeling water, Sand at a higher Erosion, the degree to have been this same Section, Clay, pure white li. Coal 5, 8 in. 7 ft.

About 400 yds due N. of the top of this sec. a cross the little valley and not less than 25 ft. above the highest bed of this sec. a very hard marble bed

of light, or whitish limestone weathering so as to present a rough, fragmentary appr. crops out of the brow of the hill, 6/2 feet in thickness.

Across the little valley on the same side as Cedar bluff (about 300 yds due S. E from the 6/2 foot out crop) the same rock crops out along the brow of the hill, but not less than 25 to 31 feet lower, showing a decided (probably local) dip here to S. or S.E.

From this visible dip and the fact that no outcrops are seen between here and Neb. City, I am now much inclined to believe that this Cedar Bluff section dips south or S.E. so as to pass under the section seen at Neb. City. It seems scarcely probable that even if there is a reverse of the dip that these heavy beds of hard limestone could rise up and run out as we go southward, without cropping out somewhere, or being struck in wells, at some point between Cedar Bluff and Neb. City. If it is true, this inclusive Cedar Bl. section up to division 18, bears considerable general resemblance to the Neb. City section, and I was at first inclined

to regard it as the same with some modifications of the beds, but the facts mentioned led me to think it more probably a lower repetition of similar beds with heavy limestone between.

Arrived at Nebraska city at 4 o'clk P.M. Locusts (Rocky Mts) very numerous here. We saw scarcely any north of Weeping water, but they increase in numbers as we go southward, and in this region they threaten injury to some kinds of crops. The largest of them are now about 3/4 to 1 inch in length. Some of them have their wings fully developed. When we were here on the 8th inst, they were coming out of the ground by thousands. They have more than doubled their size since then.

Tuesday June 25th

Morning cloudy, a little cool with a light south wind.

Three miles west of the landing at Nebraska and at an elevation of about 50 feet above the Missouri at a medium stage of water and near the house of Mr. Anton Wirth but not on his land, I saw the following

Section 25 (A. Wirth's)

4	Loose pieces yellowish gray siliceous marked Inc. Sandstone along slope	
3	Slope as far as could be seen composed of soft bluish ash col. drab & greenish shaly clays	18 feet
2	Blue argil. rock, some parts very hard and compact. others soft and shaly, Fenestella sp. Planoconcha, Chonetes, abundant. ~~Blue argill. accom.~~ Step. crenistria sp. Camerot. Synbilgoma, Pood. Costatus P. symmet. P. longisp. Myalina subquad. Myalina hirsiple, Euomph. sulcatus, Ath. sub. Sp. Kentucky.	2 to 2½ feet
1 (A. Cutler)	Impure coal	8 in

About 150 yards farther up the little valley (18) a bed of soft arenaceous argil. rock of bluish green color is found at some elevation of some 30 feet above No 1. This I think holds about the same position as the loose pieces seen upon the slope 4 of above sec. Just over it bluish ash col. clays were seen exposing 3 or 4 feet. All of these beds, including the coal bed, are somewhat higher position than the coal crop at Neb. city.

See Sec. 25 & Shaft p. 30 for the fossils characteristic of the locality see p. 25

Section 26 (Morlous coal)

	Slope to the summit of the country	Morlous House 95
6	Soft, micaceous sandstone, some parts argillaceous (ripple marked)	8 in seen
5	slope imposed 12 feet	19 ft
4	Bluish and drab clays 7 feet seen below	
3	Blue arg. cal. rock, Lonsdalia Sp. Kentuckensis, chonetes (Hard and compact or soft)	18 inches 2 feet
2	Coal and bitt shale, the coal being about 8 inches, & not of very good qual.	1 foot
1	Blue clay, laminated (seen)	27 in

The base of this section is about 3 feet lower than the top of Mr. Morlous shaft, which is scarcely within 40 yards of it, ~~and~~ ~~which is~~ ~~equal~~ at a point 91 feet above low water of the Mo, and penetrates (at this time) some 104 feet deep. The above section is the same as Sec. 25 except that it goes some three feet lower. I have no means of ascertaining the relative elevation of these two outcrops, but there seems to be little difference since the coal at Morlous is 6 to 8 feet above the little creek, and down at its level

at Mr. Wirths; while there must be, at least that much, and probably more fall in the creek between the two localities. It is therefore obvious that we have here at Mr. Morlous and Mr. Wirths a Bed containing Lonsdalia, and numerous other Carb. fossils above all of the Marcous Dyas at the Nebraska City landing, since Mr. Morlous shaft penetrates directly through those so-called Dyassic strata, which also contain all the common Carb. Measure fossils.

Wednesday June 26

Had rain, thunder and lightning last night — Cloudy this morning, with a breeze from the South; but evidently clearing up — a little cool.

I observed yesterday that the grasshoppers are doing much damage to the crops in this vicinity. One man says he has had a 70 acre field of wheat entirely destroyed, and that they are now seriously injuring his corn crop. They seem to prefer some kinds of vegetation, but eat all kinds. I have seen them eating wheat, corn, potatoes, tomatoes, and nearly all kinds of wild vegetation. They are far more numerous here near Nebraska City, than at any place we

have yet visited, and it is feared they will entirely destroy the crops. As yet however some farms, and larger districts, appear to entirely escape these savages this year, of the same. Mr. Morton, who has lived here ten years, says this pest was unknown here until last year, when they came in swarms from the S.W. They were too late last year to do serious damage, but those now here were hatched from eggs deposited here last year, and commence their ravages early

Started out to see salt spring 3 miles west, of Arb. City. Soil becomes more sandy and seems to be underlaid by Drift after we had gone out 10 to 12 miles, but still good and productive. See some pebbles in the washing along slopes, in the road. Occasional boulders generally red quartzite, some of them 7 or 8 ft in diameter. Also granite. 20 miles out soil a little more sandy but good and very productive. Surface beautiful rolling prairie with very long gentle slopes. A few clumps of elms, willows &c along the streams

Saw no graptolites after we came

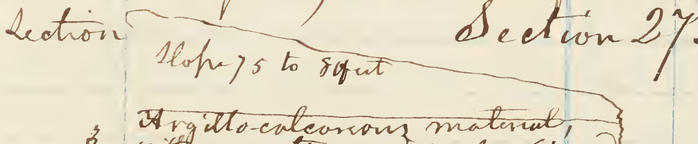
8 or 9 miles out.

Was given the following fossils at a farm house 20 miles out (Local T. 8, R. 11, Sec. 11): Productus semireticulatus, Inoceramus mytiloides, Sp. Camerata, Sp. Planoconvexus, Athyris subtilita, Nucella, Retzia Mormonii, Eucharis, Shalus sugrosus, Pleurotomaria, Bryozoa. Also saw in rock form near the same place, of a whitish limestone, many Fusulina

After dinner visited this locality and found it to be a quarry on a little ravine some 60 to 80 feet below the summit of the country which cannot be less than 250 feet I should think, higher than the highest point of the county at Arb. City, or about 420 feet above the level of the Mo.

This little quarry shows the following section

Section 27



From No. 3 of this section we collected,

in addition to the fossils already mentioned Chonetes mucronata, C. vernuilian, Rhynchonella lita, Orthis carbonaria, Productus longispinus, Prod. Prattenianus, Cyath. hemisphericus, Spirifer Fraeriuus mucrospinus, plates and spines Archaocidaris, Strept. crenistria, and a fragment of a pinna

About two miles N. of this, on a stream called the Nemaha (one of the Nemahas) and at about 25 to 30 feet lower horizon saw the following &c.

Section 28.

4	Bluish and greenish clays	8 ft seen
3	Reddish brown clay	1 foot
2	Greenish and bluish lam. clays with calc. concretions	12 feet
1	Bluish and drab indurated, and soft or argillaceous marly material, with some hard layers	5

Saw no fossils in any of these beds. — Was informed that similar outcrops are seen along this little creek for several miles N. of West up, at intervals.

In the upper part of No 1, saw many little thin argillo-calcareous flat whitish pieces more or less reticulated over with thin raised markings as if there had been clay between them that had cracked, and the cracks had been filled with hard calc. matter, and the clay subsequently weathered out leaving the filling of the cracks projecting. This reminded me of similar appearances in the Permocarb. rocks of Kansas

That these exposures are actually considerably higher than the highest outcrops seen along the Mo. near Neb. city, is evident from the general slope of the country in that direction. Whether or not they occupy a higher geological horizon, is not so clear, though I am much inclined to think they really do.

Thursday June 27

Stayed all night at a farm house called "Union Ranche" near the exposures mentioned above. Morning clear and bright.

1 Mile nearly due W. of sec. 28 and elevated some 60 to 65 feet above its a thick level, saw quarry within 25 or 30 ft. summit of country, showing a larger yellowish white rather hard limestone 12 in thick, containing many fusulina (Prod. acuteceostatus) some Sp. Allopsis nov. / Productus? Polypora, Fenestrates, Stenopora, Acanthocladons. This evidently holds a position 25 or more feet above sec. 27, the space between being probably occupied by clays. This rock makes good lime. Also fine sills and caps, or other masonry. It is easily quarried, being so near the surface, with but few feet of soil to remove to get at it, near the top of the sloping crops look very fine here.

The above mentioned limest. is found at the same elevation all through this neighborhood. At one place a lime kiln is dug showing the following section under it

Sec. 29

Same limest. mentioned above (max. fusulina)	1 foot
Slope covered with limestone	15 ft
Dark laminated clays	7 ft
Hard gray limestone	15 inch

Black carboniferous shale is found here at a lower level than the section 29.

Boulders red quartzite seen at many places in this region. Neosho creek has generally a rocky or gravelly bottom here, and the water is clear. Unions ~~in it~~ Leydas and Anodons in it.

About 2 miles a little N. of W. of (Sec. 28, T. 19, R. 19) from the Union Ranch where we slept Sec. 28, p. 79) saw a salt spring, boiling up in a muddy place, at an elevation not far from above the top of Sec. 28, and of course below that of the Fusulina limestone mentioned on p. 80 not less than 40 to 50. Hence this sp. has its origin in the upper coal measures. It would perhaps run about 60 gals in the hour. Very little odor sulph. hydrogen.

Stopped for Dinner at the house of a new settler 14 miles (N. of West) from the Union Ranch where we stayed last night. Proceeded to the N. side of the Neosho at the salt spring mentioned above, and came out on the N. side. The little valley of that stream here, with its little clumps of trees is in

eight on the south, at a distance of 2 miles. The whole country is beautiful rolling Prairie land of good quality — supports a fine growth of grass and other Prairie plants. Saw some of the same kind of light col. or drab limestone (mentioned on p 81, as containing many Fusulina) at the same house, quarried on a little stream 2 miles farther north for walling cellar do. Saw no Fusulina at it.

On Salt creek 50 m. W. Neb. City on Sec. 6. T. 8. R. 10 E. Saw the following

Section 30

	Slope with which decagonal li. crops near base in place red concrete pebbles & Sand. Crek. No 1.	40 to 60
6	Green, blue and red clays, with some layers harder rock	25 to 30 ft
5	8 in. layer soft laminated whitish li. 5 to 6 in. card grayish layer soft yellow, pinky arg. argn. rock	3 feet
4	Bleuish gray clay, crowded col. Spirifer Archaeocid.	1½ ft
3	Soft. arg. mfs. li. Prod. semiratic	4 ft
2	Black shale rather imp. Carb. many Dice, some Brachiopods. Fusulina	20 in

1	Hard gray imp li, with many Fusulina	14 inches

The base of this section is down nearly on a level with the ~~base~~ water in Salt Creek which is about 70 or 80 feet below the summit of the surrounding country. All the beds here show a dip of about 3°, a little E. of south.

About 1 mile in the direction of this dip mentioned above, from the locality of Sec. 30, and with its base on a level with No 7, of that section saw the following

— Section 31 —

5	Soft drab arg. or magnesian li. splitting into thin layers, but becoming massive when ground into. Imp. Brach. Oecid. some layers finely oolitic. Crinoid. Eccid. Bryozoans.	5 ft
4	Similar to No 3. but splitting into thin pieces	2 ft
3	Gray or light gray arg. calc. material harder and more calc. than No 2	15 in
2	Ash col. and drab clays concretions calc. and more indurated	8 ft
1	Green and blue clays	8 ft
	Knee pressed	30

All of the last section must come in ~~a few distance~~ above the horizon of the last preceding section, as there is a dip of at least 3° from the first towards the latter, with an interval of not less than a mile between. The limestones of Sec. 30, look very much like those of the Permian in Kansas, and may belong to the same horizon.

This is a very beautiful country here on Salt Creek; the higher country sloping down to the valley very gradually for two or 3 miles back. Soil good, a little sandy. Crops growing finely, but injured by the Grasshoppers — the first I have seen since leaving the neighborhood of Neb. City — some timber along Salt Cr. and its branches. Grasshoppers not so numerous as near Neb. City. They destroyed some of the Crops here and far in towards Neb City last year. They did not seriously injure the corn, because they came too late, but destroyed the Corn leaves. I was told they attack any kind of Crops (including even tobacco) except oats. They came in Sept. last year from S.W. or N.W.

Friday June 31

Morning clear. 1 3/4 mile from the location of Sec. 31 in a direction S.E., ~~little E.~~ saw at a lower elevation an outcrop of the same beds apparently as Sec 30, and at about the same elevation.

Found here in the Blue slate No 2. Lingula R. rot., Dis. and in the dark arg. beds associated or commonly with the beds above Fucoidea, Sp. Phillipsia, Sp. planocov., from the shaly clay of 4 ft 5 above ~~Sp.~~ Prod. Sem. Chon. mac. Many Sp. planocov. and Fucoidea. The exp. show that the dip at Sec 30 must be 8½ M. N. of Sec. 30, or Sec. 8, T. 8, R. 6. Saw a coarse light colored sandstone rendered porous where exposed by the exploding out of some softer material. On W. side Salt Creek. From outcrops seen on the hill and in the little side valley it is evident this sandstone forms the whole nucleus of the bluffs here and also on the opposite of Salt Cr. valley at least 60 feet in thickness. Saw Dicot leaves in the sandstone, that show it to be Cretaceous No 1.

One Mile N of the last mentioned

(3 mi. a little E. of S. fr. Salt Springs)
locality, and at about the same elevation as the top of the red sandstone, at Salt City (a very small village) all the wells strike a white sandstone. One well penetrated through 45 feet of this white sandstone, which is tolerably firm sandstone, and then 35 feet through loose white sand. This sandstone and loose sand is doubtless of Cretaceous age, and the depth of the well shows that it extends down below the bottom of Salt creek.

After dinner went down to look at the salt springs. They are in the flat bottom of Salt creek. At the principal location the water bubbles up in numerous places over an area of near 250 acres, which is occupied by black mud about 12 to 20 inches deep. This mud when we visited the springs, was somewhat hard and stiff so that one could walk over most of the area without sinking over shoe top deep. Other places were softer, so that one would sink more than ankle deep. Still other places were quite soft, and it would probably not be safe

to venture into them. All the parts of the surface hard enough to walk upon were whitened with a thin saline efflorescence, so that as seen at a little distance, the whole area looks exactly like a large pond in winter partly covered by ice. The saline matter however, does not form a crystalline crust, but when examined closely, looks more like flowers scattered over the surface. On digging down at one place where firm enough to stand upon, the black mud was found to extend down about 12 inch becoming softer below. Under this is gray loose sand. Both sand and mud have a saline taste and a sulphurous odor, but none of this odor is observed in traversing the surface. The numerous little springs that bubble up at various places collect together, and form a small stream flowing off into Salt creek. This has quite a strong salt taste, and affords so much water as two or three good springs (as much as would fill a 40 gal barrel in 7 to 8 minutes). Salt has been made here by some of the settlers

There is only one of about 10 or 12 of these basins scattered about in this little valley here, but it is the largest and most important.

Judging from all the surroundings near here, it seems highly probable that the salt water issues from the cretaceous sandstone, which from the wells sunk at Salt City on the west side of the valley probably underlies the valley here. Its real source however, is probably in the Upper Coal Measures or Permian rocks that probably underlie this locality at no very great depth. There salt ponds &c in T. 10, R. 6. Some 3000 tons of salt per day has at some time been manufactured here by boiling, and a smaller quantity by solar evaporation – both in a very crude manner. If these salines are composed of sodium cl, must be in making salt by solar evaporation, as there is very little wind near enough to be used – only a little scattered along Saline Creek and its branches

Saturday July 1

Morning clear, with the prospect of a warm day. Barge S. After the dews of the night the salt flats look less white this morning, owing probably to the remelting of the efflorescent salt on the surface.

See some Grasshoppers in the vicinity. Some fields of wheat and other crops more or less injured by them, but not much so. This is a beautiful prairie country – The valley of Saline here is about 3 miles wide, and not more than 60 to 70 feet lower than the higher country on each side; while the slopes are so gentle that there are no well defined limits to the latter.

Twelve miles west of here the surface is said to be more hilly, soil thinner and somewhat sandy (?). At Blue River 18 to 20 miles and down it, the soil is much as here, a little sandy and very good farming land.

Went up a little tributary of Salt Creek this morning, some 5 miles S.W. from the Salt Creek flats at the Salt Spring locality. Saw several rather weak brine

springs at places along this little creek. One of these shows a ferruginous deposit but not much chalybeate taste.

At one point on S. 12, T. 9, R. 6 saw the following section

Section 32.

3	Slope	
2	Soft white sandstone (showing) composed of angular grains quartz, [illegible] some grains of ash, [illegible] stones	18 ft
1	Red, ash colored, and bluish clays with near the upper part, a layer of reddish, fine grained rather soft [illegible] rock, some parts of which are bluish - 2 ft. This layer also contains [illegible] near bluish [illegible]	18

Along the bank of the creek and on its bed saw an exposure of mottled red, whitish and ash colored plastic clay perhaps 4 or 5 ft lower than No 1. of the above section. Some parts of this clay would probably be useful for potters use. No 1 evidently belongs to the Upper Coal Measures, and No 2 belongs to the Cretaceous, being probably the same stratum in wells at Salt City, and apparently underlying the salt flats in the valley

of Salt creek. It seems to occupy much of the country in this neighborhood, and is a lower member of the Dakota gr. than the Red leaf bearing Sandstone.

Whether the mottled plastic clay seen in the Creek, as mentioned on p. 91 belongs to the Carb. or to some part of the Cretaceous is not so clear. I think the former however, though in that case it is probably not strictly in place, as it seemed to be mixed up, and mottle, as if it had slidden or had been redeposited. Camped 15 miles towards Neb. City, and stopped for the night at a farm house.

Sunday July 2d

Morning clear and warm with south breeze. After breakfast came on to Neb. City, where we arrived at 12 o'clk P.M.

Monday, July 3d

Morning clear and warm, with a south breeze. Went down to the Rock-ford crossing of a little stream that empties into the Mo at Nebraska City and collected quite a number of fine specimens of fossils from the Clays. This exposure is only about ¼ of a mile back from the river, and its base is about

12 or 14 feet above low water mark.
It shows the following beds

Section 33

Beds

7	Mottled red, bluish and greenish clays, with schizodus, Leda, Sp. plant-conifers, chonetes, Surrillia longa Proteon Kiamni &c &c &c	3 ft
6	Bluish & yellowish clay, more laminated than above. & dark seam below	20 in
5	Limestone like No 3	6 & 8 in
4	Ash col. Clays with many fossils	5 in
3	Hard gray limestone (arg.)	5 in
2	Ash col. clay with many fossils	6 in
bottom cr.	Hard ~~bluish~~ gray limestone	10 in seen

No. 1, 2, 3, 4 & 5 of this section are the same as 3, 4 & 5, of the Neb. City landing section (p. 28), and No 6 & 7 are the lower parts of No. 6 of same section. From the clay intercalated between 1 & 5, and probably in part from 200 below No 1, of this Rockford section the following fossils were picked up at the quarry – see p. 96

One mile below the Neb. City exposure show the following

Section 34

Seen 50 to 60 feet

4	Slope with some exp. of bluish and yellowish clays, and loose pieces bluish arg. calc. rock	15 ft
3	Hard bluish gray limestone, with rough fracture, common pyrites and a few fossils	30 inch
50 diff 200 yards S	Black shale, with near middle about 2 inch imp. coal	20 inch
	Blue and ash colr. clays at sp. 2 ft seen	2 ft
W	Slope from high water of Mo. which is some 15 feet above low water m.	30 feet

I can scarcely doubt but the above beds 2 & 3. represent the Mottom coal and the overlying limestone seen at the shaft, some 3 miles a little N. of N. from here. As his lie, and coal are about 80 feet above low water m. this would show a dip of something over 8 feet to the mile from Mottom to the above section

Tuesday July 2

Morning clear - Day as yesterday was. 93° in shade. Spent the day in collecting at Neb. City wife

Wednesday July 4

Morning clear and very warm. Have noticed for several days past that the grasshoppers have their wings sufficiently developed to fly. This morning at about 11½ o'clk. Saw many flying very high some not less than 1000 feet high. They go with the wind, which is towards the North today. They do not have the power of making headway against a moderate breeze. Probably they could go in any direction in a perfect calm, but I imagine their migrations are always with current to of wind. When the sun is shining, they are visible for a great height, and look white like flakes of snow. They are not numerous enough yet, to obscure perceptibly the rays of the sun, or to be seen in the distance like a cloud. They will probably do much damage to crops.

Bid a final farewell to Nebraska City at 12 o'clk M. and started on south, driving

the wagon we camp by the road side on the high country, and rode on horse back along a road at the base of the Missouri bluffs in the valley. Soon found the water so high that we had great difficulty in getting along - sometimes riding in the water, and at other times being compelled to ride above over steep hillsides covered with trees, shrubs and tangled vines; in other instances we were compelled to descend entirely out of the Mo. valley to very steep hills 200 & 300 feet in height and then descend to the valley without any path to ride on. These changes we had to repeat frequently. The few little appearances seen for 2 or 3 miles below Neb. City seemed to indicate a dip down the river, but the appearances seemed in all the passed by a stage of water which completely so often to leave the bluffs were not sufficient to enable us to settle this question satisfactorily.

After coming on about 6 or 7 miles below Neb. City without seeing any appearance of any outcrop we saw at a point about ~~7~~ 4½ miles above, a village called Otoe City, the following section:—

Section 35. Otoe city

Soil with locally some drift 4 ft
15 ft

7 Soft yellow sandstone 10 ft

Drab and ash col. clays with scattered concretions and [illegible] 3 ft

6 Bluish laminated clay, [illegible] 7 ft

(see p. 99) 4 Nearly black laminated clay shale with sp. plant remains 3 ft

3 Hard dark gray calc. layer 4 ft

2 Red, green, blue and ash col. clays, some parts a little arenaceous, and towards base a 2 or 3 inch seam black shaly matter. The whole not well exp. 58 ft

Red and slope with no rock exposed 36 ft.

No 1

109 ft.

A short distance below this above exposure saw near the top of the bluff of soft whitish gray sandstone showing a thickness of 15 feet with blue and red clay above. Have the impression

that this sandstone holds a position just above No 7 of the last section, but am not quite sure.

At the village of Otoe City 8 miles below Neb. City, and almost in sight of the last sec. saw rising abruptly from the waters edge the following section.

Section 36.

6 Purple, blue and green clays 6 ft

Soft ash col. [illegible] material with hard col. [illegible] layer, million fossils [illegible] Sp. Camarat, Strep. Micrenata, Sp. Camarat, Strep. Acanthoceras Neb. the [illegible] Cooking [illegible] Lake the lower pt. No 2 of Plattsmouth sec. [illegible] (see note p. 100)

5 Ash col. loam, clay [illegible] 12 ft

4 Black shale, one [illegible] 10 in

3 Yellowish soft sandstone 6 ft

2 Soft [illegible] sandy shale, large concretions, saline efflorescence 6 ft

1 Brownish and ash col. clays some parts appr. a little arenaceous to high water mark 15 ft

I can scarcely have any doubt but the beds seen in this section occupy the place No 1 of the last preceding section. So that we have here a continuous sec. [illegible]

tion of over 111 feet of rocks consisting of various colored clays, and very soft sandstone, as no such extensive series of soft material as this was struck in the borings at Nebraska city, I can hardly think the dip is continuous in this direction, and that the whole of these soft beds seen today, hold a position above the top of Morton's shaft.

After seeing the exposure of soft white sandstone mentioned at the bottom of p. 97, with purple and black clays above it, I am much inclined to think the similar rock seen near the salt springs, (see p. 91 sec. 32) really belongs to this upper Coal-M. or Permian series rather than to the Cretaceous as we had supposed. I also now believe a similar sandstone seen near Rock Bluff, Iowa (see p. 21), belongs to this series instead of to the Cretaceous.

Pitch Camped for the night at Otoe village. Half mile above Otoe City saw where some one had dug into No 4 of Sec. 97 just over the dark shale there is here 1 to 6 to 8 inch bed yellow limestone. In the shale saw Prod. aspiciort, P. longispina, Sp. planoconvex, Rhynch. uta, Chonetes mucronatus, Sp. kansasensis, P. semiretia, Thrift crenistria

Note for Sec. 36-4-p. 98 - In this bed saw at one place ¼ mile up, where the streak of black swells out into a dip to 8 in. bunch of coal. Just under this whole surface of bed 3, is covered with a bright yellowish efflorescence of a mixed salt having the taste of Copperas & alum. Some little selenite.

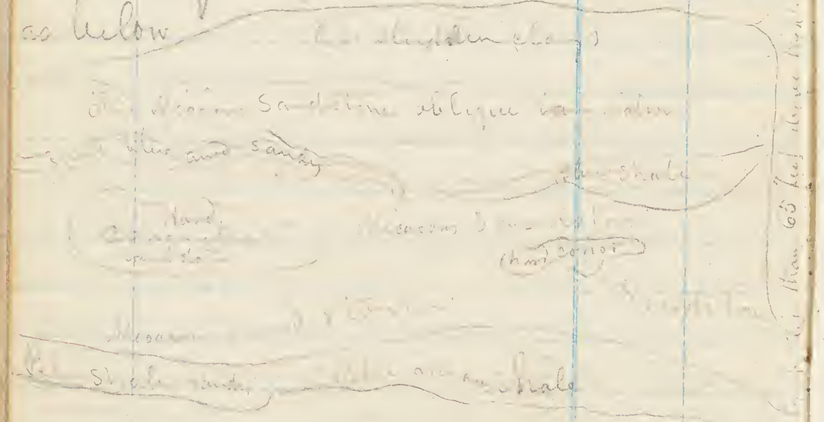
Note for bed 5, Sec. 36. In addition to the fossils mentioned in the sec. on p. 98, we afterwards found in it S. Hunterensis, Syringopora, Aleckella, Lima rara alta, Prod. Semiretia. At some place but a few 100 yds. from where this bed is so incoherent and so full of fossils, it passes entirely, or partly into a massive, moderately hard lighter col. li. with very few fossils.

July 4 Thursday,

Came up to the village called Peru, first here in the bluff, we saw at some 15 feet above the mean high water of the Missouri, an outcrop of soft yellow sandstone, stained red by clays that seemed to have slipped down upon it from above. Left there at 7½ by mile below the

(Sec. 37)

Village an abrupt exposure rises almost from the edge of the river to a height of some 65 feet above the present high water. This is one of the most remarkable deposits I have seen being composed of yellow and light gray soft sandstone with large harder concretions of the same, and irregular intercalated seams and beds of blue arenaceous shale somewhat as below



This exposure presents a very curious appearance; the intercalations of blue arenaceous shale sometimes wedging out or seem cut off abruptly, or cropping the exposure beds of sandstone obliquely at different angles, while at other places along the same outcrop they are entirely wanting, the whole bluff, from top to bottom being composed of soft sandstone with obscure planes of stratification and indications of oblique lamination. The concretions are of various sizes, some being many tons in size. They are well defined and rounded in outline, very hard (almost like quartzite), composed of fine sand grains like the surrounding rock, but not showing a concentric structure; the lines of division being either horizontal or parallel to the oblique lamination of the enclosing soft sandstone. In some of these concretions, as well as in the surrounding sandstone we saw the flattened stems of Calamites. Some were not flattened however in the sandstone, and 2½ inches in diameter. In the blue ~~[illegible]~~ soft arenaceous shales we saw fragments of plants amongst which we could only make out Sigillaria.

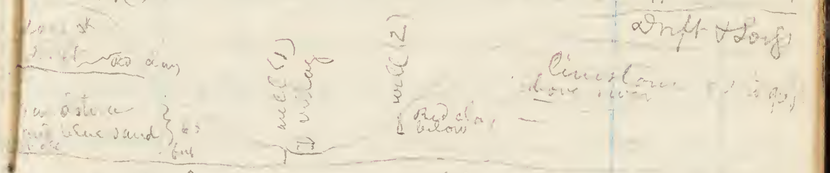
Between a ¼ and a ½ mile above this

exposure, and also above the village, in a direction a little north of W. from the sandstone bluff, 12 to 18 inch beds of light colored limestone crop out along the slope 90 to 100 feet above the river, with also some indications of intervening red clays. Lower down some hard arenaceous loose masses have been dug out for building purposes. From one of the higher beds of limestone that had disintegrated, or from a calc. clay associated with it we picked up many sp. Platycrinus, Chonetes mucronata, a few sp. camerata, Prod. Nebrascensis, P. longispina? Ath. nob. Sp. Kentuckensis, Strophomena, a minor col. and one E. rugosus.

This bluff is probably mainly made up of various colored clays and some intercalated beds of limestone and sandstone, probably in part the equivalent of the Hocking beds.

The bluff of sandstone below the village described on p. 101-2, seems to pass under that above the town, though may compose also some of the lower part

of the latter. This is indicated by several facts such as the following:



1st. the limestones in the bluff above the town are actually higher than any part of the sandstone bluff below it; while a well sunk in the lower part of the village between the two bluffs struck sandstone with blue shales, and another (well 2) some 50 feet higher, struck red clay like that seen overlying the sandstone in the other bluff (1).

Again on coming on about 2½ to 3 miles W. of S. towards Brownsville, and about 1½ m. back from the river, we saw a limestone quarry evidently considerably some distance higher than any part of the sandstone bluff, and agreeing exactly in appearance with some of the masses we had seen in bluff 2) above the village. This is a whitish very yellowish limestone 12 to 18 inches in thickness. In the soft material thrown out at this quarry we found the following fossils: Pleurotomaria

Cyrtolites micronat., Myalina., Bellerophon carbonaria, B. montfortiana, Sp. camerat Pleurotomaria, 1 Sp. planoconvex

Friday July 5th

Rain thunder and lightning - Last night morning cloudy but clearing up at Sunrise Grasshoppers rather numerous here three m. S. of ~~Otto Creek~~ Perri, and near there

38th Section at Brownville

	Soil	40 to 100 feet
13	Dark shale, and below nearly black clay weathering to drab. (Fossils)	0 to 6 feet
12	Yellowish gray granular or imperfectly oolitic magnesian limestone	3 feet
86 ft above high water		
11	Unexposed	10 ft
10	Whitish soft argillaceous lime	6 to 8 in
9	Purple and greenish clay	10 ft
8	Whitish and yellowish impure limestone - rather marl, Myalina, Pectinites, Bracaculus, Stems crinoids, Cyrtolites micr.	3 ft
7	Purple clay	1 foot
6	Whitish limest. soft and arg. Plancph.	6 feet
5	Bluish clay	5 1/2
4	Black shale and seams impure coal. Fossils	1 foot
3	Blue clay with fragments coal - Orbicula fossils	20 ft
2	Black hard rock with crystals calc. Sp.	

1	Soft yellowish micaceous sandstone with occasional seams and alternating laminae of black or greenish more or less carbonaceous, bands marked with yellowish and the fragments of coal, calamites &c. just form leaves &c. much broken up	57

Of No 1, we only saw in place above high water mark some 20 feet, but a shaft was sunk here that penetrated it 57 feet without passing through it, as we were informed by the gentleman who sunk the shaft. We were informed by several persons, that at low water in the Mo. stems and some trunks of trees are to be seen in the sandstone, which from the description were probably Sigillaria and Calamites. We saw in place the latter from the lower and exclusively portions, with impressions of the latter. There is undoubtedly the same sandstone seen just below Perri, five miles west of N. from here. As it seems to be lower here, there would seem to be something of a dip in this direction. Saw a mass of fossilized wood from the shaft here, apparently of a very oxygenous growth, black but simple, ordinary

Of the beds filling the space between No 1 & No 4, we only saw the upper part of No 3 in the foregoing section, but they were described to us and their thickness given by a gentleman who sunk a shaft down through them 57 feet into No 1.

I am now more than ever impressed

with the idea that the yellowish and whitish soft sandstone forming bluffs below the mouth Big Sioux, and supposed to belong to the Cretaceous may belong to the bed No 1 seen here at Brownville

The section here also clearly shows that the sandstone seen just below Sioux really passes beneath the limestones and red clays of the hill above the village

Saturday July 6

Cloudy this morning. Rain last night. Stars rain this morning at 8 o'clk. Rain over by 11½ o'clk.

A little below the landing at Brownville and not more than 100 yds in a S.E. direction from the outcrop of No 1, of the Brownville sec. (See. 38 p. 105) I saw at the base of the hill 5 or 6 feet of greenish fine arenaceous clay overlaid by about the same thickness of Reddish brown clay. Just above the latter many fragments whitish arg. li. with loose angular chunks, (one) Pod. sumnet. fragment Ins. camerat. Above the latter the exposures along the slope, show there

are some (8 to 10 ft) rather thick beds red clay, and some greenish. Above all, about 50 feet above high water of the Mo. Whitish rough crumbling shelly li. and ash col. clays, amongst the fragments of the latter found loose. Crinoids Pod. sumnet. P. longirp. P. Nel. Crinoids Stems &c (no Fusulina). I noticed nothing over this crumbling li. saw indications of (60 to 70 ft.) from bed black shale, and red clay.

From these exposures it is evident that this hill is composed (under the loess) of a series of red clay &c and is entirely different from seen just above the village. Can this be the result of a fault? The bed 12 of sec. 38 just above the town seems to show a S.E. dip, which would bring it lower in the bluff below the town but it seems very improbable that there is dip enough to carry the whole 40 to 80 feet of strata (entirely) Comparing that section near the bluff below the village

Sunday July 7

Morning clear and pleasant. Some grasshoppers in this neighborhood, but not enough to do serious damage to crops.

One and a half miles below Brownsville, and above along the same line of Bluffs mentioned on p. 107 just below that village, we saw the same red, blue and drab clays continuing down the river, and apparently composing the hills for 50 or 60 feet up. At 1½ m. distance below (Brownsville) Saw 27 Sorg

Section 39

	Blunt clay, a few inches	
6	Lamina. sub. oolitic Ci. lime Sec 12 of Sec. 38 (Yellowish)	5 ft 10 in
	Drab col. clay, with thin seams or specks mottled white	
5	Blue clay, not well exposed	8 ft
	Red clay	
4	Yellowish gray imp. li. some fragments oolitic.	2 ft
3	Red and bluish clays	8 ft.
2	Whitish impure li. with acqueous	10 in
1b.	Ash colored, red and bluish clay, with many loose fragments whitish li. above with Lon. sp. S. Hal. Sp. Cam. & near base many Chonetes, Myalina quadrator	4 ft
1a	The whole not well exposed.	

Mo. Pac. Pell sp. Montfortana, 1 sp. Flanconny

It is remarkable that this sp. would almost correspond, partly with the Wiper part of Sec. 38, above bed 10, if we suppose 12 to be the

section to be divided into two beds, the upper one 10 in and the low about two feet, with 8 ft. clay between; and it is worthy of note that the bed 12 of Sec. 38 is in two layers the upper 1 foot and the lower 2). While the beds below differ entirely.

At Aspenwall 8 miles below Brownsville Saw

Section 40

Sorg

16	Grayish drab clay with very thin seams light col. arg. calc. matrix,	3 to 4 feet per 6 feet
15	Mesopone yellowish, rather hard li. with many Myalina perascuminata, Aviculop. occ. Strep. crenistria, E. nitrosus, Allorisma subconcola Schizodus, Pecten, Nucula acuminata Nucul. occ. Natica (Bin).	3 feet
14	Bluish and drab indurated clays ~~some~~ gray soft imp. li. 6 to 8 in	2 ft per
13	Yellowish Ci. stone	18 in
12	Bluish clay	5 feet
11	Red clay	5 feet
10	Bluish laminated clay	3 feet
9	Bluish and whitish imp. limestone with, P. longispinus, Spirif. c, Sth. sub, Strep. Crenistria, Myalina, Flanconny, Nucella chonetes	4 ft
	Coal	6 in.
	Fire clay	2 feet
6	Drab indurated clay	4 feet
5	Red bluish imp. li.	18 in
4	Black shale	4 feet

Sec. 40 contin.

3	Coal	22 to 24 in
2	Shirt clay	15 feet
1	Sandstone	3 feet

Of this section I saw No 2, 3 (unpaintly), 4, 5, 6, 13, 14 in part and 15 entire. The other parts of the section, I obtained from an intelligent miner familiar with all of the rocks in the hill. He asserted very positively that all of these beds have a decided dip to the east or up the river, and as he thinks, they dip beneath the heavy bed of sandstone seen at Brownsville. Still they seem to me to agree in some respects with the beds composing the hill just below Brownsville for a mile or two.

The bed of coal (3) of above section is said to be the same as at Clarinda, Page Co. Iowa by the coal miner who worked there several years.

Note for Sec. 40 p. 109 – In addition to the other fossils collected from this bed afterwards found in it Lophophyllum profundum, Prod. Nebraskensis, [illegible]

Monday July 8th

Morning clear and warm

N. Arroyo Sec

Section 41

Soil 2 ft

3 Dense massive blue limestone in many [illegible]

2 Bluish clay [illegible]

1 Hard compact blue limestone [illegible] 18 in

Spirifer Rockymensis, Prod. Articulatus, [illegible]

Yellowish [illegible] 7 in

12 feet above high water mark

Sec. 42

2 miles above Pueblo [illegible]

Morning Section

Megaphyllum planum, Zaphrentis [illegible] 4½ ft

6 [illegible]

5 [illegible] clay. Below 4 ft

4 Bluish shale clay, with fossils

3 Coal 6 to 7 in

2 [illegible] 8 ft

1 Sandstone [illegible]

The lead of Sec. No. 6 of the foregoing sect. looks very much like No 4/6 of sec. 40, and I was at first inclined to think it the same, but on closer examination it is seen to differ materially in its nature, (see specimen), while the sections between it have not corresponded and therefore inclined to think the whole section different from that, and perhaps lower.

There are many slides along the line so that it is difficult to be sure, unless lies is seen at its exact proper level, all the beds seem however, are in their proper positions with the relation to each other, the whole having evidently apparently come. This seems to be sustained by the statement of the miners, who say there is a fault that was the coal in 40 or 50 feet. As Sect. 43 about 25 ft above No.,

114 Miles S. of Rula, Dr. Jones

2	Yellow Sandstone (Indurated clay)	18 ft
3	6 Yellow limestone	3 ft
3	5 Blue clay, (fossils 1 (5))	12 ft

5	Hard gray limestone 4	11 feet
3	3 Blue clay (3)	12 feet
2	2 limestone	3 ft 4 in
1	1 Blue clay (Bored into) Sandy	12 feet
		72

This section is believed by the Mem to dip under sec. 42: He says they dip N.

The fossils from No 5 Strep. crenistria, Sp. cam., Pellecypoda, Naticopsis, Murchisonia, Pleurotomaria, Bod. Nautiloids, etc

Another shaft commencing ~~at~~ about 20 ft lower (30 yds. S.), sunk 17 feet struck ~~abo~~ bed coal (we were told) 16 in thick. The miner thinks it was not struck in the other shaft on account of the dip to N. but this would seem improbable. Possibly there are slides or faults here

Along the slope 12 or 14 feet above the top of shaft (sec. 43) many fragments and pieces of yellow fossiliferous limestone (see specimen) indicate a massive ledge of that kind in the hill above.

Washington May 16th 1867

	Paid out for Gilbs own people		
	from Washington to Chicago	44	90
	For Padlock for chest		20
	Express on bedding	5	00
17	Chest car		12
	Exp. on trunk to depot		50
	Breakfast at Baltimore	1	50
	Lunch		55
	Supper	1	50
	Sleeping Car	2	50
18	Breakfast	1	50
	~~Telegraph to Stanton~~		~~1 20~~
	Dinner	1	50
20	Breakfast at Chicago	1	00
	Night rate at Chicago	5	25
	Dinner " "	1	50
	Supper " "		65
	Express on baggage Chicago		50
21	Passage Chicago to Iowa City	17	00
	Sleeping car	2	50
	Breakfast	2	00
22	Dinner Iowa City		50
23	Dinner on the R.R.	1	00
June 9	Express on trunk to Baltimore	1	00
	Sacks for specimens		50
		9	67

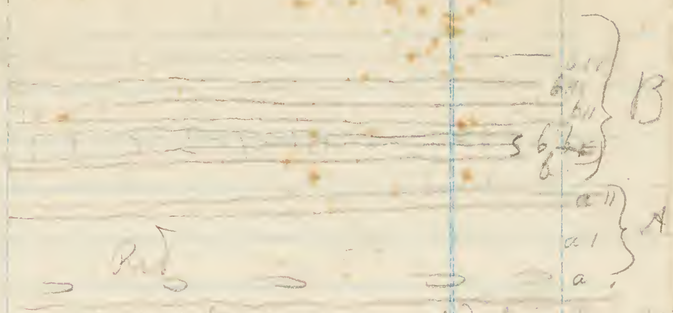
	Amount forward	87	15
	~~Provisions to Omaha~~	~~7~~	~~00~~
June 9	Passage for Mrs. Gilbs to Kansas		50
"	Lunch for Mrs. Gilbs		100
" 11	Hommons & Chisolm	4	00
	Provisions Nebraska City	10	00
" 12	Box for specimens		25
" 13	Express on baggage Council Bluffs to Omaha		25
15	Cash paid Mr. [illegible] on R.R.	5	00
"	Dinner at North Bend & Nebraska R.R. for Mr. Gilbs and Wife	3	00
	Supper for same at Grand Island	3	00
16	Breakfast for do at Mr. Platte	3	00
17	Breakfast do	3	00
"	Supper do	3	00
18	Breakfast "	3	00
"	Dinner do	3	50
"	Lodging last night for 3	3	50
"	Supper at F. Kearney	3	50
	Lake line		75
19	Breakfast Omaha City	6	00
	Baggage man		25
July 9	Passage for Rube to Atchison	9	00
" 10	Porter on boat		50
" 11	Added to Sum		00

1867	July 15	Passage Atchison to Springfield	17.80
		Cushion car	1.50
"	16	Breakfast	.75
"	"	Dinner	.75
		Supper	.75
	17	Lodging & breakfast Springfield	1.75
"	18	Breakfast Springfield	.75
	19	Springfield to Chicago	9.95
		Telegram to Stimpson	.65
	25	Chicago to Washington	22.50
		Cushion car	1.75
		Lunch & porter at Chicago	.75
		Coffee	.75
	26	Breakfast	.75
		Dinner	.75
	27	Lodging & breakfast at Harrisburg Pa. Sying over	.75
		Dinner	.75
		Porter & Omnibus at Washington	.75
		Total	5.00
		Less Expense paid me	1.00
			8.00

Observations central Div. Union Pacific

	Vermillion	394
	Hill just beyond Vermillion	416
27	Vermillion	391
	Bluff E. Ackermans R.	407
	Ackermans Branch	385
	Bluff at Little timber	400
	Little timber	310
	Hill just beyond Vermillion	434
	Vermillion	350
	Mill creek	367
	Bluff Vermillion	368
28	Vermillion R.	340
	Bluff at Wils fork	376
	Wilcox fork	366 ~~3 45~~
	Bluff ~~a~~ R. Blue	360 ~~3 37~~
	Big Blue R.	3 25

Washington Mar. 15th 1867
Recd. of Dr Hayden check for $5,000.00
to pay expenses in Nebraska during
Pres. Nebraska Duty 10th
Recd of Dr Hayden 60 00



Note. Say the part (A) is succeeded by a prominent bed B 10 feet thick, which consists of light yellowish or pink colored dolomitic calcites, which are very compact, with a few earthy fractures, and contains numerous crinoid stems &c

Elevations - N. Platte above Mo.
1840 feet.

Elevation 310 mile Post. On N. P. Pacific R. 1777 ft
Omaha above sea 907 feet
Elkhorn River 183 ft above Mo
N. Bend - 332
Long Fork 318
Island
Ele. 340 in. feet above Mo. or Omaha 215 ft
along the road 2418 ft

Elevations Omaha & Mo. Bluffs of Mo.
Bluffs (in the v.)

On Pacific Railroad
Average [illegible]
1st 100 5.07
2 " 6.856
3 " 6.89

Anton Birth

Some loose pieces (flat lamination) yellowish gray sandy rock, soft with light marks, (mica)

Black, varnish and ash col clays, as far as seen (some 6 ft of lower part) are in cons above — 18 ft

Black, or brown, sandy, hard and compact & other alternating fossil in both — 2 ft

1 coal — 8 inch

Fifty one Miles W. of 10 N. from Salt Water - One m. S. of this white Chalky Li. and Rough red sandy and Pebbly rock seen in place

1 m. N. Norton's place

Chonetes mucronatus
" glabra } abundant
Sp. Camerotoechia
" planoconvexa } abundant
Syntrilasma bimplicata
Strep. semistria
Prod. costatus
P. symmetricus
Nucleocrinus ovatus
Cyath. bimastoph
Lonsdaleia - abundant
Euomph. rotulus.
Orth. pustul
Lep. Rectiuskensis
Rhynch. vita.

June 10th 1867

Clothes left at Salt City to be washed
2 Shirts
1 under do
1 pr. Drawers
2 Handkfs
1 Towel

June 25
4 shirts
1 under do
1. pr. Drawers
2 Handkfs

July 2 —
2 Shirts
3 pr Sock
1 Towel
2 Handkfs

Colonel George C. Gillette

Eteroptrophiurus

Land Prop. J. Miller
Neb. City

Colonel George C. Gillette

Stenopterygius

Read Prof. G. Miller
Mo. City

Section of the rocks at Atchison and ~~Summer~~ Riverside Kansas

1	Slope without exposure of rock to summit of hill (Prospect point)	27 feet
	Rough yellowish limestone splitting on weathered surfaces – great numbers Fusulina	2 feet
	Blue clay below, yellowish do. above	2 feet
19	Two layers hard impure yellowish gray limestone, with an 18 inch bed clay between	5½ feet
18	Ash col. clays, not well exposed (Chonetes found loose on surface of slope)	2½ feet
17	Black, thinly laminated bituminous shale	2½ feet
16	Hard impure yellowish gray limestone	2 feet
15	Blue clay	6 feet
14	Soft yellowish limestone	3 feet
13 Quarry rock?	Gray impure limestone weathering to yellow. Lower layer 20 inches thick, upper layer 1 foot. — Fusulina	2 feet 8 in
12	Bluish and ash colored more or less laminated sandy clays, with near the top a 2½ inch seam of impure coal, or carbonaceous matter	11½ feet
11 Shiners Sta	Yellowish and gray, or bluish gray sandstone. Some parts soft, and a few layers very hard, or almost like quartzite. generally soft, sometimes laminated, and other parts in 10 to 12 in layers	23 feet seen probably thicker and occupying a part of the slope below
10	Slope with no rocks seen	17 feet
9	Hard bluish gray impure limestone – Prod. Nebrascensis, P. (small sp. with concentric wrinkles), Chonetes mucronata?, Athyris subtilita.	2½ feet
8	Slope, no rocks exposed	21 feet
7	Hard gray ~~rough~~ limestone with rough fracture – Prod. Nebrascensis, P. Prattenianus Athyris subtilita. (Some parts arenaceous limestone)	4 feet
6	Bluish laminated clay, with near the top two or three thin hard calc. layers	5 feet
5	~~Yellowish~~ ~~Bluish~~ and light gray limestone, weathering to yellowish, in irregular layers with thin gray and yellowish clay partings. — Many Fusulina, – Pinna peracuta Dicoelosmia subcuneata, Prod. Nebrascensis, P. Prattenianus, Sp. camerata, Sp. lineatus, Athyris subtilita, Schizodus, Cladodus, Syntrielasma hemiplicata	16 feet
4 Atchison	Yellowish and ash colored laminated clay	30 inches
3	Black regularly laminated bituminous shale	30 inches
2	Hard bluish limestone, weathering to yellowish gray. Fusulina, Chonetes glabra Prod. cf. icosiatus, P. Nebrascensis, P. longispinus? Steptor. crenistria, Myalina, Schizodus, Fusulina (At Riverside 3 feet below base Fusu. bed)	22 inches
1	Bluish and dark or ash colored more or less laminated clays, with near the top many Chonetes – Myalina, Lower ~~five or 6~~ 8 or 12 feet under high water was hidden by slope	42 feet
	Hard rock called by workmen conglomerate (not seen being under water at Atchison and hidden by the slope at Riverside	(See over)

Sec. 42

At Atchison, the top of the bed No 5 is 60 feet above high water mark of the Missouri, while at Sumner 3 miles farther down the (E of S) river, its top is 100 feet above the same. If we add 3 feet for the fall in the Missouri river, this would leave a difference of 37 feet in the actual elevation of the corresponding beds at Atchison and Sumner — showing a dip to the north here of something over 12 feet to the mile.

Top of Mr. Swensonghs cistern at Riverside 152 feet above high water of Mo.

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12 Miles west of Atchison there is a quarry of hard bluish gray limestone, bed, or beds (I only saw the rock as brought to Atchison) in 4 to 10 inch layer (or layers) — Interspersed [illegible] Stromatopora [illegible] Fossil plants, large [illegible]

One mile N. of St. Joseph [illegible] a Shaft has been sunk 100 feet for coal. Commences perhaps 50 to 60 feet above the Mo. Indications [illegible] more than half the depth is clay. Found the [illegible] feet blue [illegible] [illegible] colors and with [illegible] specimen of fossil [illegible] the most [illegible] belonging to the coal series, as [illegible] from the general [illegible] of Missouri and the [illegible] [illegible] 40 to 50 feet, so and known as [illegible] of the Mo. A few [illegible] of coal measures were thrown out before he reached the clay. Lifts were said to be loose and not forming a continuous [illegible] [illegible] in the clay.

Boring 2 M. South of South Abu. 60 ft. above high water mark.

		Coal		Red Shale	231
		Shale (Fire Clay)	95	Shale	239
		Sandstone	101	Sandstone	243
10		Gray Shale	120	Shale	263
		Sandstone	124	Light gray or drab Sandstone	269
3		Gray Shale	126	Green Shale	251
2		Shale	128	40 Bluish Clays	320
1 1/6		Coal	129	1 " Coal	321
6		Fire Clay	135	3 3/3 Blue Sandstone	324
2 1/2		Sandstone	142	4 1/2 Bluish gray Shale or indurated clay	328
5		Shale	147	1 1/2 Light bluish gray and darker do Sandstone	354
6		Sandstone	153	3 Light bluish Shale	357
2		Black Shale	155	2 " Coal	360
4 1/2		Sandstone	160	9 Ash col. Shale	367
5 1/2 Black		Shale	165	6 " Sandstone	373
1		Sandstone	166		376
4 1/2		Shale	180	2 1/2 " Shale	378
4 1/2		Sandstone	185	2 1/2 White Sandstone	381
3		Hard black shale	188	14 1/2 Black, marly Clay	395
2 1/2		Sandstone	190	7 Black, slate Coal	402
2 1/2		Shale	193	38 " Shale	440
4 1/2		~~High colored~~ Sandstone	198	20 1/2 Sandstone	460
4 Dark bluish		Shale	222	15 " Shale	475
11		Sandstone	~~224~~	20 Light gray "	495
2 Black (gas)		Sandstone	234	2 25 ft	
6		Shale	230	J D Hockley	