



HENRY PENNY'S
 PATENT
Improved Metallic
Books
 BEST PREPARED PAPER

WARRANTED IF WRITTEN ON WITH HIS
 PREPARED PENCILS
 TO BE AS PLAIN & DURABLE AS INK

*They will be found of great advantage
 to Travellers and all persons who wish
 to preserve their writing*

EVANS, MALEWELL, & CO. SOLE MANUFACTURERS

No. 8

Walsby
 7882

No 6.

L. D. Walcott,
U. S. Geological Survey.

Sept. 5, 1882, (1)

Moved out of Kanab
& camped 10 mi. S.S.W.,
on the Kanab, Wash.,
just north of low
Permian cliffs.

Collected fossils
from the middle band
of limestone 5th + 6th

Sept 6.

Went down the
Kanab, Cañon to
the upper Camb. l.
Collected a few

fossils with E.H.H.⁽²⁾
I returned to the
Permian cliffs to
assist C.H.H.,
7.

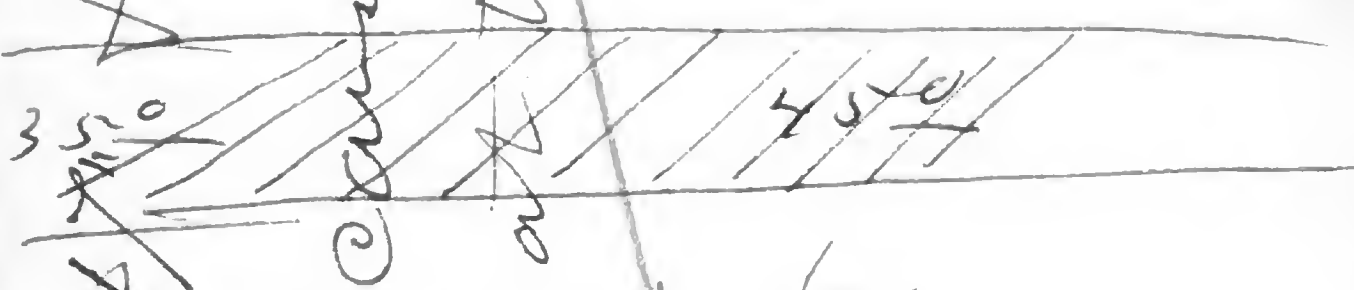
Rode 10 miles west
along Permian
l- outcrop in search
of fossils with C.H.H.
Mr Hayden made
sketch of uncon-
formity at ~~summit~~ ^{middle}
of Permian.

8 (3)
With C.H.H. collected
fossils in Permian
l-
E.H.H. sketching.

9.
With E.H.H. rode
to the east of camp
5 mi. in search
of water, (none found)
and also took a
look at Permian
l-

10.
Moved camp to
Laramie Kanab field

~~In the Johnson Canyon #
 a light colored
 stratum show a
 dip of 75° to the
 crossbedded laminae~~



~~measured by
 Clinometer Aug.
 38 ft of water made.
 Locality about 3 miles
 above Johnsons store,
 Permian dip 25°~~

Sept. 11"/82. 5

Went in to Kanab to attend to errands & telegraph to Washington.

Sept. 12/82

Busy all day cutting up beef for drying.

Sept. 13/82


With C. H. H. out on the Permian south of Kanab, got collecting fossils.

The double band of limestone extends.

several miles to the
east or about to
the mouth of the
Johnson wash below
the Shinarump cliffs.
They retain the
characters given
in the section of 1879
& the same ^{specimens of} fossils
are embedded in
them along 20 miles
of outcrop.

Sept. 14

~~Attended to the road~~

Left the A. H. & E. C. H. 
drove to head of
Cottamood canyon thence
to Lenny canyon & Kanab
to Kanab thro' the
Vermillion cliffs.

Sept. 15

Rainy day, at Kanab
to camp.

Sept. 16

Moved camp to
Johnson canyon.

Sept. 17

A.M. Rode up Johnson
canyon to examine
cross bedded sandstone

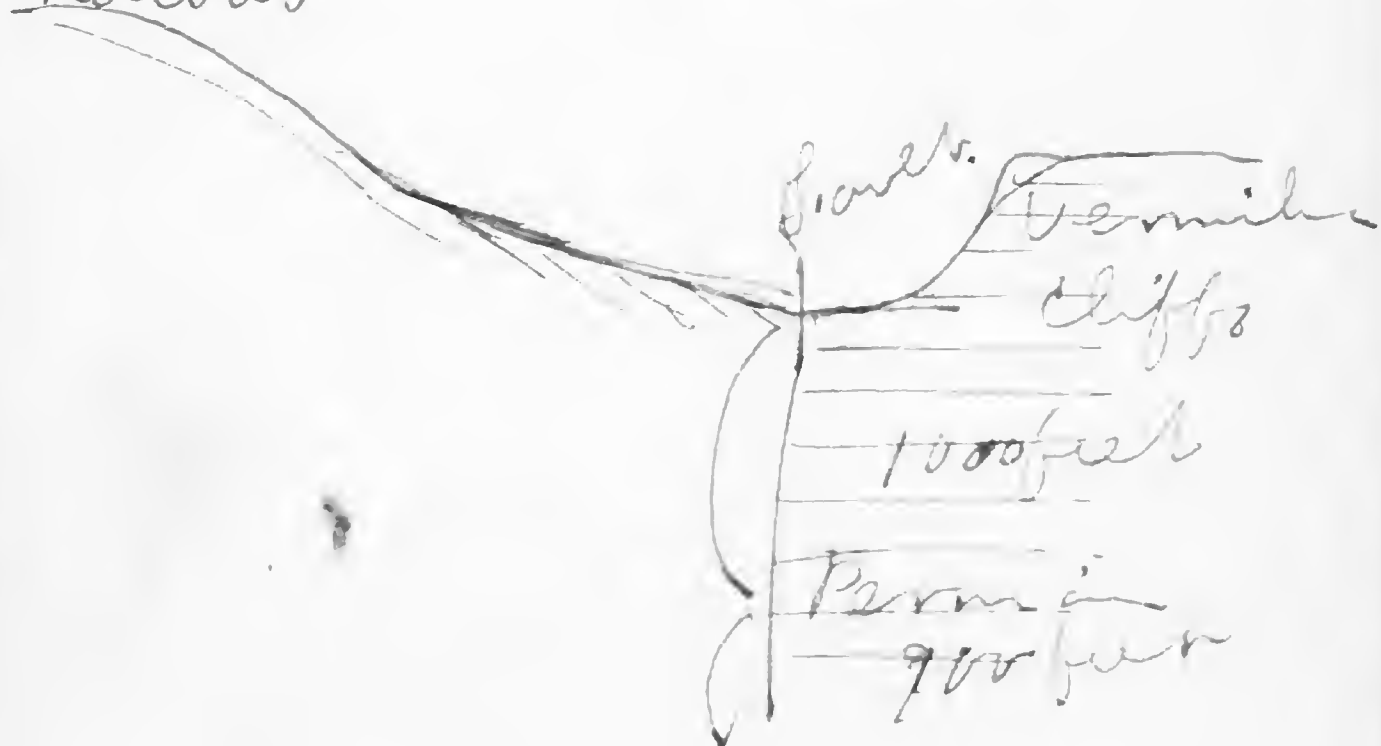
(See pg. 4) and after ⁸
lunch man and camp
to Navajo wells.

Sept. 18.

Crossed the Kaibab
Plateau to Horse Rock
valley, camping at
Horse Rock Spring.

On the road to the
east of Navajo wells
noticed Permian
limestone below
Shinarump conglom-
erate. Fine place
for a section.

Going south from ⁹
where the road
enters the H.R. valley
the entire Permian
& portions of the
Trias are faulted;
dip before reaching
the Carboniferous.
Kaibab



Sept. 19th 10

At Horse Rock Spring
the gneiss bed is well
developed in the summit
con cliff

A mile south of the
spring the cliffs dip
East at an angle
20°. near the summit,
at the base the strata
rise up to the west and
show a section =



From the character of
the beds there are probably
local faults causing
a repetition of the beds.



The broad floor of the
valley is quaternary
& no connection is
shown between it &
the Carboniferous.

Crossed the valley
& found the Upper
Bellenophon beds of
the Carboniferous

With Mr. Hayden 12
collected a few good
specimens.

Above the Bellefleur beds,
a peculiar deposit of
broken up fossils, small
angular fragments of the
limestone, ^{+ chert} below covered
by buff colored limestone
occurs. These condi-
tions of deposit, such
as noticed at same
localities in Kanab cana
in 1879.

Sept. 20th

Started N. from Horse
Rock Spring. About

6 miles up the 13
valley, two points of
Shinarump Cong-
appear in compara-
tively close relations
to the Carboniferous
limestone on the west
side, so much so
that the Permian
is probably faulted
down at this point.
The Conglomerate
does not appear again
for 8 or 10 miles when
it forms a ridge
or hogback in the
valley & also can ^{now}

outcrop on the (14)
eastern side.



The Permian is here faulted out in a great measure.

At the Buckskin wash 22 or 23 miles from the Horse Rock Shg the Permian rests conformably on the Carboniferous & gives a section,

see pg. 16.

(15)

The eastern Kaibab fault varies very much. In places there is scarcely a displacement & in other the downthrow must be at least 1000 feet. This depends on the projection of the great swells of the Carb - limestone line of Vermilion cliffs.



Sept 21st

16

On the W. side of the
Brockton road the
shale is not so thin
Perrin shales only
the lower part of
the Camb. l. - and a
little less than 100
feet above (85) a
band of ~~reddish~~ yellowish
sandy limestone + "
l-shaly. occurs and
contains *Myalina*, *Schizotha*,
Urosalpinx, *Urosalpinx*, *Rafinesquina*
& fish plates. At
one point the band
is 3 feet in thickness.

about 10 feet below
a layer of sandy l-
3" thick occurs.

These beds are overlain
by strata of chert,
partly colored shales
the thickness of which
owing to the faulting
along the line of the
Shinarump Cong. - was
not determined. At
another point a
half mile north a
band of sandy l-
1 foot thick contained
great numbers of

11

species of Bakewellia ¹⁸
This stratum appeared
to be about 150 feet
above the Camb- l- .
The section of the
Permian was not unlike
that S. of Kanab. The
marlites underlying
the S- cong- are variegated
in color & banded. The
arenaceous-marls of a
brownish-red & chocolate
color extend down to
the thin bands of l-
carrying the fossils
& the color of the
marly beds & sandstone

to the Carboniferous (19)
l- remain the same.

The ~~Permian~~ ^{Permian} Cong-
retains its characteris-
tic features & the strong
deep chocolate colored
sandstone beneath is
very noticeable. Below
this however, a belt
of light buff ^{gray} colored
sandstone (25 feet) occurs
which at a distance
gives the impression
of a double band of
the conglomerate.

Continuing north to
the head of the Vermilion
cliffs leading to the

16

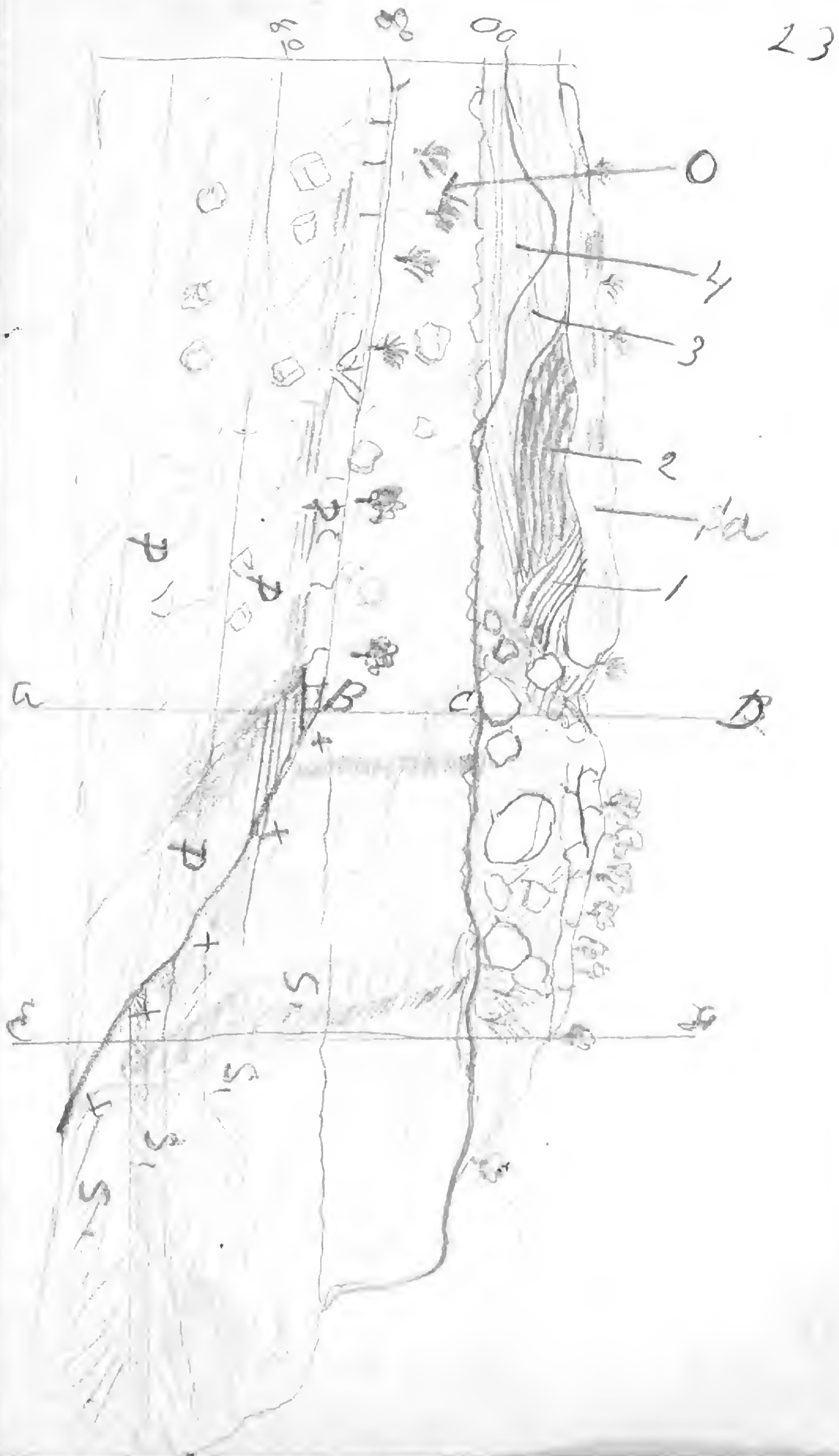
Cañon of the Paria (20
& the Term of " the
S-cong. & also the
Permian beds & the
beds above the Cong-
are alternately faulted
or eroded out of sight.
The fault cutting
first through one & then
the other according
as erosion has exposed
the ridges or hollows
of the waves in the
strata.

Conglomerate

The same as on pg. 15.

The descent to Paria (21
is thro' a ^{wide} cañon cut in
the marlites above the
S-cong. and the
lower beds of the
Permian cliffs. The
view of these beds as
lighted up by the
western sunlight is very
fine, excelling anything
of the kind I have yet
seen. Several hundred
feet of parti-colored
beds are eroded in
many beautiful forms
of buttes & cañons &
sculptured in smooth
round knolls & projections.

1895. Jr. 1899.
 Also Jr. 1905
 Vol. III
 Part. III
 Section 10.
 least for a rock but near
 to Kanab) on the N. side
 of the cañon a striking
 conformity is observed
 between the chocolate
 colored layers of the
 Permian and
 Permian Conglomerate
 The following
 illustrates it,
 strike of Permian side
 54 W. Dip. 80 N.



16

P.P.P. = the Permian (24)
chocolate colored sand-
stones as they occur just
beneath the Shinarump
Cong. - along miles of
outcrop both in the
Kanab region & north
of Horse Rock valley.
Along the line a-b it
is 62 feet thick and
is mainly a coarse
sand altho' pebbles (Silice)
occur near the upper
portion. At the
N.E. end of this
exposure there is
an old cliff xxxx
indicating a strong

surface erosion, (25)
against which
the sandstone S.S.S.
was deposited. The
bottom of this was
not reached owing
to the talus & dip
but 74 feet was added
to the thickness giving
136 feet to the Shinarump
at this point.
To the N.E. at O. the
Shinarump is still
thinner than at a-b,
not being over 40
feet.
above the Shinarump
at 1. 2. 3. 4. the

16

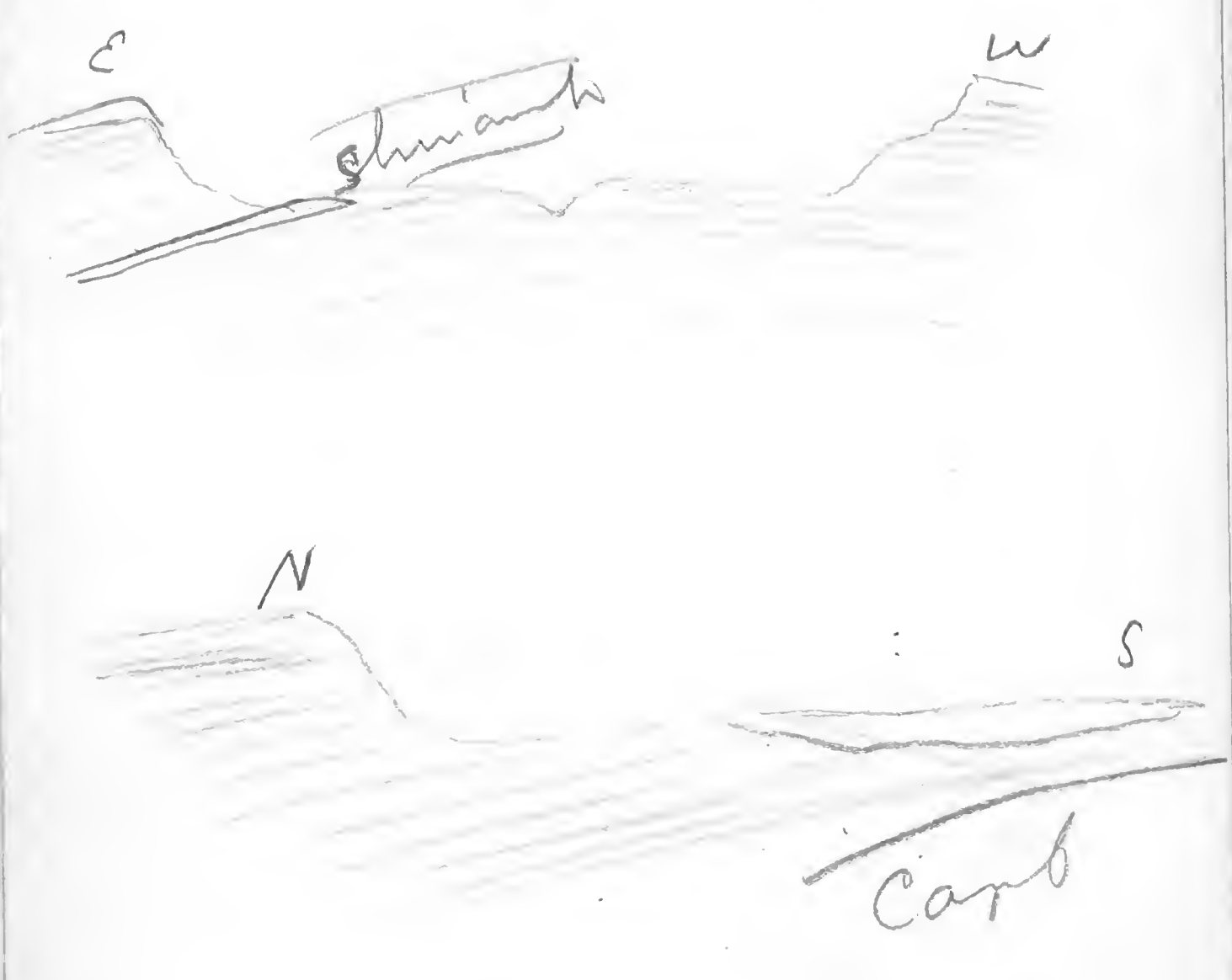
unconformity of 26
deposition of the
marls is beautifully
shown & over them
the deposit sd. is
a conglomerate of
pieces of sandstone
silicified wood and
coarse sand. This
is of local deposition
as only a short
distance to the east-
ward the marls
rest directly on the
light colored shi-
onite.

The line of strike
of the old Permian

Cliff is N.W. & S.E. 27
& can be traced
plainly a half mile
to the river where
another canon cuts
thru it & also to
the S.E. where it
is cut by the
opposite side of
the canon in which
the sketch is made.

About 200 feet of
the upper Permian
is exposed at the
deepest cut in the
from point to point

of the Vermilion 28
Cliffs caused by the
elevation of the strata
towards the Karibab
Plateau from Pania



The section this is

- 1. Brown marls with 29,
massive brown, chocolate
colored sandstone
bed above. 200 ft
- 2. Shumankh
40 to 140 ft
- 3. Marl & Brown sd. 0
0 to 50 ft
- 4. Vanigated marls
500 "
measured 493 feet
- 5. Reddish brown sd
to fish bed
75 to 80 feet.

Vermilion Cliffs above
not over 150 feet to the
white Cliffs

S.E. of the point where (30)
 the sketch was taken the
 strata of the Permian
 cliffs dip N.E. 15° and
 the section just taken
 is beautifully shown
 down thro' the marls
 (4.) and to the massive
 brown sd bed capping
 the Permian. The marls
 rest directly on this
 bed & there is no
 thin arg. cony -
 present in its equivalent
 sd. Beneath the
 massive massive br.
 sd, the succession of

marls etc, is the (31)
 same as beneath the
 cony. These beds
 present many features
 showing shallow
 water origin:

Ripple marks; local
 unconformities of bedding,
 mud cracks & tracks
 of Gastropods &
 Annelids.

The thinning out
 of the Shinanunb
 south of the Permian

Cliff is a feature 32
 connected with the
 topography at the
 close of the Permian
 and as the Shinarump
 is thin all
 along House Rock
 valley & north it
 leads to the view
 that the elevation
 of the Kaibab was
 going on at that
 time.

Sept. 25th for
 Camp 1 (2) (a) 33

To the west of the (53)
 point from which the
 sketch was taken. The
 conglomerate thin out
 and sandstone colored
 sands come in between
 it & the main red bed,
 & locally there is a
 second light gray
 coarse sandstone
 about 50 feet above the
 1st. This same feature
 also occurs about 20
 miles to the S.E. in the
 N. end of the H.R. Valley.
 Following along under
 the Vermilion cliffs
 towards Kaibab the
 Shinarump is only seen

occasionally as a 34
 gray sd. coming in
 on top of the massive
 br. bed. At the south
 base of Cone point
 the double bed of
 sd. comes in again
 for a little way &
 then for some distance
 the Sarnian is
 entirely absent.

The Sarnian is
 not seen again
 until the west side
 of the great butte at
 the mouth of ———
 ——— canyon is
 reached. There it
 is developed as

a bed about 20 (35
 feet thick and
 rests on the massive
 brown sd. bed. The
 latter bed is not
 always present
 where the canyon
 is absent as the
 upper marks rest
 on those below,
 with the exception
 however of the
 locality near Paya
 the massive brown
 sd. bed was always
 seen beneath the
 cong., It varies in
 as the result of a
 slight erosion on

the upper surface. (36)
An east to Kanab
and beyond the
cliff is unbroken except
by recent erosion or
folding.

Sept. 24" — Sunday
Navajo Wells.

In looking over Mr
Gilbert's section at the west
Pania creek I find that
he mentions the thinning
out of the Shinanup
Conglomerate from 75
to 0, but that the
Cong- rested on the eroded
surface of the gypsiferous
clays below. On p.
175 he refers this to the

Wheeler Rept. III. 1895.

erosion of the current
spreading the Cong- (37)

In many instances this
is undoubtedly correct
as is shown south of
Kanab, but the cliff
at Pania I would attribute
to aerial erosion and
not to the current alone.

The absence of the
Shinanup Cong- on
the line of the Kaibab
uplift is measurably accounted
for by the theory mentioned
on p. 32. of this note book.

Fossil localities below
Shinanup Cong. mentioned
by Gilbert & Howell, p. 176.
p. 285.

Pemo-Camp 177.

Morrise h. 213.

Sept. 25/82

38

Endeavored to get a section from the Carboniferous to Shinarump but could not do so satisfactorily. The east of Navajo wells 5 miles. C. H. H. collected a lot of fossils in the Permian l. which is here most strongly developed in the upper bed. Asst him for a time.

Also found a few
b) poor fossils in the Permian Carb.

Sept 26,

(39)

Went in to Kanab to refit & make shelter tents etc

Oct. 1st. Moved camp to Lower Kanab field.

Oct 2nd

With C. H. H. collected a lot of Permian fossils in the l. - south of Kanab 6 miles. Found Goniatites, Nautilus etc. Tho' on these beds

Oct. 3^d

40

Rode along Shunianh
cliff E + W of Karab
gap.

Noticed portions
of silicified water
worn tree 3 feet
in diameter.

(Measured conglome-
rate with tape line
& found it to be
47 feet on E. side
Karab gap.)

(Noticed many traces
of coarse pebbles
and also annealed

formings in the (41
sandstone immediately
over the conglomerate.)

Oct. 4th

Moved camp to
Pipe Spring.

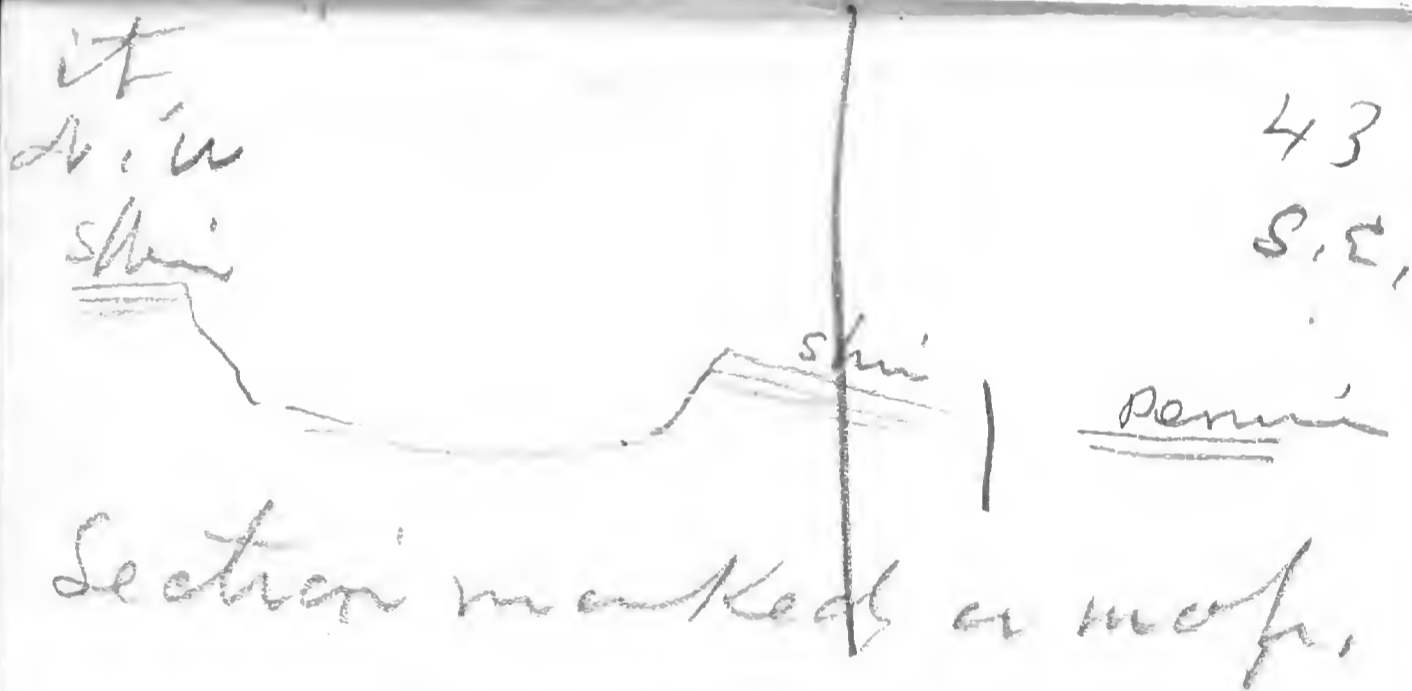
Noticed a yellowish
brown argillaceous limestone
in Permian clays about
300 feet below Shunian-
h conglomerate,
3 mi. W. Karab wash.
No fossils.

Oct. 5

With E. C. H. collected
a lot of Permian

fossils 7 miles (42
 a.s. Pipe Spring. There
 appears to be but one
 stratum of l. 3 or 4
 feet in thickness.

This outcrop of
 Permian l. which
 has been uninterrupted
 from the Kanab wash
 crossing except by
 a few places of erosion
 is cut off S. of Pipe Spg.
 by the Long valley
 fault & the Shin-
 a-rump canyon is l. r.
 dam almost against



a strongly marked
 unconformity by erosion
 is shown beneath the
 Shinian cliff, S.S.W.
 of Pipe Spg. The brown
 chocolate Permian
 sandy shales are cut
 into 30 feet and this
 irregular line is
 shown in several places



Oct. 6

44

With S. C. K. & ~~others~~
collecting fossils
in Permian ls at
same locality as
yesterday 7 mi South
Pipe Spring.

Oct. 7th

Section of Permian
S.S.W. of Pipe Spring
Starting 15 mi S.S.W. of Pipe Spring
1) Estimate of sandstone
(Brown) + arenaceous &
gypsiferous shales &
fossil bearing ls -
150

2. Shaly - light col. (45)
ls - carrying numerous
fossils. Str. N. 75° E, S 1/2 N
Myalonia, Murchisonia
etc, etc. 5 feet.

3) Brown sandy clays
with some small
gypsum. 245 "

4) Light chocolate brown
alternating with
drab, arenaceous &
gypsiferous clays.
Dip. 75- 335

5) Brown, chocolate col.,
passing into Br. ch. - gyps.
clayey shale & d. with
massive layers of
red mud. sh. of shaly

laminated layers (46)
Dip 1 1/2 N. 150 W. 287.

Shenandoah Canyon
65°
to clear weather
summit layers.

The distance from
the Carb. l. to
the Permian is
mainly a level
plain so the thick-
ness was estimated
think however that
150 feet is under
rather than over
the true thickness.

The upper part of (47)
of No 41. is a drab
colored arenaceous
clay passing into
sandstone near the
top. Gypsum is found
throughout 41 and often
forms thin layers
1/4" to 1" in thickness.
~~Returned to base of the 8th~~

~~See note book No
7 for interval~~

Note on Permian (48)
Fauna

The peculiar fauna
of the Permian is
is undoubtedly owing
to the physical condi-
tions during the depo-
sition of the sediments.
a sea deposit of a
mixture of clay and
sand & only clear
locally for the
deposition of an
inherent limestone

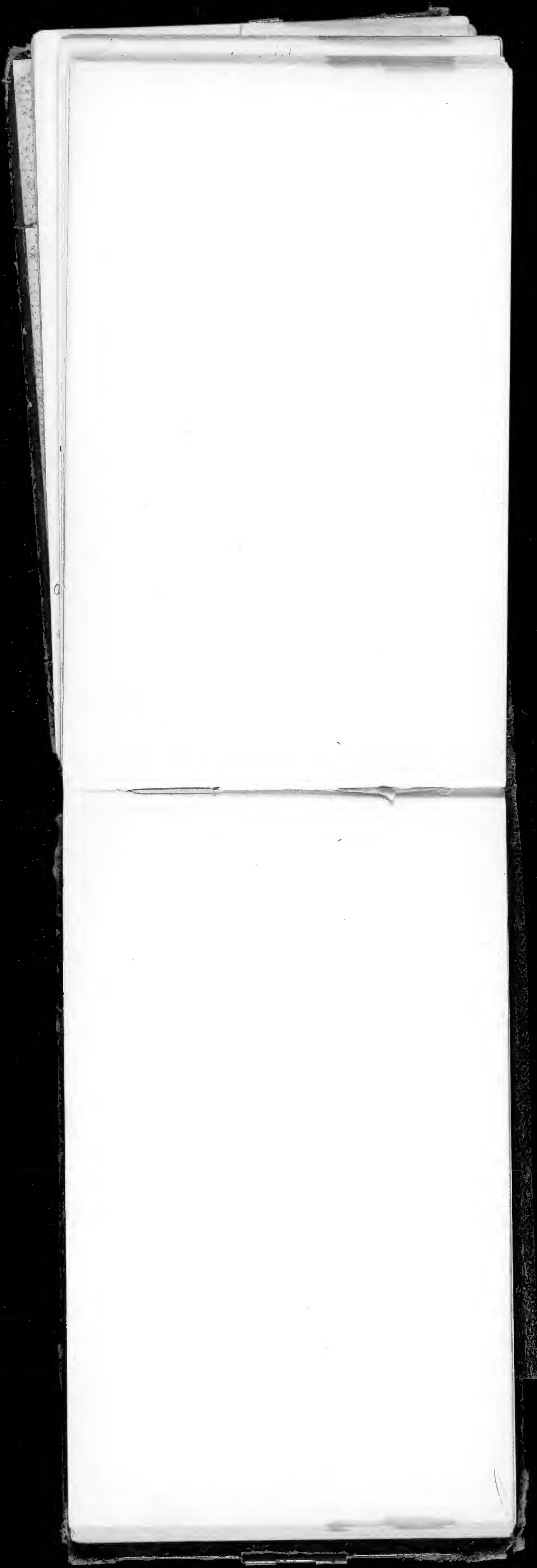
on sandstone would (49)
only allow of the growth
of forms capable of
living under such
conditions and
the *Mytilus* & *Cardium*
families are represented
and the former largely
developed. Both
of these are represented
in the strong saline
waters of the Caspian
sea at present and
we also noticed them
in the muddy &

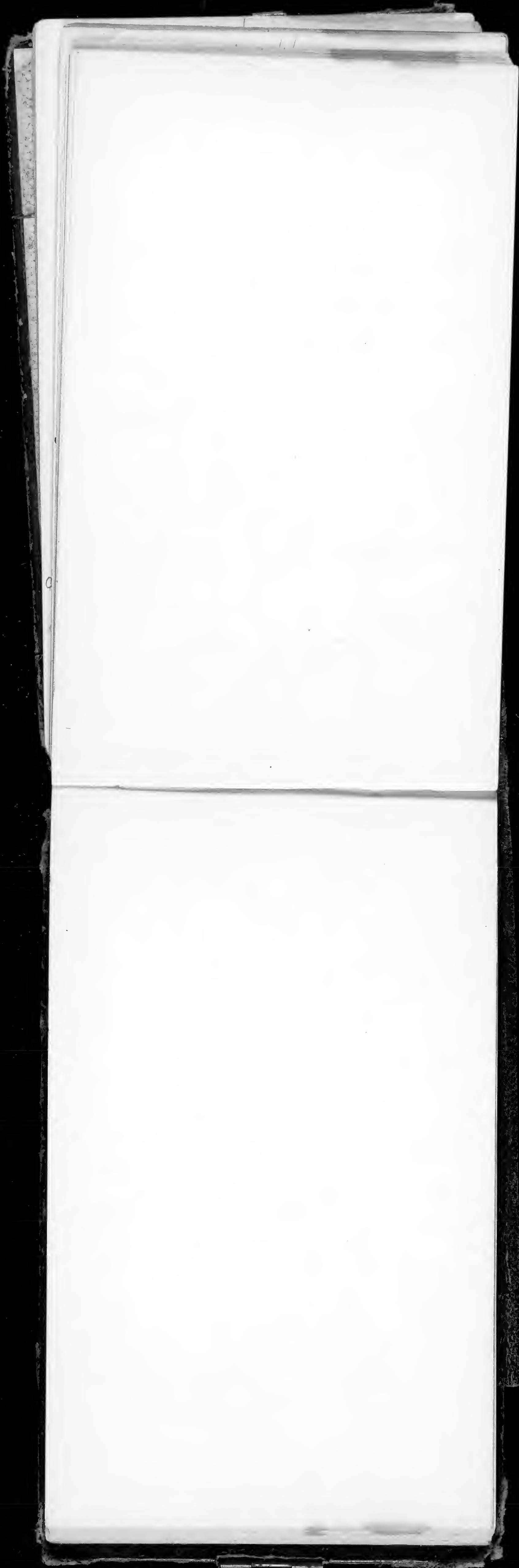
arenaceous deposits (50,
of the lower portion
of the Aubrey group.

In the Permian l-
Brachiopods occur but
they are exceptional
& probably spread
from some locality
where limestones
were in continuous
deposition. The
subject of the origin
of the Colorado Permian

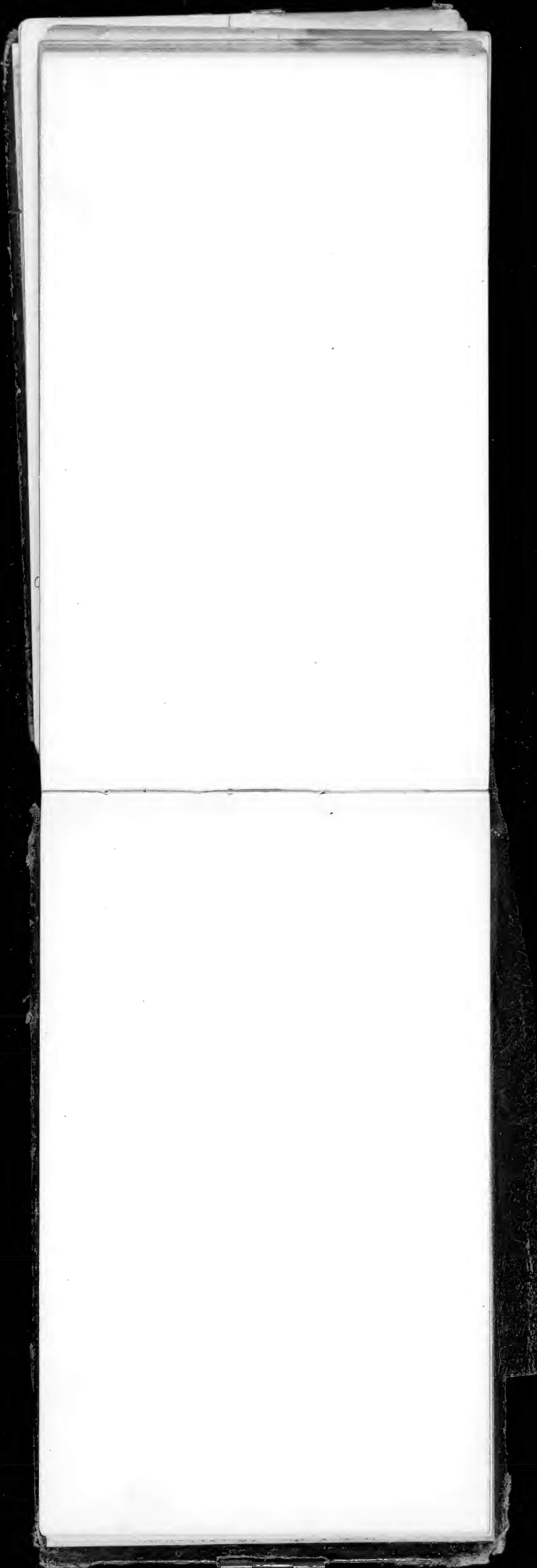
fauna is one of (51
interest & will proba-
bly be found to the
eastward of the
Colorado river.

In studying Permian
fauna refer to the
fauna just above
the Aubrey l-., as
it possesses some
points in common.









" Boxes sent in from
Milford. Utah.

To No 17. sent from
Merada

No 17:

~~10. PKg. Permian.~~

~~7 " Fish (Lias)~~

No 18)

~~21. PKg Permian~~

" 19) ~~9. PKg. Carb.~~
~~6 To Fish (Lias)~~

" 20)

14. PKg. Carb.

" 21)

17

"

"

1

"

Permian

"

22)

10 PKg. Carb.

"

23)

"

24) 14. PKg. Lithologie
Grand Caen

"

25

17. Same fossils
ditto

"

26

14. Lithologie
ditto

"

27. 4. Lithologie
 11. Fossils.
 Grand Canal

Pennine section.

No. 3.

Distance 7015 feet,

Rise

63 feet
 180
 245

4, Distance 10000 ft

Rise

260.

2^d Distance, 5250 "

120

380

640.

2871		
580		
867.	130	
220	265.	
66	26	260.
280.	6	75
	150	335

Base of Shinarump in Wallace

No 1. 5450.

" 2 ~~5500~~

Ditto on massive chert layer

No 1. ~~5500~~ 5475

" 2. ~~5500~~ 5500,

" Summit of Cong.

No. 1 ~~5500~~ | 5550

" 2 ~~5800~~ | 5550

26	33	264
7	5	22
<hr/>	<hr/>	<hr/>
182	185	
	22	
	<hr/>	
	187	

245
 335
 287

 867
 1

	1430	
11	7150.	12696
<hr/>		58
55		
7		
<hr/>		
62 feet upper Cong.		
13	1048	86
68		4.
9	184	
	23	87
<hr/>		5
77	115	
	15	435
<hr/>		58
62	130.70	
<hr/>		493
136.		

March, 85. 12.0

1 - 5475. 144

1 - 6100 230

625

600.

25

