

Junius Henderson  
Field Notebook

No. 7

July 21, 1914 -

July 21, 1916

Junius

Henderson,

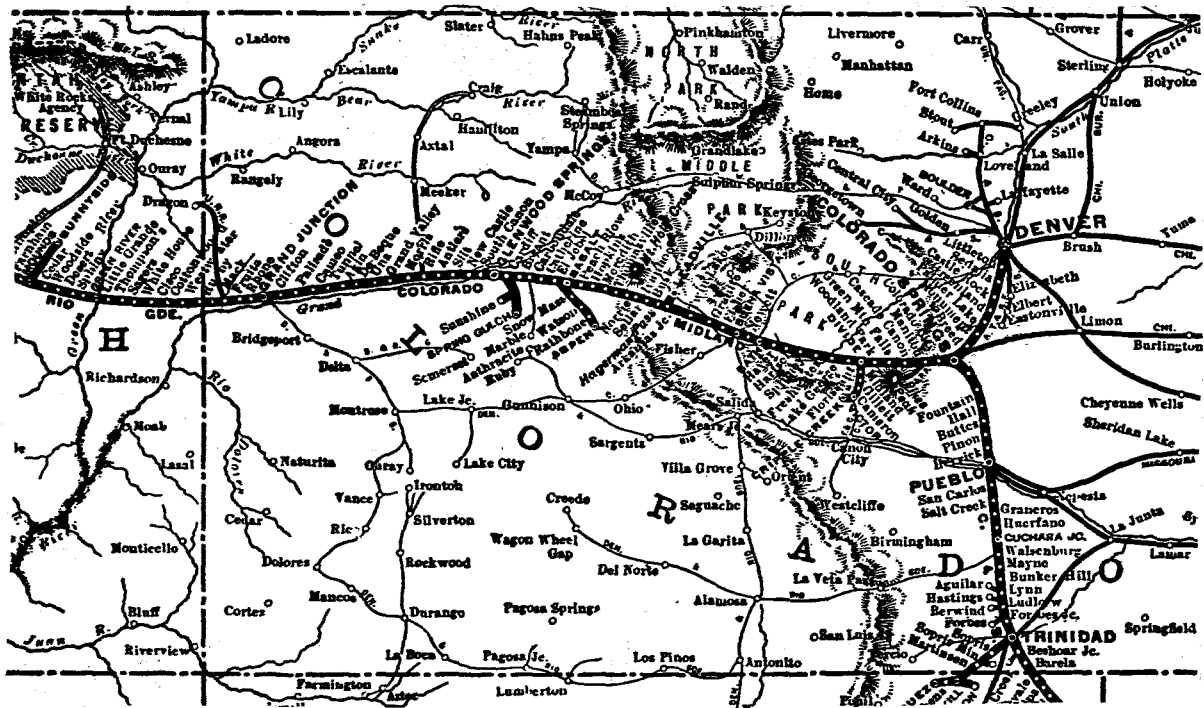
Boulder,

Colo.

Note  Book

No. 7.





# The Colorado Midland Ry

0	Lv Denver.....	Ar.		5197
74	Ar Colo. Springs..	Lv.	SHIRLING	6000
74	Lv Colo. Springs..	Ar.	The Range	6000
77	" Colo. City.....			6092
80	" Manitou.....			6442
86	Ar Cascade.....	Lv.	UTE PASS	7421
86	Lv Cascade.....	Ar.		7421
89	" Green Mt. Falls..			7743
91	" Crystals.....			7950
94	" Woodland.....			8494
97	" Edlowe.....			8923
102	" Divide.....		GRANITE HAYDEN	9198
110	" Florissant.....		Divide	8193
115	" Lake George.....			7978
117	" Lidderdale.....			8086
124	" Idlewild.....		GRANITE HAYDEN	8479
126	" Howbert.....		CANON	8572
132	" Spinney.....			8652
143	" Hartsel.....			8892
151	" Haver.....		SOUTH PARK	8994
159	" Bath.....			9516
165	" Newett.....			9100
175	" Buena Vista.....			8248
186	" Barre.....		ARK. RIVER VALLEY	8596
192	" Granite.....			8951
195	" Twin Lakes.....			9383
201	" Snowden.....			9805
208	Ar Arkansas Junc..	Lv.		9695
212	" Leadville.....	Lv.		10103
212	Lv Leadville.....	Ar.		10103
208	" Arkansas Junc..	Ar.		9695
216	" Busk.....		Crossg.	10805
218	" Ivanhoe.....		Conl.	10944
224	" Hell Gate.....		Divide	10540
228	" Sellar.....			9819
232	" Nast.....		Frying Pan	9078
236	" Norrie.....		River	8454
239	" Thomasville.....			7985
241	" Meredith.....			7792
244	" Ruedl.....			7585
250	" Sloss.....		Red Rock	7184
255	" Castles.....		Canon	6973
259	Ar Basalt.....	Lv.		6614
0	Lv Basalt.....	Ar.		6614
3	" Snow Mass.....		ASPEN	6899
8	" Watson.....		BRANCH	7168
11	" Rathbone.....			7515
18	Ar Aspen.....	Lv.		7950
259	Lv Basalt.....	Ar.		6614
263	" El Jebel.....		ROARING FORK	6502
266	" Wheeler.....		VALLEY	6372
267	" Catherine.....			6310
271	" Carbondale.....			6142
272	" Bryant.....			6066
280	" Cardiff.....			5940
283	" Glenwood Springs.			5793
287	" South Canon.....			5702
295	" New Castle.....			5574
302	" Silt.....		GRAND VALLEY	5400
309	" Rifle.....		DISTRICT	5310
312	" Lacy.....			5267
318	" Morris.....			5207
326	" Grand Valley.....			5104
331	" Una.....			5025
339	" De Beque.....			4945
346	" Akin.....			4873
350	" Tunnel.....			4881
355	" Cameo.....			4800
360	" Palsade.....			4741
365	" Clifton.....			4660
372	Ar Grand Junc.....	Lv.		4590

Cal. Geol. Surv. Exped. to Carnotite  
fields of S. W. Colo., 1914, continued.  
#

Mouth of Gypsum Creek.

Tuesday, July 21, 1914.

cloudy, cool, rained or sprinkled from  
daylight until 4 p. m.

I rode to head of Gypsum Valley,  
thence over into Disappointment Valley  
and back, about 30 miles or more.  
For geological notes see survey  
notebook.

Gypsum Creek, Wednesday.

July 22, 1914.

Bright and warm most of day.  
Clare Coffey and I worked about  
12 miles east on north side of Valley.

Gypsum Creek, Thursday.

July 23, 1914.

We left tents, wagon and most of outfit at Gypsum creek and went with pack horses up  $\bullet$  Little Gypsum and over a low divide to the ~~Siberia~~ <sup>Sybia's Pocket</sup> camp of the Standard Chemical Co., about ten miles.

Bright morning, cloudy from noon to 2 p.m., sprinkling some, then hot again.

For the past two or three weeks large, winged, red ants have swarmed about the rocks on <sup>many</sup> sharp, high points. Not common elsewhere.

Sybia's Pocket, Friday,

July 24, 1914.

Slept under bright stars last night without a tent. Got a good night's rest.

Bright, warm morning.

Antelope squirrels abundant here. Saw broad-tailed hummingbird.

Rode down gulch to Coyote Wash and

followed it to Dolores canyon, then  
back up the wash about 7 or 8  
miles - magnificent scenery.

A few narrow broad-leaved cottonwoods  
and box elders in bottom of the canyon,  
scattered cedars and pinons on the hills -  
cloudy at dark.

Sylvia's Pocket, Saturday,

July 25, 1914.

Cloudy all night, at 7 a.m. rained,  
and rained and sprinkled at intervals all  
day. I found Manassa fossils in head  
of Little Gypsum Valley, then crossed to  
rim of Dolores Canyon.

Sylvia's Pocket, Sunday,

July 26, 1914.

Cleared in night. Bright, cloudless  
morning, cloudy at noon. Rained hard at  
1 p.m. Then cleared. Rained again at  
5 p.m.



Sylvia's Pocket, Monday,

July 27, 1914.

cleared again in the night. Bright, warm morning. Started back to camp at mouth of Gypsum creek in morning, pack horses following. Furious rain from 2:30 to 3:50. Reached camp at 4 p.m.

Mouth Gypsum Creek, Tuesday,

July 28, 1914.

cloudy until 4 p.m. sprinkled and rained at intervals, especially in afternoon. Spent the day in camp mending tents where torn by horses, washing clothes, etc. Rained again at 10 p.m.

Mouth Gypsum Creek,

Wednesday, July 29, 1914.

cloudy until 2 p.m., thence partly cloudy, sprinkled at intervals.

I went up Little Gypsum above north

Wall to the head.

20 magpies in one flock.

Russian thistle taking the country everywhere I have been, saw it even up Coyote Wash.

Raining again at bedtime.

North ~~Little~~ Gypsum, Thursday  
July 30, 1914.

Cloudy forenoon, sun breaking through at intervals.

I rode up <sup>Gypsum</sup> valley on North side.

Rained from 10 to 10:15.

Clear afternoon and evening.

Rained hard at 9:30 p.m., followed by a very fine lunar rainbow, then cleared.

Little Gypsum, Friday  
July 31, 1914.

Bright, hot forenoon.

Hinds and I rode up valley to the Carboniferous.

Moved camp to S. side of Disappoint.

ment creek, where we found a very good spring (or well), about 8 ft. down to water. ~~6 ft~~

- clear and hot all day.

Disappointment creek,

Saturday, Aug. 1, 1914.

Clear, bright morning.

Hinds and I rode to same place as yesterday. In afternoon there was a hard thunder storm there, which did not reach camp.

Saw 4 white rumped shrikes.

Disappointment creek,

Sunday, Aug. 2, 1914.

Bright, hot morning, remaining hot all day. Stayed in camp.

Disappointment Creek, Monday.

Aug. 3, 1914.

Bright, hot forenoon and early afternoon.  
I rode about 15 miles up valley.

Was caught in furious thunder storm  
at 3 p.m., which flooded one of the inter-  
mittent streams so that I had to ford  
a wide, swift, deep torrent on way back.  
Left camp at 7 a.m., returned at 7:15  
p.m.

Saw a big black-tailed jack-rabbit  
and a coyote. Coyotes howled about camp  
at 8 a.m.

Mt. bluebirds common about camp.

Robins occur in cottonwoods up gulch  
above camp and along Disappointment  
creek.

Ridge S. of Disappointment Valley covered  
with dense growth of cedars and junipers,  
which occur less abundantly on N. ridge.

Valley treeless as usual, but large cotton-  
woods along creek, which is perennial, but  
muddy. Sage brush and rabbit brush  
in valley. <sup>Arbut-leaved cottonwoods on creek.</sup>  
narrow-leaved in gulch.

Disappointment Creek, Tuesday.

Aug. 4, 1914.

Partly cloudy morning, sun hot. Springs occur in gulches along S. side of Valley in Dakota s. s. and trickles of running ~~and~~ water for the horses at this season. Our spring is really a well about 8 ft. deep.

Stayed in camp all day. No rain.

Disappointment Creek, Wednesday.

Aug. 5, 1914.

Rode up creek. Bright and hot all day. Went about 15 miles up.

Disappointment Creek, Thursday.

Aug. 6, 1914.

Bright and hot, but sprinkled a little in afternoon. Moved camp down Joe Davis Gulch to Dolores River.

Joe Davis Gulch, Friday,

Aug 7, 1914.

Partly or wholly cloudy all day, sprinkled at times in afternoon.

I rode up Solera River into the canyon several miles above Disappointment creek.

Forded river 14 times

Some yellow pines, very large, in canyon, also broad leafed cottonwoods.

Saw old head of a mountain sheep.

Collected *Arceuthobium s. depressa* - dead shells abundant. Found one live one under a rock and one under a *Ut. ushagany*.

Joe Davis Gulch, Saturday

Aug 8, 1914.

Partly cloudy most of day, sprinkled at times in afternoon.

Moved camp about 1 1/2 miles down river in three loads, making three fords. A terrible hill as we left Joe Davis canyon & several other bad pulls.

We carried most of the outfit up the big hill on foot and horseback.

Found a box set in the haul for a sand filter here, as the Dolores water is muddy from the effects of Disappointment creek.

This is a rather open canyon.

Our camp is just above the Rare Metals Co.'s mill, in San Miguel Mfg. Dist., on Dolores River.

Dolores River, Sunday,  
Aug. 9, 1914.

Bright, hot forenoon.

Roy Coffin, Herman C. Graves and I went down below mill, forded river, not above boot tops, recrossed on suspension footbridge, and visited caverns in upper La Plata <sup>in Summit Canyon</sup> s. s. Roof of one blackened with smoke. Bed of charcoal in another covered by 1 1/2 ft. of sand, exposed by erosion.

Mummies and pottery have been taken from others, said to be in possession of Ed. Snyder, of Montezuma creek, & Dr. Harrington, of Cortez. Good springs in the gulches visited. Furious thunder shower at 3 p.m., continuing for an hour and at intervals until dark. Cold evening.

Dolores River, Monday.

Aug. 10, 1914.

Bright, hot morning.

Moved camp S. to the divide <sup>s. of mouth of</sup> ~~near~~ Summit <sup>creek</sup> ~~camp~~, going up Bush Canyon. <sup>camped W. of its head.</sup> Some freighters were going up, so we put on six big horses and got through without dividing the load.

Cloudy and rained a little in afternoon. Cold evening.

We find a small spring in a gulch near camp, and water for horses in the same gulch.



W. of Bush Creek,  
~~Summit~~, Tuesday,  
Aug. 11, 1914.

Bright morning, warming up as soon as sun arose.

This divide presents numerous sagebrush parks in rather open piñon forest, some cedars

Piñon Jays abundant.

Mt. chickadees common.

Clear all day. Cool in shade. Cold evening.

Wednesday.

Aug. 12, 1914.

Bright morning. Hot in sun. Stayed in camp all forenoon. Rode S. W. and S. E. in afternoon.

Altitude 7,000 ft.

Thursday, Aug. 13, 1914.

I started for Soloes with Ray Ashley and the team. Bright, warm day. Started from Bush Creek camp at 7:30. Reached Dove Creek store at 12:30 and lunched. Started on at 1:50 p.m. At 4 p.m. we had gone eight or ten miles, and one horse was played out, so we camped by a rivulet where there are a few <sup>small</sup> pools with a trickle of water between. Found a cool but rather alkaline spring.

Mink tracks in the mud here.

Very hot, bright, calm afternoon.

Rivulet is alkali creek.

Slept out under the stars.

Fine well water at ranch near on Dove Creek.

Alkali Creek, Friday,

Aug. 14, 1914.

Creek 10 miles from Dove Creek.

Bright morning. Up at 5 p.m. Started at 6:45. Watered horses at Sandstone Creek at 9:55; ten miles from alkali.

Reached yellow-jacket creek about 12 noon.

Old pueblo ruins on W. side of creek, S. of road, about 140 ft. long, near small spring. Not excavated. Ranch shed near by. Probably another ruin on knoll about 300 yds. west. 3 or 4 miles N. of W. from Lewis Postoffice. ~~See~~ Many ranches in vicinity. Black & white ware and coiled and indented ware.

Reached Lewis at 1:30 p. m.

Reached Dolores at 8 p. m.

Found some black & white pottery fragments about 4 miles out from Dolores by the roadside.

Bright all day, hot afternoon.

Dolores, Colo., Saturday  
Aug. 15, 1914.

Bright morning.

North wall of canyon here bears sparse piñon-cedar growth. S. wall densely covered by shrubs and trees. Both

broad and narrow leaved cottonwoods in  
bottomlands and fine ranches.

Scattered ranches from Bush  
creek to Dolores - more abundant  
after passing Yellow Jacket creek,  
near where irrigation on an  
extensive scale from Dolores river  
water begins in earnest. Fine  
ranches from Lewis to Dolores.

All way from Bush creek  
camp to within 3 miles of  
Dolores ~~on~~ the road in on the  
McElrus drainage side of the  
divide, crossing the heads of  
numerous draws, uphill and  
down.

Left Dolores at 1:40, 1.0 minute lat.

Reached Durango at 4:15, went to Savoy  
Hotel.

Partly cloudy afternoon, not hot.

Durango, Colo., Sunday.

Aug. 16, 1914.

Bright morning, cool breeze, hot  
in sun. Cloudy afternoon, sprinkling

at intervals, raining hard at times.

Left Durango at 5:40 p. m., travelling up Animas river by rail, arrived at Trimble springs, 9 miles out, at 6:15, went to hotel. Hot springs here.

Yellow pine at Durango and all along road, big ones.

Trimble Springs, Colo.

Monday, Aug. 17, 1914.

Hot in sun, cool breeze in shade. Cloudy most of afternoon, sprinkling at intervals.

I walked up on the cliffs W. of hotel, thence to Hermosa creek. They pronounce it here Hermosa.

Mostly trees are yellow pines, saw pine needles 9 to 10 inches long.

A few cedars, dense growth of scrub oaks on slopes.

Found *Oreohelix s. depressa*

and one specimen beaded & ridged.  
Could find no more.

Trumble Springs, Colo.

Tuesday, Aug. 18, 1914.

Hot bright morning. Partly cloudy  
afternoon. Sprinkled, rained and hailed  
from 12 to 2 p.m.

I rode up Hermosa Creek about  
3 miles over forest service trail.  
Collected a lot of *Oreohelix*, mostly  
with beaded periphery.

Trumble Springs, Wednesday

Aug. 19, 1914.

Took train for Durango at 8:10 a.m.  
Went to Savoy Hotel, Chas. Fleck, proprietor.  
Bright and warm all day, some clouds  
in afternoon.

Durango, Colo., Thursday  
Aug. 20, 1914.

Left on 8:50 a. m. train. Clare Coffin  
boarded the train at Dolores at 12:30.  
Reached ~~Durango~~ <sup>Telluride</sup> at 5:20, on time.

Bright morning, cloudy after-  
noon. Have had hard rain at  
Telluride.

Telluride, Colo., Friday,  
Aug. 21, 1914.

Left Telluride at 7:30, reached  
Placerville about 8:30 or 9 a. m.  
where Prof. George boarded the train  
and rode to Montrose with us, where  
he got off, Coffin & I continuing.

Cloudy all day. Rained hard  
in evening from Marshall Pass  
to Salida.

Boulder, Aug. 22, 1914.

Reached Denver at 7:45 a. m. &  
Boulder at 9:40 a. m.



## California

Henderson - 1053 N. Hobart Blvd., Los Ang.

" 1427 Malvern Ave. "

A. L. Bryant, R. D. Goss, Glendale, Cali.

Prof. S. S. Berry, La Jolla

Dr. Fred Baker, Pt. Loma.

Chas. L. Cass, Pacific Beach

(624 Broadway, San Diego)

Port Harford (San Luis Obispo)

Fossil Point, east of Pt. Harford

Santa Barbara

Foraminifera at tops of bluff hills  
species differ from those at  
bluff on beach.

Ventura

Pleist. up to 800 ft. above sea.

35 ft. of fossil strata - 5 or 6  
layers from 3 to 9 inches thick  
separated by soft sand layers, between

Barbora's ranch house 3 mi. E. of Ventura and prominent point called the peak N. of house - 50 sp.  
see also irrigating ditch 20-50 ft above sea level on E. side of valley W. of Ventura.

### Port Los Angeles, Santa Monica.

Hard sandy stratum beneath 100 ft. of soft sandy deposit at mouth of canyon at end of large wharf at Port Los Angeles near Santa Monica, 16 spp.

### San Pedro.

Bluff, north end near lumber yard 1/2 mile N. of Valley, Upper Pleist., 25-2 species.

Timms Point, Pliocene, mostly covered with detritus, 28 spp. of Mollusca, hard to find exposed.

Also exposed in R.R. cut in bluff S. E. part of San Pedro, where it contains many *Thracia trapezoides*

San Pedro - continued

Timms Point Pliocene, "highly fossiliferous light-colored yellowish sands and clay sands from Timms Point" 105 spp. Foraminifera, abundant. Also fragments of minute mollusks, small echinoid spines, sponge spicules, ear bones (otoliths) of fishes, small Ostracoda and numerous Diatoms.

U.S. G. S. Bull. 513.

San Diego.

Pliocene on mesa - good exposure N. end 10<sup>th</sup> st., short distance N.W. of Ruse school, 50 ft. exposed in cut on both sides of ravine

Pleist. - foot 26<sup>th</sup> st., base of bluff Anomia lunatula - 6 inch stratum overlaid by *Assinia* etc.

Pleist. - Spanish Right, bluff 12 to 18 ft. high - base of bluff and beach is fossil stratum

other fossil strata higher, one  
of cemented Donax  
Pacific Beach - N. of San Diego  
Bluff 4 ft. high at Ocean Front,  
to 60 ft. 1 mi. N., dip S.  
Pliocene - brownish yellow s.s.,  
200 ft. exposed, upper 100 ft.  
fossiliferous, lower barren.  
Two horizons - upper contains  
no *Opalia*, and *Pecten hemphilli*  
replaces *P. stearnsi*, while *P.*  
*expansus* much less abundant,  
also contains *Scutella* and  
*brapidula*.  
Aeolocene 6 to 10 ft. with  
gravel at base overlies  
Pliocene

Asuncion, N. of San Luis Abispa.  
Miocene Foraminifera.  
Red of Graves Creek, 500 ft. S. of J. H.  
Henry's House 7000 ft. due S. of  
Asuncion station.

Santa Clara Valley

Camulos

~~Camulos~~ - between Los Angeles + Ventura  
Fernando formation, 1 mi. N. of Camulos,

fine sandstone + conglomerate

33 spp. Includes Arca

Higher horizon at Elsmere Canyon  
+ Fernando Pass. 33 spp.

N.W. of Santa Paula

Goat Mt., near mouth of Adams  
Creek; and St. Paula creek between  
Mupa schoolhouse + Sulphur Mt.

41 spp.

S.E. flank Mt. San Cayetano

19 spp. many undet.

Barlowe ranch, 3 mi. E. of Ventura

53 spp.

Above mostly Pliocene.

Puente Hills

+ Pliocene  
Pleist. 38 spp.

Topanga Canyon (Head of) 3 mi. S. of

Calabasas, W. end San Fernando Canyon.

34 spp. Miocene

See

Los Angeles - Pliocene

Oil Wells 13 spp.

Shattoo Estate, W. Los Angeles 11 spp.

Normal School 18 spp.

See further on, after diagrams

Santa Maria Oil Dist.

S. of San Luis Obispo

mostly Pliocene - Many species

Waldorf asphalt mine, 3 mi. S.E.  
of Guadalupe. See Lake

R.R. cut 1 mi. N. of Schumann.

Scutella horizon N. of St. Maria

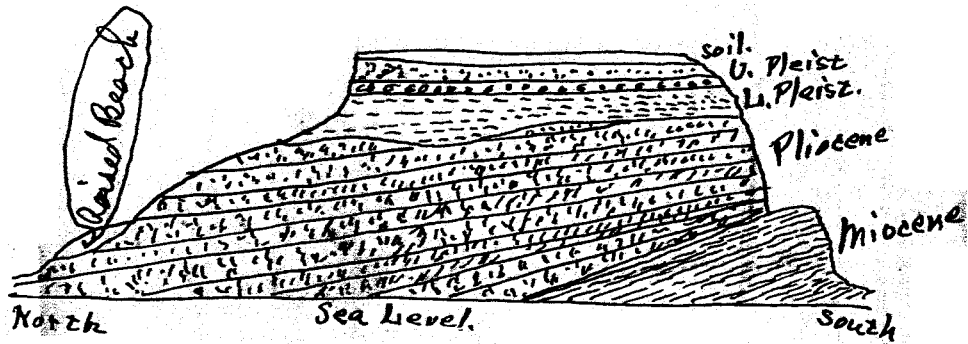
oil & Gas Co's well No. 4, 2 mi.

S.E. of Orcutt - and at east of  
head of Howard canyon, 4 mi.

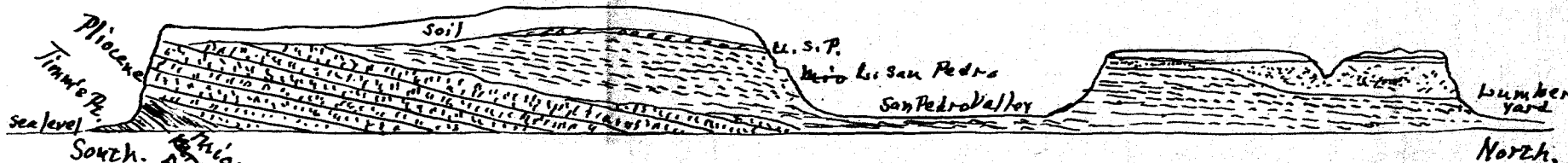
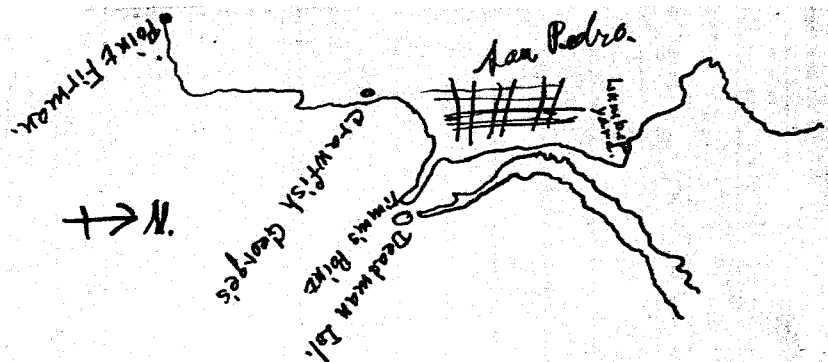
N.N.E. of Los Alamos, on Pacific  
Coast R.R. - No other species.

Eocene 13 spp. Just above St. Julian  
ranch house 1 mi. S.E. of bench  
mark 603.

also 3 mi. N. of Sudden, on N. flank  
of 1912 ft. hill, on coast N.W. of  
Conception, S.W. cor St. Maria  
Bill. map. - above it here is  
Miocene, 5 spp.



Deadman Island.



San Pedro Bluffs.



San Pedro

Los Angeles - continued - Tertiary

Puente s.s., Elysian Park Hills

Raymond Hill, Pasadena, 10 spp.

Laughlin Hill, N. of Los. A. 6 spp.

3 mi. S. of Calabasas, Los A. Co. 34 spp.

Cypress, 2 spp., Monterey

Tarrey Pine, strip 1 mile wide both  
sides Saledad River, from 3 mi.  
N. of Del Mar, 1 1/2 mile from coast,  
to 5 mi. S. of Point Pinos.

## Utah Oreobolus

Hemphill.

*O. wasatchensis*, "near Ogden", confined to one acre, "among quartz boulders in crevices sufficiently large to afford cool and moist retreats during the active summer season."

N. of Ogden transverse ribbed varieties,  
S. of Ogden longitudinally ribbed.

In gulches near Ogden found *O. strigosa* & *cooperi* and small snails.

Salt Lake, in all gulches reached in a days walk only *strigosa* & *cooperi*.

Provo,

Salt Lake, W. side Oquirrh Mts.

at foot of Mt. *O. utahensis*; no ribs;  
above in l. s. - *O. oquirrhensis*; <sup>revealing</sup> ribbed  
next typical *O. haydeni*.

at summit true *O. cooperi*.

Near *haydeni* is *gabbaria*.

Ogden - *O. newcombii* further north, in shade among bushes on steep N. slope.

Brigham City - albino *strigosa* colony. Especially at edge of bluff on Bear River. also *albofasciata*

3 mi. to rocky cliffs, *O. castaneus*.

Lagan, Utah, strigosa, cooperi & haydeni with  
microscopic striae at head of galea  
high in hts.

Franklin, Idaho, *O. strigosa*.

White Pine, Hamilton, Nevada. - *O. leucophylli*

	Self	Levin
1915		
shoes 4 <sup>50</sup> cap 75 <sup>¢</sup>	5 25	
Baggage	25	
Fare Baliz. & ret.	45 00	
sleeper	4 50	
Baggage check 30 <sup>¢</sup> car fare 10 <sup>¢</sup>	40	
July 2, dinner	1 10	
" 3 brkfst. 55 <sup>¢</sup> lunch 10 <sup>¢</sup> dinner	75	
" 4 " 65 <sup>¢</sup> dinner 90	1 55	
" 5 " 60 <sup>¢</sup> porter 50 <sup>¢</sup> Lunch 70	1 70	
" " Expos. ticket 40 fare 20 drink 10	70	
" " Handkerchief 1.00 Woven flag 35	1 35	
" 6 Brkfst. 55 <sup>¢</sup> ferry 10 fare 10 dinner 90	1 30	
" 7 " 50 <sup>¢</sup> ferry 10 10 dinner 70	1 40	
" 8 " .36 fare 20 dinner 42	97	
" 9 " 32 dinner 34 papers 20 postage	49	
" 9 tip 10 fare 20 lunch 44	74	
" " Expos. ticket	50	
" 10 - brkfst. 35 <sup>¢</sup> fare 10 fare to Bolivia 1.00	<del>1 40</del>	1 45
" 11 - Express 3.00 Hotel 2.25 ferry 2.25 2.5		5 55
" 11 - dinner 65	61	<del>5 50</del>
" 12 - brkfst. 35 - Expos. ticket 40 fare 10	85	
" " telegram 1.06 organ rental 10 lunch 35 postage 50	1 66	
" 13 - Hotel 19.00 brkfst. 2.5 bellboy 1.25 tips 1.00	21 75	
" " laundry 90 fare Del Norte Jr. to Monterey 65	90	65
" " lunch 30 alcohol & cotton 50		80

Jul. 14 - lunch <sup>.20</sup> alcohol <sup>.25</sup>		45
" 15 - postage <sup>.22</sup> postcards <sup>.25</sup> care fare <sup>.5</sup>	25	21
" " devel. <sup>.25</sup> cherries <sup>.10</sup>		
" 16 postage <sup>.59</sup> fruit <sup>.10</sup> ice cream <sup>.10</sup>	20	51
" 17 - 9 meals at Delicatessen		3 25
" " Room and baggage transfer		4 70
" " Fare Monterey to Del Monte Junc		50
" 18 Livery bill Guadalupe		3 25
" 19 - Hotel, fruit candy nuts, ice cream	45	4 75
" 20 - livery <sup>4.00</sup> cotton <sup>.40</sup> ice cream	10	4 00
" 21 - fare Pina <sup>.50</sup> to Llanillo <sup>.10</sup> ret. from Pina <sup>.50</sup>	60	55
" 21 ice cream + lemonade <sup>.50</sup> phone <sup>.50</sup>	60	
" 26, 2 round trips Long Beach + car fares	1 20	
" " 2 suits underwear 2 pr. socks	2 50	

Boulder, Colo. July 2, 1915

Left on 8:25 a. m. train for Denver.  
Joined Amer. Assn. Mus. car for West  
on U. P. leaving Denver late, at  
6:45 p. m.

Train broke in two before leaving  
Colorado, delaying several hours.

Green River, Wyo., July 3

Train  
Left our car at Green River for  
repairs at 7 a. m.

Evanson, cottonwoods for swale in  
bottoms, sloughs also.

Left Ogden at 4 p. m.

" "

San Francisco, July 5, 1915

Reached Oakland at 11 a. m., nearly  
a day behind time. Have room 417 at  
Hotel Herald, association headquarters.  
Spent a few hours in afternoon at  
Exposition.

Bolinas, Cali, July 10, 1915:

Left S. Francisco at 7:30<sup>a.m.</sup> by boat, reached Bolinas 11 a.m., went to Adams Hotel. In afternoon walked the beach to the reef, north.

Bolinas, Cali, July 11, 1915:

Up at 3:40 a.m. and went to the reef. Low tide. Collected urchins, starfishes and mollusks. Back to hotel at 9 a.m.

Packed and shipped 32 lb. box. Left at 12:15, walked to Mill Valley, caught train at 6:05 p.m. to ferry & reached San Francisco about 7 p.m.

San Francisco, July 12, 1915-

Spent day at Exposition and in evening heard fine massed band concert of Sousa's, Courway's and Exposition bands.

Monterey, July 13, 1915:

Left San Francisco at 8:05 a.m. reached here 12:30.



Monterey, July 14, 1915

I worked down beach westward to where coast turns south.

Rocky coast. Not many species of mollusks. Littorinae very large. Collected many limpets. Met ~~man~~ and woman named Sisson, from Kansas University, teacher of English, who knew Profs. Evans and Kelley.

Monterey July 15, 1915  
Thursday.

Walked through Pacific Grove to Moss Beach and some distance beyond. Collected 20 starfishes, mostly red with very short rays; also a lot of mollusks, chiefly limpets. Cool breeze

Monterey, July 16, 1915

Walked the bay beach north to some distance beyond the

Salinas river, very few shells  
except detached valves of *Monia*  
and *Hinnites*, very warm day

Guadalupe, Cali., Saturday

July 17, 1915:

Left Monterey 10:35<sup>a.m.</sup>, half hour  
late, Reached Guadalupe 5:30, an hour  
late. Hot day. Went to Palace Hotel.

Guadalupe, July 18, 1915:

Took a buggy and a boy and drove  
first to canyon W. of Waldorf looking  
for Waldorf asphalt mine. Fog was  
so dense I could see nothing, so  
returned to the valley and drove  
south to ~~Shumann~~<sup>Shumann</sup> canyon where  
we collected fossils in the railroad  
cut mentioned in the Santa Maria  
report - 1 mile north of Shumann.

Working from S. end of cut north-  
ward, the first horizon, dipping  $53^{\circ}$   
 $N. 70^{\circ} E.$  contained ~~only~~ <sup>two</sup> *Crepidula*. Sta. 1.

~~58~~ Sta. 2, 58 paces E., 2 ft. thick  
contained many species.

Sta. 3, 26 paces further E., ditto.  
All material badly weathered.  
Hot in Valley at noon.

Guadalupe, Monday, July 19.

Dense fog in morning.

Left Guadalupe at 7:34 a. m.,  
10 minutes late. Clear at Santa  
Barbara and hot. Stayed here  
10:30 to 2:15. Reached Santa Paula  
at 4: p. m., went to Glen Tavern.

Santa Paula, Tuesday,

July 20, 1915.

Team from Stoner's stable and driver.  
Went up Santa Paula creek to Spring  
(Sulphur Mt. Spring) then up Sissar creek,  
then back to Santa Paula and  
up Adams canyon. Found no

fossils at all.

Hot and bright day.

Santa Paula, July 21, 1915

Took 8:45 train to Camulos.

Hot, still, bright morning.

Found no good fossils N. of  
Camulos. Walked back to Piru,  
found fossils badly weathered  
there, collected only a few.

Partly cloudy afternoon.

Bought jitney back to Santa  
Paula at 4 p. m.

Santa Paula, July 22

Took 8:45 train for Los Angeles.

San Pedro, ~~Monday~~ <sup>Wednesday</sup>, July 23

Took noon interurban for San  
Pedro. Collected Pleistocene fossils  
at lumber yards.

San Pedro, Saturday

July 31, 1915.

Collected Pliocene(?) fossils at Timmie Point, including Foraminifera. Material resembles that at ~~Timmie bluff~~ Bath-house bluff at Santa Barbara. Weathers rapidly on weathering. Bluff has been cut back at the very joint so that it does not expose as much "Pliocene" and more Miocene, than shown by Arnold's section (see tracing, supra).

Santa Monica, Aug. 2.

Went down on noon car to Santa Monica, walked to long pier. Very few shells except large mussels. Total absence of *Donax*, few small *Tivela*, no *Brucibulum* or *Crepidula*.

Redondo, Bahi, Tuesday,

Aug. 3, 1915:

Frank and I went to Redonda and walked 5 mi. S. to a point of rocks. Many *Donax* on <sup>sand</sup> beach but little else. When we reached the bluffs found *Chlorostoma* & *Limpeta* abundant. At the point we collected many *Limpeta* and chitons, but found little else.

San Pedro, Aug 14, 1915-

Collected fossils in upper San Pedro Pleistocene at bluff at lumber yard N. of town. Material much broken same as upper horizon on Deadman Isl.

Aug. 15:

Collected Pliocene fossils at Trinnis Point and Pliocene and

Pliocene on Leadman Is.

San Diego, Calif.

Aug. 16, 1919.

Left Los Angeles with N.E. Hinds at 8:10 a.m., reached here 12:30. Got rooms at Morgan Cafeteria. Spent afternoon at Exposition.

San Diego, Aug. 17

Took 9 a.m. train for Pacific Beach and collected around point to the south. Principal Scutella horizon contained a few Amiantis, Trivella, etc., overlaid by Bonax bed.

San Diego, Aug. 18.

Took 9 a.m. train for Pacific Beach Ocean Front, collected Pliocene fossils along the bluff to the north. Found several *Opelia* in upper fossil horizon near Pleistocene conglomerate, but

many more further north in a lower horizon, in which large *Pecten* predominate.

San Diego, Aug. 19.

Hinds, Bethel and I collected Pleistocene fossils in bluff at Spanish Right. Then Hinds & I collected near foot of 26<sup>th</sup> st., where we found very large *Dosinia ponderosa*.

San Diego, Aug. 20.

Hinds, Bethel & I went to Coronado Islands, off the Lower California Coast, starting at 9 a. m., passed to west of Corpus Christi Island, and reached South Island at noon. Started back at 2 p. m., reached San Diego at 4:45 p. m. Collected over 50 live *Siphonophora*. There were very few marine mollusks on the rocks except small *Littorina*.



eat a few, <sup>small</sup> Chitons (2 species) and small  
limpets (2 spp.). Tide not very low.

Aug 22, 1915  
Returned to Los Angeles 7:15  
a.m.

Los Angeles, Aug 20-  
Started for Eureka, Utah, at  
9 a.m.

Eureka, Utah, Aug 26, 1915-  
Reached Tintic 9:40 a.m. and  
left for Eureka at 11 a.m.

L. E. Daniells met me at  
depot. After dinner we started east.

Went up N. end of Godwin Mt.

Limestone, with numerous shrubs  
of various kinds. Found a small variety  
of *Oreohelix* very common under dead  
leaf trash, seldom under rocks.

Resembles Bachman's *O. cooperi minus*

but a large proportion of them have the color bands obscure or confined to earlier whorls.

Locality No. 6

Nos. 1 to 5 were visited by Daniels before reaching Eureka.

The region did not look very favorable for snails

Eureka, Utah, Friday,

Aug. 27, 1915

Spent forenoon cleaning snails and packing. Took train at 1:12 for Tintic and thence Tooele, arriving at Tooele station at 3:30. Went to the town, a mile or so distant, by carriage. Got rooms at Ogden Hotel.

Altitude of town about 5,000 ft.,  
of station, 4892 ft.

Tooele, Utah, Saturday  
Aug. 28, 1915

Walked about 6 miles (just 2 hours)  
N. E. to mouth of canyon about 2(3)  
miles N. of smelter, just N. of a  
ranch. Just within the canyon, on  
l. s. ledge on s. side,

Loc. #7, White Oreobolix with  
inconspicuous bands, mostly under  
fine grass, but also under other  
vegetation and rocks, abundant.  
cf reversed specimens.

Same species continues up the  
gulch on same side for half  
a mile, where we turned back

Loc. 8, opposite side of gulch.

Same species, many large dead  
specimens. Collected a few.

Then we came down canyon and  
got water at ranch, ate lunch and  
headed for canyon east of ranch  
where we found same species in similar  
situation near mouth of canyon,

Loc. 9, collected a few



Loc. 10. Then went to next large gulch to south & found large smooth *Oreohelix* on N. side of gulch about & below h.s. ledge This is next gulch north of one at mouth of which smelter is located  
F.

Tooele, ~~Idaho~~ Utah,  
Aug. 29, 1916.  
Went up into gulch S. E. of

town from which town gets its water supply.

Loc. 11, picnic ground just within gulch, found ~~Archelium~~ <sup>fresh water</sup> in water cress and a small slug (light grayish ~~sa~~ (dirty <sup>brownish</sup> white ~~for~~ anteriorly, dark brown posteriorly) Eucoules, Lombrides, Pyramidula, etc. in cottonwood grove.

Loc. 12, rock slide, mostly quartzite s.s., large *Archelium* mostly with two broad bands, *Vitrea* sp. and *Vitriina*, one of each of latter alive. *Archelium* few found alive - dead shells abundant. Slides among ragged crags, S. side of gulch - a little l.s.

Loc. 13. About 1 mile further up canyon on S. side under maple leaves found apparently same species of *Archelium*, but all specimens large, robust & adult.

The station of Tooele on the Salt Lake Route is a mile or so from the town, the Tooele Valley Ry. running into the town, and on to the smelter.

Tooele, Utah, Monday

Aug. 30, 1915

Went to grove in mouth of canyon and cleared snails in forenoon. At 2:40 p. m. took Tooele Valley Ry. train for Salt Lake Ry station, there caught <sup>3:30</sup> Salt Lake train for Garfield, arriving at 4:25 p. m.

Three hotels all company hotels. We went to No. 3.

Called at Alan MacArthur's house, 153 E. 14<sup>th</sup> Ave.

Garfield, Utah, Tuesday

Aug. 31, 1915

Grove W.

Loc. 17, Mt. side S. & E. of Black Rock, many dead Oreohelix about limestone slide rock, but found no live ones. Burnt over within a few

years, all shells badly weathered.

Loc. 15: Gulch nearly E. of Morris station, S. side, mostly recently burned over, many dead shells of a species like *O. haydeni*, but with revolving ribs inconspicuous about 50 found alive in small unburned areas about limestone

Next gulch S., which may be Hemp-hull's locality, is black, having been recently burned over, so we have decided not to spend a day visiting it.

Ogden, Utah, Wednesday,  
Sept 1, 1915:

Took morning train for Ogden, stopping until 2:20 p.m. at Salt Lake City. Went to Reed Hotel.

Ogden, Utah, Thursday  
Took 25<sup>th</sup> St. car, rode E. to end of car line, walked a mile to mouth of canyon to S.E., where there is a

spring. Street car conductor says Taylor canyon.

Loc. 16, find, rather high spired  
Oronohelix, under elder berry and  
poison ~~ivy~~ ivy in boulder "island"  
in bed of canyon. (See below) #18

Loc. 17. Up canyon probably  $\frac{1}{4}$  to  
 $\frac{1}{2}$  mile, about l. s. ledge, under  
various bushes, a smaller species  
crawling about, brought out by  
last night's rain.

Loc. 18. On <sup>steep</sup> slope above Loc. 16 found  
Oronohelix abundant in dense  
shrubbery - maple, etc., probably same  
species as #16 but smaller  
specimens.

Loc. 19. Probably same species as #16,  
at line hike just out of canyon,  
on south side, under elder

We visited next gulch & small  
gulches to the south, but found  
no snails and no rocks except  
quartzitic s. s., shists and igneous  
rocks.



Ogden, Utah, Friday,

Rained all night

Sept. 3, 1915.

Went up Ogden Canyon 8 1/2 miles on electric car. crossed creek on R.R. bridge, <sup>below</sup> where our car turned back, crossed to S. side, altitude <sup>about</sup> 5-800 ft.

Loc. 20, rock slide at S.W. end R.R. bridge, S. side creek, l.s., below ledge. Very large *Archelix*, active after rain.

Loc. 21, N. side creek 1/4 to 1/2 mile below #20, same species but mostly smaller, a few large ones at base of slope near creek under large maples - up slope found under l.s. slide.

Loc. 22. Half mile further down, on S. side, in slide of l.s. and a micaceous rock (gneiss or mica schist, perhaps) same species, large, very abundant. Collected large sack full in a short time. Found it also half mile or so further down.

Loc. 25, Further down creek, opposite Quaternary gravel and on same (south) side of creek, found a smaller, higher-spired form in great abundance in gneissic slide rock and adjacent bushes. Far up slope at top of canyon wall thick l. s. formation occurs, from which the wash is down over this slide.

☼ early clear at sundown. Cool and cloudy or partly cloudy all day.

Ogden, Utah; Saturday,  
Sept. 4, 1915.

Left Ogden on U. P. Ry. at 9:10 a. m., 30 min. late. Got off at Peterson in Meber Canyon, Brahman said 6 miles below Morgan. Walked back to Gateway, about 3 miles. Then on down canyon. Brisk half hour's walk below Gateway arrived at

Loc. 24. Granite and gneiss slide, no limestone seen, S. side canyon large *O. cooperi* (?), also half mile further down same kind of slide.

In 45 minute walk from Gateway reached mouth of canyon and looked out on mesas.

Loc. 25: ~~Reto~~ Turned back up canyon 1/4 to 1/2 mile up, about 400 to 500 yards below Utah Light & Ry. Co.'s power house, on S. side of canyon, S. of canal, found *O. cooperi* & *O. depressa* (?) in granite-gneiss slide, smaller specimens than at Loc. 24.

Cloudy, misty and rainy all forenoon, partly clear, with cool breeze in afternoon. Reached Ogden at 5:20 p.m.

Ogden, Utah, Sunday  
Sept. 5, 1916

Partly cloudy, cool morning.

Took 7:55 a.m. North Ogden car.  
Walked into North Ogden Canyon.

Loc. 26. Half mile or so up canyon  
a gulch comes in from south.  
On west side of gulch hard s.s.  
& congl. occurs for 100 ft or more  
up slope, with l. s. above. From  
almost the base of the slope up as  
far as we went a transversely ribbed,  
high spired *Oreohelix* occurs,  
perhaps *O. newcombi* of Humphill's  
records. They were in oak and  
other brush, but mostly oak. None  
were found in or about a l. s. rock  
slide well up gulch, though  
common in brush near by. The  
specimens low on slope near  
mouth of gulch averaged smaller  
than above. They everywhere, how-  
ever, varied greatly in size in  
adult stage.

Bright day, not too warm.

Ogden, Utah, Monday  
Sept. 6, 1915.

Took 7:30 electric car for Brigham  
Bright morning.

Willard, Utah,

Sept. 6, 1915.

Passed through on way to Brigham.  
Close to mts. Good canyon for  
snails near by. See no hotel.  
1 1/2 hour train service.

Brigham, Utah, Monday  
Sept. 6, 1915.

Reached Brigham about 8:30, went to  
Hotel Booth.

Walked N. to first canyon, about a  
mile.

Loc. 27. at Lombardy Poplar grove (or row)  
just outside of mts. is a spring  
feeding a small reservoir about 20 x 25-  
ft. On <sup>small</sup> rocks where a thin ~~foot~~

film of water flows over were a few small Physas. None found in reservoir.

Loc. 28. Canyon very steep. In s.s. and l.s. slides at edge of small maple + oak thickets + other shrubbery we collected small *C. rocheli* like depressa, mostly under rocks, some under leaves, a few in the open, all active.

Brigham, Utah, Tuesday  
Sept. 7, 1916.

Sprinkled during night. Cloudy cool morning. Took the 9:15 a.m. train for Cache Junction.

Elevation of Brigham 4310 ft. at Union depot.

Honeyville, Utah, Sept. 7

Several fairly good gulches for  
swails near by. Possibly a boarding  
house,

Sevey, Utah, Sept. 7.

Fair rock slides in gulches to south.  
Small hotel.

Bollingerston, Utah, Sept. 7.

Nothing favorable here. A derelict  
hotel. Bear River to W. from Mt. 8.

N. slope of Mt. to N. E. near by looks  
pretty good.

Wheldon, Utah, Sept. 7

Train stopped here, just where  
river leaves Mt. gorge.

Cache Junction, Tuesday,  
Sept. 7, 1915.

Reached here at 10:30 a. m. Left baggage at hotel, lunched at R. R. lunch counter, and walked back a mile or to, to where <sup>near</sup> river enters the gorge. Here, on the steep river bluffs, occurs a formation resembling the Niobrara.

Loc. 29. Here in river bluff, <sup>east side river,</sup> under maple, oak, sage, elder, etc., we found a fine ribbed (transversely) *Oreohelix*, some without color, many albifasciata. <sup>1/4 to 1/2</sup> mile or more above dam.

Loc. 30. Down river on same side in older l. s., *Oreohelix* heavily ribbed, with no bands or only obscure bands, about base of rocks, no rock slide, at power plant dam. This is Daniels No. 5; but he ~~confuses~~ mixed this + next number.

Loc. 31. On up the hill they abruptly change to smaller size, so we are keeping them separate. In



No. 5 They were combined - No  
difference observed except size.  
100 ft. further up slope they were  
larger again. Found mostly under  
rock clinging plants

Loc. 32, at base of l. s. cliff above  
(up slope) # 31 found same as  
# 30 & 31, but many of them with  
two heavy dark bands instead  
of light bands or none.

Altitude about 4400 ft. (4425' at  
Cache Junction station.)

Cache Junction, Utah  
Wednesday, Sept. 6, 1915

Cool, nearly clear day.

Spent the day on Bear River Bank  
cleaning thousands of Oreohelix from  
Garfield, Ogden, Brigham and near  
here.

Wheeler, Utah, Thursday  
Sept. 9, 1915

Bright, cold morning, soon  
warming up.

Took 9:05 a. m. train <sup>at Castle June</sup> down through  
the gorge to where the river ~~leaves~~  
leaves the mts.

Loc. 33. In <sup>east</sup> ~~the~~ bank of Bear River  
~~and~~ valley and up a <sup>ravine</sup> gully which cuts  
back into the bank just below  
Wheeler, under maples and  
birches chiefly, same species  
we found along river bank (#29.  
above the gorge, but smaller  
proportion banded. Above ditch.  
In a dried up backwater from the  
ditch at mouth of one ravine  
we found *Physa* cf. *gyrina*, *Planorbis*,  
a small *Lymnaea*, etc.

Loc. 34. Going up into the gorge,  
at a ravine on E. side of  
canyon, just ~~below~~ S. E. of  
R.R. tunnel, not far up gorge, found  
same species as #33, under bushes

(maples, oaks, etc.), dark-banded form predominating.

The tunnel is marked "Bear River Tunnel." "1890". This must have been prior to Hemphill's ~~locality~~ visit to the region.

Localities 30-31-32 are in Cache  
Elder Co., 33 and 34 in ~~Cache~~  
~~Port Elder~~ Co., the line just along R.R.

Track being a short distance  
N.E. of tunnel (200 yds.?)

The gorge is not more than a mile  
or 1 1/2 mile in length, occupied  
by Paleozoic limestone.

Revisited Loc. 29 and obtained  
a few more specimens.

Cache June., Utah, Friday  
Sept. 10, 1910.

Walked from here through Newton,  
2 mi. distant, to a Mt. about a  
mile or two N.E. of Newton. On  
~~the~~ way stopped at brook just

out of Newton and collected Physa.

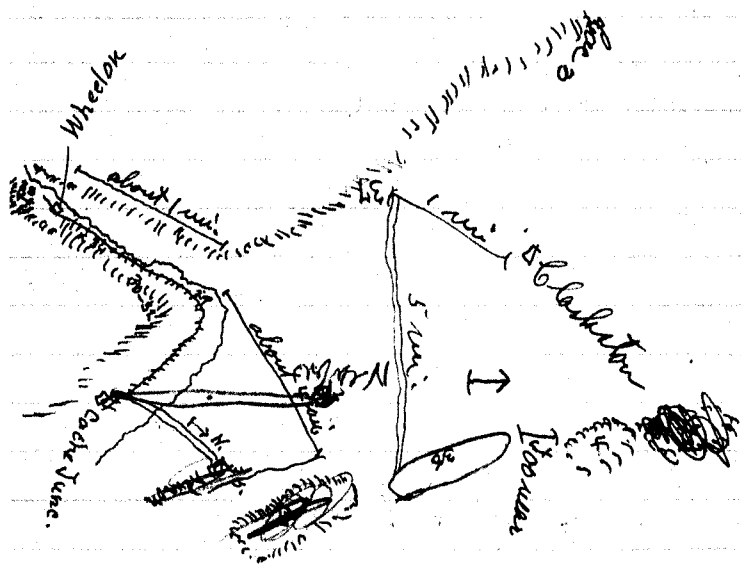
Loc. 35. Physas in brook.

N. E. of Newton

Loc. 36. On W. slope of Mt. chiefly under <sup>Kunzia tripartita</sup> gooseberry(?) and weeds away from larger shrubbery, found an Oreohelix entirely different from those at Loc. 29 to 33, only 4 mi. distant. Mt. is rounded, surface mostly small angular fragments of white, <sup>slightly</sup> calcareous stone, few rocks of any considerable size. Cache Co. Isolated hill like Daniel's station 4, west to north.

We next took road leading from our mountain west across the valley. Efdruined bushes along valley bluff of brook, but found nothing.

Daniel found fragment of a mussel on the bank of creek, thin like Anodonta or Strophotus. There is a deep pool near where we crossed.



Loc. 37. Followed road due W. from  
 S. end of Mt. (#36) 5 miles across  
 valley to range through which  
 Bear River cuts below Cache  
 Junction. In <sup>rapids</sup> gulch about a  
 mile S. W. of a <sup>Barkston</sup> town which lies  
 N. W. of Newton, about 2 miles  
 W. of #29, under bushes <sup>+ herbs</sup> on slope  
 of black soil mingled with fragments  
 of white calcareous rock, we found  
 same species at #29. The  
 road leads directly to mouth of ravine.

Franklin, Idaho

Saturday, Sept. 11, 1915.

Rainy forenoon, Took 11:25 a.m. train & arrived in Franklin at 12:15. Dined at Franklin and then started out.

Loc. 38. Small isolated limestone (Paleozoic) mountain, <sup>about 1 mi. N. W. of Franklin,</sup> covered with sage. At edge of small rock slides a rodent ~~to~~ in diameter, under sage & rocks and amid Oregon grape (*Berberis*) found *Oreochelis* which is probably fragilis. <sup>little</sup> ~~to~~ shrubbery except sage brush.

Partly clear afternoon, rained in evening.

Franklin, Idaho, Sunday

Sept. 12, 1915.

Walked into canyon cutting into face of ~~the~~ high mountain to S. E.

Loc. 39. Quartzitic s.s. slides along N. wall of canyon, *O. fragilis*, rare at most slides, abundant at one

*Vitrina alashana* seen, not taken. Cloudy morning, soon cleared, cool. Snow on Mt. tops.

Prater Prater gulch, S. of High  
Creek Canyon and 2 or 3 miles  
S. of Idaho line.

Loc. 40. On small isolated  
mountain about W. of 39 and  
just outside of canyon, a  
little E. of S. from Franklin and  
about <sup>for more</sup> 4 miles distant, ~~#1~~ <sup>about</sup> 2  
mi. S. of Idaho line, an Oreohelix  
with high spiral ridges which  
is probably *O. haydeni*.

Polyspiral, S. of  
with small bluish  
not much above

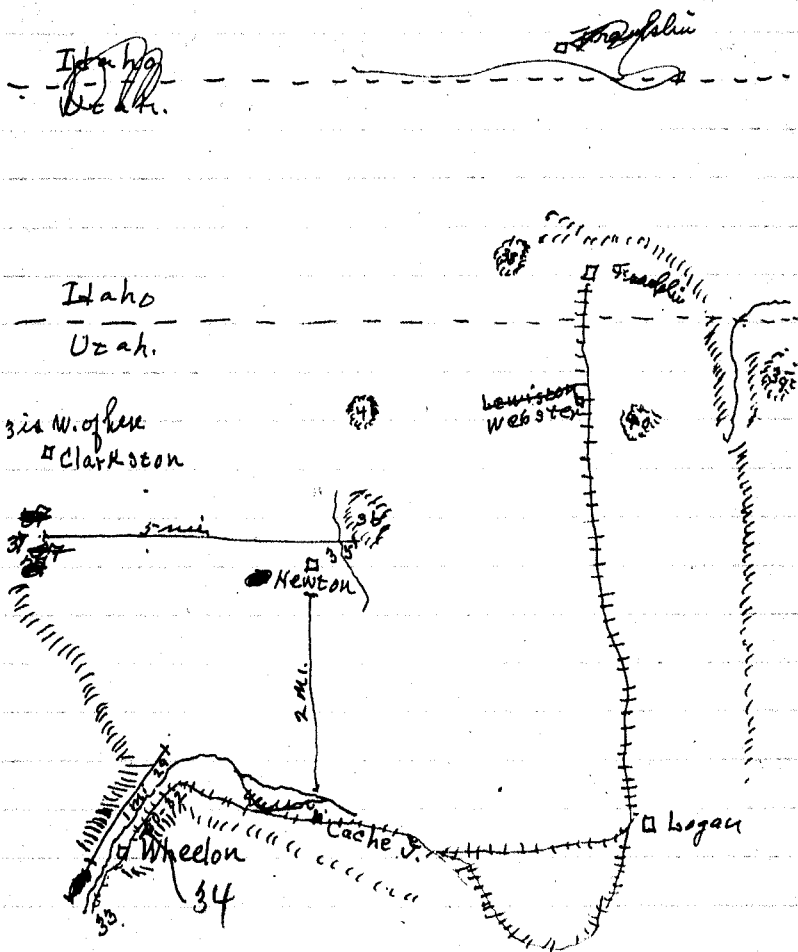
To the south is another similar  
outpost mountain, several miles  
away, which would probably yield  
snails of some species. ~~to~~

Franklin, Idaho, Monday,  
Sept. 13, 1915.

Partly cool, cloudy day. Rained  
and snowed a little at intervals.

We returned to Loc. 40 and  
collected a lot more *O. haydeni*.  
Found a fine lot under dense

dead leaves and stalks of a plant  
growing in a small rock slide.





Franklin, Idaho, Tuesday  
Sept. 14, 1915

Clear morning. Heavy frost.

Took 7:33 a. m. train for Logan.  
Loc. 40 is about a mile a little S. of E.  
from Webster, Utah

Good hill N. E. of Smithfield,  
perhaps about at Richmond

Logan, Utah, Tuesday  
Sept. 14, 1916

Loc. 41. First gulch S. of Logan  
Canyon, in Paleozoic limestone  
talus, a small, depressed, smooth  
*Orchelimum*, perhaps a form of *depressa*,  
many without color bands, not  
abundant, collected only 106 alive.

Loc. 42. Next gulch S. of 41,  
under l. s. slide around  
herbs and shrubs, including

Mountain maples, an Oreochelone  
probably same as Hemphill  
reported from here as "beginning  
of hibernia."

Took 5:50 p. m. train for Cache  
Junction.

Cache June., Utah, Wednesday  
Sept. 15, 1915

Clear and bright most of day.  
Heavy frost and ice in morning.  
Spent day cleaning snails collected  
recently.

Took 7:15 p. m. train for Salt Lake.

Wednesday  
Salt Lake, Utah Thursday  
Sept. 16, 1915

Arrived here at 10:30 p. m., half  
hour late.

Went to Mopum Hotel. Not very good  
for its price.

Salt Lake, Utah, Thursday.

Sept. 16, 1915:

Daniels took early car for Provo to collect snails.

Billy Mac Arthur and I went up Dry Canyon, about half mile N. E. of University of Utah.

Loc. 43! Under herbs in oak thickets, E. side canyon, steep slope, little rock, limestone also under maples.

Provo, Utah, Thursday

Sept. 16, 1915

Mr. Daniels collected as follows

Loc. 44. Rock canyon, the east of Provo, rock slides, limestone slides, with oak brush, border of slides.

Loc. 45: Slate canyon just canyon south of Rock <sup>Canyon</sup> limestone slides, oak brush, border of slides.

Salt Lake, Utah, Friday  
Sept. 17, 1915

Samuel & I went to Emigration  
Canyon, S. E. of city.

Loc. 46 S. side canyon a mile  
or so up, under maples & other vegeta-  
tion in fine limestone slide rock.  
Cool morning, very warm day.

Salt Lake, Utah, Saturday  
Sept. 18, 1915

Hot, bright day. Left Salt Lake  
for Denver on U. P. train at 92:45;  
40 minutes late.

Weber Canyon, Utah  
Sept. 18, 1915

Fine limestone rock slides for  
miles ~~to~~ where river flows  
through gorge just below tunnel  
between Morgan and Devil's slides.

Good clear to Devil's Slide, beneath  
plant and hotel there, probably  
hotel at Morgan.

Red s.s. and congl. above Devil's  
Slide, specially fine exposures above  
Echo.

Tuesday.  
Boulder, Colo., Feb. 8, 1916.

Lecture trip for University Extension  
Dept. "Glaciers of Colorado, Existing  
and Extinct."

Left Boulder 1:30 p.m. on Interurban .70  
Reached Denver 2:50 p.m.  
1000 mile ticket D. & R. G. \_\_\_\_\_ \$30.00  
Car fare Boulder & Denver: \_\_\_\_\_ .15  
Sleeper to Minturn mileage 209 mi. \_\_\_\_\_ 3.00  
Had lenses set in new gold frame.  
at Paul Weiss, \$5.00  
Break stand 10¢ dinner 44¢ .54  
~~Snowing & deep snow on ground~~

Minturn, Colo., Wednesday Feb. 9.

Snowing and deep snow on ground from  
Leadville to Minturn.

Breakfast on train .50  
Reached Minturn at 9 a.m.  
Room at D. & R. G. Y. M. C. A. .50  
Dinner, Eagle River Hotel .33  
Supper " " " .30

Spoke to school children, grade school,  
at 1:30. Spoke at Presbyterian Church

in evening, cloudy & snowy all day, not cold.

Good snail country - limestone, sandstone and aspen groves.

Eagle, Colo., Thursday, Feb 10

Cold night, bright morning, at Minturn.

Breakfast, Eagle River Hotel, Minturn — 35

Left Minturn at 10 a. m., one hour late  
Went Minturn to Eagle 27 miles.

Room at Hotel Montgomery

dinner at "Frank's Restaurant" .35-

supper " " " .15-

Spoke at "Opera House".

Eagle, Friday, Feb 11.

Partly cloudy, cold morning

Breakfast at Frank's Restaurant .50-

Probably good snail country, limestones, sandstones and shales, cedars & pines, with brush patches and probably aspen-heck on upper slopes

Probably a long way back to Oriskany

Spoke at High School, Prof Smith,

Principal, at 10 a. m.

Room \_\_\_\_\_ 1.00

Left Eagle for Glenwood Springs at  
10:27, 1 hr. 25 m. late

Milage Eagle to Glenwood spr. 32

" Glenwood to Carbondale 13

Left Glenwood on Aspen branch at  
12:45 p.m.

Good dinner, Sapsie Hotel, Carbondale .50

Ticket Carbondale to Marble 25 mi. 1.75

Left Carbondale 3:20 p.m., 3 hours  
late, ~~was~~ in small, delapidated caboose of  
accommodation train.

### Carbondale

Marble, Colo., Friday, Feby 11.

Arrived at Marble at 5:40 p.m. met at  
train by Principal Supt. of Schools, J. H.

Pease. Got room at Larkin Hotel.

Valley below here hummocky with  
moraine. Stream has cut through moraine,  
also moraines on Mt. Sapsie.

Spoke at Motion picture theater, manage-  
ment T. H. Pease.

Marble abundant, fine quality.  
Coal in Mesa Verde formation.



Bluffs of Mesa Verde just N. of town.  
Big marble shops here. Manning,  
superintendent.

Deer & mt. sheep reported plentiful  
along track below here. We saw  
none.

Good snail country, I believe.  
Treasury Mt. 7 miles away. Horses available.  
~~Tragelons here see via~~

Marble, Colo., Saturday

Feb'y 12, 1916.

Larkins Hotel bill \_\_\_\_\_ 2.00

Ticket to Barbondale - Crystal River Ry. 1.75

Sleigh " to Glenwood Spr. 3.50

Bright morning, thawing, snow soft.

Left Marble on time (nearly) 10 a. m.

Reached Barbondale 12:30. Small rock  
slides along the road. ~~Left~~

Lunch at Sopris Hotel, Barbondale - .50

Left Barbondale 1:07 by sleigh, roads  
very bad, snow soft, many deep water-  
holes. Reached Glenwood Spr. at 3:40.

Doc came from N. of river & crossed just  
above hotel. Looked thin & weak. One  
killed by mt. lion below Marble was fat.

A. Shaw, of Gypsum, says milky water comes down a small stream one mile below Crystal on south side of creek above Marble.

Check room at Glenwood — .40  
Left Glenwood at 4:30; one hour late. Made up some time reaching Gypsum at 5:30.

Milage Glenwood to Gypsum 25 mi.

Gypsum, Colo., Saturday.

Feb. 12, 1916.

Spoke in I. O. O. F. hall at 8 p. m. Management, A. C. Johnson, principal Eagle Co. High School, whom I had met at Carbondale high school several years ago.

<sup>Sunday</sup>  
Gypsum, Feb. 13, 1916.

2° below zero this morning. Water standing by radiators in my room froze, with only one window open.

Red Beds and Gypsum here - perhaps Carboniferous  
Travellers Hotel 1.20

Left Gypsum 10:47 a.m.

Milage to Grand Junction. 114 mi.

Snow still deep.

Palispade, Colo., Sunday,  
Feb'y 13, 1916

Snow nearly gone in valley here. Warm.  
Valley wall on north is Mancos shale  
with Mesa Verde s. s. rim. Hotel here.

Clifton, Colo., Sunday,  
Feb'y 13, 1916.

Next town, 6 or 8 miles below Palispade.  
Mancos shales in valley near town.  
Hotel here.

Grand Junction, Colo., Sunday,  
Feb'y. 13, 1916.

Reached here at 2:30. Went to Sea Coast  
Hotel. Lunched at Dr. Clapp's.  
Spoke briefly at M. C. Church at 8 p.m.  
Warm afternoon, cold evening.

Grand Junction, Colo., Monday.

Cold, frosty morning.

Feb. 14, 1916

La Court Hotel

\$ 2.70

Left here on Montrose line at 8:30.

Mileage to Olathe 62 mi.

Up river McElmo formation both sides of river, Mancos <sup>shapes</sup> further back.

Whiteriver, Colo., Monday.

Feb. 14, 1916.

Just below here, 40 minutes from Grand Junction, McElmo dips under the Mancos & disappears on N. <sup>E</sup> side of river. Good Mancos exposures here close by.

Hotel and apparently livery stable.

Above here McElmo on both sides, then La Plata s. s. appears in two benches, then disappears on N. side.

At 9:50 we cut through La Plata into the vertical wall forming upper Dolores s. s., passing through a short, narrow canyon, then back

into the McElroy.

at 10 a.m. the La Plata appeared again West of river.

Delta, Colo., Monday.

Feb'y 14, 1916.

Whole valley and mesa here in Mancos shale, forming <sup>high</sup> bluff some miles to the north, capped by Mesa Verde s.s.

Olathe, Colo., Monday.

Feb'y 14, 1916.

Reach here at 11:30. Room at Wortman Hotel.

Spoke at High School, in afternoon and in evening at motion picture theater, under auspices of the schools, with Supt. B. D. Cornwell as manager.

dinner	_____	.50
supper	_____	.50

(

Olathe, Colo., Tuesday,

Feb'y, 15, 1916.

Bright, frosty morning.

Meadowlark singing at hotel.

Breakfast	_____	.50
Dinner	_____	.50
Room	_____	1.00

I walked to the bluff beside the wagon road north of the railroad, northwest of the High school. It looks like clay shales of Pierre age, ~~but~~ with an absence of limestone and sandstone bands and concretions, but the numerous poorly preserved fragments of *Inoceramus* appear to be mostly *I. labiatus*, with a few thick shell fragments maybe *I. deporius*. Two oysters looked like *O. congesta*. I could not feel certain of any of them, but am tolerably sure of the *I. labiatus*. So I presume it is Lower Manson shale. As the second terrace west of the stream is higher geographically, it may be upper Manson.

The Valley wall to the east several miles is Red Beds, dipping west sharply under the valley.

alkali seepage from shales extensive in this valley.

Left ~~Delta~~ for Ho & Lathe 3:34<sup>7</sup>, 20 min. late.

Milage to Delta 25 mi.

Left Delta for Hotchkiss 4:15 p.m., 20 min. late.

Milage to Hotchkiss 15 mi.

Manos shales both sides to Lagear but no town for stopping place except Austin, Terraces, tape buttes, etc., with many concretions.

Probably Mesa Verde at Lagear.  
More snow here.

Hotchkiss, Col., Tuesday  
Feb'y 15, 1916.

Reached here 5:30 p.m., 20 min. late.  
Room at Hotchkiss Hotel.

Spoke at motion picture theater  
under management of W. H. Lady, School,

superintendent.

Hotchkiss, Col., Wednesday  
Feb. 16, 1916.

Bright, frosty morning.

Meadowlark singing

Trailload of coal from Somerset  
went down valley this morning.

Orchards on high mesas.

Valley and mesas are Mancos shale.

Below here, much of the mesa cap  
conglomerate is basalt, and well  
consolidated in many places.

Left Hotchkiss

Hotchkiss Hotel ————— 2.00

Transfer ————— 25

Left Hotchkiss at 9:35 a.m., 15  
minutes late.

Willage to Delta — 25

The s.s. at Lagear appears to be  
Sabata, on S. side, dipping under  
Mancos shales to the north.

Out of Delta at 11:16, 20 min. late



Milage to Montrose ——— 22.

assisted Mansos shale occupies valley and slopes all way to Montrose.

Arrived Montrose 12:10 p.m., 9 min. late.

Lunch at Montrose ——— .25

Book stand ——— .30

Colona, Colo., Wednesday,

Feb'y 16, 1916.

Went to Colona, about 12 miles up line, by auto, with Dr. C. G. P.

Spoke 5-0 minute ride. Spoke in new high school auditorium.

Supper at Colona ——— .35

Auto 1/2 ——— 2.00

Returned to Montrose at 11 p.m.

Montrose, Colo. Thursday,

Feb'y. 17, 1916

Bright, frosty morning.

Spoke at High School at 9:30 a.m.

Breakfast ——— .35

Room ——— .35

Sleeper ——— 2.00

Dinner ——— .35

Left Montrose 12:20 p.m. on time  
Milage to Salida — 1.36.  
Reached Salida 8:45 p.m., on time.  
Lunch at Salida ————— .35  
Milage to Denver — 15.5  
Friday a.m., Denver at 7 a.m. on time.  
Breakfast at " ————— .80  
Fare to Boulder ————— .90

# Expense to Utah, Idaho, etc.

1916.

June-	U. S. G. S., maps 50¢, 3 <sup>00</sup> —	3.50
" 9	N. S. B., <del>fare</del> etc. on checks —	1.50
" "	Ticket Boulder to Globeville	.70
" "	car fare	.20
" "	Round trip Denver to Salt Lake	27.50
" "	sleeper " " Green River	2.20
" "	lunch	.40
" "	check room charges	.20
" 10,	breakfast on dinner	.70
" "	Porter 25¢ 10¢	.35
" "	lunch at lunch counter <sup>Emmett</sup> <sub>Emp.</sub>	.20
" "	fare Morgan to Devil's slide	.25
" 12	livery up canyon 1 <sup>50</sup> } 1 rest.	
" 13	Hotel 39¢ } 5.45-	
" "	porter no rest.	.25
" "	breakfast no rest.	.50
" 15	Briggs Hotel 2 <sup>50</sup> livery 1 <sup>50</sup>	.40
" "	Porter 10¢, fare to Weston 25	.35
" "	Baggage transfer at Weston	.25
" "	Dinner & supper "	.85
" 16	Breakfast 35¢ room 1 <sup>00</sup>	1.35
" "	Baggage transfer at Weston	.25
" "	Fare to McEammon (1 <sup>40</sup> ) <sup>80</sup>	2.40
" "	Formaldehyde <sub>49</sub>	.25

1916

Aug brot. frd:		49.80
June 19, McCallum livery	5 <sup><u>00</u></sup> 2 <sup><u>00</u></sup> 5 <sup><u>00</u></sup> 3 days	12.00
" 19. " " " "		
" 20 Commercial Hotel, McCallum		6.50
" " Fare McCallum to Montpelier		2.30
" 24 - 10 meals		4.05-
" " Room		4.00
" " Fare to Paris from Montpelier		.40
" " " Paris to Ovid		.20
" 27. Livery " " St. Charles		3.60
" " Hotel Rogers, Paris		6.35-
" 29. Mrs. Madison's Boarding House. Charles	st.	2.50
July 1 " Dustin " " Garden City	st.	4.50
" " J. Metton stage fare to Logan		15.00
" 4 Logan, Booster's Inn, meals		2.45-
" " " Hotel Logan, room		4.50
" " " Booster's Inn, lunch		.25-
" " " Fare to Franklin, Idaho		.60
" 4 Franklin, 2 lunches		.70
" 6 " hotel, room & board		3.50
" " " fare to Preston		.25
" " Preston, livery		1.25
" 10 Fare Ogden to Promontory	frst.	.95-
" 10 Return fare		.95-

Denver, Colo., Friday,

June 9, 1916

L.E.  
Daniels reached Boulder at 9:30 a. m.  
We both left Boulder on Interurban  
at 12:30.

Left Denver on U. P. at 7:30 p. m.  
Hot, partly cloudy day, very dry.

Altamont, Wyo., June 10, 1916

Aspen groves near station. Did not  
see hotel, 13 mi. E. of Evanston.

✓ Saturday, Morgan, Utah, June 10, 1916

Reached here at 3:41; 37 min. late.

At head of an open valley on Weber  
river. We started north of town  
looking for snails.

✓ Station 47, continuing numbers from last year.

In gulch about half mile north  
of the R. R. depot, on dark colored  
Paleozoic limestone, we found a

small, strongly transversely ribbed  
*Oreohelix* very common. It is much  
like the white form of *O. peripherica*  
(Ancey), but flatter, on the average,  
as I recollect that species, a  
few had either one or two narrow  
color-bands. The flatter adults  
and the young had a sharp periphery.  
The snails were confined almost  
entirely to the sage brush clumps.

✓ Devil's slide, Utah.

Sunday, June 11, 1916.

Went to Devil's slide by train at  
9:46 a.m. Photographed the "slide"  
S. of river, from north side,  
then crossed the river.

✓ Sta. 48, both sides of and above  
the "slide"; not in rock slides, but  
confined almost entirely to beneath  
heavy, dead-leaves of an arisa with  
spearhead shaped leaves, thus ♀.

Found *Oreohelix* of *haydeni* group,  
with sharp periphery though not

sheeled, and spiral sculpture faint, as  
in *C. gabbiana*, varying greatly in height of spire.

✓ Sta. 49. W. slopes of first gulch  
coming in ~~to~~ from the north just  
below R.R. depot. In cottonwood  
grove 100 yds above mouth of gulch  
found *Vitrea*, *Louitoides*, *Vallonia*  
and *Vitrea*. ~~Under~~ <sup>in</sup> limestone  
rocks slide up slope, with sage  
brush, cherry, *vit. mahogany*, *vit. maple*  
and scrub oak overhanging the edges.  
found same ~~form~~ <sup>species</sup>, as at ~~the~~ sta. 48,  
but averaging much larger and not  
varying much in height of spire,  
all being rather flat. Leaves and  
fine soil filled in the crevices  
where they were found to a great  
extent. at 48 there was fine  
lime dust from the cement plant  
thickly covering everything.

✓ Sta. 50, perhaps half a mile  
or so below Sta. 49, in pools by  
R.R. track, we found *Physa* sp.,  
*Lymnaea* sp., *Paludastrea longiqua*  
and *Aplexa hypnorum*, the *Paludastrea*,

and *Physa* in watercress.

Further down stream dead shells of *Orcohelix* like those above were found but no station numbers given, and one specimen with a decided keel and coarser primary ribs, more like typical *haydeni*, but not as coarsely ribbed.

Morgan, Utah, Monday,  
June 12, 1916.

Morgan Hotel Proprietor took us up to a point opposite 2<sup>nd</sup> R.R. tunnel above town in auto.

✓ Sta. 57. N. side of river, just opposite (north) of R.R. tunnel, <sup>just</sup> above (east) of a <sup>dry</sup> gulch which comes in from the north.

*Orcohelix*, flat, sharp keeled, spirals variable in prominence, in <sup>carboniferous</sup> limestone slides, fairly common.

*Pyramidula* sp., 2 specimens with *Orcohelix*.



✓ Sta. 5<sup>2</sup>, rock slides across gulch above mentioned, N. side of river, from 100 yds. W. of # 5<sup>1</sup> down valley around the curve. Oreohelix, same sp. as # 5<sup>1</sup>.

✓ Sta. 5<sup>3</sup>, further down valley, at a point almost due W. of R.R. tunnel above mentioned, in limestone and sandstone slides (carboniferous), separated from # 5<sup>2</sup> by 100 or 200 yards of slope free from slides.

Oreohelix, smoother than # 5<sup>1</sup> & 5<sup>2</sup>.

✓ Sta. 5<sup>4</sup>, a mile or so down the canyon from 5<sup>3</sup>, on slope facing east near where wagon road nears the railroad.

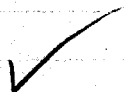
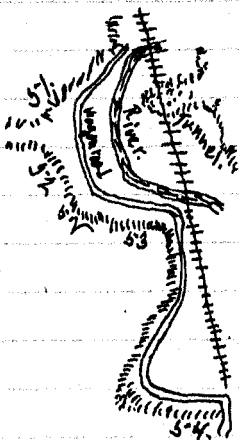
Oreohelix, same species as # 5<sup>3</sup>, under poison ~~ivy~~ ivy in rock slide, less calcareous than other stations.

✓ Sta. 5<sup>5</sup>, small stream by roadside about 1 1/2 mi. above town. Large Physa sp. + Lymnaea sp. on rocks. Pools above and below this station contained Aplefa in abundance, but we collected none.

✓ Sta. 5<sup>6</sup>. About 1 mi. above town,

in vegetation choked pool between  
wagon road and railroad, not far  
above where wagon road crosses  
railroad.

*Pisidium* sp. and *Planorbis jarous?*  
in water cross.



Trenton, Utah, Tuesday,  
June 13, 1916.

Left Morgan at ~~7:00~~ 6:03 a. m.

Left Ogden on 9:30 a. m. train, but  
late. Reached Trenton at noon. In  
afternoon walked 2 miles west.

✓ Sta. 5-7, Newton town reservoir,  
about half way between Trenton and  
Clarkston. Large *Planorbis trivalvis*,  
*P. parvus*, large *P. macrus*, *Physa gyrina*?  
*Musculium* sp., *Succinea avara*,  
*Lymnaea palustris*.

In a dried up lagoon we found  
valves of a brachiopod in abundance.

✓ Clarkston, Utah, Wednesday.  
June 14, 1916.

Drove over from Trenton this  
morning.

✓ Station 5-8, on edges of ravines  
on mountain side, due west of the  
southern part of Clarkston, about  
half a mile S. of Daniels' last  
year's Sta. 3. *Archelix rugosa* (Hemph.)  
under *Aricea* and various shrubs about  
limestone fragments and ledges, abundant,  
and thousands of dead shells. The *aricea*  
is very robust here, the spearhead-  
shaped leaves 6 to 9 inches long.  
Took 2 pictures of it.

✓ Trenton, Utah, Wednesday,  
June 14, 1916.

Returned on foot at 4:30 p.m.

In seepage from ditch we found  
*L. yunnanensis* common along road  
just west of Trenton, but collected none.  
✓ Daniels' sta. 4 last year is the  
same mountain as our sta. 36 of last  
year. Sta 4 is ~~at~~ on N.E. side,  
near Trenton, while sta 36 is on W.  
side, near Newton.

✓ Trenton, Utah, Thursday  
June 15, 1916

blewed soils until 10:30. Left  
on 11:30 a.m. train for Weston.

✓ Weston, ~~Utah~~ Idaho, Thursday,  
June 16, 1916

Reached Weston at 12:15.  
In afternoon walked north.

✓ Sta. 5-9, rock slides (like igneous rock at foot of bluffs about three miles N. W. of town. A few dead *Oreohelix cooperi*? shells and one small live one. Mountain had been burned ~~Sta. 60~~ over a year or so ago, but the snails were probably never abundant.

✓ Sta. 60, muddy bottom of irrigating ditch S. E. of Sta. 5-9, perhaps  $\frac{1}{3}$  of the way from Sta. 5-9 to town. *Lymnaea palustris* common, *L. parva*? abundant, and a few *L. b. cockerelli* found.

✓ Sta. 61, stagnant pool on W. side of road, a mile or so N. W. of town. *Lymnaea palustris* abundant, *Paludestina longinqua* exceedingly abundant.

✓

Weston, Idaho, Friday,

June 16, 1916.

We walked to the mountain S. E. of town, but did not find any snails, though there was plenty of shrubbery & lime, a good cover

as at the Newton hill last year.

✓ On the way back saw *Lymnaea palustris* and large *Physa* in stagnant roadside pools, but collected none.

Left for McCannon on 11:55 a.m. train. Terribly hot day. Crops worthless.

✓ McCannon, Idaho, Friday,  
June 16, 1916.

Reached here at 1:30 p.m.

Went down river perhaps a mile to where a new channel has been cut for the Lost Reef River, cutting off an old bend. In

Daniel's Sta. 1, 1916; leaves under wild cherry & other bushes along a lava bluff, large *Orsokelixa cooperi*.

In slough beneath the bluff, *Lymnaea palustris* and large *Physa*, sp.

✓ Sta. 62, River <sup>in cut</sup> opposite Sta 1, and  
as far as examined, Sphaerium sp.  
and an operculate shell. The both  
were abundant on muddy bottom and  
the operculate snail was also  
abundant on the lava rocks in  
the water.

✓ McBammon, Idaho, Saturday  
June 17, 1916

We drove up the river to where  
Daniels collected *Oreohelix tenuistriata*  
last year.

✓ Sta. 1 1/2 (Daniels, 1915), about 10 miles  
up <sup>Port. West</sup> river above McBammon, in gulch at  
east end of a mountain on south side  
of river, about 3 miles W. by S. from  
Lava Hot Springs. Type locality of  
*Oreohelix tenuistriata* (?). We found 29  
live ones and many dead shells on  
N. side of gulch, under arnica and  
small shrubs which overhung small  
piles of rocks on steep slope in

rather open spots. The Mt. mahogany grows very large here - several inches in diameter and sheds so many leaves that the environment was unfavorable ~~was~~ in their midst. In the bottom of the gulch we found also

Encoulus, Vallonia, Utrina and Loutitoides.

✓ Sta. 63, next gulch N. of  $1\frac{1}{2}$ , found a few of same Oroschii as at  $1\frac{1}{2}$ .

✓ Sta. 64, in river 2 or 3 miles below Sta. 63, same <sup>species of</sup> Sphaerium and operculate snail that we found yesterday at McCammon.

✓ McCammon, Idaho, Sunday.

June 18, 1916.

We drove up Harkness Canyon, E. of here, nearly to the white ~~bluff~~ cliff which is seen so plainly from town.

✓ Sta. 2, Daniel, 1915; limestone slides covered with shrubbery, Mt.



Maples, conifers, etc., at foot of cliff not far below the big white cliff, at the springs which supply the water of the canyon, which is the McCarmon water supply. Large, heavy shelled *Oreohelix stipes depressa* abundant.

In the shrubbery <sup>just</sup> below them we found *Louitoides*, *Vitrina*, *Vallovia* & *Encourbes* common, but not abundant. In a dry channel of the creek <sup>near</sup> at foot of shales of Sta. 2 *Thysanophora ingersolli* - dead shells - abundant in fine drift wood. No live ones found.

✓ Sta. 65; <sup>E. side of</sup> gulch coming in from the north just above Sta. 2 and the springs, limestone shales more open, shrubbery & herbage more scattered than at Sta. 2. Here we again found large, heavy *O. s. depressa* ~~rather~~ common.

✓ The sphaerium of the river is also a common fossil in the alluvium of the banks up to ten feet or more

above the present water level of the river.

✓ McBarmon, Idaho, Monday.  
June 19, 1916.

We drove across Marsh Creek valley to the mountain range 4 or 5 miles to the <sup>W. side</sup> ~~N.W.~~ of town, driving to end of road in

— Sta. 66 Goodenough Canyon, <sup>then walking</sup> a mile further

✓ Sta. 66, Goodenough Canyon, under leaves, logs & sticks on steep slopes:

*Pyramidula* sp., *Zonitoides arborea*,  
*Thysanophora ingersolli*, *Encrinurus* sp.,  
*Vitrina alaskana*, *Puzosia blandi*.

No limestone or good rock slides were observed. We found no *Creobelix* and no *Vallonia*.

✓ McBarmon, Idaho, Tuesday.  
June 20, 1916

Rained hard during the night and snowed on the mountains, which are

white clear to the base this morning.

We cleaned snails in kitchen of the Commercial Hotel, packed them and shipped them.

Took the 1:30 p.m. train for Montpelier, reaching there at 4:20.

Not much good snail territory between McCammon and Montpelier.

Lava flows (vesicular basalt) fills the valleys at McCammon and up to a point some distance beyond Soda Springs, the streams having cut channels some distance into the basalt. It does not appear up the mountain slopes at all. I suppose it is Tertiary.

✓ Montpelier, Idaho, Tuesday  
June 20, 1916.

Reached here about 4:20 p.m. Went to ~~Mont~~ Burgoyne Hotel, a very good one. Walked up nearly to mouth of Montpelier Canyon. Cold, cloudy, not much rain here.

✓ Montpelier, Idaho, Wednesday,

June 21, 1916

Snowed during the night and continued all day, nearly clear at 6 p. m.

✓ Montpelier, Idaho, Thursday,

June 22, 1916.

Snowed again in the night sun shining this morning.

Went up Montpelier Canyon in afternoon, partly cloudy, wind cold.

✓ Sta. 67. Just inside mouth of Montpelier Canyon, on south side, about Carboniferous limestone ledge, on slope devoid of rock slide, *Oreohelix cooperi*, active after the storm, numbers in copulation, plentiful, mostly immature.

✓ ~~Sta. 67~~ Young *Vitrea* by ditch seen, not taken

✓ Sta. 68, about 3 miles up Montpelier Canyon, in <sup>carb. limestone</sup> rock slides on N. side of gulch coming in from the

north, where canyon runs N. + S. for a short distance. *Oreohelix cooperi*, plentiful, not abundant, nearly all mature\* \*

✓ 69. Directly across the narrow gulch from #68, on slope on S. side, under limestone ledge, free from rock slides. *Oreohelix cooperi*, very much smaller than at #67 and 68, though not more than 15-20 ft. from the colony at #68. This colony was cut off entirely from #68, by the narrow but unfavorable bottom of the gulch. The snails were not here very plentiful, and occurred under <sup>very</sup> small shrubs\*

Cloudy, cold day. snow melting

✓ Montpelier, Idaho, Friday

June 23, 1916.

✓ We walked north along the <sup>foot</sup> edge of the mountains.

Bright, warm day.

✓ Sta. 70. Canyon about two

miles north of town, north side a  
limestone cliff plainly seen from  
town. *Orchelimum cooperi* in edges  
of rock slides. Not plentiful.

Sta. 71, a short distance up  
Bennington canyon, E. of Bennington.  
Large *Orchelimum cooperi* (?) very  
abundant in shrubbery, especially  
under wild roses and currants,  
~~and~~ on steep banks of creek,  
active between the little piles  
of ~~bank~~ snow and even a few  
in the snow. None found in the  
big sandstone slides up slope  
a rod or two.

Took picture of rose bushes  
matted and hanging down the  
bank; also of wild currants  
~~at~~ <sup>at</sup> the edge of the creek.

✓ Montpelier, Idaho. Saturday,

June 24, 1916

Bright morning. We walked down the Ovid road to the river.

✓ Sta. 72, sloughs on E. side of river, both sides of road near bridge over river. *Lygus stagnalis appressa*

" *palustris*

*Planorbis trivolvis*, *parvus* & *efesus*

*Physa* sp.

*Succinea haydeni* ?

*Musculium* sp.

*Sphaerium* sp. 2 dead valves.

*Palaudestrina* ? sp. 1 specimen

*Aplexa hypnorum*

*Valvata* sp.

We took the 4:25 p.m. train for Paris.

✓ Paris, Idaho, <sup>Saturday</sup> Sunday.

June 24, 1916.

Reached here at 5 p.m. Got rooms at Rogers Hotel, a pleasant place with good meals.

✓ Paris, Idaho, Sunday,

June 25, 1916.

Started up Paris Canyon in auto, which got stuck in a canyon just within the mouth of the canyon, so we walked up about 4 or 5 miles, where we found limestone (Calogria) on N. side of canyon, at  
✓ Sta. 73. *Cerithium cooperi*, common under shrubbery on limestone slopes. We searched in small aspen groves for small snails, without success.

Bright forenoon, pleasant, partly cloudy afternoon, with cool breeze.

✓ Paris, Idaho, Monday,

June 26, 1916.

Went by rail to Ovid, then walked E. & N.E. on R. R. track to where it crosses Bear Lake Outlet.

✓ Sta. 74, loose sand on bank of Bear Lake Outlet 2 mi. N. of E. from Ovid, ~~with~~ <sup>Idaho</sup> Dead shells of



*Valvata sinuata*, *V. tricarinata*, *Pisidium* sp.,  
*Sphaerium pilsbryi*, *Physa* sp., *Lymnaea*  
*sp.*, etc., all numerous.

✓ Sta. 75; Slough from Mill Creek  
drainage by R. R. track one mile  
N. of E. from Ovid. *Musculium*  
*sp.* abundant.

✓ Sta. 76, Mill creek, where R. R.  
crosses it S. of Ovid. One live  
*Anodonta*, several dead shells of  
*Sphaerium pilsbryi* and *Physa* sp.  
Saw several live *Lymnaea*  
*stagnalis appressa*, not quite mature,  
but did not collect any. Shells  
seen at various sloughs near  
Ovid we called *Lymnaea palustris*.

✓ Paris, <sup>Ind.</sup> ~~Mo.~~, Tuesday,  
June 27, 1916.

Cleaned nails at Hotel Rogers  
in forenoon, using oil stove for  
heating water.

St. Charles, Idaho, Tuesday,

June 27, 1916

✓ Came from Paris to St. Charles by auto at noon. Obtained rooms and board at Mrs. Madison's. In afternoon we walked up St. Charles Canyon.

✓ Sta. 77, Paleozoic limestone ledge on S. side of canyon, above the upper ~~cut~~ ditch, about half a mile up the canyon. *Oreohelix* sp. under arnica leaves and gooseberry (?) bushes. Pupilla and Vallonia under the polygonaceous plant that clings to the rocks.

✓ St. Charles, Idaho, Wednesday,

June 28, 1916.

We walked out on the <sup>natural</sup> turpentine along the northern end of the lake.

✓ Sta. 78, ~~Fossiliferous~~ Natural turpentine at northern end of Bear Lake, east of St. Charles. The sandy soil of the turpentine contains great numbers of

snails of various species and Pisi-  
dium valves, with occasional valves  
of Sphaerium pilabryi. In one place  
the soil thrown up for a grade  
was composed almost entirely of  
snails (Larinix? largely) but with  
a considerable sprinkling of Sphaerium  
valves. The snail shells also oc-  
curred in quantities along the beach,  
but we found none at all alive,  
though many of the Lymnaea and  
Planorbis were quite fresh.

✓ Sta. 79, roadside lagoons on the  
way back to town. Lymnaea  
palustris common, but small, alive.  
Aplexa hypnorum common, but only  
half grown alive.

✓ Sta. 80, St. Charles Creek, N. edge  
of town, Agriolimax (small + black, 2  
specimens) Succinea sp., Pyramidula  
sp., Zonitoides ~~sp.~~ arboreus, Emmeulus sp.  
I took a picture of #78

✓ St. Charles, Idaho, Thursday,

June 29, 1916.

Went up St. Charles canyon again, and collected more *Oreohelix* at sta. 77, also more *Valvulias* & *Pupillae*.

~~Then~~ also went further up, to ✓ Sta. 81, about 3 mi. up St. Charles canyon. *Oreohelix strigosa depressa* found sparingly in sandstone slides and about limestone ledges. *Paludestrina* sp. and *Pisidium* valves in water cross in small seepage channel from the creek, and *Succinea* sp. and *Lymnaea asperata* (?) on the muddy banks.

✓ The *Musculium* from C. of Ovid were gravid, but none of the *Oreohelix* thus far cleared this season have been contained embryos, as those taken in Sept. last year after the first few days were without embryos, when do they breed here?

✓ Garden City, Utah.

Thursday, June 29, 1916.

Came here from St. Charles this afternoon by team.

✓ Garden City, Utah.

Friday, June 30, 1916

Walked up into Garden City Canyon a little way.

✓ Sta. 82, Mouth of Garden City Canyon, on S. side, W. of Garden City, Utah.

A subspecies of *Oreohelix haydeni* found sparingly under shrubs and especially under arnica, about limestone. Slopes very barren. Formerly large *Wt. mahogany* (a foot thick, they say) + other <sup>trees</sup> shrubbery covered the slopes, but it has furnished wood for settlers for 45- years or more, many fires have occurred and the mountains have been grazed by cattle and sheep. Hence the barrenness. It is doubtful whether these snails

could gain a foothold here ~~now~~ now if not already here. Probably the colony is a remnant of a once more numerous colony.

✓ Sta. 83. S. side of next canyon S. of Sta. 82. ~~Or better~~ cover than at Sta. 82, but otherwise same conditions of limestone and shrubbery. *Oreohelios rugosa*, abundant, smaller than at the Clarkston localities.

✓ Sta. 84. Stagnant pool by roadside 2 mi. S. of Garden City, Utah. *Leymnaea parva* (?), abundant.

Hill 5 mi. S.E. in quartzite. No snails

✓ Garden City to Logan, Utah.  
Saturday, July 1, 1916.

Left Garden City for Logan by private conveyance, at 7:10 a.m.

✓ Sta. 85: Garden City - Logan State Road just before reaching Sick Hollows, on the divide, *Oreohelios cooperi*, one large bleached shell on limestone slope.

As we had 35 miles still to drive, we did not stop to look for more.

Sta. 86. North fork of Logan canyon, N. side, about 3 mi. above "the forks," 16 miles from Logan. Orochely depresses abundant under Mt. maples at edge of rock slide where dead leaves were thick but a few large rocks or roots lay beneath the leaves for the snails to cling to. *Thyranophora*, *Pyramidula*, *Pupilla*, etc., under rocks in rock slide. Practically the whole canyon is in limestone, as well as most of the region traversed ~~to~~ E. of the divide.

Our driver says Mt. knobzomy did not extend lower on slopes and here ones not more common 40 years ago than now, thus contradicting other informants.

Reached Logan at 4:30 p.m.

✓ Logan, Utah, Sunday,  
July 2, 1916  
Went first up Logan canyon,

then north into the next big open canyon, two or three miles N. of Logan Canyon.

✓ Sta. 87. <sup>s. side</sup> Opposite power plant at mouth of canyon Logan Canyon. *O. depressa*, rather small, nearly white, with two very conspicuous, usually broad, almost black bands, numerous under clematis and ~~grass~~ bushes on limestone slide rock, scattering for a mile or so up the canyon. *Pyramidula*, *Vitruvia*, *Eucouulus* & *Thysanophora* also found, & *Paludestria* in water crev.

✓ Sta. 88. Next large canyon to the north of Sta 87, about 2 or 3 miles N. of Logan Canyon, ~~half~~ a mile, <sup>on a side</sup> up the canyon, on s. side, under mt. maples in limestone slides. *Oreohelix depressa*, numerous dead shells, a few alive.

✓ Sta. 89. Between 87 and 88, we found *O. hybrida* (?), dead shells about h.s. <sup>at mouth of</sup> ~~on~~ first small gulch



S. of Sta. 88, one *O.* <sup>live</sup> *depressa* like those of sta. 87, at next ledge up gulch, and *Vitrina* abundant, all dead. *O. hybrida*, dead shells found scattered about the mouth of each small ravine and on the open face of the mountain for a mile southward, and in two places a few live ones were found, about half a dozen altogether, one under <sup>open</sup> sagebrush, the others in rock slide under sagebrush none under the arnica, which was not about rocks. Clearly the vegetative cover of the slopes has been greatly reduced by overgrazing. Evidence of this was abundant and unmistakable. The colony is likely nearly extinct and can be saved only by several good, moist years and reduction of grazing.

✓ Logan Utah, Monday.

July 3, 1916

We first visited our *O. hybrida* sta. 42, 1916, about a mile S. of Logan Canyon, and obtained some more of them, then worked S. along the base of the mountains to the next large canyon which carries a stream of water.

✓ sta. 90, steep, narrow, dry short, narrow ravines S. of sta. 42, 1916.

We visited several and found in all of them *Oreohelix hybrida*. The species seems confined to such ravines.

We have found none in any of the larger canyons here.

✓ sta. 91. Good-sized canyon about 4 mi. S. of Logan canyon, which carries a stream used for irrigation in the valley. Large rock slides.

*Oreohelix depressa*, or possibly *albida*, many boxes found under shrubbery & Mt. maples in the slide, and a few live ones. They exhibit "numerous

microscopic revolving striae," as described for *albida*, but that is often a feature of *depressa*. (See also *Phoridae*)

✓ Sta. 92. Small stream choked by water cress, a mile S. of Logan. *Succinea* sp., a few found on the bank, and *Levinseni* *palustris* abundant in the water, mostly young.

✓ Franklin, Idaho, Tuesday.  
July 4, 1916.

Reached here at 1:15 p.m.

We walked to a hill about four miles N.E. of here, on W. side of a water canyon. The rock is volcanic and ~~is~~ tufa(?), cover poor and no snails.

✓ Franklin, Idaho, Wednesday  
July 5, 1916.

Hot day. We walked up into High Creek canyon.

✓ Sta. 93. Dry slope S. E. of Franklin,  
about half way to the <sup>bluest</sup> mountains,  
amid quartzite & red s.s. boulders,  
where ~~the~~ storm waters sometimes forms  
very small (3 or 4 inch) pools between  
the rocks, due north of *O. corrugata*  
Sta. #40, 1916. *Succinea* sp. very  
abundant under rocks and clinging  
to rocks sheltered by scant vegeta-  
tion, some even clinging to the mud  
under rocks & plants. They adhered  
to the rocks by means of a  
glutinous secretion which caused the  
snails to cling to the hand or  
tweezers in removing them from the  
rocks. None taken alive are as large  
as ~~the~~ some of the dead shells.  
Scars left on the rocks showed  
former places of attachment, as in  
the case with *Succinea*. We traced  
dead shells all the way up the slope  
to where we started down into  
High Creek canyon. Probably  
the Idaho-Utah line passes through

the colony. Those we collected were taken in Idaho, close to the line.

✓ Sta. 94. Small reservoir in shallow ravine just north of Sta. 93. *Physa* sp., only a few seen.

✓ Sta. 95. Slides of <sup>quartz</sup> quartzite, conglomerate and red sandstone on north side of High Creek canyon, beginning just within the main canyon and continuing for some hundreds of yards, in Utah, not far from the Utah-Idaho line. *O. s. fragilis*. (See also July 7)

✓ Sta. 96. Similar slide up canyon a mile or so, on S. side. *O. s. fragilis*, larger, not plentiful.

✓ We found limestone occupying both walls two or three miles up the canyon, but no slides and so snails.

✓ Preston, Idaho, Thursday  
July 6, 1916

Cleaned snails this forenoon at Franklin. Reached here at 1:30 p. m.  
Went to the <sup>Bear</sup> river, 2 miles west,  
in afternoon.

✓ Sta. 97. Bank of Bear River, S. of  
bridge due W. of Preston. Layer of  
sand several feet above the water,  
containing fossil Mollusca, including  
a few small Sphaerium valves.

No ~~the~~ mollusks found alive in  
the river.

✓ Sta. 98. On flat alluvial bottom  
land near #97, no stone at all any-  
where near. *Oreohelix cooperi*  
plentiful under leaves in clumps of  
rock bushes, scrub willows, etc.,  
an unusual situation for *Oreohelix*.

✓ Sta. 99. Slough near 97 & 98, but  
N. of wagon and due W. of bridge.  
*Lymnaea*, probably *L. palustris*,  
none found alive. Also one dead  
*Physa* shell. No shells at all were

found in slough across road to the south.

✓ Sta. 100. Muddy bank of Bear River, under willows (overhanging) due N. of Sta. 99.  
Very hot day.

✓ Franklin, Idaho, Friday.  
July 7, 1916.

We passed through here on early morning car on our way south from Preston. The conductor pointed out the Idaho-Utah state line as we crossed it. Sighting eastward, the line runs S. of where we collected Succinea, Sta. 93, July 5, but cuts through the slope to the S. ~~W.~~ E., where the dead snails continued abundant. Hence our specimens are from Idaho, but the colony evidently extends into Utah.

✓ ~~From~~ *Oriobolus fragilis* colonies up High Creek canyon are in Utah.

✓ Smithfield, <sup>Utah</sup> ~~Utah~~, Friday,  
July 7, 1916

Reached here at 7:49 a. m., changed clothes, and started north on foot.

✓ Sta. 101. Limestone butte about two miles N. E. of Smithfield, Utah. *Orchelimum peripherica*, almost wholly devoid of bands in adult. Dead shells exceedingly abundant on all the slopes of the butte and clear to the top, starting near base, thence extending across to the north slope of the entrance to the <sup>big</sup> canyon to the S. E. Very few live ones found. The slopes have been considerably denuded of vegetation by overgrazing and perhaps by drouth, and erosion has washed the soil from beneath the arnica. Scores of dead shells, some of large size for this species, may be found beneath and just below shrubs (*Kunzia tridentata*) where there is now no cover. The destructive influence of grazing upon the



vegetation is plain and unmistakable. Last year was a very dry one, but the unfavorable conditions antedate that time.

✓ Up to the present time we have found no embryos in any of the snails, but occasionally find young dead shells in old dead shells or under the debris.

✓ Providence, Utah, Friday,  
July 7, 1916.

The canyon, sta. 91, in which we found *O. albidus* (3), south of Logan (July 3) is ~~only~~ only a mile or two S. E. of Providence. In returning from the canyon to Logan we passed through the edge of Providence.

✓ Friday.  
Dewey (Deweyville) Box Elder  
Co., Utah, July 7, 1916  
arrived here at 5:15 p.m.

Dewey (Deweyville), Utah,  
Saturday, July 8, 1916

✓ Sta. 102. In mouth of first gulch  
N. E. of Deweyville, at edges of immense  
limestone slides (rock mostly small) both  
sides of gulch, under overhanging wild  
cherry and Mt. maples, *Oreohelix* cf.  
*utahensis*, common alive, abundant dead  
shells. *Vitrea* common

✓ Sta. 103. Next gulch S. of Sta. 102,  
S. E. of Deweyville, same ~~and~~ species(?)  
under similar conditions, abundant  
dead, rare alive. Conditions good.

✓ Sta. 104. Gulch about 2 mi. S. of  
Sta. 103. *O. hybrida*? plentiful under  
Mt. maples in edge of l. s. slides <sup>of Madison</sup>  
very hot & dry, live snails hard  
to find.

✓ Ogden, Utah, Saturday,  
July 8, 1916  
Reached here 6:45 p.m. by interurban



Ogden, Utah, Sunday.

July 9, 1916.

Rode about a mile up Ogden canyon on electric road and walked back.

✓ Sta. 105: Quartzite slides and granite slides for a mile up Ogden canyon on both sides. *Oreohelix* s. *depressa*, dead shells all along, live specimens found in several places by a moment's search, especially abundant under a large mat of *bleuetia ligusticifolia* on one quartzite slide. Formation is granite at entrance to canyon and along <sup>base of</sup> mt. slope to the north, with quartzite resting upon it and dipping east into the mountains.

The dead shells extend also along the west ~~&~~ slope of the Mts. as far as we went, about quartzite and granite slides, to a gulch a mile or so N. of Ogden canyon, but the region had been burned over a few years ago, so the cover is not

now good. Hemphill says almost the first shell he picked up was *O. wasatchensis*, in crevices between quartzite "boulders," ~~and~~ in a space covering an acre. We found no quartzite "boulders" except at mouth of canyon, and there the boulder bed has been almost destroyed by cutting into it for the wide wagon road and electric railway. If he meant the angular slide rock, then why did he find *wasatchensis* first? Everywhere we saw *depressa*, and nowhere *wasatchensis*.

✓ Sta. 106. Small, sluggish stream at N. side of valley ~~just~~ half a mile below <sup>mouth of</sup> Ogden Canyon, *Bygonia palustris* common, *L. obrussa* (?) 2 specimens, *Physa* sp. common, an operculate snail abundant.

✓ Ogden, Utah, Monday.

July 10, 1916.

Took Southern Pacific train across the lake to Promontory Point. Climbed terraces in ~~N. by W.~~ N. by W. direction, then crossed to the isolated limestone butte near Saline.

✓ Sta. 107, isolated l. s. butte near Saline, S. E. corner of southern end of Promontory range. Vegetative cover very poor about rock slides. *Pupilla* cf. *blandi* and *Vallonia* sp. common under a bush in fine rock slide. No *Orchelimum* seen. The contours ~~indicate~~ and old lake terraces indicate that this butte was a very small island during the cutting of the upper terraces and probably possibly was completely ~~submerged~~ covered at the time of the greatest extension of the lake.

We then crossed to the main rise of the southern end of the Promontory Range and climbed several feet up, going up one ravine and

down another. Vegetative cover scant and not of such nature as to protect snails, and the limestones (which predominate here) weather into fragments too small to afford snail cover in the numerous slides. Only one snail was seen - a *Vallonia*. It was not taken.

The southern part of Promontory Range was isolated from the rest and formed an island during the greatest extension of the lake, according to Hague, as quoted by Victor Butler & Heicks in U. S. G. S. Bull. 640-A, pp. 2-4, 1916. Hague says the highest terrace is 940 feet above present level of lake, so we did not reach it.

Ogden, Utah, Tuesday,

July 11, 1916.

✓ Rode nearly to mouth of Ogden canyon on electric road. Then

crossed to S. side and started up the terrace on foot.

✓ Sta. 108. S. of creek, just outside mouth of Ogden canyon, opposite<sup>ed</sup> foundation of large building, at foot of terrace, alluvial slope, with a little fine fragments of limestone, *Oreohelix wasatchensis*, a form not well carinated on the average, under scrub oak, Mt. maple, etc. Dead shells abundant, about 2 dozen found alive. *Vitrea* also common.

✓ Sta. 109. Following up a draw toward the mountain, we found the same species ~~of~~ all the way, but as we started ~~up the draw~~ into the draw they became well carinated and continued so up the slope draw and slope as far as we went, several hundred yards, to a lot of quartzite which is probably what Hemphill referred to as "quartzite boulders". The area last referred to has been burned over some years ago, so the vegetative cover is poor, and

in so dry a season it would be difficult to find snails in such a rock slide.

Hemphill mentions finding them only among quartzite boulders, of an acre in extent. A study of the topography in relation to the business part of the city where he would have started, indicates that he would likely have started up the terrace near town (no street car service to the canyon then) and crossed to the quartzite ~~state~~ locality on his way to the canyon, and thus missed the part of the colony where they are abundant under shrubbery away from the quartzite, as well as the base of the colony where they are not well carinated.

Many of the large quartzite fragments are water worn, but there are also true quartzite slides of angular rocks. The carinated form is abundant under the shrubbery.



All of our specimens were obtained there. They seemed to prefer scant cover of leaves, sometimes only a leaf or two.

Went to Morgan on evening train

✓ Morgan, Utah, Wednesday  
July 12, 1916.

Went up to Devil's slide by auto and walked back. Revisited stations 49, 51 and 56 and collected some more of same material as before at each station.

✓ Sta. 110. On S. side of canyon, below <sup>(west of)</sup> big tunnel, nearly opposite Sta. 53, (south of 53). O. s. depressa in ~~edges~~ edges of big rock slide. Somewhat and hard to get.

✓ Sta 111. at foot of canyon wall near big ranch, about 2 miles E. of Morgan. O. peripherica, showing gradation from plain, through narrowly banded to the albogevia form, on steep slope by roadside, beneath hives.

stone ledge, under Mt. maples, scrub oaks, etc. This is where the canyon narrows below the big hay meadows and separated from the big *O. depressa* slides up the canyon by a mile or two of low sagebrush covered gradual slopes quite unfavorable to snails  
~~Sta. 112~~

✓ Morgan, Utah, Thursday,  
July 13, 1916.

Revisited Sta. 111 this morning, then worked down the canyon, on S. side.

✓ Sta. 112. Next point of rocks, about 200 yards below (W. of) Sta. 111, in limestone slide concealed from the road by shrubbery, *Oreohelix s. depressa*, rather small, white, well banded, common.

✓ Sta. 113. Not far down canyon from Sta. 112, maple-oak slope with numerous fragments of limestone, recently burned over and practically all leaves and undergrowth destroyed. *O. depressa*

abundant dead shells, now found  
aline.

✓ Sta. 114, down canyon from Sta  
113, on slope just above a big spring  
and picnic ground, ~~at~~ a small  
red hill where the canyon opens  
into a broad valley, about a mile  
or so S. E. of Morgan depot, where  
l. s. outcrops at base of low red  
hill, on E. side of ledge, *O. depressa*:  
abundant beneath arnica, sagebrush  
and other overhanging herbs and  
shrubs, many of them deep in the  
loose red soil beneath the plants,  
an unusual situation for this subspecies.

✓ Sta. 115: ~~E.~~ W. end of same  
colony, just W. of ledge, same  
subspecies under same conditions,  
but many of them flatter than at  
Sta. 114.

✓ Morgan, Utah, Friday,  
July 14, 1916.

cloudy morning, cleaned snails  
at hotel in forenoon and shipped

a box of them. The only embryos we have found in the parent shells this season were found today in *O. wasatchensis* and the *O. cooperi* from Preston. Found young in the Muscivium from Ovid.

Started to Ogden at 3:08 p.m.  
At Ogden put up at Newhouse Hotel  
Rained in afternoon.

Bingham, Utah, Saturday  
July 15, 1916

Left Ogden at 7:45<sup>a.m.</sup> on Bingham & Garfield Ry. of the Salt Lake system.

Rained at intervals during the day, but we got out on the hillsides enough to conclude that it is not good *Orchelimum* territory. Steep slopes, no limestone, no good looking rock slides and no vegetation with close overhanging limbs or stems & leaves, hence poor cover. Saw no snails at all.

Came to Garfield in evening.

Garfield, Utah, ~~Saturday~~

Sunday, July 16, 1916.

Reached Garfield over Bingham & Garfield Ry. (Salt Lake Route System) about 5:30 p.m. yesterday. Went to Compaug Hotel #1, a great improvement over #3, where we stayed last year. I called on Alan MacArthur in evening. Mrs. Mac. & sister, Lucile M. Morrison, is with them, but expects to go to Boulder again the coming season.

This morning we climbed up the old lake terraces S. of town, followed an upper one around to opposite Magna, thence up a cañon to the S. W., over ~~into~~ a divide into a cañon which ~~then~~ leads down to the terraces S. of the W. part of Garfield. Throughout the trip we found the region had been swept by a fierce fire some years ago, which seems to have almost destroyed the vegetation. Few

of the blackened stubs of sagebrush, Mt. Maple and scrub oak were more than a few inches in height in many places and leaves deep in the slides were charred. The brush "islands" out in large slides had also been burned. In many places new growth of shrubbery has since sprung up, but over large areas there is now nothing green but Russian thistles. The land snails seem to have been wholly destroyed.

Sta. 116. Rock slides and ledges, chiefly limestone, S. and S.E. of Farfield, O. *G. rugosa*, bones common, numerous in places, but several hours of digging under new growth of shrubbery and deep into rock slides ~~we~~ did not produce a single live snail. The country back of the terraces on the higher ground is mostly sandstone. We found two dead shells in the gulch we came down where now

there is only Russian thistles

Sta. 117. Sand pit on one of the lower terraces s. of the s. ~~W.~~ part of Garfield. Fossil *Leymnaea* and *Palaudastria*.

Sta. 118. Sloughs between the W. edge of Garfield and the ~~old~~ ~~main~~ main line of the Salt Lake & San Pedro Road. Dead *Leymnaea palustris* and *Planorbis parvus*? abundant, a few *Physa* seen, small ones.

Garfield, Utah, Monday,  
July 17, 1916

Drove W. and then S.

Sta. 14, 1915: Revisited this station and got a lot of dead shells same as last year, in rock slide, above a <sup>high</sup> terrace which crosses a broad draw. This is at the N. W. cor. or N. end of the Ogquirk range. Found none alive.

Sta. 12 + 119. Rock slide just below, sta. 14 (down slope), *Archelix*

cf. *depressa* or *utahensis*, common, all dead, burnt.

Sta. 120. - 3<sup>d</sup> or 4<sup>th</sup> ravine N. of Sta. 15; 1915; and low divide to the S. of it. *Oreobolia haydenii* (?) abundant, all dead, about big rocks and among stumps of burnt scrub oaks. The species is not partial to rock slides. All this part of the range is very barren, but new growth is coming up in some places, and a few clumps are now of good size. Found no live ones, and few dead ones in the slides. Dead *Succinea avara* also common in same ravine and all along to Sta. 15.

Sta. 121. Nest gulch ravine S. of Sta. 120, separated from it by low divide. *O. haydenii*, smoother mostly, under same conditions. This is really the S. end of same colony at # 120, probably, as the former extends up on the divide to within 200 ft. of where we first



noted 121 in bottom of ravine.

sta. 122. ~~W.~~ W. slope of Mts. S. of #121 and almost connected with the latter. Small *O. gabbiana*, common, dead, very little vegetative cover now.

sta. 123. ~~W.~~ West ravine S. of 122, S. side, very little vegetation left. Large *O. gabbiana*, common, all dead.

sta. 15, 1915. Revisited this station. Got lots of dead shells, one live one. Very barren since fire. New growth of oaks starting.

There should be snails in several ravines S. of sta. 15. This whole region can be worked easily from Morris, by coming out on morning train from Garfield or Salt Lake, arriving about 8:15 a.m., returning at about 5 p.m. It is a flag station, no buildings, and no agent.

Eureka, Utah, Tuesday.

July 18, 1916.

Left Garfield at 8:03 a. m. reached here at 11:20 a. m. Got rooms at the Tietz hotel - very good.

cool breeze, bright day.

Sta. 6, 1915: Revisited this station on Godiva Mt. Found a lot of *Oreohelia eurekaensis* mingled with small *O. cooperi*. *O. eurekaensis* was plentiful especially on next slope east of where we worked before, but it is a continuous colony. This species seemed to prefer the ~~driest~~ <sup>far</sup> driest part of the limestone slope under arisia where *cooperi* was not so plentiful nor so robust.

Eureka, Utah, Wednesday.

July 19, 1916.

Walked N. E. of Piñon Mt.

Sta. 124, N. slope of Piñon Mt., about 3 mi. N. E. of Eureka. *Oreohelia*

*s. depressa*, a few small dead shells  
beneath *Hemifia tridentata* near line-  
stone ledges. None found alive and no  
bones in rock slides. No *aruisa*.

Revisited Sta. 6, 1915, + collected more  
*O. eusekensis*, confined to *aruisa*, with  
small *O. cooperi*, but not found in the  
western part of the *cooperi* colony -  
only found across draw to east  
where *aruisa* is the only plant on the  
l. s. debris slope. *Aruisa* has large  
arrow-shaped leaves in great cluster at  
base accumulating into a mass year  
after year and hanging close to the soil  
or rocks, usually confined to rocky  
slopes. Numerous flower stalks rise  
from one plant and bear a few narrow  
leaves.

Provo, Utah, Thursday,  
July 20, 1916.

Reached here at 9:30 a. m. Walked  
south along D. & R. G. Ry. to Fishatch  
station on Interurban 1 1/2 mi. N. of  
Springville.

Sta. 125, creek and sloughs from  
1 1/2 to 2 miles N. of Springville -  
same being 4 mi. S. of Provo, Utah.  
*Succinea* sp. abundant in rushes,  
*Lymnaea palustris*, etc., common, an opercular  
found dead - a few - in creek bottom,  
brought down from up stream.

Sta. 126, Gulch 1 1/2 mi. N.E. of  
Springville, *Oreohelix depressa*,  
dead shells common. Made very  
little search for live ones.

Provo, Utah, Friday, July 21, 1916.

Went to Lehi by Intermurban.

Sta. 127. Shores of ~~Lehi~~ Utah lake and  
adjacent slough 2 mi. S. of Lehi, Utah.  
Large live *Succinea* sp. Large dead *Physa*  
and *Planorbis*, dead *Anodonta*, *Sphaerium*,  
*Lymnaea* spp. & many others.  
Some fresh - others probably fossil, washed  
from alluvial soil.

Aug 17<sup>th</sup> 1915

# 1. McCammon, Idaho, One mile north of town on the north side of R.R. under small trees and among large lava boulders found an *Oreohelix* with bands

Aug 19<sup>th</sup> 1915

# 2. McCammon, Idaho. About six miles up Harkness Canyon (directly East of town) and below the first Limestone ledge under leaves and small stones took a large number of a very large *Oreohelix* nearly all without bands.

Aug 21<sup>st</sup> 1915

# 3. ~~Franklin~~ Clarkston, Utah  
A little north of West-  
and about  $\frac{1}{3}$  up the

mountain found a white *Provelix* (none with bands) under scrub oaks and sage brush. (They are between horn color and white). Abundant.

#4 Trenton, Utah Aug 23<sup>d</sup> 1915  
 "The Cliffs" one mile south-west of Trenton found a small ribbed species of *Provelix* without bands. dead ones were abundant but live ones were scarce as a fire had destroyed all brush and leaves.

#5 Cache Junction, Aug 24<sup>th</sup>  
 Just ~~south~~ East of the dam  
 (you have this station)