

doc. 0285

1964

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOOSE-LEAF FIELD NOTEBOOK

9-137

Please return to - K. M. Waage,
Peabody Museum
New Haven, Conn.

doc. 0285

7048

v - recorded on loc. map

○ in loc. book

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Coll. No.	Locality	
A-4650	265	✓
4651	265	✓ (✓)
4652	267	✓
4653	270	✓
4654	270	✓
4655	270	✓
4656	270	✓
4657	272	
4658	274	
✓ 4659	20	✓ (✓)
4660	275	✓
4661	275	✓
4662	275	✓
4663	275	✓
4664	275	✓
✓ 4665	21	✓
✓ 4666	21	✓
4667	276	
4668	111	✓
4669	111	✓
4670	279	✓
4671	279	✓
4672	279	missing
4673	33	✓
4674	33	✓
4675	33	✓
4676	33	✓ part only?
4677	28	✓
4678	28	✓
4679	282	✓
4680	282	✓
✓ 4681	17	Upper Dnie (✓)
✓ 4682	17	Protocordia (Several times inc) (✓)
4683	287	✓
4684	287	✓
4685	74	needs location data in this book.
4686	17	New cut, Gervilliz Concretion

2,

1.8

1.15

175

119

7.20

8.70

34.80

7

30

recorded - map ✓
register

Locality 265, Bluffs S. of Moreau River in center W 1/2, SE 1/4, sec. 17, T. 14 N., R. 22 E., Lantry NW quad., Dewey Co., So. Dak.
Timber Lake overlies Irish Creek lithologies.
Sections measured by Reiskind + Schalle + J. Waage.

Following adapted from Reiskind's notes

Section #1

Section begins at top of layer 8" gray cone-in-cone concs, with 3/4 to 1" jaspers associated, in "dark shale."

- 1) 5.8 Dark gray shale interbedded with lighter silty shale; ^{several} jaspersitic layers, 1" layers 4.4 and 5.8.
- 2) 9.4 Dark gray-brown shale with thin interbeds silty sh. increasing upward in thickness. Numerous jaspersitic bands lower 4.0; 1" layers at 3.9, 7.2 and 9.2, silt layers in upper 2.0. At top layer scat flat concs, 2th 16 diam. of reddish tan with tan outer layer.
- 3) 6.6 As in (2), several thin layers jaspersitic, at top is layer sparse scat. gray sandy concs with cone-in-cone struct.
- 4) 4.8 As in (2), scat. concs* at 2.0, jaspersitic layer 4.4, scat concs at top that have sandy gyms jackets are flat (2") ovoid. (Ammonoid in scat may be from here - not collected.)
- 5) 7.2 As in (2), scat concs at 3.9, and layer flat ovoid concs at top that are silty sh cores with gray c-in-c extensive jackets, 2.0 diam and about 4" high. Jaspersitic common, layers 2.0, 5.0 + 5.3, and scattered in upper 2.0.

* See J.R. notes for details of lithology.

2025

100

195

100

216

100

300

100

100

100

100

100

100

100

100

Check with JR silty shale = silty clay
 Note - except where interbedding noted or beds called "banded", questionable how much JR calls silty shale. IS actually a shale - bc in contrast to silty clay, where doubtful original is quoted. Doubt could ever "ironstone"

- ⑥ 5.2 As in ②, with concentration of concretions as follows -
- 2.3 extensive thin layer dk gr. concs with light "bumpy" rind.
 - 3.3 sparsely scat. layer of similar concs.
 - 5.2 local, scat, small punky, sandy concs some with cores.
- ⑦ 8.0 Chiefly interbedded silt and silty-shale with extensive conc. zone at top. Concs in broad sand jackets that may constitute ^{0.8} layer, concs are "ironstone" [question this]. Beds below have jarosite layers .2 to .5 thick at 2.6, 4.1 and 7.2.
- ⑧ 5.2 "Silty shale", layer concs 1.1 thick at top, concs. "ironstone" with convoluted gray ss jackets.
- ⑨ 11.4 sandy "Silty shale", dk mixed weather. tan-gray some limonitic streaks. At top 9" limonitic zone with pocket loose fossils (A-4650) _{cat}
- ⑩ 9.5 "Silty shale", with 1.0 conc. layer, "ironstone" with with gray ss jackets, at top.
- ⑪ 10.0 Clayey silt, lay small (3" thick) "ironstone" concs at top.
- ⑫ 4.8 "Silt", with zone large "ironstone" concs up to 2.0 dm with gray to tan ss jackets.
- ⑬ 6.9 Sand, fine grained, brown yth., minor silty beds, small scattered "ironstone" concs at 1.9 and 5.5. At top a layer "ironstone" concs with red-yell-brn.



Section 2. How this fits with Sec. 1. J.R. does not show, says that

Base is top of "major conc zone above double layer near bottom of T.L."

There is a ... layer ... zone ...

- ① 11.4 Clayey silt and sand, mottled with small concs. layer at top.
- ② 3.4 As in ① with small "ironstone" conc layer at top.
- ③ 5.7 As in ① with large concs. layer at top.
- ④ 1.2 Sandy silt, with thin (0.1") layer sandy tan concs. at top.
- ⑤ 16.9 "Sandy". In top 5.0 ± large gray sandy "ironstone" concs with gray ss jackets. Fossiliferous, Sphenodiscus, Pheopteria. [A-4651]



Locality 266. Exposures in gulley N of dam and
at base of butte south of Bickley
Ranch in center W $\frac{1}{2}$, SW $\frac{1}{4}$, sec. 15, T18N
R23E, Black Horse SE quad., Corson Co.
So. Dak.

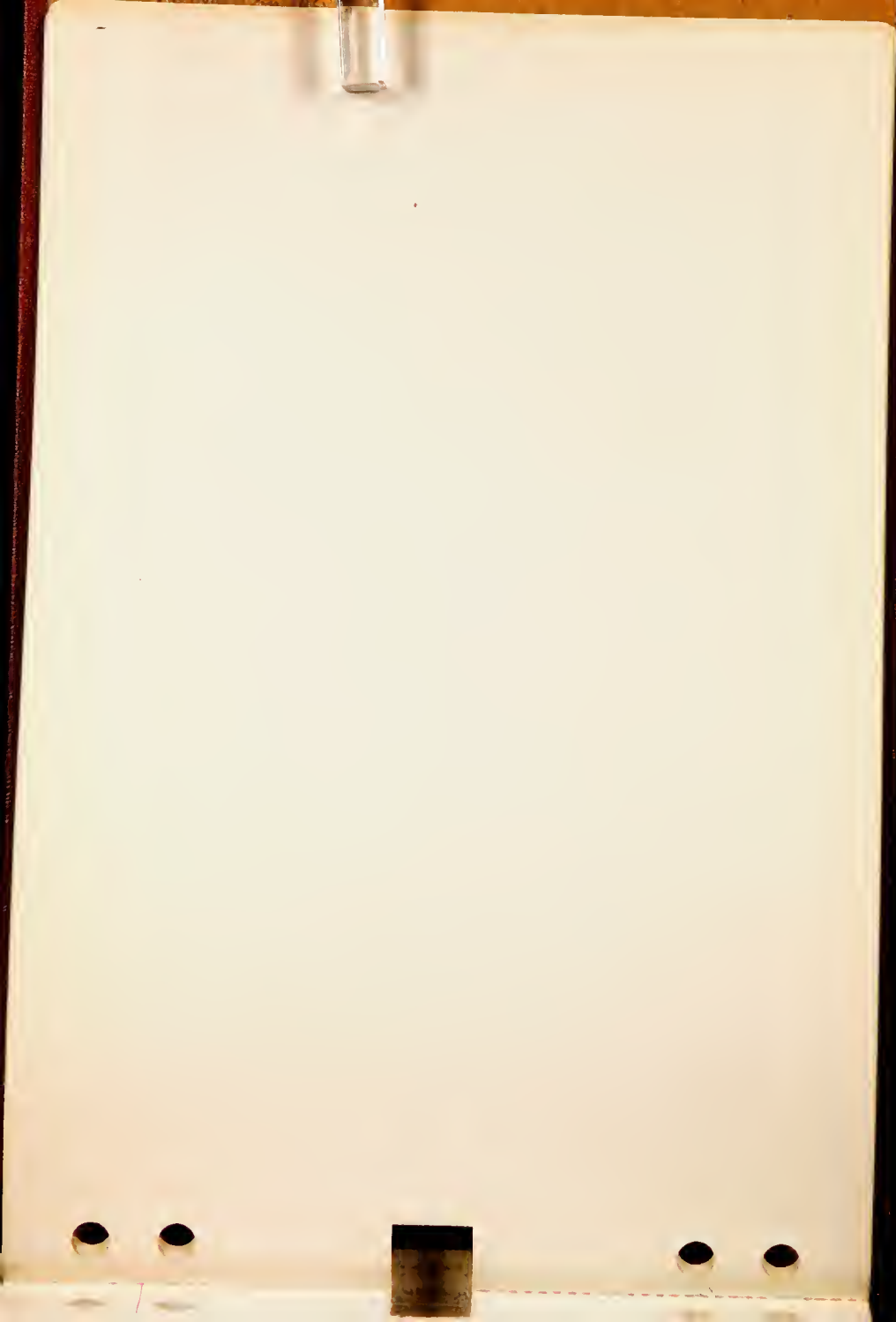
Taucaelia-Ophiomorpha biofacies in
gulches N of dam, grades into grayish
Ophiomorpha-bearing ss in lower part
of butte which is capped by hard gray
O-bearing 'Calgate'. Complete section
of butte not exposed but patches show
orange sand. Total interval from gulch
base to butte top about 75'.

No section measured.

To south, on road heading E. from Fitzgerald
School along S border sec's 22 and 23,
T18, R23, float of Hell Creek concretions
and chips fossil wood come in on rise
in center sec's 22-27, at about

Eli. 2220. To east across draw, rd
road gutter shows rather "banded"
Calgate-like friable sand with ext
OB ferrug concs and purplish
layers with abundant plant frags.

Sugg's total absence of Bullhead facies; but
on road S from 266 to Firesteel a road
cut on W side shows mixed Bullhead-Calgate
lithology - whether actually interfingering
or just local Bullhead lens cut tell
from outcrop scale. This cut located on S.
side dip across draw, W side road, about 1
mile S of Fitzgerald school (which is in NE
cor. sec. 28, T18N, R. 23 E.).



Locality 267. Southwest facing bluffs east of Firesteel Creek, 0.65 mi NNW of old Stone Church (Holy Spirit Ch.) in center SE $\frac{1}{4}$ sec. 4, T. 19 N., R. 23 E., Black Horse NE quard. So. Dak.

Following adapted from Reichard notes:

Section 1.

Begins within Irish Creek. Lithofacies - height to creek level not indicated.

- ① 7.7 Clayey silt and sand, dk gray - with sect. limy concs in lower 3.5 and at top.
[A-4652 from conc. zone at top]
- ② 12.0 "Sandy shale" (prob. clayey sand), conc. zone at 3.4, also 0.2 jarosite at top.
- ③ 33.0 Interbedded thin layers dk silty shale and tan fig. ss, latter increase upward partings of plant frags and micz. Scattered Nucula. Capped by 1.0 conc layer dk gr. concs and gray convoluted ss jackets.
- ④ 6.5 Interbedded sand + shale with $\frac{3}{4}$ " layer limonitic sand at top.

Section 2 (50 feet to N of Section 1)

Begins at jarosite layer 0.3 thick

9.6
5.6
8.5
7.1

30.8

137

- ① 1.2 Silty shale with cover layer at top, dk centers, Fe weath.
- ② 15.6 Chiefly covered. "Shale and silt" up to concretion zone at base unit ① of Section 1.

Section 3. (200 yds N of "the above sections")

Begins at top of concretion layer marking top of unit 3, Section "1".

- ① 24.9 Sandy silt and silty sand, mottled dk and light gray with fossil fragments.
- ② 5.9 Sand with interbeds shale, yellow with limonite impregnation [dk brn called "lignitic" could be limonite stain + impreg.] Thin shaly limonitic (?) beds with concretions at 4.4 and at top, latter with gray sand jackets "ironstone" centers.
- ③ 23.7 Sand, mottled tan-gray and yellow-orange in lower 10.0, chief of tan above. Massive. Layer thin conchs at 9.6, limonite layer 15.2, and at top a zone of large "ironstone" conchs up to 4.0 - rarely with ammonites.
- ④ 7.1 Sand, tan.
- ⑤ 20.0 - ? Sand, with limonitic layers, *Tenoceras* and *Ophiomorpha*.



Remarks on sections at loc. 267



Loc. 268. Cut in the north bank Grand River
about one mile ESE of Highway 65 bridge
in E $\frac{1}{2}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$, sec. 20, T. 20 N.,
R. 23 E., Black Horse NE quadrangle, Carson Co.,
So. Dak.

Following adapted from Reiskind notes.

Base of section on 0.5 jarositic layer overlying dr
thinly interbedded silt and shale (distance above
river not noted)

- ① 32.4 Interbedded & laminated silty clay and fine sand
scattered burrows; thin (0.1) jarosite layer at 17.5.
- ③ 19.9 "Terminated with oblique burrows
"Clay and shale with sand-lined $\frac{1}{4}$ inch burrows"
Fossils loose in matrix (JR says "Mactra and
?Protocardia") At top is thin (0.6) concv. layer.
- ③ 13.1 * Sand and silt, mottled, overlain by more
dominantly sandy, bedded zone which is
capped by 2.0 concv layer consisting of
gray sandy jackets with rusty to rb sandy cores
- ④ 27.8 Sand, tan to yellow, massive but with
faint appearance of bedding on
weathered surfaces. At top is conc
layer 1 to 3.0 in diam. ("ironstones")
- ⑤ 6.8 Sand, with faint layering (scale?), massive
lenses 1-2'
- ⑥ 7.4 Sandy, tan, faint layering, with interbeds
of dk gray fissile shale with ^{small} limonitic
concs in lower 1/2 and upper 1/3

* unit appears, bedding changing from massive to weathered



⑦ 4.8 Sand, tan, massive, with abundant Ophiomorpha

⑧ 12.0-? Sand, tan-yellow, thin-bedded, x-bedded,
limonite layers.

~~~~~  
Gravel cap







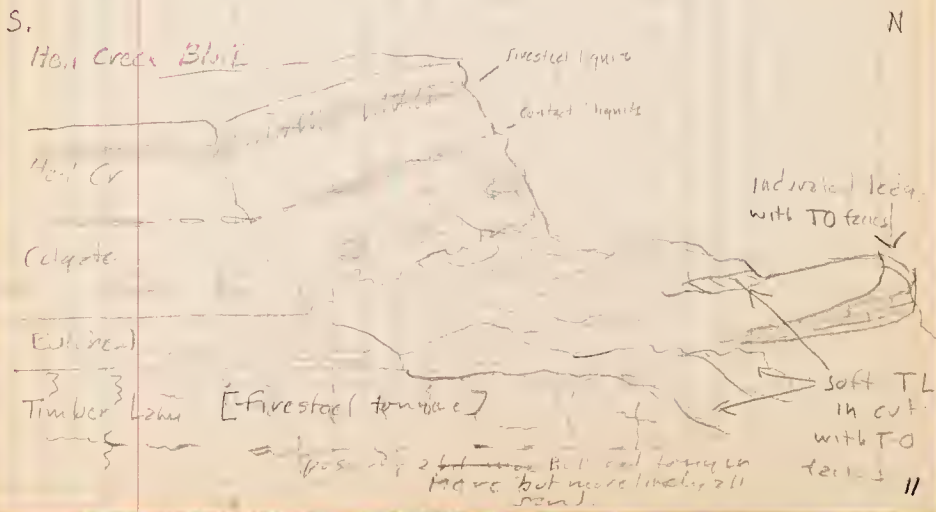


Loc. 269 Indurated ledge on S side Hump Creek valley  
 between 0.4 and 0.5 mi. 10° NW of the small bulge  
 of 'banded beds' at locality 48; along E edge of W 1/2  
 NW 1/4, NE 1/4, sec. 31, T21N, R.23E, Black Horse  
 NE quad, Carson Co., So. Dak.

Hard ledge of Colgate-like sand that is here  
 actually indurated top of Timber Lake.  
 Has *Tenuroditis* (scattered) - many *Ophiomorpha*.

South, down back slope of ledge the  
 Timber Lake T-O bioherm is exposed in  
 several banks, and shell fragments of  
*T.* common on back slope itself. Although  
 direct tracing not possible, there can be  
 no doubt this ledge is indurated Timber Lake.

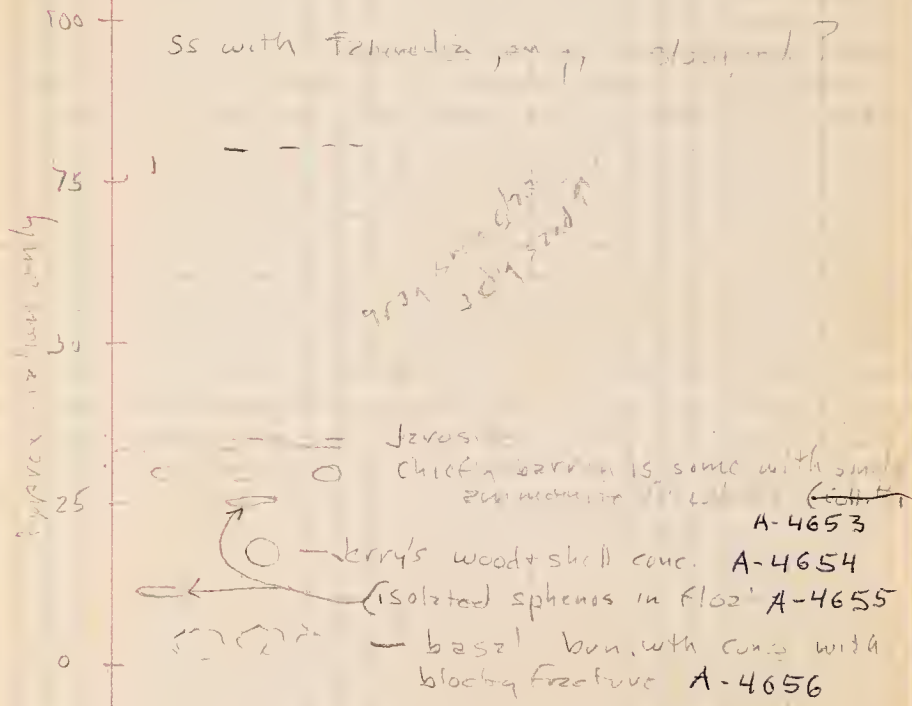
1. It carries some bioherms
2. Occupies same strat position relative  
 to lateral TL exposures and overlying  
 Bullhead.
3. There is no TO bioherm in Colgate  
 beds present in adjacent outcrops to  
 N and S.





Loc. 270 Northwest-facing bluff south of Grand River in the SW corner, sec. 21, T. 20 N., R. 23 E., Black Horse NE quadrangle, Corson Co, So. Dak.

Exposure of Irish Creek lithateer capped by Timber Lake member. Could get a section but would take considerable digging. Guess at parts =



Note that the *P. linguatula* fauna high in Irish Creek is lacking here, or else we didn't find it.



Exposures on

Loc. 271 - <sup>N-S</sup> bluffs west of old meander scar  
W side of Firesteel Creek in NW cor, SW  $\frac{1}{4}$   
NW  $\frac{1}{4}$ , sec. 28, and NE cor, SE  $\frac{1}{4}$ , NE  $\frac{1}{4}$ ,  
sec. 29, T19N., R. 23E, Black Horse SE  
quadrangle, Carson Co., So. Dak.

Following is adapted from Reiskind notes.

Section 1. South end of the exposure, -  
measuring up from top of a soft  
grayish tan sand that presumably marks  
top of Timber Lake.

- ① 25.3 "Banded beds":  $\frac{1}{4}$  to  $\frac{1}{2}$ " beds of shale, silt, +  
fine to med. grained sand; colors range from  
dk gray to tan + brown. Shale and  
silt predominant. (note presence of the  
dark gray silty shale + shale layers here)
- ② 3.9 Thinly interbedded dark gray silty shale  
with some rusty sand laminated, and tan  
sand with limonitic laminated, shale  
and sand layers 1 to 2 inches thick.
- ③ 4.6 Sand, tan, with limonitic sand beds,  
bedded, 3 to 8" thick; finer  $\frac{1}{2}$ " layering  
indicated on weathered surfaces.
- ④ 6.2 Sand, grayish-tan, appears massive; no  
evident bedding may be thinly laminated.
- ⑤ 1.9 "Banded beds", up to 1" thick, dk gray to  
limonitic stained.
- ⑥ 3.0 - ? Gray-tan sand as in ④

Grass roots



Section 2. Just N. along bluff from section 1 the TL is better exposed,

Base is top of Ophiomorpha-rich, tan sand at least 4.0 thick.

- ① 5.0 Sand, massive, light tan-gray with thin indurated layer of Tenacledia hash at top.
- ② 1.0 Conc-in-conc in X-bedded sand.
- ③ 0.7 Sand, reddish, partly indurated
- ④ 0.5 sand with conc-in-conc structure, locally concretions.
- ⑤ — "Banded beds"

Note — Section 1 apparently does not start at the lowest "banded bed" in section, but the base of Section 1 is within about 5' of top of section 2.









Loc. 272, Low knob east of Firesteel creek and south of "Colgate" capped buttes in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ , sec. 33, T. 19 N, R. 23 E, Blackhorse SE quad, Carson Co, So. Dak.

Southwest face has small exposure

At approx. 20 feet below top of knoll is contact of T.L. Memb. and Braded beds Rich T-O fauna just below it with Tancredia, Mactuz, small Ostrea, Penope.  
A-4657

Note that this one of few Bullhead exposures seen thus far on E side of creek. Relation of this knob to butte 500 ft. due north can't be determined. No cone-in-cone seen here at TL-Bullhead contact.

Loc 273, Exposures in valley wall of tributary of Firesteel Creek in sec. 34, T. 19 N, R. 23 E, Black Horse SE quadrangle. Two best are SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , NW $\frac{1}{4}$  in SW-facing bank, and in center N $\frac{1}{2}$ , N $\frac{1}{2}$ , SW $\frac{1}{4}$ , in NE facing cut.

Here 50+ feet of Tancredia-Ophiomorpha facies in TL exposed without break and no top or bottom contact.

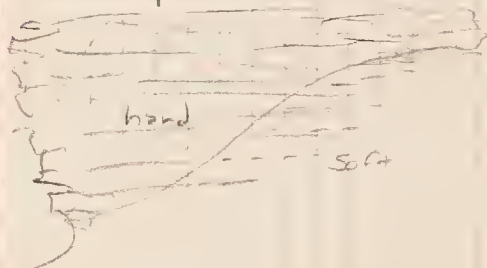
An obscure fault of unknown but probably small displacement seen at bank east side of west bend in minor gully in center N $\frac{1}{2}$ , NE $\frac{1}{4}$ , SW $\frac{1}{4}$ , SW $\frac{1}{4}$ . Downthrow is on the SW, trend about NWSE. Contact of TL with about 3 or 4 ft Bullhead, and the cone-in-cone cones, on southwest against T-O facies on NE. Note that



if this fault projected NW it could come between Loc. 272 and the "Colgate" buttes just to N and NW.

Loc 274 Area just east of Firesteel Cr and north of "short cut" to S.D. 65 from Firesteel via Bickley Ranch. Chiefly in SE cor. sec. 8 and small parts adjoining secs. 16 and 17, T. 18 N, R. 23 E. Black Horse SE quad, Cousson Co. So. Dak.

Butte on N. side of tributary in SE  $\frac{1}{4}$ , SE  $\frac{1}{4}$ , sec. 8, T. 18 N, R. 23 E. is capped by indurated T-O biofacies SS, some additional elements of fauna incl. Ostrea (small) etc. (Coll. A-4658). Cap grades down into buff sand on same biofacies. On SE end can see induration cutting across bedding thus



Downslope a few feet of "banded bed" shale picked up at several places on N side of tributary. Below it are exposures more T.O. biofacies incl. big conc. bryozoa, all the way to bottom.

460

Loc. 275. High, west-facing cut of Standing Cloud Cr.  
in SE 1/4, NW 1/4, SW 1/4, NW 1/4, sec. 8, T18 N, R. 23 E  
Black Horse S.E. quad., Corson Co., S. Dak.

Measuring up from creek bottom.

1) 10.3

Sand, fq., clayey, gray, some blobs  
of gray clay. In basal foot discontinuous  
layer of hard sandy gray concs, and,  
for about 2 ft above, a few scat.  
flat concs of same type and  
loose shells in matrix.

Basal Concs A 4660 - P. linguiformis

Conc 1.0' above basal concs. A 4661 <sup>M. Tellina</sup>

Loose fossils include Tenacledia, Fusus, 1/2 or  
3' above the basal layer.

A 4662 - parts of a second Mactra-  
Tellina concretion

Concretions and matrix both have a  
great amount of wood - much of it  
black, locally boring clems in large  
chunks wood in concs in lower level.

2) 13.0

Sand, fq, weathers light yellowish orange,  
few clay blobs, concs, small in  
lower 2 to 3' chiefly P. linguiformis  
Weathers massive shows no bedding  
structure. (Single conc at base A 4663)

3) 2.0

As above, some scattered Tenacledia  
valves appear. Massive, could add  
to interval #





4.) 18.5

N  
C-1A-2

As above, from 5 to 8 feet above base large rusty to red brn irregularly tabular concretions also with scatt. Tenuredia & few Ophiomorpha in but not abundant in lower 13 feet. In this lower part clusters of Orthis <sup>(A. 664)</sup> some Tenuredia with both valves. A few scattered Penaeus in living position (Coll. A. 4664) in upper 5.5 ft massive bedding gives way to current tabular X-lam with much O. and current traces of T. shells.

5.) 15.5

Sand, weathers light yellowish orange, is fine grained - similar to that in interval (4), but has abundance of Ophiomorpha in rusty fest, and a very few scattered Tenuredia, many orange Fe chips and partings. Concentration of Tenuredia at top of unit 4 marks end of all but a few scattered valves, but no apparent change in lithology

6.) 1.0 ±

Shale, Dk gray to brownish, waxy with some layers greenish sand and scatt. cone-in-cone concretions. Prob. a bentonitic shale

7.) 1.1

Sand, massive greenish yellow to ochre-stained bed type.



- 8.) 2.7 Thinly interbedded sand & shale with plant frags on bedding planes. Shale is fissile dk gray, sand weathers yellowish green.
- 9.) 1.3 Sand as in 7, below.
- 10.) 7.0 Chiefly shale, thinly interbedded or banded, minor sand.
- 11.) — Gravel to top of bluff.

Resumé - ① Fauna of basal gray clayey sand (=Irish Creek lithofacies) in unit 1 - could be 2 lateral equiv. of the Idoneozetes biofacies of the Morzeau, or it may be the equiv. of Mactra Tellina of the thick west-Morzeau marine section.

To get confirmation of latter would need to find lower fauna that could be related to Idoneozetes. Worth a check N along Fiveston Cr.

- ② Note 3 phases TL sand.  
 A Unit ② Massive marine  
 B Units 3 & 4 Massive - Tenacledia - Ostrea - Ophio  
 C Unit ⑤ Bedded " - Ophio.  
 Note 2nd L.P. is same as "Colgate" in bottle Loc. 274!
- ③ Note Thicket interbedding of SS with banded beds - this could easily be "upper Colgate" or transition laterally into it.



Loc. 111

Cut in T.L. lithology at juncture of  
Rt 8 and road to Promise,

Rare scattered punky concretionary sand  
masses with fossils. Appear to be,  
roughly, a lower horizon and an  
upper one about 2 to 3 feet above it.

Lower: - *Protocardia* - *Tellina* are  
A.4668 dominates, latter more in lower  
part of mass with few sect.  
*linguiformis* & *Mucula*; *Proto*  
in upper part with sect *Tellina*  
and some *Drepanochelus*. In  
one cone found internal  
cast, clippensoid, schinoid.

A.4669 Upper: - *Toss. scann.*, *Tellina*,  
*C. transversa*, *Mactra*.



Miscellaneous Collections et al

- A-4659. Loc. 20, concretions in place Lower nicolleti AZ. - Reiskind Scholle Wazoo to
- A-4665. Loc. 21, part of Lower nicolleti concretion in place
- A-4666. Loc. 21, most of Lower nicolleti concretion in place.
- A 4667 - See p. 23, oysters from Loc. 276.
- A 4668 - A4669 = Loc 111, see p. 21





Loc. 276 - Iron Lightning bedlzads, oyster bed  
just beneath contact with Hell Cr.  
on west wall of bedlzads <sup>about 150 yds</sup> ~~above~~ W of  
Loc. 224, ~~1/4~~ just S. center SW  $\frac{1}{4}$ , SW  $\frac{1}{4}$ ,  
Sec. 33, T. 14 N., R. 19 E., Redelm NE quad,  
Ziebach Co, So. Dak.

Unusually good preservation - oysters, many  
with both valves, and Anomia.  
Coll. A 4667.

~~Loc. 11 - Road cuts at turnoff on 8 to Promise Road~~

~~A 4668~~

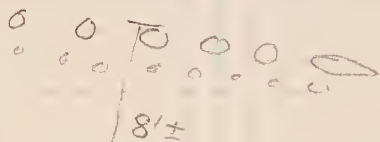
~~A 4669~~

50.1

Loc. 277 Road cut on Ridgeview-Whitehorse rd - construction cut. Probably slumped down from nearby divide which has Cucullize layer on top.

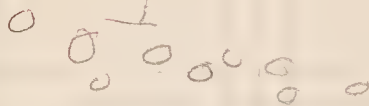
Two concretion layers

(2)



rusty weath  
outside to  
purple brown ls  
concs. loc.  
Cucullize with  
O-Passoc.  
beneath 2 layer  
small punky  
concs like silt  
rim

(1)



8 feet ± to irreg layer lower  
concs which are punky + sandy,  
light gray when fresh, rarely with  
fossils incl. Lingulellus + Proterodus

$$\begin{array}{r} 5.9 \\ 5.2 \\ \hline 2) 11.1 \end{array}$$

$$\begin{array}{r} 3) 54 \\ 39 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 4) 57 \\ 48 \\ \hline 9 \end{array}$$

$$5)$$

[161]

Locality 761. Bulldozer scrapes N+S of stock dam (about center SW $\frac{1}{4}$  SW $\frac{1}{4}$  Sec. 29, T. 13 N, R. 27 E, Dewey Co. (no USGS topog) Section from Ncut. French belongs to . See Ian's two sections of this locality.

- 1) 6.5 Clayey, silt and sand, with light brownish gray with some rusty stain grading up into sandy, clayey silt. massive to mottled. At top is layer cones, up to 1.5 LD, no fos., with red to rusty brown, gray sandy jackets, blue ls interiors some calc in cracks.
- 2) 11.1 Clayey silt + vfg sand mixed, is gray, with light gray. At top layer chiefly ovoid rusty with cones in zone of rusty stained matrix; cones rusty with obs, dk purple blue ls with yellow calcite. [On opp (w) slope dk clayey silt + jarosite blebs near top]
- 3) 9.2 Chiefly clayey silt and sand as below capped by sandy gray with silt layer that prob is jackets on layer rb with blue gray ls cones yellow calcite, whole ledge 1.5 to 2' thick. Silt layer has cone-14-cone considerable glauconite. [on opp slope 2nd cone layer 2.5 above base as in top]
- 4) 9.3 Clayey silt and sand as below, brown to gray with to light gray.
- 5) 5.4 Gray to dk gray mottled clayey silt with heavy jarosite concent. in lower foot. This overlain by light gray calc. silt. cones with gypsum rhizoids, with pinkish gray. These silt to top of interval. Above

$$\begin{array}{r} 5.5 \\ 5.9 \\ 4. \\ \hline 15.4 \end{array}$$

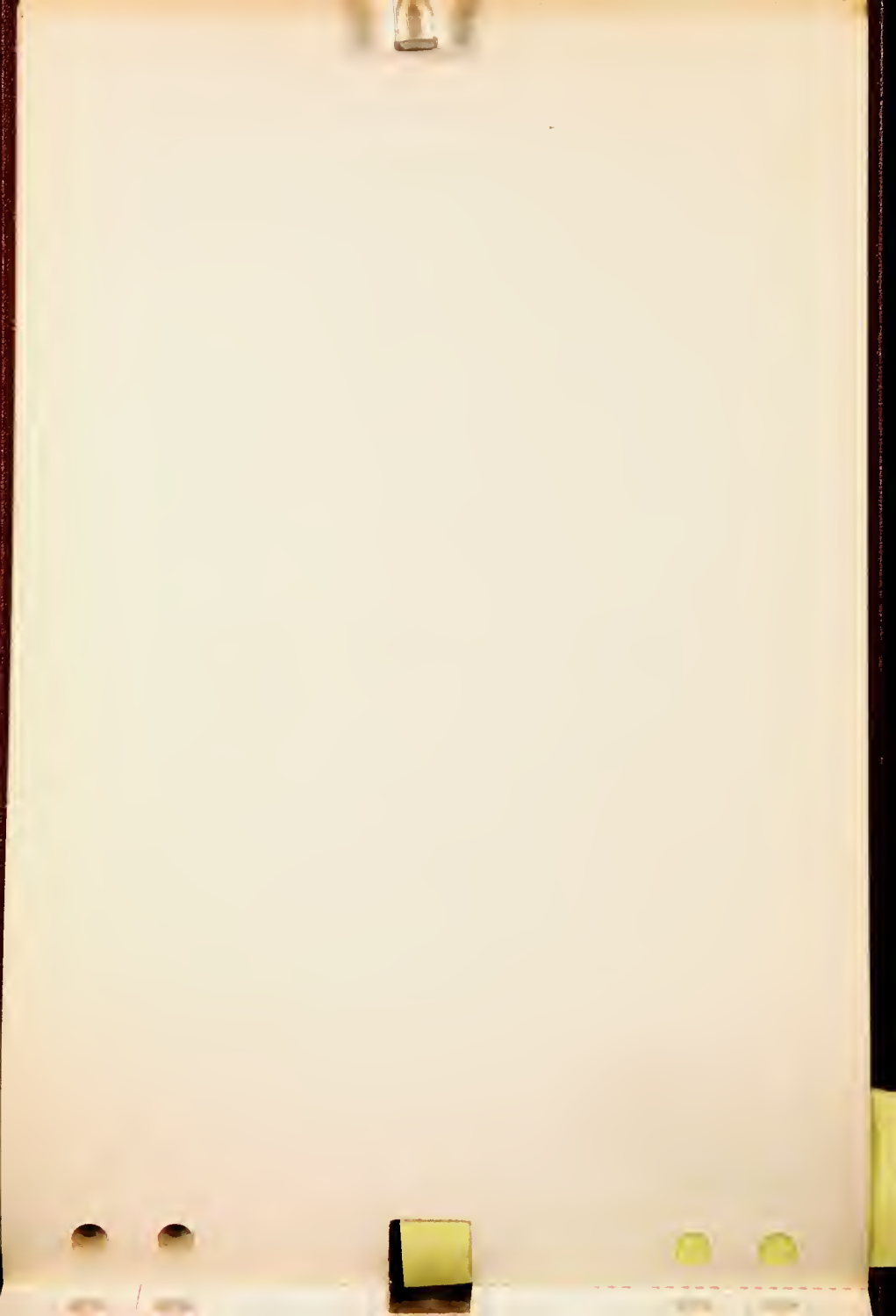
lower 10 to 20 silt + fine sand blobs  
come in again so that at top it is  
dk gray clay + sandy silt mottled.

(6) 2.7

To Grass roots an calcite spotted  
gray silty sand + sandy silt., splashes  
Fe stain at top.

Just N of cut at E side of stock dam a  
lower layer cones visible. No layer  
in cut can be traced across to  
tie in, but one layer on slope  
holds approx same level as cone  
layer at top unit #1 and this is  
15.5 ft above lower layer at res.

Lower layer. blue ls some  
calcite in cracks. One Limopsis found





Loc. 73

Return visit with Mellow. River bank to NE shows part lower Irish Creek lithofacies and intervening bluffs include slumps in which possible to go below bentonite (lowest of old sec. #1-2), tie into good jarosite zone then pick latter up in river face.

River cut Irish Cr shows excellent, thin bedding also tabular masses of pyrite, but there are fossils loose in shale - found *Wocuz* + part of *Sphen.*

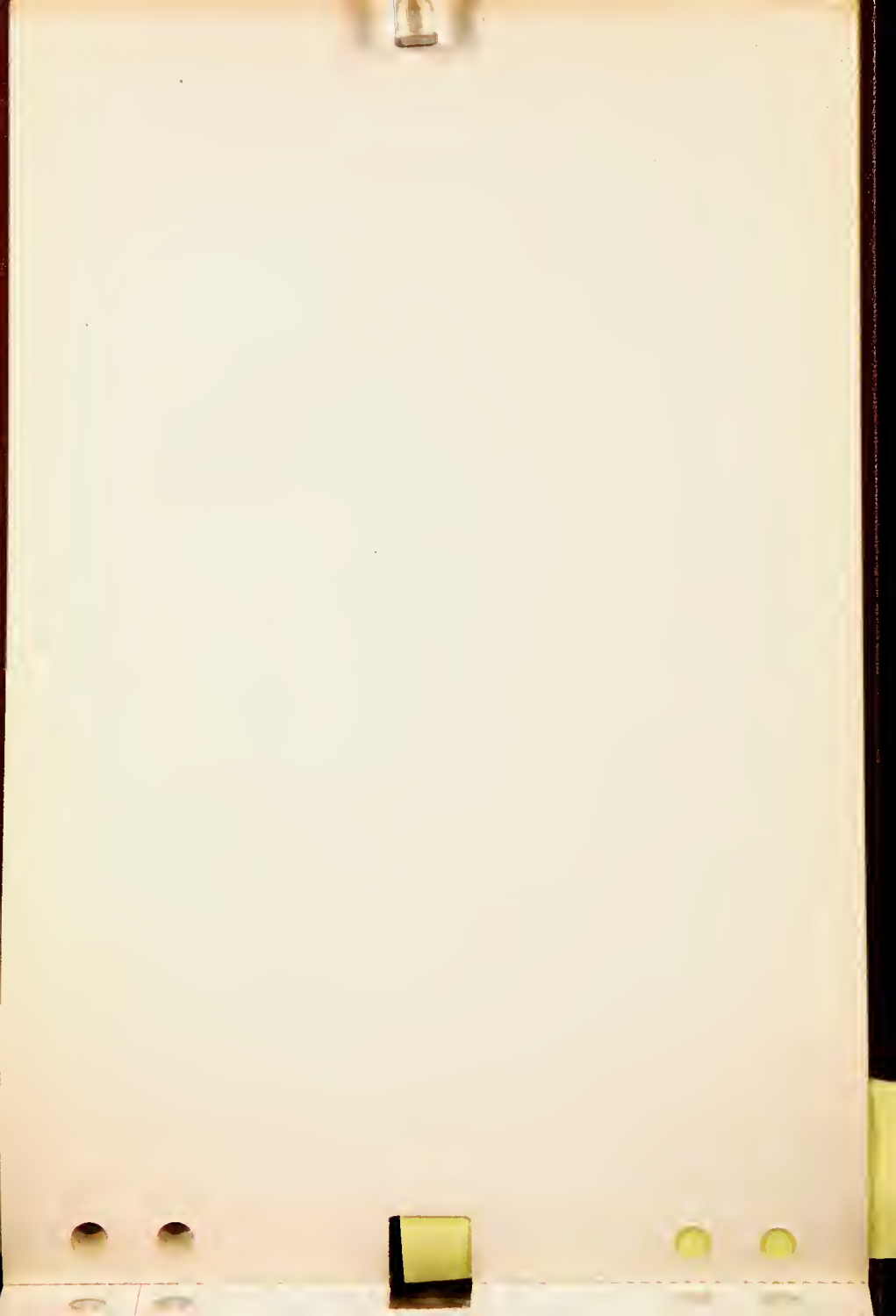
Also, old sec #3 cut seems better cleaned than previously + basal banded beds do come in above the jarosite; they are bentonitic.

Scouting S. side Grand between Loc. 26 and Plum Cr.

① Spur about center  $N\frac{1}{2}$ , Sec 32, T. 20 N, R. 25 E  
On N side few scrappy bare spots show thin bedded lower T.L. Memb. overlain by massive chiefly brown and which has 3 layers large or jacketed ledgy conc zones.

② Locality 279 - South facing bluff along small flat and eastward trending spur, west of Grand River on Peterssens Ranch in  $N\frac{1}{2}$ , NE  $\frac{1}{4}$  Sec. 19, 2nd Sdgy. SE  $\frac{1}{4}$ , Sec. 18, T. 20 N, R. 25 E, Miscot NE quarter Corson County, So. Dak.

A section from Elk Butte into Timber Lake Couls probably be worked out here by carrying key beds slump to slump. On the spur the lower TCM is almost complete.



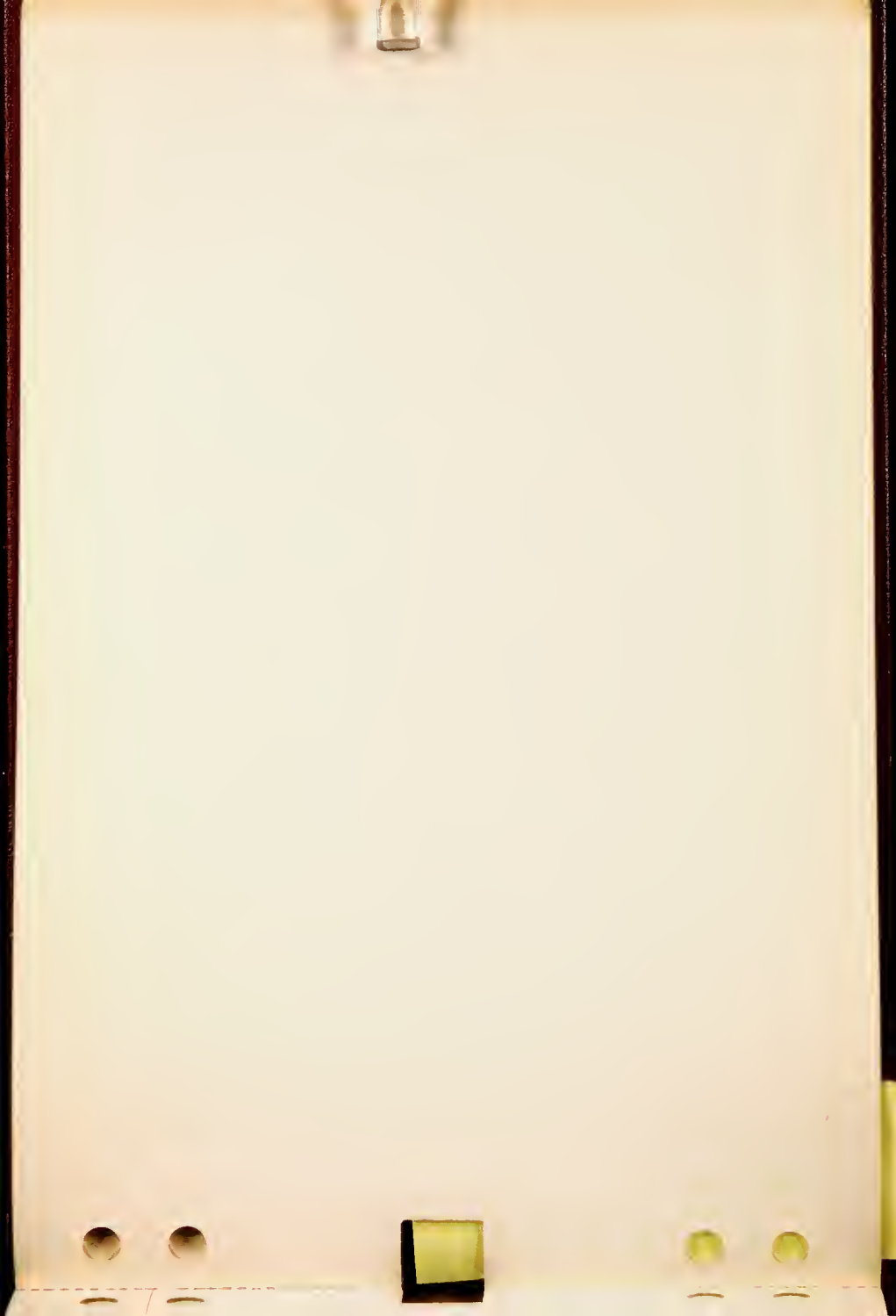
exposed, bare slopes from Elk Butte to  
Limopsis Cove. cones, patches from here to  
Poleward Oxytona AZ which caps knob.

LNAZ - Thick with much *Jovasia*,  
numerous jacketed cones but  
practically unass. Only a few  
uncollected in Bishel. size cones  
and in uppermost part of zone  
a rare small *Drepanochitys* cones  
(A 4672).

LGAZ - At least one very fossiliferous  
large cone layer - *Gouvillea*  
predominant and show cones double  
size range. Includes some cones  
with big ones. Locally *Limopsis*  
clusters within a same layer,  
same cone. - Not collected

POAZ - Richly fossiliferous here,  
Occurs relative short distance  
above LGAZ.

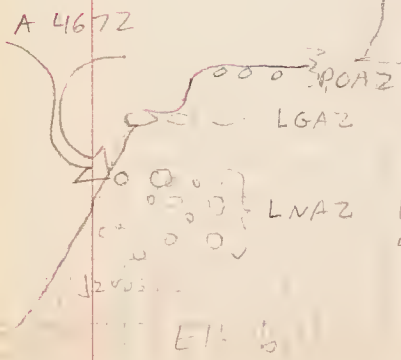
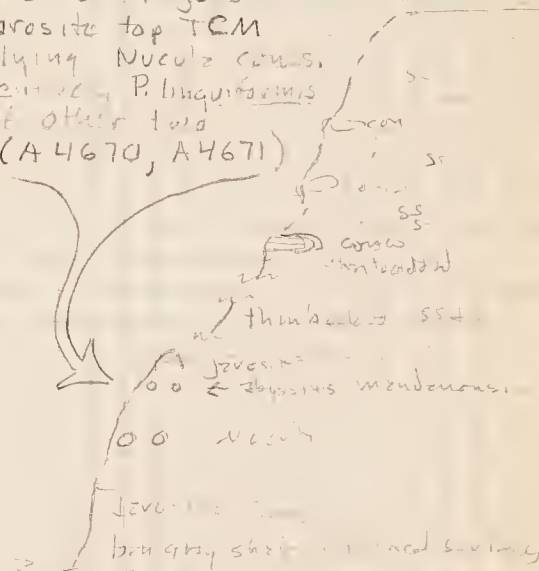
This on first joint of spur - move of  
it next block toward or not investigated  
Passing to spur of flat, outcrop of layers  
can't be carried. Exposures show  
shell & *Jovasia* zone in lower part --  
i.e. beds above the POAZ are. Then  
above this short distance pass stem.  
RB cone layer in which one *Wucala*  
frag seen. Then above is same  
distance. *Jovasia* located  
and above this is a few feet  
of thin-bedded ss & shale exposed.  
No reason to believe that TLM  
thin-bedded plus well represented



here. Possibly could piece section  
up the TL outcrop off s edge of  
flat but it is pretty poor.

No telling how thick thin-bedded  
phase is - would guess not much over  
25 ft.

3 cores found at zone AM biofacies  
between jarosite top TCM  
and underlying Nuculz concs.  
One was core - *P. linguiformis*  
Portions of other two  
collected (A 4670, A 4671)

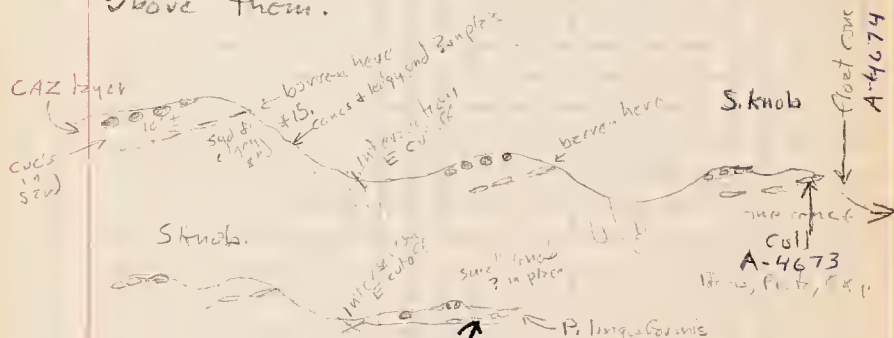




Locality 33 - Ch. 4 road bed + sides of dirt sec. 200 yds  
 due south of Eagle Pointe 2.5-3+ miles, chiefly in  
 that part in S $\frac{1}{2}$  sec

A succession of slumps of fossiliferous part of  
 Timber Lake. Unfortunately none of blocks  
 lend selves to a trustworthy section.  
 But the south knob + north knob (see  
 diagrams) have best actual exposures.

South of S. knob along road, fossiliferous layer  
 in in E bank rd around small knob 70 yds  
 S of intersection. Knob itself has Big  
 Cucullaea cones on it, possibly in place  
 relative to cones in road cut and 10.5-12 ft  
 above them.



**A 4676 part of Pteris conc from place**

Only well defined part of section is  
 that with large upper bed with big concs with  
 Big Cuc's and ledgy bed 10'± below which  
 contains sect. rhyolite with hard blue to greenish & blue  
 sandy concs. You found one in place with Pt. Proto-  
 Oxycane assoc + many small ammonites, this  
 is coll. A-4673

A4674 was in float well down slope and looks  
 like an "abyssinus" type assoc. with big Sphero  
 layer - tho no such layer established at  
 this locality. A4675-15 float from a  
 variety of places 11. 2. 2

$$\begin{array}{r} 55 \\ 30 \\ \hline 9.0 \end{array}$$

.6



## Locality 28

Running section on conc levels + other key beds up road.

Base of conc. layer, brownish gray to purple is gray or gray with brittle brown ls. concs, no matrix in weather, no jackets apparent. with lite rusty brown up to 1 foot down

- ① 9.0 weathered slope in road gutters. At top 1.5 - 2.0 zone tabular concs up to 2' long diam. with rusty brown conc hard brittle barren ls lite gray<sup>15</sup> silty, not sandy, no ves, jackets.
- ② 0.6 wash covered
- ③ 5.1 shaly blue gray, silty clay with jarosite blebs and layers ~~at~~ and selenite xls in lower 4" becoming sandy at top. Fairly pure 1" jarosite at base. 2 other layers about 3.0 + 3.3
- ④ 6.0 wash covered, clayey silt conc end at base. At about 4.0 spot sample shows fine gr quite somewhat shly and a few scst, small ls concs. At top is conc layers. Brownish gray with some sandy ls concs barren, rusty with jackets
- ⑤ 5.6 To top widespread, crinoid lgy ls concs occupies  $\pm$  upper 1.5. Just below it a few scst white matrix, petiole ls concs in rusty patches, these small, finely sandy ls. Slope wash covered. Upper concs, weather lite

47

59

59

7

5

---

4

3

---

22.2

4.8

5.0

4.9

4.0

4.3

---

23.0

gray to rusty, and greenish brown, surface ls  
with linear to rusty. up to 4' in lower  
diam. tabular masses. Rare fossils - A-4677  
mollusks? small ammonoids - see list.  
conc layer holds up spur below the 2 knobs.

Carrying on conc layer top unit, (5) to W side  
spur just NW of 2 knobs. Measuring  
up over cross slope to spur-capping layer  
of concs.

6 23.0 covered, at top is layer large  
(up to 3' l.d. tabular) rusty brown warty  
fossilif. ls. concs. (large cucullate,  
and highly varied fauna, *Protocardia*  
*zssoc.* prob. most common.)  
About to 3.0 beneath layer scattered  
small concs many very foss.

Coll's from ~~these two layers~~ just  
below top unit 6 — A-4678, single conc.



Recco SoF SoDok8 between SoDok 63 + 65 - on "Colgate" problem.

Loc. 280 Colgate in road bed of county road about middle N line sec 1, T16N, R 23 E, Dewey Co. 3 miles S and 1.5 miles W of Rts-63 intersection

Contains *T. rosei* & *M. zebra*? well defined *Cyphomyrma* here but not common either burrows, also *interfluencia* ripple marks. Sumpied.

Readings on joint sets - may have tilted or no surf. Joints short & curved

A N50W, N53W  
N26W

B N-S N70E

C N88W

Seems to be a Colgate lens cutting obliquely across road. Roughly N75W edges not well defined.

Major ripple set ridges strike  $\pm$  N36W crossed by tube fillings || surf.

Loc. 281 Road cut through base of butte NE of Lotz Farm, and associated buttes, just E creek along county rd in NW cor sec 15 and SW cor sec 10, T16N, R. 23 E. (Joint Readings on butte S of road)

South end butte North end butte

A. N. 72 W

N 54° E

B N. 08 E

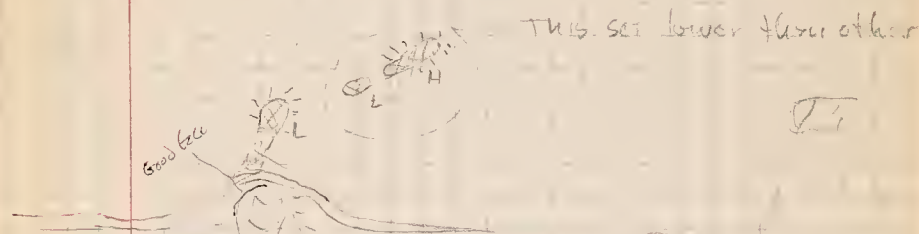
N 80 W

C N 78 E

N 54 W

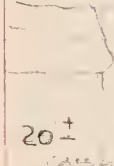


Timber Lake or Lignite sand with broad "butter cap" ledges. Locality along rd transition from sand to ss can be seen. Here distribution of wood caps is at <sup>two</sup> levels in the sand, and in diff. directions.



FLAX  
has  
whitish wash  
patches with  
small conc. pits  
purplest brn. Like  
Heller's pr Bullhead.

(2)



at least 4' thick loc., much Ophiomorpha  
many burrows, trace and bedding, some  
red Tan. color, conc. pocket Pteris-Ostrea  
assoc. (see sample)

20'

15'

(1)



Sand, gray with jasperite, fusible  
tends to impreg. sh scattered  
x-1/2 in to massive, Ophiomorpha  
locally.

at <sup>very</sup> level lower in  
layer begins to become in.

Lower layer contains fewer Ophiomorpha,  
less burrowing, but one patch Ostrea-Pteris  
assoc. found. No Tan. color (see sample)





Loc. 282 - Cut on abandoned county road on N side Meadow Creek, along section line between sections 4 + 5, T 15 N, R 23 E, at top of rise just N of Creek.

Slightly clayey sand (which may be mixed with soil here) with concretions of calcite AZ, richly fossiliferous. No exposure big enough for a section. Fossils in large reddish weather cones and also in brown-colored cones of blue ls with peculiar irregular + crusty surface, which appear to come feet or 2 below red ones. (compare Loc. 88.)

A 4679 - from single conc. A 4680 - from many cones

Loc 283 - A T.L. fauna; fragments weather out of highly clayey sand + sandy clay, below level of heavy butte by 2' less. Suspect it is beginning of B.S. litroferus. Frags of Tancredia, Osteria transvada, + Protocardia.

Small exposures along county road along line between sec. 36 T 16 N, R 22 E and sec 1, T 15 N, R 22 E, in vicinity of stock dam on Stradinger farm.

Loc 284 - stream cut just W of rd + N of Redoubt Creek tributary in SE cor. sec 21, T 16 N, R 22 E Dewey Co.

Butte here and in road cut. At top 25' (500) of it to where section in rd cut gets down. sandy and has big hard platy cones. This is probably "C" or "G" butte exp along rd to S on same level. Altho the exp butte exp higher. Along



rd to S both buttes have evidence of Bullhead  
in them.

### Summary.

Loc 281 is good + needs photo. Entire sand here could  
be calcite in strict sense (with some banded beds below?)  
but it 'looks' more like TC in its yellow weathering + OS  
stain + conc chip layers

5.0

4.5

4.0

4.4

4.2

4.9 in 2000 lb of 5 bit

4.6 w 2500 lb

4.6

.2

These are each sold  
+ 1/2 lb extra  
not in use

has 5 bit  
ones

Locality 285 - An area showing intrusion relations of indurated ledges in upper & lower Hills. Lies on Bickle Ranch E of Firesteel Cr. in E $\frac{1}{2}$  SW $\frac{1}{4}$ ; W $\frac{1}{2}$  2nd NE $\frac{1}{4}$  SE $\frac{1}{4}$ ; SW $\frac{1}{4}$  NE $\frac{1}{4}$ ; Sec. 17, T18N, R. 23E.

① Joint sets [N. 29 E  $\pm$ ] in NW facing wooded ledge. Lear massive indurated ss up to 12' in single faces + float blocks. Tauvediz-Ophiomorpha with latter prev. indurated. A flat body elongate NW-SE with locally 30' ind. on SW underlain by T.L. ss. Is ind. T.L. thins NE

② Nearly vertical face Irish Cr - TL over 50' high. It has porous concs - Tauvediz has dis. ind. O. trans. voidz - much chaz. ind. many proto brachiopods - about 10 to 20' below col. chaz. ind. Norveg at the linguiformis ss. or. in. Tauvediz. In ss above, but not visible locally 20'.

③ Small butte. - Has Ophiomorpha cap, prob overlies But ind  
N 15° E  $\pm$   
N 70° W  $\pm$

④ Section of Billies member E of fault. (Note strike of sheared ss or "dike" along fault is N 8° W - don't know what it means but strike of ph. thinness.)

view  
22.0 bb-dk sh + fl + ss lb. + silt.  
36.2 5.0 sand zone, beds to 10' ss + lam. ind. ss  
9.2 bb, dk sh + silt + lb. minor ss upper part  
← local conc. micaceous conc.  
T.L. ss, massive, ophiomorpha

4.2  
5.  
5.1

5.2  
1.7

Locality 286 (NE <sup>of</sup> 73 rd river cut)

Starting at top + measuring down

① 2.8

Thinly interbedded <sup>with river ss, with some x lam.</sup> silt sh + vfg ss. Rather highly porous, pitted bands top and bottom and some minor less regular bands + patches or pods elsewhere. (About 2.0 above top is old river terrace deposit.)

② 14.4

Dark gray finely silty silt with thin vfg ss <sup>or silt</sup> layers, becomes more sandy in upper 2.0 with thin ss interbeds ~~and some~~. Very scatt. in blcks, chiefly in upper part. Lower 5 feet the ss is ~~is~~ more thickly interbedded. About 2.5 from base unit 1 is persist. layer (locally) of tabular brown ls. comes with silt jackets and similar comes appear to be scatt. lat in zone from 2.0 to 5.0 below the top of this 2) unit. And 1 lb. in this zone shows ~~working~~

③ 6.9

Dark gray ~~very fine~~ silt sh with gray vfg ss up to 3/4 inch loc. some very fine lam. + x lam. At top is zone ~~plunging~~ to flint gravel base to gray silt sh + brown ls. comes.

4.1

2.2

—

5

4

48

2.3

—

70

1.5

17.3

6.9

14.4

2.8

.6

100.00



4. 17.0

Thinly interbedded shale and vfg sand as above  
At top is layer hard sandy ls cones, with  
green silty material (see sample) with  
to brown tabular masses low of fossils  
in gray silty sand & some ls-cone.  
Laterally thinning ls-cone sand within  
about 1.5, usually persistent top layer  
Interval has rounded clay and small  
dentulum sand throughout (see sample) See  
in core logs too. Few ammonite  
frags. One partial spleno (large) near base.  
Zone red brown with sandy ironstones  
intermittent & small about 4.6 from base  
and/or approx 12 ft from west

5. 1.5

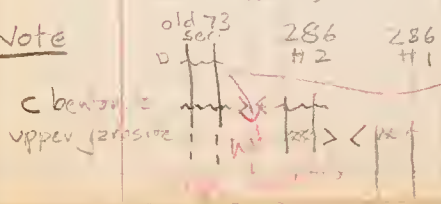
As above with persistent one layer in  
upper 0.8 to 1 - flat oval to tabular  
masses, gray to ss & lam & c-lk-c  
jackets. Cones + sediment has  
small nuclea.

T. 42.6

Section 2 - Slump face just west of ...  
shows the upper beds ...  
the c bentonite, Interval down ...

1.3± bentonite  
6.5 - dk gray finely silty shale, with  
to gray chips, some Fe staining, vfg  
Some laminae + thin lenses in  
upper 1.0 ± and base 1.0.

Note



~~Key for preceding  
sections above  
Thunder Bolt crossing~~



Loc. 287, Rd cut, E side of rd. Butte Village, —  
Rt 8 cut off, south of Navarre Bridge in  
NW cor. NE 1/4, SE 1/4 NE 1/4 sec 3 T14N, R 30E,  
Thunder Butte Quad., Ziebach Co., So Dak.

Cut exposes most of CAZ in Irish Creek lithofacies  
near top is the D bentonite.

A-4683 - Two concretions with Protocordia  
masses from same horizon — about  
2.5± feet under the D bentonite  
and 10 feet apart along face.  
Note size consistency in each.

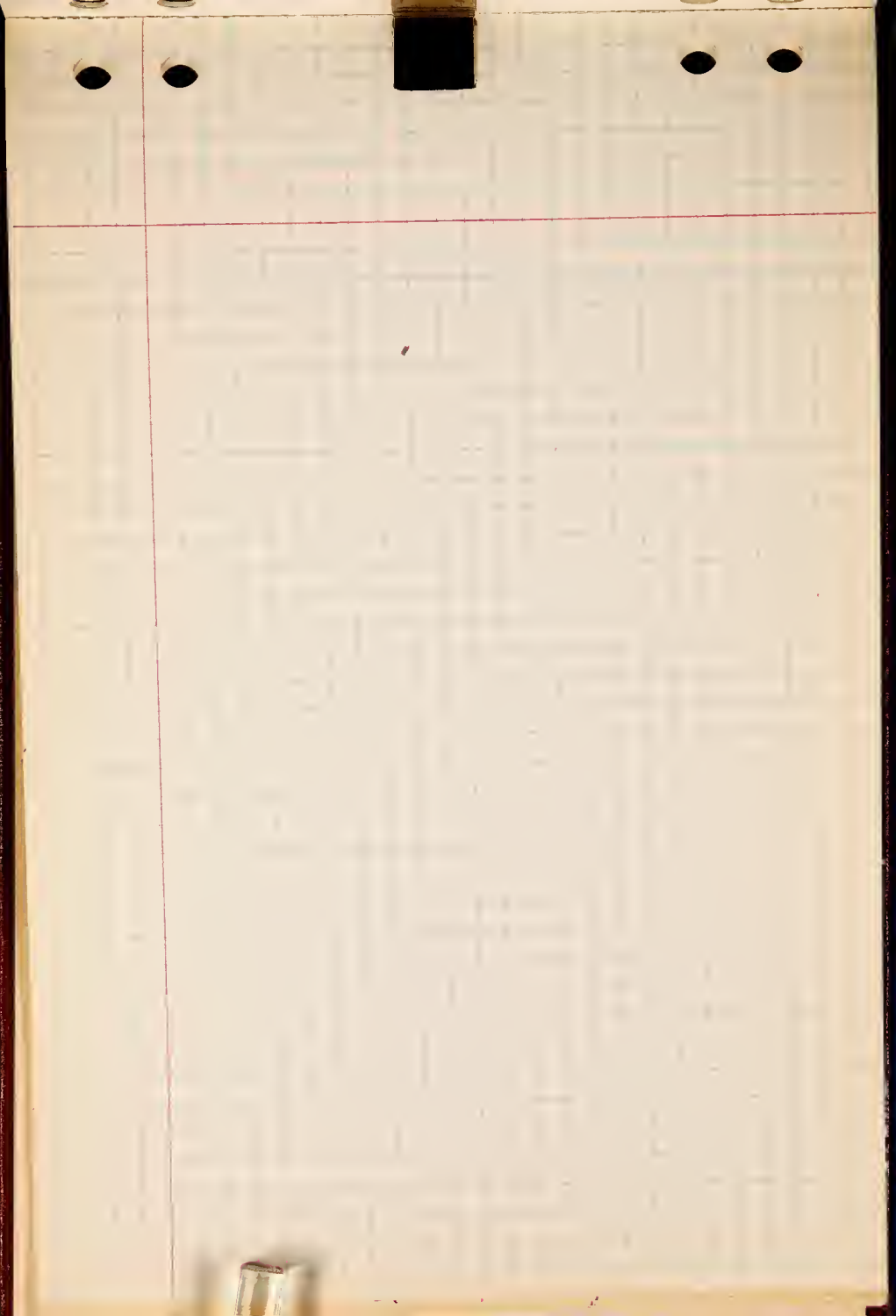
A-4684 - Fossils from several layers in CAZ.  
It looks as though there is a  
basal barren layer, a layer  
dominated by Circularia — the  
typical Irish Creek CAZ fauna,  
and other scattered concs.  
However relationships here  
are obscured because outcrop  
plucked of the more fossiliferous  
concs. — there may be no  
consistent order of distribution.  
On of few places easily accessible  
where relation of D bentonite  
can be shown.

★













# Shipping lists

Box #1 - ~~Loc. 265, A 4650~~, Loc. 20, single  
Lower nicolleti conc.

Box #2 ✓  
Loc 275, A 4660, 4661, 4662, 4663,  
4664;  
Loc. 267, A 4652 (2 bags)

Box #3  
Loc. 21, - A 4665 conc + 2 bags (A 4666  
frag in one bag), part of A 4666  
concretion.

Box #4  
Loc. 21 - Most of <sup>Lower</sup> D. nicolleti - A 4666,  
(See Box #3 for remainder).  
Miscell. from Loc. 74 - 3 bags  
Loc. 224 - 2 bags  
Dog bottle reef - 1 bag.

Box #5 ✓  
Loc. 265 - A-4650, A-4651, from  
section meas. by J.R. + crew.

Loc. 269 - Lith sample  
Loc. 270 - A 4655  
" A 4654 + One piece "edgite"  
" A 4653 and 2 chunks of  
" A 4656 the "type" Pduoxylon  
Loc. 272 A 4657 wazzei  
Loc. 274 A 4658

Box #6 ✓  
Loc 54A - part of high LDmic conc - 1 chunk  
1 bag  
Loc. 265 - Float, lower spherone zone  
Loc. 276 - A 4667 - one bag  
Loc 111 - A 4668 - 2 bags, one tin box  
A 4669 - 1 bag



Box #6 (cont.) Some miscellaneous  
individually labelled

Box #7 Locality 279, A4670, A4671, A4672  
(Petersson's ranch - Trail City)  
Loc. 280 - lith and Loc. 281 - lith  
Loc. 282, A4679, A4680  
Loc. 28, A4677, A4678

Box #8 Montez collection  
✓ 1 bag odd lots  
✓ Loc. 17, A4681 - Upper Duric (part)

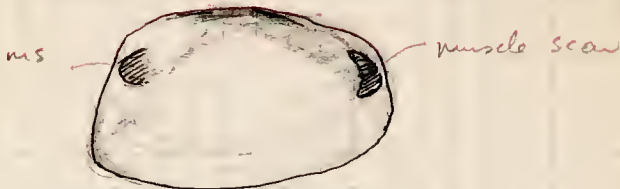
Box #9 Loc. 17, A4681 - Upper Duric (part)  
Loc 17, A4682 - POAZ cones (1 bag)

Box #10 Loc 33, A-4673  
A-4674 A4675 A4676

Box #11 Loc. 17, A4682, A4681 (part)  
(The big fragment is in A4682)  
Loc 286, section Lot  
Some Tenebridiz from loc. on Firesteel Cr.

Box #12 Loc. 17, A4682  
Loc. 287 A4683  
Loc. 287 A4684





List Wk

S AM - Roller coaster + US 192 construction

M RT 73 + Dupree 2022 N

T Lutz Farm picture, Redearth record

W Gizard 270

T Buckles

F

S

S Pack

M Leave



Saturday 15 - Tickets (NH - D.C. round trip) — \$ 59.80  
 Baggage .75  
 Bus. .25  
 Train (Oubert - 30<sup>th</sup> trip) .88  
 Cards .44  
 Map paper .35  
 Dinner 2.50  
 Candy for Via + Lemus kids .74  
 Taxi (Oubert - Home) 1.00

Sunday 16

Monday  
 Pm Sat Sun 10.00  
 Baggage .70  
 Lunch 1.45  
 Czb 1.00

Tuesday  
 Lunch 2.50  
 Pipe cleaners .20  
 Czb 1.50

Jule Wade  
Mrs Ross



72

Colo  
traded

