

Junius Henderson
Field Notebook
No. 1
1905 - April 7, 1907



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Junius Henderson
Boulder, Colorado.

Field note book.

#

Ornithology, Mollusca
Fossils etc

No. 1

1905 - Apl. 7, 1907.

Boulder, Colo.

July 28. ¹⁹⁰⁵ Saw say Phoebe and siskin
Robins, flicker

July 29. Saw ^{say} Phoebe. Heard a robin
at 11³⁰ last night.

July 30. Saw say Phoebe

July 31 Heard siskin at noon at court house.
Have seen none for a week

Expense University Ferris out trip 2 tickets
to Denver Dr. Ramsley & I — \$2.00
Saw a Kingbird and robin on way to depot
Left Boulder with Dr. Ramsley at 6:45 pm
Reached Denver about on time. Stayed
at Oxford Hotel to be near depot in the
morning. Went to City Park and heard
band and saw moving pictures, in-
cluding "Stage Robbery", which, to say
the least, was not an elevating specta-
cle, nor helpful to venturesome boys,
apt to be carried away with the wildness
of such a life.

1905

Aug 1, special rate Denver to Florissant \$4.50.

Paid 9⁰⁰ for Ramsey & D.

Hotel for both 4¹⁰

Left Denver at 9⁴⁵ a.m., on Colo. Midland (via
C. & S.) for Florissant.

a few miles before reaching Castle Rock
appeared ^{scrub} oaks on dry hills and long
leaved pines in valleys. In valleys we
saw perfectly stratified unconsolidated
horizontal formations, with hills capped
by hard horizontal rocks. Further
north recognized Niobrara ridge,
Dakota ridge + Triassic ~~to~~ ridge to
the west of R.R. In one place rocks
like Boulder Red Rocks - possibly a
^{short} resistant zone in the jur.
Apparently the oaks are southern
species pushing northward from
dry New Mexico, hence occupying
dry positions, while the pines.

pushing out from the mountains
such severe moist situations, but
a little further south the pine wings
with oak in dryer situations &
& also appear on rocky ridges, as
at Boulder. The oak line is sharply
drawn. They do not encroach at all
upon the lower part of the valleys, which
are open, brushless meadows, with occa-
sional sharply defined patches of
oak brush.

A few miles before reaching Palmer
Lake trees disappear to some extent
from the valleys. The rocks to
N.W. of R.R. are abrupt and carved
into towers and monuments, do
not recognize the formation. Palmer
Lake is right up against the foothills,
but does not seem an attractive place. The
foothills appear to be Dakota sandstone.
Only birds recognized to Cole, Spring

were ^{a few} *Thryothorus* & *Protonotaria* & *Chondestes* & *Junco*
& many mourning doves. Left
Colo. Springs at 12:40, 50 minutes later
seats all filled. Did not drive, but
got a little fruit. From Manitou we
tunnelled through what appeared to be
Paleozoic rocks below the Jura Trias.
The Paleozoic is a *mass*, resting upon
granite, which, ^{granite} continued from then
on, climbing rapidly.

Saw dippers soon after entering the granite
^{gorge} *gorge* more open above cascade alt. 7500
13 miles from Colo. Springs, closes in again
near Green Mt. Falls, but continued
even more ^{open} beyond there, like Estes Park.
Prairie dog town between Green Mt. Falls &
^{Woodland Park} *Woodland Park* 8000
Cryptotis about 8000 ft, occurring even
among the lay leaf pines.

Asperis appeared at 8000 ft. Probably a
northern plant, hence not found as
low here as at Boulder.

spruces also appeared at 8400 or 8500 ft
Prairie dogs again at Edmore 8910 ft.
Top of divide between S. Platte & Arkansas
stratig. open & rolling along R.R., with
scattered groves of pines & spruces
9200 ft alt. 1 magpie here. Red gilia
& clover here with *Potentilla fruticosa*.

at Florissant 4th Lark burtings

Not Bluebirds cliff swallows

Barn swallows. Brewer blbbd.

Light 2
Lark sparrow ^{Fisher} King sparrow

lava dyke at N. E. cor. of town very badly
shattered and weathered, breaking into
rather flat, irregular pieces, very unstable
under foot and in one place greatly
broken, opening up crevices from 2 to 10
ft. wide and as deep, filled to that
depth with debris. 80 ft above creek
bed.

station!

Fossil leaves at point N. W. of hotel in
several strata immediately beneath
strata of volcanic ash and sand.

Prairie dogs at Florissant 8100 ft

Station 3 up first gulch W and N of station!

Florissant lake basin is a mountain park divided by a ridge into two portions. The surrounding mountains are not as high and abrupt as at Estes Park but more rolling, and streams are small. Can jump across the two streams at Florissant postoffice now. The old lake beds so far as we saw them today are mere remnants of former more extensive beds, and contain many bands of volcanic ash and sand, the main portion of the beds, except in patches along the edges of the marginal hills, having been eroded away. Igneous dykes border the old lake basin at various places, but as yet I see no connection between these and the volcanic debris in the lake beds. I believe the igneous rocks are older.

Florissant, Colo.

Aug 2 -

Went up track to R.R. cut E. of town. ^{in lake beds} ~~Large~~ terrace there dissected by numerous gullies cut from top of mesa to base. Bright, clear, comfortable morning. Heard flickers calling and Brewer Blkbirds singing as I worked.

Station 4 R.R. cut just around point E. of Florissant. Leaves plentiful in a narrow stratum half way to top of cut but few good specimens, comparatively. ~~But~~ a diagonal furrow from the top of the cliff down well into the talus & found leaf bearing zones an inch or two in thickness alternating with barren zones of greater thickness. The fossiliferous zones were somewhat persistent, so far as I examined. Calcite bands and yellowish strata so common and pronounced at Station 1 were absent here. Strata quite wet in places, upon digging in.

Station 4 next cut above ~~town~~ Station 3
being through a sort of breccia or
conglomerate of (apparently) an igneous
~~rock~~ rock containing quartz pebbles.
Do not exactly understand it. Further
up the R. R. + consequently a little
higher appears a 25' exposure of
coarse, rudely stratified ^{rather} angular gravel
including at least one continuous
bed of water worn boulders. The
strata are nearly horizontal and are
truncated by the slope of the hill at
the west. Next cut up the hill is in
granite, the gravels resting on the
granite. Collected about 270 specimens
at station 4 today. 10¹⁵ a.m. cool cloudy.

Aug. 3. Hot, bright morning. Went
up creek after breakfast; found another
lava breccia on banks of creek west
of stations 4 and 5. Packed the

remainder of the fossils at station 4
and brought them down.

The bluebirds here are either western
or chestnut backed, instead of mountain
bluebirds(?) saw a marsh hawk, Say
Phoebes and v. g. swallow, long crested jay.
Started down to Lake George at 8.40 a.m.
with horse and buggy. Lake about 5 miles
below Florissant. On way saw rounded
knobs which looked as if they were of glacial
origin, but have found no moraines here.

At head of Lake George, which is an arti-
ficial lake said to have been made for
ice purposes, etc, about 15 years ago, found
caddis larva. also found *Limnaea* similar
to those from Mesher, in great abundance,
but only on the delta. Found a few dead
shells further down the lake shore, but
none alive there. In the mouth of Twin
Creek found a few *Physa*, smooth like
P. integra, lying on the gravel, very hard to
see. The *Limnaea* were on the muddy bottom
of the delta, nearly all adult, but smaller
specimens, probably young of same

species, were found abundantly ^{for} a few hundred feet up the creek.

at outlet of the lake, in a seepage pool just below the dam, were great numbers of the *Linnæa*, alive, mingled with dead shells of a large *Physa*, but I could find none of the ^{live} large *Physa*.

The lake is formed by a dam thrown across South Platte river. shortly below the mouth of the stream which runs past Florissant. At the upper end are forming just such ^{fine} beds of mud as compose some portions of the Florissant lake beds. The beds were ~~was~~ very much cracked, many of the cracks being an inch or two wide and nearly a foot deep, dividing the mud into blocks from a few inches to 3 feet across. The waters of the South Platte flow through Granite Canyon

and enter the lake quite roilly, and leave the lake in about the same condition, but soon gather great quantities of sediment from the fine silt of the valley and becomes very muddy - almost black, which condition continues as far as we drove down the river - a mile or two.

Near the east western end of Florissant lake basin we found ^{including} a shaft cut to a depth of about 50 feet through the Tertiary lake beds, and 30 or 40 feet of the beds exposed above the shaft. The whole capped by what may be a crumbling stratum of volcanic ash 3 or 4 feet in thickness. We found a shaft sunk also at the base of the east wall of the igneous dyke north of Florissant postoffice, which we are told was sunk in search for gold by a man who claimed to have found a shaft already started, presumably by the original inhabitants, with

timbers left therein. It is ^{more} probable that he found one of the holes left by the chipping of the rocks before mentioned, and possibly found timbers used by Indians or prospectors in preparing the hole for shelter purposes. But I cannot imagine why the shaft was sunk in the lake beds.

Saw^a kingfisher and long-eared jay
Dail Nevitt, the hotel keeper says the shaft above mentioned was sunk in search of coal because the shales got blacker as depth increased.

He also says the Platte is generally not so muddy.

saw a bat last night & another this evening

Aug 4

Yesterday and day before the sun was intensely hot and dazzling in the

forenoon, but clouds relieved the intensity of the heat in the afternoon. In spite of the intense heat and some hard work I have sweat almost none. I feel my skin drying up. It is cool at all times in the shade - almost too cool - even when the sun's rays are hottest.

This is a very bright morning. Breakfasted at 6:³⁰ as usual. Dr. Ramsley changed dryers on his plants and we started south to the fossil stump by ^{with} buggy at 8:³⁰ a. m. Terribly hot in the sun - a male + female redwing blackbird passed the hotel before we started - the first we have seen here, though Brewer blackbird is quite common.

Heard a chickadee, but too far away to determine the species.

We found the old trenches near the fossil stump filled with debris. Tried to dig down to the fossil beds we ^{wished to} reach with picks alone but it was such slow work I asked Dr. Ramsley to go back to the village

with the horse and buggy and bring a shovel and bucket of water as working in the heat without water was too much for me. I dug a diagonal trench at the north end of the hill while he was gone. After lunch we began a cross cut to reach the lowest part of the former workings, which gives us a fine section. Worked hard all afternoon taking turns with pick and shovel, but found ~~the~~ ^{only} insects, though about 200 good fossil leaves, some of them being very fine. The formation there is capped by several feet of consolidated volcanic ashes.

The fossil stump is about 6 or 8 ft in diameter, ³ saws broken off in the attempt to saw it up for transportation to the World's Columbian Exposition still remain in the stump. When it is a large fossil log nearly buried. Got back to hotel at 6:30.

Lunch 10¢ cotton 10¢ Twine 5¢

The fossil stump above referred to is on a hill left by the erosion of the Lake Beds in the southern portion of the Basin, and tradition has it that his measurements of strata were made at the northwest corner of the hill.

Aug 5: Another bright, hot morning.

The R.R. people keep 3 or 4 engines steamed up here all the time to help trains up the steep grade to Divide. They must waste much coal, as the escape valves hiss by the hour.

I had a very narrow escape from the loss of an eye yesterday. While digging in very hard rock with the big pick a piece of rock struck me a terrific blow an inch over the eye, the flat side striking, so that it did not cut much, but dazed me for a moment or two. An inch lower would have struck the right lens of my glasses, the result of which could not be safely predicted.

Saw a Sparrow hawk.

It clouded shortly after noon and sprinkled more or less during the afternoon. We finished the cross cut at the pass all stump, but found comparatively little. Made a cross cut at the northeast corner of same hill, which is locally reported to be the point of which Prof. Seudder gave a section in his monograph, but did not find the strata at all conformable to his section. It seems certain that is not the place.

Went to S. end of Park and over into the Arkansas drainage. If it be true, as is supposed that the ancient lake drained at one time ^{southward} into the Arkansas but was afterwards turned westward into the South Platte, the uprising ridge must have crossed the valley either at the very end of the lake or a little way into the lake, as we found the lake beds involved with igneous rock ^{and granite} at what we took for the former terminus, showing in at least one place considerable movement just north of the present divide between

Arkansas and South Platte drainage.
On the Arkansas side of the divide we found a park which may have been originally included in the lake, but we saw no sedimentary deposits there, while in all portions of what we know to have been included we find numerous outcrops. The topography there is also somewhat different, particularly in respect to the lack of steep slopes and mountain walls. It may be that there are lake beds there, but unexposed on account of gentle slopes not favoring erosion.

Aug 6. Fine, bright, Sunday morning, but threatens a hot forenoon. Haven't slept at all well on this trip. Am tired and sore from the hard rock work of Friday and Saturday and my catarrh has been very bad for several days on account of getting heated in the forenoon, then chilled by the sudden cooling of the atmosphere in the afternoon, accompanied by wind and sprinkles of rain, this occurring every day.

Mr. Keritt, the hotel keeper, gave us some specimens of Quartz & Amazon stone crystals, this morning, from Topas Peak, sometimes called crystal Mt. ^{due north of Fabrisant}. He also accompanied me to some fossil beds S. W. of the hotel, about a mile, this morning, where we did a little exploring, preparatory to tomorrow's work.

In walking past station 2 this evening I noticed that the dip is N. W., which corresponds to the idea of an uplift from the S. E. Have not noticed any dip before. 2 night hawks very tame, apparently nesting, as they circled over one stop spot & soon alighted after we backed away.

Aug 7. Bright, warm morning. Started for the fossil beds at 8¹⁵ a.m. Did not succeed very well at the place 1 mile S. W. of town, ~~as~~ but got nearly 100 leaves and a few insects. We closed our collecting at 1³⁰ p.m. and brought our outfit to the hotel, where I we began

packing. The fossils are all first wrapped in paper and packed in particleboard boxes, these boxes to be packed in wooden boxes. The rock and mineral specimens are to go into wooden boxes loose.

Discovered strong dip to the N. W. at our morning station, while near by it was strong to the S. W.

Saw mourning doves + house wrens
Got specimens packed in 4 big wooden boxes.

Went to spring in evening and were caught in hard rain. The afternoon was clearer than usual. Am completely used up by the heavy digging for the last week and heartily glad we are through.

Aug 8. Bright morning, but soon clouded. Am spending the day chiefly in resting from the fatiguing work recently done.

Saw robins yesterday + today + a meadow lark Sunday evening.

Shore bird common here has tipup habit white belly, darker breast & neck white of belly extending upwards slightly in front of wing - above uniform brownish (?) bill about 1 inch long.

Hotel & livery Kamely & I 8 days \$17.00
Train 7 hours late so Mr. Nevin for \$2.00 drove us to Divide to catch theripple Creek - Denver train. On the road we saw ^{gray-headed} Junco's. Just before reaching Divide we saw what appeared to be moraine, the first we have seen on the trip. It is possible that a glacier from Pikes Peak may have reached as far as this, though the boulders may have been from streams. Train at Divide late, made us miss train at Colorado Springs, and as the later train was quite late we went to above hotel & stayed all night. First going to the college grounds, & to Straton Park, where we heard fine music by Colorado Midland band. Bought ~~train~~ ^{at 7:30^a} ~~bag~~ ^{supped} at depot restaurant, an excellent but high priced place.

cool morning but soon got warm
Breakfasted at depot restaurant
aug 9 caught train to Denver at
7³⁰ a.m. - half hour late. ~~Aug~~
Lunched at Oxford + caught 1 p.m.
train for Boulder

End. of Florissant Trip

Silver Lake Arapahoe Trip

Aug. 29 to Sept.

<u>List of stuff taken</u>	—
✓ Bedding, Tarps, etc.	—
✓ Tents - stakes & poles 2-10X12	—
✓ Cameras + plate holders, Tripods & etc.	—
✓ Wire nippers + wire	—
✓ Guns + ammunition loading + cleaning outfit	—
✓ Instruments	—
✓ Tape	—
✓ Plant press + dryer	—
✓ Insect net	—
✓ Cyanide bottles	—
✓ Alcohol + empty bottles	—
✓ Mollusk strainer	—
✓ Hunting + bird licenses	\$1.50
✓ Bark boxes 4	—
✓ Casacaeta 1 box	—
Glycothymic + stouche	—
✓ Bojee net	.80
✓ Cocoa 1 can	.35

Spice		.30
Bacon 1/2 slab		2.50
✓ Singer awaps etc 25-25		8.50
✓ Malted milk tablets 1		50
✓ Brauer isochromatic plates 2 doz	1 furnished by Kameley	.60
✓ Raisins		25
✓ Sweet chocolate		.50
✓ Bread 8 long loaves		.75
✓ Butter 3 lbs in 3 pint jars		90
✓ Beef roast		2.25
✓ Mutton-leg		
✓ Fruit 1 box peaches		1.75
✓ Eggs 5 doz. in saw nest		1.25
✓ Potatoes		.25
✓ Knives, Forks, spoons ^{large & small} & cups & plates		—
✓ Pots 3		—
✓ coffee pot		—
✓ Salt & pepper		—
✓ Canned beans 1 can		.15
✓ " hominy 1 can		.10
✓ Soap 1 bar ivory		.10
✓ Towels		—
✓ Dish towels		—
✓ Toilet paper 1 pkt.		.10
✓ Wristcap, extra socks, handkerchiefs & clothes		—
✓ cap for grease jillows		—

✓ Brines	.50
banned beans	—
—	—
✓ condensed cream 2	2.50
✓ Matches	—
✓ Dissecting outfit	—
✓ safety pins	—
✓ Spectacle case	—
✓ Tooth brush	—
✓ Button needles & thread	—
✓ Whetstone	—
✓ can opener	—
✓ Letter from Maxwell	—
✓ Papers	—
✓ Fishing tackle & bait	—
✓ Drinking cup for pocket	—
○ mixed: bread butter for cold meat	

Sly of sugar, cocoa, cream, bacon

Silver Lake-Arapahoe Trip.

Aug 29, 1905.

Finished packing and loaded wagon in evening - last evening - putting tents over load to keep it dry. The load is a heavy one for two horses over a bad road. This morning open bright and warm. Saw a phoebe in back yard before starting.

H. F. Watts, F. G. Henderson, Harvey R. Markham, Lambert Rohrer & I started by narrow gauge b. & N. at 9:³⁵ for Silver Lake siding, the wagon having gone early - al. an horse, wagon & good team. Train consisted of 4 cars to sunset, then 2 cars to Silver Lake siding, which we reached at 11:⁴⁵ p.m., 15 minutes late. At lunch at the brook N. E. of the siding & collected a few small *Pisidium abditum* ^(No. 1) in the brook. Then started up the hill. Began raining on Baldon Peaks before we left the train. Spinkled at intervals during afternoon.

and, at bedtime was warm and
sprinkling with no wind. Walter & I reached
the top Silver Lake at 3 p.m. thinking the other three
and the team would be there but they were
not, so Walter came on to select camp and I
started back. Soon met Merleman who
said they had taken the wrong trail soon
after leaving us while we were waiting to
see if the wagon was coming. He had soon
seen some men who told him his mistake
and promised to send the others back, but
they kept on till their trail played out,
then through dead timber till they struck
the Camp Albion road where they were
directed across to Silver Lake. I
walked rapidly until I met the wagon
about 4 miles back. We were unable
to get to Goose Lake on account of
logs across the road, but arrived
at the new city sawmill, head of Island
Lake at about 6 p.m. where the

boys had built a beaver, thinking perhaps we might not reach them. We got everything in dry, put up 2 tents, Wette putting his cot and most of the outfit in one tent while we spread pine boughs in the other and laid very comfortable beds of blankets, quilts and canvas. Mashukan is now putting up a Brewer sparrow as I write these notes by a campfire, preparatory to going to bed. Only birds seen were a long crested jay, black brow, Rocky Mt. jays, chickadees, juncoes, Mt. Bluebirds, scissor tailed flicker. Wette is to sleep on his cot in the supply tent while the rest of us sleep in the other tent. ~~Be~~

Aug 30-01

Rained during the night more or less, and the poor quality of the tents was manifest in the way the drops splattered

through. All started for the glacier at 7¹⁵
a. m., + made a slow trip. Collected
small caddis cases and larvae^(No. 2) in stream
from North Lake, near High Fall, and some
insects just above High Fall. The party
showed fatigue in the following order:
Sievert least, I next, then Watts, then
Markman, then Frank. Sievert + I went
on ahead + climbed out of the cirque at
the saddle to photograph the glacier
and the range. It is a fearful climb,
the loose rock sliding at every step.
Were much exhausted upon reaching the top
and laid down for a few moments, then
took two pictures and returned to the
cirque to join Frank + Watts. Ate a
few malted milk tablets + raisins
while sitting on a Boulder on the
glacier. We easily found the tablets set
last year. They were set as follows: No. 1
3150 feet from bench mark on country

Rock above N. E. Moraine + 100 paces from edge of ice, at that point. From No. 1 to No. 2 was 89 ft.; No. 2 to No. 3 was 51.7 ft.; No. 3 to No. 4 was 58.6 ft.; No. 4 to No. 5 was 65.4 ft.; No. 5 to No. 6 was 82.8 ft.; No. 6 to No. 7 was 87.4 ft.; No. 7 to No. 8 was 73.8 ft.; No. 8 to No. 9 was 97.2 ft.; No. 9 to No. 10 was 114.4 ft.; The latter was just below ~~among~~ the crevasses near the center of the glacier where the flow should be greatest. We found the tablets and accompanying boulders had moved as follows: No. 1 - 11.5 ft.; No. 2 - 11.9 ft.; No. 3 - 13 ft.; No. 4 - 15.9 ft.; No. 5 - 16.75 ft.; No. 6 - 18.5 ft.; No. 7 - 20.6 ft.; No. 8 - 20.45 ft.; No. 9 - 21.7 ft.; No. 10 - 27.7 ft. We also found unmistakable evidence of waste all along the front of the glacier except just west of the terminal lake, at which latter point it remained unchanged. At the big boulder on the north east moraine it had shrunk away at least 4 or 5 feet vertically. The medial moraine between that point and the terminal ^{lake} ~~moraine~~ showed much more plainly and the same was true of the drainage basin west of the terminal lake. More ice was exposed than we

have seen except in 1902, while there is more snow in many other places than last year, I believe. The photos will enable us to definitely decide that question by comparison. We found numerous insects ^{dead & alive} on the glacier, particularly abundant on the dead south branch, & collected quite a number. Frank found a good Mt. Sheep head in the moraine at point opposite the saddle & Sievert & I brought it down with infinite toil, as we were already loaded down with cameras, including one big one, tripod, hammer, rocks, etc. Just before leaving the glacier it hailed hard, and at intervals all the way down it rained and hailed terrifically, with crashes of thunder. The brush was so wet so we were soon soaked through. Sievert & I reached camp at 5:30 about half an hour after Frank & Madman, who started down long before us, and with Watta, whom we had

overtaken. Watta and I were on our "last legs" but the others were not so tired. I felt the trip more than I ever have before, though kept up well on way up, carrying the heavy load back without pack harness used me up & Watta probably felt the altitude, as usual the first day out. Had fried eggs for supper & they were good. Watta ate no supper. Ed. Housel & another man from the sawmill called in evening. It rained again as we were going to bed.

Birds seen today - Clarke crow & Rocky Mt. Jay, chickadees & juncoes common up to high fall. Above there ~~pop~~ pipits common, ^{especially on glacier} At saddle leucostictes (brown capped). Several undetermined hawks in the gulch. Pika's abundant from Goose Lake to the glacier.

Aug 31 - 1905

Bright windy morning. Boiled & then fried potatoes & bacon with wood smoke in eyes. Arose at 6⁴⁵ soon

followed by the others & we spread out our wet clothes & shoes to dry. Markman began collecting crustacea before breakfast and continued after breakfast, while Frank & Siebert played cribbage & Watts started after mypouscetes. Collected badia's larvae & cases No. 3 on rocks not well attached, very loosely constructed of sticks placed longitudinally. No. 4, of same style but very small. No. 5 of sand & mica, tapering rapidly less than half an inch long, strongly attached to rocks. No. 6 water beetle. No. 7 sticks with something on. No. 8 smooth, large caddis case, of sand, found in the sand at bottom of lake. No. 9 badia's cases of sand at bottom of water unattached. No. 10 ~~includes~~ includes one which has just shed its skin, ~~Markman also~~ Watts climbed ^{a spruce} tree and cut off the top for a big witch's broom. Got longtailed chickadee & mountain chickadee, the latter with first shot from the Galegun. Collected insect galls from willow and

huckleberry, and fungus on birch. At camp there are 6 ridges, parallel, within 100 yards, running N. 50° E., a characteristic of this entire country from Silver Lake to High Fall, as well as the Camp Albion gulch. The whole valley topography is glacial, but the direction of these ridges was undoubtedly predetermined by the lithology, probably hard and soft zones. Rained for a few moments in afternoon, but sun set nearly clear just as Seivert returned without fish. The sun's rays have been very hot all day, but quite cool after sundown.

Sept 1 - 1905

White frost this morning. A pot sitting in the open which contained hot water at bedtime was covered by thin ice ~~tho~~ at sunrise. Another pot containing less cold water & one containing less hot water, were neither of them frozen. Up to this hour time (2³⁵ p.m.) there has not been a cloud in the sky, so far as I have seen. The sun's rays are hot but a cool breeze makes it almost too cool in the shade. Frank & Seivert went fishing before sunrise, returning at 10 a.m. without fish. Oetta started to walk to the train just before they arrived. Markman

and I started up the canyon just after breakfast. He took the shotgun & auxiliary tube. I took Yelie's gun, the camp pack, camera, tripod fish, etc. Parted with Markman at Horse Lake as he wanted to do some collecting there. I went up the north fork to North Lake, where I ate a sandwich at 11 a. m., collected two pipits, some plants and a heavy load of garnetiferous granite, hornblende rock, etc. Had the pack and my hands full, about all I could carry. Took 3 photos & reached camp a little before 2 p. m. Markman not here yet. The snowbanks west of North Lake are crevassed, the crack probably being in the nature of the Bergschlund. As they certainly cannot be called glaciers, it shows that crevasses alone are not sufficient to indicate a glacier. Found numerous N. E. dykes similar to those near camp, but larger, some being so situated in the north gulch as to be almost across the track of the former

glacier. Found one fair sized empty *Pisidium* shell and at the same place ~~and~~ an empty land snail shell in a small stream near high fall. Markman saw a flicker up gulch & we both saw juncos, (morbless, unidentified) and a sandpiper (spotted?). Markman returned at 4 p. m., having collected only a junco. A few clouds appeared at 5 p. m. Wind has been quite variable today but for the most part easterly. Perfectly clear at bedtime, & not cold.

Sept. 2 - 05.

White frost this morning & thick ice on water pail between the tents. ~~The~~ Birrus clouds scattered in all directions at 8 a. m. Markman started at 6 a. m. to collect birds. Sivert started ^{at 8 a. m.} for ~~the~~ top of ridge south of lake to collect insects and see the country. Frank & I started for Silver Lake siding at 9 a. m. to meet John Andrews, picking wild raspberries on the way and arriving there (7 miles) at 11 a. m. Took camp pack to carry up stuff. Train was nearly an hour late & John did not come but conductor, without stopping, put off basket containing cocoa, evaporated

cream, bottles, a package for Siebert & of
cantalopes. We ate 2 cantalopes and a sandwich
at the cabin spring, and left there at 1 p.m.,
reaching the first crossing of North Boulder
at 2 p.m., where we rested 10 minutes.
Reached Silver Lake at 2³⁶ & camp at 3 p.m.
Markman returned at 1 p.m. with a bagful
of birds & mammals, including Douglas?
~~mountain~~ squirrel, a weasel, etc. I saw
white crowned sparrows & what I took
for Audubon warbler. I don't like the
way the clouds are acting. At 3¹⁵ I
went down to the Island Lake dam and col-
lected water beetles, leeches & other "beasts", re-
turning at 5²⁵. Siebert returned at 4 p.m.
with a lot of insects and a cony which
was killed by a hawk. Saw flickers and
warblers. Island lake is drained quite
low & men under direction of Mr.
Buffham are building up the dam, so
I did not succeed in getting specimens.

of Sphagnum. The ^{near} Sphagnum made a vertical wall about $1\frac{1}{2}$ to 2 ft high all around the lagoons.

Sept. 3-05

It cleared in the night & west wind cleared away the clouds as well as the smoke of Denver smelters which had drifted in on the S.E. wind. Arose at 7⁴⁵. Markman started up lake to collect insect larva in a pool near the Goose Lake dam. at 9¹⁰ Frank & I started for train to meet John. at last creek crossing at 10 a.m. & at siding 11¹⁰, only stopping for water twice, saw several hawks, & collected some butterflies & moths. Stratus clouds scattered through the sky. Wind S.E. very warm in sun but breeze temper sun rays and makes a cool comfortable in the shade. Train again so late as to afford ample opportunity for philosophic meditation upon the motives which inspire railroad people to advertise time which they do not expect to make except under rare circumstances. Train arrived at 1⁵ 1 h. 35 min late. I carried the water ration in the pack & Frank

carried the telescope containing pies, etc.,
to the cabin spring, where we ate the
melon, sandwiches, eggs, etc., & started
on at 2 p. m. Reached the creek at 3 p. m.
rested 10 minutes & started on, taking
John, Frank & I taking turns with the
pack, arriving in camp at 4 p. m. Markman
was here with Phyllopoete, worms, larva,
leashes, Pisidium, etc., from pools, ^{near} ~~at~~ ~~head~~
~~of outlet~~ above Goose Lake (No. 11). I have labelled
some larva from Island Lake No. 17. The
clouds mostly cleared off by sundown and
it got cool as usual. West half of sky clouded
all over at bedtime.

Sept 4, 1905

at daylight sky overcast with even
gray clouds. soon after it began
raining, continuing for 2 hours.
soon after breakfast rain began again
& continued till 10 a. m. and at intervals

until noon. Sun at times tried to
break through. Violent wind on range
from west & fog low on Gata, but not
cold. At 1:30 it looked like clearing, so Sievert
& I started for ridge N. of camp with camera
pick, scale gun & insect net. From timber
line could see clouds hanging over valley
& foothills as well as mts. Collected a fern
new to me. Brought back a heavy camp
pack load of rocks and several birds.
Nearly clear at dark. We returned at 6:15
very tired & had supper at 7. Wind has
been west the greater part of the day, but
at times easterly.

Sept 25, 1905

Clouds hanging ^{low} over Arapahoe and most
of the sky partly overcast, with strong west
wind, which, however, did not reach camp.
Fearing a storm, ^{plus Sievert and I} we started for the glacier and
peak at 7:05 a.m. Were at foot of high fall
at 8:05 & some distance above it at 8:35.
Cool, delightful travelling. The stream from the
glacier shows the effect of cool

cloudy weather in the ^{next} greatly diminished
flow of water. Clouds have hung over
the glacier all day yesterday and today,
but last night no ice formed at camp.
Reached glacier in blinding sleet storm. Visited
some of the largest crevasses. Ate lunch on the
moraine, collected a lot of rocks + started
for the saddle. Had to cut about 30 steps in
the ice to reach saddle. Hard work. Reached
top of peak at 1 pm. in blinding snow storm
but soon cleared. John got sick at top
& vomited on way down. Terminal lake
as green with rock flour as the next one
below. We carried very heavy loads of rock
down ^{which with} John's sickness, made a slow
trip down. Heard Mopit train whistle
while on the peak. Loose Lake has
fallen ~~now~~ 1 1/2 ft. since last Wednesday.
Reached camp at 4⁴⁵ + found Mr.
Eggleston here with Al. Anderson's
team to take us home in the

morning, so began packing rocks,
plants, insects etc.

Sept. 6, 1905.

Arose at 6 a. m. ^{some} & began packing while
others got breakfast. Got wagon loaded &
started at 9¹⁵. John ^{rode} ~~drove~~ to Bluebird road,
whence we all walked down to North
Boulder Falls, where we ate lunch at
11 a. m. Were caught in several showers
& hailstorms, taking shelters under
~~some~~ trees, & reaching Silver Lake
siding at 1 p. m., where Markham shot
an Audubon or Myrtle warbler. Rained
again just after reaching the siding.
~~Had rains~~ ^{spores} ~~clear out in the valley~~
Back of sunlight prevented collecting
insects on way down as we hoped
to catch train at 2²⁰ p. m. Ran ~~express~~
with entire absence of robbers on the
trip. Reached Boulder at 4⁴⁵, shaved
and after supper went to office for
my ~~mail~~ mail, then to University
~~to~~ to see that the collections were
properly taken care of.

1906 Trip to Northeastern Colorado.

June 2	White Davis 1 bolt cheese with ^{3.10}	3.10
" "	8 towels ^{1.00}	4.10
" "	P. B. Johnson 2 doz. flour sacks	.80
" 4	Sayre & Graham, spring for Doregon	1.75
" 4	Sent, chink, stone & pipe W. N. Blow	2.55
" 4	camp outfit Nes Whiteby	4.80
" 5	Howard Gro. Co.	4.90
" 5	Stewart & Adams groceries	1.50
" "	Peoples Meat Market	2.45
" "	Greenman typewriter ^{Supplies} chassis	1.50
" "	Traps ^{Tristal Hoyer} per Greenman ^{revised}	1.20
" "	shirt " " "no voucher	.70
" 6	Bostwick Co. 2 cartons ^{voucher lost}	5.00
" 6	McClure Edson groceries	.50
" 6	F. E. Wilson ^{looked} shells	1.50
" 6	C. E. Boulehan octa etc	.90
" 6	Express no voucher	.50
" 7-4	camp stools W. N. Blow no voucher	1.00
" 7-	McClure Edson 40 lbs fruit	.80
" "	Boulder City Bakery	.70

"	"	Sharpening art	.25-
"	"	Jacob Faus fixing dredge rings	.25-
"	9	Moody Bros. ^{Hydine} provisions & soap	.80
"	"	Fruit	.80
"	"	Burson Meat Market, ^{Loveland} meat	.25-
"	"	Loveland Market provisions	.80
"	"	Lloyd Fisher ^{Burkhead} 3 doz eggs	.55-
"	10	Johnson Bros. ^{Loveland} horse feed	.15-
"	11	Ferguson & son wire & curvy comb ^{Long}	.30
"	11	Model Meat Market meat	.25-
"	"	D. L. Towne oats	.80
"	"	E. L. Smith provisions	2.35-
"	"	Hickman Hdw. Co. utensils	.75-
"	"	E. L. Smith fruit	48.05-
"	12	Lepton Bros provisions ^{at ballin}	.75-
"	"	Galbraith's Market	.80
"	"	Rent of Wagon see below ^{20x6}	.50
"	"	Milk (in voucher 15)	.20
"	15	Bals. Bakery	48.50
"	"	Wells Bell oats	1.55-
"	"	Jno E. White packing boxes	.75-
"	"	H. J. Nelson repair	.30
"	"	Rent of Wagon for Wagons	11.20
"	"		.50
"	18	P. Marks meat	.80
			<hr/>
			73.80

1906

Forward 7 3.80

June 19	Scott & Kitson	Grainy oats	1.45
"	Mack's Grocery	Provisions	10.05
"	J. F. Fejer	collecting boxes	.55
"	A. A. Donahay	setting tire	.75
"	McIntosh & Harlow	Bread flour	.15
"	Kittles & Turkey	supplies	.45
"	"	cotton batting	.10
"	Nisert & Drummond	meat	.50
"	A. Scott	Bread grade	.45
"	Ben Perry	Quilt	.25
"	Baskin Bros. Eaton	Hay	2.10
" 21	John A. Clayton	Team & wagon 1 day	3.00
" 23	Geo. W. Parker	Grocer, Provisions	.85
" 28	"	"	4.75
" 28	"	"	5.75
" 29	"	"	2.75
July 3	Scott & Kitson	Grainy oats	.80
"	R. Jones	Eggs & milk	.80
"	Mack's Grocery	Provisions	1.95
"	P. Marks	meat	.60
"	Phoenix bakery	bread etc	.45
" 5	S. J. Register	Longmont hay	.25
"	"	bread	.05
" 6	Sawley & Clark	Team for 30 days	30.00
"	"	"	141.60
"	J. Kleumme	Wagon for 30 days	15.00

Wednesday Parowee Butte Trip

June 6, 1906.

Boulder, Colo.

Spent the afternoon sorting camping outfit and began packing wagon at Hall Bldg., University campus, at 8:45 p.m. Got through, took a hasty bath and retired at a little after 11 p.m. Very windy last night, and again tonight.

Thursday

Friday June 7, 1906

Gideon S. Dodds, Harvey C. Merriam, Harry C. Wetworth and I left Boulder in a camp wagon at 8:50, two riding in front and two behind. Broke a spring when about two miles north of town, but a block, blocked it up and went on, stopping to collect but little except a species of fly which I had not seen before and some Pupae, Vallonia, etc., at Six mile creek. Some of us walked considerable of the time. Reached Left Hand creek at 12:10, dined at 1:30, and were on the road again at 2:07.

Went into camp at 4:30 p. m., on the St. Vrain,
 in a place partially sheltered from the wind
 by timber. Has been a cold, windy, disagree-
 able day. Has snowed on the range in
 neighborhood of Arapeese Peak for two or three
 days. Day Pike's Peak, and it was white
 with fresh snow. Saw ~~Redwinged blackbird~~
 Redwinged blackbirds ^{new young} numerous
 Robins very common
 Lark buntings abundant ^{young} ^{point}
 Lark sparrows
 Whiterounded sparrow
 Killdeer 12 or 15
 Mourning doves common
 City swallows
 yellow warbler
 Kingbirds a few
 Meadowlark abundant
 Vesper sparrows
 Wren sp.
 Kingfisher (at St. Vrain)
 Hawk sp. 1
 Barn swallows common
 Kingbird 1

Friday June 8

Too cold to sleep well last night,
 so got up late. Finished breakfast
 at 8 p. m. Dadd & I collected plants

in St. Vrain creek bottom just below Lyons all forenoon. Also collected some Mollusca. Lamprolaima arborea Platyhel under a narrow leafed poplar log. Markman & Harry out after birds, etc. Went back up creek and collected Valonia sp., Oreohelia strigosa and a few O. albogrisea at end of Dakota sandstone ridge. Dadda took pictures of the Valley. Left camp after a late dinner, for crossing of ~~the~~ ^{Little} Thompson creek. Dadda and Markman went to Higgie with the wagon to ship the plants collections (including a fine lot of fungus) to Dr. Rameley at Boulder, who is to attend to drying, arranging and labelling them. Harry and I crossed the headland formed by the big fold in the Dakota sandstone, travelling afoot. The heat was terrific. By the time we reached the Little Thompson creek at the end of the Niobrara ridge we were very tired. We took off our boots.

dangled our feet in the stream for ten minutes,
got a good drink of water, and went our
way much refreshed. Found a cache left by
me several years ago, when ^{very} there with Prof.
Spangler, containing several large Duoceramus
deposits, showing great deformity of the shell.
Collected some concretions of crystallized masses.
ite, loaded the Duoceramus into our bags,
and started down creek to meet the team
which was to travel north from Hygiene.
Our loads were very heavy and we were
thoroughly fatigued. We found a ranch,
but they either knew nothing or were ~~not~~
unwilling to part with the information.
They told us the road running north
from Hygiene was a mile further
down stream, so we resumed our
weary march, quite discouraged.
When we reached that road we waited
until a team came along. The driver
~~seems to~~ seemed to know the country,

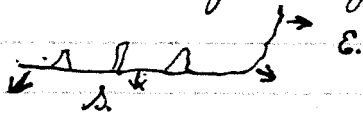
and told us the folks would surely
reach the creek at the very ranch where
we got such bad advice, and that he
saw the wagon travelling in that direction.
We wearily cached our load and turned
back, but soon saw the wagon coming.
Reached a camping place in time to set
the tents, make beds etc before dark, &
ate supper by firelight, or rather
lantern light. Then we sat about a
campfire until 10 p.m., & then retired.

Little Thompson Creek

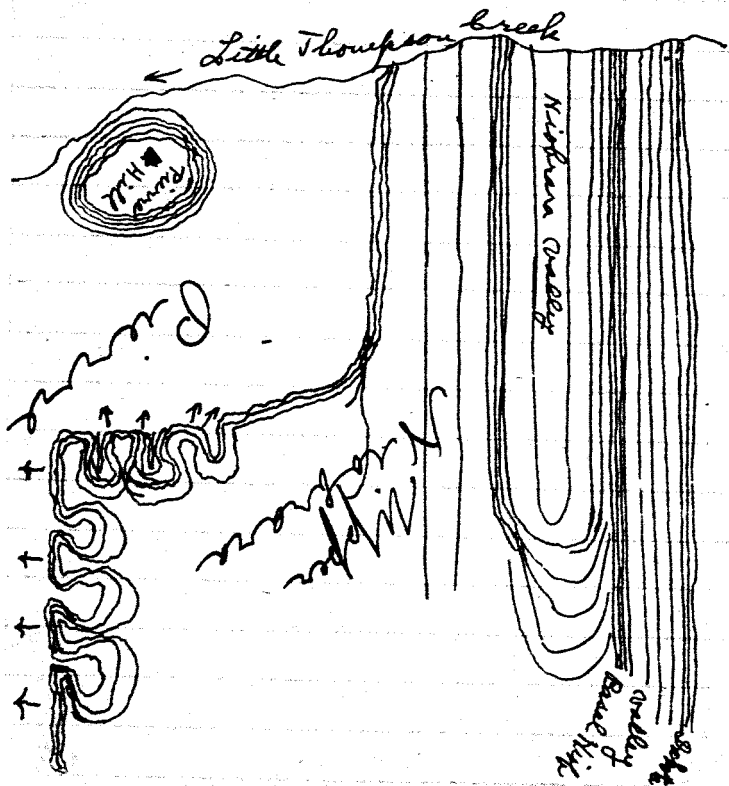
Saturday June 9, 1906.

Slept late in morning. Got a better
night's rest than before. We were none of us
so cold in the night, though Harry complained
of being cold because he had my tarpaulin
all under him, when he could as well
have had two or three folds over him.
We emptied the wagon and doled and

I took the empty wagon, leaving the others at camp and went up to the creek nearly to the basal Niobrara. The upper Niobrara is badly folded and probably faulted. Dodge went nearly to the Basal limestone and reports ~~short~~, narrow, sharp folds, the apex eroded into sharp ravines cutting ~~fast~~ through the yellow upper shales into the darker shales. Further East they shales round into a broad fold, then dip away sharply away under the Pierre. At one point is a flat topped hill of Pierre shales close to the creek, capped by sand and boulders, evidently isolated from the debris sheet of the plains border by erosion. a little ~~way~~ W. of N. from the hill, across a broad valley, upper Niobrara dips S.W. very slightly, then further E. it flattens, then dips to S.E., then to east for a long ways N. thus



This causes an escarpment for a long way along the foothills, most of the way from Little Thompson to Big Thompson and probably further, the upper Niobrara being somewhat resistant, the overlying Pierre being eroded away.



We found no fossils in upper Niobrara except the bands of Ostrea Congesta crowded on ^{flattened} Jucoserranus sp. just as they occur between Boulder and Left Hand creeks. The basal limestone contains large numbers of Jucoserranus deformis covered with Ostrea congesta, some of them ^(the Jucoserranus) quite large. At the next cut through the Niobrara the shales are badly involved in places vertical, and the small stream cuts through the entire series of lower Pierre, in which I found only three poorly preserved Jucoserranus barobini. In an exposure of Pierre nearly east of the S.E. point of the upper Niobrara escarpment there are many specimens of Baculites ovatus and ^{a few} Jucoserranus barobini, usually poorly preserved, though I found one or two of the latter in good state of preservation. I found one limestone lens about two or three feet in diameter from which had weathered many specimens of small Baculites.

showing the sutures very plainly, possibly young B. ovatus, and a few bivalves, with a fragment of some species of Scaphites and a couple of gastropods. We reached camp at 4:15; hastily broke camp and reached the Big Thompson just below Loveland in time to set the tent ~~below~~ before dark. Markman and Dodds went to town for provisions while Harry & I prepared the cots etc. at 9 p. m. Dodds returned and we had a good beefsteak supper, leaving some in the oven of the camp stove to keep warm for Markman, who returned at 10 p. m., just as I was ready to extinguish the light. It has been a hot, clear day. We are getting lots of alkali in the water now.

Big Thompson creek near Loveland
Sunday, June 10.

Arose late, had breakfast of hot cakes.
Got milk last night for first time

Starting in for a warm day, but at times cloudy. A slight breeze. We are camped on an island in a cottonwood grove. Has been cloudy and sultry this afternoon. We wrote postals and letters and Doodle went to town to mail them. I did not get through arranging, labelling, wrapping and boxing the mollusca and fossils collected yesterday and day before until six o'clock, when we had stewed chicken and dumplings prepared by Harry. Harry is fishing and catching chubs etc.

I have spent the entire afternoon in labelling + arranging the collections. Found more stuff stowed away after supper and worked until dark, with Doodle's help. All retired at 10 p. m. My back was very lame from bending over the specimens so long at a time without proper work table. Put some fish in formaldehyde - two or three species. Markman has put up a few bird skins, young birds, but has not yet obtained any mammals.

Big Thompson Creek near Loveland
Monday, June 11, 1906.

Markman collected a garter snake before the rest of us were up this morning. ^{Nothing in his traps.} After breakfast Markman went at his traps again, Dodds looked after camp affairs, while Harry & I took the big dip net and began dipping for mollusks, but the creek was high and quite roily, so we could see nothing, hence worked at a disadvantage. We collected quite a number of Anelys, however, clinging to the rocks which we fished out with the net, and a few insect larva. The creek was rising so rapidly that we concluded to pack up and get off the island before the water got too deep for fording. This high warm weather means water too high for stream collecting. We got off the island at 10 p.m. Then Dodds

Drove into town to make some purchases, while the rest of us continued work with but little success. *Ballock orioles* very abundant in the timber here.

Marshall caught a pocket gopher. Harry caught several species of fish ^{in small stream} with the net. We saw hundreds of *Fundulus* sp. congregated at the mouth of small stream where the clear water flowed into the turbid Big Thompson. Collected several. Also collected *Planorbis parvus*, *Physa* sp., *Limnaea* sp. and *Pisidium* sp. in same small stream. Found a portion of a *Strophitus* or *Ancodont* shell there also. Left Loveland at 1:30. Collected carp, ^{cut} catfish and one specimen of *Physa* (perhaps *P. virgata*) in a small, filthy brook about 2 miles N. of Loveland and some *Planorbis trivolvis*, *P. parvus* and *Physa* sp. in a lake further north, where they were very abundant. Dodds + I went west on foot finally to what I ^{thought} ~~found~~ was

an outcrop of the Fossil Ridge sandstone, and found it was so. The wagon went on to Trilby school house and camped in a pasture between the school house and ^{public} bridge. Just as we turned into the pasture, in crossing a furrow the right hind wheel dished and is a complete wreck. We unloaded, got a pole under the ~~axle~~ axle, and dragged the wagon to a camping place. Also broke another spring, the front one. All hands take it philosophically and are thankful that there are still three wheels on. Finished labelling specimens at 10 p.m. + retired

Fossil Ridge, Trilby schoolhouse

June 12, 1906 Tuesday.

Arose at 6:15; got breakfast and had the wagon taken apart ready to load on a lumber wagon to take to town at 9 p.m. Then I went

to the fossil beds while Harry went for another wagon to go to town, Doodle started out with the plant press and Markman went to town. Either a heavy dew, ^{but} a little rain in the night or things about camp were wet. am inclined to think it may have been fog, as it evidently crept into the tent. This morning clouds hang low on the mountain, with an east wind, hot in the sun when sheltered from the wind, but cool and refreshing in the shade exposed to the breeze. Found fine fossils by breaking up big concretions in afternoon, Harry swinging the big sledge. Received mail for first time since starting. In evening Doodle and Markman developed photos until 10 p. m. in dark room of blankets thrown over tripod in tent.

~~Wednesday~~
Tuesday, June 13

Markman and Harry both complain of sour stomachs this morning. Took some soda & went without their breakfasts. Refreshing breeze this morning, from northeast. I peeled potatoes, then chiseled out and wrapped fossils until breakfast. Started for fossil beds at 9:30 a.m. Collected fossils until 4 p.m. without food or drink, then brought a sackful of smaller ones to camp and wrapped and packed 150 of them. Collected about 200 specimens today mostly small bivalves - *Callita*, *Valdella* and *Pteria*, selecting only the best *Duoceras* to show variation - also a few *Pinna* and *Scaphites nodosus*. Hot all day when sheltered from the breeze.

Thursday June 14, 1906

Up at 6 ~~4~~ a.m., got to fossil beds at 9:15; Harry going with me. We took a canteen of water and a little lunch this time. Not quite so hot as yesterday. L. C. Pragg came out from the agricultural college and spent an hour or so. While he was with us it rained hard and we got soaked.

Fossil Ridge appears to extend for at least a mile below ^(south) camp (or perhaps two), & a mile northeast, so far as we have observed it. The formation much resembles the Hygiene sandstone at Left Hand creek, but is full of great concretions of sandstone with an outer coating of iron oxide. It dips to the eastward at a very low angle. This in weathering makes a sloping escarpment to the west, with a rise, followed by a gentle slope to the east. Facing the westward escarpment is the Upper Niobrara escarpment skirting the foothills, as at

Little Thompson creek, the concretions are filled with fossils, *Duocerasurus* oblongus predominating, *ballista* sp. ^{*deroyi*} abundant, many *Pinna lakeii* and *Baculites* *compressus*, besides other species. A very similar sandstone ridge outcrops to the east half a mile or so.

Friday, June 15, 1906

Harry + I took a big load of fossils + some ^{reeds} mollusca, fungi + bird + mammal skins to Ft. Collins, packed + shipped them. Had great difficulty finding suitable boxes sent four big boxes by freight and one by express. Then got running gear of wagon and reached camp at 5 p. m., very tired. Has been a very hot day.

Saturday June 16, 1906

Mosquitoes have been very troublesome at Trilby camp, particularly from 6 p. m. to 9 p. m. Have not been bothered much by them

except between those hours except at the alkali flat south of Little Thompson, where they swarmed as we passed through both morning and evening. Their presence is especially noticeable in the neighborhood of alfalfa fields.

Very hot morning. We set the wagon bed and top on running gear (a difficult undertaking without proper blocking, etc.) and broke camp about 11⁴⁵ a.m. taking roads leading to S. + E. for Greeley. I hastily examined the ridge paralleling Fossil Ridge to the east, and found it to quite strongly resemble the materials of Fossil Ridge, but the concretions are not as rounded. Found a single fossil - apparently a young *Duocerasmus oblongus*. Harry + I examined a very small, swampy lakelet N. of the head of Poudre Valley Reservoir + found *Linnæa* sp., *Physa* sp., *Planorbis trivolvris* + *P. parvus*. These occurred in large numbers in the outlet

of the lakelet. It was a great breeding place for water fowl & yellow headed blackbirds. In Poudre Valley Reservoir found no mollusks, but picked up three dead shells of *Planorbis trivolvis* on the beach. Saw an American avocet, black crowned night heron & 9 great blue herons. We discovered that the tire of the new wheel which we obtained at Ft. Collins was not properly shrunk on, so the wheel is weak & we must drive with care, especially as the roads are abominably rough. Also discovered that the new front spring is weak, nearly broken through one leaf. We blocked this up and went on. Markman shot two young night herons ^{or bitterns} at a lake south of Poudre Valley Reservoir & we saw others. In a marsh we saw several Wilson's phalaropes. Near Windsor we crossed what I believe is Fox Hills sandstone, dipping to East. Found no identifiable fossils. At Windsor, on N. side of Cache la Poudre, we bought provisions, then went on to

some bluffs about 4 miles down the river and camped. Had a little rain in afternoon, accompanied by wind and lightning. For a mile or two E. & W. of Windsor it appears to have rained hard.

Below Windsor, Sunday, June 17 1906

Had a very windy night. I slept in the wagon last night & night before, Harry going into the tent. Cloudy this morning, & windy. I prepared and catalogued the mollusks collected yesterday, then read the papers & magazines received at Ft. Collins Friday. Harry & Sodda started down the valley soon after breakfast. It sprinkled at intervals, and finally, at 1:30 p. m., rained hard, continuing for half an hour or so, and sprinkling for some time later. Harry & Sodda came in drenched to the skin & we had dinner at 3 p. m. After dinner I walked across to the bluffs S. of the creek and found

about 120 - *Verrucella humilis*, some *Cardium*
speciosum, *Mastra* sp., *Pholadomya* sp. &
other fossils in limestone concretions
near base of exposure
and *Platystrophia* sp. *Cardium speciosum*,
shark teeth, fish vertebrae scales, *Mastra*
sp. and *Tellina* sp., ^{*Ostrea* sp.} *Fucoids*, etc., in the
upper part of the exposure. The lower part
of the exposure may be Pierre, but the
upper part is the typical greenish yellow
Fox Hills ^{sandstone} such as is exposed below
White Rock, with large concretions of
sandstone with iron cement, flaking off
horizontally in large scales practically
the size of the concretions. The sandstone
is quite soft, easily excavated with
a knife. The *Ostrea* were well preserved, though
thin, and valves were easily freed from sand
on both sides with the knife. The other
fossils were friable, the shell crumbling, leaving
only casts. Some of the *Mastra* are very
fine. The lower part of the exposure con-
sists of alternating strata of thin bedded
clay shales and sandstone, with lime-

stone concretions from 3 to 6 feet in diameter. The veinlets broke out readily in large numbers from some of the weathered concretions, and were confined to concretions in a somewhat definite zone and to a narrow zone in each concretion. The whole formation looks horizontal when viewed from the north, but an east or west view of a north and south section shows a strong southerly dip.

Monday June 18, 1906

Harry & I worked on the paleontology of the Fox Hills sandstone, getting some fine specimens, while Dadds took care of his plants and Washman skinned birds. Had a hasty lunch at noon & started for Greeley at 1:30, where we arrived at 4:30 - 12 miles or more. Saw Jim Bartlett & Judge Southard, interviewed blacksmith, bought some supplies, got

our mail and went into camp on the
bache la Poudre, at what is said to be a city
park. It looks more like a private driving
park, the only improvements being a race
track, pavilion & stables. The other men
printed and developed veloc postal cards in
the evening. County Attorney Carpenter and
another attorney (cousin of Harry - name for-
gotten) called on us and promised us a
map and letters to ranchers north and
northeast of here. Has been clear and hot
today.

Tuesday, June 19, 1906

The other three went to town to get
supplies and have the wagon repaired.
As the load is evidently too heavy for the
wagon, they took the 10 gauge gun & ammuni-
tion, the cot, two suit cases & some other things
to leave with Max Clark until our return, in
order to lighten. I have cleared up all the
dishes, compacted our load, dredged the
stream, which is very muddy here (judging

a single dead *Planorbis bicarinatus* + one
poor value of a *Pisidium*) and now (11:30)
have everything ready to load on the wagon
as soon as it arrives. We will probably
feed the horses, eat a hasty lunch, and
start. I find we have lost my box
containing fine dissecting, egg blowing
other instruments, fossil + mollusk ^{of the type} boxes, etc.,
serious loss. found box We left Greeley at 2:30,
changing our route for a longer trip.
Drove through Eaton to Ault, arriving
at latter place at 7 p.m. Had a cold,
piercing gale all afternoon + were chilled
with our slickers on. Camped at edge of
town.

Wednesday June 20, 1906

Left Ault at 7:50 going north. Intended
to drive past Boyde Big Springs, but missed
the ranch. Drove through another ranch
where there were water holes then on to
N.E. for Eastman's Lake. Roads generally

must better than from Boulder & Greeley. Occasionally pass over hills covered with water worn debris from the mountains just like the mesa caps near Boulder, but not flat. Intermittent channels are also strewn with boulders & gravel & the soil generally sandy but hard. Saw flower ^{with young} lilies, horned larks, meadowlark, burrowing owls and lark bunting. at 1 p.m. we arrived at Speer's homestead a mile west of where Eastman's reservoir is placed on our map & were informed that the reservoir is fully 7 miles further east, so we cut it out and started up Owl creek for Slayton's Ranch, that also being incorrectly mapped as being on Eastman creek. Collected Phycas at a ranch 2 miles S. of Slayton's & reached Slayton's at 6 p.m.

Thursday June 21, 1906

Harry & Markman obtained a team & light wagon from Blayton & started back for Eastman's Reservoir this morning & Dadda & I took our wagon & started for chalk bluffs. Had to drive over rough prairie for three miles, with no road, but fortunately found wire fence down & thus avoided some distance. We both walked several miles. Dadda went ahead and found the spring in a ravine in the bluffs. Camped, got dinner at 1:30 & started East on foot to examine formation at 2:15. First visited the ^{isolated} conglomerate butte a couple of miles east of camp. Conglomerate consists of pebbles of granite & other igneous rocks, limestone, sandstone, quartz, agate, etc., very similar to those we have found lying on the prairie all day yesterday, but here cemented with a highly calcareous cement. This suggests the former extension of the forma

tion southward + eastward, the loose pebbles being the residue from the decomposition of the conglomerate and the washing away of the softer ^{+ finer} portions. The conglomerate is not generally very well set, crumbling readily under the hammer, with a disagreeable odor somewhat resembling dog feces, very irritating to the nostrils. ~~could not~~ ~~correlate~~ ~~the~~ It is about 60 ft. in thickness overlying the soft calcareous mud which characterizes the formation in general, the latter, with some harder bands, extending as deeply as erosion has reached - certainly not less than 100 ft. The conglomerate ~~is~~ is strongly cross bedded in places, + some of the pebbles are 6 or 8 inches in diameter, though it is mostly ^{coarse} sand + gravel. Am unable to correlate this bed with any of the conglomerates in the bluffs proper, though it may represent the cap of the bluffs, which is, generally speaking, thoroughly disintegrated.

leaving only beds of pebbles, etc. In the bluffs east of camp where our informants, Messrs Carpenter & Baker had indicated fossils on the map & told us they stood out prominently in vast numbers, we found only peculiar concretions, several inches in ~~the~~ horizontal diameter & sometimes several feet in vertical dimensions, forming all sorts of peculiar shapes & sometimes running into each other, weathering horizontally into terraces of from 2 to 10 feet in height and vertically into fantastic slopes, often resembling bones of large animals. They are much harder than the formation in general and the terracing suggests their segregation by waters moving along planes represented by the terraces. True bedding planes are not noticeable where the formation has become entirely concretionary & even in many other places the formation is massive, but in other places it is well stratified. We returned to camp

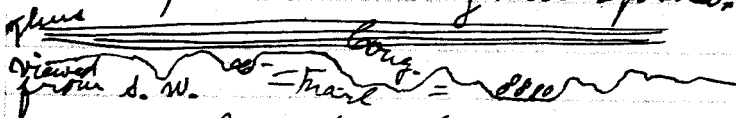
at 4:30 & busied ourselves about camp. Harry & Markman came in just before dark on foot, very tired. We saw them crossing the prairie & had a hot supper of fried ham & potatoes ready for them & us. After dark we loaded plateholders & got to bed at 10:30. Harry & Markman got nothing except some fossil wood and cannon ball concretions.

~~Thursday~~ Friday, June 29, 1906

Got up at 6 a. m., shaved and took some pictures before others were up. Harry not very well. After breakfast Doda & I started west, over the terraces, found the ^{thick} conglomerate of conglomerate Butte outcropping in a number of places, but not at all continuous through the entire formation. In one exposure W. of camp giving a nearly complete section it is entirely wanting, while on the next butte to the east it is well developed. To the northward of the latter it is seen on

the first hills, but not beyond, a thin
bed lower down seems continuous here,
but it plays out a short distance to the
west. Some of the numerous terraces
throughout the formation are conglomeratic,
but most of them are concretionary. Marl
greatly predominates, quite soft except in
concretions, effervescing strongly under
acid throughout, including conglomerate.
Numerous caverns are formed under
overhanging ledges by dissolution of the
marl beneath conglomerate. In one
place a cavern extended 18 feet back
& numerous chimneys admitted
storm waters, making underground
drainage for ~~some~~ ^{that} distance. Streams
are sand creeks, water from springs
disappearing at once, flood waters
^{from storms} choked with sand, forming almost
flat beds, with steep walls, often
perpendicular. In one place a strong
conglomerate passes within three or
four feet into marl, with no signs

of faulting. Beds are approximately horizontal, but in our place on escarpment the thick conglomerate shows a decided dip to S. E. However it appears to have pitched forward into that position. W. of camp there is a decided unconformity between the thick conglomerate & the marl. at first sight this seemed possibly the result of the conglomerate pressing into the soft mud, but the strata above continuing unbroken & straight across that idea unless the boulders ^{gravel} pressed in as they were deposited.



at N. W. (left) end of section conglomerate rapidly passes into marl, not by thinning out, but by intercretion of strata of marl between narrow strata of conglomerate. Here, as elsewhere, the line dividing conglomerate from ^{underlying} marl is abrupt, no gradation. The two places in above section marked by circles are occupied at base by boulders. In many places the conglomerates as

Well as the marls are concretionary. Went down to the conglomerate butte east of camp about 11 a.m. & photographed it and the concretions north of it. Broke camp at 2 p.m. & arrived at deserted ranch west of Gault P.O., ^{at 6 p.m.} where we went into camp. After supper several neighboring ranchmen called at camp, including A. B. Hilton, to whom I had letters of introduction from Herbert Baker & Chas. E. Southard. Wind blew all night last night & for a while this morning, shaking the wagon in which I slept. About noon it rained at intervals, and on the road to Gault it rained and hailed hard several times, with a cold disagreeable northeast wind. Harry & I went home with Mr. Hilton to see his specimens, and at 9 p.m. it was raining hard & very dark, so we remained all night.

Saturday, June 23, 1906

arose at 5:30 ^{a.m.} & Harry & I started for camp with fresh milk & eggs which Mr.

Hilton gave us very cold northeast wind. Cloudy. Broke camp at 8:35^{a.m.} + started east, reaching Grover, on the B. + M. R.R. at 3 p.m., a distance of 16 miles in 6 hours + 20 minutes. We had a cold head wind and rain all the way + poor roads. Camped in lee of the schoolhouse barn at Grover + turned horses into school yard. We were all wet and thoroughly chilled. Had a good dinner of salmon loaf covered with peas, then went to store, then built a fire in the camp stove at entrance of tent + sat somewhat comfortably in the tent. All retired at 8 p.m.

Sunday June 24, 1906

Rained nearly all night, quite hard at times. Hard wind part of the night. Sun shining this morning but still cloudy, wind changed to westerly. Rained again while we were getting breakfast of mush + milk and crackers. At 10:30 we started to move camp.

Very heavy roads. At occasion to reprove
Harry for his impatience & loss of temper.
I walked all the way from Grover, saddle
& I left the trail about 5 miles from
Grover, and examined the bluffs north
of the road. The formation appears to be
the same as the base of the Chalk Bluffs,
but the escarpment is more nearly
vertical, instead of being so markedly
terraced by conglomerate & concretionary
bands. The upper part of the bluffs, how-
ever, are irregularly concretionary & in
many places the underlying marls
have assumed a whitish color and are
very soft, the irregularity of the white
bands strongly resembling miccongruity,
the dividing lines being very abrupt.
The debris slope is a gentle curve to the
south, as at Chalk Bluffs, ^{winding} ravines
10 to 20 ft. in depth, with steep walls
extending out for a mile or so until
they shallow to nothingness, leaving
the prairie beyond free from ravines.

All slopes of marked grade, however, are terraced, the terraces being only a few inches in height, making the best travelling along the beds of the swales below the terrace line. The bluffs have here a decided tendency to weather into circular towers with nearly vertical walls. The ravines leading out through the ^{debris} ~~strata~~ slope generally have flat bottoms, but in one or two there was a secondary ravine perhaps caused by the washing out of cattle trails along the center. We reached camp at Davis ranch at 5:30, much sooner than we expected. Are camped in one of the ravines which extends back into the bluffs. Loaded plateholders after dark.

Monday June 25, 1906

Got up early & went to work. I worked all day in the hot sun and found nothing worth bringing in. At noon Dodds brought in a good ^{porcine} jaw bone & some teeth. Do not get in this evening (5:30). Formation here resembles Chalk Bluffs, but the

conglomerates are composed more largely of waste of underlying rocks with less debris from the mountains. Am terribly fatigued with so much hard climbing & being on my feet since 6 a.m., so gave up at 5:30. Dodds came in at 6 p.m., with nothing more. Harry arrived at 8 p.m. with part of a jaw bone & Mackman came later. It rained just after Mackman arrived, wind north. Had mush & milk for supper.

Tuesday, June 26, 1906

I started west with Dodds & Harry & worked along the cliffs, at last point of bluffs but one to the west Dodds found a small turtle in clay about $\frac{1}{3}$ of way to top & we chiseled it out around the point to ^{west} eastward ~~we~~ he found a portion of a jaw bone in about the same horizon & near by I found a turtle. We got out the former but the latter was

too badly shattered. Further east in the base of the conglomerate I found another turtle + Dodd + I worked on it until 6 p.m., when we had it uncovered for 3 ft in length & 2 1/2 in width & quit for the night. It is on the hanging wall, where the conglomerate overhangs, so we may not be able to extract him. The formation is not favorable to extraction. Here where we got the first turtle we ~~also~~ countered a beautiful little spotted adder as we walked along a narrow ledge. Harry was in advance, I passed him the big gloves and cyanide bottle & he collected the snake. Further along I killed a big rattlesnake, the first one I have seen on the trip. Mockingbirds are common here, as also arkansas kingbird, say phoebe, barn & cliff swallows, white throated swifts & meadow-larks. Harry had some rhubarb pie made & Washman had a salmon loaf ready when Dodd + I arrived in camp, very tired.

Has been a very hot day, with a few
fleshy clouds.

Wednesday, June 27, 1906

Arose at 6 a.m. Hot morning. Saddle & I
Went to work on the fossil turtle, while
Harry started to hunt the missing mare
& Saddle skinned birds. Harry got Mr.
Davis to hunt the mare & joined us at
1 p.m. We got the turtle nearly cut out,
resting with carapace downward on a
pinch of rock, at 5:30 & began
fasting cheesecloth around it, starting
for camp at 6:30. Wind blew all
afternoon, filling our eyes with dust
as we worked & making it very disagree-
able. Found the mare at camp when
we returned, & workman had supper
ready. It was very hard work
digging in cramped quarters all
afternoon.

Thursday, June 28, 1906

Not quite so hot this morning on account of cool easterly breeze. Sun very bright. Yesterday morning with a heavy load, including 1 gallon water, camp kettle of paste, bolt of cheese cloth in camp pack, big pick, heavy hammer, light picks, chisels, boards, etc., it took Dodd + me $1\frac{1}{4}$ hours to walk over here. This morning with 1 two quart canteen of water + a few crackers I walked it in 45 minutes. The turtle is near base of concretionary stratum at top of cliff. The others soon joined me + we padded beneath the fossil all around with a moss like chickweed and the tender young shoots of mountain rhogony. Then while the other three studied the fossil I chiseled away the supporting pinnacle. It dropped easily into the crevice just as we had planned. We easily turned it over. Then Dodd started to Grover to order lumber

and sawdust, Harry started to look at his mammal traps & Markman & I finished wrapping the turtle in tissue paper, cheesecloth and gunny sacks, completing this at 11 a. m. Then we began prospecting for more possible camps. We came in at 3:30, had a lunch, then I went to work collecting, pinning & labelling insects, while Markman & Harry went out for birds. Harry caught a hairy tailed rat in his traps. It was fairly cool in the morning, exceedingly hot in the afternoon & just before sundown a wind too cool for comfort sprang up. Markman killed a rattlesnake. We average about one a day. Brewer's blackbird is common here. There are hundreds of abandoned hawk's nests in these cliffs & many still in use. Last night Dadds left his collecting bag at the big turtle & this morning the shoulder strap was eaten through by small rodents. They did not injure the straps of the camp pack nor the paste, which latter was in a bottle covered with gunny sacks, nor did they nibble the layers of cheese cloth pasted on the

fossil.

Friday, June 29, 1906

Dodder & Markman took the wagon around to the fossil turtle this morning, while Harry & I walked across the hill, examining his traps & collecting insects on the way. Found two rats in traps. We boxed the turtle with the two inch planks which Dodder got yesterday, sawing the planks with my small trimming ^{saw}. We used the dry moss & the plants of the vicinity for packing, graded a road on the face of the cliff just below the conglomeratic shelf, to a point where the debris slope was comparatively smooth, then let it down to where we could back the wagon up to an embankment and loaded it on the wagon. Harry & Markman then took it to Grover for shipment, finding that it weighed 640 pounds as boxed. Dodder & I collected plants & insects on our way.

camp. at camp I took a bath & changed my underwear & shirt, then labelled & pinned about 75 insects finishing at 8.45 p. m., while Dods was getting supper ready to go into the stove. The boys came with the wagon at 9 p. m., & a few moments afterwards we had a good supper - salmon loaf covered with peas, ^{and} crockers, cake and cocoa. The last few days have been altogether too strenuous. We are all sore and tired & very thankful the big tooth is off our hands.

Saturday June 30, 1906

Left camp without load in wagon at 9 a. m. Reached Pawnee Butte at 12:30, via Joe Dolan's place. Fed horses & ate lunch, then went on S. E. Markham found fossil jaw bone at ^{the} West Butte Formation about same as at Davis ranch. Below butte country more cut up by erosion than valley at Davis, but no dissected escarpment. We passed near the Seboky's shack on way to Fitch's.

+ as Hilton had urged, we made a very hasty search for fossil teeth, ~~then~~ but found none. Then went on to Fitch's where we arrived at 4:40, & did no work. Started back by a more southerly route. The formation around Maitha Sebich's has a decided tendency to change from ~~yellow~~ to whitish, passing rather abruptly from one to the other & the upper part is emphatically a sandstone. (By the way, the formation where we dug out the fossil turtle put an abrupt point on the picks in digging.)

Sunday, July 1, 1906

sprinkled at breakfast time, then cleared with steady northerly wind. We left camp in gulch at Davis ranch at 9:15; going a mile or so south to Jackson, ranch, then south-westerly over rolling prairie for brown creek. Crossed B. & M. R. R. where ship once was. There is not a building there now nor even a sidetrack at a lagoon near a cabin about 10 miles S. of Grover is a ~~large~~ of

quartz sandstone. Here one collected
some red evening primrose - a species
new to all of us. About two miles
further on we saw three antelope, the
only ones yet seen on the trip ~~except~~
one east of Slayton's, I believe. Near a
lagoon 15 miles S. E. of Grover, while collect-
ing batrachians, we saw another antelope,
a doe. Most common bird is the shore
lark, next the lark bunting, a few meadow-
larks and plover. Harry killed a fine Ameri-
can rough-legged hawk. Saw first dove
at Crow Creek. Came 25 miles today
over a ^{rolling prairie} road which did not pass a fence
or inhabited house, with only a single
buggy track made ~~by~~ since last Sunday's
storm, and saw but one person after
leaving Jackson's ranch - a solitary
horseman some distance from the
road. Road good much of the way, but
crossing many wide lagoon-like
stretchers which were particularly bad.
In Crow Creek we find the water in

frequent waterholes, separated by a few feet of moist ground, inhabited by *Sphaerium*, *Physa*, *Planorbis*, crayfish frogs, fish (*Fundulus*) etc., banks lined with fine willows & a few cottonwoods. Reached here at 4:30. Find Magpies here, and nesting big. Before supper we found a place where *Sphaerium* are very abundant, and in addition collected two species of *Physa* and *Planorbis* *trivialis*, *P. bicarinatus* and *P. parvus*. Also found turtles, green water beetles and leeches. Rained at dark & continued for some time after we retired.

Monday, July 2, 1906

Examined the creek bluffs below camp. At the top is a zone several (4 or 5) ft. in thickness of bituminous shale containing abundant plant fragments, underlain by white sandstone, all badly weathered & very soft, containing iron concretions. Below this is a hard stratum of sandstone a foot or two ^{thick}, which presents a strangely knirkled appearance

on its weathered surfaces. Strong north
wind makes work disagreeable. I found
an ironstone concretion containing gas-
teropods resembling *Vivipera* and some
bivalves resembling ^{*Conchylia*} ~~*Callista*~~ ~~*retrocurva*~~
& collected 70. Harry found a steatite
at the dam & collected therefrom 110
bivalves of two or more species. We then
had lunch, fed the team & started down
creek. On way I collected 40 more at
same place where Harry had worked, while
the others were looking at hawk's nests.
about ^{7 1/2} miles further down creek found
a heronry & I discovered an outcrop
from which I took 75 specimens of *Ostrea*
glabra & ~~some *Callista*~~ ^{*borborypha*} ~~*Callista*~~, making a total
of 400 specimens for the day. Also found
a ledge containing many gasteropods, so
we went a mile down creek where we
could get water from a well & camped.
Have seen no water in creek since
leaving last camp. Road has followed
creek & is poor, with many gates.

The fossils collected today have been fine. Pleasant this evening.

Tuesday, July 3, 1906

Arose at 5:30, had breakfast and Harry + I started for the fossil beds at 7:20. Washman + Dadds joined us at 10:30 + by 11 a. m. we had 75-6 specimens. The wagon was all loaded + Washman + Dadds started to drive down ~~east~~^{west} side Crow Creek, while Harry + I walked a couple of miles on ~~east~~ side + then joined the wagon. Reached Greeley at 5 p. m., boxed + slipped the plants, fossils, etc., + drove north one mile to Cache-la-Poudre to camp. Had a good beefsteak supper with bread, the first we have had for a long time. I am puzzled about the fossil formation at last night's camp. *O. glabra*, and *Viviparus* and one specimen of *Physa*, indicates Laramie but some of the other species look marine to me, which would indicate Fox Hills, at the brow of the gentle slope are great quantities of *Ostrea glabra* and fragments of some other bivalve

broken from iron concretions and come in
cones. In one place large numbers of
gastropods were broken from iron con-
cretions. Down the hill some distance is a
perfect mass of bivalves of several species,
including a few gastropods which I take for
Viriparus. A short distance to the south
a gulch has exposed what appears to be typical
Laramie white sandstone containing "cannon-
balls" concretions. As we found no other
exposures except recent I am compelled to
suspect that this locality, though said to be
18 miles from Greeley, is the place called
15 miles N. E. of Greeley in the reports, from which
ten or more Laramie species have been de-
scribed. Has been a fine day, but the air
feels decidedly frosty tonight.

Wednesday July 4, 1906

People were passing along the road
until midnight, and most of them
halloed as they passed the camp. At
5 a.m. they began passing again on
way to Greeley to take early excursions

trains for Boulder + Eaton to see the Fourth of July celebration. Now 8:30 a. m. + Markman ~~is up~~ just dressing while Harry is still in bed. We had the cots again which we left in Greeley on our way north two weeks ago. Packed for shipment some of the outfit which we will not need again + left Greeley at noon, passing through Evans, then crossing Platte to East side, recrossing to West side about 7 miles from Evans at the Twin Bridge. We camped ^{at 4:30} on Big Thompson ^{East (S. side)} two or three miles below mouth of Little Thompson. While Sudds + Markman made a dry camp in a pasture, getting water at a nearby farm house. Harry + I started to examine the bluffs north of the creek, wading across. The formation is typical Fox Hills sandstone. Found Cardium speciosum, shark tooth + other fossil mollusks at base of exposure. Near the top I found fossil leaves which I at first took for a Laramie species.

and above it found numbers of *Ostrea glabra*, but a thorough search brought to light a single specimen of *Cardium speciosum* in the upper strata, so that settled its Fox Hills age. Reached camp at 6:30 & had pea soup, canned salmon and bread & butter, with peaches.

Thursday, July 5, 1906

At 6 a. m. I went to the stream with the big net looking for mollusks, but found none except some small *Physas* and *Pleurobia farvus*. Reached the wagon at 7:30. Breakfast was ready. We got the wagon loaded and started at 9:20. Reached mouth of St. Vrain, 5 miles distant, at 10 a. m., and explored the Fox Hills deposits there. ~~at~~ At the top we found a coarse conglomerate, some of the pebbles derived from the mountains measuring two or three inches in diameter. Beneath that a few feet is a two foot stratum composed almost entirely of *Ostrea* sp., with a sandstone matrix. The greater part

of the beds are typical Fox Hills sandstone, with long concretions such as those at White Rock, and other more tabular & extensive ones which cause the formation to weather into broad-capped pinnacles. Found a few fish vertebra & some fine fusoids. Lower down Markman & Harry found a number of species. At the base of the river cliffs are intercalated strata of shales which may be Pierre. Left there at 11:55 p.m. Reached Longmont, 18 or 20 miles away, at 6:30 p.m. Two livery men refused to furnish us hay and W.H. Dieters refused to allow us to camp in an unsanitized pasture, the first such refusal we have met. Camped in another pasture across on the S. side of creek & W. side of road. Finished supper at 9 o'clock.

Thursday July 6, 1906

Left Longmont at 7:35 - Reached Boulder at 11:45 a.m.

Arctope Glacier Trip 1906

Aug 31, 1906 Friday

Left Boulder at 9:30 a.m. on narrow gauge, accompanied by Sievert Rohrer, Mrs. Lockwood, Prof. Daniels, of Miss McCoy, Miss Sheldon and her father. Clear morning, but clouded more or less by trinitine. Stormed after leaving Bluebird mine. Reached ~~Clare~~ at 1 p.m. Got dinner at Gold Miner Hotel, then went up gulch collecting mollusca. Found *Louitoides arboreus* very abundant under logs in quaking aspen, a few *Vitrea Pfeifferi*, some *Vallonia cyathophorella*, one juvenile *Agriolimax*. Probably the black form of *campestris*. At Hesse found quite a number of *Pisidium* sp., varying from ^{nearly} central beaks to posterior beaks, covered with iron rust and very closely resembling the sand in which they are found. It threatened a storm during

early afternoon, but cleared toward evening. Called up Mrs. Rehner after supper and found Nellie was no better, threatened with toxicities.

~~Saturday~~ Sept 1, 1906

Drained toward morning & blew hard all night. Mrs. Gardiner arrived on the night train at 11 p.m. We were all up at 5³⁰ a.m., had breakfast at 6 p.m., but did not get our horses until 7 p.m., got away at 8³⁰ a.m. for peak, Mrs. Sheldon Mrs. Cocherell and Miss McBoy riding in carriage with John Lilly, driver, and the others on horseback. Reached shaft house of 4th of July mine at 10 a.m. Sixt & I reached ~~at~~ ahead of others, took our pictures, then I went down into glacial cirque, Sixt, Mrs. Gardiner, Miss McBoy, Miss Sheldon and Mrs. Cocherell coming down later.

Found considerable shrinkage on the north side, the ice being 20 feet from the big boulder on north moraine, very noticeable shrinkage on the south side, none just west of the terminal lake. The crevasses were pretty well filled with fresh last year's snow except the larger ones. When we again reached the rim of the cirque, ~~Saint~~ and Miss McKay went to the top. We were caught in snow and rain and on way down it rained hard most of way. We were all soaked. Had supper at about 7¹⁵ p. m. Then I called up Mrs. Hoover and found Nellie was no better, so I will go down on morning train.

Marshall, Colo., Feb. 9, 1907.

Drove out at 9:30 with Dr. Ramaley,
G. S. Sells and Sievert Rohwer. On
the bluff about due S. of Marshall
station, near top of bluff line
and East of the steep point we
collected a lot of fossil leaves
of various species. They were
where excavations for coal had
been made. S. W. of the station,
West of the bluff point in an
old open cut in the hillside
we found large numbers of
large fossil leaves which I take
for a species of *Ficus* (Fig).
Reached home at 6:30

Four miles N. of Boulder, Col.

Feb'y 12, 1907

Sievert and Frank Rohrer and I started at 9:45. Drove to where private road crosses the mesa about $3\frac{1}{2}$ miles N. of Boulder & there left the rig.

Where the private road crosses the Hygiene sandstone (Pierre Cretaceous) in SW⁴ ~~lot~~ of Sec 6, Tp. 1 N., R 70 W., we found a fossiliferous zone about 30 feet from top of exposure; ~~see~~ 1 Baculites ovatus, 15 Duoceramnus sp., a fragment of wood, some seaweeds? and worm or mollusk burrows. Above and below this horizon the sandstone seemed barren, except for apparent seaweeds.

N. of the gulch which cuts this mesa off on the north and about 200 to 300 yards East of the west line of section 6, consequently beneath the Hygiene sandstone, we found

numerous Baculites, perhaps both ovatus and compressus, and Duoceramus barabini. Traced this horizon north-eastward for half a mile or so.

The strike here is northeastward and dip southeastward, hence Hygiene sand stone here makes a N. E. - S. W. ridge, but near N. line of section it turns northward.

In gully on N. side of a gulch in N. E. 4 sec. 6 perhaps 300 yds W. of ranch and section line fence, consequently above Hygiene sandstone, I found 3 ^{small} specimens of Scaphites nodosus.

Along the north face of the mesa in S. W. 4 sec. 6 and 200 to 300 yards W. of east line of section, 40 or 50 ft. below top of exposure we found a calcareous sandstone a few inches in thickness containing large numbers of Duoceramus vanuxemi. Collected about 40 specimens. Beneath this was a horizon containing D. sagensis in which I found a cephalopod which is puzzling me and a fossil which

I cannot place at all, even as to family. The two last mentioned horizons remind me of those bearing similar relations about a mile S.W. of ~~here~~ there. In a higher horizon, just E. of W. line of Sec. 5 we found a fine lot of Duoceras barbini, many with the sulcus upon which Whitfield founded his genus Eudoceras, with a few D. sagemis and D. von-upeni and numbers of Astrea inornata?

Feb'y 17, 1907

Scientist Rohwer and I walked out to same place to make sure of localities in afternoon & found them correct. Just S. of N. line, ^{of S.W. 1/4 Sec. 21, T. 42 N., R. 22 W.} & E. of the fossil locality in that quarter section we found a 2 ft. bed of conglomerate consisting of mountain debris and angular fragments of Hygiene shales sandstone apparently cemented by a calcareous infiltration, at the base of the mesa boulder cap and resting directly

upon Pierre shales.

East of there & just ~~E~~ in about the
N.W. cor of N.W. 4 N.E. 4 sec. 8 T₁ N. R. 70 W.
we found a sandstone much resem-
bling the Hygiene, dipping S. E. but dip
slight, on N. face of mesa. Found a few
fragments of Ostrea and Doceramus,
undeterminable, former turned up
sharply at sides and attached to the
latter, much resembling O. congesta
from the Steibere. This may be the
equivalent of the sandstone in the
pasture N. E. of Haystack Butte, as
well as the one found by us today in
S. E. cor of N. E. 4 N. E. 4 or N. E. cor. S. E. 4 N. E. 4
sec. 7 T₁ N. R. 70 W., in N. edge of gulch
near E. line of section. This latter suppos-
ition would make its strike nearly
the same as the underlying Hygiene
sandstone

N. of Boulder July 22, 1907

Sivert Rohwer & I went out on horseback to sketch in the map. E. of W. line Sec. 7 Tp 1 N. R. 70 W., E. of little house in adjoining Sec. found *Thyris* sandstone very steep, but it flattens as it passes over Four Mile Mesa to the north, this accounting for widening of outcrop. In S. E. 4 Sec. 6 we collected *Heteroceras* sp. *Aneylopus tri-costatus*, *Lucina occidentalis*, *Inoceramus barabini* & *sagensis* etc in gulch at Station 7 Sec. 6 Tp 1 N R 70 W. Sivert collected *Inoceramus* sp in fragments near base of Pierre or at top of Kiobrara in Station 2 Sec. 12 Tp 1 N R 71 W.

N. of Boulder July 23, 1907

Sivert Rohwer, Frank Rohwer & I went with today, collected fossils. In sandstone at Station 8 ^{Sec 7 Tp 1 N R 70 W.} found *I. vanuxemi*, *I. barabini* & *sagensis* in poor condition & 1 *B. cf. compressus* just at W. line of sec. and about intersec.

tion with E. & W. $\frac{1}{2}$ sec. line. Bluff E. of
the station 3 sec. & contained *J. sagensis*
in limestone ~~concretions~~ Bluff is sandy.
In lateral gulch ^{in black shale} at station 4 S. E. cor N. E⁴
S. W.⁴ sec 8 we found *J. barabini* and
sagensis. Dip all S. E., gentle. Found
sandstone again at station 6 N. E. cor N. W.⁴
S. E.⁴ sec 8. E. of there clay is yellow.

On S. front of Four Mile Mesa Hygiene
sandstone reaches W. line sec. 6 T₁ N
R 70 W. On N. slope of mesa it trends
rapidly to the northeast

In N. E.⁴ S. E.⁴ sec 6 T₁ N R 70 W. the
upper part of the Pierre exposure on N.
slope of mesa weathers yellowish.

Denver, Colo., Feb 2, 1907

Prof. Geo. L. Cannon and I went out to
the creek S. of Cheltenham Schoolhouse in
West Denver. The creek is locally known as
Dry Creek, but to distinguish it from a
dozen other "Dry" creeks Cannon pro-
poses the name Green Mountain Creek

as its tributaries find their sources in Green Mountain, a foothill to the west. In the street south of the schoolhouse at the S. E. corner of the schoolyard we found a new trench 8 feet deep which did not reach bed rock; while a short distance E. the Denver sandstone came to the surface. Then a little further it dropped again. The first mentioned drop was evidently once a lateral gully, while the other was the original bluff of the South Platte Valley, which was afterwards filled by the river and since excavated again by the same stream.

at Green Mountain Creek we found original bluffs of ^{the north side of} a valley perhaps 100 ft. in depth, which was afterwards filled by stream action, and has since been excavated by the creek. I were, was the filling done by the creek or by the Platte or by joint action of both. I found no break between the deposit

and the undoubted river deposit downstream toward the mouth of the creek. Cannon has not found any Denver sandstone south of the present creek channel cutting it from the river channel, from which it may be inferred that it was part of the original river channel. The character of the deposit, too, is more in accord with the idea of deposition by flood waters of a large stream. Prof. Cannon, however, says that long observation teaches him that there is a vague, indescribable, undefinable difference ^{between} the intercalated gravel beds in Green Mt. Creek valley and those in the main valley. If the deposits are distinct in origin, the gravels of the Platte deposits should contain elements derived from South Platte canyon which could not well occur in Green Mountain debris. These gravel beds are local, irregular and usually of small extent so far as any

observation today goes. The original Denver sandstone bluffs were irregular in outline and deeply incised by lateral gulches. Three former land surfaces were usually discernable:

- (1) The Denver sandstone, very irregular.
- (2) a sort of loessoid deposit containing occasional pebbles of fair size suspended, somewhat regularly sloping down toward the present bed of the valley.
- (3) Loose material plainly derived by ~~scouring~~ ^{scouring} the higher ground in the nature of talus, thus



The talus was thinnest above thickening down slope.

The Denver beds ~~above~~ were massive above with few joints, more argillaceous and thinner bedded below, thoroughly jointed by irregular joints as shown by weathered surfaces. It struck me that these

lower deposits showed origin similar to the river deposits. The pebbles and small boulders contained in these river deposits as well as in the loessoid were usually rounded, with some flatish surfaces and sometimes angular, suggesting transportation some distance at a time by strong floods without much wear, as often occurs nowadays. The pebbles left on the surface by wind erosion are of quartz, hornblende rock, andesite, etc. — mountain debris. Throughout this plains region erosion and deposition have frequently progressed with terrific rapidity during great storms. Prof. Cannon showed me one place where a gulch about 50 ft in depth was cut through the loessoid and river deposits, to bedrock (Denver sandstone), by a single storm, N. E. of Cheltenham schoolhouse.

at brick kiln in S. bluff of Green Mt. Creek we visited ~~the~~ place from which Cannon, Bethel & Martin had

sent Quaternary fossils, and collected Pupilla muscorum, which were abundant in one stratum, Valvonia gracilicosta, Succinea grossenori and 2 specimens of Lymnaea sp. The latter had not been seen by me before. We did not find Planorbis parvus, which Cannon had found there.

In a lateral gulch ~~on~~ in west bluffs of ^{the} Platte, N.E. of Cheltenham schoolhouse, we found one large specimen of Succinea grossenori in deposits of aeolian origin, probably, as the opposite bluff of the gulch is undoubtedly aeolian.

Well up on the hill N. of the latter point a street cut exposed aqueous deposits dipping S. E. perhaps 6 or 8 degrees or more, and quite regular in stratification. Does this indicate folding in recent times.

N. of Boulder, Colo., April 5/07

Drove north in morning, taking Frank Rohwer and Clinton Follen with me. Visited Station 2, Sec. 12 T. 1 N. R. 70 W., + found some poorly preserved *Duoceramus* sp. + fragments of *Baculites* sp. This station is some distance above the base of the Pierre group, instead of being at the base as I had supposed. W. of this station I found the boulder cap of the mussel cemented into a conglomerate by a calcareous cement, as at Station 3, Sec. 5, T. 1 N., R. 70 W. Of course, this being W. of the Hygiene sandstone there are no Hygiene fragments, as at Sta. 3 in Sec. 5.

We then went N. to the "paper" shales, collected some *D. labiatus*, a shark tooth + 2 specimens of the undescribed cephalopod which I

collected N. of Left Hand, in the upper Benton Cretaceous. In the Niobrara shales, just above the basal limestone, we found the Duocranus deformis greatly flattened, except one or two specimens. This may have been due to pressure but did not appear to be. They are in a yielding shale.

Thence we took the road connecting the ^{roads along} E. + W. lines of Secs. 30 + 31, & near where it connects with the E. section road, not far below the Hygiene sandstone I found a sea urchin, Baculites ovatus, Duocranus barabini + Heteroceras sp.