doc 318

Typed from original by C. Ross
in 2002 ±

BOOK 3
Leonardian and Wordian notes
(and a few other notes; Oklahoma, revisted some Wolfcampian sections, etc.)

C.A. and J.R.P. Ross, Summer 1959

PG. 1
7/8/59
Brooks Ranch Section 2
1) Shale, blue-gray, 1/4"-1/2" bands of brown siltstone - 10'.
2) Covered - 15'.
---- Top of Lenox Hills fm <-> Base of Leonard ----
3) Limestone - light gray to light gray weathering 3" to 2' beds, very fine fossil hash for most part - fusulinids in thin beds within this unit.
Collection 2-3A - 8' up
Collection 2-3B - 22' up
Collection 2-3C - 37' up
-- shale interbeds gradually thicken to 6" or so - 48'.

4) Limestone, like below and shale, light brown to light gray - limestone are 1' to 1.5' thick, shale beds are 1.5' to 3' thick - 27'.

5) Limestone, light gray to light brown, very fine grained, clayey and silty - 3" to 2' beds -
Collection 2-5A - 12'
Collection 2-5B - 35'

PG. 2
Collection 2-5C - 52' up; --total for unit --95'

6) Dolostone, light brown weathering; and shale (covered mostly) - light brown-gray very fine limestone near top 1' to 3' beds -

Collection 2-6A - 33' up, Coll. 2-6B - 85' up------- 112'

7) Limestone, light gray-3' to 6' beds, few and thin shale interbeds. Coll. 2-7 - - - - - - - - - - - - - - - - - - - 32'

8) Limestone, light orange-brown weathering, very fine frag.;
3' to 5' thick separated by 2-7' shaly intervals. The limestone have a "Staffella" fauna, and locally scattered "fusulinids" - - - 90'.
Cyclothems—10 to 12 - get progressively more shaly toward top of unit.

9) Limestone, orange-brown weathering, 1' to 4' beds. Omphalathrocus type gastropods.

PG. 3
7/9/59
near base - fusulinids recrystallized
Collection 2-9A - 42' up (Top of ridge 140')
Collection 2-9B - 145' up
Limestones become progressively more silty and change to light gray weathering.
Collection 2-9C - 160' up
Collection 2-9D - 185' up; total -------- 215'

10) Limestone and dolostone, orange-brown weathering - very silty - 2" to 6" beds - shale interbeds up to 1'.
Collection 2-10A - at 5',
Saddle at 80'
Collection 2-10B - 105' up
Rose colored dolo 3' separated by 4' of orange weathering silt-clay stem. Cyclic beds become.
{note: illustration:
bed 2: silty limestone (+-)
bed 3: silt-sand, silt-clay
bed 4: dolo pink to orange}

PG. 4
fusulinids are rare - recrystallized when found. Gastropods - brachiopods and ostracods, locally abundant. - 187'.

11) Shale, light gray, and limestone, light gray - shale - 2-5' beds. Limestone - 1/2 to 1' beds.
Collection 2-11A - 5' up.
at 35-50' Ophalotrocus outlines common
limestone is porous and recrystallized). - 89'.

12) Limestone, conglomerate, well sorted - 25'.

13) Sandstone, light brown silicified crinoid stems and brachiopods well sorted, fine grained - grade vertically into calcarenite. Collection 2-13A - 32'. 105' top of ridge to saddle -
thickness of unit--158'.

PG. 5
14) Dolostone - brown-gray, porous, sacchoidal, weathers to pitted surface - 3 to 6' beds - 10'.

15) Limestone, light gray, 6" to 2' beds - little in the way of shales or siltstone.
2-15A - 42' up
2-15B - 65' up
Several different limestones in this unit - all are very fine sand size or lutites limestone. The more rubbly beds are white, sand size and are brown-gray. 4 or 5 alteration of grain size. - total for unit - - 205'

16) Limestone, orange-brown weathering, [relict outlines of fusulinids (abundant) 5' at base]. Like 15 below.
Collection 2-16A - 53'.
[at 65' a mottle quartz ss. bed with shell fragments]
[at 97' - silty bed 1', brown-orange, brachiopods].
Collection 2-16B -at 185'.--- total for unit --197'.

PG. 6
17) Sandstone, orange-brown weathering very silty, calcareous cement - 3" to 1' beds. at 30' a shell hash - recrystallized, no fusulinids, but has crinoid columns. ----------42'.
[base of Leonard Facies?]
18) Limestone, gray-brown weathering, 1' to 3' beds, pock marked, silt and fine calcarenite for most part. [22' recrystallized fusulinids abundant] [154' and 3' conglomerate bed, including quartz, quartzite, chalcedony pebbles to 1.5" diameter].---157'

[West?] Afternoon looked at the rest of the Leonard fm., lower part of Word fm. There isn't much difference between the Hess facies and these upper units this far east [west?]. King's Sect. about 2 miles east is supposed to be quite markedly different in the 2 facies of the Leonard fm, but can't say that is true here.

PG. 7
{note: attached illustration of beds}
[From the top of these hills one can see beds in the Leonard fm thicken and thin within short distances. The units of brown-gray dolomite limestone may change

from 120' to 0' thick in 300 yards. Thus there seem to be few "key horizons" in this interval - We have 3 or 4 chert pebble conglomerate zones near the top of the Leonard, a couple of conglomerates in the Hess facies - and that is about all. Even these are probably not of to great a regional significance as they are mostly 3 to 6" conglomerate lenses (near the top of the fm), and the ones lower are calcirudites with locally derived pebbles and cobbles of limestone.

7/10/59
18) cont. chert frag. scattered throughout upper 150'; pebble bed at 190' - 3" pebble band - ----------293'.
19) Limestone dolomite, light gray to light brown weathering, 1/16 - 1/8" laminate of limestone alternating with dolostone - 2'. Dolostone [algal laminae?? supratidal?]

PG. 8
20) Dolostone, light brown pitted surface - 15'.
21) Like 19 - 8' [algal laminae?].
22) Like 20 - [20-28' up - quartz frag. conglomerate thin pebbles - 74'].
23) Limestone, light gray, with some 1/8" bands of irregularly bands of dolomite, 6" to 1' beds -
Top of ridge (Fulk ranch)
Locally angular limestone pebbles and cobbles make 6" beds.
24) Dolostone brown-gray, with Leptober outliers, in 6" to 2' beds pebble conglomerate 6' up 3" band - 37'.
25) Limestone, brown-gray, shelly, Collection 2-25A - 5' up.

PG. 9
Collection 2-25B - 24' up - 3" bed of fusulinid "cochina"
[P. iveri Collection] - 42'.
26) Limestone, light gray, poorly bedded. 2' to 3' beds, weathers crumbly - [65' up - crinoid columnal hash - 2'] [local intraformational conglomerate - limestone pebbles] - 185'.
27) Sandstone, brown, red-orange, very fine quartz sand - 5'.
28) Limestone, blue to purple-gray, irregular wavy bedding- 42'.
29) Limestone, light gray, massive 2'-3' beds, excellent silicified faunal of gastropods, Brachs ?, pelecypods. - 12'.

PG. 10
30) Limestone, light gray, to white, fossils replaced by calcite, 4' to 6' bed, 30' (Cretaceous K?).

PG. 11
7/10/59
Allison Ranch, Section 1
Covered below on this west side of road -
1) Limestone, brown, silty and sandy, 3" to 1' beds - 4'.

2) Sandstones, cream, lime cement, cross bedded, 3'.
3) Limestone, dark brown-gray, - 3' black, dense.
4) Covered - shale and marly limestone. 18'.
5) Limestone, like 1, silicified fossils - 8'.
6) Covered - 7'.
7) Limestone, like 1 and shale above it, collection 1-7 [Fusulinids] 5'.
8) Limestone, like 1- gastropods - 1'.
9) Covered - 8'.

PG. 12
10) Limestone, gray-brown, 2" to 6" bedding, 3', 6" of rubble beneath - Collection 1-10.
Fusulinid cochina - 4'.
11) Limestone - yellow-brown, vertical fracture - rubbly weathering, Collection 1-11. - 5'.
12) Covered - 9'.
13) Limestone, brown, fossil hash, fusulinids and Ornaphalotrochus gastro - 1'.
14) Covered - shale? - 4'. Collection 1-14.
15) Limestone, like 10 - 1'.
16) Covered - 3'.
17) Limestone - like 10 - 2'.
18) Covered - 4'.
19) Shell-hash - everything in gastropods, echinoids - 6".

PG. 13
20) Covered - 10'.
21) Limestone, yellow-brown, fine grained calcarenites - Collection 1-21 - 2'.
22) Limestone, light yellow-gray, marly - 3" to 6" beds - 5'.
23) Covered - 29'.
24) Limestone - dark gray, 6" bedding - recrystallized fossils - 8'.
25) Covered - 12'.
26) Limestone, yellow-brown weathering and fresh, graphic recrystalization - part - 3'.
27) Covered - 15'.
28) Limestone, gray-brown, 1' to 2' beds - fine shell hash - 10'.

PG. 14
29) Covered - 37'.
30) Limestone, light brown, indistinct lamination, 6" to 1' beds - 7'.
31) Covered - 13'.
32) Limestone, light yellow-brown - 4'.
33) Covered - 11'.
34) Limestone, medium gray-brown, 3" beds - 3'.
35) Covered - probably more shaly interval of 34 - 12'.
36) Limestone, orange-brown, 6" beds, silty and sand (very fine grained) - 8'.
37) Ss., white to very light gray, cross bedded - 15'.

38) Limestone, yellow-brown, very sandy, massive - 3'.

PG. 15
39) Covered - 8'.
40) Limestone, brown-gray. 3" beds, recrystallized fossils - 2'.
41) Covered - 7'.
42) Limestone, medium gray-brown, 6" beds small fusulinids? 3'.
43) Covered - 4'.
44) Limestone, light brown-gray, silty, recrystallized fossils, several shale beds 6", beds 6" - 12'.
45) Covered - 11'.

----------Subtotal 356'

46) Limestone, light gray, fine grained, dense - 2'.
47) Covered - 4'.
48) Limestone like 46 - [2'?]
49) Covered - 6'.

PG. 16
50) Limestone like 46 - 1'.
51) Covered - 2'.
52) Limestone, orange-brown, silty, shell hash - [2'?].
53) Covered - 22'.
54) Limestone - brown-orange, sandy and silty, 6" beds; and shale 4' to 6' beds - 24'.
55) Limestone, fusulinid cochina, gray-brown, 6" beds. Collection 1-55 - 2'.
56) Covered - 9'.
57) Limestone, dark gray -shell hash - 6".
58) Covered - 8'.
59) Limestone, like 57 - 1'.

PG. 17
60) Limestone, orange-brown, sandy and silty - 2'.
61) Covered - 3'.
62) Limestone, gray-brown, sandy, silty, shellhash, 6" beds- 1'.
63) Siltstones, brown to yellow weathering, partly covered, - 17'.
64) Sandstone and siltstone - 2'.
65) Limestone, light brown-yellow, 1' beds - 3'.
66) Covered - 37'.
67) Ss., purplish-gray weathering - 2'.
68) Limestone, gray-brown, shell hash, 3" beds - Collection 1-68 - 61'.

----------subtotal 160'

69) Ss., orange-yellow weathering, 1' beds - 3'.

PG. 18
70) Covered - 10'.

71) Ss., like 60 - 9'.
72) Shale, gray in 5-15' bed, alternating with ss in 6" beds - 53'.
73) Ss., like 69 - 3'.
74) Shale, gay; friable ss (white and purple) and 6" ledges of resistent ss - 38'.
75) Ss., like 69 - 3.5'.
76) Covered for most part - some purple-brown limestone with large calcite crystals, and ss. - 22'.
77) Ss., like 69 - 2.5'.
78) Shale and Ss., (orange) - 22'.
79) Ss., gray to brown, cross bedded - 6'.

PG. 19
80. Ss., orange-brown, like 69 - 12'.

----------Subtotal 184'

81) Limestone, light to medium gray, chert frags, common, 2' to 3' beds. [27' up an orange-brown weathering silty limestone] - 45'.
82) Ss., - light brown - grades vertically into silty fine grained limestone {note: illustration followed} - 15'.
83) Like 82 - 17'.
84) Like 82 - from limestone at top-Collection 1-84 - 12'.

--------Subtotal 44'

85) Limestone, gray-brown, 6" to 2' beds fossil hashes - 25'.
86) Like 82 - 12'. Limestone has algal plates.

PG. 20
87) Limestone, blue-gray, 3" to 6" beds, fine shell hash, recrystallized fusulinids in a few beds - 35'.
88) Covered - one or two thin limestone ledges - 22'.
89) Limestone, medium-gray, ironstone nodules common, 6" to 2" beds, fossils recrystallized. - 35'.

----------Subtotal 92'

90) Shale and Ss., - 7' to 10' bed alternating with limestone, dark gray - 52'. Traversed NW 150 yards.
91) Covered - 11'.
92) Limestone, medium gray, brown "tubes" on weathered surface. 1/2'.
93) Covered for most part, ss. orange, limestone purple and siltstone yellow, outcrop in patches - 3.5'.

-------Subtotal 95.5'

PG. 21
94) Limestone, medium gray, 2" to 2' beds with some covered intervals - 34'. Calcite crystals - replaced fossils?
95) Covered - 7'.
96) Limestone, mottled gray and orange-brown weathering 3" to 6" beds - 11'.
97) Covered - 21'.

98) Limestone, medium gray, silty and sandy - 2'.
99) Largely covered, probably siltstone, also every 4' to 10', a 6" ss (orange-brown) crops out - 48'.
100) Limestone, light gray, very silty, sandy, clayey, persist at beds - 2'.
101) Shale, largely covered, and Ss. 2 beds, orange-brown - 8'.
102) Covered, except for 3, 6" beds of ss - 31'.
103) Ss., orange-brown, limy cement, massive - 2'.
--------Subtotal 122'

PG. 22
7/12/59
Section 3
Western part of Brooks Ranch
remeasured King's Sect. 26 (probably closer to sect. 27 of King (King's 30) His bed numbers as shown in his sec. 26.
King's beds
9) = S. crassitectoria zone with large Omphalotrochus
Collection 3-(9)A first appearance at base of bed
Coll. 3-(9)B - 35' up. ----------108'
10) Collection 3-(10)A - 5' up.
Collection 3-(10)B - 50' up. ------270'
11) Double Ledge
Coll. 3-(11)A - 2' up.
12) Collection 3-12X - 2 bag 15' up.
Collection 3-12XA - 35' up.
Staffella are common throughout the lower beds - (9) through (12)
13) Second ledge Coll. 3-13-A - 30' up.

PG. 23
14) Coll. 3-14A - lower limestone ledge
Coll. 3-14B - top of unit.
Coll. 3-14C - algal bed.
16) Coll. 3-16 - 15' up.
Coll. 3-16B - 35' up.
17) Coll. 3-(17)
Coll. 3-17B - in section, 50' up.
Base of King's fossil bed is a conglomerate.
In Coll. 3-17B fusulinid occur with gonatite,s camacatochid, Omphalot, Thindeus.
18) Coll. 3-18A - base of bed we think King's pisolite bed, pisolites are fusulinids with algae coatings.
Coll. 3-18B - 35' up.

PG. 24
Near top of King's bed 19 or in the base of bed 19 - red siliceous shale and siltstone - 10' +- thick.

The lower part of King's section was much easier to follow than the upper part. This might be in part the result of the topography for beds 14 and higher are exposed on the top of the mountain. Here again there seems to be a change in lithology at the interval of the Hess fossil bed and just above and below - Thus, although we tried to follow the route of the measured section it is possible we missed it in the upper units.
The fossil bed is a pretty poor unit here and is not the resistant cliff it is to the west.
Fusulinids (often recrystallized) really make up a lot of this interval above and below the Hess fossil bed.

PG. 25
7/14/59
With Cooper, Grant, Skinner and Wilde, and Stehli.
Collected from Hess ranch horst and from the Word about 1 mile NW of Hill 5779 north of Leonard Mt.
Word 1 limestone - 35' - 3 collections.
Word first shale Collected 5-2A Word - 35' up.
Word first shale Collected 5-2B - 45' up
5-2C - 65' up
Limestone becomes more abundant and the upper 50' are 2' to 3' limestone beds -
Collected 5 -3A - 15' up.
Collected 5-3B - 20' up. ---------Total 140'.
Word limestone - position of second limestone -
Collected 5-4 - ------- 7'.
Shale----------155'
Word - 1' beds of limestone -
Collected 5-5A - [near base]
Collected 5-5B - 5' up. ----------10' [I think this is what the notes mean.]

PG. 26
Shale -------- 20'
Limestone - Collected 5-6A. ------2'
Shale ----- 20'.
Limestone - base third Word limestone- Type locality of Paraf, sellardsi according to Skinner. Collected 5-7A. ---- 3'.
Shale - 12'.
Cephalopod zone - 2' limestones at base of next limestone, medium gray (upper part of third Word limestone[?]) - no fusulinids ------ 65'.

The first Word limestone is thinning to the NW - mainly at the top by intertonguing with siliceous shale - The limestones just below Word limestone 2? are fine

grained lutites, and a few 6" limestone are rare (2 or 3) between second limestone Word and third limestone. Cooper pointed out a high Leonard limestone locality just north of the road up Gilliland Canyon at the base of the Word fm.

PG. 27
It seems that Cooper's "Hess Ledge" can be traced around the end of the ridge behind the Hess ranch House and behind the horst to a point opposite the gap between the hills in the horst. He doesn't find this fauna on the front of the limestone escapement to the south (Hess escapement) because in his words "it isn't the right lithology". Thus he would rule out the idea that his fauna occurs in several horizons.
Wilde is using the first Leonard limestone of King (1930) as equal to the Hess fossil bed. - This seems to solve a few problems - but I wonder how many?
The section we measured in the Word seems to best fit in with King's 1930 Sect. 18, p. 71, but this on depositional strike 2.5 miles +- to the NE.

PG. 28
7/15/59 [Old Word Ranch]
Split Tank
Collection 3-(19) from upper dolomitic limestone in Hess facies - most of this is a crinoid cochina - 15' below top. (maybe in lower limestone of Leonard).
Collection 3-(2) Leonard -[3-13]. The upper beds of Leonard (2) have abundant fusulinids.
Road to Red Tank
Word first limestone - has limestone cobbles in the upper unit. Overlain by 15-20' of siliceous shale followed by dolomitic #2 limestone.
Collection from float near top of first limestone.
Collection - 4 to 5' above Word limestone #2.

PG. 29
The fourth Word limestone and the Vidrio are dolostone facies for most part here. They like the Upper 250' of Hess facies locally they have abundant relict outlines of fusulinids but we couldn't find any that were well preserved.
The Split Tank Leonard section is faulted in several places and we were able to follow King's section in only a general way. Cooper said each limestone was a lense which pinches out within a short distance and each of these apparently contains a distinct brachiopod assemblage.

PG. 30
7/16/59--Hess Ranch
Loc. 2 Word limestone; second limestone by the road north of the horst - This is apparently second or third limestone - in the field I judged it to be the second limestone - or #1.

Loc. 3 Word 4 limestone - [Collection] A-12' up in ledge probably #3 [Word Limestone]. 3/4 mile up valley [Collection] B-16' up in ledge, from earthen tank. This is not too close to the massive beds at the top of the ridge - which King calls Vidrio - say 125' to 150' below the Vidrio - The sequence is a silty, dirty limestone in 2" to 6" beds with a few scattered fusulinids in some of the more indurated beds -
[See later page for Word 4-Vidrio Section.]

PG. 31
Road Canyon, East end-meager collection from Word third limestone
-------35' up (A)
{note: illustration:
bed 1: 3rd limestone, goniatite bed, --35'.
bed 2: orange-brown ss., with a few thin (6") yellow-gray limestone.----250'.
bed 3: limestone silicified - 6'.
bed 4: shale or covered ---145'.
bed 5: limestone 7' silicified fossils. ----7'.
bed 6: Ss., orange-brown, ---120'.
bed 7: dolo-limestone, ---25'.
bed 8: Sandy dolomite limestone, ---18'.
bed 9: dolo-limestone, -----3'.

PG. 32
There is a fault cutting the SE face of section at Road Canyon - also several Terrva Blocks have dropped down. The Word 4 limestone lenses are just about gone here with the Vidrio dolo. lying conformable but with an abrupt lithologic change. [probably unconformity here]

PG. 33
7/17/59
Sect. 5 Leonard Mt-
0) (see p. 36, 2 pages over) Covered below - mainly dolomitic and limestone interfingering in tongues and patches.
1) Limestone, medium to dark gray or fresh surface, massive 10 to 20' beds, Sacchinella zone of G.A.Cooper, weathers to rounded surfaces, one 5-6' zone of shaly 1' limestone beds 65' up ---112'.
2) Limestone, dark gray, 1 to 2 foot beds, crinoid and bryozoan fragments - 43'.
Leonard Formation±
3) Limestone, medium to dark gray, 6" to 2' beds, caps ridge, a few pits, angular weathering - conglomeratic locally - 37'. Collection 5-3.
4) Limestone, dark gray, 3" to 1' beds - 12'.
5) Calcirudite, 4" cobbles, with 4' of dark gray 6" limestone, in middle - 34'. top of ridge. Collection 5-5 Leonard anthill top of ridge.
6) Limestone, light gray, shell hash, silicified in part - 3'. [Wilde's locality - Collection 5-2 gully probably about bed 2].

PG. 34

7) Covered inpart, thin limestone (dark gray) and siliceous shale - King's fault zone - but no fault here. Silty limestone and shaly limestone in part - 18'.
8) Calcirudite - light gray, massive, 2-5' beds, 16'.
9) Calcirudite, dark gray limestone matrix, 6" bed, 21'.
10) Limestone, light gray, 2' beds, (calcarenite), one brown bed (Collection 5-10 [???]) 5' up - 20'.
11) Calcirudite, dark gray matrix - 12, 3' cobble.
12) Limestone, 2" crinoid columnal bed, light gray, 5-6' beds - shell hash - calcarenite -
5-12A - 3' up.
5-12B - 8' up.----------38'.

PG. 35

13) Calcirudite, dark gray limestone matrix, 2" cobbles --- 6'.
14) Calcirudite, light gray grading virtually into shell hash - several of these cycles repeated - (3)-----37'.
15) Shale, siliceous, red and orange ----- 33'.
16) Conglomerate, limestone matrix and a few cobbles, chert fragments - 2' --> 6'-7' to SE 100 yards ----- 2'.
17) Shale, orange - siliceous, platy. ---- 32'.
18) Limestone, light gray, massive, silicified fossils, chert frags
conglomerate near top - ---56'.
19) Shale, orange-brown, with 1'-2' limestone beds (conglomeratic chert pebbles) ----- 67'
silicified cochina.
20) Limestone, light brown-gray, 2'-3' beds silicified bands -
---17'.

PG. 36

21) Shale orange-brown, silicified. [continued below]

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0) [cont. from 2 pages ago] base of Hess ledge rest unconformably on truncated edge of Lenox Hills fm. 3' relief, 5° difference Lenox Hills, dips more south.
Collection 0-A, 10' below unconformity.
Collection 0-B, 1' below unconformity.
Collection 0-C, 1' above in Hess ledge.

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21) Shale, orange-brown, silicified, top 6" beds of sandy limestone ---- 47'.
22) Shale, orange weathering (black fresh) with 1"-3" shell hash band - ---- 55'.
23) Covered ---- 115'.
24) Shale and siltstone orange ---- 23'.
25) Limestone, black, shell, bryozoans and brachs ---- 6'.

PG. 37

26) Siltstone, yellow-orange, becoming near top was a fenestellid heaven --------24'.
27) Covered, mostly gray shale ----- 87'.
28) Conglomerate, chert frags, brown weathering, many bryos and brachs silicified ----- 1.5'.
29) Covered, mostly gray shale and a few 6" silt and s.s. (orange) bed-shell hashes - ----146'.
30) S.s., orange-brown, brach shell hash, Collection 5-30 (Leonard) - -------12'.
31) Covered - 86'.
32) Word limestone. Here it has a s.s. at the base, 2-3' beds orange to brown-gray; 20' above we get a massive calcirudite.----100'+

PG. 38
7/18/59
Rained out--Saw G.A. Cooper and Dick Grant in town
7/19/59
Section 4 [+- King's section 23]
1) Silt --- 20'.
2) Shale, brown, with thin clay rich dolomitic limestone ---72'. Collection 4-2; 6' down from top.
3) Limestone, brown-gray weathering with large calcite crystals - -----4'.
4) Shale, brown, and thin limestone. 4-4A - 5' up. 4-4B - 11' up. - --- 23'.
5) Limestone, brown-gray, 2' beds, calcite crystals in long "bodies" - ------13'.
[9/2000 Middle transgression in Lenox Hills Fm]
Top of Lenox Hills Fm with an unconformity with 5' to 8' relief in 200 yards -
6) Limestone, medium to dark gray, calcarenite, many fusulinids - 2' to 4' beds.
Collection 4-6A - --- 3' up.

PG. 39
and shaly limestone - 'snail' limestone
Coll. 4-6B is 15' up,
Coll. 4-6C - 23'. {note: illustration followed}.
2 cycles of limestone 6' to 8' and shale 18'-20' --- 52'.
7) Limestone, light gray, with brown-orange chert concretions - massive. Collection 4-7A - ---- 16'.
8) Shale and limestone, brown and light brown weathering - varicolored shales and white ss. 25' up - --- 32'.
9) Limestone, brown-gray, 4" to 3' bed - mottle zone 1' at base. Small recrystallized Staffella are common throughout -17'.
10) Shale and shaly limestone - 6" bed of white s.s. --- 12'.
11) Limestone like 9 - 10'.

PG. 40
[base of Hess Ls.]

12) Limestone, gray, 1'-2' beds, vertical fracture on weathering. Collection 4-12A - 3' up.
Collection 4-12B - 12' up.
Coll. 4-12C (Problematical fossil)- 22' up.
Coll. 4-12D - 32' up. (and top of bench) ----32'
13) Limestone, dark gray, calcarenite, 6" to 1' beds.
Collection 4-13A - 20' up. ----- 23'.
Follows Neal fence here upwards
14) Shale, brown, grades upward into clayey limestone and finally into a calcarenite at top.
Collection 4-14 at top - ---- 27'.
15) Limestone, light to medium gray, 6" to 1' bed.
Collection 4-15A - 12' up.
Collection 4-15B - 50' up.
Shaly beds commonly reach 10-15' in this unit.
Coll. 4-15C - 78' up. -- --106'.

PG. 41
16) Limestone, medium gray, little shale, 6" to 2' beds, rubbly in part -
Collection 4-16A - 3' up.
Collection 4-16B - 25' up.
Several beds of dolostone common very fine calcarenite - becames dark gray above 30'; light gray above 42'.
Collection 4-16C - 43' up.
Collection 4-16D - 58' up. ------- 59'.
17) Limestone, light gray, silty, 3" to 1' beds rubbly - with thin shale bands - small "Staffella" fusulinids common in all beds - above 33' dark gray - small, subcyclindrical fusulinids replaced by dolomite (47') --- 52'.
18) Dolostone, brown-gray and limestone, gray-brown,
Coll, 4-18A - 11' up --- 27'.
19) Limestone, light gray, 2'-4' beds, silty, clayey; ----37'.

PG. 42
20) Limestone medium gray to light gray, thin bedding 2" to 6", and shale and siltstone, dolomitic;
Collection 4-20A - a 2' calcarenite 26' up ----- 37'.
21) Limestone, light gray to cream, massive 3' to 5' beds with thin bedded medium gray limestone.
rubbly bed Collection 4-21A - 30' up.
rubbly bed Collection 4-21B - 35' up.
rubbly bed Collection 4-21C - 42' up. --- ----54'.
22) Limestone, light gray, 2" to 4" beds, fossils are common but dolomitized - ---------- ----------82'.
23) Limestone, light gray, massive, 2' beds.
Collection 4-23A - 17' up.
Collection 4-23B - 29' up. --- --------34'.

PG. 43

24) Limestone, light gray to cream, thin irregular beds, 2" to 4" beds - laminated, Pink tones about 65' to 80'. ------87'.

25) Limestone, light brown-gray, wavy bedding, in beds 2' to 3' massive, clayey and silty.

SEVERAL SMALL FAULTS ---------- 97'.

26) Limestone, medium gray, 2' beds, with brown shale cycles of these, the shale gradually becoming dominant --- 193'.

[up to Hess - Neal gate. This is very near the base of the Hess Fossil Bed]

PG. 44

7/20/59 -[walked about a 1/3 to 1/2 mile east along bed 26 and found section better exposed and better preserved]

Coll. 4-26m - 1/2 mile east of section 4, 25' below fossil bed.

Coll. 4-28mB - 1/2 mile east of Sect. 4, from a 35' to 40' light gray limestone above fossil bed. - 8' up.

Coll. 4-28ma - 5' up.

Coll. 4-27ma - fossil bed, silicified just above 2-3' limestone ledge 15' beneath top.

Coll. 4-28mc - 35' above fossil bed.

Coll. 4-29ma - massive limestone about 25' above top 4-28.

PG. 45

27) Fossil bed, two lithologies

a) basal calcirudite---------- 28'.

b) Shale and limestone, shale is brown; limestone is medium gray, abundant silicified fossils - brachiopods, collection of bryozoans, yellow silty limestone. ------27'.

28) Limestone, medium gray, 1'-3' beds, dolomitic, chert nodules.

Collection 4-28A - 42' up. Omphalthrocus common. Collection 4-28B - 64' up.

Top of hill at 89'. Total ----- 115'.

[?]Hess fossil bed includes bed 28; Leonard Fm bed 29 to 34 [?].

29) Limestone, brown-gray, 2'-4' beds, with lime mud blebs and chert pebbles ------ 24'.

30) Shale and limestone, brown, siliceous shale; dolomitic or dolomitized limestone. 2' beds ------- 29'.

31) Dolostone, dark gray-brown, 4' beds ----- 21'.

32) Limestone, light gray, "graphic" dolo-limestone beds.--12'

[Word Fm starts with bed 33].

33) Limestone conglomerate (calcirudite) with chert frags 3-4' beds - ------ 9'.

PG. 46

34) Limestone and shale, siliceous, w/ chert nodules .-----25'

35) Dolostone, brown-gray, pitted ---------- 250' est.
Word 2A limestone, Coll. 4 --25' up.
Word 2B limestone (Coll.)-------50' up.
The following (2C and 2D) are 10-15' above the top of the second limestone and separated from it by siliceous shale and sandstone.
Word 2C limestone (Coll.) - 65' up (top).
Word 2D limestone-about same horizon as Coll. from Word 2C. Word 2D is from saddle.
Word 2E - 25' above 2D; 35' below first massive limestone in Third[?] Word limestone.

PG. 47
Word third limestone A - 5' up.
Word third limestone B - 8' up.
Word third limestone C - 18' up.
----35' total thickness of limestone.
Dolomite - 12' to top of ridge

Word first limestone - Collection 4-Word 1a, 20' below top of King's unit "a"

The Word limestone contain a lot of conglomeratic stuff at this place - most pebbles and cobbles of limestone probably intraformational in part, and fine chert pebbles - Where we saw the formation, the basal limestone (#1a is very little different from #1b although King's separation isn't too bad. The distance between #1 and #2 is closer to 83' than 14' and I think these members are reversed on King's 1930 page 143. The distance between #2 and #3 is a little high - unit 6 becomes limestone and unit 5 has fossiliferous limestone tongues in it. [This area is near the Wordian shelf break and thicknesses and facies change abruptly, so if we were offset a bit from King's line of section these differences would be understandable.]

PG. 48
7/21/59 Southside of Leonard Mtn.
The southside of Leonard Mtn. is complicated by:
a) facies change
b) irregular dolomitization of beds
c) several faults
I have perhaps drawn the top of the Lenox Hills Fm. a little high but we'll let is stand for the moment - [Changes on] the Lenox Hills Fm is thin here as if on an eroded pre-Leonardian anticline.

Jail Canyon where road ends on map -
1) No Altuda shale on SW end of Hill 5789 - This is King's Capitan, upper member -

2) Vidrio = Capitan upper member apparently and it seems likely that Altuda shale and lower member [of Capitanian] are equal to upper part of Word. [In 2004, I don't think this was correctly interpreted and need to study this part of the facies transistion much more thoroughly.]

PG. 49
Section 5 Jail Canyon
Section on East side of Old Blue Mt., Jail Canyon.
Covered below
1) Limestone, medium gray, 2-4' beds, gastropods and crinoid columnals, recrystallized; - ---15'.
2) Limestone, (buff) light brown weathering, 6"-1' beds, siliceous bands ----- - 85'.
3) Limestone, medium gray, pitted weathering, surface, 2-5' bed (similar to unit 1); calcarenite lenses (Coll 3A).----51'.
4) Ss., orange-brown to light brown, weathering, 2" to 6" beds, a lot of calcite cement, "siliceous bands are irregular throughout unit - 112'.
5) Limestone, medium gray, calcarenite - 2' to 6' beds, silicified and replaced fossils -
Jail Canyon - Coll. 5A-about 3' up.
Conglomeratic in part- calcarenite, very fine to 1"-2" pebbles - Calcirudite. [See King's Sect. 16, unit 5]. ------ ---------about 20'
6) Limestone, tan, calcirudite and ss., pinches out to South - varies from 10' here to 30-40' on ridge 400 yards North.

PG. 50
7) Limestone, medium gray, 2'-3' beds, to top of Hill.
His unit 3 is missing where we measured section but becomes thicker to southwest - His units 3 and 2 = upper part of his unit 1. {note: illustration followed}. [This is the area of the upper
Word and lower Capitanian shelf break so facies and lithologies are changing abruptly.]

PG. 51
[3 3/4 miles about N30°W of Skinner Ranch].
The Word limestone which King maps along the west side of Gilliland Canyon is probably his third limestone, not the first one. (Collection Iron Mt. road Word Limestone A) is from this - includes a few scattered fusulinids, cephalopods and a "scachinella" brachiopod. There seems to be no need for the fault further southwest. The top of the hill we climbed is a terrva block. The Gilliland Anticline poops out to the south of this point and beds regain their 10° NW dip.

PG. 52
Blank

PG. 53

7/16/59
Elbow in Hess Canyon
[note: illustration]
Bed 1. Ss., and dolomitic limestone with silicified layers.--10-15'
Bed 2. Fusulinid hash. Coll. A. -----8'
Bed 3. Like #1. ----------22'
Bed 4: Limestone, well-bedded, in 2' beds, fusuliniferous.
Coll. B in basal bed.
Coll. C, 2' up;
Coll. D, 18' up;
Coll. E 30' up. -------total about 35'.
Bed 5. Covered. ----------45'
Bed 6. dolostone, Vidrio Member ------200'+,

PG. 54
Blank

PG. 55
7/22/59
Clay Slide - The upper part of Leonard is badly covered by terrva blocks from the Word limestone above. [note: illustration]

Covered below.
Bed 1. Shale, ss., and orange limestone. two collections from float. CS-X1 and CS- X2, --------35'+.
Bed 2. Covered -------90'.
Bed 3. Shale, black chert, and limy ss. in 2" beds; some fossil hash limestone lenses.-------14'.
Bed 4. Limestone (calcilutite) with lenses of shell hash,
Collection A (CS-A.), 19' up. --------23'.
Bed 5. Calcilutite, papery limestone, light gray, 1" beds, Collection B (CS-B) at 20'. ------37'.
Top of Ridge

PG. 56
Clay Slide
King's ammonite collection locality, 1/2 mile SW of King's dip symbol "12°". along road.
Sullivan Ranch Road and Clay Slide limestone cap - junction [where limestone that caps Clay Slide mets road]. 3 Collections:
20' -1) Word Limestone Coll. C - in lower 20' of gray limestone.
25' -2) Brown to yellow weathering bed.
35' -3) Word limestone Coll. D in lower part of massive recrystallized limestone 10' up.
Word limestone Coll. E, 6' below top of ridge.

PG. 57
7/23/59
Morning - climbed from the "Hess" ledge up to the second Leonard limestone - made three collections based on King's Sect. 12.

The base of the Capitan at Sullivan peak is a beautiful unconformity - 40' or more relief and parallel bedding.

Afternoon - base of little knob of Coopers' SW end of Lenox Hills - base of hill shale and siltstone and sandstone dip 10°. to the S10°W. note: illustration:
Bed 1: First Ls, 35'. (3) Collection, C (Top).
Bed 2: S.s., orange-brown shale-gray. 85'.
Bed 3: Limestone, 3 Coll. 60', Second Leonard limestone.(Coop's Knob)

This section is cut by a fault or faults and the exact relation of the knob is dubious - it is probably the second Leonard limestone, but?

PG. 58
The Leonard fm in the Lenox Hills consists of series of limestone tongues which tend to become thinner to the SW and break up into a number of thin units by additional shale tongues. The structural problems are big especially in the area south of Sullivan Peak, between Dugout Mt. and the Altuda uplift. Of course, it is all covered but there is still a real problem to figure out.

King's map is wonderful, but his isn't very consistent about his boundary between the Word and Capitan - his Leonard and Word also have problems - the Ammonite bed which he places in the Leonard in the west is about the right horizon for his first Word limestone in the east. i.e.,[?] It seems the Word-Leonard boundary is also inconsistent.
The base of the Word in the west seems to be about the third limestone of the eastern Mts. In Section 12 this unit is greatly thickened and may represent the reef between

PG. 59
the hash reef faces to the east and the basin to the west.

PG. 60
7/25/59
Decie Ranch - Sullivan Peak
Collection from lower 25' of bituminous Word limestone of King's Sect. 12.
Collection King's Sect. 12 Coll. B float 25' below top.
Collection King's Sect. 12 Coll. C in place 20' below top.
Collection King's Sect. 12 Coll. D in place 10' below top.
(B and C and D are from King's section 12, bed 3.)

Kin'sg Word bed 4 is conglomerate - 3" to 4" limestone cobbles from younger [older] Word or Leonard limestone, some chert. Collection - King 12 - Word 4.
Collection King's Sect. 12, Word bed 5, 12' up.
Collection from King's Sect. 12, bed 6 (maybe 9 or 8).
Collection from float from King's bed 18, Sect. 12.

PG. 61
7/25/59
Iron Mt. Ranch
Section 5A
covered below:
1) Siltstone and shale, with thin platy sandstones, yellow-brown weathering, 1/4"-1" beds ---- 58'.
2) Calcarenite, medium gray weathering, fusulinids. 1' ledge, Collection 5A-2 ----- 1'.
3) Limestone, orange and gray weathering, fossil hash of brachs and fusulinids - Collection 5A-3 ----1'.
4) Limestone, orange-brown weathering, sandy fusulinids - Collection 5A-4 -- -- 2'.
5) Sandstone, yellow-brown weathering, limy, 1' to 6" beds - --------27'.
6) Limestone, medium gray, 1' to 2' beds, even bedding.
Collection 5A-6A,
Collection 5A-6X float -------- 2'.
7) Siltstone and sandstone, yellow-brown, with limy beds of same color - ------ 37'.

PG. 62
8) Limestone, medium gray, massive beds, 5' to 10' cliffs, thin irregular brown chert bands.------ 56'.
9) Siltstone and shale, covered for most part, yellow to light brown weathering, upper 15' becomes a sandstone. - -----123'.
10) Limestone, medium gray; basal 2-3 a calcirudite, becomes finer grained upwards, fusulinids common in a 6-12" band just above conglomerate. Collection 5A-10 -- ---- 8'.
11) Siltstone and shale, yellow to green-gray. ----- - 48'.
12) Limestone, gray weathering, 3" to 1' beds, thin (1/2") shale interbeds.- -- ---4'.
13) Sandstone, siltstone sequence, tan to orange-brown weathering ------- 62'.
14) Limestone, calcilutite, gray, 3-6" beds. ------ 5'.

PG. 63
15) Sandstone, orange-brown, 6" to 6' beds, calcarenous cement.

------- 56'.
16) Calcilutite, brown-gray weathering, 2" to 3' beds, irregular bands of chert (3 cycles) nodules, grades upwards into quartz sandstone beds, at 56-60' there are several lenses of shell hash with silicified fossils -
Collection 5A-16 at 60' ---------- 137'.
17) Limestone, brown-yellow weathering, 6" to 2' beds scattered white chert patches, cliff forms, saccharoidal with purple weathering patches, pitted surface ------ 25'.
18) Limestone, brown-gray weathering, 6" beds ------ 17'.

Unconformity - 8' of relief in 100 yards along strike.
19) Dolostone, brown-gray, rubbly cemented by clear calcite matrix - forms top of ridge - 65'+.
[Start here.]

PG. 64
Section 5. Section at West end of Road Canyon. 9°S dip to the S70W
King's fault contact of the Word against Vidrio is true, although there is [also] possibly a fault 100 yards further up the hill.

Vidrio [top of section]
10. Dolostone, brown-gray with large clear calcite crystals and a calcite matrix (Collection of this) - to top of hill. Unconformable contact - several (2') of relief?
[Top of Word, Fourth limestone]
9. Limestone, calcilutite, yellow-brown, 2"-6" beds with chert nodules - ----12'.
8 . Ss., dark brown weathering, siliceous bands with calcarenous cement where calcite cement remains weather, light yellow- brown - -------32'.
7. Limestone, calcilutite, yellow-brown weathering, brown on fresh surface, 1' to 2' beds patches of chert crystals ---- 20'.

PG. 65
6. Limestone, medium gray, massive lenses 1' to 4' thick in rocks like above unit -------12'.
5. Limestone, yellow-brown weathering, brown chert nodules, 6" beds.
Collection of fusulinid from here.------ - 18'
4. Ss., dark yellow-brown weathering, 1' to 3' beds chert crystals - ----------8'.
3. Limestone, yellow-brown weathering, brown chert nodules, 6" to 1' beds - ---------10'.
2. Ss., dark brown, siliceous ---------- 6'.
Probably top of third Word limestone
1. Limestone, light gray weathering, platy, - ---10' exposed.
0. Covered beneath.

PG. 66
Blank

PG. 67
7/26/59
Section 4A.
Examined the middle of King's Sect. 12, Lenox Hills, and remeasured it in part, see book [King 1930 section].

Then drove to Hess-Hall boundary fence and measured from road north to the top of the ridge and across the rolling slopes about 400 yards.
Section along Hess-Hall boundary fence.
1) Limestone, dark gray, silicified fossil hash, 3' to 6' beds.
---------- - about 20'.
2) Covered, probably siliceous shale. -------- - 126'.
First Word limestone:
3) Limestone, medium-gray, finely laminated, very silty with bands of brown siliceous replacement, lenses of fossiliferous calcarenite, (Collection 10' from top) -------- 84'.
4) Dolostone, "dirty" gray, 5' beds, a yellow weathering limestone 6" about 20' up - ------40'.
Second Word limestone:
5) Shale, red-brown weathering ------ 10'.
6) like 4 below - ----about 30'.

PG. 68
Blank

PG. 69
7/27/59
Dugout Mt. Section
Section 7 - dip 14°WNW.
Siliceous siltstone below.
1) Limestone, medium gray weathering, 1' to 2' beds, bands of brown silica, fossil hash, conglomerate, chert pebbles up to 1" diameter ---------- 24'.
2) Limestone, medium gray, lenses of shell hash up to 6' thick, silicified nodules common.
Collection 7-2[-A] -- 3' up.
Becomes interbedded with blue-gray calcarenite upwards - Collection 7-2-B --31' up.
Shale breaks at 35' and 40'. Total ------- 53'.
3) Shale, siliceous with chert bands, and thin limestone calcarenite -------- 8'.

PG. 70
4) Calcirudite, brown weathering, 6" cobbles in 4' beds and shale, siliceous, red-brown in 6' beds calcarudite has abundant silicified corals ------- 27'.

5) Calcarenite, gray, 1' grading up into quartz ss. ----- 12'.
6) Calcarenite, medium to dark gray, 1' beds,
Collection 7-6A -- 1' up?
A few pebbles - calcarenites have siliceous through the pores - gets brown weathering color. Upper part of a conglomerate - dolomite also in patches. (Cephalopods and bryozoans to the west).----- - 18'.
7) Sandstone, red-brown weathering, and conglomerate, chert pebbles in a dolostone and siliceous matrix, 4 repetitions.
--------30'.

PG. 71
8) Limestone, brown weathering, shell hash, some beds conglomeratic, siliceous deposits in voids, 1' to 2' beds -
--------40' (to top of knoll).
To the west these beds change facies into orthoquartzites, siliceous shales, to a large extent.
Above, beds which I think are the same as unit 8, there are:
9) Sandstone and shale, friable, yellow and red-brown weathering, some bands of dark brown siliceous shale ------ 30'.
10) Sandstone, light brown, orthoquartzite and thin beds of shales.
(6° WNW dip).- -----15'.
11) Covered above, some beds are exposed but strikes are variable and apparently the sequence is broken by several faults.
-------(King's est 525') mine —about 400'.

PG. 72
12) Shale, yellow-brown weathering, impart siliceous.
----- 25' exposed.
13) Conglomerate, local lens. -----about 30'.
14) Ss., and shale, gray-yellow ----- 232'.
15) Limestone, yellow-gray weathering, finely laminated with some cherty bands, lenses of calcarenite -
Collection 7-15A -- 5' up.
Collection 7-15B --12' up.
Collection 7-15C --17' up. ---------Total 17'.
16) Shale, yellow-brown, thinly laminated, lenses of calcarenite with fossil hash - -------14'.
17) Limestone, medium gray, 1' massive beds, fossil hash calcarenite.
Collection 7-17A 1' up. - --------2'.
18) Shales and ss., red-brown to yellow, thinly laminated, siliceous, one 6" calcilutite bed in middle. - -----10'.

PG. 73
19) Limestone, medium gray, conglomeratic in lower part, calcarenite higher -
Collection 7-19A - 6" up.
Collection 7-19B - 1.5' up --------- 2'.

20) S.s., brown to red-brown weathering, siliceous, thinly laminated, 1" beds, friable ------- 260'.
21) S.s., brown-red, cliff former, 6" to 3' beds, conglomeratic.
------ 60'.
22) Limestone, dark gray, conglomeratic ------ 2'.
23) Covered ------ 37'.
24) Limestone, light gray to chalky weathering, a series of ledges, fossil hash ---- 35'.
[Fault N of Ss cuesta] (dip 6° to the ESE)
25) Calcarenite, light gray to brown weathering, 2" to 1' beds.
Collection 7-25A 6' up.
Collection 7-25B 10' up. Total -------- 12'.

PG. 74
26) Covered
27) S.s., dip 14° to the WNW, brown weathering, 1' to 3' beds, cross bedded locally, conglomerate in bands - 70' up a Cephalopod locality.
Collection 7-27A - ----110'.
28) Limestone, dark gray, 6" beds, calcarenite.
Coll. 7-28A --5' up.
Coll. 7-28B --12' up.
20' of light brown calcilutite
Coll. 7-28C dark gray limestone ---4' up.
12' of brown siliceous shale and siltstone
8' of limestone, black, Coll. 7-28D --6' up.
10' of siliceous shale.
4' of very fine grained calcarenite. Coll. 7-28E.
29) S.s., brown and siliceous shale --------- 62'.
30) Limestone, calcilutite, yellow-brown and siltstone alternating in cycles - chert nodules common in upper part - 175'.
-----more than 50' (up as far as we went).
31) Gray Capitan dolomite.
[Start Here]

PG. 75
7/28/59
Tried to chase down King's section up Little Blue Mt. - met a Mr. Mills who was of great -[help] [Mills is son-in-law of Ferguson and now, 7/59, is taking care of Little Blue Mtn. pasture.]

The fusulinids in King Sect. 17, p. 77 are mostly funny spots in the limestone but are not apparently fusulinids. His thicknesses here is about right.

PG. 76 Blank

PG. 77

7/29/59
Section 2A. Walker and Falk Ranches. Eastern Glass Mountains.
Covered below
1) Dolostone, brown to gray-brown weathering, 1' to 2' ledges, chert pebble lenses --------- 48'.
2) Limestone, medium gray, 6" to 1' beds, fossil hash, many fusulinid-bearing calcarenites:

Collection 2A-2A 24' up
Collection 2A-2B 26' up
Collection 2A-2C 31' up
Collection 2A-2D 43' up
Collection 2A-2E 48' up
Collection 2A-2F 62' up (platy in upper 20')
---------- Total 67'.

3) Limestone, gray, 1-2' beds, abundant fusulinids, almost all fusulinid limestone in total -

Collection 2A-3A 2' up - ------14'.

(--> King's base of the Word Ls. here)
4) Dolostone, probably like unit 3 below originally.

PG. 78
Sect. 2B - (on Fulk ranch here and higher)
4) Dolostone, gray-brown weathering, pitted surfaces (relic fusulinids), 1'-3' bed, a poorly silicified brachiopod bed about 25' up --------- Total 85'.
5) Dolostone, 1-3' beds, light gray in lower 200' becomes medium gray in upper part. ------- - est. 700'.

PG. 79-82
Blank

PG. 83
Salt River Section, Arizona
Collection 0 to 3 are in first road above Molasses-Redwall road cut. Collect 4 is in second road 10' above Collection 3, but the structure is a bit odd, is several NW plunging folds, slightly faulted? so that Collection 4 may possibly be same as Collection 0 (doubtful) because of lithologic dissimilarities however?
Collection 5 - Coral-Brach-Crinoid-Bry bioherm Prismopora and Fenestelloids.

PG. 84
Blank

PG. 85
Gap Tank area, Marathon/Glass Mountains, West Texas.
Stop 1.

Photog. April 16, 1964
Sect. 43, Bed 17 lenses into Sect. 40, from about bed 15-19.
43-16 looks to be about as thick as 43-14 as shown on section.
Distance between 43-15 and 43-13 is too great as shown on section

Stop 2. 39-1 is = 40-21; Lenox Hills conglomerate cut out limestone units 39-7 to 39-12 about 100 yards east of where Sect. 39 measured. "Stream channel" about 250 yards wide E-W.

Stop 3. 39-1 = [40-]38.21
{note: illustration followed along side}
and 38-4 = 39-7
37-9 = 38-24
and 37-9 = 36-6
38-21 = 37-5 and 37-6

PG. 86
4-19-64 A
Sunday April 19
Near Sect. 29
about 70-80' below 29-1 about 200 yards east of section 29 out on flats.
"Uddenites" zone of Keyes??
4-19-64B = 31-11
Ammonoid = 31-13
4-19-64C
4-19-64D = 31-13
Gray limestone conglomerate in flank of bioherm forming face of hill.

PG. 87
4-19-64π
Section 21 revisited
{note: illustration:
Bed 1: 31-11; algal mudstone
Bed 2: covered
Bed 3: 31-13; limestone congl, crossbedded
Bed 4: 5' covered
Bed 5: 7'. Fine ss., yellow, 6" beds, silty near top. Eolian?
Bed 6: 6". recrystallized algal limestone.
Bed 7: 18'. Mostly covered, some s.s., as below in lower 4'.
Bed 8: 2.5'.
Bed 9: 5'. Algal limestone. Limestone conglo. and calcarenite.
Bed 10: 7'. 2' reddish and s.s..
Bed 11: Coll. 4-19-64E, 4' up in red limestone.
Bed 12: Coll. 4-19-64F.
Beds 11+12 (14'; jumbled up like concrete mixer (=30-8) limestone mud - 2"-2' beds mottled reds and brown).

Bed 13: 6', cover.
Bed 14: 5'; Limestone light gray, 2' beds, mudstone.
Bed 15. [Calcirudite] 25-40'.
{note:this section is illustrated on following page 87}
PG. 88
{note: illustration followed}

PG. 89-182
Blank

PG. 183
Decker and Merritt Okla Geol. Survey 1931, Bull 55.
Measured 1/4 mile west of US 77. Didn't find Bed 9. Sponge sect.
1) Bromide, Deckers Sect. 4, bed 16 calcarenite; buff weathering; rubbly. Collection 4-16 Diplotrypa zone. (upper Tulip Ck poorly exposed - didn't fine Decker's bed). Seems to be all a "calc". SS.
2) McLish - Collection in Decker's Sect. 4, beds 72 and 73; rubbly limestone.
3) McLish - Collection in Decker's Sect. 4, beds 75/76, calcarenite, bry thin sect. here.
4) McLish - Collection in Decker's Sect. 4, bed 80; weathers buff; calcarenite; bry. colonies.
5) Oil Ck - Collection in Decker's Sect. 4, be 87 poorly exposed medium gray limestone; thin beds 2'-3'; very rubbly overlying more massive thin bedded units with few bryozoa and these in turn overlie a massive finely crystalline lightly gray limestone. Rhinidictyids with ramose bry.

"Decker's section measured along edge of Ardmore - Davis Highway (US 77) Dip 55° SW. Strike N60°W.

PG. 184
"Strat and Physical Char. of the Simpson Gp." C.A. Deckers and C.A. Merritt.

Doc. 318

doc 251
c 0318

WESTERN WASHINGTON UNIVERSITY 1893

COLLECTIONS MADE BY CHARLES A. ROSS

The following collections were used in Charles A. Ross' 1965 Journal of Paleontology article "Late Pennsylvanian Fusulinidae from the Gaptank Formation, West Texas" vol. 39, p. 1151-1176.

Section 26, bed 2 (26-2)	30-3	31-3	32-1*
26-8	30-6	31-8	32-11 (2 bags)
26-10B	30-10	31-13	32-12
28-1*	30-19		32-16 (?3 bags)
			32-16 (=7-16-57-loc.7 (not 7-17-59-loc.7 & not 6753 (Leonard?)

*Not included in study - probably lacked fusulinids.

34-15	36-4	37-1
35-6	36-6	37-9 (8-20-57; 6683
35-7	36-7	37-9 (float)
35-10		37-11
		37-12 6683

The publication locates the collections quite well. These samples were retained by Charles Ross from the main smaples for future reference. They are part of YPM accession 6683

Charles Ross had a note to me that he was still tracking 37-36b which may be from the lower part of the Hess facies. He was also trying to locate the source of samples 8-31-66-J and 8-31-66-O and -Q; probably southeastern Arizona.

doc. 0318

C.A. + J.R.P. Ross

Summer 1959 Book 3

If found please return to

Peabody Museum, Yale University

New Haven, Conn.

These are Lower and Mid sections and samples

6755

doc. 0318 7/8/59 /59

Brooks Ranch Section 2

1.) Shale, blue-gray, 1/4-1/2" bands of brown siltstone —— 10'

2.) Covered —— 15'

—— Top of Lenoxhills fm. ←→ Base of Leonard —

3.) Limestone - light gray to light gray weathering 3" to 2' beds, very fine fossil hash for most part - fusulinids in thin beds within this unit.

Coll. 2-3A - 8' up

Coll. 2-3B - 22' up

Coll. 2-3C - 37' up

—— shale interbeds gradually thicken to 6" ave —— 48'

4.) Limestone, like below + shale, light brown to light gray - ls. are 1 to 1½' thick, shale beds are 1½ to 3' thick —— 27'

5.) Limestone, light gray, light to brown very fine grained, clayey & silty - 3"-2' beds -

2-5A - 12'

2-5B - 35'

2-5C - 52' up

——— 95'

6.) Dolostone, light brown weathering and shale (covered mostly) — light brown-gray v.f. ls near top 1 to 3' beds —

Coll. 2-6A - 33' up

Coll. 2-6B - 85' up

——— 112'

7.) Limestone, light gray - 3' to 6' beds, few & thin shale interbeds

2-7 ——— 32'

8.) Limestone, light orange-brown weathering, v.f. gray - 3 to 5' thick separated by 2-7' shaly intervals

the ls have a "Staffella" fauna, and locally scattered "fusulinids"

——— 90'

Cyclothems - 10-12 - get progressively more shaly toward top of unit

9.) Limestone, orange-brown weathering, 1" to 4" beds. Omphalotrochus type gastro

7/9/59

near base - fusulinids rather (?) abundant

2-9A - 42' up

(Top of ridge 140')

2-9B - 145' up

limestones become progressively more silty and change to slight gray weathering

2-9C - 160' up

2-9D - 185' up

——— 215'

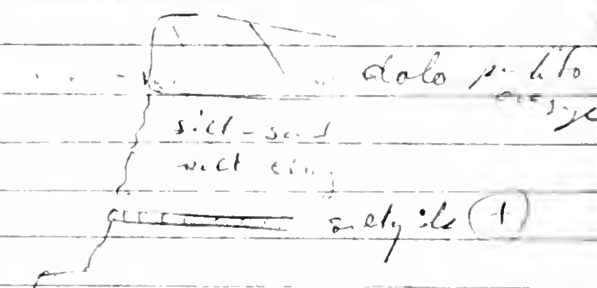
10.) Limestone & Dolostone, orange-brown weathering, - very silty - 2" to 6" beds - shale interbeds up to 1'   Coll. 2-10A - 5'

Saddle 80'

2-10B. - 105' up

[illegible] 3' separated by 4' of orange weathering silt - clay [illegible]

Cyclic beds [illegible]



fusulinids are rare - recrystallized when found.
Gastropods brachiopods + ostracods.
[illegible]

— 187'

11.) Shale, light gray, + ls., light gray
- sh - 2-5' beds
ls. - ½ to 1' beds
2-11 A 5' up

33 30' [illegible] common (ls is [illegible])
——— 89'

12.) Limestone conglomerate, well sorted
— 25'

13.) Sandstone, light brown, [illegible]
crinoid stems + brachiopods
well sort, fine grained - grade
vertically into calcarenite
Coll. 2-13A - 32'

to saddle — 158'

14) Dolostone - brown-gray, porous, saccroidal,
weathers to pitted surface - 3-6' foot
beds. — 10'

15.) Limestone, light gray, 6" to 2' beds -
little in the way of shales or siltstones
2-15A — 42' up
2-15B — 65' up
— 205'

Several different limestones in this
unit - all are ss. size or lutites. limestone.
The more [illegible] beds are white, ss. size ones
are brown gray. 4 or 5 alternations of
grain size

16) Limestone, orange brown weathering,
[relict outlines of fusulinids (abundant)
5' at base]
like 15 below
Coll. 2-16A 53'
[at 65' a mottled quartz ss. bed w/shell
fragments]
[at 97' - silty bed 1', brown-orange,
brachiopods].
Coll. 2-16 B. 185'
——— 197'

17.) Sandstone, orange-brown weathering, very silty, calcareous cement
3" to 1' beds
30' — shell hash — rextallized, no fusulinids but few crinoid columnals,
42'

18.) Limestone, gray-brown weathering, 1' to 3' beds, pock marked
silt + f. calcarenite for most part.
[22' rextallized fusulinids abundant]
[154' a 3' conglo bed, including quartz, quartzite, chalcedony pebbles to 1½" diameter.]

Afternoon looked at the rest of the Leonard fm., lower part of Word fm. There isn't much difference between the Hess facies and these upper units this far east. King's Sect. about 2 miles east is supposed to be quite markedly difference in the 2 facies of the Leonard fm, but I can't say that is true here.

from the top of Hess Hills one can see beds in the Leonard fm. thicken + thin within short distances. The units of brown-gray dolomitic ls. may change from 120' to 0' thick in 300 yards. Thus there seem to be few "key horizons" in this interval — we have 3 or 4 chert pebble conglomerate zones near the top of the Leonard, a couple of conglomerates in the Hess facies — and that is about all. Even these are probably not of too great a regional significance as they are mostly 3 to 6" conglo. lenses (near the top of the fm), and the lower are calcirudites with locally derived pebbles + cobbles of limestone.

[chert frag. scattered throughout upper 150' 7/10/59
18 cont. [pebble bed at 190' — 3" pebble band
— 293'

19.) Limestone - dolomite, light gray to light brown weathering, 1/16 - 1/8" laminae of ls alternating with dolostone — 2'

20.) Dolostone, light brown
pitted surface — 15'

21.) like 19 — 8'

22.) like 20 —
[20-28' up - quartz gray. congl.
fine pebbles
— 74'

23.) Limestone, light gray, with
some 1/8" bands of irregularly bands of
dolomite, 6" to 1' beds -

Top of ridge (Faulk ranch)

Locally angular ls. pebbles + cobbles make
6" beds
— 29'

24) Dolostone, brown-gray, with Leptaena
outlines, in 6" to 2' beds
pebble Congl. 6' up 3" band
— 37'

25.) Limestone, brown-gray, shelly,

Coll. 2-25 A - 5' up

Coll. 2-25B — 24' up - 3" bed of
fusulinid "coquina"

[Pricocki collection]

— 42'

26) Limestone, light gray -, poorly bedded
2' to 3' beds, weathers crumbly -
[65' up - crinoid columnal hash - 20']

{local intraformational congl. -
ls. pebbles}

— 185' (165)

27.) Sandstone, brown, red, orange,
v.f. quartz sand — 5'

28.) Limestone, blue to purple gray, irregular
wavy bedding, 42'

29.) Limestone, light gray, massive 2'-3'
beds, excellent silicified fauna of
Gastropods, Brachs, pelecypods. —
— 12'

30) Limestone, light gray to white, fossils replaced by Calcite, 4 to 6' bed. 30' (K?)

7/10/59.

Allison Ranch, Section 1

Covered below on this side of road —

1.) Limestone, brown, silty & sandy, 3" to 1' beds — 4'

2) Sandstone, creamy lime cement, X bedded 3'

3) Limestone, dark brown-gray, black, dense — 3'

4.) Covered — shale & marly ls. 18'

5.) limestone, like ①, silicified fossils 8'

6) Covered — 7'

7.) Limestone, like ① and shale above it, coll. 1-7 5'

8) Limestone, like ① — gastropods — 1'

9 Covered 8'

base → top #9

57'

10.) Limestone, gray-brown, 2" to 6" bedding 3', 6" of rubble beneath — Coll. 1-10. fusulinid echinoid — 4'

11.) Limestone - yellow-brown, vertical fractures - rubbly weathering, Coll. 1-11. — 5'

12.) Covered — 9'

13.) Ls., brown, fossil bank fusulinids + Euphalotrochus gastro-trochus — 1'

14.) Covered - shale? — 4' Coll - 1-14

15.) Ls., like 10 — 1'

16.) Covered — 3'

17.) Ls. — like 10 — 2'

18.) Covered — 4'

19.) Shell-hash — everything — gastropods, echinoids — 6"

base → top #19

90'6"

20.) Covered — 10'

21.) Ls., yellow-brown, fine grained calcarenite — 2' Coll. 1-21 —

22.) Ls., light yellow gray, marly — 5" to 6" beds — 5'

23.) Covered — 29'

24.) Ls. — dark gray, 6" bedding — recrystallized fossils — 8'

25.) Covered — 12'

26.) Ls., yellow-brown weathering + fresh, graphic recrystallization — part - 31'

27.) Covered — 15'

28.) Ls., gray-brown, 1' to 2' beds — fine shell hash — 10'

base → top #28

184'6"

29) Covered ——— 37'.

30) Ls., light brown, indistinct laminations, 6" to 1' beds ——— 7'

31) Covered ——— 13'

32.) Ls., light yellow-brown, ——— 4'

33) Covered ——— 11'

34) Ls., med. gray-brown, 3" beds ——— 3'

35) Covered — probably more shaly interval of 34 ——— 12'

base → top #45 344'6"

36.) Ls., orange-brown, 6" beds, silty + sand (v.f.g.) ——— 8'

37.) Ss., white to very light gray, X bedded, ——— 15'

38.) Ls., yellow-brown, very sandy, massive ——— 31'

base → top #38 297'6"

39) Covered, ——— 8'

40.) Ls., brown-gray — 3" beds, recrystallized fossil ——— 21'

41.) Covered ——— 7'

42.) Ls., med gray-brown, 6" beds, small fusulinids? ~~cut p-42~~ 3'

43.) Covered ——— 4'

44.) Ls., light cream gray, silty, recrystallized fossils, several shale beds 6", beds 6" ——— 12'

45. Covered ——— 11'

Total 356'

46. Ls., light gray, fine grained, dense, ——— 2'

47. Covered ——— 4'

48. Ls. like 46

49. Covered ——— 6'

50.) Ls., like 46, —— 1'

51.) Covered —— 2'

52.) Ls, Orange-brown, silty, shell hash,

53.) Covered —— 22'

54.) Ls – brown-orange, sandy + silty, 6" beds; and shale 4 to 6" beds —— 24'

55.) Ls., fusulinid coquina, gray-brown, 6" beds
Coll. 1-55 —— 2

56.) Covered —— 9'

57.) Ls., dark gray – shell hash – 6"

58.) Covered —— 8'

59.) Ls., like 57. —— 7'

60.) Ls., orange-brown, sandy & silty, —— 2'

61.) Covered —— 3'

62.) Ls., gray-brown, sandy-silty shell hash, — 6" beds —— 1'

63.) Siltstone, brown to yellow weathering, partly covered, —— 17'

64.) Sandstone + siltstone —— 2'

65.) Limestone, light-brown-yellow, 1' beds —— 3'

66.) Covered —— 37'

67.) Ss., purplish-gray weathering, — 2'

68.) Ls, gray-brown, shell hash, 3" beds —— 6'
Coll. 1-68

Total 160

69.) Ss., orange-yellow weathering, 1' beds, —— 3'

70) Covered ——— 10'

71). Ss., like 69 ——— 9'

72) Shale, gray in 5-15' bed, alternating with ss in 6" beds ——— 53'

73.) Ss., like 69 ——— 3'

74.) Shale, gray; grades with ss. (white + purple) + 6' ledgy resistant ss. — 38'

75) Ss. like 69 ——— 3½'

76) Covered for most part—, some purple-brown ls. with large calcite Xtalls, + ss. ——— 22'

77.) Ss. like 69 ——— 2½'

78.) Sh + Ss. (orange) ——— 22'

79.) Ss., gray to brown, X bedded, — 6'

80.) Ss., orange brown, like 69. — 12'

Total 184

81) Ls., light to med. gray, chert freq. common, 2' to 3' beds [27' of a orange brown weathering ls.] ——— 45'

82.) Ss. — light brown — grades vertically into ssly fine grained ls.

III 2'

13' 15'

83.) like 82 ——— 17'

84.) like 82 — from limestone at top — Coll. 1-84 ——— 12'

Total 44

85.) Ls., gray-brown, 6" to 2' beds fossil fragments ——— 25

86) like 82 ——— 12'

ls. has algal plates

87.) ls., blue-gray, 3" to 6" beds, fine shell hash, recrystallized fusulinids in a few beds. — 35'

88.) Covered — over two thin ls. ledges — 22'

89.) Ls., med-gray, ironstone nodules common, 6" to 2' beds, fossils recrystalized — 35'

Total 92'

90.) Shale and ss. — 7 to 10' bed alternating with ls., dark gray, — 52'

Traversed about 150 yds.

91.) Covered — 10'

92.) Ls., med. gray, brown "tubes" on weathered surface ½'

93.) Covered for most part, ss. orange, limestone purple +, siltstone, yellow outcrop in patches — 3'

Total 95½'

94.) Limestone, med. gray, 2" to 2' beds with some covered intervals -34'
calcite Xtalls - replaced fossils?

95.) Covered — 7'

96.) Ls., mottled gray + orange-brown weathering 3" to 6" beds — 10'

97.) Covered — 21'

98.) Ls. med. gray, silty + sandy — 2'

99.) Largely covered, probably siltstone, also every 4 to 10 a 6" ss (orange brown) component — 48'

100.) Ls., light gray, very silty, sandy, clayey, persistent bed. — 2'

101.) Shale, largely covered, + Ss. 2 beds, orange-brown — 8'

102.) Covered, except for 3 6" beds of ss — 31'

103.) Ss., orange-brown, limey cement, massive — 2'

Total 122'

7/12/59.

Section 3

Western Brooks Ranch
reexamined King's sect 26

His beds

9.) = S. ~~coarse~~ tectonic zone with large Omphalotrochus
3-(9) A first appearance at base of bed
3-(9)B – 35' up

– 108'

10.)
Coll. 3-(10)A — 5' up

3-(10)B - 50' up.

– 270'

11) Double Ledge

3-(11) A – 2' up

12.) Coll. 3-12 X – 2 bar 15' up
Coll. 3-12A – 35' up

13.) 2nd ledge 3-13A 30' up

14.) 3-14 A – lower ls. ledge
3-14 B – top of unit

3-14C – algal bed –

Stafella are common throughout the lower beds — (9) through (12)

16) 3-16 – 15' up
3-16 B — 35' up

17.) 3 (17)
3-17B – in section, 50' up

Base of King's fossil bed is a conglomerate ~~to~~

In 3-17 B fusulinids occur with Goniatites, Camarotoechid, Omphalotrochus ~~Plinidera~~

3-18A – ~~base~~ flat We think King's pisolites are fusulinids with algae coatings.

3-18B — 35' up

Nearly top of King's bed 18 or in the
base of bed 19 — red siliceous
shale + silt stone — 10' ± thick

The lower part of King's section
was much easier to follow than
the upper part. This might be in
part the result of the topography
for beds 14 and higher are exposed
[illegible] the top of the mountain. Here
again there seems to be a change
in lithology at the interval of
the Hess fossil beds & just
above & below — Thus although
we tried to follow the route of
the [illegible] section it is
possible we missed it in the
upper units.

The fossil bed is a pretty
poor unit here and is not the
resistant to cliff former that it is to
the west. Fusulinids really
make up alot of this interval
above + below the Hess fossil bed.

7/14/59

With Cooper, Grant,
Skinner + Wilde,
and Stehli

Collected from Hess ranch horst and
from the Word about 1 mile NW of Hill
5779 north of Leonard Mt.

Word 1. ls. — 35' — 3 coll.

Word 1st shale — Coll. 5-2A word — 35' up
" " — " 5-2B — 45'
5-2C — 65'

ls. become more abundant and the
upper 50' are 2' to 3' ls. beds —
Total from top of 1st ls. 80'

Shale, siliceous with 2-1' ls. beds —
— Coll. 5-3A — 15' up
— Coll. 5-3B — 20' up
total 140'

Word ls. — position of 2nd ls —
Coll. 5-4 — 7'

Shale 155'

Word — 1' limestone — 5-5A —
(10') 5-5B — 5' up

Shale - 20'
ls. - 2'   Coll. 5-6A.
Shale - 20'
→ ls. - base 3rd Word ls - Type Paraf.
sellardsi   Coll. 5-7A
3'
→ Shale - 12'
→ cephalopod zone - 2' ls at base of next ls. - med gray 3rd Word ls -
no fusulinids - 65'

The first Word ls is thinning to the NW - mainly at the top by intertonguing with siliceous shale - the ls. just below Word ls 2? are fine grained lutites, and a few 6" limestones are rare (2 or 3) between 2nd ls Word and 3rd ls.

Cooper pointed out a high Leonard ls. locality just N of the road up Dick Canyon at the base of the Word fm.

It seems that Cooper's "Hess Ledge" can be traced around the end of the ridge behind the Hess ranch House and behind the horst ~~to~~ a point opposite the gap between the hills in the horst. He doesn't find this fauna on the front of the ls. escarpment to the south (Hess escarpment) because in his words "it isn't the right lithology". Thus he would rule out the idea that his fauna occurs in several horizons.

Wilde is using the 1st Leonard ls. of King as equal to the Hess fossil bed. — This seems to solve a few problems - but I wonder how many?

The section we measured in the Word seems to best fit in with King's Sect. 18, p. 70, but this on depositional strike 2½ miles± to the NE.

• 7/15/59

Split Tank

Coll. 3-(19) from oyster dolomite ls in these facies — most of this is a crinoid cochina — 15' below top.
(maybe in lower ls. of Leonard)

Coll. 3-(E) Leonard — [3-13]
The upper beds of Leonard (2) have abundant fusulinids

Road to Red Tank

Word 1st ls. — has ls. cobbles in the upper unit. overlain by 15-20' of siliceous shale followed by dolomitic #2 ls.

→ Coll. from float near top of 1st ls.

→ Coll. — 4-5' above Word ls. #2

The 4th Word ls. and the Vidrio are dolostone facies for most part here. They take the upper 250' of these facies locally they have abundant relict outlines of fusulinids but we couldn't find any that were well preserved.

The split tank Leonard section is faulted in several places and we were able to follow King's section in only a general way. Cooper said each ls. was a lense which pinches out within a short distance and each of these apparently contains a distinct brachiopod assemblage.

Hess Ranch — 7/16/59 —

✓ Loc. 2 Word Mbr; 2nd limestone by the road north of the house — This is apparently 2nd or 3rd ls. — in the field I judge it to be the 2nd ls. — or #1

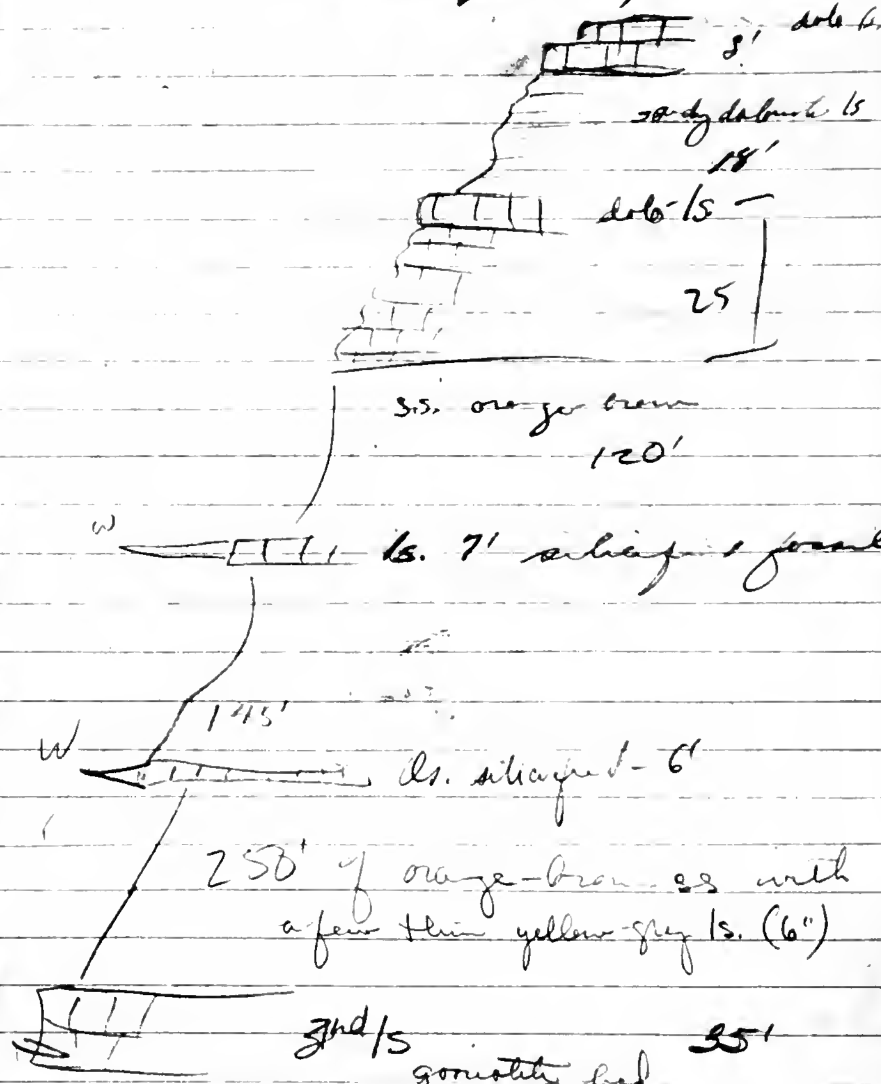
✓ Loc 3 Word 4 ls. — A- 12' up in ledge
probably #3 3/4 mile up valley B - 16' " " "
from earthen tank

This is not too close to the massive beds at the top of the ridge — which being Cases Vidrio — say 125' to 150' below the Vidrio.

The sequence is a silty, dirty limestone in 2" to 6" beds with a few scattered fusulinids in ~~some~~ of the more indurated beds — 135' of these up to 4th ls.

See Cali page for Word 4-Vidrio Sect.

Road Canyon, East end —
✓ → meager coll. from Word 3rd ls.
35' up (A)



There is a fault cutting the SE face of section at Road Canyon — also several Terra Blocks have dropped down.
The Word 4 ls lenses are just about gone here with the Vidrio dale lying conformable but with an abrupt lithologic change.

7/17/59

Sect. 5 Leonard Mts —

0.) — (see next page over)
Covered below — mainly dolomite and ls. interfingering in tongues + patches

1.) Ls., med. to dark gray on fresh surface, massive 10 to 20' beds, Sacchinella zone of G.A.C., weathers to rounded surfaces, one 5-6' zone of shaly 1" ls. beds 65' up — 112'

2.) Ls, dark gray, 1 to 2 foot beds, crinoid and bryozoan fragments — 43'

3.) Ls., med to dark gray, 6" to 2' beds, caps ridge, a few pits, angular weathering — conglomeratic locally — 37'
→ Coll. 5-3 Leonard

4.) Ls., dark gray, 3" to 1' beds — 12'

5.) Calcirudite, 4" cobbles, with 4' of dark gray 6" ls. in middle — 34'
top of ridge
Coll. 5-5 Leonard ant hill top of ridge

6.) Ls., light gray, shell hash, silicified in part — 3'

[Wilde's locality — coll. 5-? gully probably about bed ?]

7.) Covered in part, thin ls. (dark gray) ~~& siliceous~~ shale — King fault zone - but no fault here
silty ls. & shaly ls in part — 18'

8) Calcirudite — light gray, massive, 2-5' beds, 16'

9.) Calcirudite, dark gray ls. matrix, 6" bed — 21'

10.) Ls., light gray, 2' beds, (calcarenite), one brown bed (Call. 5-10 beds) 5' up — 20'

11.) Calcirudite, dark gray matrix — 12
3" cobble

12.) Ls., 2" crinoid calcareal beds, light gray, 5-6' beds — shell bank — arenite -
5-12A — 3' up
5-12B — 8' up
38'

13.) Calcirudite, dark gray ls matrix, 2" cobbles — 6'

14.) Calcirudite, light gray grading vertically into shell bank — several of these cycles repeated — (3) — 37'

15.) Shale, siliceous, red to orange — 33'

16.) Conglom., ls. matrix + few cobbles, chert fragments — 2' → 6'-7' to SE and NW — 21'

17.) Shale, orange - siliceous, platy. — 32

18.) Ls., light gray, massive, silicified fossils, chert frags, conglo. near top — 56

19) Shale, orange-brown, with 1'-2' ls beds (conglomeritic chert pebbles) — 67'
silicified section

20.) Ls., light brown-gray, 2'-3' beds silicified bands — 17'

21.) Shale, orange-brn, silicified,

0.) base of Hess ledge rest unconformably on truncated edge of Leonardian fm.
3' relief, 5° difference Leonard dip[illegible]
coll 0-A 10' below unconformity
0-B 1' "
0-C 1' above in Hess ledge

21.) Shale - orge-brn - silicified - top 6" bed of sandy ls., — 47'

22.) Shale, orange weathering (blk fresh) with 1"-3" shell hash band — 55'

23.) Covered — 115'

24.) Shale + siltstone - orange — 23'

25.) Ls., blk, shell, bryo + brach — 6'

26.) Siltstone, yellow orange - becoming near top [illegible] brown — 24'

27.) Covered, mostly gray shale — 87'

28.) Congls., chert frags, brown weathering, many bryo + brachs silicified — 0-1½'

29.) Covered, mostly gray shale + a few 6" silt + ss (orange) bed - shell hashes — 14½'

30.) S.s. - orange-brown - brach-shell hash — Coll. 5-30 Leonard 12'

31.) Covered — 86'

32.) Word ls. — 100'+
here it is a ss. at the base - 2-3' beds
orange to brown gray — 20' above
we get a massive calcarenite —

7/18/59 – rain-day out –

Saw G.A. Cooper & Dick Grant in town

7/19/59 Section 4

1.) Sill — 20'

2.) Shale, brown, with thin clay-rich dolomitic ls. —— 72'
Coll. 4-2 — 6' down from top

3.) Ls, brown-gray weathering with large calcite crystals —— 4'

4.) Sh, brown, + thin ls.
4-4A – 5' up
4-4B – 11' up
—— 23'

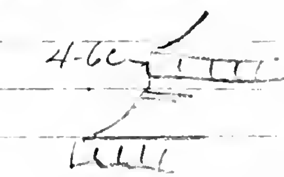
5.) Ls, brown-gray – 2' beds, calcite xtals in long "bodies" —— 13'

→ Top of Lenox Hills Fm. ←

unconformity with 5 to 8' relief in ~200 yards –

6.) Ls, med to dark gray, calcarenite, many fusulinids — 2 to 4' beds
Coll. 4-6A 3' up

and shaly ls. —
snail ls. 15' up (4-6B)
4-6C — 23'



2 cycles of ls. 6' to 8' + shale 18'-20'
52'

7.) Ls., light gray, with brown-orange chert concretions – massive
Coll 4-7A — 16'

8.) Sh. + ls., brown + light brown weathering –
[Varicolored shales + white s.s. 25' up]
—— 32'

9.) Ls., brown-gray 4" to 3' bed – mottled zone 1' at base
small recrystallized Staffella are common throughout. —— 17'

10.) Shale + shaly ls ——
6" bed of white ss.
—— 12'

11.) ls. like 9 —— 10'

12.) Ls., gray, 1'-2' beds, vertical fracture on weathering.
Coll. 4-12A — 3' up
4-12B — 12' up
probable termination of fault 4-12C — 22' up
4-12D — 32' up
top of bench

13.) Ls., dark gray, calcarenite, 6" to 1' beds
Coll. 4-13A — 20' up
Follows — Neal fence here up — 23'

14.) Shale, brown grades upward into clayey ls + finally into a calcarenite at top
Coll. 4-14 at top — 27'

15.) Ls., light to med. gray, 6" to 1' bed
Coll. 4-15A — 12' up
Coll. 4-15B — 50' up
Shaly beds commonly reach 10-15' in thickness
4-15C — 78' up
— 106'

16.) Ls., med gray, little shale, 6" to 2' beds, rubbly in part —
Coll. 4-16A — 3' up —
Coll. 4-16B — 26' up
several beds of dolostone ~~common~~
ls. calcarenite — becomes dark gray above 30'; light gray above 42'
Coll. 4-16C — 43' up
Coll. 4-16D — 58' up
— 59'

17.) Ls., light gray, silty, 3" to 1' beds rubbly with thin shale bands —
small "Staffella" fusulinids common in all beds —
— above 33' dark gray
— small, subcylindrical fusulinids replaced by dolomite (47')
— 82'

18.) Dolostone, brown-gray + ls., gray-brown
4-18A — 11' up
— 27'

19.) Ls., light gray, 2-4' beds, silty, clayey
— 37'

20.) Ls., med gray to light gray, thin bedding 2" to 6" — and shaley siltstone; dolomitic; —
Coll. 4-20A – a 2' calcarenite 26' up
— 37'

21.) Ls., light gray to cream, massive 3 to 5' beds with thin bedded med. gray Ls.
rubbly bed Coll. 4-21A — 30' up
rubbly bed Coll. 4-21B – 35' up
massive bed Coll. 4-21C — 42' up
— 54'

22.) Ls., light gray, 2" to 4" beds, fossils are common but dolomitized —
82'

23) Ls., light-gray – Massive 2' beds,
Coll. 4-23A – 17' up
4-23B – 29' up
— 34'

24.) Ls., light gray to cream, thin irregular beds, 2" to 4" thick – laminated,
Pinkstones about 65'-80'
— 87'

25) Ls., light brown gray, wavy bedding in beds 2' to 3', nodular, clayey & silty:
SEVERAL SMALL FAULTS
— 97'

26) Ls., med. gray, 2' beds, with brown shale cycles of these, the shale gradually becoming dominant — 193'

up to Hess – Neal Gate
This is very near the base of the Hess Trail
Bed — delete

7/20/59

✓ 4-26m – 1/2 mile east of section 4, 25' below fossil bed.

✓ 4-28 m_B – 1/2 mile east of Sect 4, from a 35' to 40' light gray ls. above fossil bed. – 8' up

✓ 4-28ma – 5' up

✓ 4-27ma – fossil bed, silicified just above 2-3' ls ledge 15' beneath top

✓ 4-28mc – 35' above Fossil Bed

✓ 4-29ma – massive ls about 25' above top 4-28 –

27.) Fossil bed,
a.) basal calcirudite 28'
b.) Shale + ls., shale is brown; ls. is medium gray, abundant silicified fossils – brachiopods, coll. of bryozoan yellow silt ls. 27'

28.) Ls., med. gray, 1'-3' beds, dolomitic, Chert nodules,
Coll. 4-28A – 42' up
Omphalotheca common
Coll. 4-28B – 64' up
top of hill – 89' — 115'

29.) Ls., brown gray, 2-4' beds, with lime mud blebs & chert pebbles – 24'

30.) Shale + limestone, brown-siliceous sh; dolomitic or dolomitized ls. 2' beds – 29'

31.) Dolostone, dark gray-brown, 4' beds – 21'

32.) Ls., light gray with "graphic" dolo–ls beds – 12'

33.) Ls., conglomerate (calcirudite) with chert frags – 3-4' beds — 9'

34) blk sh, siliceous — 25'
Chert nodules

35) Dolostone, brn-gray, pitted — 250' est.

↑ Start here

Coll 4 — Word 2_A ls — 25' up

Word 2_B ls — 50'

There are 10-15' above the top of the 2^{nd} ls { Word 2_C ls — 65' up (top)

Word 2_D ls — about same thickness as 2_C — S.S., separated from it by siliceous sh.

word 2D is from saddle

Word 2E — 25' above 2d
35' below first massive limestone in 3^{rd} Word ls.

Word 3^{rd} ls. A — 5' up

Word 3^{rd} ls. B — 8' up

Word 3^{rd} ls C — 18' up
12' dolomite - top of ridge

(35' total thick of ls.)

Word 1^{st} Ls. — 20' below top of King's unit "a" Coll. 4 - Word 1a

The Word ls. contain a lot of conglomeratic strips - many pebbles + cobbles of ls. probably intraformational in part, and fine chert pebbles - where we saw the formation, the basal ls. (#1a is very little different from #1b although King's separation must be bad. The distance between #1 & #2 is closer to 83' than 14' and I think these numbers are reversed on p143.
The distance between #2 + #3 is a little high — unit 6 becomes ls. and 5 has fusuliferous ls. anyway in it.

7/21/59

The south side of Leonard is complicated by: a) facies changes
b) irregular dolomitization of beds
c) several faults
I have perhaps drawn the top of the Lenoflukk fm. a little high but we'll let it stand for the moment — Change in the Lenoflukk fm. is thin here as an eroded anticline (pre-Leonard).

Jail Canyon where road is drawn on map —
1.) No Altuda shale on SW end of Hill 5789 — This is King's Capitan upper member —
2.) Vidrio = Capitan upper member apparently + it seems likely that Altuda sh. + lower member are equal to upper part of Word.

Section 5 Jail Canyon

Section on East Side of Cold Blue Hills
Jail Canyon
Covered below

1.) Ls., med gray, 2-4' beds, gastropods + crinoid columnals, reXtallized; — 15'

2.) Ls., (buff) light brown weathering, 6"-1' beds, siliceous bands — 8.5'

3.) Ls., med gray, pitted weathering surface, 2-5' bed (similar to unit 1) — 51'
lenses of calcarenite (Coll 3A)

4.) S.s., orange-brown to light brown, weathering, 2" to 6" beds, a lot of calcite cement, "siliceous" bands are irregular throughout unit — 112'

5.) Ls., med gray, calcarenite — 2-6' beds, silicified + replaced fossils —
Jail Canyon — 5A — 3' up ±
Conglo. in part — v.f. calcarenite to 1"-2" pebbles in calcirudite (See King's Sec. 16, unit 5)
20'±

6.) Ls, tan, calcilutite + ss, pinches out to South — 10'
30-40' on ridge 400 yds N.

7.). Ls., med. grey, 2'-3' beds, to top of Hill.

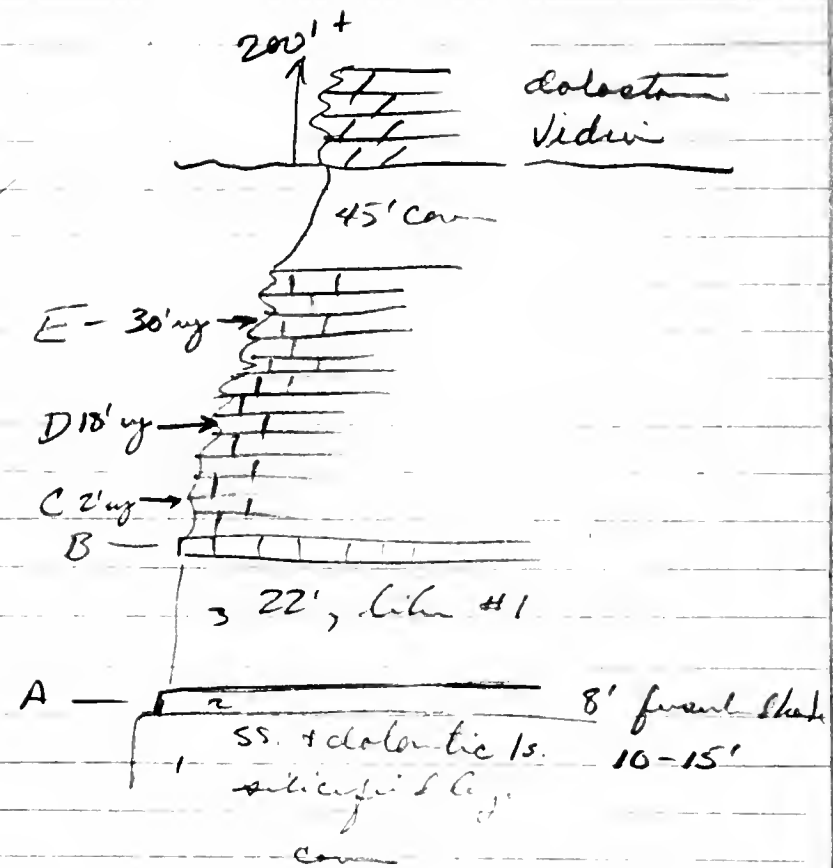
His unit 3 is missing where we measured section but became thicker to SW — His units 3+2 = upper part of his unit 1

[3 3/4 miles N 30°W ± of Skinner Ranch]

The Word ls. which King maps along the west side of Gilliland Canyon is probably his 3rd ls. not the first one. (Coll. Iron Mt. reef Word ls. A) is from this — includes a few scattered fusulinids, cephalopods and a "Scacchinella" brachiopod. There seems to be no need for the fault further SW. The top of the hill we climbed is a Lenox block

The Gilliland Anticline peters out to the south of this point & beds regain their 10° NW dip

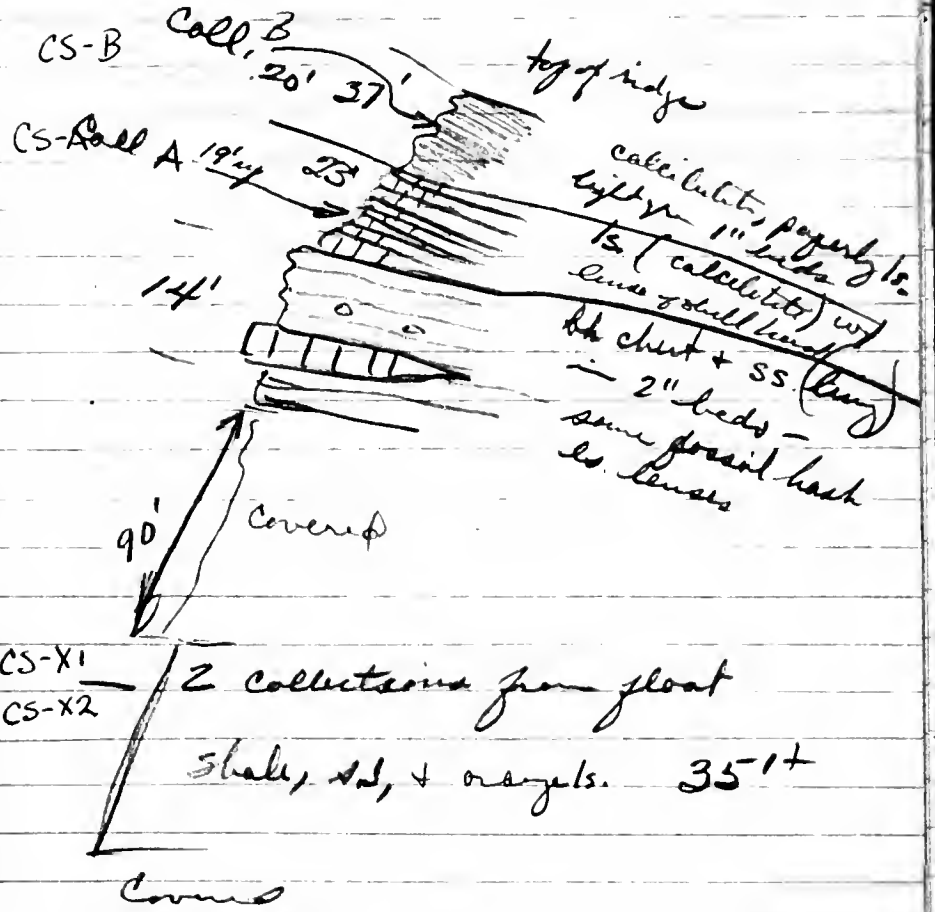
Elbow in Ness Canyon - 7/16/59



7/22/59

Clay Side –

The upper part of terrace is badly covered by terrace blocks from the Word B. above.



Clay Slide
Ammonite Coll. ½ mile SW of
King's dip sample 12° along road.

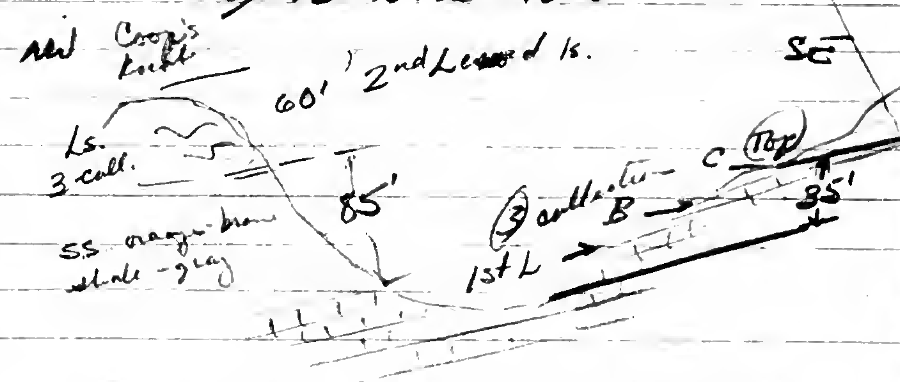
Sullivan Ranch Road - I. Clay
Slide scarp - junction -
3 collection -
20 { (1) Word ls C - in lower 20'
of gray limestone
25 { (2) Brown to yellow weathering bed
35' { (3) Word ls D - in lower part of
massive recrystallized Ls. 10' up.
Word ls. E, 6' below top of ridge

7/23/59

Morning - climbed from the "Hess" ledge
up to the 2nd Leonard ls. - made three
collections based on King's sect. 12

The base of the Capitan at Sullivan peak
is a beautiful unconformity - 40' or
more relief and paralleled bedding.

Afternoon - base of little knob of
Cooper's - SW end of Leonard Hills -
base of hill shale + siltstone + sandstone
dip 10° to the S10°W



This section is cut by a fault or faults
and the exact relation of the knob is
dubious - it is probably the 2nd Leonard
ls., but?

The Leonard fm. in the Lemon Hills consists of a series of ls. tongues which tend to become thinner to the S.W. and break up into a number of thin units by additional shale tongues. The structural problems are big especially in the area south of Sullivan Peak, between Dergart Mt. and the Altuda uplift. Of course it is all covered but there is still a real problem to figure out.

King's map is wonderful, but he is not very consistent about his boundary between the Word and Capitan — his Leonard & Word also have problems — the ammonite bed which he places in the Leonard in the west is about the right horizon for his 1st Word limestone in the east. It seems the Word Leonard boundary is also inconsistent.

The base of the Word in the west seems to be about the 3rd Ls. of the eastern Mts. In Section 12 this unit is greatly thickened and may represent the ls. between the back reef facies to the east and the basin to the west.

7/24/59

Decie Ranch — Sullivan Peak

Coll. from lower 25' of bituminous Wothles of King's Sect. 12

Coll. " " B float 25' below top
Coll. " " C in place 20' " "
Coll. " " D " " 10' " "

B + C + D are from King's bed 3

King Word bed 4 is congl. — 3-4" ls cobbles from gorge, which has and ls., some chert.
Coll — King 12 — wbed 4

Coll. King's Sect 12, Word bed 5 12' up

Coll. from King's Sect 12, bed 6 — 9038

Coll from float from King's bed 18, Sect 12

7/25/59 — Iron Mt. Ranch
Section 5A

Covered below

1.) Siltstone and shale, with thin platy sandstone, yellow-brown weathering, 1/4"-1" beds — 58'

2.) Calcarenite, med gray weathering, fusulinids 1' ledge, Coll 5A-2 — 1'

3.) Ls., orange + gray weathering, fossil hash of brachs + fusulinids — Coll. 5A-3 — 1

4.) Limestone, orange-brn weathering, sandy fusulinids — Coll. 5A-4 — 2'

5.) Sandstone, yellow-brn weathering, limy, 1" to 6" beds — 27'

6.) Ls., med. gray, 1' to 2' beds, even bedding, Coll. 5A-6A
Coll. 5A-6X float " — 2'

7.) Siltstone and sandstone, yellow-gray with limy beds of sandy cal. — 37

8) Ls., med gray, massive beds in 5 to 10' cliffs, thin irregular brown chert bands, ——— 56'

9.) Siltstone + shale, covered for most part, yellow to light brown weathering, upper 15' becomes a sandstone ——— 123'

10.) Ls., med gray; basal 2-3 a calcarenite, becomes fine grained upwards, fusulinids common in a 6-12" band just above congl. Coll 5A-10 ——— 8'

11.) Siltstone + shale, yellow to green-gray, ——— 48'

12.) Ls., gray weathering, 3" to 1' beds, thin (½") shale interbeds ——— 41'

13.) Sandstone - siltstone sequence, tan to orange-brown weathering - 62'

14.) Ls., calcilutite, gray, 3-6" beds - 5'

15.) Sandstone, orange brn, 6" to 6' beds, calcareous cement ——— 56'

16.) Calcilutite, tan-gray weathering, 2" to 3' beds, irregular bands of chert nodules, grades upwards into (3 cycles) quartz sandstone beds; at 56-60' there are several common shell beds of silicified fossils — Coll. 5A-16 at 60' ——— 137'

17.) Ls., brown-yellow weathering, 6" to 2' beds scattered white chert patches, cliff former, saccharoidal with purple weathering patches, pitted surface ——— 25'

18.) Ls., brown-gray weathering, 6" beds — 17'

Unconformity — 8' of relief in 100 yards along strike

19.) Dolostone, brown gray, rubbly cemented by clear calcite matrix — forms top of ridge — 65'+

↑

Start here

Section 5

Section at West end of Road Canyon
King's fault contact of the Word against Vidrio is true, although there is possibly a fault 100 yard further up the hill

9° S dip to the S70W

Vidrio

10 dolostone, brown-gray with large clear calcite xtalls and a calcite matrix (Coll of this) ——— to top of hill

unconformable contact – [illegible] (2') [illegible]?

9 Ls., calcilutite, yellow-brown, 2"–6' beds with chert nodules ——— 12'

8 Ss., dark brown weathering, siliceous bands with calcareous chert when calcite cement remains weathers light yellow-brown ——— 32'

7 Ls, calcilutite, yellow brown weathering, brown on fresh surface – 1' to 2' beds patches of cherty xtalls — 20'

6 Ls., mid gray, massive lenses 1' to 4' thick ~~in~~ rocks like above unit ——— 12'

5 Ls, yellow-brown weathering, brown chert nodules, 9" beds ——— 18'
Coll. of fusulinid from here ?

4 Ss., dark yellow-brown weathering, 1' to 3' beds chert xtalls ——— 8'

3 Ls., yellow brown weathering, brown chert nodules, 6" to 1' beds 10'

2 S.s., dark brown, siliceous, — 6'

1 Ls., light gray weathering, platy, (probably top of 3rd Word Ls. — 10' exposed

— Covered beneath

Section 4A

7/26/59

Examined the middle of King's Sect. 12, Lenox Hill and remeasured it in part, see books

Then drove to Hess-Hall boundary fence and measured from road north to the top of the ridge and across the rolling slopes 400 yds±. Section along Hess-Hall boundary fence

1) Ls., dark gray, silicified fossil hash, 3' to 6' beds — 20'±

2) Covered, probably siliceous shale — 126'

1st Wood l/s.

3.) Ls., med gray, finely laminated, very silty with bands of brown siliceous replacement, lenses of fossiliferous calcarenite (call 10' from top) — 84'

4) Dolostone, "dirty" gray, 5' beds, a yellow weathering ls 6" about 20' up, — 40'

2nd Wood l/s

5.) Shale, red-brown weathering, — 10'

6) like 4 below — 30'±

7/27/59 Dugout Mt. Section

Section 7— Cp 14

Siliceous siltstone below

1) Ls., med gray weathering, 1 to 2' beds, bands of brown silica, fossil-hash, conglomeratic, chert pebbles up to 1" diam., — 24'

2.) Ls., med gray, bands of shell hash up to 6' thick, siliceous nodules common, Coll. 7-2 — 3' up becomes interbedded with blue-gray calcareous shale — Coll. 7-2B — 31' up shale breaks at 35' + 40' Total — 53'

3.) Shale, siliceous with chert bands, and thin ls. calcareous — 8'

4.) Calcirudite, brown weathering, 6" cobbles in 4' beds and 2' shale, siliceous, red-brown in 6' beds. Calcirudite has abundant silicified fossils. ——— 27'

5) Calcarenite, gray, 1" grading up into gravelly s.s. ——— 12'

6) Calcarenite, med to dark gray, 1' beds, Coll 7-6A - 1' up?
(Cephalopods + bryozoans to the west)
a few pebbles - calcarenites have siliceous through the pores - get brown weathering color.
upper part a conglomerate - dolomite also in pebbles
——— 18'

7.) Sandstone, red-brown weathering and conglomeritic chert pebbles in a dolomitic + siliceous matrix, 4 repetitions - 30'

8.) Ls., brown weathering, shell hash, some beds conglomeritic, siliceous deposits in beds, 1' to 2' beds, —
40' to top of knoll

To the west these beds change facies into orthoquartzite, siliceous shales, to a large extent.
above beds which I think are the same as unit 8 there are

9.) Sandstone and shale, friable, yellow and red-brown weathering, some bands of dark brown siliceous shale. — 30'

10) Sandstone, light brown, orthoquartzitic thin beds of shales ——— 15'
(6° WNW dip)

11.) Covered above, some beds are exposed but strikes are traceable and apparently the sequence is broken by several faults

(Elev 525' est)

Hor. 1

12.) Shale, yellow & brown weathering, — part siliceous 25' exposed

13.) Conglomerate, local lense ± — 30'

14.) Ss. + shale, gray + yellows — 232'

15.) Ls, yellow gray weathering, finely laminated with some cherty bands, lenses of calcarenite — Coll 7-15A - 5' up
Coll 7-15B 12' up
" 7-15C 17' total 17'

16.) Shale, yellow-brown, thinly laminated, lenses of calcarenite with fossil hash — 14'

17.) Ls., med. gray, 1' massive beds, fossil hash calcarenite Coll. 7-17A. — 1' up — 2'

18.) Shales + S.S, red-brown to yellow, thinly laminated, siliceous, one 6" calcilutite bed in middle — 10'

19.) Ls., med gray, conglomeratic in lower part, calcarenite higher —
Coll. 7-19A — 6" up
7-19B — 1½' up — 2'

20.) Ss., brown to red-brown weathering, ~~siliceous~~, thinly laminated, 1" beds, friable 260'

21.) Ss., brown-red, cliff former, 6" to 3' beds, conglomeratic, — 60'

22.) Ls., dark gray, conglomeratic — 2'

23.) Covered — 37'

24.) Ls, light gray to chalky weathering, a series of ledges, fossil hash — 35'

~~[Fault N of SS. ascent]~~ (dip ~~60~~ 62 to the ESE)

25.) Calcarenite, light gray to brown weathering, 2" to 1' beds
Coll. 7-25A 6' up
Coll. 7-25B 10' up — 12'

26.) Covered

dip 14° to the WNW

27.) Ss., brown weathering, 1' to 3' beds, X bedded locally, congl. in bands — 70' up a Cephalopod locality Coll. 7-27A

— 110'

28.) Ls. dark gray, 6" beds, calcarenite
7-28 A - 5' up
7-28 B - 12' up
20' of light brown calcilutite
7-28C - dark gray ls. 4' up
12' of brown siliceous shale + siltstone
8' of Ls. black, 7-28D 6' up
10' of siliceous shale
4' of v.f. grained calcarenite 7-28E

29.) Ss., brn, + siliceous sh. — 62'

30.) Ls., calcilutite, yellow-br. + siltstone alternating in cycles — chert nodules common in upper part — 175'
50' up — as far as we went.

31.) Gray Capitan dolomite

↑ Start Here

7/28/59 —

Tried to check down Kings section up Little Blue Hills — met a Mr. Mills who was a great —

The fusulinids in King Sect 17, p. 77 are mostly funny spots in the ls. but are [illegible] apparently fusulinids. His thickness here is about right.

7/29/59 Section 2A

Walker Table Ranch.

Covered below Sect. 2A

1) Dolostone, brown to gray brown weathering, 1 to 2' beds, chert pebble lenses ——— 48'

2) Ls., med. gray, 6" to 1' beds, fossil hash making calcarenite:

Call	2A-2A	24' up
	2A-2B	26' up
	2A-2C	31' up
	2A-2D	43' up
	2A-2E	48' up
(platy-oyster 20)	2A-2F	62' up
		Total 671

3) Ls, gray, 1-2' beds, abundant fossils, almost a fossiliferous ls in total —

Call. 2A-3A — 2' up — 141'

→ Kijs base of the Ward

4) Dolostone, probably like unit 3 below originally

Sect. 2B – Fuller ranch

4.) Dolostone, gray-brown mottled, pitted surface (relic fenestrae), 1-3' beds, poorly silicified brachiopod bed about 25' up ——— Total – 85'

5.) Dolostone, light gray in lower 200' becomes med gray in upper part — est. ——— 700'
1-3' beds