

1907



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1907

Sept. 8. Left Redlands at 3:30 and reached Banning about 5 P.M.

Sunday and I could not do more than get located and talk over Mabour desert trip with Mr. Barber, who has cattle over there.

Sept. 9. Hired team and man with sled, wide tired buckboard. Got camp supplies and started at 9:30

Reached Whitewater ranch by noon & then crossed Whitewater river and over into Morongo Valley and camped at Chuck Wassen's ranch.

Came 28 miles, over hot desert on one of the hottest days of the year they say at the ranches. Probably 110 or 115.

Crossed several good creeks and found a big stream of beautiful clear water in the river, up to the horse hills.

Struck creosote and full set of desert brush at Cabezon & both kinds of mesquite full of fruit at Whitewater & Wassen's ranches. Found Sycamore all the way except a trace of upper on north slopes of ridges in crossing over into Morongo Valley.

Some Juniper + Quercus laevis on cold slopes.

Camped late and set only a few traps. Shot 2 jackrabbits + 2 Ammospermophilus

Sept. 10, Slept cold at the camp in damp bottom cañon of valley, but soon got warm when the sun came up. Had specimens to skin + got off late. (7:30)

Continued east through Morongo Valley across little Morongo Cr., a fine stream of good water, then over divide at 3300 feet and down into long smooth valley sloping gently east and down it 5 miles to Warrens Well at 2100 feet + camped. Came about 14 miles.

Morongo Valley is all arid Lower Sonoran with the full set of ^{desert} plants.

Cresate Acacia + mesquites!

Yucca brevifolia begins in the east and runs over the divide into Mohave desert. Cacti are abundant

There is just a trace of Yucca elata on cold slope of divide and along cold slopes of ridges north and south of Warrens Well Valley. The soil is granite gravel, dry + loose.

Warrens Well is about 5 miles
down on the Mohave Valley slope at
3100 feet. The valley is open and
slopes gradually eastward past Coyote
Holes and on down to 29 Palms
some 23 miles still further east.

The ridge to the north 200 or 300 feet
higher than valley separates it from
the Mohave Desert proper of about the
same level as the Well and of
the same general character of country.

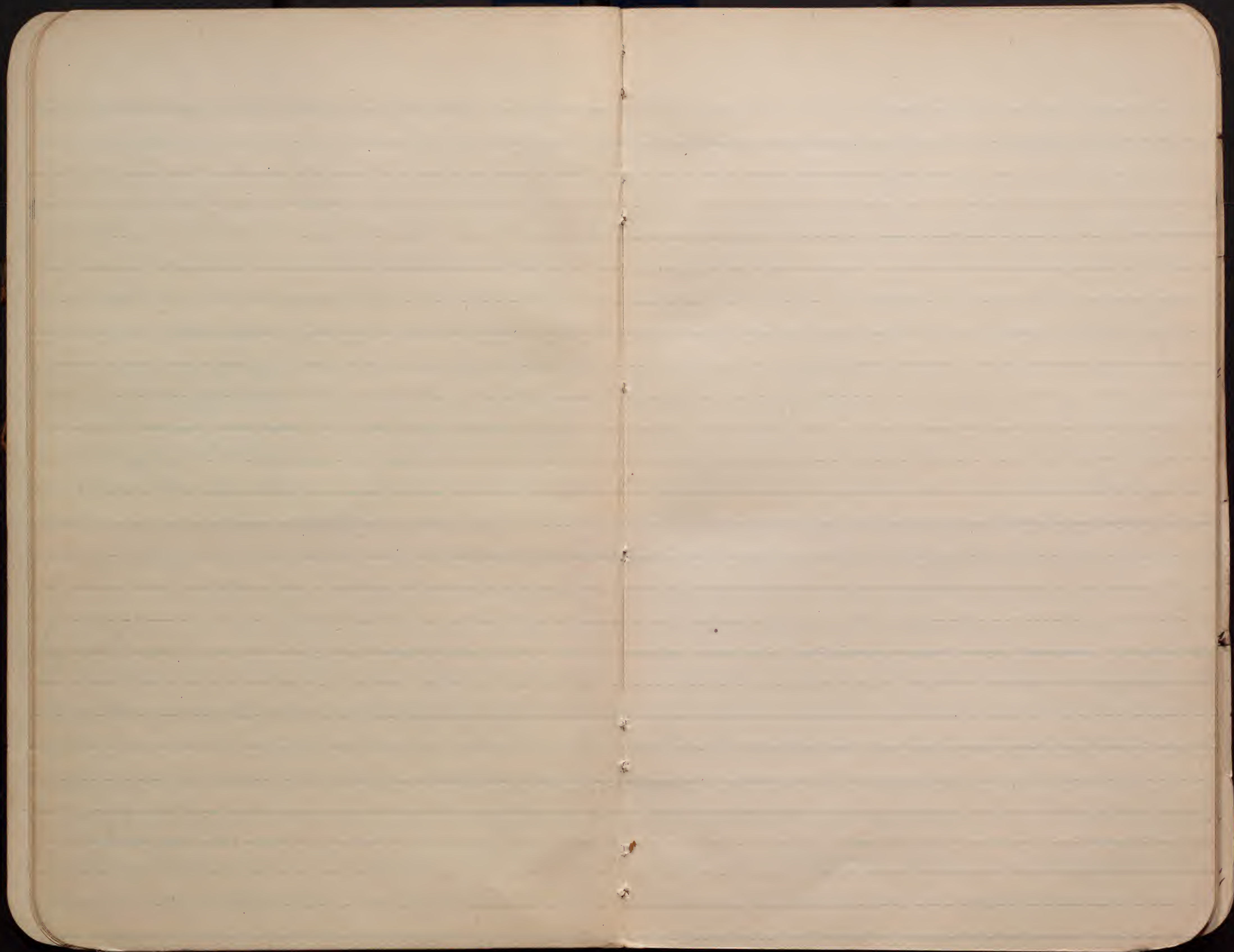
The mts on the south are higher, 1000 to
2000 feet higher than the well and covered
on north slopes with juniper & nut pine
but no larger timber.

The rock is mainly granite of a
coarse texture and the washes are
granite gravel. The soil of the valley
is firm & good generally and
supports a good stand of desert
plants. Water is scarce, but
that at the well is very good & pure.
A windmill pumps enough for the cattle
& for passing teams. A cabin &
corral at the well are used by
the cowboys & campers.

Warrens Well

Sept. 11. ~~12~~. Trapped and collected about
the well and got most of the ~~con-~~
manuals & lists of birds & plants.

Sept. 13, Took up traps & started back,
reached Warrens Ranch at 9 &
Mission Creek at 10 and White
Water ranch at ~~12:30~~ 1. Camped &
set traps. Very windy and
rather warm.



Arroyo Seco

Sept. 27, Left Pasadena at 9:30 AM.

and followed up the Arroyo Seco to about 2200 feet, then over the ridge and down into Long Canyon at Switzers, then north over the ridge just west of Strawberry Peak and down to Colby's Ranch.

Switzers in 3100, top of ridge, 5500 and Colby's 3500.

After entering the canyon at 1400 feet we were in pure Upper Sonoran zone all day except for a trace of transition on the ridge and north slope of Strawberry Peak. There are lots of *Pinus coulteri* with the *Pseudotsuga mucronata* and in the gulch n.e. of Strawberry are some *Libocedrus* and Mr. Colby thinks some yellow pine. It got dark as we came down the north slope so I could not tell the trees & was pitch dark when we reached Colby's ranch in the Coldwater canyon at 3500 feet. The last mile of steep trail down the slope I followed with my feet more than my eyes.

Up Tazungo Canyon

Sept. 28 Spent the morning looking over the Colby ranch and talking so did not get off till 9:30. Struck the Tazungo canyon at 3200 feet & followed up it to Alder Creek & up Alder to about 4300 feet, then over ridge to S.E. to the Chillos and camped at 5300 feet, above the cabins.

Entered strongly marked transition zone at edge of Pine flats at 5250 where *Pinus ponderosa* and *jiffeyi* & *Libocedrus* and *Pinus lambertiana* & *coulteri* are in continuous forest with *Artemisia tridentata* below. This is a winding basin and gulch country and above it are pines on cold and choppy or not slopes. *Cyanocitta*, *Sitta pygmaea* & *scutellata* & *Pinus gambeli* & *juncea* were also common & the small *Thomomys* and *Sciurus nigripes*.

From the ridges I could map transition zone by Pine timber the whole length of the Pacifica ridge and down the upper slopes of the peaks and on Pike Mountain and many others without names.

Mammals.

Odocoileus scaphiotes - One live & one dead seen in Long Canyon & a head & skin at Colby's ranch. Tracks common in Long Canyon and Alder Creek canyon and around Colby. Three killed at Colby's this year.

Ovis - Colby says he has seen tracks on Shawberry Peak that he believes are sheep. It is an ideal peak for them.

Sciurus nigripes, Common on Pine Flat.

Citellus beecheyi, In places all along.

Very troublesome & hard to be poisoned at Colby. One seen dead is slightly *intermedius*.

Eutamias merriami, first heard at 2000 feet in Arroyo Seco Canyon, then common all along.

Neotoma fuscipes - , Stick houses all along Arroyo Seco

Thomomys pallidus, obs. at Colby's in Coldwater Canyon at 3500 feet. Some damage in alfalfa & orchard. Many caught. One fine old male secured.

Perodipus agilis? , Tracks common in chaparral up to 5500 feet.

To Buckhorn Canyon

Sept. 28. Slept cold and got up early, but waited to write up notes & did not get off till 8:45. Struck east over several ridges, each getting higher until we crossed one at 7000 feet & down into Buckhorn Canyon & camped at 6500 feet on the N.E. side of Mt. Waterman. Camped at noon & went to top of Waterman in afternoon & got back in time to set all the traps.

Have been all the way in pure transition zone. Even to the top of Waterman at 8000 there is scarcely a trace of Canadian. No *Pinus muricata* and probably no *flexilis*. *Pinus lambertiana* is very much like *flexilis* when dwarfed & not always distinguishable.

Pinus ponderosa, *jeffreyi* and *lambertiana* and *Abies concolor* go to the top.

Larix laricina reaches to 300 feet below.

From Chullas to Buckhorn is about 12 miles over fairly good trail and all the way through beautiful forest of pines, cedar & fir.

It has never been cut and not badly burned. There is no chaparral or dense underbrush.

Mt. Islip

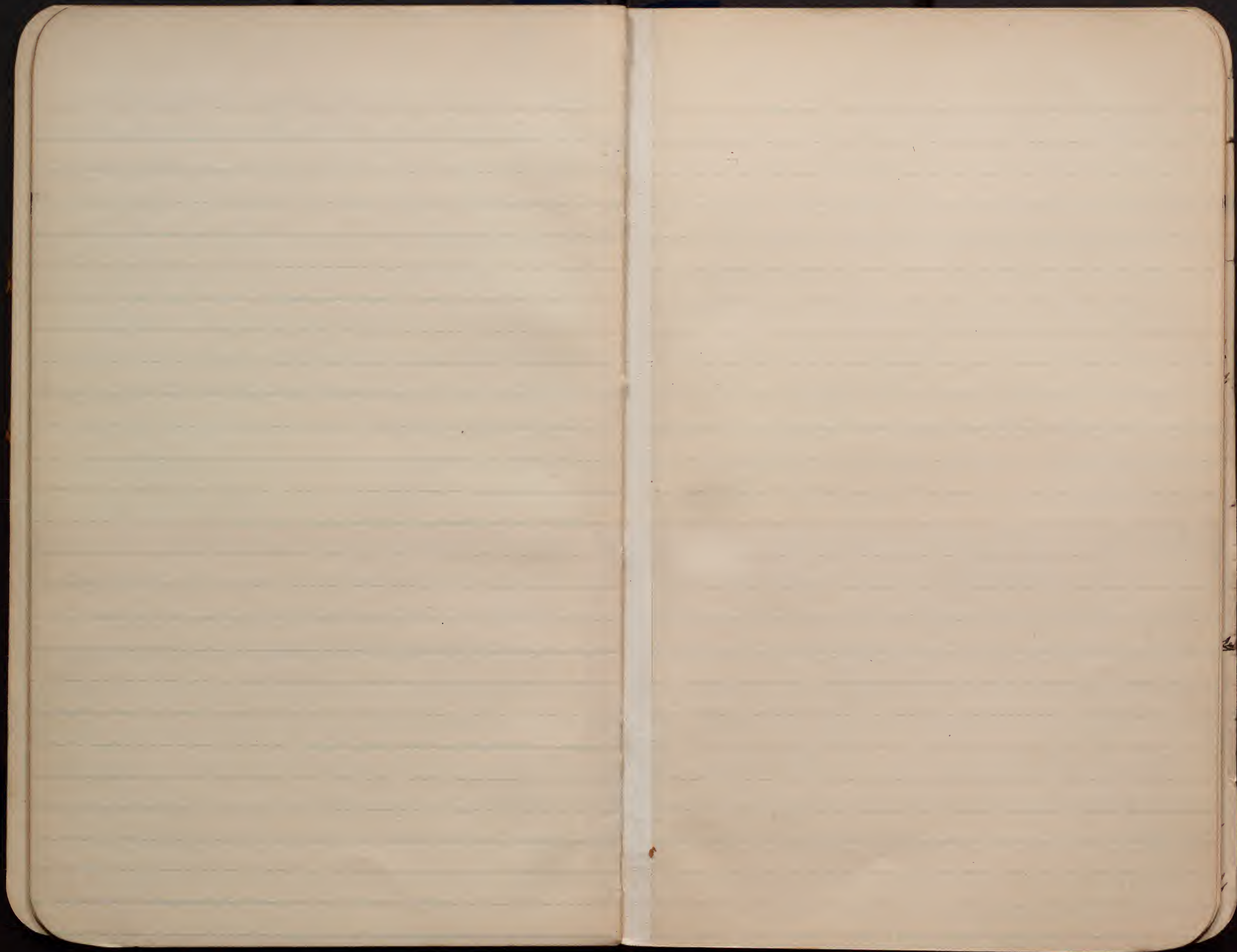
Sept. 29, Followed main divide on backbone of range east to Mt. Islip, over the top of Islip and down to first Siemega on south side at 6700 feet and camped early enough to set out all my traps. Climbed up and down steep peaks and ridges all day varying from 6500 to 8000 feet. Came about 15 miles, all the way in pure Transition zone. The slopes are so steep that most of the timber is scattered! The dense forests have been burned out but the scattered timber remains untouched. The same trees were seen as noted yesterday. No trace of Canadian zone was noted on Islip, but on the peaks east of it there should be some on Cold slopes, as they run to 9300. Bird and mammal life is rather scarce. Only 2 spruces were passed today.

Caught *Thomomys perpes?* + *Neotoma lepida?* + *Peromyscus gambelii* + 1st *Eutamias* species.

Could map Transition zone on both sides fairly accurately.

To Agusa + Pasadena

Sept. 30. Followed trail down to Squirrel Inn, and road down the canyon to Agusa, where I left Chas. Richardson to bring the horses over in morning, while I took evening train to Pasadena.



Los Angeles to Fernando

Oct. 28, took 2:30 train for Fernando
+ spent the rest of P.M. tramping
over wash east + south of town.

Oct. 29. Drove west from Fernando
about 3 miles, then south across
valley to Santa Monica Mts.
and up a canyon nearly to
summit of range. Got back
at dark + wrote up report in
evening.

Fernando to Saugus + Santa Barbara

Oct. 30 took 7:37 train to Saugus and got tea + drove several miles up San Francisco + Soledad canyons and got good lists of plants + birds.

Extensive orange and olive groves were seen along the R.R. from Fernando to the tunnel, then upper Sonoran chaparral covered the hills when not burned over.

As we came out at Newhall the valley opens out and is marked by scattered live oak + *Q. lobata* along the sides, and Walnut and sycamores along the dry wash. At Saugus the valley is wider + the bottom open + weedy.

San Francisco valley is a shallow upper Sonoran wash, full of juniper, *Artemisia tridentata*, and mainly upper Sonoran brush.

Soledad canyon is much the same but a little more open and the weedy bottom part may carry a mixture of lower Sonoran some distance up.

The ridges are pure upper Sonoran, covered with *Adiantum*, *Quercus*

densa, *Rhus ovata*, *Prunus ilicifolia*,
and nearly the whole set of chaparral.
The wide valley about Saugus and to the
west is partly cultivated, but in
waste places has most of the lower Sonoran
weeds of the San Fernando Valley, such as
Erenocarpus utigera, *Crotalaria californica*,
Trichostema lanceolata, *Marabium vulgare*,
Opuntia (small pods), *A. borealis* var.,
and in woods *Baccharis ovina*,
Lythospartum squarrosum etc.

Quercus lobata grows abundantly over
low mesas and foothills, but does
not come into the valley valleys nor
on chaparral covered ridges.

Cactus wrens have freshly lined
nests in many of the cactus bushes
a mile north of Saugus.

Left Seargeus at 4 P.M. & followed
down the Santa Clara Valley to the west.
The valley soon widens & there are
extensive cottonwood & willow bottoms
and great patches of *Baccharis viminea*
and *Phacelia borealis* down as far as
Moribu Canulus. Here the valley
begins to be cultivated & has fine
large groves of Orange trees full
of fruit, also olives, pomgranates,
English walnuts, pappi & Eucalyptus
trees, peach & apricot.

At Piru is a large lemon grove
of fine trees full of fruit.

The river bottoms are sandy & poor
& mainly used for meadows or pasture
land. The fruit zone is along
the side slopes & foothills below the
chaparral.

The valley is about the same to
Fillmore, good orange, lemon &
grapefruit groves & the other fruits
that go between - apricots, peaches,
Grapes, olives, etc.

Also corn, alfalfa, squashes,
melons & vegetables.

At Suspe the hills rise higher & steeper to the north and are crested with long arched spurs of *Pseudotsuga mucronata*. *Rhus lucida* and live oak & *Opuntia littoralis* come down on the washes. The soil is dark & rich and there are large fields of grain & beans & less fruit.

A few miles west of Suspe the citrus fruits have ceased but peaches, apricots & English walnuts are seen. Olives & grapes are still raised but the weeds & vegetation becomes more dense & the chopiness comes lower down as we near Santa Paula.

Just west of Santa Paula there are good orange groves again & lots of olives & English Walnuts & other fruits, but it soon got too dark to recognize the trees.

Santa Barbara

Oct. 31. Got a saddle horse & rode up past the old Mission, to the stone chulabas quarry & tunnel & then up the trail to summit of Santa Ynez Mts. and along ridges to highest peak, 3987 feet.

I had no aneroid or contour map but by dividing the slope slope into halves & quarters could estimate approximate altitudes.

The lower 500 feet of the slope is largely open country with scattered live oak and tongues of chaparral in the gulches. Parts of it are cultivated and groves of oranges, lemons, grapefruit & olives grow up to its upper edge. Also, a great variety of ^{various} native trees and shrubs.

Above this the Upper Sonoran Chaparral begins and runs to the top of the range is a dense mass, impenetrable except along trails. A large amount of northern species occurs here, or species that do not go much farther south.

To San Francisco

Nov. 1, arrived at San Francisco about 9 A.M. and worked on plants the rest of day and most of the time for several days, getting our summer's collection identified and labeled and the names worked into our reports and note books.

Miss Alice Eastwood came over and helped us one half day and we went to the Berkeley herbarium and worked with Prof. Hall another afternoon. We lunched at the

Luxury Club with Mr. Gilbert and met Prof. Siebel, Prof.

and Prof. Hall. Also Prof Ritter and Dr. J. C. Merriam & President Wheeler and a lot of other interesting people.

Dr. Ward, of the bacteriological laboratory told me of 15 cases of bubonic plague near Berkeley & San Francisco in which the men had been out shooting and had carried home ground squirrels (*C. rubeus*) in their pockets. It is suspected that the squirrels were affected by the plague & that their fleas conveyed the disease to the hunters. The Marine Hospital people are studying the

problem in relation to both spermophiles
and rats. Mr. Ward tells me that
the plague bacillus can be positively
determined without much difficulty, that
a slide made as a smear of blood from
the throat glands of a diseased animal
gives a fair test but that a
final proof should be made by
inoculation of another animal.
He says the bacillus could not usually
be recognized in an animal that
had been dead over 24 hours, and a
fresh specimen is best.

Dr. J. C. Merriam's fossils from
the asphalt beds near Los Angeles are
wonderfully preserved specimens including
some nearly complete and perfect skulls
of saber-toothed tigers, huge wolves
larger than any living species,
small wolves, and many other wonderful
mammals.

Berkeley University is a
delightful place and the Faculty Club
where the old lion takes a crowning
spot

To Lovelock, Nev.

Nov. 6 Left San Francisco at 6:20 PM,
for Lovelock, Nevada where a "Plague
of Voles" is reported.

Nov. 7. Daylight at Yreka, then
Yellow pines and transition zone to
Reno, Upper Sonoran began
good and strong below the meadows
at Sparks, but the big meadows
filling the bottom of the valley
from Reno to Sparks and 2 miles
beyond is probably transition,
simply because a damp, cold meadow.
The train missed Wadsworth and went
down the south side of the valley &
then over the mesa to Hazelton and
around by the Carson Sink, over
desert meadows subject to the ditch
but not yet reclaimed. Many
stunties had a few pieces as up
but the ground is still bare and dry.
The whole valley looks even more
brown and bare than I remembered
seeing it before. The lakes
and salt marsh are about as
I remember them.

Reached Lovelock about noon.

In afternoon drove out to the Reservation, as it is called - Rogers Ranch, and found Mr. George S. Webb, the warden. Together we went out over fields that had been alfalfa but are now a porous mass of *Microtus* burrows and mounds, so close together that one mound is entered by 2 or 3 burrows and the earth from one burrow fills two or three others, or would if not thrown back. One put case into the honeycomb and almost every bunch of alfalfa remaining has a burrow or two against its roots and is being rapidly consumed for food.

Large fields have been almost denuded of alfalfa and many are being plowed up. Mr. Webb says the crop on the Rogers Ranch is 1500 tons short on account of the mice. This year ~~last~~ the after effect will be more serious next year.

Alfalfa is now worth 12 or 13 dollars a ton at Lovelock. Last year the crop on the Rogers Ranch was about 10000 tons. This is all fed to stock.

during winter, mainly cattle and
sheep for the San Francisco market.
The ranch contains 4000 acres,
largely in alfalfa. The soil is
rich, heavy alluvium and yields
large crops. Not half of the valley
however is under cultivation and
as usual the large ranch methods
of farming are not very economical.

On the way to the ranch I picked up
a dead jack rabbit on the road that was
a fairly good specimen. Saw also a
dead Coyote & on my return saw a
live one out in the field hunting mice.
Pocket gopher hills are very large and
very numerous in places. The Microtus
seen to be montanus, but many small
gray individuals may prove to be nanus.

Saw many Buteo borealis calurus &
swainsoni in the cottonwoods along
the fences and flying over the fields
or sitting on the ground. Saw a few
Archibuteo lagopus sanctiohannis and
several Accipiter cooperii among the trees
or flying over the fields. Saw one
Falco mexicanus skimming over the fields
close to the ground like a war hawk.

Saw several warsh hawks in their usual
pursuit. Saw a large flock of gulls
in ~~the~~ one of the large fields ~~on~~ the
ground and many more circling low
over the fields. Ravens are common
and many were seen on the ground
out in the fields chasing & eating mice.
Magpies were common along fences,
in cottonwoods & willows and out
in the fields, sometimes following a plow
or lighting down and hunting on their
own account. Small birds are
scarce, a few sparrows and Otocoris
were heard. One shrike, that looked
large and dark enough for bovelis, was
seen on the fence.

On returning to town I laid
in a stock of poisons, Cyanide,
phosphorus & arsenic, and wired for
barium carbonate. I have plenty of
strychnine.

Nov. 8. Mr. Webb took me out to the Ranch to stay while doing my work on *Microtus*, and on the way at drove over another large ranch where they are poisoning with phosphorus. For several days men have been at work putting out the poisoned wheat and now the dead mice are scattered over the ground in thousands. Still there are many alive and many sick ones were seen, too stupid to run.

In places I could pick up 10 or a dozen to a square rod lying on the surface while probably more were dead in the burrows. Still there were others alive, but these would probably get some of the remaining wheat.

The men told me they were putting about 16 bushels of wheat on this field of, I should guess, 40 acres. They were sowing it broadcast in strips up & down the field, ^{almost} as thick on the ground as if seeding.

The phosphorus is put up in 3 oz. bottles in a liquid preparation by the local druggist here and sold at 75¢ a bottle. One bottle is

added to a bushel of soaked wheat
and distributed while wet. It seems
safe and simple to handle in this
way and was being distributed by
3 dull looking Scandinavian workmen.
Two or three bushels of the wet and
poisoned grain were placed in a
big box on a low sled and a boy
drove the horse slowly while the
2 men scattered the grain. Each
had a large tin pail. These were
filled with a shovel and carried
on the left arm while with a
big spoon the grain was scattered
as the men walked. It was
not intelligently done and as
much was scattered over salt grass
ground where were no mice as in
the worst infested spots.
It would take 2 or 3 times as long
to put the grain down the burrows
but this would prevent much of
the danger of poisoning stock &
birds. I am told that the waggies
die of eating poisoned mice but
suspect they eat the grain as well.

We then went over a field where the Pasteur virus had been put out about 3 weeks ago and found no dead or sick mice, but lots of live and healthy ones. Still a few of the burrows seemed to be closed or unused and a few of the mice may have been killed. Mr. Webb had put out the virus in this field, hoping to inoculate the mice so thoroughly as to exterminate them.

Then returning to the ranch I got out my materials for work and after dinner went with a man who is plowing up a ruined alfalfa field with a double sulky plow & 8 horses. The book keeper, Paul Reed, went with me & each with gloves on and a coal oil can in the left hand we started after the plow, catching the mice as they were turned out of the furrows and ran and putting them in the can. After 15 minutes lively jumping and scrambling we were out of breath & panting & tired but had as many mice as our cans would hold without being

P.S. Later one bit my thumb through a heavy leather glove till the blood ran in a stream.

P.S.
Another square rod had 161 burrows on it and thousands of rods ^{or acres} have them just as numerous.

smothered by their own numbers. On counting up we had 51 in my can and 34 in his, or a total of 85 mice caught in 15 minutes in our hands. At this rate I could catch 200 mice to the hour, or in 10 hours 2000. With a long handled dipper one could catch them faster & easier. They could not bite us through heavy leather gloves, but would stand up and fight valiantly & bite as deep as they could into the leather.

The 85 & 11 mice were put into 5 cages and given preparations of arsenic on sugar bits, wheat & cracked barley and cyanide of potassium on sugar bits & barley.

I measured off a square rod of the field and counted 134 burrows on it. This is about a maximum but on a seathed place I counted 54 on a square rod which is about the minimum.

A large lot of pellets made up of microtus fur & bones were gathered up where the gulls sit during this

resting time and another batch
under trees along the edge of the
field where hawks & owls sit.

The birds seen today were:

Archibuteo sanctijohannis, at least 4 were
seen in the trees along the fields or
out in mouse infested fields.

Buteo b. calurus - Red tail hawks are
unusually common over the fields,
or sitting on the ground or in the
trees along the fences too full for
action. In the evening as they flew
out of the trees their crops were so
stuffed out as to land conspicuously
as the hawks flew.

Bubo swainsoni - a few were seen along
the rows of cottonwoods bordering the
fields and others flying over
the fields. They are slightly less common
than the red tails.

Circus hudsonicus. A few marsh hawks
were seen skimming low over the fields

Bubo - A great horned owl came
into the cottonwoods close to the ranch house
in the evening, but paid no attention to
the chickens, ducks & turkeys under the trees.

Larus delawarensis Gulls were busy flying over the fields all day when not sitting in flocks on the ground waiting for digestion to make way for more mice. At one time I counted two flocks of 24 and 53 sitting on the ground while others were circling over the field. This was in about a 40 acre field where the mice have ruined the alfalfa crop. The gulls are often seen diving to the ground for a mouse and many a quarrel takes place over the prize. The mice are gulped down whole, so little time is wasted. On the roosting grounds lots of pellets of mouse hair and bones are found & the gull pellets can be distinguished from those of hawks & owls by their open, scattered form. Apparently a gull picks part of the bones out of a pellet after it comes up & so tears it open. Gulls often are seen chasing mice on the ground and evidently catching them by help of wings and legs. A sudden flushing in some part of the flock of sleepy gulls, a rush and flutter of wings indicates

Nycticorax, Black crowned Night
herons came into the field after 4 P.M.
until sundown, or as long as I staid.
I counted 12 in one field, flying in or
sitting like soldiers with drawn sword
watching at Microtus burrows. I watched
them creep up with bill poised ready
to strike but did not actually see one
snare a mouse.

Zootheryx - Quail were heard
calling in the greasbrush back of the
ranch buildings.

Corvus sinuatus - Ravens are common,
and almost constantly heard or seen
over the fields. They are often seen
on the ground watching at burrows
or picking at mice which are torn
to pieces before being swallowed.

They seem to catch the mice by watching
at the burrows or by a quick short run.
Probably 25-30 ravens were seen during
the day.

Corvus americanus - Crows are much
more numerous than the Ravens and
seem even more active in pursuit &
capture of mice. Fifty to a hundred
crows are often seen in an 80 acre

field, scattered out singly or in small
squad, chasing or eating mice. They
are often seen carrying mice in their
bills while flying but more often seen
tearing the mice to pieces on the ground.
I have seen 3 or 4 this consecutive few
posts, each tearing up a microtus
and eating it bit by bit.


Pica pica - Magpies are numerous
and constantly seen in the fields,
or on the fences or in trees or brush
along the edges. They hunt systematically
over the fields, one in a place, but
apparently with great success. They
are often seen carrying microtus or
eating them on the ground or a post.
They also come to feed with the chickens
in the morning and are seen picking
around the slaughter yard and old bones
thrown out, but most of their time is
spent in the field & Microtus seems to
be their principal food.

Euphagus cyanocephalus - Brewer's blackbirds
are common in the fields especially
on plowed ground. I have not seen
them hunting or eating mice, but presume
they find grubs or insects plowed up.

There seem to be no grasshoppers or other insects out. There have been heavy frosts and most of the insectivorous birds are gone.

Otocoris - Horned larks are common in fields and along roads.

In evening I went over to the nearest neighbor Mr. Aufer, who has lived here 30 years and has a ranch of 620 acres, mostly in alfalfa. He estimates his loss this year by the mice at 600 tons, \$5000. Last year he cut 2500 tons of hay and this year only 1200, but he attributes part of the shortage to the late, cold spring. He is plowing up some of his best fields where the alfalfa is killed out by the mice & will put in grain next year. He thinks the loss will be much greater next year from the damage all ready done.

Oct. 9. In the three arsenic tests on wheat, barley, and sugar beets the mice were all dead in the cases this morning but one. In the two tests of cyanide on wheat & sugar beets none of the mice were dead except a few that had probably been hurt & were eaten up by the others. So I mixed a peck of ^{put}wheat & peck of wet cracked barley with half a pound each of dry arsenic and cut up a quart of sugar beet cubes  and rolled in arsenic & put out in the field. The wheat & barley each covered about an acre, distributed in burrows & runways and it took two of us half an hour to put out each kind. The result remains to be seen, and two nights should be allowed for definite results.

My baggage came & I set a few traps for gophers and took some photographs. Carried out the dead *Microtus* & had them plowed under & caught a fresh lot of two ones. With a tin can in one hand & gloves on I followed the plow for 35 minutes & caught about 127 *Microtus*.

The same birds as yesterday were seen
and a few others.

Larus delawarensis - 165 gulls were
counted at one time in two flocks
on the ground and others were
flying around over the field.

The gulls have been here for a month
or more Mr. Webb says.

Archibuteo sanctijohannis - In a field
two miles from the ranch house
I counted 10 Roughleg hawks fly out of
one line of trees as we drove along
and probably 20 were seen sitting
on the ground out over the fields.

All seemed full and stupid.

Many of the hawks were in beautiful
plumage with black bellies & white
head & cape and basal half of tail
but no ferruginous was seen on
any. Many were close by and the
glass showed them up distinctly.

Falco mexicanus, One seen sitting on
a gate in pig field. He was very
tame and stupid for his kind.

Falco columbarius - One seen on a fence
in a large field.

Canis latrans a coyote was seen at about 5 P.M. hunting in an alfalfa field. It was walking cautiously about & evidently hunting mice, but I did not wait long enough to see it catch one.

Mephitis - While catching mice I found a dead skunk in the middle of an 80 acre field and saved the skull. Another skunk was seen by the roadside.

Thomomys nevadensis, Gopher hills are numerous & big. The ranchman says they could not raise any alfalfa if they did not drown out the gophers in irrigating. Still they have come into the fields & are doing great damage now.

Falco sparverius - A fine adult male was seen on a fence but I had no gun & did not ask him what he had been eating.

Circus c. hudsonicus, A few marsh hawks were seen over the fields.

Euphagus cyanocephalus - A large flock of several hundred were sitting in the cottonwood tops near the ranch just after sundown.

Zayornis saya, One seen on fence.

Colaptes cafer, two were seen in the orchard.

Junco - Juncos are common in the orchard but bordering brush patch.

Merula m. propinqua - A typical western pale robin was seen in a ditch near the house.

In the evening I went over to the ranch of our nearest neighbor, Mr. P. Anker, who has been here for 30 years, and has a ranch of 620 acres, mostly in alfalfa. ~~He~~ estimates his loss this year by the mice at 400 tons of alfalfa, or about \$5000. Last year he cut 2500 tons of hay and this year only 1200 tons. But he attributes part of the shortage to the cold, late spring. He thinks the loss next year will be far greater than this from the damage already done. He is plowing up some of his best fields of alfalfa and will put in grain next year and if the mice have left will seed to alfalfa later.

His potato patch was nearly ruined by the mice and where he should have had 6 tons of good potatoes he gathered about a ton of damaged potatoes.

Knowing Mr. Anker to be an old resident and a very reliable man I went over especially to ask him if such an invasion of mice had

ever occurred before. He said it had only once in his 30 years here. A similar and equally destructive wave of mice began in 1899, reached their greatest abundance in ^{the fall of} 1900, and suddenly disappeared about March or April of 1901. He figured out the dates very carefully and they agree with what others had previously told me in less detail. He says the alfalfa crop was practically ruined and the land had to be reseeded.

Many people poisoned extensively at that time, but did not succeed in saving their crop, while those who did not poison were so much ahead.

Mr. Anter also tells me that the gulls "have always been here" and that they fly over the fields all summer, especially when the land is being irrigated. He thinks they stay most of the winter.

Rogers Ranch

Nov. 16. Caught a few gophers & photographed the gulls in the field. In P.M. went over to where we put out the poison yesterday and found 4 dead mice along the strip where Phosphorus treated wheat had been put out. Also found one little pile of wheat (about a teaspoonful) smoking & on touching it with a stick it burst into a blaze.

One sick mouse that died in about 5 minutes was found where arsenic poisoned wheat had been put out, but none were found where the barley & sugar beets were distributed. The grain & beets had been partly eaten but I think the mice die in the burrows instead of coming outside as they do from phosphorus poison. Tomorrow we will dig open some of the burrows to see.

Saw other fields where the mice were as abundant as usual and in one field of barley stubble they are numerous. They seem to live on the dry stubble & what grass was left.

Saw no new birds but an unusual number of rough legged hawks, probably 50 or more in the trees along the roads or sitting on the ground out in the field. All of the birds previously noted seem to be more numerous and cover new territory.

The microtus in the cages to which I had fed some of the ^{Italian} poisoned wheat & barley had all died, while those fed phosphorus poisoned wheat were about half dead. It is probable that too much phosphorus was used and the taste or odor was offensive & hence it was not eaten.

I had about 100 dead mice to carry away, but saved the heads of a lot of the males and examined probably 50 females to see if they are still breeding. Not one showed signs of pregnancy, and I have not seen any young less than one third grown, or probably a month old. The breeding season seems to be entirely over & I would not be surprised if the birds prey on

them would practically exterminate
them before the breeding season
begins again in probably April.
If half the mice were poisoned the
birds would surely do the rest.
Coyotes are also numerous and must
consume great numbers of the mice.

Rogers Ranch

Nov. 11, Made up *Thomomys* & *Microtus* skins till noon when Mr. Webb returned with the Barium Carbonate, then mixed poisons and fed the mice in cages and later took wheat prepared with it to the field and distributed about 1/2 quart on about an acre, putting a teaspoon full of wheat down each fresh and well used burrow. I mixed half a pound of the Barium ^{with half a pound of sugar} with 1/2 quart of wheat which makes ~~it~~ ^{it} six times as expensive as arsenic. Some of the ~~same~~ preparation was fed to 12 mice in a cage and in other cages were placed a stronger mixture and also Barium on sugar beets. This was put in the cages about 1 P.M. but only one mouse (with the wheat) was found dead before dark.

In the field where phosphorus was put out day before yesterday 4 dead mice were found at 2 and 3 rods from the wheat.

In the area where arsenic poisoned sugar beet cubes were distributed day before yesterday one dead mouse was found on the surface, but none were

P.S. Nov 13. The sugar beets were not touched tho they have been out 2 nights. The coating of arsenic was very thick on them & may have prevented the mice from eating any.

found by digging out several burrows. When the arsenic poisoned wheat was put out day before yesterday we dug out several burrows and found in one nest at the bottom of a deep cavity 2 dead *Microtus*. Their stomachs were full, mainly of green alfalfa, but in each was the ground up remains of wheat to the amount of about 2 kernels. Possibly only one. Evidently the mice poisoned with arsenic go into the burrows to die. A few live mice were seen running about on the area where the poisoned wheat & beets had been put out but not half so many as on the next block where none had been distributed. There are not so many freshly used burrows either on the poisoned area.

A new line of poisoned beets not sliced long and rolled in dry arsenic were distributed along a populous ditch bank. These pieces are too large to be eaten at once & the amount gnawed out of them can be seen each day.

P.S. next morning.

Barium: All 3 mice were dead in morning.
If the Barium killed them it works very slowly.

P.S. next morning.

Apple: Considerably eaten, 5 mice dead, 1 alive.

Potato: Not much eaten but 5 mice all dead.

Cabbage: All 4 mice dead. Not much eaten.

Rogers Ranch

Nov. 12, Only about half of the microtus fed Barium Carbonate were dead in the morning and these were partly eaten & may have been killed by the others. Later in the day ^{10 AM} a freshly killed mouse was eviscerated & filled with Barium Carbonate & put in a can with 3 live ones. It was promptly eaten and a large part of the ~~two~~ poison taken but at 5 P.M. the 3 live mice showed no symptoms of discomfort. Barium seems worthless.

At the same time another was well filled with arsenic & put in with 3 live Microtus and in 2 hours 2 of the three were dead, & the other was dead in morning.

Others were put in cans and fed apple, potato, Cabbage, ~~the~~ onion & beefsteak with dry arsenic scattered over them. The apple was quickly eaten as in that can the mice were hungry & had little to eat all night. In 2 hours one was dead & in 5 hours 4 more. ~~Some~~ Considerable of the potato was eaten but ~~one~~ of the mice died before dark.

The cabbage was not eaten for some time, but by 5 o'clock 2 of the mice had died and others were affected.

P.S. Next morning.

Onions: In the morning little had been eaten and of the 7 mice 2 were dead & 5 alive.

Beefsteak: Edges eaten & all 5 mice dead.

Cabbage: In the morning cabbage not touched by mice.

Dead mice: The 4 poisoned mice were not touched.

Apples: Some eaten from nearly every piece.

Potatoes: Many pieces had been eaten and one dead mouse found beside a piece of poisoned potato.

Onion: Not touched by the mice.

The onions were not eaten at first but at 5 P.M. some had been eaten and 2 of the mice were nearly dead.

The beefsteak was not eaten until late, but at 3 P.M. the edges had been eaten all around tho the mice were all alive. Morning will show the rest.

A pan full of fresh cabbage was sliced and covered with arsenic and put out in the field where microtus are thick.

Four microtus were vivisectioned & opened to the skin & filled with arsenic & put down burrows in the field & marked with stakes.

> A sliced apple was rolled in arsenic & put in holes along a ditch bank.

A sliced potato was put out in the same way.

A sliced onion was also put out in the same way.

In afternoon Mr. Webb drove down to the end of Humboldt lake with me to see if the mice were numerous down there and in the tule & wild land. It is about six miles to the lake.

Microtus were numerous in the alfalfa fields down about 4 miles, then a mile of salt grass and quince brush intervened where there were few or none. Then a big alfalfa field had no mice except a few here and there along the ditch banks. Over the flat salt ground there was no trace of mice but on the mounds out near the mud flats there were a few fresh burrows & trails about the normal number for such localities. There are no tubes at this end of the lake until far out in the water. Last spring the water was unusually high and came up among the ranches but has gone back to near its normal level.

The mice evidently have evidently entered the alfalfa fields from surrounding country and multiplied under the favorable food and cover. It evidently is not a migration, as desert country surrounds the valley. They are said to be numerous also up at Winnamucca & Battle Mountain.

Large flat mounds are seen over much of this flat valley

that has recently been lake bottom.
They are most numerous down near
the edge of the wet ground and come
out into the edge of the water.

They are usually 4 to 10 feet high and
50 to 300 feet across. Some are
sandy, but most are of black
mud, rather moist & often encrusted
with soda. The valley soil is generally
black, rich heavy alluvium.

Many flocks of wild geese were
seen along the edge of the lake, probably
2000 birds at least.

Culls were seen in another field
that is being plowed about a mile west north
of Mr. ~~Thomas~~ Anker's field. I counted
176 in it at one time, on the ground
& on the wing.

Many purple finches (not *montanus*) were
seen along the fences, & a few *Zonotrichias*
and *Ammodramus*. Also, many
redwing blackbirds & 2 sparrows & a few
meadow larks. No other new birds.

Rogers Ranch.

Nov 13. The mice had not touched the onions or cabbage put out yesterday but had eaten some potato + apple poisoned with arsenic + one dead mouse was found close beside the potato he had been eating.

The bins of sugar beets rolled in arsenic + put out 2 days ago were not touched. They were heavily coated with dry arsenic.

The wheat poisoned with Barium carbonate 2 days ago had been largely eaten but no dead mice or scarcity of mice could be discovered.

On the area where wheat poisoned with arsenic was put out on the ninth one dead mouse was found and the burrows freshly used were scarce. Much of the wheat has been eaten.

On the area where arsenic poisoned cracked barley was put out the 9th 7 dead mice were picked up + most of the grain had disappeared. The freshly used burrows were scarce, compared with those before the poison was put out.

Went to town but the 8:20 train was 7 hours late so staid over for morning train.

To Hazen & Fallon.

Nov. 14, The 6:40 A.M. train did not come until about 11 A.M., so I wrote on report and examined a big field close to town that is full of Microtus. Also talked with one of the county commissioners who owned the field and who told me that the mice were just as bad to where the valley narrows up 5 or 6 miles north east of Lovelock. He also said they were reported as numerous at Cosgrove and in the valley north of Winnemucca. He said a few of his apple trees had been gnawed and killed and he was afraid more would be killed during the winter.

Reached Hazen about noon and Fallon about 2 P.M. and went to the Hotel Fallon. Telephoned Mr. Means but was not able to see him.

Fallon.

Nov. 15. Mr. Means (Engineer in charge of the Truckee Carson Project) took me out over the valley and showed me many places where the gophers had cut the ditch banks, or rather where gopher holes had caused the water to cut through the banks and do a great deal of damage. We struck one fresh break which a gulch 6 feet wide & four feet deep had run cut through the bank and ~~was~~ across the road. This was photographed as also several other breaks and sets of gopher hills in the ditch banks. Many burrows of *Perodipus*, *Dipodomys* and *Onychomys* were found in the banks but these are less extensive and not very dangerous. Mr. Means says that last year one of the big canals broke out, probably through a gopher hole, and it cost about 500 dollars to repair the break. If the country was under cultivation such a break would mean immense loss.

The development of this immense valley of rich agricultural land is going to bring up a lot of problems in useful and injurious species of mammals to be destroyed or protected.

A little bulletin on the species, their habits, etc for these valleys would be timely now and Mr. Means thinks it would be appreciated.

Nov. 14 Reached Blue Canyon at daylight
and Sacramento at 11 A.M. and
stopped at Davis to wait for
the train north from San Francisco
at 5:40 P.M.

Was rather surprised to find
oranges, lemons and grape fruit
trees in many of the yards in town
full of nearly full grown and in
some cases ripening fruit.

None of the trees were very large but
all were well loaded with fine
fruit. Peach, apricot, almonds
and many kinds of grapes are also
raised in town at at ranches.
The most of the valley is big
grain fields. Wide spreading
oaks (Q. lobata evidently) are
scattered over the valley in places.

To Grants Pass, Oregon.

Nov. 17 Daylight began to break at Edgwood but we did not get a clear view of Shasta until near Agnes. There is not much snow on it for so late in the season. The Siskiyous were mostly in clouds but the valleys were clear. At Ashland we got the usual fine flavored apples. ~~and~~ the valley from Ashland to Madras and Table Rock is a good farm and fruit valley with a mixture of Upper Sonoran and transition zones. There is an abundance of Arctostaphylos, Sanicula cuneata, Ceanothus thyrsiflorus?, Amurensis fillozi?, but these are mixed with Pinus ponderosa + lambertiana, Pseudotsuga, Larix laricina, Arbutus and other transition zone species.

Nov. 18 Left Grants Pass at 11:30

The same mixture of Upper Sonoran & Transition zone species continued beyond Hugo, but gave place on the Tunnel & ridge to mostly Douglas spruce and on the north side of the ridge some Abies lowiana. At Island Cornus nuttallii and Anemone cordulata were first seen.

Wolf Creek

A few patches of Anemone cuneata ^{& Thymiflorus} and Arctostaphylos grow on hot slopes and a few Pines ponderosa & Sugar pines & Quercus kelloggii, but most of the timber is Douglas spruce, with some Abies lowiana. ~~Pines~~, Acer macrophylla & Alder.

Tunnel No. 8

After passing through tunnel No. 8 the timber is mostly Pseudotsuga and Abies lowiana until we come out into the more open valley, where a few Pines ponderosa - sugar pines & Liriodendron are seen. We soon reach Glendale in a narrow valley with sawmills and a few small cleared farms. Most of the country is heavily

Glendale

timbered and the cold slopes seem to be all Canadian zone while the warm slopes & bottoms are transition or a mixture of the two. We followed up Glendale Creek to the head of the pipe line, half a mile at least on N.E. gulch in a beautiful forest of *Pseudotsuga* and *Abies borealis*, with ~~scattered~~ scattered *Taxus*, *Castroopsis chrysophylla* trees, *Quercus densiflora*, *Alnus*, and a few *Ulmus macrophyllum* for timber. The smaller shrubs & plants are *Vaccinium microphyllum*? (tall), *V. ovatum*, *Gaultheria shallon*, *Berberis nervosa*, *Linna borealis*, *Ceanothus velutinus* (big, 10 ft high), *Rubus nutkanus* + *leucodermis*, and lots of ferns, moss and sarsil.

The transition zone species in the valley are *Quercus kelloggii*, *Q. chrysolepis* (one tree only), *Pinus ponderosa* (a few), *P. lambertiana* (a few), *Libocedrus laurinus* (a few), *Arbutus*, *Ulmus macrophyllum*, *Ulmus* (little leaf), *Populus trichocarpa*, and *Cornus nuttallii*.

All trace of Upper Sonoran seems to have gone.

There is a mixture of Canadian and transition but with a mild winter climate that modifies both zones. Roses and honeysuckles are in flower in the dooryards as well as asters & Chrysanthemums. Grass and alfalfa and many tender plants are growing, fresh & green. The winters are said to be very mild with practically no snow to remain on the gravel in the valleys. The summers are said to be delightfully cool.

A little farming & fruit raising is done in the valley but tillable land is scarce. A dust hole was seen near the town & there are said to be lots of deer, some bear & mountain lions.

A few Thompsons hills were seen on the flats near Glenfeld, but none on the ridges or in the heavy timber. *Distamias townsendi* and pine squirrels are common.

Bluebirds, juncos & English sparrows were eating woodbine berries from vines on the porch. One mountain quail was seen & a Cooper's hawk & edwards & cedar birds

Glenade to Portland.

Nov. 19.

Leaving Glenade at 12:30 we wound along the narrow canyon of Cow Creek with dense forest up the steep slopes on both sides.

A mixture of Canadian & Transition zone species run through the canyon, one predominating on a cold slope, the other on a hot slope, until we near the Mupqua Valley.

Here it opens out at Glenbrook and at Biddle is a wide farm valley full of good fields and orchards.

Pseudotsuga, *Abies*, *Taxus*, *Castanopsis*, & *Vaccinium microphyllum* & *ovatum* are vastly left behind in the canyon while *Panachroa pinn.*, *Quercus kelloggii*, ^{*californica*} *Modione*, *Maple*, ash, and *are* the principal trees along the edges of the open valley.

The fields show vastly plowed ground & orchards. Apple, peach, plum & pear orchards are extensive and thrifty & some of the apple & pear trees are still loaded with fruit.

After crossing the Mupqua River at Myrtle Creek, a few patches of *Ceanothus cuneatus* are seen on

stup, bare, hot slopes but no other
signs of Upper Sonoran zone plants.

Along the river banks grow
Populus trichocarpa, *Alnus*, *Salix*,
and *Taxus*.

Flourish hills are common in the
Muppesa valley but gophers could not
live in the timbered mountains along
Cox Verde canyon.

Crows & blackbirds are common.

To Lake land and Drain the
country is similar but high, timber
covered hills begin at Drain, the
too dark to see what the timber
is

In crossing the ridge north of Drain
I could not recognize the timber
owing to darkness & rain.

Reached Portland at 11 P.M. &
went to Oregon Hotel.

Nov. 20. Got a lot of accumulated
mail and wrote letters.
Left at 11:45 A.M. on N.P.

Zacoma to North Yakima.

Nov. 21. Got into Zacoma at about 5 AM and left at 8:15. Warm & raining. Grass fresh & green but many of the common plants dead & dried up.

Lots of berry fields and apple orchards, some hop fields.

Followed up slope through heavy timber but rain & snow & dirty windows hid the view for any detailed notes.

Struck snow at 2400 feet & had it over the summit about 4 inches deep and some down to Eastern on the east slope at 2150. Then no more snow and a few miles past Eastern *Pinus ponderosa* begins and grows more abundant. At Cleelum it is the dominant tree the aspens & alders grow along the bottoms. The high mountains are all hidden by clouds, tho at Cleelum we leave the rain and fog.

About half way from Cleelum to Thorp the country opens out with big yellow lava hills on the north & black timber on the south but with pines and cottonwoods along the river bottoms. There may be a touch of upper Sonoran on both

slopes, but in general the country
is transition to Hoops + beyond.
At Lutes (1400ft) the snow began to
show on slopes above and at
about 2400ft we struck into fresh
snow, which became 3 or 4 inches
deep as we reached the summit
a little higher, but stops at Easton.

Transition zone seems to
run to the summit on warm
slopes, with hemlock, *Abies balsamea*,
and cedars. In cold slopes
over the summit Canadian zone
is marked by *Pinus murrayana*
+ *Populus tremuloides* - down as far
as Easton, where *Pinus ponderosa* +
cedars begin on at least the warm
slopes. (2100ft) Rain + snow
+ clouds and fog + dirty windows
prevented any good observations along
the road over the mts.

at Clunium ^(1900ft) *Populus tremuloides*
continues along the river bottoms but
Pinus ponderosa is abundant and a
little *Kunzia* is seen. Below this
country soon opens out and the
timber is restricted to gulches + hillsides

At Ellensburg (1500ft) there are a few
scattered *Pinus ponderosa* along the river
bottoms, also a few thickets of *Aspens*.
Cottonwoods are abundant + seem to be
P. balsamifera. *Aritimia tridentata*
becomes common + *Kunzia* is seen
along rocky places + on bottoms.
The hills are big + bare of timber.
It is a question whether to call it
Upper Sevieran or transition, but
I should compromise on transition
until better data is to be had.

Continued down the valley
between lava ridges to North Yakima
at 1150ft.

At North Yakima the alfalfa is
still green + leaves are green +
apple trees + some of the apples
have not been gathered.

The country is marked by mostly mixed
species of plants but seems to be
Upper Sevieran zone. *Aritimia tridentata*
Dicentra canadensis + *toothpola* + *Kunzia*
are abundant, with some *Tetradymia*
and along the bottoms patches of *Opuntia*

Natches

Nov. 22. Went up to Natches on the new railroad & tramped over the mesa west of there. The edge of *Pinus ponderosa* is about 5 miles west on the mesa at 2500 feet. All below seems to be Upper Sonoran zone.

The mesa 500 feet above the river bottom is apparently as warm and probably freer from frost than the bottom.

Soil is excellent in both and good crops of alfalfa, grain & fruit are raised when water is to be had. A fair crop of grain is raised on the mesas without irrigation.

Good apples, pears, peaches & apricots are said to grow on the mesa at 2600 feet, about a mile below the end of Tunnel No. 4 of the Govt. Ditch.

Thomomys are abundant and very destructive in fields and in one alfalfa field I found a few *Microtus thomomys* + runways.

Tracks of Coyotes, Coons, wild cats are common and badger holes were seen in many places.

- Paseo to Le Gravel

Nov. 23 Reached Paseo at 1:20 A.M.
& waited till 7 A.M. for train to
Pendleton. Then waited from 11 A.M.
to 4:40 P.M. for train to Le Gravel,
only to find no Sunday trains
run to Elgin & will have to
wait till Monday morning.
Would drive out to Wallawa, but
it has been raining for a week
& mud is deep.

Nov. 24 Sunday, Rained all day,
mud deep & some snow on hills
all around valley.

Nov. 25, Took train to Elgin at 8:30
& arrived at 10. Left on step at
1 P.M. for Wallawa & reached there
about 8:30 P.M. dark, cold & muddy.
Stopped at Mr. George O'Brien's
hotel & had a delicious hot supper.

Wallowa to Chico.

Nov. 26. Got off about 10 A.M. with Mr. Howard O'Brien, Forest supervisor, with good saddle horses & a pack mule. Toole bed & grub. Rode hard till long after dark & got into Chico, the ranger cabin about 8 o'clock. Got some supper & slept on hay in hayrack. Snow 1 to 6 inches deep in timber. Warm slopes bare at Chico. Came about 35 miles. Cold, tired & sore.

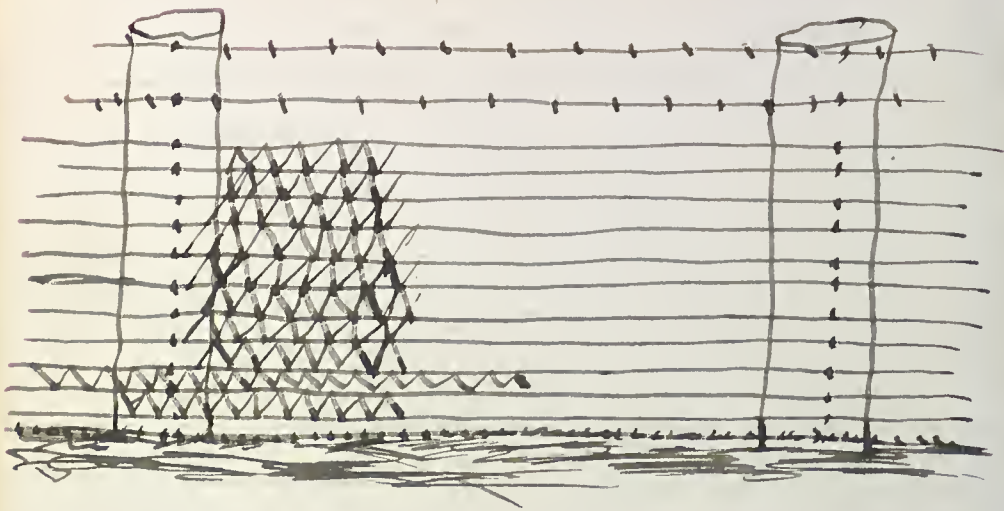
Nov. 27 started at sunrise, taking Walter Fay, the ranger, with us. Ground frozen hard & white with frost & struck snow on top of ridge above cabin. Traveled N.E. till noon & struck the wolf proof fence in about 15 miles. and rode along part of two sides. Then down to the ranger cabin & got lunch.

Snow is about a foot deep in the pastures and crustal so it will nearly hold me.

The pasture is located on top of the mesa between Joseph & the Delnada. It is probably above 5000 feet and mostly in Canadian zone. The warm slopes are covered with open woods of *Pinus ponderosa*, but the cool & cold slopes are mostly a dense forest of *Pinus murrayana*, *Abies*, *Picea*, *Pseudotsuga*, *Aspens*, *alders* & *willows*. There are some small meadows and some open dry patches but over half of the 4 section pasture is dense Canadian zone forest.

Much of the murray pine has been killed by the insects and 3 trees had recently fallen across the fence.

The work of clearing the way for the fence was enormous & expensive. A strip of about 20 feet was cut out & the stumps blasted out. In places the fallen trees lie 6 feet high in a tangle & these had to be chopped through as well as the standing timber. There is bound to be much trouble with falling trees.



The pasture is 2 miles square.
The posts are 16 feet apart,
and only about half could be set in
the ground on account of rocks.

The rest are "jacks" -
posts with a set of
braces nailed at the
bottom & loaded
with stones.

A heap of stones
that I think
would weigh
500 to 1000 lbs.



These posts are very solid but
took a lot of work to build.
The posts are peeled, very heavy,
and most stand 2 feet above
the top of fence.

The fence is over 4 point top wire
on the ground, close above this a
42 inch Elwood triangular mesh
with 4 inch triangles in 10 series,
above this 6 inches a light 2 point
post wire & a heavier one 8 inches
above, making a 4 foot 8 inch fence.
It is well built & well stretched.

Over-Mountain sheep are said to be holding their own or increasing in the Wallawa Mts. Mr. O'Brien reports a herd of 30 seen a year or two ago + many smaller herds seen.

He also has been told by old hunters that sheep are dead in winter and one that he killed in March had the ears completely filled with hard wax that could only be dug out with a strong knife. It came directly toward him while he was shooting + seemed not to notice the sound.

Fresh tracks of 2 coyotes were seen in many places in the pasture and these 2 ~~had~~ have been there all the fall. The ranger thinks they were fenced in. Coyotes are abundant outside all over the mesa country. Many fresh tracks were seen and one coyote.

Several bears are said to have gone through the fence this fall, by squeezing over the mesh and under the bars.

Deer are said to jump the wire and Mr. Fay shot a large buck in the pasture a few days ago and wounded it + followed when it jumped over and beyond. Mr. Fay + Mr. O'Brien agree with me that another wire 12 or 15 inches higher would probably keep mountain lions out + keep deer in. I think it worth trying.

No wild cat tracks were seen but the cats are said to be common.

A few badger tracks are seen and a badger skin hung on the cabin. Badgers may dig under + be a source of danger.

· Snowshoe rabbits are numerous
in and around the pastures. They
go through the mesh but it bothers
them. One will track up and down
the fence before crawling through & then
sometimes turn back.

There are elk not far from
the pastures and they might be fed
in with hay. The dense timber
would be ideal for them in winter
if some hay was available.

There are said to be several bands of
elk in these mts, about 20 in one
band. Some are killed every year
& the Oregon game laws are said
to be a farce. There is no law
protecting deer.

2500 sheep were kept in the
pastures through Sept. & Oct., and
Mr. O'Brien thinks 2500 can be kept
in it all next summer. The fee
for sheep on the reserve is 7¢ a head
for the summer. It ought to be
doubled in the pastures for the saving
of birds & protection of sheep.
Still at 15¢ a head 2500 sheep
would yield a revenue of ~~only~~ \$375 a year.

This rate would require 20 years to pay for the fence - total cost \$600+.

But under ordinary circumstances the fence would have cost about half as much & if the sheep would pay for it in 10 years that would be as good as the Reclamation Service requires.

The excessive cost of this fence is due to location and rush work. It is about 100 miles from the end of a spur RR. over very difficult freight roads and new roads had to be built a long distance to it. The expenses for freighting was enormous.

Excessive rates were necessarily paid to get the freighting and other work done promptly. Men were paid 3⁰⁰ a day for 8 hours work and poor men at that.

We should ask for a copy of the summary of Mr. O'Brien's report on the fence. also for Mr. Jardine's report on results.

In other places the fence
can be built for less than half.
More expensive material was used than
called for in my specifications.
The Elwood woven wire is 42 instead
of 36 inches and cost 66¢ at
Elgin, I think. See report at Forestay.
Other makes of wire are cheaper &
the next move is to see how cheap
a good fence can be built.
It is important also to select
sections where grazing can be
carried on as long as possible
and as many sheep kept to the
area as possible to get the
best returns for the investment.
Mr. O'Brien tells me that
a ranchman by the name of
Emmons about a days trip from
Willow has a wolf proof fence
that has been in use 4 or 5 years.
He is going to get a full account
of it for me.

Birds

The Lodgepole pines in this region seem to be doomed. An insect attacks them in swarms and kills acres in a body, then breed in the dead trees and swarm out to attack live trees again.

One pileated woodpecker was seen working on them & several white throats. Many of the dead trees have a large part of the bark stripped by the woodpeckers.

We ought to have a man working on them. Creepers and other birds may be feeding on them too & we should know the facts.

Many of the yellow pines are also attacked by an insect and are being killed. Mr. O'Brien thinks it is the same as the one in the Black Hills.

Rough grouse tracks were seen in the pasture. Blue grouse & sharp tailed are said to be numerous in places.

Nov. 28 Started for Olives at 7:30
A.M. & got back to Wallawa at 5
P.M., a little after dark. Had a small
dry biscuit with a piece of bacon in
it for Thanksgiving dinner, but
made up for this in a roast goose
supper at Mr. O'Brien's.

This is the last of a hard 3 days
horseback trip. The weather has been
clear and pleasant tho cold.

Nov. 29 Got up at 2 A.M. & took
stage for Elgin. Got a good
breakfast at daylight down at
the "Station" near forks of river,
and got in to Elgin at 10:45
and to La Grande at 12.
Waited for a 9 P.M. train to Umatilla
but it was 2 hours late so went to
bed & slept till morning.

Nov. 30 - Left La Grande at 9:15 &
got to Pendleton at noon & to Pasco
at 9 P.M. Waited till 1:30 A.M.
for train to Spokane.

Dec. 1, Reached Spokane 7 AM + left
at 11 P.M.

Dec. 2, Daylight in the Flathead River valley
got up on top of summit and had breakfast
at De Smit while waiting for a week to be
cleared off the track. No snow on summit
or in Missoula valley, but parties &
ground frozen & cold. The same
up Hellgate valley to well toward
the top of Continental Divide, where a
light snow laid on ground, about 3 inches
deep on top of pass. Snow disappeared
down east slope.

At Helena cold & dry & frozen, as
along rest of valley. Drove before
we reached Livingston.

Before reaching Glendive the
Yellowstone River was all open
and free from ice.

Dakota

Dec. 3. Got up at Glendive & then
kept careful notes as this is new
ground & important for the game map.

Left the river at Glendive and for about
10 miles followed up crevices & draws
through big badlands. The high buttes
have a fringe of juniper & yellow pine
on the crests and along north slopes.
The creek bottoms are fringed with cottonwoods,
boxelder, ash, bulberry & willows,
and the side hills & flats are covered
with sagebrush, (*A. cana*).

Then we came out onto short grass
plains for a long way with little save
grass & small weeds. Then down
to another small valley and some rough
country at Surtain Buttes. Here were
the same river bottom trees & bushes &
a few junipers along the badland banks &
lots of *Artemisia cana*.

Then out over more plains and
down to the valley of the little Missouri
with badland buttes & bluffs & bushy
bottoms & warm, sheltered woods & coveys.
Here *Atriplex confertifolia* & *Begonia*
were first seen; they are common on warm
slopes & in sheltered places with

sagebrush + grivulca. There are lots of
junipers on the outlet, mostly on north
slopes, and along streams are Populus sp. white,
Nygunde, Fraxinus, Willows,
Bullberry, rose thicket and Clematis
vines. A large prairie dog town lives
a mile or two east of Medora & 25 dogs
were counted sitting up in one corner
of a field in the worn morning sun, their
furry coats glistening in the light.

Near Bullfield another & best prairie dog
town was seen.

After getting out of the Little No. valley
we cross wide grassy plains again &
at Bullfield, South Heart and Deekrover
cross creek valleys with Cottonwoods,
willows, ash, boxelder, bullberry and
rose thicket, but with all grass
country between.

Then it is all prairie with
now farms & grain fields & rarely
a bush or tree until we again strike
Heart River near Mandan. Here
there is timber & brush as before, but
only a little Artemisia cana and
for the first time we strike Quercus
macrocarpa. Ulmus, Plum &

chokecherry. A red brown grass like
Andropogon covers the south slopes of the
hills but there is no trace of Atriplex
or Sarcobatus.

Reached Mandan at 3:55 & over
to Bismarck at 4:05. Went to Grand
Pacific Hotel & tramped over hillman
works before dark.

It is dry and still but very
cold. The Missouri river is frozen
over, the rough cakes of and broken ice
have set & frozen together. In
narrow or rapid places there are
still strips of open water but most of
the way the ice is solid clear. This is
in striking contrast to the open
Yellowstone river above Glendive and
below Helena. This morning & last night.
This is further south, but also further
east.

Mammals

Odocoileus, Fresh deer tracks were seen near the river flats above & below town.

Microtus drummondii, A microtus was seen in the grass near the river but not caught. A quiet weathen shrike was driven away from one it was eating & a mutilated specimen saved. The skull was broken & brains eaten out.

Thomomys talpoides, gopher hills are numerous and large, but some are fresh. The ground is frozen hard & ice is 5 inches thick.

Lepus campestris, patches of pure white fur were seen in several places where fox & rabbit had been eaten. Tracks & pellets are com.

Lepus texianus, Cottontail tracks & trails & pellets & cuttings are abundant in the bottoms.

Putorius longicaudus, a dead ♀ was found on the flats, chewed up by a dog or coyote probably. It had been dead some time, shaved to white.

Neotoma tracks are com on dog trails on flats. Lots of old excrement is made up entirely of grass-stoppers & fullers.

Taxidea, Badger holes are com.

Bismarck N. Dak.

Dec. 4 Tramped over the river flats below town west of the prairie, over big meadows with hundreds of braystades and through thickets of river bottom woods. It is dry and still but so cold I can hardly keep warm with heavy clothes & buckskin gloves.

In P.M. Went up over hills and river bluffs above bridge where I found *Yucca angustifolia* and *Opuntia missouriensis* on both slopes and more timber along the bottoms.

Found "red grass" (*Andropogon?*) abundant on sheltered north slopes and found one patch of *Helianthus annuus* on a warm basin slope. There seems to be a well trace of Upper Serroran zone on the most favorable slopes, but none over the open country.

Saw fresh deer tracks near the river above & below town.

Mandan.

Dec. 5. Packed up & went baggage, then crossed over to Mandan & tramped over hills north & west of town and over the Heart River bottom. Found a stronger element of Upper Sonoran than on east side of river. The north side of valley is a very warm & protected slope and the bottoms are warm & sheltered.

As Upper Sonoran elements we found abundance of *Yucca angustifolia* in well matured ripe fruit all over the south slope. Two species of tall red brown grass (*Andropogon*?) give a strong color to the south slopes but not on top or north slopes. Other plants that are probably Upper Sonoran are *Haselia*, *Salia*

Aesclepias speciosa?, *Gibbiflorus annuus*,
Clematis virginiana & *Montzelia*

On the bottoms *Populus fremontii* & *Salix nigra* may indicate Upper Sonoran but I want to map the range of the species before deciding.

Most of the vegetation however is neutral or Transition.

Artemisia cana is common along

Tree on the Heart river is 405 inches
thick

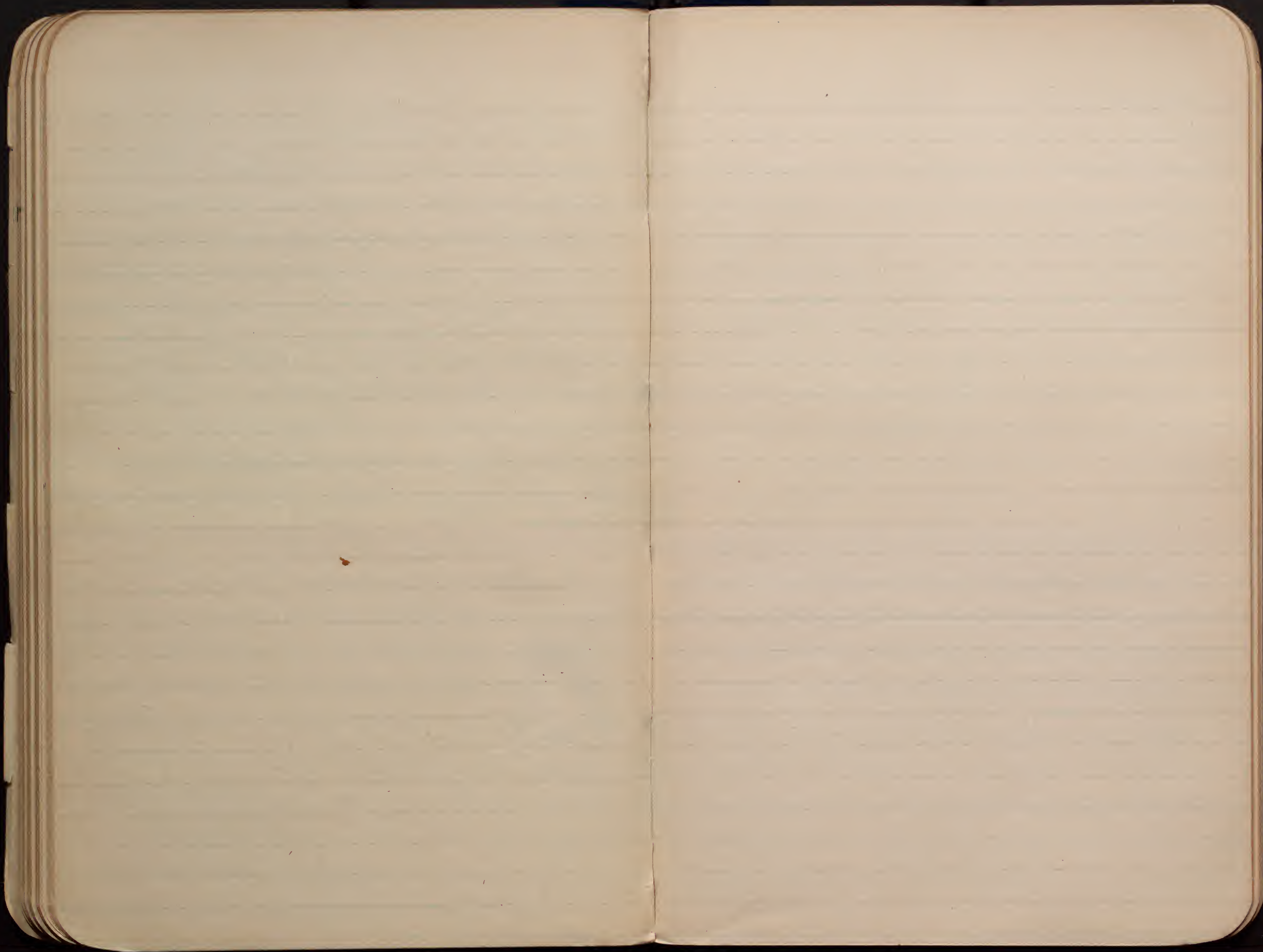
dry slopes on this side of the M.R. which
only one small patch was seen on
east side.

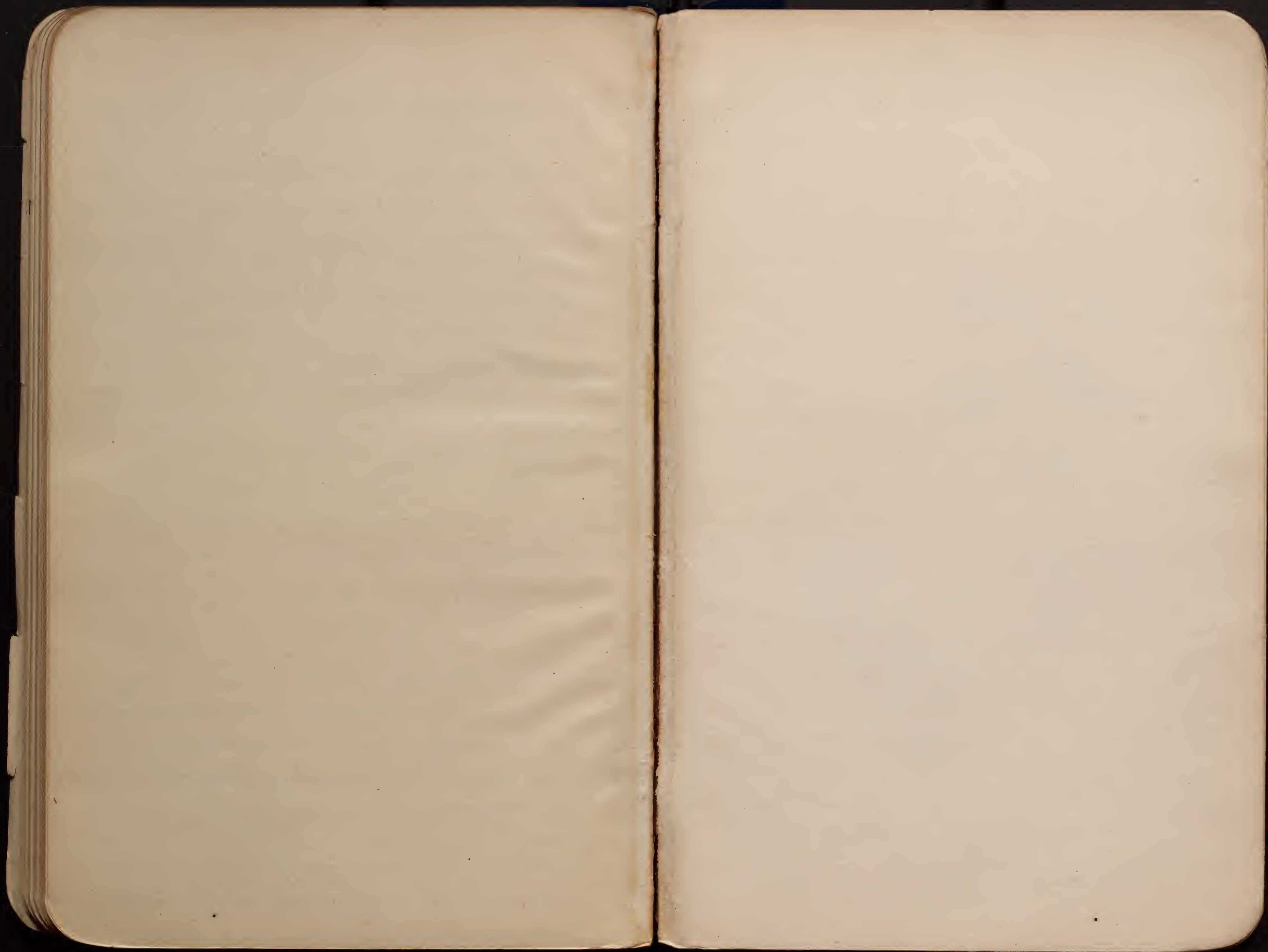
Artemisia frigida is abundant all
over the prairie, hills & bottoms &
is one of the best transition zone species.
The woods on the bottoms include huge
old cottonwoods, 3 species of willows,
Elms, oaks, ash, boxelder, plum, choke
cherry, bullberry, red osier, rose,
Symphoricarpos & woodbine. Clematis
vines full of plumey heads cover the
bushes.

Bluejays (*C. cristata*) and magpies
were heard in the bottoms, & Chickadees.
Two downy woodpeckers were seen, but no
other birds. English sparrows are
common in town.

At 3:35 took train back to
Bismarck and on east across
Dakota prairies till dark.

No trees or bushes after getting 2 miles
east of Bismarck.





~~was 1900, partly lost in 1899.~~

~~disappeared in 1901. very suddenly
about March.~~

~~6.20 acres, loss 600 tons.~~

~~1904 usually gets 2600 tons,~~

~~1906 " got 2500 "~~

~~\$5000 loss this year.~~

