

DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY  
Geologic Records

J. S. DILLER

Millard area and Taylorville

1906

No. D-47

K-10

Transcribed by  
Oregon State Dept. of Geology  
and Mineral Industries

Thursday - September 13, 1906

Moved from Canyonville by Myrtle Creek to west part of sec. 2,  
T. 28, R. 5, about 9 miles southeast of Roseburg.

Dillard The object of the trip is to study the 'type area' of Leuderback's  
Dillard. We entered it near Ruckles where conglomerate  
and sandstone occur. It is not firmly lithified and looks very like the  
Knoxville but has a few quartz veins at one point. The same  
is true of the sandstone along the Clark Branch road. Near the  
main road and in fact all the way up the stream where  
sandstone occurs and it is the prevailing rock it appears but  
little altered and not hard. There are however at nearly every  
exposure with considerable talus distinct traces of quartz veins.  
They are never prominent, at least as far as I saw and some  
times scarcely perceptible but nearly always one finds in the  
talus fragments with small veins of quartz. The rock is  
greatly fractured and sometimes sheared somewhat so as to almost  
wholly obscure the bedding planes. Maybe when we find the Knox-  
ville here and compare the two this will look less like the Knoxville  
but it certainly (excepting veins) looked much like the Knoxville.  
Tomorrow will tell better for we must trace the fossiliferous  
beds and see if they are quartz veined and sheared or altered in any  
way.

Friday - September 14, 1906

Camp at Mrs. Neal's at 4, sec. 1, T. 28, R. 4 - south fork of Deer Creek  
8 miles SE of  
Roseburg.

Knoxville

The hill in road corner in 1, Sec. 1. I ascended from camp on south side and passed over hill to road. Rock is mostly sandstone but some fine conglomerate.

Rocks much fractured and crushed, sometimes much slickensided occasionally veined small irregular veins. Sandstone well exposed on road and around west side of hill to south fork. I saw no fossils but Storrs who went around eastern slope of hill found aucella at a number of points beginning near creek and around east side to road. He found the best ones, excellent specimens of aucella in middle of old road to north side of hill. The road has been changed within the last few years and sandstone is well exposed in old road much crushed and sheared and somewhat veined with calcite - and certainly Knoxville for aucella of Knoxville type.

Fossil The aucella which Storrs found at SE base of hill I number 6910. He says it is the best he found at that place. The shell appears to have had a hole. The rock he says is full of fragments of shell but this is most perfect one.

Gray SS The shell found in road at north base of hill is 6911. The rock at Dillard ? this point is fresh hard and gray and sample 6912. It looks like the so-called Dillard but is not sheared in rock so as to give it a schistose structure like that of Thompson Creek but is sheared along fractures.

Diabase Having thoroughly wet my feet I went to Roseburg for rubber boots and slicker so as to work in rain. Returning I left the \_\_\_\_\_ 2 miles north of camp to in sec. 35, T. 27, on what I have mapped as diabase in Roseburg Folio - Ed. East of it between it and sandstone

Amphibole I find a greenish rock mapped as amphibole schist. Near it on east side Schist is what appears to be greenstone or Ed and some well marked serpentine whose area is so small it was not mapped.

Serpentine SE of this all is sandstone and some shale and some fine conglomerate.

Knoxville I go nearby E. up spur in sec. 36 finding sandstone to top where I find Fossils in it distinct fragments of aucella but no complete shells. Storrs too says clearly aucella. I descend spur SW to road in SE corner of sec. 35 and find traces of fossils on spur.

Arriving at road find crushed sandstone and sheared as fragments and slightly veined with calcite. Veined sandstone was found on spur going up and down also but very little and always calcite excepting one small veinlet of quartz about 1/12 inch thick and seems to fill fissure of crushed rock just as calcite does when filled at all. By the road I found a trace of aucella. Yes, Storrs agrees it is aucella.

SS older  
than K ?

There does not appear to be any reason whatever for supposing that  
any of the sandstone seen today in sec. 1, 35 and 36 is older than Knoxville.  
It

all looks the same as illustrated by the three specimens.

On my way up to this camp from near Ruckles I casually  
observed the rocks especially along the lower portion of Clarks Branch  
as noted on page 1. I am now inclined to the opinion that it is  
all Knoxville and that we can find traces of aucella there. This  
must be examined again.

Saturday - September 15, 1906

Aucella

Camp Neal - I up fork road east. Storrs to hunt leaves Oak Creek.

Find aucella fragments distinct in fine conglomerate and sandstone by  
turn of road 1/4 mile east  
of hill.

Followed up road through sec. 31 to marble quarry. Saw sandstone at a number  
of points and some conglomerate. None of it veined more or different from  
fossiliferous Knox-  
ville 200 yards below. SW of marble is yellowish sandstone (weathered)  
full of scales

of some micaceous mineral. In creek near marble is greenish sandstone not  
veined or only in traces. Find no fossils in it. In open cuts to remove

Marble &

li there is gray sandstone, most of which is somewhat veined with

SS

quartz. It is a hard sandstone 6913 with only very small veins of quartz.  
It does

Quartz veins

not appear to be cut by veins of calcite though the li or marble is greatly  
veined with calcite and very little if at all with quartz. The  
reddish gray siliceous li has spots. Are they radiolaria or infu-  
soria. See chip 6914. There is some chert here too and hematite.  
Veining of all kinds is more abundant in the immediate vicinity  
of marble than anywhere yet seen, but sandstone in creek not 100 feet away  
is not or at most only merest trace of vein.

The gray sandstone in quarry is greatly fractured like all others and in com-  
position has dark veined spots and spots of carbonized vegetable matter  
like so

much in Knoxville. There are spots suggesting shells but none certain.

The marble is longest parallel to creek and is exposed over 100

yards NE of the marble sawmill. The sandstone is in line and decidedly veined  
with quartz and hard. It looks more firmly lithified than the Knoxville  
but in composition and color like it. Could not find fossils - must look  
again.

- Aucella In sec. 29 go up ravine in which spec. 3999 was collected, find small aucella in fine conglomerate loose pieces. Saw some fine conglomerate in place among very hard but not veined beds but saw no aucella in it - aucella continues far up slope toward top and should appear on top on sandstone but have not yet found it.
- Q.V.S.S. Descending NW or nearly so toward 4 corners find gray sandstone well veined with small veinlets of quartz. One little piece of conglomerate seen but no fossils at this point. Exposures on lower part of spur few but at end in stream bed
- Fossil in sec. 29 is some fine conglomerate and C. The conglomerate is made up largely of small fragments of aucella which have been dissolved out. They were so small and abundant that it is difficult to find a definite piece that is certainly a fossil and yet I have little doubt. Storrs says -
- SS These are not far from western limit where the amphibole schist occurs. I turn back up the next ridge SW finding few sandstone and some shaly outcrops like Knoxville. On top find K fossils in dark sandstone without veins. Descend to SW through eastern part of sec. 36. Saw some good examples of small quartz veins in gray sandstone

Could find no fossils in it but farther down fossiliferous sandstone comes in again yellowish with well defined shell fragment but no sign of veins. This fossiliferous Knoxville and that on top are quite strongly contrasted with the intervening quartz veined sandstone and I take 3 specimens as samples.

6915 Fossiliferous Knoxville sandstone, 7 sec. 30, T. 27, R. 4.

6916 Quartz veined, hard sandstone, 3 sec. 36, T. 27, R. 5.

6917 Fossiliferous Knoxville sandstone, 6 sec. 36, T. 27, R. 5.

It certainly seems that the quartz veined material of the marble quarry as well as the QVSS at the two points - north and west of marble quarry are distinct from the fossiliferous Knoxville. They seem quite distinct between 6915 and 6917 but north of marble quarry the sandstone in the region of the fossiliferous Knoxville is very hard but not veined and contains fine conglomerate which as yet has yielded no fossils but must be looked at.

To illustrate rock very full of nucella fragments yet scarcely identifiable I take 6917-a fossil NE corner of sec. 30, T. 27, R. 4, i.e. 2 miles SE of 4 corners - Dixonville. I should have gotten good specimens but could not. Bunch rock composed largely of such material. Fragments show only on weathering and shells having been dissolved out are hard to identify.

Sunday - September 16, 1906

Camp Neal - Storrs south and I SE to boundary of Myrtle.

Cong. & I go up stream from sec. 7 across corner of sec. 6 into 7, T. 28, R. 4

SS Find fine conglomerate and sandstone in sec. 1, 6 and 7. Only 1 quartz vein seen in conglomerate pebble.



Great mass has no quartz veins. Conglomerate has many shale fragments and  
looks

very like Knoxville but see no fossils. Sandstone much the same though the  
stream

has some dark, hard sandstone that is veined with quartz.

Continuing SE in sec. 7 at forks is fine sandstone locally veined with small  
veinlets of quartz. All the veins are small and fill little fractures but  
parts of quartz

Quartz  
Veins veins often not full as if either something dissolved out or else never filled.  
If

filled then the dissolved mineral later for in ends of quartz crystals.  
Most likely

not completely filled.

From forks slopes steeper, ascend spur toward Brushy Butte - believe

forks composed of fine conglomerate and mostly sandstone occasionally veined  
with quartz but

generally not. Not more fractured or altered than that near camp, or does not  
look more altered.

Conglomerate weathers yellowish and soft. Fresh gray has many small  
slate fragments and looks like Knoxville excepting occasional quartz vein.

Rather rarely grains break. They pull out on fracture generally.

Follow the ridge low and up and down to road which I follow a little way to  
greenstone and serpentine and a little later cabin. Nearby is sandstone or fine

conglomerate gray and breaks through grains but no sign of quartz veins.  
It has

small shale facets and from large fragment I take type specimen 6919

very close to serpentine. Map here seems to say D. That is metagabbro of dioritic phase and maybe S is not large.

SS & Shale

Return down stream to south fork Deer Creek above mouth of stream ascended and find

good exposure of sandstone and Sh. Much sheared but not veined at all.

Strike N. 30 E., dip 70 SE

to vertical. Thought surely would find fossils but could not.

Go by forks of road in SW corner of sec. 36 where Storrs collected 6911

and I get fresh rock 6912 of which Storrs makes specimens.

Storrs followed road south through sec. 1 at pt. of hill in 2 sec. 2. He

Aucella

collected aucella 6918 an aucella in a gray sandstone or fine conglomerate with small

fragments of shale. The aucella is a good one even to the \_\_\_\_\_ and it seems to

indicate that the sandstone and fine conglomerate I saw. In 6918 grains bear out on fracture 6919 not so

6919 type sandstone of eastern border - noted above.

SS & Cong.

Storrs found sandstone and fine conglomerate and some shale. The shale was in sec.

& C.

7 half a mile SW of where I collected specimen 6919. The sandstone and conglomerate he saw were just

like what I saw. He hunted carefully for fossils but found none nearer

the contact than 6918 which was a mile away. Yet the material

containing 6918 is very similar if not identical with that I saw

and he saw up to contact. He reports a few traces of quartz veins in rocks

which he thinks identical with other. The quartz veins he thinks are

local in same rock. It is possibly so but we must find fossils. I

found a few quartz veins but apparently in same rock also but no fossils

with it. The rock looks very like the Knoxville that contains the fossils.

SS & Aucella This afternoon Storrs went out half a mile SE of camp and found near center of sec. 1, T. 28, R. 5 a fine aucella in the yellowish sandstone which contains numerous shale fragments. It is so good an aucella without striations and with an \_\_\_\_\_ that I take it as No. 6920. The rock contains as he says many small fragments of aucella.

Position of Shale & SS & Shearing Sunday evening - Where Storrs collected some fossils a short distance south of camp he informed me the position could be determined so I went and found a mixture of sandstone and shales much crushed yet the line between sandstone and Sh well marked. The best position observed is strike N. 30 E. and dip 90. Two others nearby but not so good gave strike N. 10 E and vertical. In the section well exposed in a deep stream cut gutter sandstone is most abundant and usually 5 feet or more thick. Has been much crushed and sheared but not internally in the sandstones so as to produce schistose structure but rather along fractures producing slickensided pieces. There is more shale seen today than any day yet on this large one of Myrtle.

Monday - September 17, 1906

Camp Neal - Storrs and I to marble quarry and camp.

Cong. 1/3 mile SW of marble quarry and mill is a bit of conglomerate with pebbles up to an inch through. Among these is red chert with white quartz vein and some little pieces which appear to be li, see 6921. If li this conglomerate may be later than marble.

Fossil SS This may be Eocene or Horsetown same as fossils 6922. Nearby 1/8 mile SW of marble by road is yellowish weathered sandstone with fossils - 6922.

It is soft and suggests Eocene but large pieces fresh inside are gray and harder.

Storrs found a few shells - small gastropod and bivalve but no sign of definite Horsetown or Knox. fossils seen yet.

The greenish or gray sandstone very near the li appears to be same. It was noted other day. It has a little bit of calcite veining on shear planes and it is distinctly sheared though soft and new looking.

Q.V.S.S. In marble quarry is distinct quartz veined sandstone in which we hunt for fossils. It is hard and gray and looks older than last two.

Spec. 5923 to illustrate QVSS with marble was taken along road NE of quarry 250 yards.

A little farther along beyond elbow in road and on opposite side (NW side) of valley found sandstone and fine conglomerate. The sandstone strikes N. 70 E. and vertical not veined but hard. Fine conglomerate rotten and has yielded no sucella yet.

Fossils & V. SS ? Up the next gulch at first falls sandstone strikes N. 65 E., dip 54 NW apparently but

not certain. The sandstone has a trace of quartz veining but very small yet distinct - Q ? but some small calcite sure.

- Aucella cg.** At second fall about 5 ft. (1st is 7 ft.) on edge of crest is fine conglomerate with sandstone and the conglomerate contains fragments of aucella - spec. 6924 - 3999. The strike of the conglomerate is about E.W. and dip 70 to S. This is best observation on gulch and based on structure.
- The other may have been joint plane, that is the last. The one on road is sure vertical.
- Q.V.S.S.** Yes, we have some sure quartz veins in the beds here but very sparingly - 6925. I take also calcite veins 6926 to see if calcite not later than quartz. Go up road toward next marble and in 2" gulch NE of fossils find sandstone and Sh strike N. 78 E., dip 73 SE. Some thin bedded sandstone and Sh and dip 90 to steep NW also, but strike all about same.
- Marble** Went to find li in sec. 33 but didn't find quarry. Saw li and on creek E. much sandstone and fine conglomerate with shale patches just such as we saw yesterday east of Deer Creek.
- Sandstone** Followed road to summit near center of sec. 30 and went east on divide to contact. Nothing but a few fragments of yellowish sandstone seen. They look like those seen SE of valley yesterday excepting they do not contain distinct shale fragments.

Aucella grained Descended road north to north boundary of sec. 30. Found grained aucella sandstone near

SS

top and in shaly sandstone near midway while shale forms \_\_\_\_\_ at turn by barn.

Returning at the forks of the road in SW corner of sec. 30 at forks of road I find shaly sandstone with distinct fragments of aucella even better than on

other side so no doubt Knoxville by road.

Edward Joquins now owns marble of SW $\frac{1}{4}$  of sec. 28 at head of south fork of Deer Creek.

It is overlain by bed of red chert very ferruginous. Is gray much veined with quartz and dip

westerly apparently. Opposite to Knoxville on opposite side.

Continuing west into sec. 29 I find fine conglomerate and distinct shells. Some sandstone also which

is veined clearly but all the veins tested or examined are calcite and not quartz.

Eocene or

Just below marble works, say 1/8 mile, is yellowish sandstone

Horseshoe ?

like Eocene. Storrs collected fossils at one point - 6922

and connected it with conglomerate 6921 but it is not same as sandstone just south of the conglomerate.

Tuesday - September 18, 1906

Camp Neal - I up Whitsetts Branch of south fork.

Conglomerate and sandstone on Whitsetts Br. short distance above forks - conglomerate full of slate fragments

and hard, associated sandstone veined with quartz - and nearby are veins of calcite rock

fresh and hard and conglomerate full of sandstone or slate like old pebbles in California.

Cong. Up creek 1/4 mile find much conglomerate interbedded with sandstone and conglomerate has fragments up to  
 & 4 in. diameter and contains numerous fragments of li but li gray and not veined and not  
 SS like that of this region now - many sandstone fragments. See no chert. House by first  
 forks. Take left through gate to Whitsett's place at foot of hill. This hill is of sandstone  
 much fractured and veined with small veins of quartz. 300 yards farther up by forks of road  
 see no quartz veins in sandstone and less altered. Not so hard but see no fossils.  
 Nearing Adams I come to greenstone and turn back. The stream bed  
 by the road near contact has not much greenstone (small stream bed) but  
 has much fine sediments, compact sandstone. Some a little shaly so eastern border  
 region here must have fewer beds or else they lay beyond. I map an area  
 beyond. Certainly conglomerate does not curve to contact near coarse sandstone in great  
 mass. There are some fragments but not common.  
 On steep slope nearby fine compact sandstone or shale not slaty but breaks up in chunks.  
 It is like that of stream just noted. Veined but not conspicuously. In the main  
 stream bed nearby the sandstone and fine conglomerate and slaty fragments all look much  
 like the Dothan of Doe Creek and one would expect Jurassic sucella. The rocks  
 east of li belt are much more generally veined with quartz and yet not conspicuously.  
 A little lower down, i.e. west where road crosses stream come to lighter gray sandstone - rather fine but seems to have much calcite and calcite cement. If  
 so it can hardly be Dillard according to Louderbeck. See spec. 6927.

sandstone in stream strikes N. 25 E., dip 90 - much twisted and some veined  
with quartz.

This is just above eastern forks of road and sandstone yellowish, varying  
coarse and

fine and fine conglomerate banded parallel to stratification green above.  
This seems more

siliceous than 6927 so I take it 6928 and farther down at foot beyond fork  
of road west of Whitsetts take conglomerate with numerous shale fragments 6929.  
No trace of fossils this side of li.

Saw piece of Eocene fossils at Whitsett's house. They do not know where it  
came from.

#### Afternoon

Go to trace out relations of quartz veined sandstone to fossiliferous Knox-  
ville, on spur 1/2 mile NE of camp. The QVSS occurs on spur between  
good fossiliferous Knoxville and go to trace out relations.

Shell

Cong. &

SS

Going up spur NE from road about 150 feet above road find a  
ledge of sandstone on side of gully. It has some *aucella* nearly or quite  
complete. Otherwise it contains a multitude of shell fragments and  
were it not for gradation in size one could not identify them. Here the  
identification is certain. Now when the shell fragments are dissolved out they  
leave holes which occasionally contain shell markings but generally too small  
and difficult to identify were it not for these complete cases to prove what  
they are. The shell fragment sandstone is one of most important/<sup>of</sup>Knoxville  
forms and widespread.

Knoxville

Going up spur find all along a yellowish to gray well marked sandstone medi-  
um grained to coarse and fine conglomerate and frequently with fragments of  
shells



or holes where leached of shells. On the whole rock rather soft.

Dillard

Come to sag in ridge and hill beyond is dark gray compact fine hard sandstone  
much

fractured. More than Knoxville near it, and hard with distinct quartz  
veins locally and no trace of shells. This continues up spur to crest of  
ridge. Turning

NE soon come to gray Knoxville with fragments of shells. The sandstone  
with the

Dillard are, when somewhat coarse and gray, very like the Knoxville. Yet  
if this is Knoxville it is mixed with Dillard. The sandstone most common among  
the veined quartz material are 6930 finer (not effervesce) and 6931 coarser  
(effervesces slightly in strong acid)

The latter looks very

like that bearing aucella fragments and but for the fossils would be the  
same essentially 6932 (effervesces more than 6931) is aucella bearing for  
comparison. It is not so fresh as

6931. If these two are alike then two formations differ but little, yet how is  
it that no fossils are found in piece with quartz veins or that looks like that  
with quartz veins in it. Found a small piece of red chert with the quartz  
veined material. This association would be natural of course.

Dillard sandstone strikes N. 5 E., dip 80 SE. This is good one on left side  
west side

of ridge ascended. Descend SW to road the QVSS extends down the rill valley  
to near the road where it is replaced by the K SS and conglomerate. The  
contrast

everywhere between the fossiliferous Knoxville on the ridge and the

Q veined sandstone is generally strong. The Dillard seems finer, harder and

darker but when dry they look much lighter. They should have siliceous cement. In the rill running SW through sec. 36 they contain calcareous nodules like fragments of limestone but very irregular possibly in part at least from solution.

The hard siliceous veined sandstone - occupies a large area is not a phase of the Knoxville I don't believe. The change is abrupt but being covered is under. It is not exposed on the gentle slopes of this region.

The absence of aucella from the SE part of the belt and from the siliceous sandstone about the limestone and also about Knoxville leads me to believe that Louderbeck is correct as far as that is concerned and that it is older than the Knoxville and separated from it by a large interval.

Storrs went to NE end of Myrtle formation on north fork of Deer Creek and found aucella at 6 places. Eocene shells at one and leaves at one. Of the aucella I take two specimens.

Fossil

Aucella

6933 is just NE of dike or small mass of gabbro in sec. 21

T. 27, R. 4. It is not far from greenstone and maybe shows it cutting K for fossils on both sides. This is fresh sandstone, dark gray, veined with calcite but no certain quartz. The specimen is particularly good in showing a good aucella and also many minute fragments.

6934 is in fine conglomerate that looks like the conglomerate east of the limestone somewhat. It has many feldspar or kaolin particles making white speckled and the aucella fragment is plain. It comes from point of hill in road at north part of sec. 22. He found

succella too at very end near 2 houses where it passes  
beneath the Eocene.

Storrs says Eocene limit is 1/4 mile SW of where it is  
mapped. He found good Eocene fossils near south line of sec. 14  
between the 2 houses on map. The fossils - No. 6935.

He found some fossil leaves 6936. They are certainly in  
Eocene and some of leaves are fair and may help since they lie  
at the very base of the Eocene.

Storrs is not sure that he saw any sandstone or conglomerate veined with quartz.

Wednesday - September 19, 1906

Camp Neal - Trip to Whitsett li - Storrs to li, I divide.

Limestone

Leave wagon on divide and I go SE by NE end of li where it appears to strike N. 35 E. and dip 80 E to 90. Seems to have fine conglomerate and sandstone on west side to road and shaly beds on east contact passing in a few feet into sandstone.

SS

By the li on east side is sandstone gray but no quartz veins seen. It breaks around some of grains at least. Take chip 6937 to study under microscope. This must go with li and if one Dillard other is and should have siliceous cement.

Cong.

There is fine conglomerate rotten nearby but can't find fossils - no holes as it should have if shells about, has kaolin particles and all else - but no quartz veins either.

Cross hill on top of which is rotten arkose sandstone and fine conglomerate in which I look and expect

fossils all the while but find none. Follow up divide in gap find trail or old road it leaves divide on east side and goes to foot of steep slope. See much

hard sandstone with quartz veins and some conglomerate in stream bed but no fossils. Follow

up farther cow trail find sandstone some rather coarse and a little fine cong.

quartz veined but no fossils. Looks like Jurassic, see no black shale particles here nor g. either must be some distance from contact. Yes, there are some good ones. These rocks look like those of Thompson Creek.

Returned to divide and back to road - before going NW of road on divide I want to

Q veins

note that no quartz veined sandstone was seen about the li nor chert. I saw only the

end and by main mass at Whitsett's there may be much. The sandstone chip taken

nor fragments of conglomerate seen on both sides nearby contained no veins,  
but going

eastward beyond the hill into the south part of sec. 14 Q. veined sandstone  
appears and also

QV fine conglomerate as in Dothan.

The hill slope in the first 1/4 mile NW of road in NW $\frac{1}{4}$  of sec. 14 is ascended  
by an old road grade exposing sandstone and a smaller proportion of fine  
conglomerate in

several beds. The first conglomerate is not firmly lithified and looks  
promising for fossils

but yielded none. The 2' near summit of hill is much firmer and siliceous.

The sandstone which is predominant or most abundant is brownish gray with  
calcareous veins and cement. It weathers with a brown coat and one expects  
fossil

remnants in it but I found none. Certainly the cement is calcareous

ment calc.

and if this is characteristic of the Knoxville and distinct from siliceous

Knoxville ?

Dillard, then this hill is largely Knoxville. No quartz veins seen at all

but those of calcite not uncommon. Well this seems good reasoning

Cal. cg

for I soon find fine conglomerate just like the siliceous last noted excepting  
cut

K fossils

by calc. veins and has fragments of sucella. I doubt very much in case of  
silic-

eous replacement of calc. fossil and silic. veining this could have been  
discovered

but the holes I noted first in calc. cg. and soon found traces of shells. See  
spec. 6938. No I will not take these, Storre got better ones not far away.

Calcareous sandstone continues and predominates to the mass of

As. in the gap. There is conglomerate at one point and calcareous but not  
fossiliferous

where I carefully examined it.

The low gap in 9, sec. 10 is open field and a farm road goes through.

No rock seen but sandstone on either side and not over 100 feet apart. In gap  
there are

pieces of red chert common and it was this that made me mark it with the  
gs (4951) half a mile to SW. It is a very doubtful case for no exposures in  
open field as far as I can see either way. Sandstone on both sides is  
calcareous. Going up

hill on NW have many pieces of yellowish sandstone just like that of K -  
so full of

fossils NE of camp - but here I can't find a trace yet. The lithological  
character is so close that I think these must certainly be Knoxville sandstone.

Calcareous sandstone continues to form divide to western limit but last hill  
only top is sandstone.

Below on NE slope much quartz and older rocks. Some serpentine in ravine and  
greenstone

on divide NE. As if Knoxville only a cover for it is not altered in the  
least. No

fossils and yet I am sure it is K. No veins of any kind just as fossiliferous  
K.

At forks of spurs to NE and E sandstone strikes N. 62 W., dip 25 SW underlain by  
greenstone or some other old rock. Does not seem much altered.

N. 35 E. from this over sandstone of same kind for 1/4 mile cross ledge of  
this sandstone then

in 40 ft. come to schist - mica schist, greatly contorted with quartz seams.  
Rich

in quartz, strikes N. 35 E. and dip 90. In 50 ft. this carries it under  
Knoxville which is

not altered at all - so schist older than K. There are a number of ledges of

schists and greenstone which should be separated here from K on map. Also some serpentine. K SS here seems to have a gentle dip and must surely be much later than the schist and unconformable with it.

Swing around on spur in NE $\frac{1}{2}$  of sec. 10 and find fine ledge of chert - strike N. 30 E., dip 90.

Runs near SE side of line of serpentine.

Next to chert sandstone strikes N. 5 E., dip 52 NW. This sandstone looks rather like K. It is not

greatly fractured, sheared or veined. It is dark not very hard and weathers yellowish.

I believe it forms a part of K blanket over the other and forming hills especially.

This chert, serpentine and schist strike under ridge of K only short distance SW. Near

by the last ledge of sandstone giving the above dip and strike I found a loose piece of

sandstone like it with distinct quartz veins so I feel confident that

the K locally has quartz veins in it but not generally or even much

of it has quartz veins. The sandstone continues to road where I find Storrs who thinks it is Knoxville.

Storrs found more fossils in Whitsett's li - crinoid

li - fossils

gastropods, little ammonite and c. He suspects Jurassic - 6938.

Aucella SS

He found a pencil sandstone just west of li between li and road and in it across the pencil structure are large aucellae 6939. Some of the sandstone is decidedly calcareous with brown border of weathering just as I noted it on ridge today west of road. He found aucella in such calcareous portion and also in fine conglomerate across the road from 6939. The aucella sandstone is so close to the li it is hard to make the

two of different age. He says there is no chert with this lens of li as with the marble. There is some glaucophane schist fragments there.

Thursday - September 20, 1906

Move from Neals to Ruckles.

Contact region The contact region SW of Neals seen yesterday is one of prominent ledges on gentle open slopes. The ledge may be gs, g. c, or sandstone and cannot tell without examining each and may be two kinds of sandstone. All small and much covered so map complicated.

GS A ledge of GS appears to occur near Whitsett's li though the li I believe belongs to the Cretaceous. The ancilla Storrs found is several hundred feet away on west side but sandstone same apparently up to li ? and the same sandstone or one like it appears on east side of which I took chip the other day. That sandwiches the li completely I think and keeps it with the sandstone but near contact of great sheet of nearly vertical Knoxville resting on irregular up surface of Dothan.

The knolls forested with oaks are mostly Knoxville sandstone like that at Neals.

SS and Gg By the road in 1, sec. 22, T. 28, R. 5 is conglomerate that has been quarried a little.

It contains little ferruginous spots like fossils but could not get any also  
\_\_\_\_\_ certain though I saw some fairly good so I mark locality as K ?

& Li Saw no li here but some seen years ago. Saw some this a.m. by road on hill between here and Whitsett's.



Turning down Roberts Creek at forks I come to hill in 5, sec. 16 that has Mg and C and SS on top. I don't go up. Next I come to rotten yellow sandstone by road in

6, sec. 17 but see no fossils. Look on side hill. Sandstone is gray micaceous with much

white feldspathic material, yet the quartz grains are rounded to a considerable extent and it is not definitely arkose. This I suspect is Dillard ? but may not be. It looks like \_\_\_\_\_. This sandstone when fresh is not yellow but

most likely gray and brown with age and weather. The hill ascended in 5, sec. 24

has no outcrops excepting in gutters by road but it seems like that along the road from the corner in 6, sec. 17 of next T. east. This is sheared somewhat in material \_\_\_\_\_ but also in fractures. Has no distinct trace of fossils yet seen. Shale spots often abundant and mica occasionally also.

I think this must be K for no trace of veining.

N. 58 W., dip 65 NE. This appears to be a little shale strike in the arkose sandstone but is ? It occurs in 1, sec. 24 probably. Roads have changed so

much I cannot tell. In Roberts Creek very little greenish water, there is a mass of the arkose sandstone I have been following for miles. It is somewhat fresher here and has the ? shale strike. This is very ? This arkose has vein matter on sheared places. White and soft and calcite. No quartz seen.

This looks much like the soft material in south fork of Deer Creek at Marble mill.

Arkose

SS

The arkose sandstone of Roberts Creek is important and I believe related to that of Winston's, i.e. Knoxville.

The Roberts Creek arkose extends to RR and is well exposed near road crossing to enter main wagon road. It is distinctly micaceous like that in 6, sec. 17 and has continued all the way. No fossils, not even a trace seen all the way but rotten arkose unmistakable at many points and will see later if Knoxville.

Chert ?

At RR by road crossing are several dark somewhat siliceous bands which I suspect may be radiolaria ooze. It looks reddish in place. Is very brittle as the arkose in which it occurs if not equally so. This reminds me very much of the radiolarial material on Salmon Creek in the Cretaceous. I take chip 6940 for examination and comparison. If this is radiolarial it is of much importance especially if we can show the arkose to be K.

It certainly looks as if this soft material formed a blanket here with the chert, GS and G protruding. Must go to Winstons later to prove age of this arkose.

Roberts Hill

Ascending the grade of Roberts Hill find sandstone and shale. Some is thin bedded

SS and

but most of sandstone is in thick beds 20 to 50 or more feet and much crushed and slickensides coated and veined with calcite. Some of sandstone in fact nearly all

Sh.

is arkose like. Beds appear to strike nearly E and W and dip steep south, say 50 to

70. Shale and sandstone in nearly equal proportions make up the hill and are often

much sheared and crushed and impregnated with calcite but no quartz seen though examined at many points.

- Geol. map  
correction
- Top of Roberts Hill on south side is G crossing the road (piece of chert here too) and area to east should be extended to road. Took chip 4582 year ago for comparison. If this is G and beds of Roberts Hill K, then G cuts them. The G is clearly veined with quartz and adjacent beds greatly disturbed and altered. It is succeeded by shales and sandstone and must surely cut series. Take chip 6941 of greenstone.
- slope Roberts Hill
- Descending south slope find chiefly shales and shaly sandstone much slid and covered.
- At first dry stream turn up to house where gray sandstone like that of Whitsett's li is exposed but can find no fossils. These all look Knoxville but can't tell - certainly without fossils.
- SS & Shales in river
- Strike N. 35 E., dip 70 NW at fording where main road comes to river south of Roberts Hill. Sandstone by far most abundant, fine and much cross fractured, minute quartz veined across bedding. Beds range from 2 inches to 5 ft. generally about 2 to 4 inches. Hard and rather flinty and this must be Dillard I think.
- Doesn't look promising for fossils.
- Greenstone
- At the SE side of this exposure just above fording there is greenstone. It may extend up the river for nearly 1/4 mile but most likely only 50 to 100 ft. then sandstone.
- SS and Cg
- At 2 RR crossing on west line of sec. 1 there is much irregular sandstone and some conglomerate in river. Conglomerate has li pebbles like that of Deer Creek. I see by

last year's observation or earlier strike N. 20 W., dip 45 SW. It is veined with quartz and looks old.

From this day's observation I feel confident that the arkose sandstone of Roberts Creek is K. Also all the sandstone and shale of Roberts Hill, but

by river SE of this by road the rocks look like Dillard.

Storrs found good aucella (6942). This lies E. of the line of the limestone on one of the forks of Roberts Creek in 5, sec. 21, T. 28, R. 5.

He did not find anything at all on Clarke Creek but thinks they are all Knoxville for no quartz and considerable calcite but I saw some quartz going up. 6942-a samples along valley of Roberts Creek.

Friday - September 21, 1906

Camp Ruckles - Hunt in slates.

Slates

At north end of area on right bank of river are fine slaty sandstone, thin bedded and some thick bedded and all full of quartz veins. Strike N. 20 E. and nearly vertical. Much squeezed, crushed and sheared and yet much looks promising for fossils. The big sandstone are most crushed. The slaty sandstone have scales of mica or splitting planes. Fine sandstone are platy.

Jurassic

Aucella ?

We hunted in slates and sandstone by the river above Ruckles and finally Storrs found 1 good aucella. We hunted long at same place but found no further trace. It is numbered 6943. This area which I thought was all slate is largely

gray sandstone. There is much slate - dark - but sandstone forms a very important

part also. Both are much fractured and have many veins of quartz. Mostly across bedding but sometimes along irregular fractures.

SS and slate

There are no large veins of quartz. Beds of sandstone up to 20 or possibly 30 ft. much fractured and crushed but bedding often distinct.

&

Cg.

Strike N. 30 E. and dip about vertical. There is some conglomerate, but no calcite veins seen. Rocks are decidedly more veined than any of the others and like those of Thompson Creek but veins small, they are chiefly veinlets. Sandstone often has scales of mica in bedding plane. The aucella, a good example, was in fine sandstone. As a sample of the siliceous sandstone of this Jurassic Dothan belt, take chip 6944.

Afternoon we went up to Clarks Br. to find aucella but failed.

The sandstone and conglomerate of Clarks Br. has some quartz veins but generally

SS and Cg

calcite and calcite was largest and most conspicuous though small. The rock looks like arkose somewhat but is much less clearly so than that of Roberts Creek. I take spec. 6945 made up of 2 small pieces, one fresh and sheared of which chips were

taken and the other showing the white spotted, weathered surface. We couldn't find even a trace of fossils.

Saturday - September 22, 1906

Move from Ruckles to Dillard

Arkose

of Clarks Br. near forks of road has both quartz and calcite veins and is much sheared.

At RR crossing next north of Clarks Br. the sandstone and conglomerate are well exposed by

river very rough, broken and sheared and veined like that of Clarks Br.

and but not greatly veined. Conglomerate and sandstone appear to strike N. 50 W., dip 60 NE.

This does not look as old as thin bedded sandstone at fording 1/8 mile farther N ?

SS thin  
bedded

At fording the thin bedded sandstone and shales strike N. 50 E., dip 70 SE - position

varies. That noted on p. 13 is N. 35 E., dip 70 NW and this last is more common but variable. Bed veined in small way but not so much as

I thought on p. 13. The sun of a.m. makes a difference. Much

veined appearance is due to deposits in fissures. These fording thin bedded shales and sandstone are similar if not identical with those of Roberts Hill. They look somewhat more altered but then they may have been deeper seated and more effected by pressure and circulating waters. These fording beds after all may be Knoxville but ?

Conglomerate

On rim for 1/3 mile above mouth of Willis Creek is conglomerate which appear to strike

N. 60 E., dip 70 SE. It is conglomerate of well rounded pebbles chiefly sandstone and beds clearly but

not prominently nor abundantly veined with quartz. Veinlets are locally abundant and run about N. 35 W. and vertical.

Q. veins

SS

In river at fording just below mouth of Willis Creek strike N. 15 W., dip 55 SW  
much

twisted. Thin bedded sandstone sheared and slickensided not much shale and  
consider-

ably veined. These are certainly old looking and probably typical Dillard.

SS

Some fine sandstone and looks as if it ought to be fossiliferous at crossing of Lookinglass Creek. There must be K I think certainly.

Go to Buxtens Ranch and by GS to aucella locality as marked by Cg but can't find either Cg or aucella. Find only yellowish sandstone somewhat like  
Eocene

and some shale. Strike N. 65 E., dip 90.

Swing around head of east fork of Buxton Creek crossing gap of divide in 7,  
sec. 9

to hill in 1 and 4 of sec. 16. Went around ledge of chert and find all  
sandstone as mapped. It is soft yellowish often rotten like that in what Storrs found fossils on north  
fork Deer Creek

but I find none. In the region NE of Alexander Butte - that is the Buxton ?

Arkose

region - sandstone buff when fresh and yellowish when weathered prevail there.  
It

sometimes has the form of the arkose with darker spots but not coarse  
as conglomerate.

Aucella

Storrs found aucella in fragment of conglomerate in bed of Kent Creek at fork  
1/2 mile above its mouth. Good clear fragment of aucella.

Sunday - September 23, 1906

Camp Dillard.

SS

Along left bank of river below Dillard for one mile to mouth of Lookingglass or near it is bluff of massive sandstone much fractured and sheared but not clearly bedded. Has a

little conglomerate \_\_\_\_\_ with it in which are some li pebbles. There is a little shale but

very little. Rock soft and often with scales of mica. At one place shale lens appear

Shale and

to strike N. 70 E., dip 90.

SS

Nearby is distinct bedding strike N. 20 W., dip 90. A small mass of clearly bedded sandstone

thin bedded and shales faulted into the massive stuff showing no bedding. This

faulted block is somewhat wedge shaped - thus

stratification is distinct while there is none

evident on sides. The rock is dark and similar to

that of Clarks Branch but perhaps not quite so coarse. This stuff

is perplexing. We followed the bluff along the river for nearly a half a

mile and though much fractured shows no stratification excepting

that just noted and also at SE end near mouth of Kent Creek where it is

much twisted and crushed and mixed with shale for a short distance.

Some veins are seen but not many and always in crushed

part. No quartz was seen, only calcite, so these rocks differ from those

up river from Dillard where quartz occurs.

Along RR NE of Dillard shales and sandstone occur that have a good deal of

vein matter. It is all calcite though I thought it was quartz at first.



The

Monday - September 24, 1906

Camp Dillard. I up RR toward Roseburg.



Sandstone and shale by railroad 1/2 mile northeast of Dillard strike N. 50 E.,  
dip SE.

By the river 1 1/2 miles northeast of Dillard strike of sandstone N. 80 E. but  
soon turns to N. 45 E.

SS By railroad 2 miles from Dillard sandstone and shale bluff strike of sandstone  
N. 85 E., dip 90. Nearby dip is steep

Sh SE. There is considerable shale along river and railroad but chiefly sandstone.  
Much sheared chief-

and ly on fractures and not flow interval but some not affected at all. There is  
much

very lit. veining on \_\_\_\_\_ or slips and in fractures but only veinlets or \_\_\_\_\_  
and all calcite.

eg. Saw a little reddish mineral like chabasite. See spec. 6946 including also a  
piece

calcite of an adjacent sandstone to study cement. It breaks around grains and I think

veins all this rock has calcite cement and not siliceous at all. Have added to this  
speci-

imen of this No. another to test for cement. It is harder but among calcite  
veinlets and

have added also some small pieces of vein matter to test. It is supposed to be  
calcite and is

the common material of veining along railroad seen this morning.

Followed railroad from Dillard around NE to wagon road. The NE portion near  
where

railroad leaves river seems fresher. No, hardly that for it is rotten but  
less stained

with iron perhaps. It is much fissured and often much veined but always with

calcite alone. A few calcareous nodules were found in the shales but could

find no fossils in them. Fine conglomerate occurs in small masses at a few

places but seems to contain no fossils. These beds strike and dip somewhat irregularly but their general strike is about N. 50 E., dip 45 SE. They seem to dip under the rocks of Roberts Hill certainly and look somewhat younger than the rocks seen on the river yesterday though they may be about same horizon. Go north over hills of unaltered soft sandstone to G in 4, sec. 14, then turn east into 5 and find point of sandstone unaltered. In swale at south side are Gs and chert and the unaltered sandstone soft and yellowish like that seen about here occurs within 10 feet of both. The contrast is striking and sandstone must be younger but no indication in sediment. Go east of hill of GS on line between secs. 13 and 14 and follow up ridge of sandstone NE through sec. 13. Near summit near north line of sec. 13 the hill presents smooth bluffs of massive sandstone to NW. There are very few exposures of this Roberts Creek sandstone it is so soft and weathers in broad round slopes. Go NW to road corner on stream a mile SE of Greens. Here find some shale not altered and well exposed strike N. 80 E., dip 50 SE. These must be Eocene I think for the sand is not lithified and the mud of the shale is scarcely more so. I have mapped them as Myrtle but I doubt it very much. In fact the whole flat about Green's station is probably of the same but ? Cross the hills SW of Green's to corner of Myrtle Point road. Find chert and GS on hill and some sandstone which is the hardest seen yet in this region but it is apparently the same as the other less indurated and widespread over country west of Roberts Hill.

No Storrs could not find the aucella locality he discovered  
aucella years ago and from which he collected 4289. I could not find

it the other day and now he has failed. Says it certainly is not in the gulch marked and thinks the locality was on the river slope east of the gap.

Schist  
pebbles in  
K cong.

Storrs found schist fragments like those associated with glaucophane schist in the conglomerate below Winston's bridge so conglomerate must be later than Dillard, so it seems from its induration so small and only calcite veining. Though we cannot find more fossils I do not hesitate to believe it is Knoxville conglomerate. The schist and chert fragments in conglomerate are numbered 6947. If these are really GS or if glaucophane type then they help to prove that the conglomerate is Knoxville. The conglomerate Storrs says forms a bed with sandstone above and below it so it is of the same period as the sandstone.

Returning from Winstons we took the short cut road to Dillard. Examined the sandstone at the fording. It is like that seen on river Sunday below Dillard but better though we could find no fossils.

Tuesday - September 25, 1906

Camp Dillard - drive up Kent Creek.

Aucella

As already noted Storrs picked up loose fragments of fine conglomerate (on Kent Creek near mouth) containing aucella fragments.

The fossils (aucella) found 4 miles up Kent Creek years ago appear to belong to SE side of axis of Roberts Hill and give age to that line of rocks.

On Kent Creek ~~at~~ above mouth to Mr. Parker's 1/2 a mile from Dillard rocks are well exposed and not altered. Slates and fine sandstone and some fine conglomerate, fresh looking, strike N. 55 E., dip 55 SE. Also not far away N. 70 W., dip 60 SW. Rocks much twisted and certainly promising for fossils but see none. Very little veining of calcite and none seen in place of quartz but one pebble seen in creek.

Conglomerate

at Parker's house contains fragments of limestone up to 3 inches.

At Gaskins sandstone and Sh with conglomerate contain li pebbles strike N. 40 E., dip 84 SE.

3/4 mile farther up beyond next house strike N. 60 E., dip 45 SE. This is good but beds

disturbed. Aucella occur in both calcareous nodules of shales and in conglomerate. Both float and rather numerous quartz veins in float also.

More quartz

than calcite.

Strike N. 50 E., dip 54 SE. Shale and shaly sandstone. Some of the shaly sandstone beds here are much sheared and veined with quartz. No calcite, yet the beds look as if they ought to be fossiliferous.

They have fragments of vegetal matter and bedding well marked. The general position

is well marked. This looks like Roberts Hill series of road and strike carries it there.

Strike N. 70 E., dip 45 SE. This is about center of sec. 6, T. 29, R. 6.  
I have marked the last

two positions too far upstream.

In sec. 7 sandstone and shale strike N. 85 E., dip 65 SE.

Go up to end of road and 1/3 of mile farther find sandstone bearing aucella on both slopes and definite quartz veins. Though not abundant are unmistakable and spec. of aucella on quartz veined sandstone is 6948 a.b.c. The aucella from here ap-

pears to be Piochii type and not striated and large. See spec. 6949. Beds of sandstone

and shale here strike N. 50 E., dip 47 SE. Most of rock is sandstone and some fine conglomerate.

1/3 of a mile up from end of road is where we found aucella not in

ledges but on the steep slope on both sides. It seems certainly to be Cretaceous form

and clearly in sandstone that is quartz veined. Not abundant but distinctly. Storrs and I

estimate that veining in Jurassic \_\_\_\_\_ is much more veined than this, say 3 times

as much and more general generally more abundant. There can be no doubt of silicification after Knoxville. The sandstone here if Knoxville is not schistose as that of

Dothan. It is sheared but \_\_\_\_\_ hard in zone of fracture not of flowage.

Fossils were found all the way along Kent Creek from the

mouth for 4 miles. The great majority were in a fine conglomerate

and evidently occur in place above where we collected today

for well rounded pebbles full of them are in the stream 4

miles from its mouth and must have come at least half a mile beyond.

All the few fossils collected of this conglomerate are put together as 6950.

We found also aucella in shale at two places loose in the stream but not beyond 2 miles from the mouth of Kent Creek so I give that as the locality and take two pieces - 6951.

The quartz veins are not especially good specimens that are with the aucella so I take a sample of quartz vein alone. No aucella in it but from same mass as that containing aucella.

6952.

No calcite veins were seen 2 miles above the mouth of the creek, Kent Creek, but below that point there is calcite forming occasional veins or irregular dashes. It effervesces poorly in HCl.

Wednesday - September 26, 1906

Camp Dillard - trip to Willis Creek - leave Dollie and Dan at Willis.

Chert 1 mile above Willis on west fork Willis Creek, strike N. 50 W., dip 36 SW, gray.

In creek fine exposure well stratified \_\_\_\_, strike N. 45 W., dip 55 SW.

Along the stream here we find fragments of conglomerate rich in chert pebbles and containing fragments of aucella. Other fragments of conglomerate just like the fossiliferous one are clearly quartz veined. The aucella appears to be the Knoxville type and is not drawn out or striated as far as we can see but specimens not satisfactory in that regard. Specimen including Q vein marked 6953.

We find sandstone also with shell fragments, sandstone like that seen on Kent Creek.

Last year or years ago \_\_\_\_\_ I noted fragments of Cg a mile higher up the creek.

That is probably the source of these fossils. This carries the K fossils close to the south

border. That is if these and yesterday's are K fossils.

At Willis sandstone strike N. 70 E., dip 66 NW - 5 ft. bed

below Willis 1/4 mile sandstone strikes N. 30 E., dip 45 NW thinner bedded. This is in 7, sec. 10.

Going north we come to narrower part of valley where creek cuts to gray sandstone

much veined with quartz, some calcite. The quartz veins are frequently

faulted and shoved  thus, but calcite do not appear to be faulted. They

are less regular. The veins are as abundant here as in Jurassic and

decidedly more so than anywhere else seen in this district. It is hard gray

sandstone like Dothan of Doe Creek. A little farther north is thinner bedded, less altered

material, strike N and S, dip west 45 - nearby a better strike N. 20 E., dip 45 NW.

Thin bedded sandstone and shale strike N. 18 W., dip 38 SW. These beds are not veined nearly as much

as the gray sandstone just noted. It certainly seems as though there ought to be a contact

and break between the hard gray quartz veined sandstone with no bedding evident and the

thin bedded gray sandstone overlying it on the bank. Contact can be seen but seems to

be transition rather than great break. Certainly if visible anywhere

it ought to be here. The overlying beds have chiefly calcite veins. These overlying

thin bedded strata appear to be the ones so well exposed at the mouth of Willis Creek at the fording.

Having determined that aucella occurs in Willis Creek fragments from its head we return to Rice Creek and go up about  $1\frac{1}{2}$  miles to Rice's place. Cross the creek and above a short distance look at fine gravel bed of creek. We soon find plenty of shells. Aucella in sandstone like those of Kent Creek and they appear to be Cretaceous type. See spec. 6954. It includes a piece of fine conglomerate with quartz veins and a distinct trace of aucella.

Having fixed aucella on Rice Creek we started for Roberts Hill.

Crossing the river at mouth of Willis Creek we searched the gulches running SW to river from Roberts Hill but found no certain trace of fossils in any of the gulches. Saw numerous small veins - nearly all are quartz, don't effervesce in acid but some do and are calcite. The amount of veining is about equal to that on Kent Creek.

Brown feels sure he got aucella near fording of creek just below fall but suggests it may have been opis.

He thinks K. next Eocene on Russell Creek and that Horsetown does not cross.

Oroville - September 30, 1906

Union Hotel.

Met here Mr. J. D. Williams of Cherokee P.O. just north of Oroville. I met him two years ago at Taylorville and liked him for he gives straight information.

He says the black slates on Morris Ravine 4 miles north of Oroville were tunneled by the Golden Banner mine and that



at their 1000 foot level ? they run NE 1000 ft. before striking the boundary of the slates, i.e. the contact with igneous rocks where they expected to find an ore deposit. He thinks the slate belt is not more than 1000 ft. or so wide and not long either with its greatest extent parallel to Morris ravine.

Monday - October 1, 1906

Oroville - to plant beds.

Greenstone - At bridge by Oroville and above by river G is well exposed. Has phenocrysts of  
 augite and is augite porphyrite like Taylorville region. Is decidedly fragmental and in places vesicular so volcanic like Taylor rock mass. Two prominent joint systems - one about N. 20 E. and other nearly E.W. No prominent ones NW and SE.

Rock is decidedly green, somewhat veined with quartz - some quartz on east and west points. Streaked as if slicken and lines rise to NW. At the bend of the river below the mouth of Morris ravine the G becomes sheared having a sort of schistose structure. The hard fragments have escaped shearing and stand out more conspicuously. Strike of sheared or schistose structure str-

ikes NW and SE parallel to Morris ravine approximately and dip steep NE or vertical.

At east end of S Table Mountain on the sheared G is a thick mass of \_\_\_\_\_ sand and gravel capped by dark basalt sheet forming rimrock, zone is about half and half gravel and sand. Gravel below is chiefly white quartz. Pebbles often as big as quail egg but mostly smaller in little layers or lenses from 1 to 5 or even 12 inches bedded with light colored sand. Upper part not seen closely - beautiful gravel. This is south end of mass I photographed at Cherokee at north end of Table Mt. 80 ft. exposed here and rests on the sheared G directly. Go up to road crossing of Morris ravine. G all the way, well exposed and see no fragments of slate - meet road. Stone sacking man, intelligent,

Golden Banner & slate lives on Oregon Gulch says Golden Banner is on gulch that runs directly into river and not into Morris ravine. Slate runs under Table Mt. and to river  $1\frac{1}{2}$  miles. 4 ledges or pockets taken out in Golden Banner - 2 dip west and 2 E. He says slate dips west and ledges dip with slate. The pockets have yielded a total of at least several hundred thousand dollars so slate must be older than great mineralization of gold belt.

Follow around Oregon Gulch road from Morris ravine over G to divide and beyond to sharp turn to SE where shaly sandstone or sandy shales begin - strike N. 20 W., dip 62 NE. Rocks

shaly rather than slaty and don't look old. 50 ft. of these shaly sandstone, then some  
 fine conglomerate and  
 shale much sheared for 50 ft. then see darker gray fine slaty shales, not seen in situ.  
 A little farther along more conglomerate quartzose and gray shaly beds or shaly slates  
 bluish gray  
 inside weather lighter. Rocks certainly do not look altered. Some quartz veins  
 in slaty cleavage.

Swing NW on slate belt up old road to mine supposed to be Golden Banner.

On way up slaty rocks strike N. 55 W., dip 70 NE and sometimes vertical but generally  
 dip E. This strike would carry them under Monte de Oro after which

Turner named this formation. In dump at the mine is conglomerate and gray sandstone that  
 looks almost as unaltered as the Big Bar beds of Trinity County.

In mine tunnel stratif. plane between sandstone and conglomerate strike N. 30 to 40 W.,  
 dip 54 NE.

This is Sugarloaf mine run by Elton J. Simmonds, Oroville, Oregon - is  
 working gravel, very bottom of gravel. The Sugarloaf mine is 100 ft. above the Banner  
 and runs into slate and conglomerate to the bottom of the zone which contains much quartz.  
 Is not much washed and is partially cemented. Simmonds is putting in errastre to  
 grind it. There is only a thin layer of this under the sand and quartz gravel  
 which extends up to lava of Monte de Oro. Bedrock slickensided.

The Banner mine is all burned down and engine removed.

Much slate on dump. Slate dark and quartz veined. Some sandy and others fine.

The mine had an incline running N. 20 E., dip 34°. It is near NE  
 contact and open cuts nearby show much quartz near contact with

(October 31, 1906 - Stanton tells me in Washington that he studied the  
 river section and found no shells but did find some plant remains.)

greenstone on NE side of slates. Slates at mine are so much fresher than at top that I suspect there may be two ages here - one of slates with ore deposits and other later one \_\_\_\_\_ but ?

On river at east side of sed. belt strike of shale and conglomerate north and south,  
dip 52 E. into G.

Belt of conglomerate, sandstone and shale about 1000 ft. wide on north bank of river.  
On west side strike N and S,

dip 85 E. Most to nearly vertical. Contact on west side is fault strike N. 70 E. and  
vertical.

No, the fault crosses line of contact after following it a little way.

On west side of slates or shales sandstone and conglomerate - volcanic conglomerate full  
of pieces and contact

parallel to stratification so laid down on it most likely and volcanics probably  
older than sediments which are included in closed synclinal. No quartz veining  
down here at all. Where there is a fine complete section - cannot

certainly fit this section to that at Banner mine which appears to drain into

2 ravines. The east one which I descended is almost wholly in G. and cross G. E.

along river until I come to west ravine where the sediments are well exposed

and along this is where plants were obtained. \_\_\_\_\_ in deep cut and slates  
near middle along stream - dry bed.

Volcanic greenstone, much of which is conglomerate undoubtedly ejected

forms rugged slopes along river to and beyond mouth of Morris ravine.

The Monte Oro formation reaches river at gulch about half a mile at least east

of mouth of Morris ravine. It is directly opposite valley on south side of river and

most likely forms that valley. At one point between sediments and mouth of Morris

ravine sandstone appears in volcanics. It may be wholly volcanic but is of

sandstone grade. The sheets of lava and tuff appear to stand nearly vertical

like the sediments. The absence of quartz veins in the sediments

and their presence in the lava on the river leads me to suspect that the

sediments on river younger and even younger than the sediments  
veined with quartz at Banner Mine but ?

The study today of the Monte de Oro formation of .

Mr. Turner (whose conclusions I have forgotten) leads  
me to believe either that the deeper part of the formation brought  
up from the 1000 ft. incline or shaft of the Banner mine being  
decidedly harder, older looking and decidedly veined, has been  
much more effected by metamorphism than the surface  
portion where few or no veins were seen in the slates, or else the  
deeper portion is an older formation. The river section certainly  
looks unaltered and ought to contain aucella ? Lava on  
both sides is veined.

Ought to get Storrs to examine thoroughly for veins and  
fossils on river.

I cannot get the river part to fit up against the part at the Banner mine and maybe there are two areas, or if not, a bend.

(See p. 37 for notes on Storrs' specimens)

Tuesday - October 2, 1906

Chico to Sterling and Prattville.

Butte County RR runs up the dry plain of divide next south of Butte Creek. No bluff limit here between alluvium and stony plain, but gentle slope and RR runs right up it. Five veins of stratified tuff and lava on walls of Butte Creek from train and stony plain with scattered oaks and sugar pines on solid tuff well exposed. Pell-Mel tuff or agglomerate in the cuts.

Butte Creek canyon has farms and its walls 1000 ft. high give an excellent section of the Tuscan tuff to work out its history in connection with the auriferous gravels. The gray pel-mel tuff is same as floor covering gravels.

In 50 minutes get to Paradise - El. 1690. Among trees, rich gentle sloping plains and here and there where water there are lovely looking little farms and homes.

Paradise 13 5/10 miles to Parker (Chico ?) and 17 5/10 to Sterling. Paradise is first principal

stop. Has hotel, small but clean - would be a good place to section canyon for road descends to Butte Creek canyon road. 1690 el. given here agrees with location of town on Chico sheet. Oiled \_\_\_\_\_, flat, keeps down dust at Paradise. Stop here 20 minutes - why ? - but pleasant in morning air. Few people at Paradise - most of them in canyon probably. The good soil here

and beyond is due to basalt floor covering tuff.

Megalia at 9 o'clock. Tuff comes up several places between Paradise and Megalia but is particularly well exposed in cut by RR near Megalia. Large round rotten pebbles in places. Saw Mill Peak of old rocks opposite Megalia stands out. Here the west fork flows on line of tuff and old rocks. So it does for miles. El. 2521, to Sterling 12 miles from Megalia. Here runs with serpentine. Soon runs into tuff.

Parker a few miles from Megalia.

Elevation 2705 and 8 miles to Sterling. Just beyond Parker tuff in cut fine exposure - looks down into canyon of west fork - down grade through tuff with layers of round gravels and slates and continue down grade for mile or so in old rocks to Doon - el. 2208 and  $5\frac{1}{2}$  miles to Sterling.

Wednesday - October 3, 1906

Prattville - Greenville and Taylorville.

At Greenville McIntire says he is still working 2 men in his mine next the N.Y. Thinks the N.Y. may begin again.

The Droege are not doing anything he says.

Saw Whitney of Crescent Mills and he says not working. He says that from one of deep openings he ran toward Indian Valley and came onto gravel that would pay for dredging. It is at depth of 120 ft.

Thursday - October 4, 1906

Taylorville.

Mr. T. Fant says that government will send out some- one or several to test high gravels of Lone Rock region. He says that a shaft of 35 ft. in depth was sunk a mile SW of Lone Rock on divide SE of Lone Rock Creek and that it paid all the way down. He thinks its mineral land and ought not to be given over to Walker and Co. timber men.

Power Co. The Power Co. that 2 years ago began mining a ditch along Indian Creek below Arlington Bridge has not yet completed its job. Stage driver said that only two men are working on ditch job so no great progress.

Pyrrhotite and copper - Mr. Fant tells me that Lummis is running a tunnel in to tap the pyrrhotite some distance below the limestone tunnel on Grizzly Spur. He says Lummis has fine copper prospect on edge of Mt. Meadows east side about 3 miles from Nannys.



The same Lummis is running a tunnel at some other point. I have forgotten where.

I walked up China grade this afternoon and around the west to Grizzly Spur and the pyrrhotite openings. There has not been much doing at this place since I was here. The pyrrhotite has oxidized and formed much copper.

Saw Mr. W. G. Lummis of Taylorville. He has openings at Mt. Meadows, Grizzly Spur, Hinchmans Ravine and Wards Creek.

At Hinchmans Ravine he has fine looking bornite in ravine from the main road up right hand fork about 1/2 a mile or Lummis says 1 mile. Must get section from him and note it.

The opening at Mt. Meadows is native copper in epidote.

The opening at Grissly Spur is pyrrhotite and has copper increasing as ore goes down. He is putting in tunnel.

Friday - October 5, 1906

After arriving at Brown's 2 miles west of summit and 1 mile east of Nannys I go up gulch south of Brown's - ascending over gravel to divide on west side of gulch - ascend to bold rocky point and find I am separated from crest of range by low gap at head of ravine up from Brown's. Peak is of andesite. I go down east to gap and find gravel so the peak belongs to island of lava lying on gravel. A large body of gravel underlies this island of lava which lies near Nannys and has prominent bluffs on that side. The gravel area is full of little basins due to land slides. Some are filled with water - many are dry. Surface looks somewhat like glacial moraine but has no boulders. The abundance of land slides I suppose is due to the fact that the lower portion of the mass being sand gets saturated with water during the winter and easily becomes fluent and slides. By Brown's house and far up the ravine and slope the gravel is prevailing of pebbles of old rocks, black chert, old conglomerate and sandstone etc. but nearing the lava cap or tuff cap lava pebbles predominate and in places nothing but lava pebbles well rounded can be seen. The tuff crest is extremely rough in places and so jagged as to be almost impassable even to men on foot, the sheets of agglomerate tuff are thin and stand on edge. I am not sure that it is stratification. The relation of the gravel to the tuff and the older rock I must

work out more in detail yet. If the copper mine of Mr. Lummis is up near here it must of course be in older rocks which stick up through the Tertiary lava. The presence of so much epidote suggests the \_\_\_\_\_ of Mt. Jura.

Saturday - October 6, 1906

Brown's SE to crest.

SE over gravel up ravine between peaks to flat crest.

Tuff on crest in nearby vertical ledges as that seen yesterday. Ledges strike N. 10 W., dip 75 NE. The great layer of tuff really lies nearly flat I think and these vertical ledges may be due to weathering along joints. The sliding gravel has broken up the lava cap and allowed masses to slide down so as to appear in the gravel.

On the crest of the range south of the Susanville road there are 3 flat topped portions, 1st on county line, 2nd the largest 1/2 mile farther NW and nearly 2 miles long, 3rd is half a mile farther NW. It is very rocky. I sit on flat 3 and looking SE to flat 2 can see the lava sheets dipping westerly. From Mt. Meadows looking up yesterday one sees a great bare slope on SW side of flat 2 and that sheets dip westerly. It looks as if the gravel may run under basin westerly. It is too far to go to flat 2 afoot today and return or go NE over gravel to

the stage road so I turn NW keeping to west of coming line of travel to see about gravel on gap and relation to rocks on both sides.

Descending to NW slope of flat 3 to bare spur I see the NW corner of flat 3. Opposite gap is capped by a flat sheet of tuff forming a distinct horizontal bluff. If that be taken as attitude of lava and tuffs in this portion of range it seems clear that they overlie the gravel and islands are formed by washing away volcanics down to gravel. Mr. Brown says copper mine is far south of his place near Llusos County line.

Continue NW toward south end of gap to see if gravels extend through.

Find that gravels do extend through to stream draining west but gravel cut off on south by lava. Go down stream to see west side of gravel. Find them limited on both sides of the stream by a fine grained granular rock 6955 and 6956. I took it for lava at first but it is not for it is clearly (Springs are abundant where gravel crops out. It is water carrier.) granular and must belong to older rock. I ascend hill on west side of gap and find it made up of such rocks. I suspect that a line of these rocks extends south of meadows and that gravels lie against them. They form hills here and farther south leaving a depression to east bounded by crest of lava and hold gravel under lava.

Ascend to summit of hill west of gap and find micro granite all the way and especially well developed on top somewhat darker than 6956.

Delighted - descend the hill of old rock NE toward high point ascended yesterday and find deep gap between them and broad belt of gravel so the hill ascended yesterday which is of light colored trachytic lava 6957 is an isolated hill of lava on gravel and gravel exposed all around. Gravel appears to be old gravel up to talus within 200 ft. of top. Belt of gravel on west as on E side is pitted and no doubt for

\_\_\_\_\_ of gravel. Farther east this is overlain by big sheet of tuffs. It should be noted in this connection that though 6957 is the lava lying on the gravel it is not the most common lava seen today. In fact it is much less common than a darker gray one with phenocrysts of pyroxene which is the type for all great \_\_\_\_\_ to Tertiary.

The gravel below this lava are very largely siliceous with black cherty pebbles very common and those of igneous rock much less common, that is of Mgr or older igneous rocks. This old gravel up to lava is easily 500 ft. but east \_\_\_\_\_ any rhyolite tuff anywhere but poor chance for its existence. No exposure of gravel only on surface.

The hill of micro granite 6955 and 6 lies east of old Goodrich place so I call it the Goodrich hill.

Just SE of Nanny's place is another hill presenting bold bluffs to the road. Between the two hills is a broad belt of gravel - old, flat, not slid at all and remarkable. Possibly it is shallow and no sand below. On the gravel divide between two hills named above find a 4 inch pebble of quartzitic sandstone which contains traces of coral - 6958 (No section for sect. 6958-6959). Looks as if it came from Mt. Jura.

The Nanny Hill is composed of a light colored lava like 6957 and no doubt belongs to same flow.

It is finely columnar nearly vertical.

Hanny Hill is made by a dike like 6957 rock, strike of dike N. 50 E., dip 50 NW.

Well developed columnar jointing and comes up through gravel and

overlies or overflows it to SE. This is like dikes cutting conglomerate at leaf locality

near road 6 miles south of this. Dike does not seem to be very long for it does

not cross valley at either end. The end is very abrupt at NE toward

Brown's but the gravel laps around end of it before reaching Brown's.

Might it not be possible that the lava flowed over the gravel

before the uplift and that the sheet shows the end of the arch but I don't

think this possible. The course is not right for a fold.

I suspect that this flow is in the horizon of the rhyolite

tuff but ?

Sunday - October 7, 1906

Brown's - over divide by stage road to see gravels of Willard \_\_\_\_\_ creeks.

Crossed divide and left horse where road comes to stream by cabin  $1\frac{1}{2}$  miles

east of summit. Ascend ridge east which is west divide of Willard

Creek. Find tuff, sandstone and fine material horizontal at base. No early gravel.

Go up and soon come to angular tuff and beds of rounded lava pebbles capped by

angular tuff in hill, white beds of tuff run around hill nearly flat.

I doubt if I got the late gravels at all on this side. Go up spur  $1/4$  mile,

soon leave tuff and get on lava gravel on flat spur, then turn SE toward

Willard Creek to try to get into older gravels in stream canyons. Descend

over 200 feet of lava, gravel and cobbles well rounded and in valley see some pebbles

of old rocks. West fork of Willard Creek has very few old pebbles. It flows well up

near top of gravel. The hill of tuff I was on is the one marked on map and the light colored beds SE of it are tuffs. The older gravels below are not exposed. I doubt the dip and strike noted on map very much. It may be due to strike. Go up divide SE to flat gravel spur. It must be flat spur at 6100 between forks of Willard Creek. Gravel of lava pebbles abundant all the way up but some of old rocks, chert and C which I suppose due to erosion of older gravel in forming later ones. This is in accord with view of Turner and Lindgren also.

Descend SE to Willard Creek over 300 ft. of volcanic gravel well rounded or at least large part volcanic and on creek whitish tuffaceous sandstone. See nothing \_\_\_\_\_. Go down stream and swing NW to hill of tuff just ascended this a.m. Here I took dip and strike of tuff years ago and the material is rhyolitic. Lindgren says like that of Sierra auriferous gravels. It is cross bedded and position given is cross bedding. It lies apparently with gentle dip to NE. Going up hill find 90 feet of tuff. Some fine white volcanic dust, but mostly light colored volcanic sand with some pebbles, very well exposed by slide. Well cross bedded but fine bedding, often dips westerly. Real position ? but apparently dips gently NE. Over fine tuff is 50 ft. of well rounded gravel

chiefly of lava fragments and this is capped by 25 ft. of agglomerate tuff forming hill top. It seems probable that the white tuff lies on top of earlier gravel and that 50 ft. of well rounded gravel represents the pre-agglomerate tuff gravel. Possibly at other points this gravel is much thicker. Where I descended into Willard Creek I must have passed over 2 or 300 ft. of it down to white tuff by creek. Old gravel not exposed. The tuff comes out on northwest side of hill too so mostly strike NW and dip gently NE.

Result of this a.m. work is to show that old gravels not well exposed here. Best exposed at heads of creeks and on west slope. The gravel exposed along road up to summit is mixed - some lava pebbles mixed with older gravel. On west slope gravel is older though there is some lava pebbles mixed in but by far greater part is older and in ravine 1/4 mile east of Brown's (1 1/2 miles west of summit) there is some sandstone exposed containing leaves and that is well down in older gravel.

Afternoon - I go directly across meadow NW of Mr. Brown's to see old rocks as I had mapped them but I find there conglomerate and sandstone reddish and whitish many quartz pebbles. It certainly looks as if Nanny dike had indurated this and that it has indurated auriferous gravel and not older rock. Continues up to top of spur 200 ft. Where it is sandstone and no pebbles it may be easily mistaken for Ngr. This seems to afford proof of dike cutting gravel near Nannys. The remarkable conglomerate and sandstone forms whole of ridge between Brown's and next ravine NW. Conglomerate and sandstone undoubtedly with distinct quartz pebbles and C continues NE to low gap where road crosses from stage road to head of ravine. NE of



this gap lava comes in and continues NE toward peak. Some of it is very fresh. Other rotten and some few pebbles lie on it. This looks somewhat like that lava of Nannys peak. Follow spur to peak all the same and continues to crest but small depression between where is tuff but no gravel. Follow stream course around south side of lava and down at bend of road in \_\_\_\_\_ come to gravel running under tuff and lava. Going down stream coarse tuff continues on west and a bluff of sandstone and gravel appears small but shows them interbedded there. Pebbles all old below tuff here and no lava. This is good place to see it. The dry creek west of stage road as it ascends west slope of summit is the best place to see the gravel pass under the tuff and lava of big area north of Nannys. Part of that large area is the hard conglomerate and sandstone, auriferous gravels. The gravel certainly does not continue all the way between the area and the crest but from previous notes I may finish the map.

Monday - October 8, 1906

Brown's - NW to study circle of gravel and associates.

The arm NW across ridge of conglomerate from Brown's has gravel far up to near its head which is in tuff and lava but gravel does not connect along crest with that of road.

Go up arm to crest and get fine view. See ridges running off with great lava plains coming down from \_\_\_\_\_ peak.

From crest about 3 or  $3\frac{1}{2}$  miles NW of road summit where I obtain good view of Bridge Creek or Susan River country N and NE see lake not on map. I go SW flat hill that is  $2\frac{1}{2}$  miles NW of Brown's.

I cross head of draw leading SE toward arm next NW of Brown's. Neering hill country becomes flat and see a few pebbles. Then at base of hill is water and gravel and gravel rises on north slope.

A good traveled road crosses just east of this flat hill. It must go over range to Bridge Creek. This road crosses in gap SE of end dome of Sierra crest. It is manzanita covered and of basaltic lava.

The flat topped hill  $2\frac{1}{2}$  miles NW of Brown's is capped with light colored andesite lava and tuff like that common in region. Gravel does not extend up north slope to nearer than 150 or 200 ft. of top. Descend on south side of hill and find gravel at 150 ft. below summit. It forms a flat \_\_\_\_\_ on that side but is not terrace as I once supposed but part where lava cap is missing or removed. This hill is a little island of lava on gravel but the belt of gravel on SW is not over  $\frac{1}{3}$  to  $\frac{1}{2}$  mile wide

and beyond low flat hills are of microgranite rock. It is clearly granular 6959 - (Sect. 6958)

and is darker than that collected a few days ago. Scattered pebbles over

this show that it was once covered. The granular rock is really granodiorite I suppose. Only on the edge is it fine grained like microgranite and grades into medium granular. The hill of grd rises somewhat to SW but does not get quite as high as the hill capped by tuff.

Descended west to the meadows. Saw only grd and near the meadows a few pebbles probably washed down from the east. Going south along border of meadow the pebbles cease. The alluvium \_\_\_\_\_ the grd without any sign of anything else. It is evident that I have marked all the alluvium of these valleys as \_\_\_\_\_ gravel but not so \_\_\_\_\_ Mt. Meadow. Followed around the border of the meadow to opposite Hannys. All is grd on hillside and alluvium in valley. Cross valley at Hannys to see gravel near dike. Find gravel in stream bed about 5 ft. of alluvium over it and south of stream is gravel ridge across meadow and meadow too is of gravel. So this portion or arm of the valley may well be marked as gravel. It is not at all improbable and most likely perhaps that the arm running west and northwest of Hannys is underlain by gravel. I had it so represented formerly. To cut it out makes the area look unfinished. It seems most likely not only that this arm but also that the great area of Mt. Meadows proper may be underlain by gravel.

Thickness of gravel - It is extremely difficult to get definite data as to the thickness of the gravel but it seems to be nearly or quite 500 ft. below the volcanic layer of lava/<sup>or</sup>tuff.

SE of Brown's 2 miles or  $1\frac{1}{2}$  miles the isolated patch of lava lies at least 500 ft. above road at Brown's and if layers are horizontal as they seem to be the gravel must be that thick. So also the flat top south of Nannys Peak is about 500 ft. above Brown's. To take the thickness as the shortest distance between lava cap and granite base is not correct because the granite projects up through the gravel and at the surface the bottom of gravel is not exposed in granite. Nearly all this gravel about Brown's is older than the volcanic, i.e. earlier gravel. A few pebbles of igneous rocks may look like lava but no certain ones were found and such if found may easily be explained as coming from higher up.

Have no data as to thickness of gravel from the \_\_\_\_\_ on to end of gravel period.

That the gravel here about Brown's are mainly prevolcanic - that is earlier gravel - there can be no doubt but what do they represent in the Light Creek section. If the sand at the base, why fine there and coarser here. There must be sand here too judging from ledge seen northwest of road and near Brown's as well as by slides but on Light Creek it seems prevailingly sand and fine gravel. The island here may have had something to do with it.

Looked along northwest base of Nannys dike but found no trace of cemented gravel like that opposite Brown's and yet

I think that opposite Brown's must be cemented through the influence of the ends of the dike which is headed directly for the indurated rock.

Tuesday - October 9, 1906

Brown's back to Greenville.

Write Nannys who lives at old place and ask depth of 2 wells sunk in gravel to test them.

Nanny dike makes \_\_\_\_\_.

Porphyritic rock \_\_\_\_\_ first ft. and old as grd.

This first big point along northeast side of meadow seems to be all old rocks.

Some of the porphyry. Some of fine grd and some old lava and tuff.

First big valley with stream brings down some fresh lava and

gravel but transported.

Second spur, the one crossed by road, is of old lava and tuff but some looks fresh.

Next arm beyond has fine gravel but mostly of local origin and not certainly auriferous gravel.

Last big point is of old lava and arriving at SW side where last of Cronche's camp house, big barn and hay stacks is, I find just south of barn a small point of well marked gravel but it does not appear on slope of hill southeast for that is old lava.

Road continues southeast from last camp but swings around to north across hills to other camp. Thought this was road to copper prospect but met A.C. Nanny, son of A.S. Nanny and he set me right but could not tell me where copper prospect is. He said the gravel well by their house was 24 ft. and they got prospect but no bottom. Dug last year. Ranch was bonded last year but bond ran out in June and would not let them rebond. The family lives at Paines Creek \_\_\_\_\_ in winter.

Continue southeast up arm that heads against bold hills overlooking Moonlight. The talus from the hill on right of arm is old rhyolite. Some is clearly banded and looks old so that ridge is of old rocks. It looks like copper rock but Lummis says his rock is porphyry. This is somewhat porphyritic with feldspar.

Johnny Smith's mine cabin is S. 72 W. from end bluff of rock at head of long branch of meadow. It is about a mile from peak.

A little farther south on west side of meadow is mine and Smith shop. Gravel is rather coarser than at Brown's and has much of light colored microgranite rock and few of black chert. Red chert is quite abundant on west side and especially in gulch coming in from that direction.

Gravel does not appear to be thick but bottom not seen. Only 8 ft. seen.  
 Farther north the old rocks crop out in gravel area indicating that it is thin.  
 I am convinced that rocks bordering these gravels on NE are older rocks and  
 there gravels are \_\_\_\_\_ stream gravels and not of necessity directly connected with  
 Moon-  
 light.

Wednesday - October 10, 1906

With new horse, Billy, from Greenville to Mt. Meadow. Smith's mine Moonlight and \_\_\_\_\_  
 and then follow trail east on gravel for several miles to cabin directly SW of  
 end of ridge. This is probably Evans cabin (no it is Morgan's says Stark). A little  
 meadow and must be very  
 close to county line.

Followed the trail beyond along the SW side of the hill which is com-  
 posed of porphyritic rock some of which is like the very porphyritic rock  
 mapped but most of it is a very porphyritic andesite that is widely distributed  
 along east side of Mt. Meadows. It is an old lava, possibly Mesozoic,  
 certainly older than the gravels. The trail ascends the east fork of Cook

Creek and cross is over the divide into Moonlight which is drained by Surprise Creek. Soon find gravel on west side of Moonlight and I think the Mt. Meadow mass of gravel and that of Moonlight would surely be connected had it not been removed by erosion. That of the west end of Moonlight is higher than that in the divide west of Moonlight. The gravel surrounds the end of the island. The copper mine of Coppervale I have located at last by Mr. Stark the forest ranger. He says that the road that runs east from the last Crouch camp swings north and crosses a low Divide. On the divide the road to the mine runs east or northeast about 1/4 mile from forks. That shows that these rocks are old as I supposed. It is nearly 2 miles northeast of Smith's gravel mine. The area of old rocks north of Moonlight is large embracing several miles of the county line. Uncle Sam mine is northeast of Ruffas place and is being developed now by Kanvek and Lasander? It was idle for some time and is not producing now.

Thursday - October 11, 1906

R. Ruffas to Moonlight and -

Left horse on Moonlight road 1/4 mile above corral and start afoot northwest across gravel belt. Start at mine cabin where gravel was mined at base or where base was washed. It is sand cemented to + or - solid sandstone and washed basement rock. Not much work and probably not pay. Did not see very bottom nor any coaly beds but saw some sandstone not 30 ft. above it. The sandstone is almost wholly quartzose with angular grains and whitish stuff as if kaolin. Horizontal beds of sandstone exposed at many places and much slid.



There must be very nearly 500 ft. of sandstone and near top is much the same as below but contains some scales of mica. The sand sometimes contains very fine quartz conglomerate of angular fragments. This whole mass appears to be derived from gnd or granitic rock. It does not contain volcanic material. I take two pieces, 6960 and 6961 the first to represent lower part of sandstone and the last the top portion. It weathers reddish and yellowish.

The contact beds of sandstone and next overlying was not seen. The next seen above sandstone is represented in slides and is ? for don't know how far it came down. It is greenish gray conglomerate both \_\_\_\_\_ and pebbles and the material is wholly of old igneous rocks like those of the island to NW. Largest pebbles about 1 ft. and all round smooth. Next above comes some finer conglomerate and in it are some pebbles of black chert and others which are like those of Brown's gravel of Mt. Meadows. There are very few ~~and~~ only trace and mass as before old igneous but not modern volcanic like top of gravel. As I go up slope great slides, some producing little lakes and meadows.

Ascended spur by the slid field of conglomerate photographed before but did not see leaf locality. That must have been just about contact.

Reached top where Storrs and I reached it before on conglomerate. The conglomerate here contains a good many chert, quartzite and siliceous conglomerate pebbles though perhaps these of old volcanic are most common.

The conglomerate extends only a few hundred feet beyond where Storrs and I reached summit. Little gap between this point and county line 1/2 mile NW reach county line of old andesites, porphyritic generally, and like pebbles of conglomerate. Some

is purple like that of Mt. Jura.

Follow county and NE to 7000 ft. all old rocks. Then turned NW toward 7000 flat which is new lava. Line of contact is in gap SE of flat and no trace of gravel in gap. The new lavas must rest on old directly. Volcanic bed of \_\_\_\_\_ flat 7000 ft., dips  $8^{\circ}$  westerly.

Returning by the ridge down to east side of Moonlight at about midway I find white rock that looks like volcanic ash. Could not determine the relations but it is associated with some newer andesite lava at that point and yet it may belong about the contact of the sandstone and the overlying conglomerate. Take chip 6962 for study.

The gravel of eastern Moonlight contains numerous black pebbles of chert as well as of old conglomerate, quartzite and C. In this respect they differ considerably from the conglomerate on the ridge SE of them. They are not consolidated like the gravel of old volcanics. The gravel of head of Mt. Meadows too is much fuller of cherty and other old pebbles than that of the great mass lying on the sandstone and yet that of Moonlight lies on sand.

Dip of gravels. The great section examined today NE of Moonlight lies directly against the county ridge of old lavas from which the gravel was in large part derived and great masses have slid off. It cannot dip NW under that ridge as I once supposed. It must lie against it and the sand under it must have been the cause of the sliding for the great slides making great bluffs to the very crest of the ridge are a prominent feature.

Gravel connected. Moonlight and head of Mt. Meadows gravels once connected and connection eroded by head of Cooks canyon. The ditch from head of Surprise Creek to \_\_\_\_\_ of Moonlight is in gravel. It spills into Cooks Creek and swings around to wash gravels at head of the meadows - so no barrier between them.

Friday - October 12, 1906

Greenville to Chases by stage - arrive 4 p.m. - Dinner Foremays.  
Going up Clover Creek - See Turner's older basalt which is  
clearly overlain by the volcanic agglomerate forming the columns  
which I photographed years ago.

Saturday - October 13, 1906

Chases - Wheeler's with Billy, Mrs. Wheeler's horse, to Squaw Valley.

Granite by way - lava and tuff to Reynolds.

Granite - high places - channels covered.

Gravel near old makes camp, some white quartz and very few  
black chert - mostly lava - probably later lava with pebbles derived  
from old gravel by erosion.

Old channels in valley deeply buried under lava and tuff.

About 2/3 of a mile NE of Wheeler's (Chases) Clover Valley house  
on road to Reynolds, the granodiorite comes to surface and forms an  
exposure 200 yards long. It is overlain all around by tuff or andesite  
and only on east side is there any trace of gravel. There a few pebbles  
of fine grained grd but these are neither certain or abundant.

Mr. Reynolds said he prospected in that vicinity in 4 ft. of  
gravel and found a trace of gold but it would not pay.

On the meadows of Squaw Creek about 2 miles NW of  
the now abandoned dairy of Hosselkus there is some gravel  
on the NW side of the valley. It forms a bench on the side of the valley  
and contains a number of quartz and quartzose pebbles but also  
many of lava. So it is evident that this gravel is later than the

earlier gravels and probably formed in part by their erosion.

It cannot be taken as evidence of an important stream flowing north during early gravel period. It would appear to belong to a later period. It is covered by lava and tuff and may not be very far from the bottom, i.e. the granite, though it is 2 miles from the nearest outcrop.

Met Mr. Whitaker who told me of the gravel and

said I had referred to it years ago when in the region. Though it does not appear to be the locality I remembered, it most likely is for I followed up Squaw Creek to beyond Hosselkus dairy and saw no other.

The apparent complete absence of important gravel deposits between the grd and the basalt and tuff seems to preclude any important stream in this direction and yet the distribution of the gravel on upper Indian Creek suggests that it came in from the SW near Clover and Squaw Creek. Stray pebbles apparently of older gravel are found at several places but those may originate with the tuff and torn from the older gravel. The contact of volcanics and granite has not been examined with sufficient care to be sure more do occur but Mr. Whitaker and Reynold and others do not know of any gravels south of Indian Creek. Their absence on the bare granite for so far south of Indian Creek is evidence they are not there.

4 p.m. leave Chases by stage 17 miles to Beckwitt - arrive about 7:30. Saw some grd 1 mile SE of Chases. Elsewhere appears to be lava.

Sunday - October 14, 1906

Beckwitt - no traces - walk down river road.

At NW of Beckwitt steep slope is andesite but some of it looks like old rock. Andesite continues to Kerby. A terrace appears to be cut above Beckwitt in andesite but no definite gravel seen.

Narrows below Kerby or mouth of Grizzly Creek occupied by RR. Narrow gauge on north side

and Western Pacific grading on south. They cut andesite on both sides in narrows. Wagon road is forced up on hillside 150 ft. and at first on andesite but soon reaches granodiorite which soon opens the country westward and makes gentler grades or slopes. On road a dike (4 ft.) of andesite is seen cutting grd. Strikes N. 75 E. On the south side of the narrows a mile west of Kerby there appear to be terraces at 250 ft. near river and at 800 ft. extending far back. Cut most likely on lava. Follow road and sometimes NGRR to Humbug Creek. Hawke place gone. Humbug Creek merely a water course - a sawmill on it. Just above mouth of Humbug Creek is bluff of terrace by river. It is rotten andesite and bed of river also. West Pacific crosses twice here. Near upper crossing is bluff of andesite being blasted. The Pleistocene lake beds of Turner certainly extend east from the Downville quadrangle east up the middle fork into the Sierra Valley sheet but exposures are very hard to find. The terrace feature which is marked in the lake bed

region extend up to within a mile or so of the narrows where higher terraces appear. The terraces of the lake bed region are at various levels from 10 to 60 ft. above the river. Commonly about 40 feet and where well marked bordering the stream are generally composed of rotten andesite. Only at one point, the lowest, where I crossed the river (now so low one can jump across from stone to stone at riffles) I found whitish stuff overlying the lava bed of the stream. Above the main camp which is on the \_\_\_\_\_ & \_\_\_\_\_ RR by the river the excavations for grading show the terraced stuff to be made up largely of angular fragments of lava mixed with earth. No prominent rounding at all. This certainly does not look like lake material. It may be the wash of the middle fork emptying into it but it is too angular for that. Good exposures occur about 1 3/4 or 2 miles below the narrows. Just above this the granite rises and the angular stuff is seen resting directly on it with nothing between. No definite \_\_\_\_\_ lake bed here. A great dike of andesite 100 ft. in middle cuts the granite. It strikes N and S and dips easterly about 45°. Soon the andesite comes in to stay and forms the narrows.

The grd is of course older than the earlier gravel and the andesite is supposed to be newer than the gravels though I doubt it very much and yet probably they are younger. The andesite clearly cuts the grd in dikes. If younger the gravel must be under it where it overflows. The contact of the grd and the andesite is exposed just west of the narrows and no gravel appears.

There are other points, however, where earlier gravels might be covered and yet not discoverable. The great thickness of lava



in and about Sierra Valley make it practically impossible to make out anything definite concerning the earlier gravel drainage.

Washington, D.C., Jan. 4, 1907

Storrs visited plant beds near Croville and found fossils in the sandstone and conglomerate associated with the plant bearing slates. His notes leave no doubt that plant beds are among the sandstone and conglomerate containing the shells. He found some belemnites and shell by river in sandstone 1/4 mile west of Morris ravine. Sandstone is just like that in plant bed area. These are marked S 1. On river at mouth of ravine next west of ravine from Banner mine he got fossil shells in sandstone and conglomerate and the conglomerate looks tuffaceous. All these are No. S 2. On road near the Banner mine but west of it he found the same sandstone with belemnite as at river. Stanton looked at fossils and believes them to be Jurassic.