GEOLOGICAL SOCIETY OF IOWA

Field Trip Guidebooks Two through Fifteen

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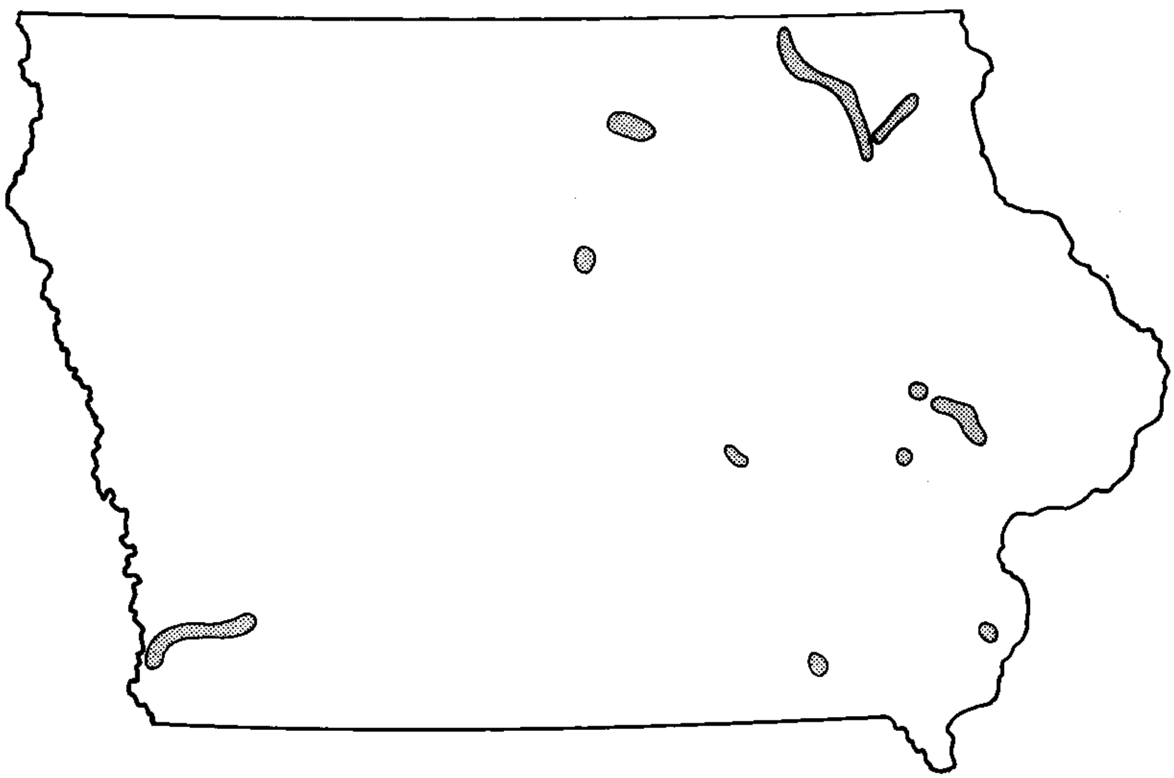


Volume One

compiled and reprinted

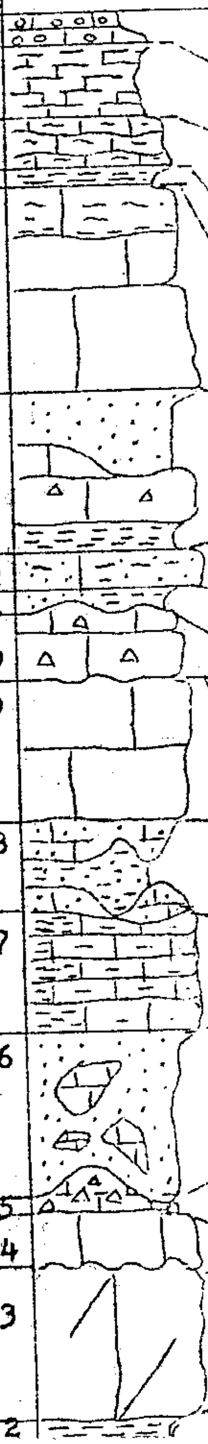
1 9 8 4

GUIDEBOOK #2
by A. Tester
F. Dorheim
R. Campbell

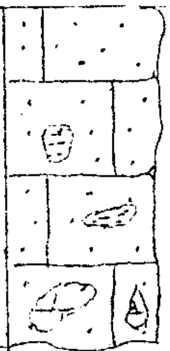
Iowa Geological Society
April 18, 1959

KASER'S SELMA QUARRY

SW$\frac{1}{4}$ NE$\frac{1}{4}$ Sec. 19, T.70N., R.11 W.



Thick	Bed	Description	Fm
1.0'	18	Limestone, light gray, medium-grained, oolitic, contains some small brachiopods; badly weathered.	Ste. Genevieve
2.3'	17	Shale, very calcareous, greenish-gray to yellowish-brown, grades to limestone.	
1.6'	16	Limestone, light-gray to tan, fine-grained, argillaceous, contains numerous shale partings, numerous brachiopods, wavy, indistinct bedding.	
0.6'	15	Limestone and shale. Limestone, like bed 15, interbedded with green shale; numerous brachiopods.	
6.0'	14	Limestone, grayish-brown, sublithographic, contains some brachiopods, upper 3' slightly argillaceous; shale partings on bedding planes; lower unit massive.	
5.0'	13	Limestone, sandstone and shale, Upper part sandstone, yellowish-green, medium-grained; middle limestone, brown, lithographic with some chert and interbedded sandstone; lower part, shale, green.	
1.1'	12	Limestone, tan, sub-lithographic, argillaceous, arenaceous; has clastic appearance.	St. Louis
.6 - .0'	11	Sandstone and shale, green, very undulating, may occur in pockets.	
[illegible].0'	10	Limestone, brown, lithographic, contains numerous large, dark-gray chert nodules and bands; may grade to sandstone in places.	
4.0 - 4.6'	9	Limestone, light tan to gray, fine to medium-grained, clastic; blue mottling.	
3.0'	8	Limestone, light-brown to tan, medium-grained, argillaceous, with sandstone partings and with bed of green shale dividing the limestone into two members.	
3.7'	7	Limestone, tan to greenish-gray, fine-grained to sublithographic, platy, very argillaceous; grades to shale	
3 - 5'	6	Siltstone and sandstone, with fragments of brecciated limestone; undulating at base.	
0 - 1'	5	Chert & brecciated limestone, gray to white, pyrite and calcite crystals.	
1.5 - 2'	4	Limestone, brown lithographic; one bed.	gen
5.0'	3	Limestone, dolomitic, brown, fine-grained, contains some glauconite; ripple marked, massive, some bryozoans.	
0.1	2	Shale, green, soft.	

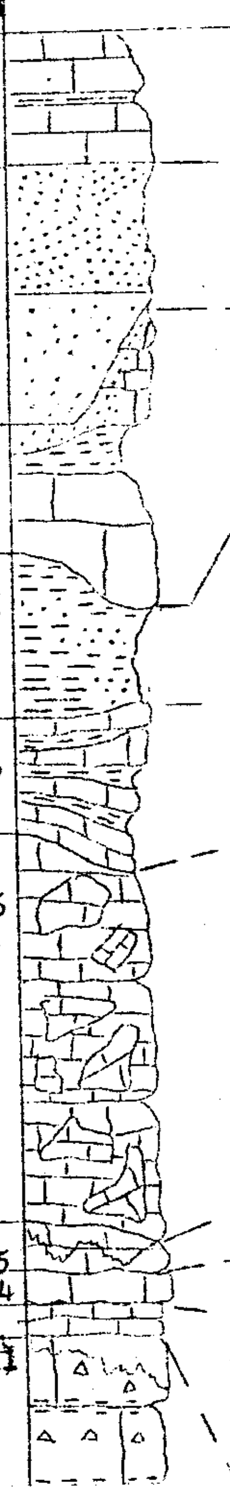
0.4' 10'	1		Limestone, brown, medium-grained, clastic, slightly arenaceous, color banded; green shale pockets up to 1' thick. Base brecciated.

Spei

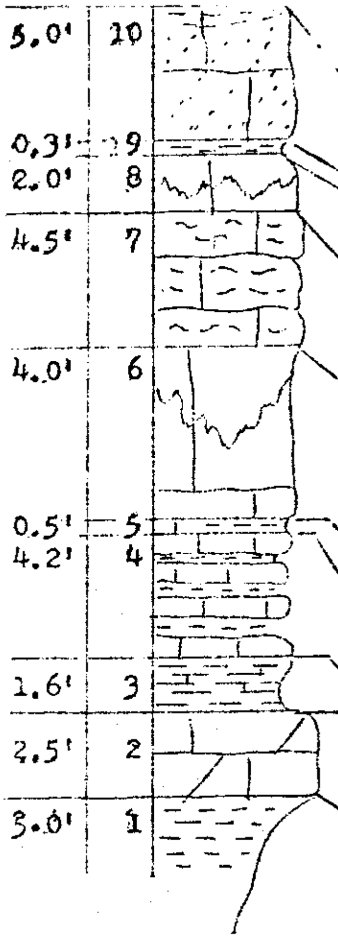
April 18, 1959

DOUDS STONE CO. MINE

NW$\frac{1}{4}$ SE$\frac{1}{4}$ Sec. 25, T.70N., R.11W.



Thick	Bed	Description	Fm
0 - 6'	21	Limestone, light-gray, lithographic, variable thickness, weathers white, numerous small brachiopods.	Ste. Gen.
9 - 14'	20	Sandstone, yellowish-drab to light gray, two units, the upper cross bedded, the lower more massive.	Ste. Gen.
4 - 10'	19	Limestone, sandstone, & shale, undulating, interbedded. The limestone is pinkish, lithographic; the sandstone, yellowish, calcareous, well bedded; the shale, green.	St. Louis
4 - 6'	18	Shale and sandstone, usually a shale with sandstone inclusions, some well rounded fragments of lithographic limestone at base; undulating.	St. Louis
3 - 6'	17	Limestone, tan to light-brown, lithographic, beds avg. 0.2' with green shale partings. Slightly brecciated, undulating.	St. Louis
9 - 15'	16	Limestone, brecciated, light-greenish-gray; lithographic fragments in darker gray, fine-grained argillaceous matrix. Shale partings and pockets. Undulating.	St. Louis
1 - 2'	15	Limestone, tan, lithographic, hard, dense, stylolitic.	St. Louis
1.7'	14	Limestone, brown, medium-grained, crystalline, saccharoidal, hard, dense, one bed; forms roof of mine.	
1.1'		Limestone, brown, dolomitic, fine to medium-grained, with some crystalline calcite and veins, one bed with thin shale parting at the bottom.	
6.6'	11	Limestone, light-brown, fine grained; some calcite veinlets, stylolitic; small shale parting at bottom; thin	



chert band.

Limestone, light-brown to brown, partly dolomitic, glauconitic, stylolitic in upper part, chert nodules in lower part, upper and lower separated by shale parting.

Limestone, light-gray, coarse to medium grained, crystalline, banded, sandy texture, argillaceous in zones.

Shale, green, calcareous.

Limestone, brown, dolomitic, fine-grained, stylolitic with shale coating on stylolite; upper part argillaceous, lower part crystalline.

Limestone, brown, medium grained, with calcite masses; one bed with dark color bands giving an undulating appearance; shale parting at the bottom.

Limestone, fine-grained to sub-lithographic, stylolitic, glauconitic, massive. Floor of mine about 1 ft. up into this bed.

Limestone and shale, brown, numerous siliceous masses surrounded by gray shale partings.

Limestone, light-brown, fine to medium grained, thin bedded, with gray shale partings.

Shale, greenish gray to dark-gray, blocky, calcareous; lenses of soft limestone.

Limestone, dolomitic, [illegible] brown, fine-grained, argillaceous, [illegible]

Shale, [illegible]

Spergen

War.

April 23, 1960
for Jr. Academy of Science

FIELD TRIP TO RIVER PRODUCTS COMPANY QUARRY
SPONSORED BY THE IOWA GEOLOGICAL SOCIETY
(non profit organization of geologists)

GUIDEBOOK 3

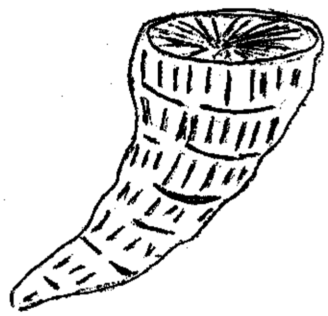
Among the industries that are dependent upon the processing of naturally occurring minerals in Iowa the crushing of limestone and dolomite is second only to the production of water.

In 1958, for example, 21,045,000 tons of limestone were crushed for various purposes in Iowa. This stone was produced for the following purposes:

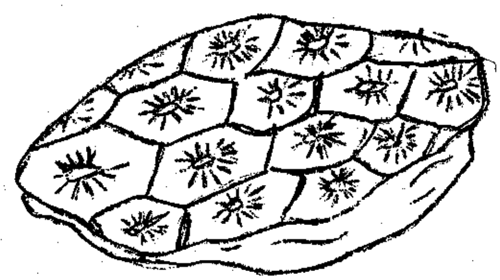
- agricultural lime
- dimension stone
- fluxing stone
- railroad ballast
- riprap
- concrete aggregate
- cement

The over-all average price would be about $1.25/ton.

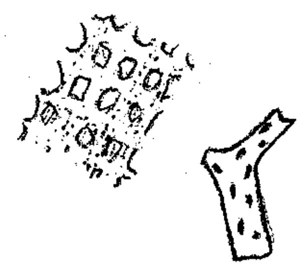
The quarry we are visiting, operated by River Products Company has been operated over a number of years. The face of the "lobe" we are in is about 70' high and about 10 acres in area. Over this particular area there has been removed about 2,000,000 tons of stone which at the usual royalty rate would bring the land owner about $100,000.00



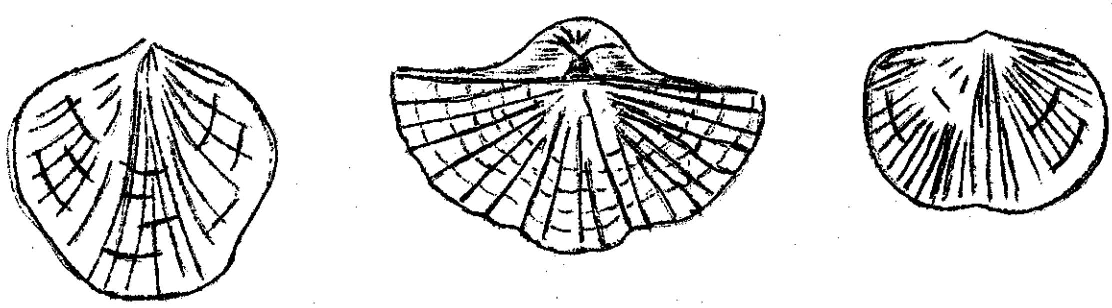
Horn Coral



Colonial Coral

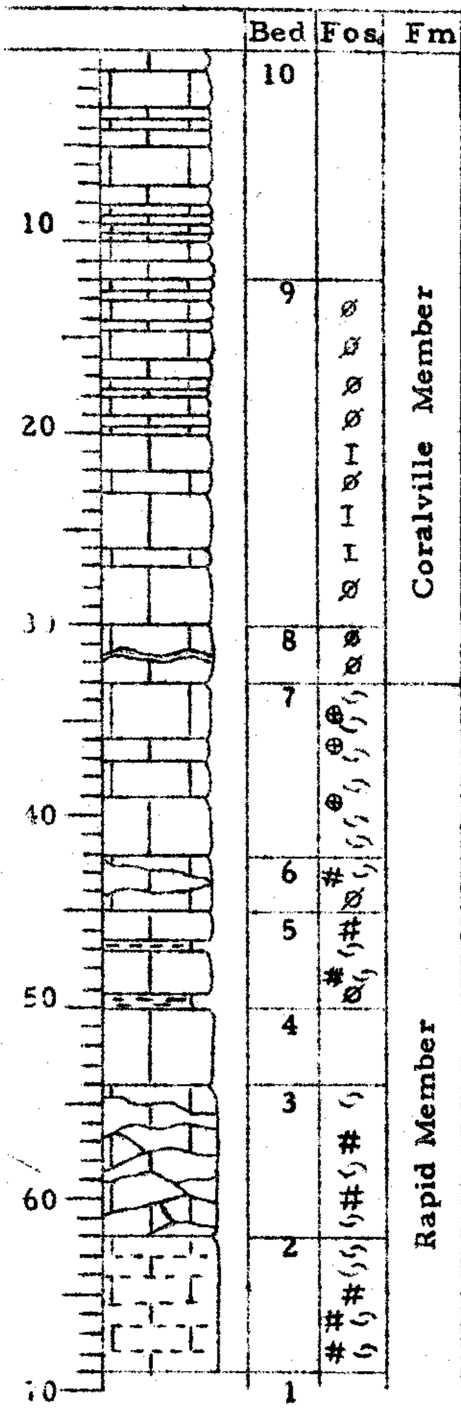


Bryozoans



Brachiopods

COLUMNAR GEOLOGIC SECTION RIVER PRODUCTS QUARRY
JUST NORTH OF CENTER SECTION 33, T. 80 N., R. 6 W.,
JOHNSON COUNTY



Description

10) Limestone, light gray, weathers white, lithographic, puddingstone breccia; beds vary in thickness from 2 inches to 1 foot 6 inches.

9) Limestone, gray to brownish gray, sublithographic, conspiciously spotted with corals and Idiostroma.

Floor of upper quarry.

8) Limestone, gray to brown, medium to fine grained, with large corals and stromatoporids which are cream in color making the bed conspicuous. A 2-inch coal seam occurs near middle.

7) Limestone, bluish gray to greenish gray, stained brown along joints and bedding planes, clayey, massive with oblique jointing; contains many fossils with the brachiopod Atrypa waterlooinsis and large crinoid stem segments most abundant. The dark gray to black fossil fragments are conspicuous.

6) Limestone, dark gray, shaly. This unit is so crowde with the colony coral Acervularia davidsoni that it appears bouldery. Also includes numerous small corals, bryozoans, brachiopods, and crinoid fragments.

5) Limestone, bluish gray, very fine to medium graine contains some large colony corals throughout and numerous small corals, brachiopods, and bryozoa in the shaly zones.

4) Limestone, gray to dark gray, very clayey, very fine grained, silty texture. Massive as one 4-foot bed.

3) Limestone, bluish-gray, very clayey, very fine grai very fractured. Breaks with chonchoidal fracture. Local pockets crowded with dark fossils, especially bryozoans, brachiopods, and few crinoid stem segments.

2) Limestone, bluish gray, very clayey, rough fragment texture; containing bryozoans and brachopods.

Quarry Floor

1) Surface of quarry floor crowded with black brachiopo and bryozoans. May be top of the Atrypa bellula zo

A fossil may be defined as the remains of, or evidence of, ancient life buried in the material of the earth's crust. Some of the representative types which you will see here are sketched above. If you would like more information about a special form, ask your group guide.

One of the important uses of fossils is in determining the relative age of rock (stratigraphic correlation) by comparing forms found in different areas. If the particular fossil type has had a wide geographic range, a short life in geologic time, and rapid evolutionary changes, then precise correlations may be made over great distances.

IOWA GEOLOGICAL SOCIETY 17 September 1960

GUIDEBOOK 4

Objective of trip:- To evaluate the question, "Are the Iowa Falls dolomite and the Eagle City limestone the lateral equivalents of the Gilmore City limestone?"

Convene:- Weaver quarry near Alden, Iowa. Sixty feet + of Gilmore City limestone is known from exposure and core.

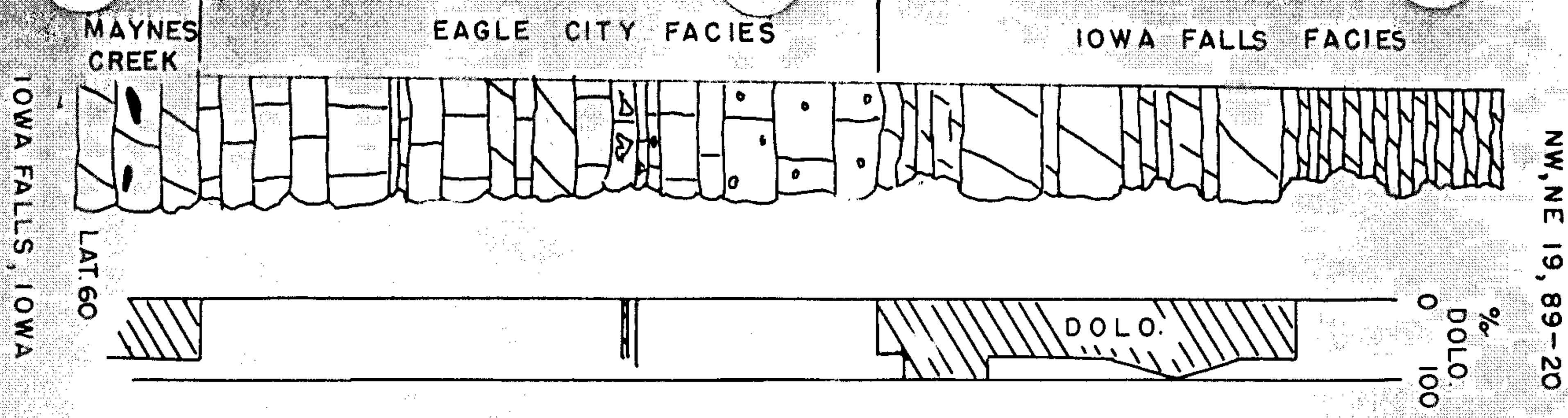
Stop 1 Railroad trestle - creek - near SE corner of Sec. 16, 89N 21 W.
(1) To observe dolomitized roll
(2) Gilmore City lithology under, or in, vertical contact with Iowa Falls lithology.

Stop 2 Dr. Johnson locality. Iowa River bank near center Sec. 14, 89N, 21W. Gradational contacts Maynes Creek to Gilmore City lithologies. Eagle City member completely dolomitized (or missing).

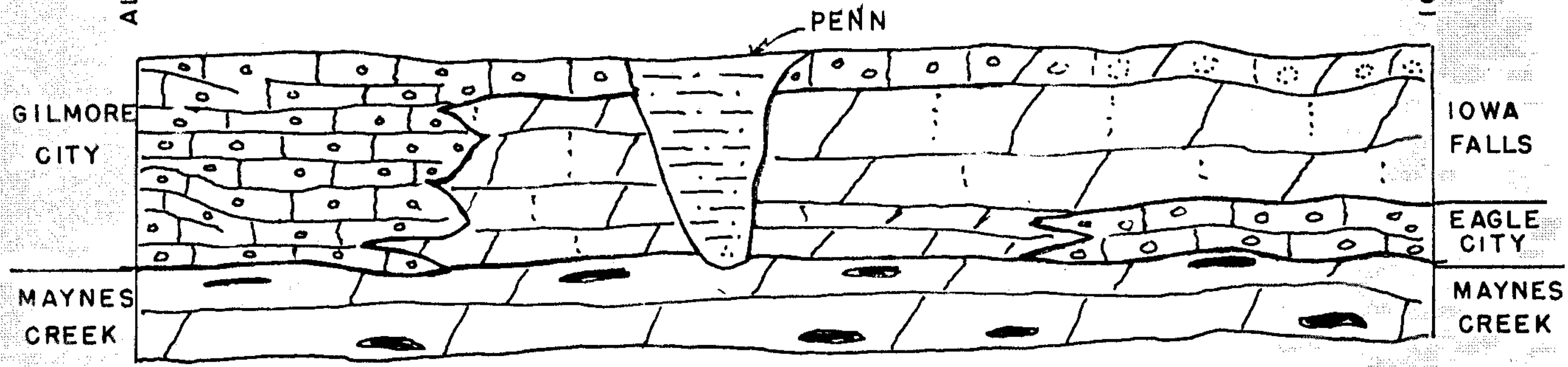
Stop 3 At railroad bridge in Iowa Falls. Near center S½ Sec. 18, 89N, R20. Dolomitization of contacts. Maynes Creek. Eagle City.

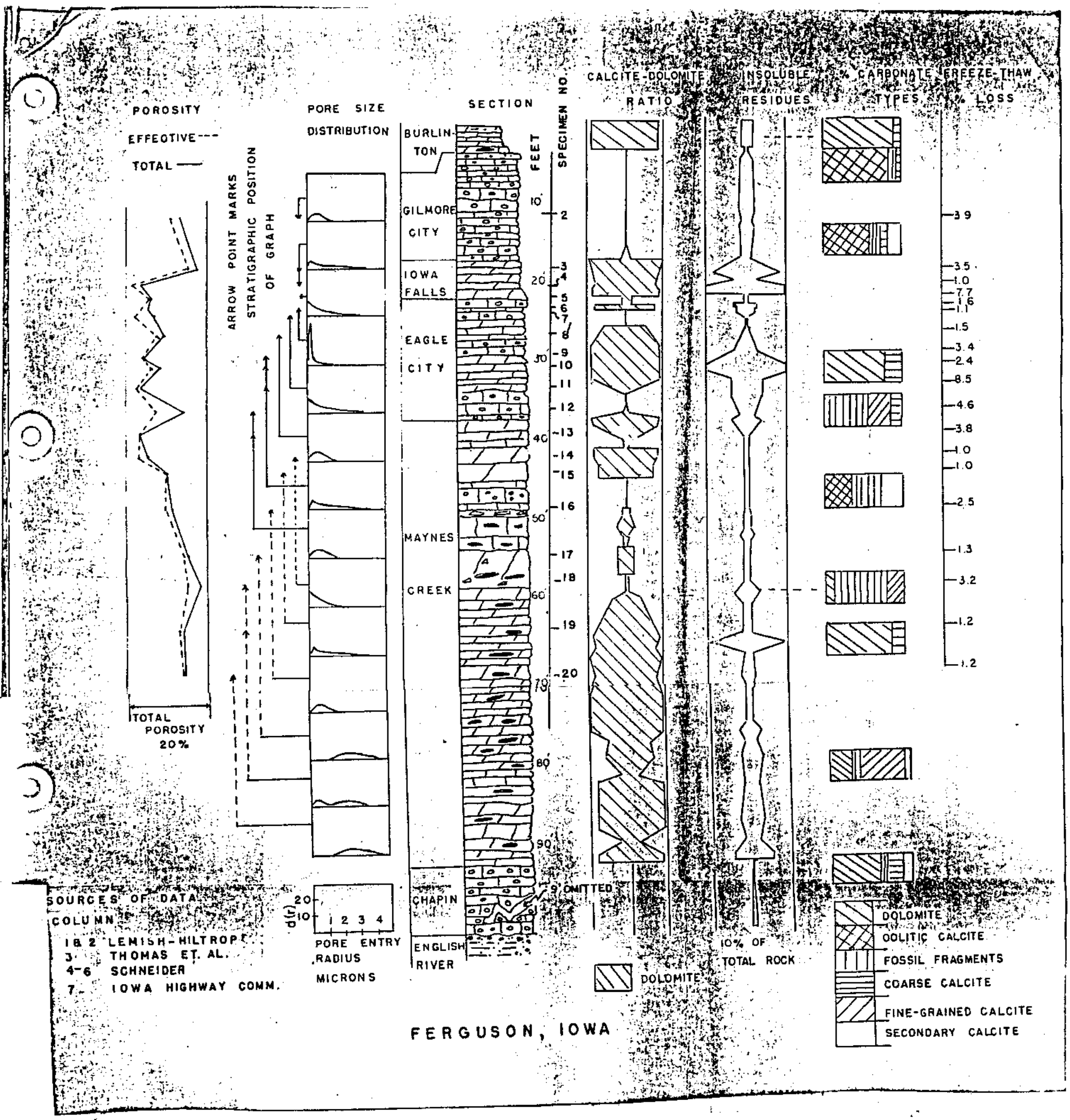
Stop 4 Welden Bros. pre-stressed concrete plant.

Stop 5 Ferguson, Iowa. Correlation of sections.

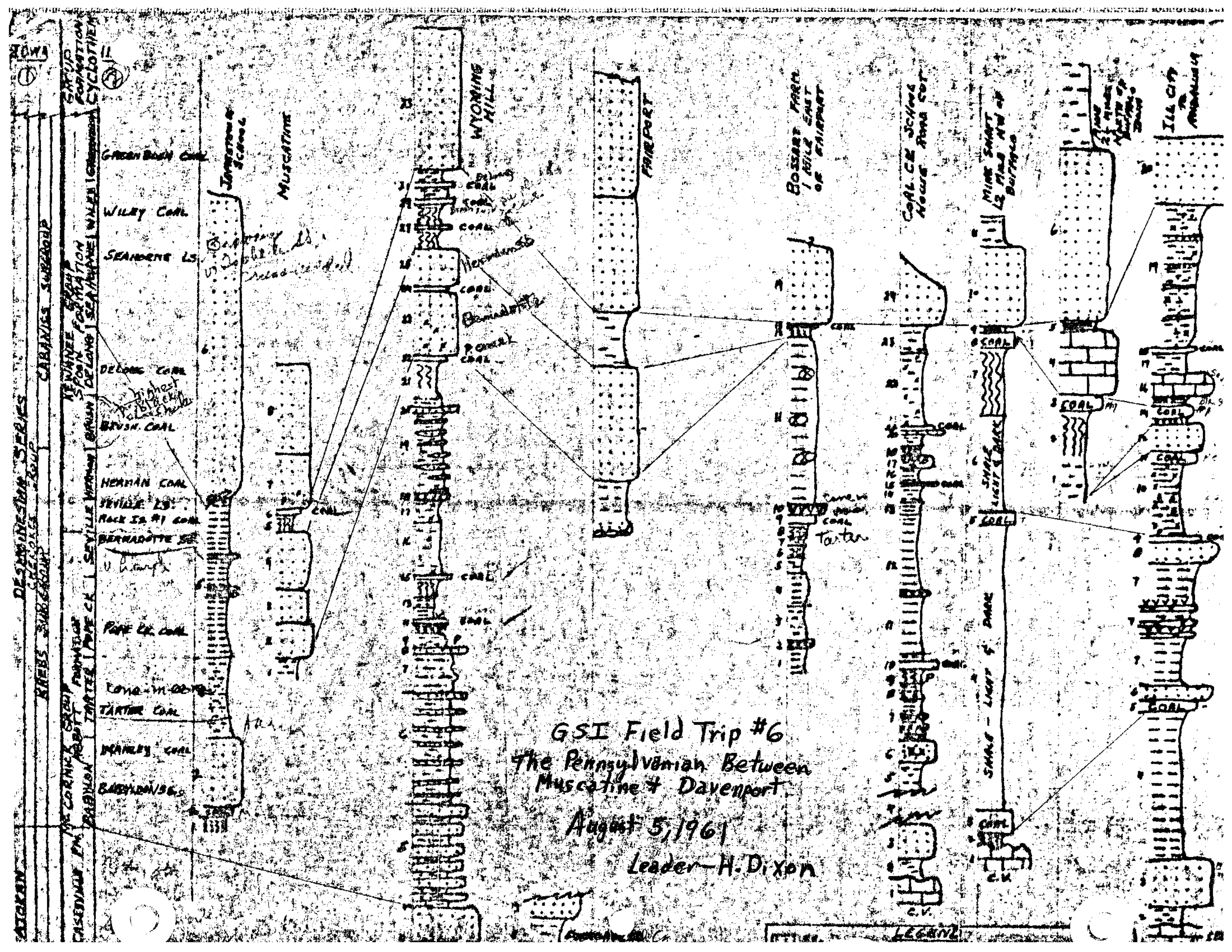


A SUGGESTED RELATIONSHIP
ALDEN TO IOWA FALLS





FERGUSON, IOWA



IOWA
ILL
DESMOINESIAN SERIES
CHEROKEE GROUP
CABANISS SUBGROUP
KREBS SUBGROUP
ATOKAN
GROUP
FORMATION
CYCLOTHEM
KEWANEE GROUP
SPOON FORMATION
McCORMICK GROUP
ABBOTT FORMATION
CASEYVILLE FM.
GARDEN BAIN COAL
WILEY COAL
SEAHORNE LS.
DELONG COAL
BRUSH COAL
HERMAN COAL
SEVILLE LS.
ROCK IS. #1 COAL
BERNADOTTE SS.
POPE CK. COAL
TARTER COAL
BABYLON SS.
JAMESTOWN SCHOOL
MUSCATINE
WYOMING HILL
FAIRPORT
BOSSART FARM 1 MILE EAST OF FAIRPORT
COAL CR. SCHOOL HOUSE ROAD CUT
MINE SHAFT 12 MILE NW OF BUFFALO
ILL CITY TO ANDALUSIA
COAL
SHALE LIGHT & DARK
SHALE - LIGHT & DARK
C.V.
C.V.
LEGEND
Tarter
GSI Field Trip #6
The Pennsylvanian Between
Muscatine & Davenport
August 5, 1961
Leader—H. Dixon

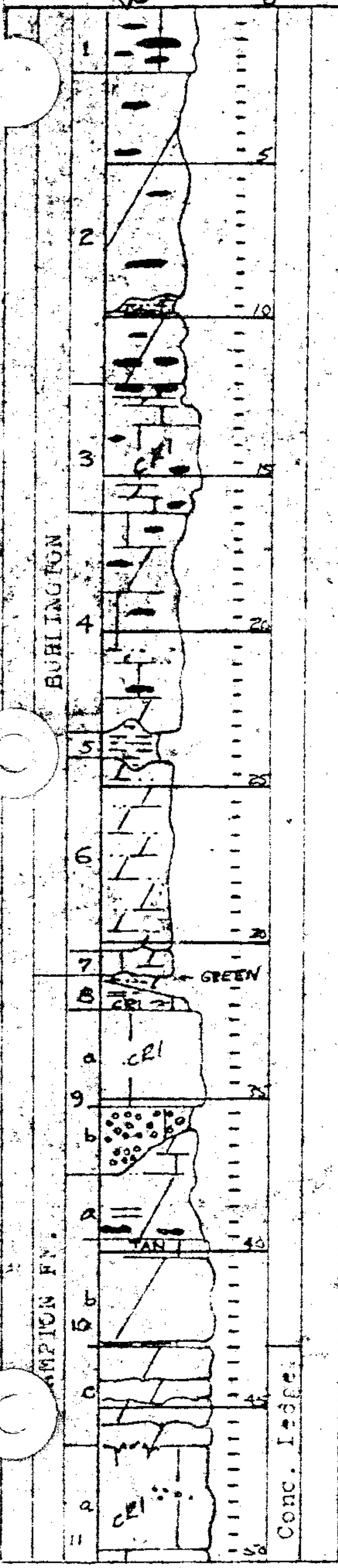
Leader: Oelschlager, Thomas, Welp

Iowa Geological Society Trip 7, Dec. 15., 1961 — 1

Donald L. Koch

Exploratory
Young
Producer
Office

Iowa State Highway Commission



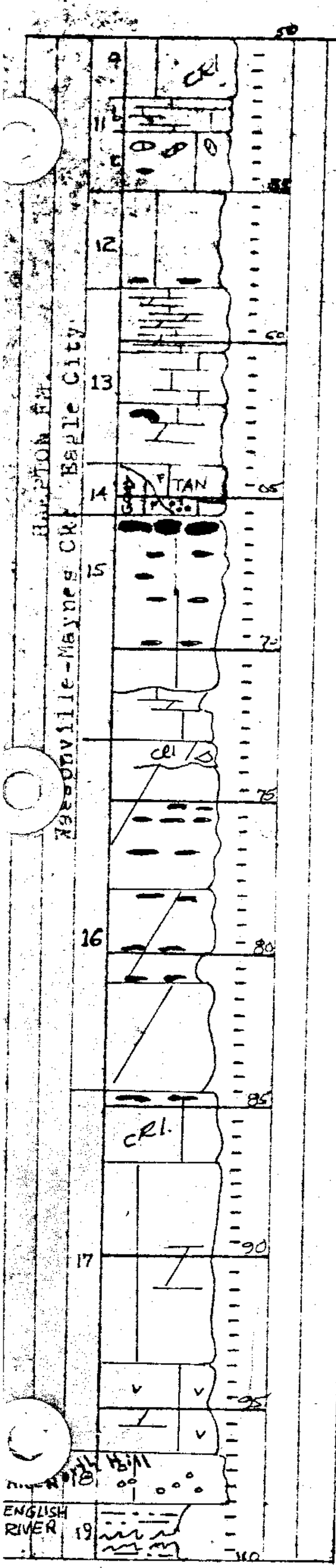
Location: SW¼ SE¼ Sec. 4 T80 N. R.15 W. Co. Poweshi
Malcom Stone Co. Puls Quarry

Remarks: Quarry Face

Measured by: Dirks & Myers Date: 10-17-61

Bed:	Description	:T
00:	Overburden about 35'	
	BURLINGTON	
1.	Limestone, dolomitic, red-brown, medium grained, filled with chert, harder than bed below.	0-2.0
2.	Dolomite, calcareous, yellow to reddish-gray, medium grained, contains abundant white chert, argillaceous, has a discontinuous green-gray siltstone band 2' above base.	10.0'
3.	Limestone, tan, crinoidal, upper 1.5' grades to red-brown dolomite, has a distinctive 0.6-0.8' white chert zone at top, some chert throughout.	4.2'
4.	Limestone, dolomitic, yellowish-brown, fine to medium grained, slightly crinoidal in zones, glauconitic, contains numerous tripolitic chert nodules, an occasional lense of green, silty dolomite, massive.	4.7-7
5.	Shale, calcareous, green, blocky.	0.6-3
6.	Dolomite, silty, greenish-gray, fine grained, glauconitic, medium hard, massive, grades to bed below.	4.6-6
7.	Limestone, dolomitic, green to greenish-gray, filled with glauconite, crinoid fragments.	0.7-1
	HAMPTON	
8.	Siltstone and crinoidal limestone, greenish to tan, grades to tan crinoidal limestone.	1.0-[illegible]
9.	Limestone. up to 8.1'	
	(a) Limestone, tan, coarsely crinoidal, stylolitic, contains an occasional band of gray, sandy dolomite.	3.6-4
	(b) Limestone, oolitic, gray-white, soft, pinches out in western part of quarry.	0-3
10.	Dolomite about 9.0'	
	(a) Dolomite, calcareous, greenish-gray, banded brown, fine grained, silty, contains a discontinuous chert band at base, pyritic, has an occasional brown crystalline limestone zone.	2.2-4

Iowa State Highway Commission



Location: SW¼ SE¼ Sec 4 T. 80 N. R. 15 W Co. Poweshiek
Malcom Stone Co. Puls Quarry

Remarks: Quarry Face

Measured by: Dirks & Myers Date: 10-17-61

Bed		Description	:T
10.	(b)	Dolomite, calcareous, as alternating bands of very fine grained, greenish-gray dolomite and dark brown coarsely crystalline dolomite, has 0.6' distinctive tan crinoidal zone at top, as one massive bed, has 0.1' shale seam at base.	3.2-3
	(c)	Dolomite, calcareous, dark brown, crystalline, has an occasional band of greenish-fine grained dolomite, beds average 0.3-0.6', grades to bed below.	3.1-3
11.		Limestone, tan about 8.6'	
	(a)	Limestone, tan, crinoidal to oolitic, stylolitic, dense, as two subequal beds.	4.3-6
	(b)	Limestone, light gray to tan, very fine grained to sublithographic, distinctively color banded.	1.4-2.
	(c)	Limestone, light brown, finely clastic to coarsely crinoidal, contains distinctive tan fine grained limestone fragments, may have some chert.	0.6-2.
12.		Limestone, tan, fine grained to clastic, has discontinuous chert band at base, contains numerous brachiopods, massive.	2.8-4.
13.		Limestone and dolomite, as light brown limestone mottled and banded with very fine crystalline dark brown calcareous dolomite, contains numerous brachiopods, crinoidal in areas, contains a few large crinoidal chert masses, as three beds.	5.8-7.
14.		Limestone, gray-brown to tan, finely clastic to earthy, filled with brachiopods, variable, argillaceous in areas, as two beds with fairly continuous bedding plane 0.6-0.8' above base.	1.4-2.
		MAYNES CREEK-WASSONVILLE	
15.		Limestone, gray-tan to dark gray brown, fine grained, earthy, has distinctive gray, tripolitic chert band at top, cherty throughout.	7.1-7.9

Iowa State Highway Commission

Location: Sec. T. R. Co.
Malcom Stone Co. Fuls Quarry

Remarks:

Measured by: Date:

Bed:	Description	Thk.
16.	Ls., dolomitic, dark brown, medium grained, saccharoidal, contains abundant gray chert, massive, has a distinctive crinoidal zone at top, chert zones at 2.4', 2.8', 3.7', 5.6', 7.3', and 7.9'	11.7'
17.	Ls., tan to dark brown, medium to coarse crystalline, crinoidal in upper 2.5', crinoid fragments throughout, chert at top, basal 3.0' vesicular.	12.3'
	NORTH HILL	
18.	Ls., gray-white, oolitic, stylolitic, as one bed.	1.4'
	ENGLISH RIVER	
19.	Siltstone, gray-green, contains numerous bryozoan, a few brachiopods.	12.8'

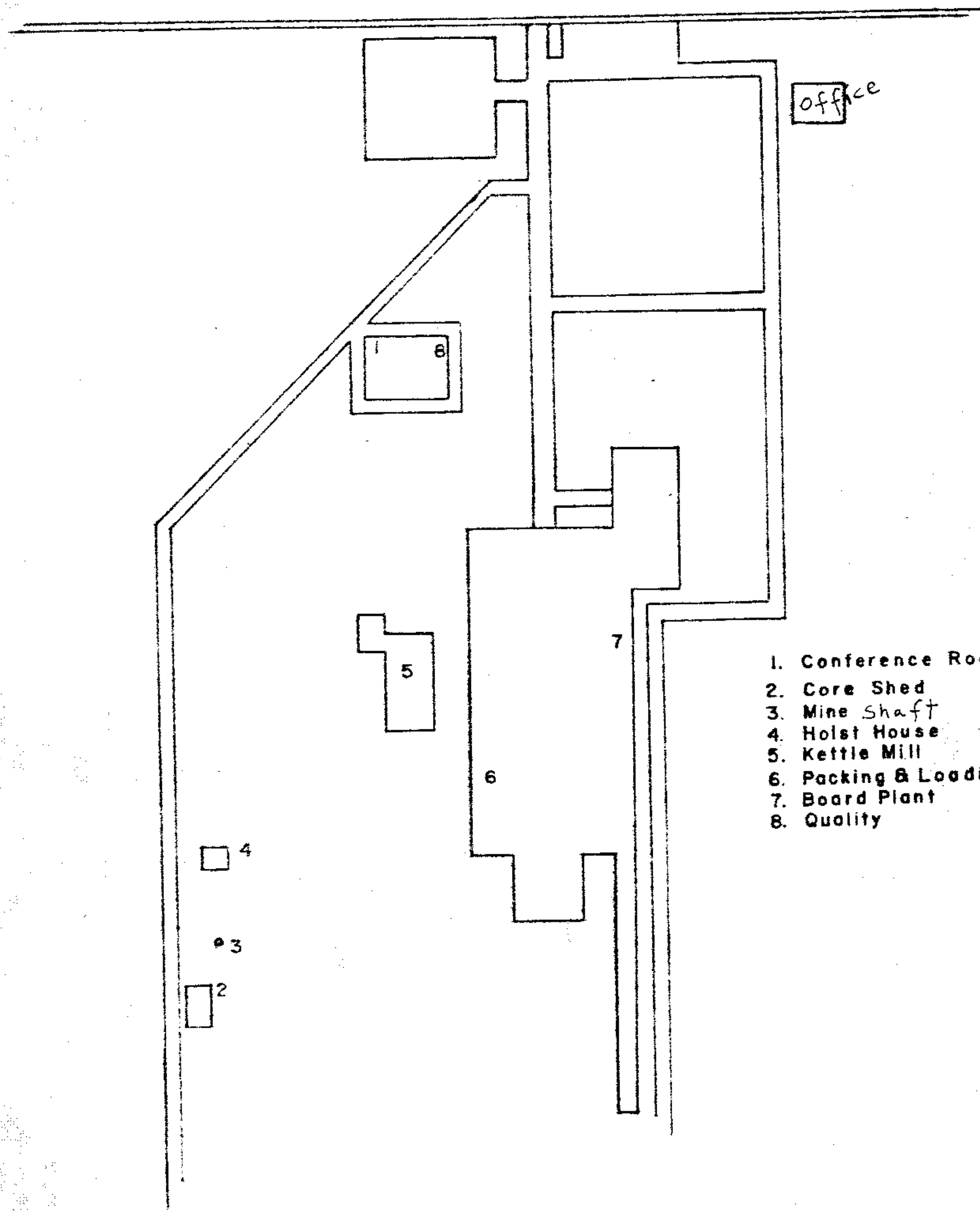
See samples from bed 13

Russell Campbell thinks that
unit 10 is beginning of Wassonville
Maynes Cr. interval and
units 8 + 9 are actually all
there is of the Hampton
Gilmore City interval

Donald L. Koch

GEOLOGICAL SOCIETY OF IOWA
GUIDEBOOK 8
UNITED STATES GYPSUM COMPANY
SPERRY, IOWA
Tour Route
March 30, 1962

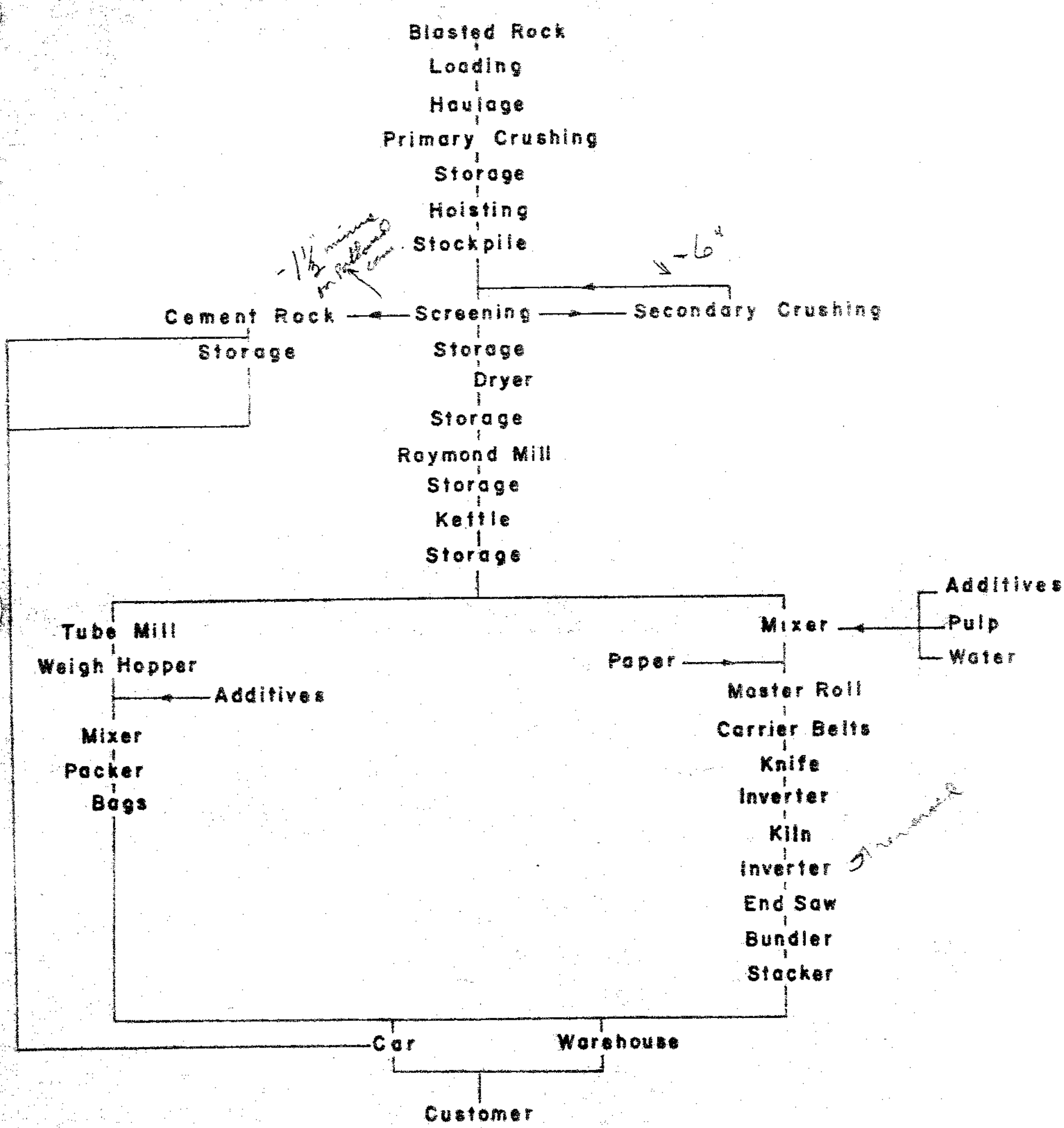
Leaders
Lyle Sendlein
Bill West



1. Conference Room
2. Core Shed
3. Mine Shaft
4. Hoist House
5. Kettle Mill
6. Packing & Loading
7. Board Plant
8. Quality

See specimens

Flow Sheet


Blasted Rock
Loading
Haulage
Primary Crushing
Storage
Hoisting
Stockpile
Cement Rock
Screening
Secondary Crushing
Storage
Storage
Dryer
Storage
Raymond Mill
Storage
Kettle
Storage
Tube Mill
Weigh Hopper
Additives
Mixer
Packer
Bags
Mixer
Additives
Pulp
Water
Paper
Master Roll
Carrier Belts
Knife
Inverter
Kiln
Inverter
End Saw
Bundler
Stacker
Car
Warehouse
Customer

General Stratigraphic Column

System	Formation		Description	Thickness
Mississippian	St. Louis		Limestone; lt. bluish-gray, v. fine grained, dense, sublithographic	0 – 15
	Warsaw		Limestone, Shale; many Bryozoa	0 to 105
	Keokuk		Limestone; bluish w/ thin shale partings	
	Burlington		Limestone; lt. gray, brownish, massive, coarse grained, with crinoids & banded chert	0 – 50
	Hampton		Limestone, Dolomite; lt buff-yellowish, f. grained, oolitic beds	0 – 33
	English River		Siltstone; yellowish brown-bluish gray, med. fine silt, fossiliferous	10
Devonian	Maple Mill		Shale; dk. brown-greenish gray, distinct banding, pyrite	0 – 300
	Lime Creek		Dolomite; lt. greenish gray-buff, f. grained to sublithographic	7 – 13
	Cedar Valley	Member		
		Rapid	Limestone; lt. buff to med. brown, coarse grained to sublithographic, fossiliferous	55 – 60
		Solon	Limestone; med.-dark gray, f. grined-sublithographic, faint banding, fossiliferous	58 – 62
	Wapsipinicon	Davenport	Limestone; lt buff-med. gray, v.f. grained to lithographic, fossils absent, styolites	17 – 21
		Spring Grove	Dolomite; brownish gray, fine grained, thinly bedded, styolitic, with gypsum	33 – 37
		Kenwood	Dolomite; greenishgray w/ dark mottling, v. fine grained, with gypsum nodules	18 – 22
Silurian	Niagaran Series ?		Conglomerate; red, black, orange, gray, and white rounded to subrounded silica grains in a greenish gray dolomite matrix	0 – 50
Ordovician	Maquoketa		Shale; greenish gray, v. fine grained, dolomitic	50 – 200
	Galena		Dolomite, Limestone; lt. buff-gray, fine textured	195 – 240
	Decorah		Limestone; brown, fine grained, w/ shale	~25
	Platteville		Limestone, Dolomite, Shale; dark gray to bluish green laminated	~45
	Glenwood		Sandstone, Shale; bluish green shale w/ sandy beds	50 – 80
	St. Peter		Sandstone; white, massive, med. textured, friable	25 – 50
	Prairie de Chien		Dolomite; lt buff to buff, crystalline, with chert	?

This column covered with 0–300' of till belonging to the Cenozoic system.

This section compiled from core hole information and well logs.

May 12, 1962

~~Bill Bunker~~

Geological Society of Iowa #9

by V. Dow
& S. Mettler

FIELD TRIP
SKVOR-HARTL AREA
SOUTHEAST LINN COUNTY, IOWA

In this area it is possible to study in outcrop stratigraphic units from the Coralville member of the Cedar Valley (Devonian) to the Silurian, which in this area consists of LeClaire, Anamosa, and Hopkinton (?).

The interpretations of the stratigraphy and structure were based on a number of cores as well as exposures. All information was tied in by a transit and stadia survey.

STRATIGRAPHY

The general stratigraphy of the units found in the area is discussed below:

SILURIAN

Undifferentiated Silurian (Hopkinton?). Dolomite, light gray, fine-grained, massive, very porous and friable to dense and hard, highly inclined fracture planes, thickness not known.

Not found in exposure.

LeClaire. Dolomite, light gray to pinkish brown, fine- to medium grained, massive, vuggy, very hard, with locally soft marly zones, highly inclined bedding, abundantly fossiliferous, thickness not known.

Exposed in south one-third of the area and in the bluffs south of the Cedar River in the east-central part of the map.

Anamosa. Dolomite, yellow-brown, fine-grained, laminated, soft, thickness not known.

Not identified in any exposures.

SILURIAN-DEVONIAN

Bertram. Dolomite, very light gray to bluish-gray, fine-grained to sublithographic, with earthy texture, massive, brecciated to highly fractured with calcite and green clay fillings throughout, thickness not known, but fifty-seven feet has been cored.

Exposed (?) in floor of Hartl quarry.

DEVONIAN

Wapsipinicon formation

Coggon member. Dolomite, brown to gray, fine- to medium-grained, crystalline to earthy, contains bands of smooth brown chert nodules, about twenty-five feet thick.

The full thickness is exposed in Hartl quarry, where the contact with the overlying Otis can be seen. There are also exposures in the southern one-third of the area where it flanks the Silurian.

Otis member. Limestone and/or dolomite, light to dark brown, fine-grained to sublithographic, even bedded, hard and brittle, with a consistent soft zone of about seven feet in the middle, locally brecciated, and arenaceous, about twenty feet thick.

Exposed in Hartl quarry.

Kenwood member. Shale, limestone, dolomite, and all gradations between, blue to yellow brown, fine-grained, irregular bedding, with lenses of limestone grading to shale, locally brecciated, arenaceous, with abundant black sand grains, some smooth gray chert, about twenty-one feet thick.

Exposed in bluffs south of the river.

Spring Grove member. Dolomite, medium to dark brown, fine-grained, saccharoidal, very thin bedded, very porous, soft, marly in spots, about nineteen feet thick.

Exposed in the creek bottom of the main creek through the area, and at the base of the large hill about six hundred and fifty feet south of the center of sec. 9 T. 82 N., R. 6 W.

Davenport member. Limestone, brown, sublithographic to lithographic, massive, brecciated, with yellow-brown argillaceous, arenaceous matrix, about nineteen feet thick.

The contact of this unit and the overlying Cedar Valley formation can be seen on the side hills east and west of the main creek which flows through the center of the area.

Cedar Valley formation

Rapid-Solon member. Lower portion is limestone, light brown, fine- to medium grained, slabby, with basal two to three feet brecciated and sandy; upper portion is limestone, blue gray, medium- to coarse-grained, with soft white crinoidal chert, about fifty feet thick.

Exposed in central part of the area, on the side hills and near the creek.

Coralville member. Limestone, light brown to light gray, fine-grained to lithographic, massive, abundantly fossiliferous.

Exposed on both sides of the main creek in the center of the area, where it is greatly disturbed.

STRUCTURE

The main structure of the area is the sharp northeast to southwest trending syncline shown on the map. In addition, there are two smaller folds, diverging northward from the main syncline, and a fault striking to the southeast. A broad anticline borders the area on the south.

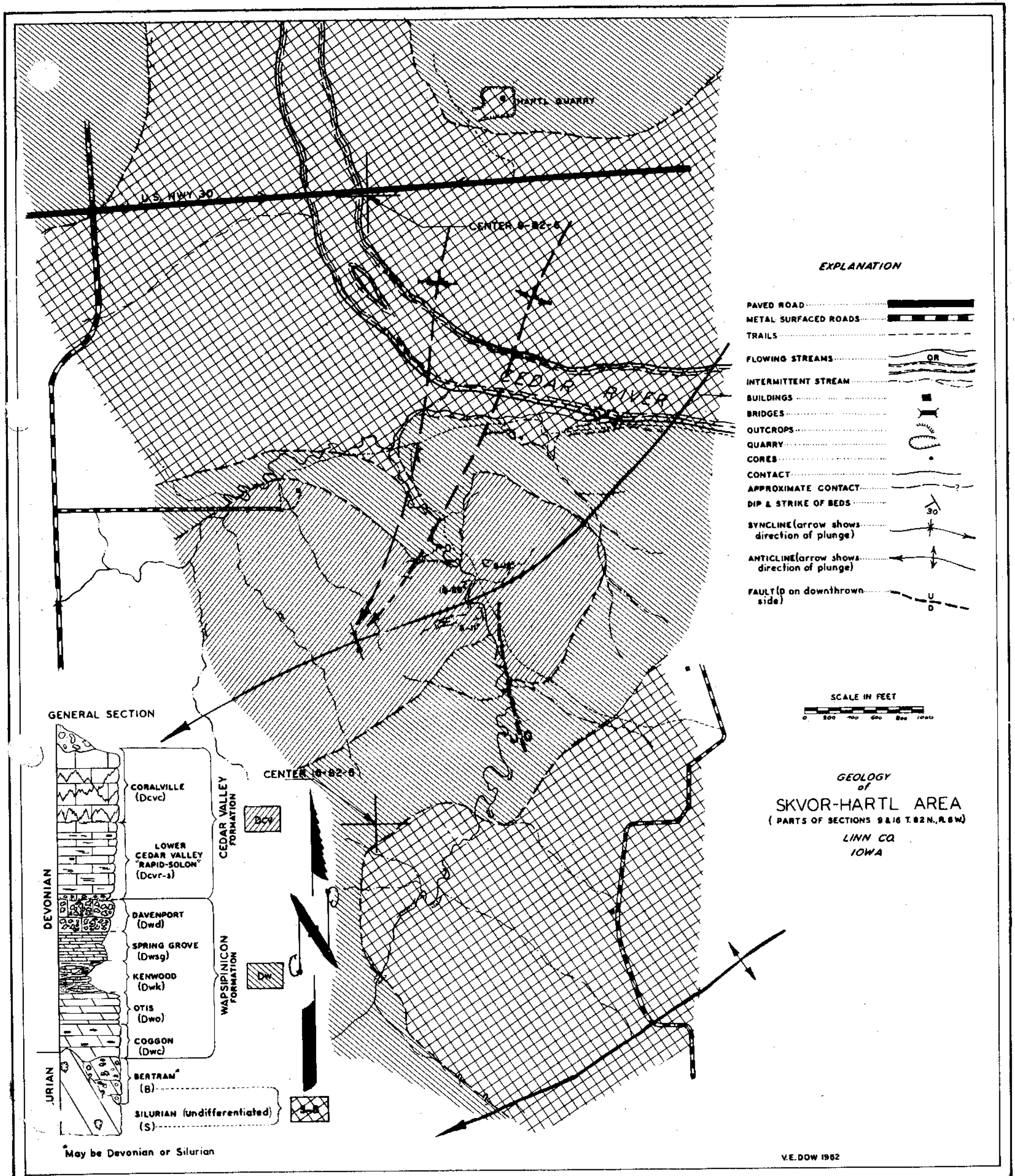

HARTL QUARRY
U.S. HWY 30
CENTER 9-82-6
CEDAR RIVER
EXPLANATION
PAVED ROAD
METAL SURFACED ROADS
TRAILS
FLOWING STREAMS
OR
INTERMITTENT STREAM
BUILDINGS
BRIDGES
OUTCROPS
QUARRY
CORES
CONTACT
APPROXIMATE CONTACT
DIP & STRIKE OF BEDS
30
SYNCLINE (arrow shows direction of plunge)
ANTICLINE (arrow shows direction of plunge)
FAULT (D on downthrown side)
U
D
SCALE IN FEET
0 200 400 600 800 1000
GENERAL SECTION
CENTER 16-82-6
DEVONIAN
CORALVILLE (Dcvc)
LOWER CEDAR VALLEY "RAPID-SOLON" (Dcvr-s)
CEDAR VALLEY FORMATION
Dcv
DAVENPORT (Dwd)
SPRING GROVE (Dwsg)
KENWOOD (Dwk)
OTIS (Dwo)
COGGON (Dwc)
WAPSIPINICON FORMATION
Dw
URIAN
BERTRAM* (B)
SILURIAN (undifferentiated) (S)
S-B
*May be Devonian or Silurian
GEOLOGY of SKVOR-HARTL AREA
(PARTS OF SECTIONS 9 & 16 T. 82 N., R. 6 W.)
LINN CO. IOWA
V.E. DOW 1962

FIGURE 1

Donald L. Koch
Leaders:
F. Dorheim
R. Campbell
M. Parker

THE GEOLOGICAL SOCIETY OF IOWA

Field Trip 10

Maquoketa of Northeast Iowa

July 21, 1962

Stop 1. Cooney Quarry: SW1/4 sec. 16, T. 96 N. R. 6 W., Allamakee County

At this location the upper part of the Galena, the "depauperate" zone near the base of the Maquoketa and the lower part of bed 1 of the general section can be seen.

Stop 2. Fitzgerald Creek. SE 1/4 sec. 8 and SW1/4 sec. 9 T. 95 N., R. 7 W., Fayette County

Bed 1 through 13 of the general section exposed in creek, tributary ravines and along the road.

Stop 3. Eldorado road cut; Highway 150 at Turkey River bridge near Eldorado, NE1/4 sec. 18 T. 95 N., R. 8 W., Fayette County.

Beds 5 through 20 exposed.

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Leaders:
F. Dorheim
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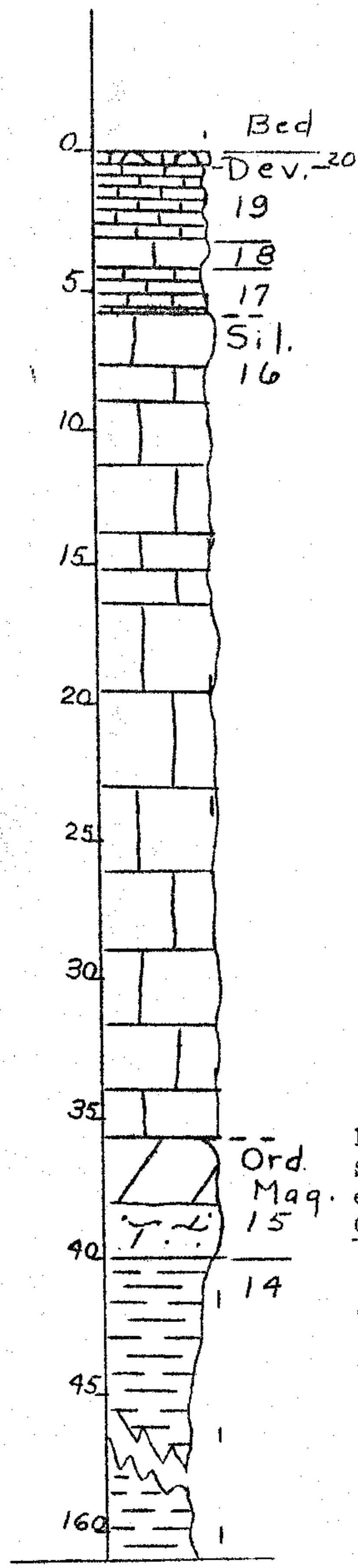
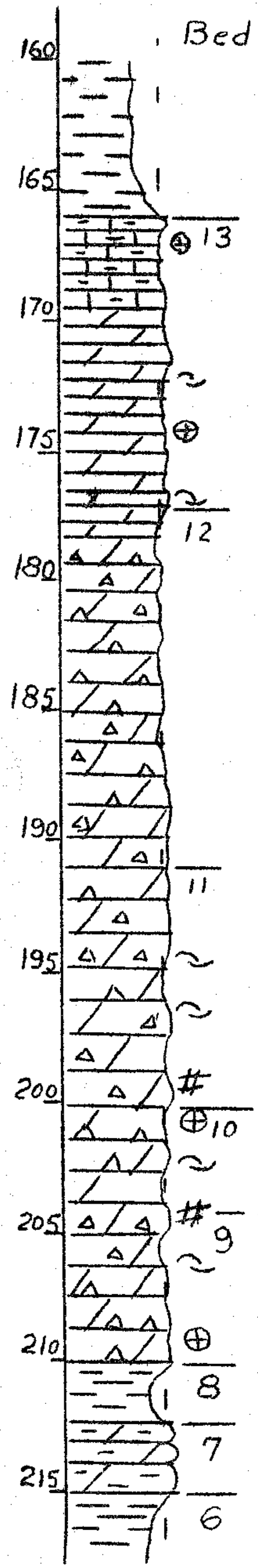
Beds 5 through 20 exposed.

Brainard 127'
Ft. ~~Atk.~~ 48'
Clermont 26'
Elgin 116'



Brainard member
Shale, soft, bluish-gray, calcareous fossiliferous, with red iron concretions and with Cornulites. 4'

Shale, greenish-blue, chunky, soft 123'



Ft. Atkinson member

Dolomite, yellowish-brown, massive, chert free in the upper 5' containing scattered chert in the lower portion. Very fossiliferous, containing a coquina-like assemblage of crinoid stems and brachiopod fragments. 10'

Dolomite, calcareous, in regular layers, containing large quantities of chert in the form of nodules and irregular beds, sparcely fossiliferous. 15'

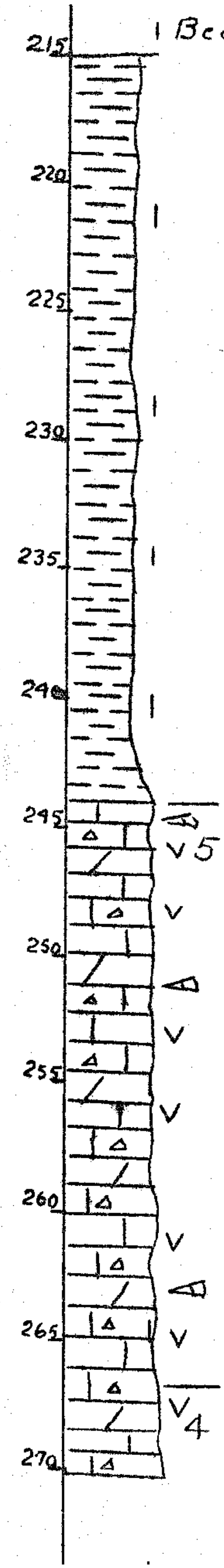
Dolomite, fine-grained, in even layers, containing nodular chert and many large brachiopods. 3'

Dolomite, massive, containing nodular chert; bryozoan abundant. 5'

Dolomite, massive, very fossiliferous; crinoidal zone at base. 5'

Shale, gray-green, dolomitic. 2'

Dolomite, argillaceous, fine-grained, thin-bedded. 3'



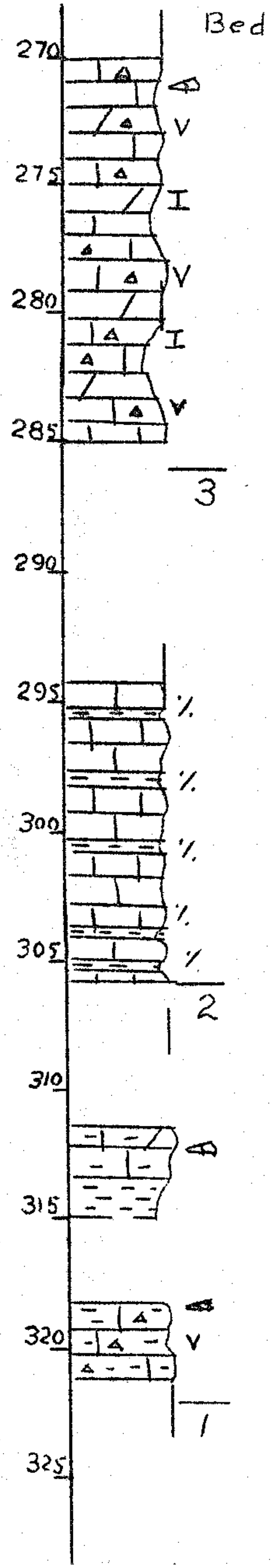
Clermont member

Shale, bluish-green with numerous crinoid stems, brachiopods, and straight cephalopods. 26'

Elgin member

Limestone, yellowish-brown to grayish-brown, fine to medium grained; in places dolomitic, chert free in upper portion, lower portion contains light-gray chert nodules and numerous fossil fragments. 20'

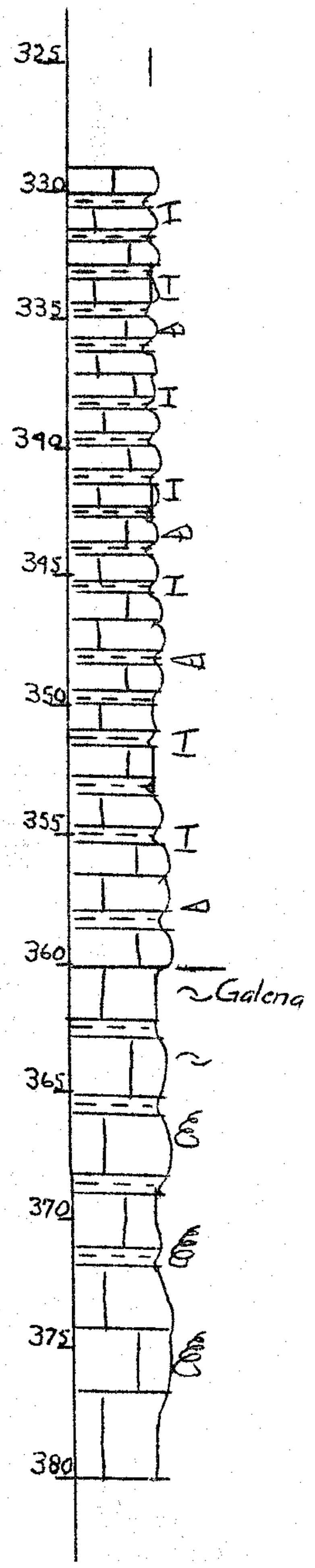
<u>Vogdesia</u> beds: Dolomite, grayish-brown, argillaceous, with scattered nodules of light gray chert. 22'



Limestone, dark brown to gray, earthy, containing numerous black bars and specks and light to medium gray mottled chert. 20 '

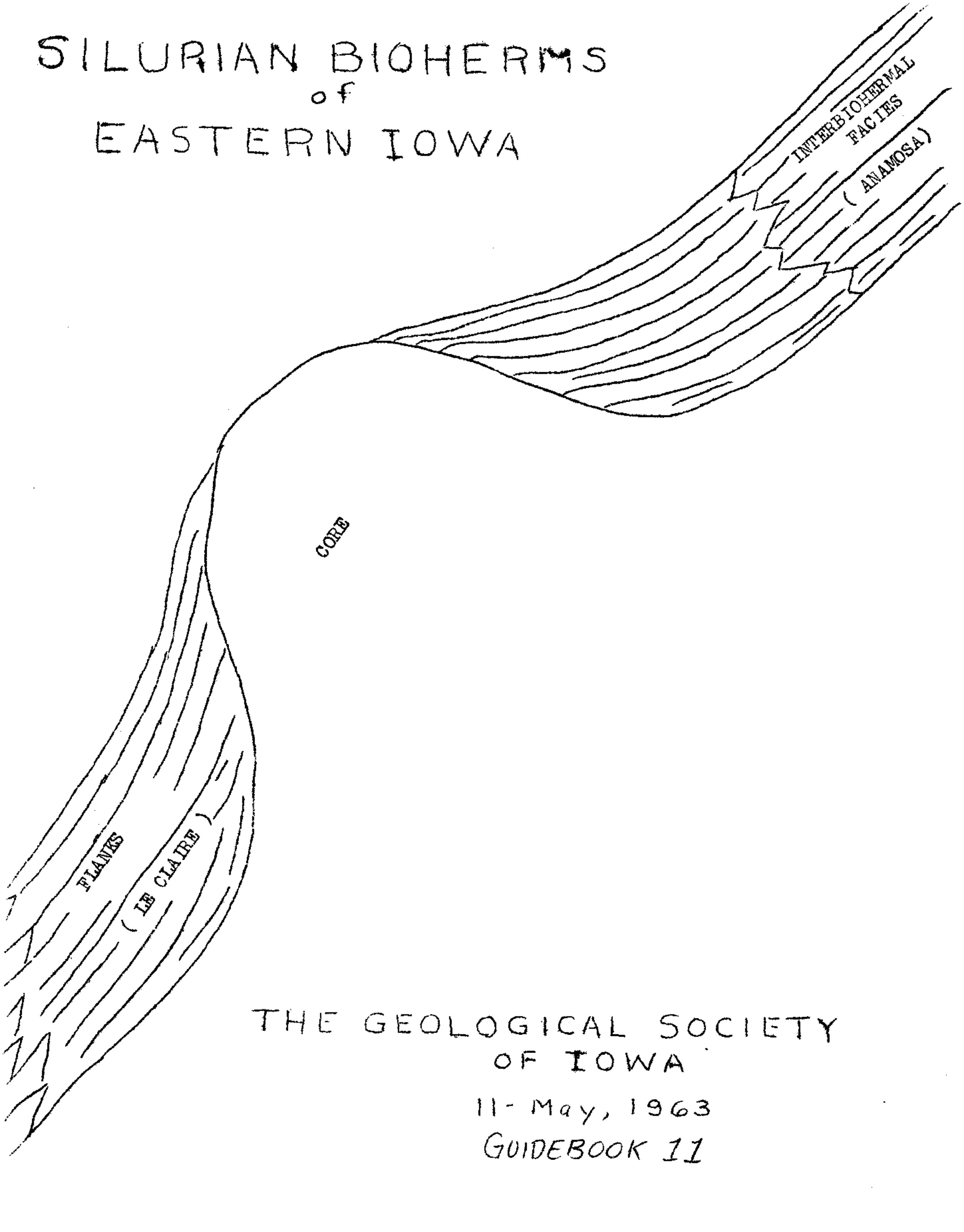
Limestone or dolomite, bluish-tan, thinly bedded, grading into shale, bluish-tan, containing rust colored trilobite fragments and some smooth, tan chert. 18'

Isotelus iowensis zone: Limestone, tan, fine-grained argillaceous which parts on laminae of shale; contains abundant fragments of Isotelus iowensis and large "orthoceras". 32 '



360
244
116

SILURIAN BIOHERMS of EASTERN IOWA



THE GEOLOGICAL SOCIETY OF IOWA

11 - May, 1963

GUIDEBOOK 11

Trip leader: E. E. Hinman
Dept. of Geology
Cornell College

Silurian Bioherms of Eastern Iowa

Introduction

The objective of today's field trip is an investigation of Niagaran bioherms in portions of Linn and Cedar Counties. These structures are typical of those also exposed in Jones, Clinton and Scott Counties.

Since no single quarry or outcrop displays all aspects of these bioherms, four sites have been selected to visit which, together, should give a fairly complete picture of biohermal architecture, paleontology, and the relationships of these features to the inter-biohermal facies.

The word, "bioherm", coined by Cumings in 1930, was intended to clear up the confusion surrounding the term, "reef", which had been used to cover widely divergent features. According to Cumings (1930, p. 207),

> A bioherm...is defined as consisting of any dome-like, mound-like, or otherwise circumscribed mass, built exclusively or mainly by sedentary organisms such as corals, stromatoporoids, algae...and enclosed in normal rock of different lithologic character.

"Reef", as defined in a standard dictionary, makes no mention of an organic origin, specifying only that it be a ridge rising from depths to or near the surface of the water. In the geologic literature, however, it had been used for organically- and inorganically-formed deposits, regardless of their relationship to the bottom or surface, and even as a structural term (as in the Australian gold reefs). Authors sometimes made the concession of adding the prefix, "coral" or "inorganic" to reef which at least gave the reader a clue to the origin of the feature. The problem remained, however, to differentiate between coral or other organic accumulations surrounded by stratified material and wave resistant ridges which rose from the sea floor as true reefs.

Stratified sediments enclosing either feature would result in structures which are very similar to each other. Cumings therefore proposed to lump all unstratified organic facies under his term, "bioherm". In essence, then, all organic reefs are bioherms but not all bioherms are reefs.

Since its introduction, "bioherm" has been misapplied and incorrectly defined to the point where some propose its abandonment. Others (Lowenstam, 1949-1950) also rejected the term on the basis that it includes accumulations of widely different origins. The term, "bioherm", if correctly applied, remains as a useful tool for people like the author who for various reasons hesitate to use the term, "reef".

History of Investigation

One of the first references to bioherms (reefs) in the literature was made by Murchison (1847) in his description of the geology of the Gotland area. Later references by other authors noted similar structures in rocks of varying ages throughout the world. Many of the authors of early reports failed to recognize their organic origin, however. It is interesting to note that the Silurian bioherms of Iowa described by Hall (1858) in the town of Le Claire were probably the first observed in the U. S. Unfortunately he then described the structures as anticlinal in origin, and despite the work of Chamberlain in 1877 in Wisconsin where similar structures were attributed to an organic origin, it was not until 1901 that Norton, representing the Iowa Survey, acceded to the organic development of these features in Iowa, and at that he bore some misgivings. Prior to that time several Iowa investigators had attributed their origin to such causes as anticlinal folding, current bedding, and false bedding.

Little work has been done in Iowa on these structures since Norton. The latest work was that of Rowser in 1929 and 1932 in connection with his study of the Silurian System and the Gower Formation. Bioherms have been widely studied, however, in Illinois, Indiana, Wisconsin and Michigan.

Gower Formation

The bioherms of eastern Iowa are confined generally to the Gower Formation of Niagaran age. The Gower Formation was named by Norton in 1899, but the history of the unit began in 1858 when Hall described and named the Leclaire (Hall's spelling), which was later to be designated as a facies of the Gower Formation. His description, which appears to be typical, is as follows (1858, p. 73),

> A gray or whitish limestone, sometimes yellowish gray on fresh fracture. The whole mass is semi-crystalline, very porous, and vesicular from the removal of fossils. It is sometimes so extremely and uniformly vesicular as to resemble the porous lavas or amygdaloids. The surface is harsh to the touch, and, on fresh fracture, has the sharpness and harshness of a siliceous rock.

Hall noted, but left unnamed, what is now designated as the Anamosa facies of the Gower. At that time Hall believed this unit to be overlying the Le Claire. By 1899 Norton was convinced that the Anamosa and Le Claire were (p. 422), "lithologic phases of contemporaneous deposition" and in 1901 proposed the name Gower as the formational name for a unit which included both facies.

Silurian Bioherms of Iowa

The Silurian bioherms of eastern Iowa are similar to those described in Indiana, Wisconsin, and Illinois. They are generally smaller than those of Indiana and Illinois, however. Their smaller size is compensated for by their great numbers.

They are low, oval mounds with diameters ranging from a few tens of feet to approximately a quarter mile. Their height has yet to be ascertained but is perhaps in the neighborhood of 200 feet. They consist of two parts: a central core, and flanking beds. (See cover).

The core consists of a dense, hard, gray to blue-gray dolomite of varying porosity which is almost totally lacking in chert. It is virtually without stratification. The core contains brecciated material, some of which is primary and some the result of solution, which is extensive in the core and which is responsible for the deposition of residual clays in these cavities and along fractures as well. The core is the most fossiliferous of these facies. Corals and Stromatoporoids are the dominant fauna of the core, and colonies or cavities produced by the removal of the colonies are conspicuous in this facies. Many of these coelenterates are to be found in a living position. Pelmatozoans, brachiopods, and molluscan fauna are also present here.

The flank beds are composed of the same lithology as the core; there, however, the material is stratified, dipping away from the core at moderate to high angles. Like the core, it has solutionally derived porosity and residual clays. Both are, however, reduced in size and amount. These beds interfinger with the inter-biohermal sediments down-dip but terminate abruptly against the core. The flanks also contain some primary breccia. These fragments are generally smaller than those of the core and are usually concentrated in bands. The dominant fauna of the flanks are pelmatozoans and brachiopods, with molluscan fossils locally abundant. Also present are corals and stromatoporoids; these, however, are generally fragmented and show evidence of transportation.

The fauna of the flanks and the core is of a type adapted to moderate turbulence, and the condition of the remains would seem to confirm this.

The inter-biohermal sediments are of a different lithology, consisting of dull, light yellow-brown, granular to dense dolomite which is softer than the biohermal facies. This material is flat bedded, well stratified, and essentially barren of fossils.

Conclusions

Several conclusions have been drawn on the basis of the above observations made on the architecture and lithology of the bioherm, together with the organisms present, their condition and position. I would very much appreciate any comments you may care to make in regard to the observations or to the conclusions derived.

The bioherms began as isolated centers of coelenterate growth in a shallow sea, these centers marking the place of optimum conditions for their development. Initially these were below wave base but with continued growth they rose into a zone of light to moderate turbulence, and hence were subjected to erosion. The material derived from this erosion was deposited in deeper water, well below the core, as inclined strata with initial dips controlled by the angle of repose of the material. Though generally of sand size, the materials derived from the core would occasionally consist of larger stromatoporoid or coral fragments which were torn from the framework during times of high turbulence. The core and flank beds constituted a new environment with increased circulation in which pelmatozoans, brachiopods, and molluscs could establish themselves. The flanks were preferentially occupied because the turbulence there was sufficient for food gathering, but less violent than that on the core. As a result of the contribution of these organisms and of their effectiveness in trapping clastic material from the core, the flanks expanded into a significant component of the biohermal facies.

Subsequent to the bioherms' formation, they have been subjected to solution and dolomitization by ground water. These have resulted in a destruction of most of the organic structures not destroyed during bioherm formation; removal of many fossils producing increased porosity with size and number a function of the size and concentration of the fauna removed; deposition of residual clays in many of the vugs, fractures, and bedding planes; and collapse features.

Road Log

Time	Mileage	
9:00	0.0	Meet in Lisbon, on paved road (Washington St.) south off U. S. 30, south of DX station.
		Head south on paved road. Pavement ends after 2 blocks; continue on gravel.
	1.0	Intersection with gravel road which bears right. Bear left on road which passes dump.
9:10-10:30	1.5	Quarry entrance (drive in).

STOP I The Mitchell Quarry (NW¼, Sec. 24, T.82N., R.5W., Linn Co.)

The Mitchell quarry, by cutting through portions of flank and core, offers an excellent exposure of core and sufficient flank rock to show their mutual relationship.

Nearly the entire NW wall, including the old and new cuts, exposes core rock, with the exception of a little veneer along the top in the old cut and obvious flank beds in the NW corner of the new cut.

The SE face in the new cut is nearly a mirror image of the NW wall, with core in the center and flank beds at both ends. The remainder of the face exposes flank beds dipping away from the quarry floor.

By biohermal standards the fossils found here are above average, both in preservation and number--this in keeping with the observation that core facies is generally more fossiliferous. Note the relatively large numbers of coelenterates and the presence of large pores produced by their removal.

1.5	Proceed south on same gravel road to intersection and turn left.
2.5	Proceed through intersection.
3.0	T-intersection; continue straight ahead.
3.5	Second T-intersection to left; continue straight ahead.
4.5	Cross bridge.
4.5	At crest of hill, road cut exposes top 5-10' of bioherm on both sides of road.
4.5	Make turn to left on gravel.
5.5	T-intersection to right; continue straight ahead.
6.5	T-intersection to left; continue straight ahead.
7.5	T-intersection at abandoned school house; turn right.
8.0	T-intersection; turn left.
8.5	T-intersection; turn right.

	9.5	T-intersection; straight ahead.
11:00- 1:00	10.5	Turn right at road just north of barn on right side of road -- Hunt quarry.

STOP II The Hunt Quarry (Center of Sec. 10, T.81N., R.4W., Cedar Co.)

The Hunt quarry is cut almost entirely into core rock with flank beds exposed only along tops of the surrounding walls and in an old cut in the SW corner of the quarry. The core exposure is enhanced by the manner of quarrying in which cuts were made that expose core in a series of nearly parallel faces allowing a three-dimensional study of this facies.

As with the Mitchell quarry, coelenterates dominate the fauna and porosity produced by their removal is conspicuous. Also present locally in great abundance are pelmatozoans, molluscs and brachiopods.

We will eat our lunches here.

	10.5	Leave quarry, turning right on gravel road.
	11.0	Cross 1-lane bridge, continue on to T-intersection, turn left after stopping -- blind intersection.
	11.5	Cross narrow iron bridge.
	12.0	Cross intersection, continue straight ahead.
	12.5	Cross bridge. Bioherms exposed in road cut and in quarry to north of road. Quarry is overgrown, exposes some core rock. Jedlicka quarry to south of road slightly beyond old quarry. Continue eastward.
	13.5	Stop at intersection; turn right (south) on County Road C for $2\frac{1}{2}$ miles.
	16.0	Stop at County Road N (paved), then turn left and continue into Tipton.
	22.0	Turn right at stop sign onto Tipton's main street and continue through town.
	23.0	Leave town on Highway 38 south.
	24.0	Turn right on gravel road approximately 100 yds. beyond Highway Commission maintenance shed on right side on curve.
	24.5	T-intersection; straight ahead.
	25.5	T-intersection; turn right.
1:30- 2:00	26.0	Brady quarry entrance on left.

STOP III The Brady Quarry (SE$\frac{1}{4}$, Sec. 14, T.80N., R.3W., Cedar Co.)

The Brady quarry was cut into the NW and W flanks of a bioherm. The N wall displays along its length the transition from inter-biohermal facies (Anamosa) through flank beds which gradually increase in dip to core rock exposed on the E face of the E-W cut.

Several sedimentary structures typical of the flank beds are exposed here, including slump phenomena and "baby" reefs which developed on the flanks. This quarry also exposes the Coggan Formation (Devonian age) which overlies the Gower Formation unconformably.

Note the decrease in porosity in size and number in the flanks, as compared with that exposed in the cores in the Mitchell and Hunt quarries, and also the drastic reduction in fauna present. Here the fossils present are predominantly brachiopods and worm-like castings found on some bedding plane surfaces.

Note the brecciated and clay-filled nature of the core as exposed in the E face of the old cut.

26.0 Leave quarry, turn right back on the same road on which you came.

26.5 T-intersection, turn right.

27.0 T-intersection, turn right.

28.0 Bridge over Rock Creek -- Norton's Quaquaversal.

STOP IV Norton's Quaquaversal (SW$\frac{1}{4}$, Sec. 23, T.80N., R.3W., Cedar Co.)

Norton (1901) first described this feature which nicely illustrates the shape and size of bioherms as well as their influence in stream pattern development.

Note the preferred path of the stream through the structure. Streams are often diverted around the periphery of the bioherm. Should these features become breached, however, the core rock is the first to succumb to the stream erosion and its course generally coincides with this facies. This has been noted in many such structures along the Cedar and Wapsipinicon Rivers where flank beds can be seen along the banks dipping away from the river which apparently flows across the top of the truncated core.

This is the last stop. Drive Carefully and have a good trip home.

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UPPER DEVONIAN

IN MASON CITY AND GARNER AREAS

THE GEOLOGICAL SOCIETY OF IOWA

20 July, 1963

GUIDEBOOK # 12

FIELD EXCURSION COMMITTEE:
Mary C. Parker
Kermit L. Dirks
Eugene E. Hinman
James K. Wagner
Stewart D. Mettler

TRIP LEADERS:
Donald L. Koch
James K. Wagner
Stewart D. Mettler

INTRODUCTION

This field trip is directed toward a closer look at some Upper Devonian strata in north central Iowa. Due to changing depositional environments and changing unconformable relationships of certain horizons, it would seem that establishing valid correlations, both surface and subsurface, requires more than an acquaintance with the general geology.

The bedrock geology in parts of Winnebago, Worth, Hancock, and Cerro Gordo counties has proven to be a subject of considerable interest and controversy. Except for Cerro Gordo county, outcrops or exposures are limited, and information must be interpreted from available subsurface data in the form of cores and well cuttings. Even then, correlations at one location have run the gamut from Cedar Valley to Lime Creek, at least near the margins of the area.

The Shell Rock formation has become an integral part of this problem, since one could never be sure just how far it extended in the subsurface. It seemed to be desirable therfore to attempt to establish the limits of Shell Rock deposition. Having done this, there would be one less factor to consider in correlating the units encountered outside the Shell Rock depositional area. Facies changes and the affect of secondary dolomitization, both in the Shell Rock and Lime Creek formations, had to be taken into consideration.

STRATIGRAPHY

The general stratigraphy of the units found in the area is discussed below:

DEVONIAN

Lime Creek formation

Owen member. Limestone and/or dolomitic limestone, calcareous dolomite, and magnesian shales; generally fossiliferous, containing Pachyphyllum, Acervularia, and other corals, Floydia, laminar stromotoporids, Idiostroma, and brachiopods. About 40' to 50' thick.

Cerro Gordo member. Shaley limestone and/or calcareous dolomite and calcareous and dolomitic shales; very fossiliferous, containing the majority of species of the Hackberry fauna, including laminar stromotoporids in the upper part. About 45'.

Juniper Hill member. Bluish gray (where oxidized, yellow) calcareous and dolomitic shales; very few fossils; crushed spore carps in lower ten feet. Average 60'.

Shell Rock formation

Nora member. Consists of three zones in eastern Cerro Gordo and western Floyd counties; (1) upper laminar stromotoporoidal limestone (2) a middle magnesian shale, and (3) a lower stromotoporodial limestone; *Actinostroma expansum*, *Trigonotreta*, and small *Atrypa* are the most common fossils. About 15'.

Rock Grove member. Magnesian shales, shaley limestone, and sublithographic limestone; *Platyrachella (Spirifer) ulsterensis* and *Productella* occur in the upper part. About 12-16'.

Mason City member. Shaley limestone, some shale, and dolomite; *Stropheodonta*, crinoidal fragments, and small, spherical stromotoporids are the common fossils. About 25'.

Cedar Valley formation

Coralville member. Very dense, sublithographic to lithographic limestone, some green clay, dolomitic zones; abundant spherical stroms and *Atrypa*. Extremely variable in eastern and southeast Cerro Gordo county--thins to the south and west.

Rapid member. Fine to medium and coarsely crystalline dolomite, some brown clay and shale.

In the area of Nora Springs and to the south the Shell Rock lies unconformably upon the Coralville, but to the southwest the Coralville decreases in thickness and the Shell Rock lies unconformably upon the Rapid.

GENERAL REMARKS

Shell Rock formation

The Shell Rock formation thins southward from Nora Springs and all but disappears in the vicinity of Greene. Outcrops and well cuttings show continual lensing out of units as they lap up onto the Cedar Valley formation, with thinning accompanied by facies changes. South and west of Mason City, facies changes and secondary dolomitization make it difficult to recognize the three members in the subsurface. The Mason City member remains the most conspicuous.

As defined in the subsurface, the southern limit of Shell Rock deposition lies roughly along a northwest-southeast line from Greene through Rockwell and Forest City. North of this line the Juniper Hill shale lies on top of Shell Rock, while to the south the Juniper Hill lies on Cedar Valley.

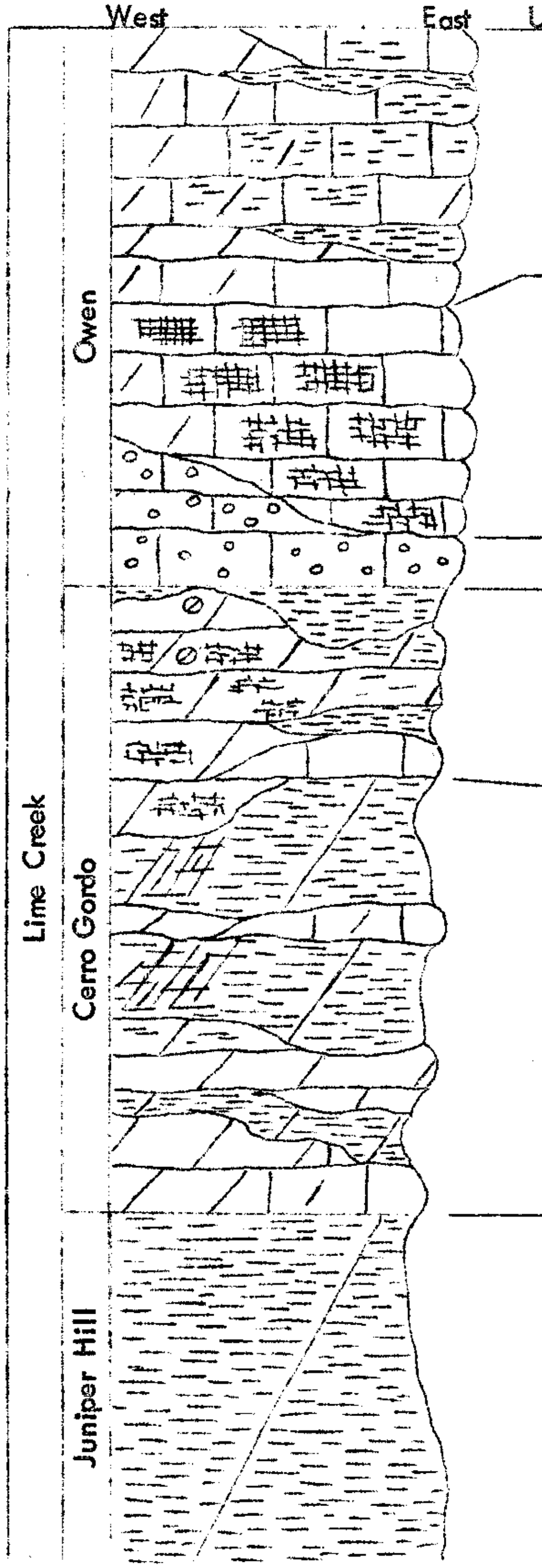
Lime Creek formation

The Lime Creek formation remains generally uniform in lithology within its individual members in the east half of Cerro Gordo County. But toward the west and beyond into Hancock county there is a notable increase in carbonate over shale. Secondary dolomitization has affected portions of both the Owen and Cerro Gordo members. Significant thinning appears to be limited to the Juniper Hill shale, decreasing from an average of 60' near Mason City to 30' near Clear Lake, 21' at Garner in Hancock county, and 5' northwest of Hutchens.

In the area of Garner, where Lime Creek is the bedrock, Pleistocene erosion has cut into the lower part of the Owen or even into Cerro Gordo; however, a well 2 miles southwest of Stop IV shows 30 feet of Owen, 40 feet of Cerro Gordo, and 14' of Juniper Hill. Stromotoporoidal limestone occurs in the lower part of the Owen with small Idiostroma at the base; stroms are also present in the top 15' of dolomite in the Cerro Gordo. The stroms in the Owen are equivalent to those observed at Stop III, and those in the Cerro Gordo are equivalent to those observed at Stop IV.

GENERALIZED STRATIGRAPHIC SECTION

Nora Springs to Garner



1 Limestone, very pale orange to dark yellowish orange and light brown, fragmental and fine to medium crystalline, grading to dolomitic limestone and dolomite to the west; mixed shaley zones, shale decreasing to west; very fossiliferous to the east.

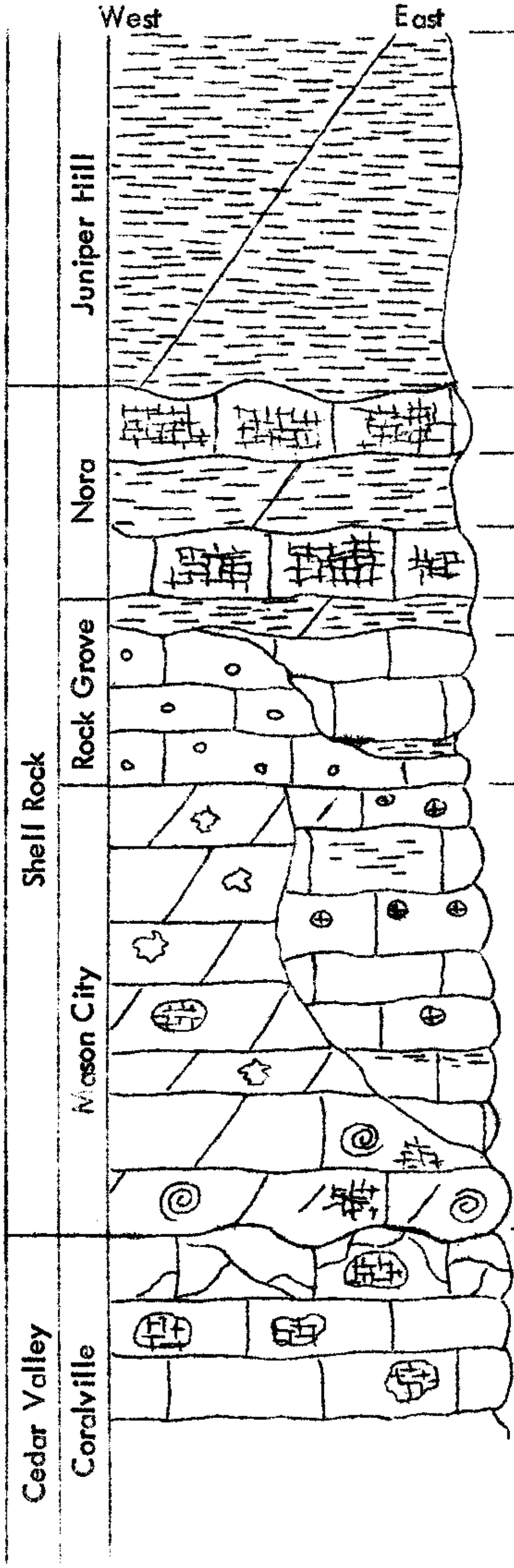
2 Limestone, light brown to cream, very fine to finely crystalline; fossiliferous, laminar stroms; becoming dolomitic and thinner to west.

3 Limestone, very pale orange to pale tan, fine to medium crystalline; abundant <u>Idiostroma</u>; thickening to the west.

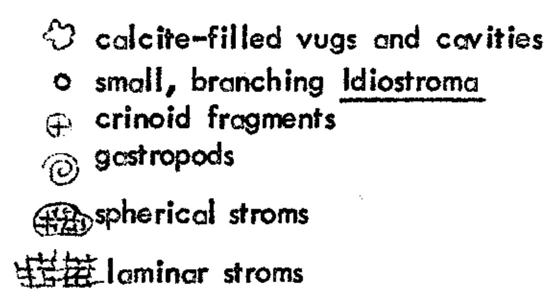
4 Shale, bluish gray, dolomitic, thin and irregular to the west; intervals of argillaceous dolomite and fossiliferous shaley limestone to the east, mostly very pale orange to tan, calcareous dolomite with laminar stroms and dolomite in west.

5 Shale, gray, calcareous and dolomitic, fossiliferous, more dolomitic and indurated to the west; occasional beds of light gray to very light olive gray limestone and yellowish orange to grayish-brown argillaceous dolomite.

6 Shale, light olive gray (where oxidized, yellow), calcareous to dolomitic; very few fossils.



Unit	
7	Shale, as above; fossil spore carps in lower 10' - 15'; thins to the west (not shown on section given).
8	Limestone, white to pale yellowish-orange, stromotoporoidal.
9	Shale, yellow to light brown, magnesian.
10	Limestone, white to pale yellowish-orange, stromotoporoidal.
11	Shale, yellow to olive gray, magnesian.
12	Limestone, yellowish-brown, soft, and impure dolomite with shaley zones in east; tan to bluish-gray dense limestone with abundant <u>Idiostroma</u>, thickening to the west.
13	Limestone, pale yellowish-orange, argillaceous, dolomitic and shaley zones; slightly fossiliferous, crinoidal, scattered spherical stroms; <u>Gyroceras</u> and stroms in lower part; generally all calcareous grayish-brown dolomite with calcite-filled vugs to the west (interval not as thick as indicated to the west.)
14	Limestone, very light gray to cream and white, lithographic to sub-lithographic, partially brecciated near top, dolomitic zones; abundant spherical stroms.



ROAD LOG

Time	Mileage	
9:00	0.0	Meet one (1) mile east of Nora Springs at intersection of gravel road and Highway # 18. Sherman Buffalo farm.
	1.7	Gravel road intersection - Bear to right down winding road.
9:10 10:15	2.8	Quarry entrance. Drive in.
	Stop I	The Williams Quarry (SW cor. Sec. 28, T. 96N., R . 18W.). This quarry exposes the lower strom (First Actinostroma zone) of the Nora in the top ledge (unit 8 of the generalized section). The middle shale and upper strom beds have been eroded. The Rock Grove is represented by yellow to light gray shaley, argillaceous dolomite and magnesian shale. The Mason City member varies from dense dolomitic limestone to grayish-brown and tan dolomite with heavy crinoidal zones, gastropods, and small spherical stroms. At this locality the total original Shell Rock was in excess of 45 feet.
	5.6	Return to Highway# 18, turn left on highway; proceed through Nora Springs west on # 18.
	12.6	Intersection of Blacktop road and Highway # 18. Turn left to Portland.
	13.5	Quarry entrance - Park on left side of road south of scale away from operations.
10:30 11:15	Stop # II	McEachran Quarry (SE$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 19, T. 96N., R. 19W.)

The top ledge is again the lower strom zone of the Nora. The Rock Grove is represented by ten to twelve feet of dense, sub-lithographic grayish-brown to tan and medium gray limestone containing abundant calcite-filled vugs, small spherical stroms, and Idiostroma. (unit 12 of generalized section). The dark grayish-brown dolomite in the quarry floor is Mason City.

An isopachous map indicates approximately 40 feet of Shell Rock at this locality, (including the eroded portion of the Nora), so that there is about 22 feet of Mason City lying above the Cedar Valley.

	13.6		Turn right on gravel road - proceed west on gravel road.
	16.3		Old quarries on north and south sides of road. Soft stone used mostly for ag lime.
	17.5		Intersection of gravel road and Highway # 65. Turn left and proceed south on #65.
	29.7		Intersection of Co. pavement and Highway # 65. Turn left and proceed on Co. pavement.
	30.2		Pavement ends - follow gravel road.
	30.7		Turn right - follow winding gravel road to quarry.
	31.8		Quarry entrance - Drive in.
11:15 1:15		Stop # III	The Lillibridge Quarry (SE¼ SW¼, sec. 26, T.94N., R. 20W.) Also lunch stop this area.

The laminar stroms in the lower part of the Owen are well developed at this locality. (unit 2 of generalized section). Small Idiostroma occur below the stroms in this vicinity. The bluish-gray dolomitic shale in the low parts of the quarry floor marks the top of the Cerro Gordo. (unit 4 of generalized section).

This location is about 2½ miles south of the southern limit of Shell Rock deposition; the Juniper Hill is about 40 feet thick and lies on Cedar Valley.

31.8	Leave quarry - return to Highway # 65 on same road as entrance.

	34.0	Intersection of Co. pavement and Highway # 65. Turn right on # 65.
	37.0	Intersection of Highway # 65 and County blacktop. Turn left toward Swaledale.
	45.9	Stop. Blacktop ends - Proceed ahead on gravel road.
	50.9	Stop. Proceed ahead on gravel road.
	57.6	Intersection of county gravel road and Highway # 69. Turn right and proceed north.
	62.6	Intersection of county gravel road and Highway # 69. Turn left and proceed west on gravel road.
	63.7	Quarry entrance - drive in.
2:00	Stop # IV	Concrete Materials Company Quarry (SE¼, sec. 11, T. 95N., R. 24W.)

The top lift is Owen, exhibiting the Idiostroma zone in the lower part of the member (unit 3 of generalized section). The zone of laminar stroms observed at stop III has been eroded or replaced by Idiostroma, i.e., the Idiostroma zone is thicker in this area. The top of lift # 2 is the top of the Cerro Gordo. The thin dolomitic gray shale at the top is irregular in thickness in the quarry; the underlying thin yellowish-gray dolomite is at once very fossiliferous and then yields only a very few fossils a few feet away (the majority of forms found in this bed are those that are present primarily within the Spirifer zone of the Cerro Gordo).

The massive dolomite that makes up most of the face of lift # 2 contains Pachyphyllum at the top and is crowded throughout the remainder with laminar stroms. (unit 4 of generalized section). This same strom zone is the bedrock in the Garner town well. Here again we are south of the southern limit of Shell Rock deposition, with about 20' of Juniper Hill lying on Cedar Valley.

3:00 This is the last stop. Thank you for your attendance, and please drive carefully on the way home.

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GUIDEBOOK 19

THE GEOLOGICAL SOCIETY OF IOWA

Southwestern Iowa Field Trip

August 22-23, 1964

by

O. J Van Eck

The purpose of this trip is to view the formations of the Shawnee Group of the Pennsylvanian System. It was hoped that almost all members of this group could be viewed in easily accessible exposures. Recent slumping has partially obscured some of the exposures, but most of the members are still exposed.

As we go north from the meeting place in Thurman,we will be coming up onto the crest of the Thurman-Redfield structural zone, and Stop 1 is just about on the crest. North from Stop 1 the structure lowers again into the Bartlett syncline, and no rock are exposed along the route until we come upon the Lyon anticline, where Stops 2 and 3 are located. North of Stop 3 the structure dips into the Glenwood syncline.

A note of interest is that about 2-1/2 miles north of Stop 3 is a bedrock valley that aligns with the present day Platte river of Nebraska. The bottom of this valley is about 200 feet below the top of bedrock at Stop 3. The valley extends to the southeast through Fremont County. There has been some speculation that this may have been the ancient Missouri drainage.

Stop 1
Saturday, August 22, 1964

NW 1/4 sec. 23, T. 70N., R.43W., Fremont County, Iowa

		Thickness (ft.)
Pennsylvanian		
Wabaunsee Group		
Severy Shale		
1.	Shale, olive green; platy to blocky, *Crurithyris* and aragonite lenses; upper 0.2 feet dark gray and thin bedded	2.0
2.	Coal, soft, powdery (Nodaway)	0.5
3.	Shale, upper 0.3 ft. orange-brown, weathers medium gray, clayey, aragonite lenses; plant fossils 1 foot below top	3.0-4.0
Shawnee Group		
Topeka Formation		
Coal Creek Limestone		
4.	Limestone, bluish-gray, dense, massive, finely banded	0.5
5.	Shale, olive, mottled dark, clayey, hard, thin bedded; aragonite in upper portion; lower 0.8 ft. bleached, soft, blocky	2.2
6.	Limestone, dark-blue, weathers blue, argillaceous	0.4
7.	Limestone, dense, 0.4-0.8 ft. beds, contains black chert in lower 1 ft.; *Marginifera*, *Ottonosia*, crinoid stems, high spired gastropods	2.0
8.	Shale, black weathers bluish gray, abundant *Crurithyris*	0.4
9.	Limestone, light bluish-gray, dense, contains pyrite	0.8
10.	Shale, dark-gray, clayey, *Crurithyris*	0.3
11.	Limestone, light-bluish gray, *Marginifera*	0.5
Holt Shale		
12.	Shale, black, blocky in lower portion, *Crurithyris* in upper portion	1.0
13.	Shale, black, fissile, hard; coaly streak at base	0.4
DuBois Limestone		
14.	Limestone, bluish-gray, dense, many gastropods; occurs locally	0-0.6
Turner Creek Shale		
15.	Shale, dark-gray, clayey, abundant *Marginifera*, *Derbyia*, pyrite nodules	1.0
16.	Limestone, light-gray with green mottling, weathers light gray and rounded; very argillaceous, blocky	1.6
17.	Shale, medium-gray, clayey, blocky	1.1

	Thickness (ft.)
Sheldon Limestone	
18. Limestone, white, oolitic, weathers slabby, abundant bellerophontid and high-spired gastropods	0.8
19. Limestone, light-gray, massive, sublithographic to oolitic, pyrite nodules, abundant *Osagia*, increasingly algal near top	2.4
Jones Point Shale	
20. Shale, dark-gray to black, clayey, upper portion quite limey; clams in lower part, brachiopods in middle and upper part; contains nodular and lenticular beds of bluish-gray, dense limestone	6.6
Curzon Limestone	
21. Limestone, light-gray, fine-grained with pseudo-oolitic texture, massive single bed; *Myalina* on upper surface, large bellerophontid and high-spired gastropods	1.0
22. Shale, brownish-gray, soft, platy, some fossil hash	0.8
23. Limestone, chalky, dense, argillaceous, weathers white and blocky	3.5
24. Shale, dark olive-gray, clayey, platy, blocky	0.5
25. Limestone, light-gray, weathers light grayish-buff, dense, black to brown chert lenses in middle	3.0
Iowa Point Shale	
26. Shale, upper one inch black, contains *Crurithyris*; lower part gray	0.3
27. Limestone, light-gray, dense, argillaceous, modular, contains *Osagia* and crinoid stems	0.3
28. Shale, upper part olive, clayey, contains *Crurithyris*; lower part black, platy, contains *Lingula*	0.7
Hartford Limestone	
29. Limestone, light-gray, fine-grained, massive single bed, many *Ottonosia*, some gastropods	1.2
Calhoun Formation	
30. Shale, upper part dark-gray, with fossil hash; lower part dark-gray, weathered blue, clayey, blocky	1.2
Deer Creek Formation	
Ervine Creek Limestone	
31. Limestone, light-gray, wavy bedded,abundant *Osagia* and brachiopod sections, pyrite in lower portion	2.8
32. Shale, gray, limy, many fusulinids	0.2
33. Limestone, brownish-gray, argillaceous, crinoid stems,obese fusulinids concentrated along shale partings in upper 3 ft.; fine-grained and wavy bedded in lower 3 ft.	7.0

Stop 2
Saturday,August 22, 1964

NW 1/4 sec. 15, T. 71N., R. 43W., Mills County, Iowa

	Thickness(ft.)
Pennsylvanian	
Shawnee Group	
Deer Creek Formation	
Ervine Creek Limestone	
1. Limestone, light-gray, bed o.5-1 ft. thick, wavy bedded, thin shaly layers between beds; Ottonasia common in lower half	10+
Burroak Shale	
2. Shale, medium olive-gray, clayey, dark-gray layer 0.3 ft. from top,very fossiliferous	1.2
Haynies Limestone	
3. Limestone, dark-gray, weathers grayish buff, hard, fine-grained, single massive bed, crinoids, Ottonosia, gastropods,Amblysiphonella, Juresania	0.8
Larsh Shale	
4. Shale, medium-gray to brown, mottled dark gray near top, lower half is darker gray to nearly black at base	2.0
Rock Bluff Limestone	
5. Limestone, medium to dark bluish-gray, massive single bed, very fossiliferous, wavy lined fossil sections in middle, obese fusulinids and small gastropods in lower part	1.6
Oskaloosa Shale	
6. Shale, dark-gray to brown, blocky, pyrite on joints	6.0
Ozawkie Limestone	
7. Limestone, light-gray, fine-grained, hard	0.4
8. Shale, dark-gray, arenaceous	1.5
9. Limestone, yellow to buff, sandy	1.1
Tecumseh Formation	
Rakes Creek Shale	
10. Shale, greenish-gray, sandy near base, grades to below	2.0
11. Siltstone, light-gray to green, weathers buff	1.5
12. Shale, gray to green	1.5
13. Limestone, light-gray,weathers buff, argillaceous, blocky, thin stringers of green shale	1.0
14. Shale, green to gray, clayey	0.9
Ost Limestone	
15. Limestone light-buff to gray, shaly	0.5
16. Shale, olive above, dark below, fossil hash with many gastropods	0.5
17. Limestone, medium-gray, hard	
18. Shale, dark-gray	1.0
19. Limestone, yellow, thin shale stringers	1.0

Stop 3
Saturday, August 22, 1964

NW 1/4, SE 1/4, sec. 10, T. 71N., R. 43W., Mills County, Iowa

Shawnee Group	
Lecompton Formation	Thickness (Ft.)
Avoca Limestone	
1. Shale, dark-gray to bluish-black, weathers light gray; lower part calcareous and weathers buff, contains <u>Crurithyris</u>, <u>Chontes</u>, <u>Composita</u>, <u>Perbyia</u>, <u>Punctospirifer</u>, ramose bryozoa	2.0+
2. Limestone, dark-gray to black, weathers brownish gray, upper part massive, lower part thin bedded and shaly, with fusulinids, bryozoa, brachiopods	1.8
King Hill Shale	
3. Shale, dark-gray to green, blocky, clayey	4.0
4. Shale with zone of limestone nodules, light-gray to green to almost maroon, weathers buff, a resistant layer	1.5
5. Shale, medium to dark-gray, mottled at base, clayey, blocky	1.5
6. As number 3 above, with green clayey shale	0.7
Beil Limestone	
7. Limestone, light-gray, fine-grained, dense, hard, one massive bed, <u>Osagia</u>	2.0
8. Shale, buff to olive-gray, contains typical fossils, <u>Campophyllum</u>, <u>Composita</u>, bryozoa, fusulinids	
(handwritten margin note with arrow: Q[illegible] Hill Shale →)	
9. Limestone, gray, argillaceous, massive, coral, crinoid stems	0.9
10. Shale, gray to green, with limestone nodules, grades to below	1.0
11. Shale, gray to green, blocky, clayey, dark streak 0.6 ft. below top	2.3
12. Shale, black, fissile, hard — exposed	0.4

Stop 1
Sunday, August 23, 1964

Center NE 1/4 sec. 27, T. 73N., R. 38W., Montgomery County, Iowa

	Thickness (Ft.)
Pleistocene	
1. Loess, bottom grades into sand, gravel, and boulders in a reddish matrix	10±
2. Clay, upper 6 inches reddish brown, grading into olive gray, plastic, dries blocky	3
Pennsylvanian	
Shawnee Group	
Lecompton Formation	
Doniphan Shale	
3. Shale, yellow, sticky, dries very hard	3
Spring Branch Limestone	
4. Limestone, light-gray to olive-gray, fine-grained to sublithographic; weathers buff; one massive ledge; fossiliferous with crinoid fragments, ramose bryozoan, brachiopods; dark gray chert masses in upper part	0.8
5. Limestone, light-brown, weathers brown; shaly, very fossiliferous with crinoid fragments, brachiopods, ramose bryozoan	0.2
6. Limestone, as No. 4 above	1.0
7. Shale, olive drab, blocky, soft; fossil hash of thin shelled brachiopods, crinoid fragments, bryozoan, *Juresania*, *Crurithyris*; irregular limy nodular layers	1.0
8. Limestone, dark bluish-gray, fine-grained, dense; thin-shelled brachiopods, bryozoa, crinoids, horn corals; weathers into grayish tan rounded blocks	0.5
9. Limestone, gray to dark-gray, fine-grained, dense; *Crurithyris*, *Juresania*, *Chonetes*, fenestellid bryozoa	0.8
Kanawaka Formation	
10. Shale, greenish-gray, weathers gray, blocky, clayey	0.5
11. Shale, black, soft, platy, weathers mottled black and olive	0.7
12. Shale, grayish-brown; upper portion calcareous with calcareous nodules; very fossiliferous with Crurithyris predominant in upper portion, lower portion also contains *Composita*, *Marginifera*, *Wellerella*, *Linoproductus*, crinoid fragments, ramose bryozoa; middle portion contains *Chonetina*, *Derbyia*, *Juresania*	4.3
13. Shale, greenish-brown with maroon streaks, blocky, soft, contains many broken thin brachiopod fragments, *Chonetes* *Crurithyris*	1.0

Oread Formation	Thickness (Ft.)
Kereford Limestone	
14. Limestone, tan, sublithographic, nodular at top, generally one massive ledge; weathers buff gray; Osagia throughout, slightly fossiliferous	1.8
Heumader Shale	
15. Shale, chocolate brown, grading down to maroon, blocky, few fossils	2.0
16. Shale, dark greenish-gray to black in upper portion, dark green in mid-portion, grades into deep maroon at bottom; soft, clayey, and blocky	2.0
Plattsmouth Limestone	
17. Limestone, light-gray, massive, fine-grained to sublithographic, dark grayish-brown chert, very fossiliferous, many Triticites	2.0
18. Shale, buff, flood of Triticites	0-0.2
19. Limestone, buff, Triticites ledge, some dark chert with Triticites	1.0
20. Shale, olive-brown, clayey	0.5
21. Limestone, light-gray, argillaceous, slabby, some Triticites	1.3
22. Shale, olive-brown, dark olive brown below	1.4
23. Limestone, very light bluish-gray, fine-grained, dense, Osagia	0.7
24. Limestone, pinkish-buff, argillaceous, black chert masses with white Triticites very persistent	0.4-0.6
25. Limestone, light bluish-gray, argillaceous, massive, Triticites, crinoids	5.5
26. Shale, dark-brown, weathers light brown, clayey, platy when dry	0.3
27. Limestone, dark-gray, weathers light gray, argillaceous; black chert with Triticites about 2 feet from top	6.6

Road Log
Saturday,August 22, 1964

Miles	
0.0	Meeting place: Thurman, Iowa, corner of Hiway 145 and road on east side of town park; go north on black top
0.2-0.5	Wabaunsee shale exposed in road cut
1.5	Quarry on right
2.7	Stop 1: County quarry; black top ends, turn right at danger sign, turn right again at second road into pit. Pit to north belongs to Jack Stanley. Continue north on gravel
3.6	Road to left, continue straight ahead.
3.7	Road to right, continue straight ahead.
4.1	Bridge over Wabonsie ditch.
4.2	Stop sign; turn left on black top
4.4	Turn right on loess road.
5.4	Road coming in from right, continue straight ahead.
5.6	Distorted and cemented Pleistocene on right.
6.3	Road to left, continue straight ahead.
6.6	Road to right, continue straight ahead; Quarry in Ervine Creek Limestone.
6.9	Stop sign, straight ahead.
7.2	Ervine Creek Limestone - Larish Shale exposed on right.
7.5	Old quarry, now a corn cob repository; Burr Oak School on right.
7.9	Quarry in Ervine Creek Limestone.
8.2	Road to left, continue straight ahead
8.4	Dashner house on left.
8.8	Stop 2.
9.4	Stop 3. Clay Dashner farm. Through gate north of house on east side of road, along side of corn field and down dry run to water fall. Continue north on gravel to reach Highway 34.

Road Log
Sunday,August 23, 1964

Miles	
0.0	Meeting place: Red Oak, intersection of Highways 34 and 48. Proceed north on Highway 48.
5.0	Turn right at power transformers and sign advertising Stennett elevator
6.0	Turn left
6.4	Turn right
6.9	Turn left
7.1	Stop 1; Kaser quarry on left.

PRE CEDAR VALLEY

POST MAQUOKETA SEDIMENTS

NORTHEAST IOWA

GEOLOGICAL SOCIETY OF IOWA
GUIDEBOOK #15

May 22, 1965

FIELD TRIP COMMITTEE
Don Koch
Kermit Dirks
Orval Van Eck
Pat Rogers
Russ Campbell
Bob Michael

TRIP LEADERS
Don Koch
Bob Michael

GUIDE BOOK

GEOLOGICAL SOCIETY OF IOWA FIELD TRIP

NORTHEASTERN IOWA

May 22, 1965

INTRODUCTION

The main objective of Saturday's trip is to review the correlation of stratigraphy in northern Fayette, southern and western Winneshiek, and eastern Howard Counties, Iowa, and to introduce some new ideas as to association of these beds. Emphasis will be on sediments deposited in the time interval Pre Cedar Valley and Post Maquoketa.

It is realized that we will see only a glimpse, relatively, of the area in a day's trip. It is hoped that this will be considered as an introduction to a problem in stratigraphy which could be solved some time in the future by students of geology.

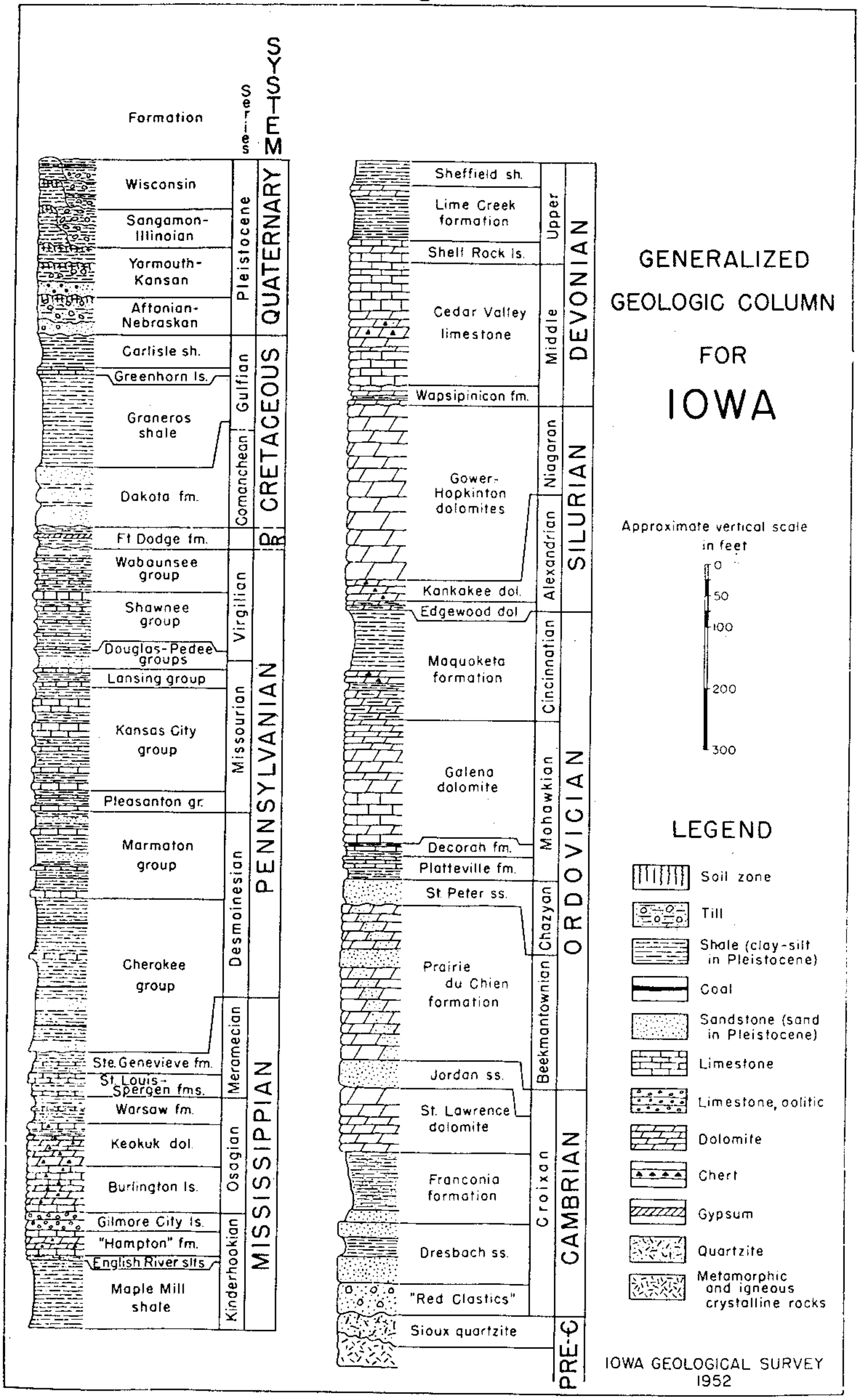
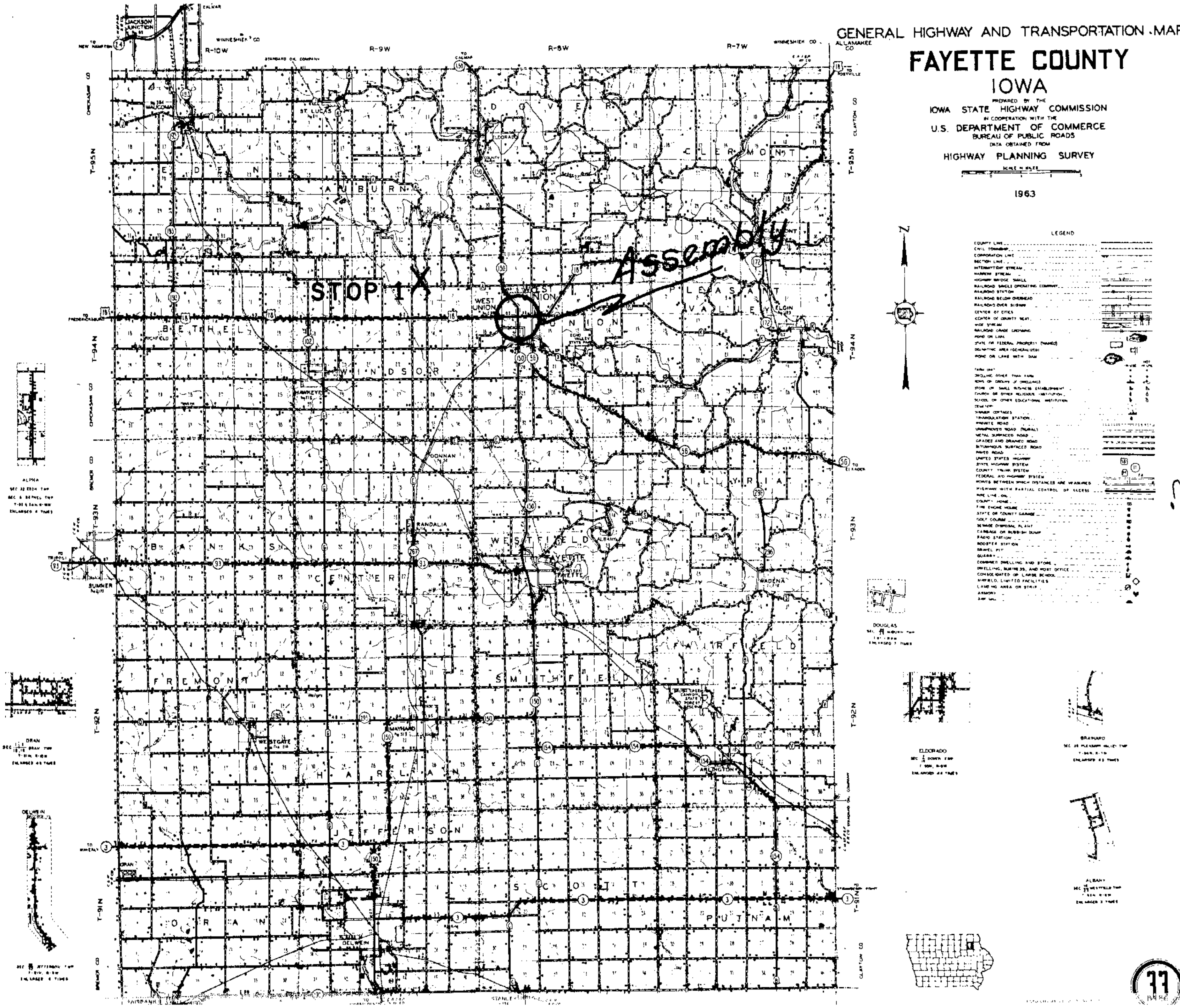


Figure 2-1 Generalized Geologic Column For Iowa


GENERAL HIGHWAY AND TRANSPORTATION MAP
FAYETTE COUNTY
IOWA
PREPARED BY THE
IOWA STATE HIGHWAY COMMISSION
IN COOPERATION WITH THE
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
HIGHWAY PLANNING SURVEY
1963
LEGEND
2.
STOP 1 X
Assembly
WEST UNION
R-10W
R-9W
R-8W
R-7W
T-95N
T-94N
T-93N
T-92N
T-91N
EDEN
AUBURN
DOVER
CLERMONT
PLEASANT VALLEY
UNION
BETHEL
WINDSOR
ILLYRIA
WESTFIELD
BANKS
CENTER
FREMONT
SMITHFIELD
FAIRFIELD
HARLAN
JEFFERSON
SCOTT
ORAN
PUTNAM
ELGIN
FAYETTE
RANDALIA
DONNAN
HAWKEYE
MAYNARD
WESTGATE
ARLINGTON
WADENA
OELWEIN
SUMNER
ST. LUCAS
JACKSON JUNCTION
ALPHA
ORAN
DOUGLAS
ELDORADO
BRAINARD
ALBANY
OELWEIN
77

3.

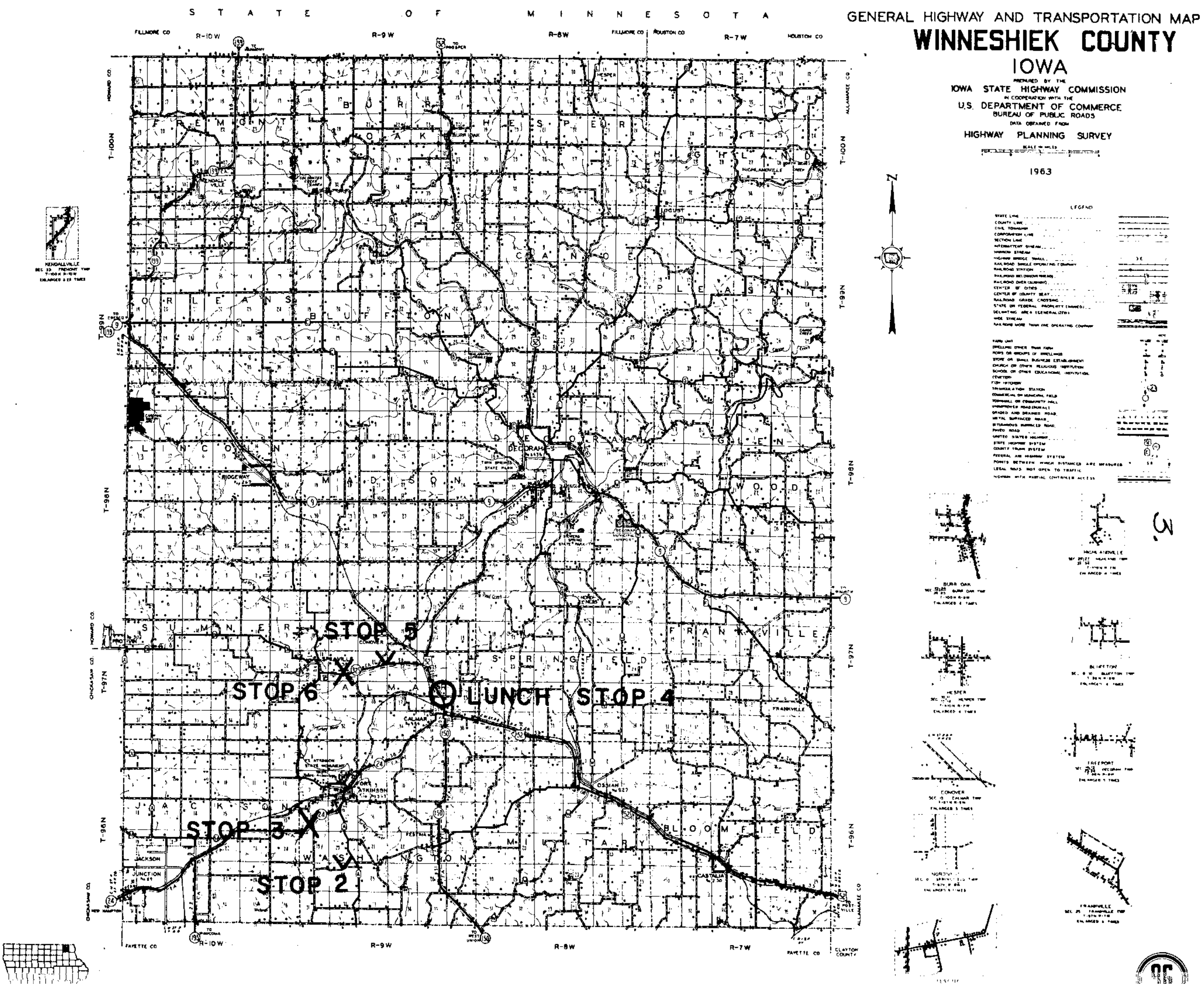
GENERAL HIGHWAY AND TRANSPORTATION MAP

WINNESHIEK COUNTY

IOWA

PREPARED BY THE
IOWA STATE HIGHWAY COMMISSION
IN COOPERATION WITH THE
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
HIGHWAY PLANNING SURVEY

1963



4.

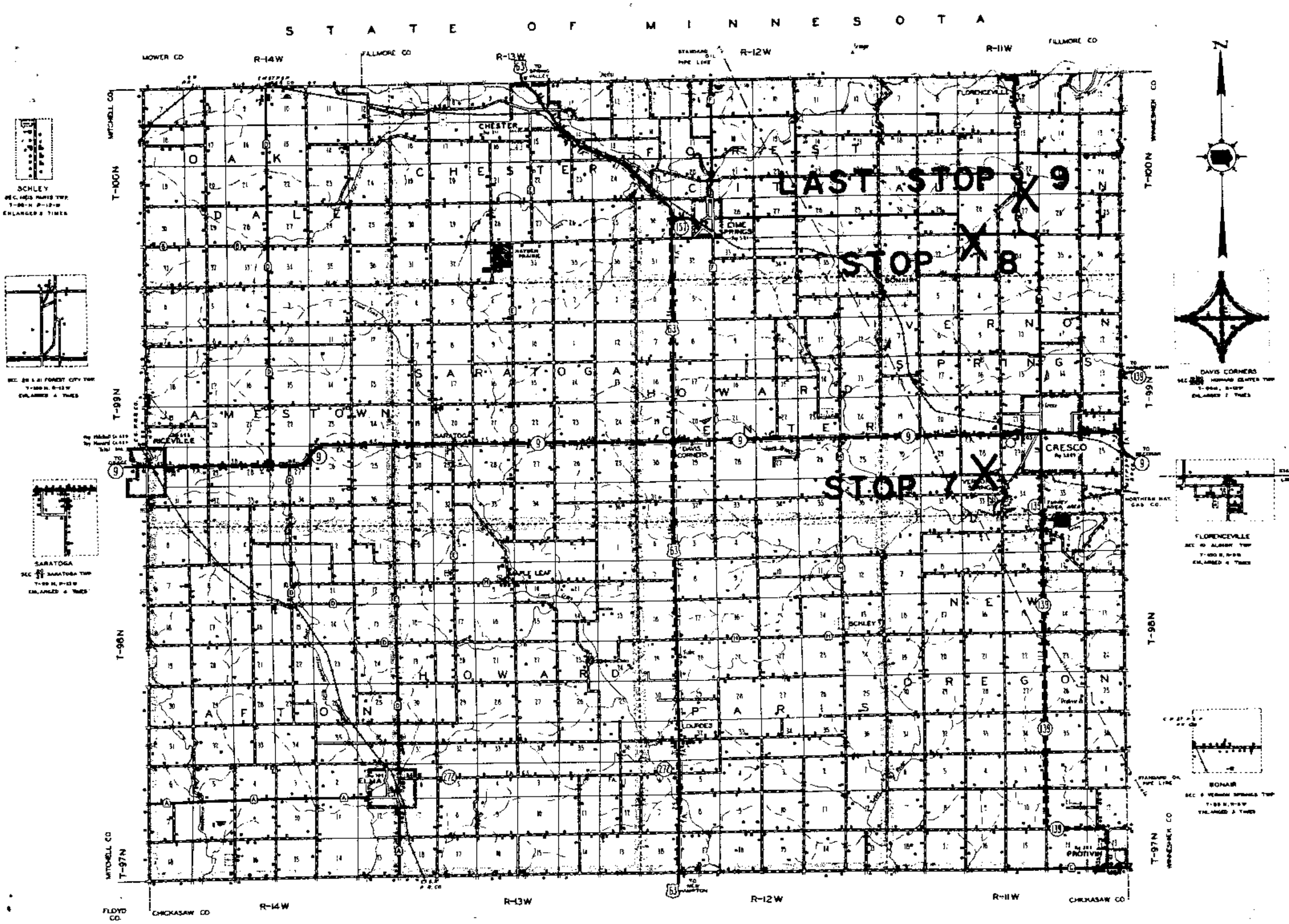
GENERAL HIGHWAY AND TRANSPORTATION MAP

HOWARD COUNTY

IOWA

PREPARED BY THE
IOWA STATE HIGHWAY COMMISSION
IN COOPERATION WITH THE
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
HIGHWAY PLANNING SURVEY

1963



ROAD LOG

by

R. D. Michael

Assembly point - 7:30 a.m. Saturday, 22 May, 1965, Junction of Iowa 150 and U.S. 18 at north edge of West Union. The Lilacs Motel is at the northeast corner of this intersection.

Note: Lunch is planned at stop 4 at about 11:15 a.m. in the City Park in Calmar on U.S. 52 at the north edge of town by the Lutheran Home. It would be wise to plan for a sack lunch although groceries could be bought in town and there are several good cafes.

Direction of travel toward first stop will be north on Iowa 150, driving distance about 4 miles.

Stop 1 - 2 hours - abandoned quarry on Don Scott property north of the county road in SE^4 2-94-9 Fayette. Drive through the gate north on dirt drive and park at quarry. In case of very moist soil conditions parking will be on county road. From quarry there will be a hike down stream on Turner Creek; about a mile round trip.

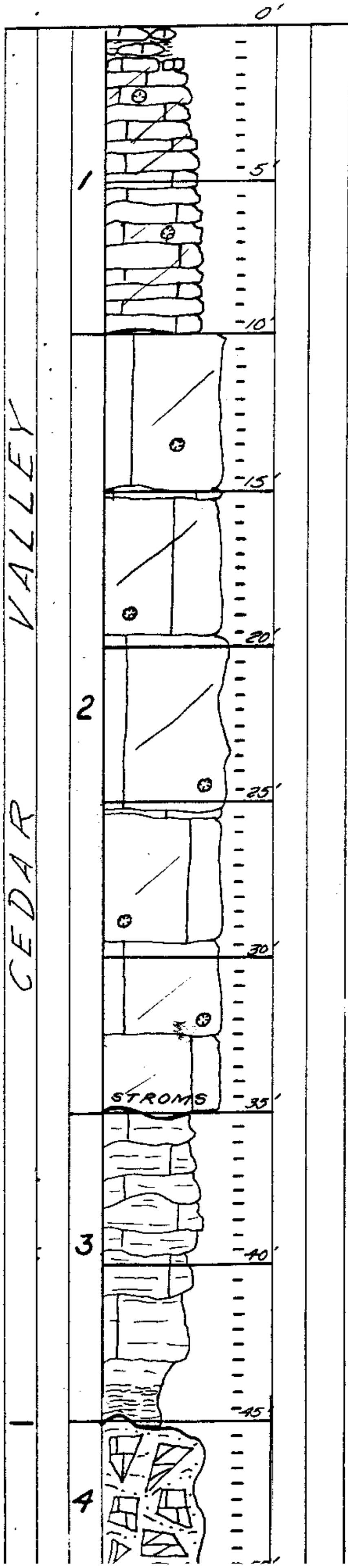
The rock in quarry face is generally accepted as being Rapid member of the Cedar Valley formation. The floor of quarry is near the top of the Solon member. Downstream from this point are continuous rock exposures through the Wapsipinicon, what is referred to as Silurian by Calvin, Savage, and Scobey, and into the Brainard shale member of the Maquoketa. We will not walk far enough to reach the shale but will see it at another location as we drive to the next stop.

Bed 6, of the geologic section at this location, is the unit which has aroused the most stratigraphic controversy. Calvin referred to the upper beds as "crackle" and placed the whole unit in the Niagaran. He also stated that it had no northern extension beyond the southern row of townships in Winneshiek County. Savage, in 1914, referred it to the Alexandrian Series, stated it was 10 to 20 feet in thickness and suggested it be called Waucoma limestone. He then correlated it with the Sexton Creek (Brassfield) limestone, of Upper Alexandrian, in eastern Missouri and southern and northeastern Illinois. In 1935 Scobey referred the upper 50 feet to the Hopkinton, the middle 17 feet (containing chert bands) to the Kankakee, and the lower 18.5 feet to the Edgewood (because of *Watsella edgewoodensis*). His section was measured in Echo Valley Park southeast of West Union.

GEOLOGY
FASSBINDER

6.

Iowa State Highway Commission



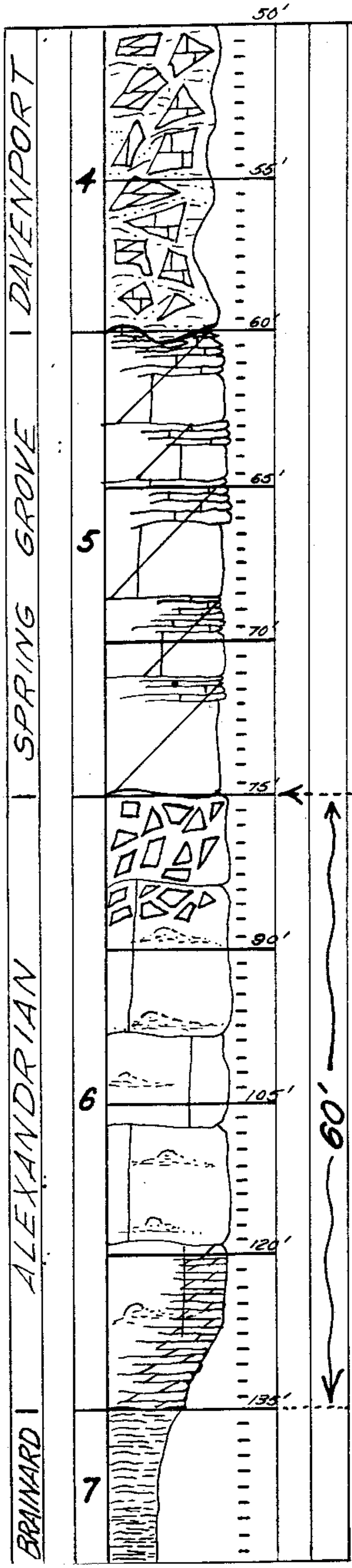
Location: Near Cen. SW¼ Sec. 2 T. 94 R. 9 Co. Fayette
Abandoned quarry on Don Scott property and stream cut exposure to north
Remarks: on Marcellus Bruening's land in SEC's 2 and 3.
Measured by: R. D. Michael Date: 5/3/65

Bed: Description	Feet
Quarry Face:	
00. Overburden : **STOP 1**	± 10.0
Cedar Valley formation: ± 45.0'.	
Rapid-Solon members: ± 45.0'.	
1. Ls.; dolomitic; gray-brown; fine grained to sublithographic in zones; hard; scalenohedral calcite geodes; beds about 0.4' thick; fossiliferous, brachiopods and some crinoid fragments.	± 10.0'
2. Ls.; dolomitic; gray-brown to blue-gray at base; fine grained to sublithographic; very hard (this may be a case hardening); calcite geodes as in Bed 1; beds massive in 4.0-5.0' thicknesses, some oblique jointing; numerous atrypoid brachiopods, tetracorals numerous near base; grades into underlying bed; stroms at base.	± 25.0
3. Ls.; dolomitic; blue-gray; fine grained; soft; very argillaceous; grades into a shale lower 1.0'; undulating base.	± 10.0
Wapsipinicon formation: ± 30.0'.	
Davenport (Fayette Breccia). ± 15.0'.	
4. Breccia; argillaceous and silty gray limestone matrix with angular fragments of similar material and brown dolomite and gray lithographic limestone fragments; some zones of laminated lithographic limestone; very undulating base.	± 15.0
Spring Grove member: ± 15.0'.	
5. Dol.; calcitic; redish-brown; fine grained; platy to massive; petroliferous.	± 15.0
Alexandrian Series (?) ± 60.0'.	
6. Ls.; top several feet may be a light-gray "crackle-type" of breccia whichappears to be discontinuous, lithographic, and very hard. This grades into a gray mottled with various shades of pink and blue; fine grained to lithographic; very hard; massive bedded; numerous green silty shale pockets which weather out on exposed surfaces and give rock a pitted appearance; lower few feet grades to a redish-brown sacchroidal soft dolomite.	± 60.0
Maquoketa formation:	
Brainard member: + 10.0'.	
7. Shale; blue-green; plastic.	+ 10.

[redacted]

7.

Iowa State Highway Commission



Location: Near Cen. SW$\frac{1}{4}$ Sec. 2 T. 94 R. 9 Co. Fayette

Remarks:

Measured by: R. D. Michael Date: 5/3/65

Bed:	Description	:Th

Iowa Geological Survey, Iowa City

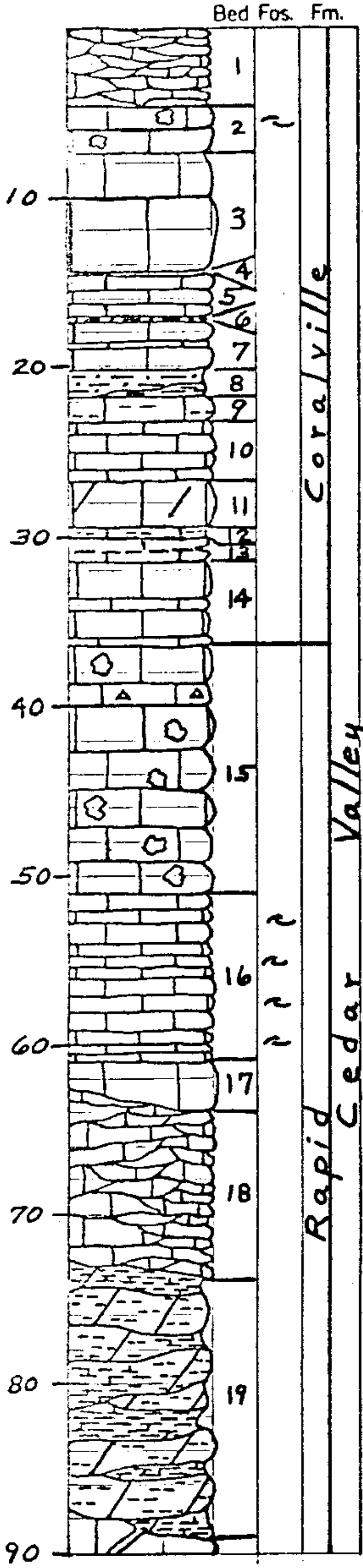
County Sec. 8. T. R.

Location – GENERALIZED SECTION —— HOWARD COUNTY

Altitude –

Measured by – F. H. Dorheim Date – July, 1961

Remarks –



Bed	Description	Thickness (feet)
1	Limestone, medium yellowish-brown, nodular, very dolomitic, earthy, soft, moderately calcitic, platy.	4.5
2	Limestone, light grayish-brown, tough, heavy bedded; vesicular; brachiopods abundant.	3.0
3	Limestone, medium to light yellowish-brown, fine, massive; geodic masses with scalenohedral calcite.	7.0
4	Shale, yellowish-orange, calcareous.	0.2
5	Limestone, medium grayish-brown to olive gray, fine, thin-bedded and laminated.	2.5
6	Siltstone, yellowish-brown, calcareous to dolomitic.	0.2
7	Limestone, bluish-gray to medium brownish-gray, very argillaceous, thick-bedded to platy.	3.0
8	Siltstone, greenish-gray, grading to soft bluish-gray shale.	1.5
9	Limestone, very light yellowish-orange, medium to fine, argillaceous, greenish-gray clay parting at base.	1.5
10	Limestone, medium brownish-gray, medium to fine, tough, in even beds 4" to 1' thick.	3.5
11	Limestone, medium to dark brownish-gray, fine, dolomitic, massive, tough.	3.0
12	Limestone, medium dark gray, fine, argillaceous, nodular.	0.6
13	Limestone, shale, and shaly limestone interbedded and intercalated.	1.5
14	Limestone, dark brown, fine, dolomitic; alternate heavy to laminated beds.	5.0
15	Limestone, yellowish-brown, fine, dolomitic, massive; numerous cavities lined with calcite; may contain nodular dark brown chert locally.	15.0
16	Limestone, bluish-gray, fine, tough, uniformly thin-bedded; fragmented brachiopopods abundant; shaly locally.	10.0
17	Limestone, medium brownish-gray, leached, very vesicular, not always present.	0.0-5

Iowa Geological Survey, Iowa City

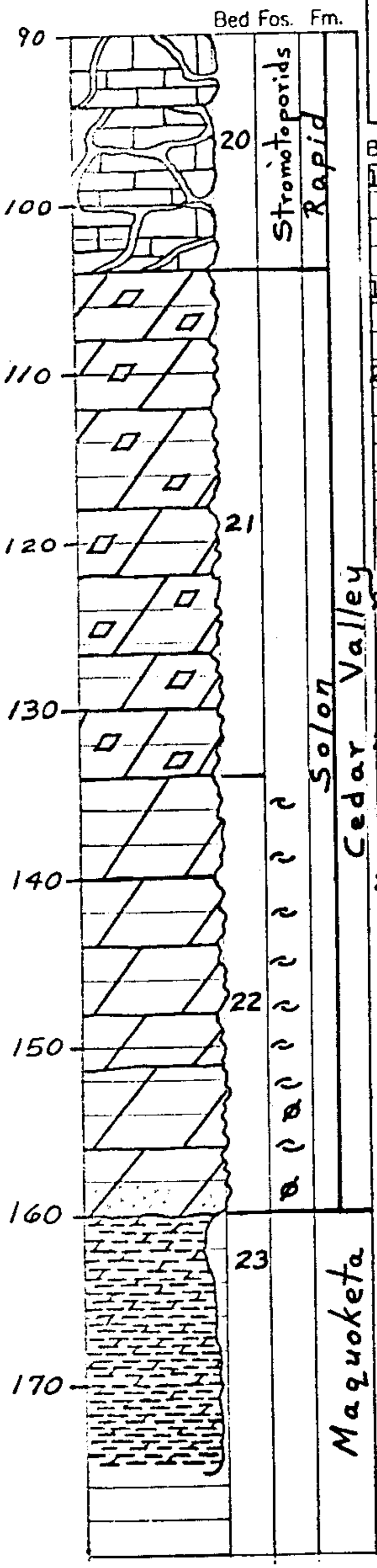
County Sec. 9 T. R.

Location – GENERALIZED SECTION —— HOWARD COUNTY, concld.

Altitude –

Measured by – Date –

Remarks –



Bed	Description	Thickness
18	Limestone, light grayish-brown, weathers grayish-white, very fine to sublithographic, platy; not always present.	0.0-10
19	Variable unit, grading from an argillaceous dolomite to calcareous mudstone and calcareous shale. about	15.0
20	Limestone, very light brownish-gray, weathers grayish white, lithographic to sublithographic, may show gross brecciation, stromotoporids common to very abundant; resembles Coralville; up to 10 feet of relief on upper surface locally; not everywhere present (in some areas all that remains is stromotoporid debris within the soil.	0.0-15
21	Dolomite, medium to dark yellowish-brown medium, massive; weathers to a rough pock-marked surface; contains large masses of rhombohedral calcite (lower calcite zone).	30.0
22	Dolomite, medium to dark yellowish-brown, medium, massive; weathers to a rough pock-marked surface; contains abundant Productella, occasional Spirifer, and poorly preserved corals.	25.0
23	Shale, grayish-orange to light yellowish-orange (weathered), dolomitic, plastic; thickest in eastern Howard county, thin to absent in western part.	30.0

Recently the term "Eldorado stone" has been popularly applied to this ledge which is quarried in about a 50 foot face by the Niemann Construction Company in the NW¼ 20-95-8 Fayette.

Follow the leader, in trail, on county road in a northwesterly direction about 16 miles to the valley north of St. Lucas.

The Brainard shale will be seen, along the road in 35-95-9 Fayette, underlying the massive blocks of "Eldorado stone". Most of the ridges south and east of St. Lucas are topped by this rock.

The terraces north of St. Lucas are topped by only the softer dolomitic basal part of this ledge and are underlain by Brainard. The first terrace north of St. Lucas shows Brainard shale lying at a higher elevation than the "Eldorado" because of a sharp southerly dip in beds.

Stop 2 - Ten minutes. On east-west county road north side 29-96-9 Winneshiek. Soft dolomite above Brainard shale being quarried for lime in area. In lowest point of stream valleys the top of the Fort Atkinson is exposed.

Follow, in trail, west and north to Iowa 24. East on highway 1¼ miles; stop on highway shoulder just east of bridge.

Stop 3 - 30 minutes - Outcrop of stromatoporoidal, white, lithographic limestone. Pavlovec's quarry on north side of highway over gully. Limestone "reef" overlying tan dolomitic limestone containing atrypoid(?) brachiopods. Plastic shale outcrops below quarry in creek bottom. What's the stratigraphy? Write in your own interpretation.

Calvin referred this rock to the Devonian because of presence of Productella subalata, Spirifer subumbonus, and S. pennatus. He described it overlying the Brainard and Ft. Atkinson. He ties the lithographic section in with similar lithologies found in Mitchell, Floyd, Chickasaw, and Johnson Counties. In those particular counties the rock is called Coralville.

Huffman, in 1941, referred this rock in Winneshiek back to Silurian.

Follow highway north to city park at north edge of Calmar on U.S. 52.

Stop 4 - 30 minutes - Lunch in park north of Lutheran Home. There are also several good cafes in town.

Drive north, in trail, on U.S. 52 to Junction of Ia. 325. Take Ia. 325 toward Spillville about 2 miles. Park on highway shoulder opposite rock cut on north side of highway.

Stop 5 - 20 minutes - See geologic description located in SE^{4}NE^{4} 21-97-9 Winneshiek. Write in your own correlations!

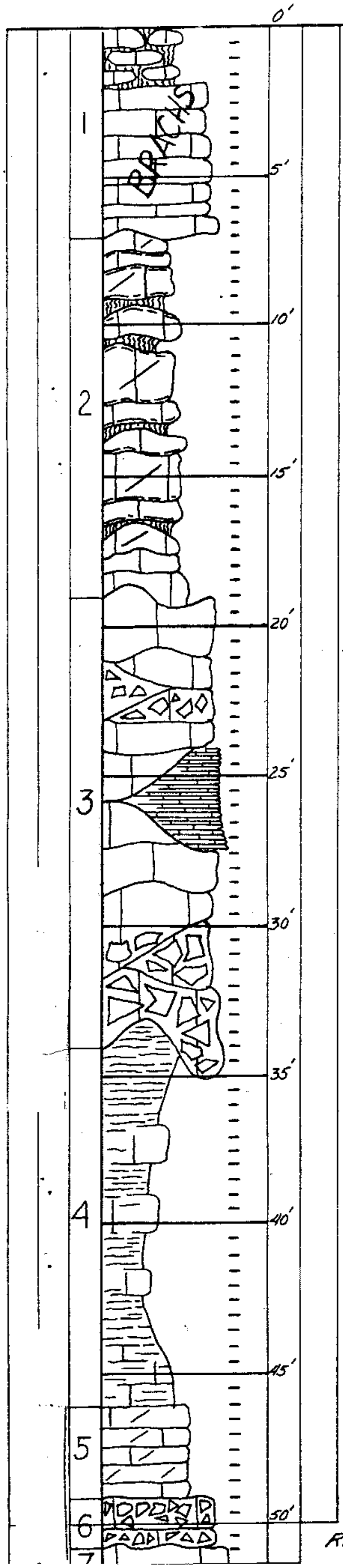
This section may never have been exposed when Calvin, Savage, Scobey, and Huffman did their work. Calvin refers to a "Devonian tongue" extending from Howard County to Calmar, but there is no description of those beds or those in the quarry at the next stop. It is believed that these beds lie above those in the quarry to the west, but there may be some controversy concerning this.

Drive west on highway about a mile to quarry on north side of road. Park in quarry. BE CAREFUL OF FALLING ROCKS.

Stop 6 - 30 minutes - See geologic description of Pavlovec's quarry in SE^{4} 20-97-9 Winneshiek. The Iowa Geological Survey states that shale may be found in stream bottom to south. This could probably be the Brainard. Write in your own correlation or take a chance on the speakers' ideas.

Follow leader, in trail, west through Spillville (Anton Dvorak's home when he composed "The New World Symphony") to Protivin. West from Protivin on Iowa 139 and north $7\frac{1}{2}$ miles. Turn west on county gravel for one mile then north to Vernon Springs Park.

Iowa State Highway Commission



Location: SE¼ NE¼ Sec. 21 T. 97 R. 9 Co. Winneshiek
North side road cut on #325

Remarks:

Measured by: R. D. Michael Date: 3-29-62

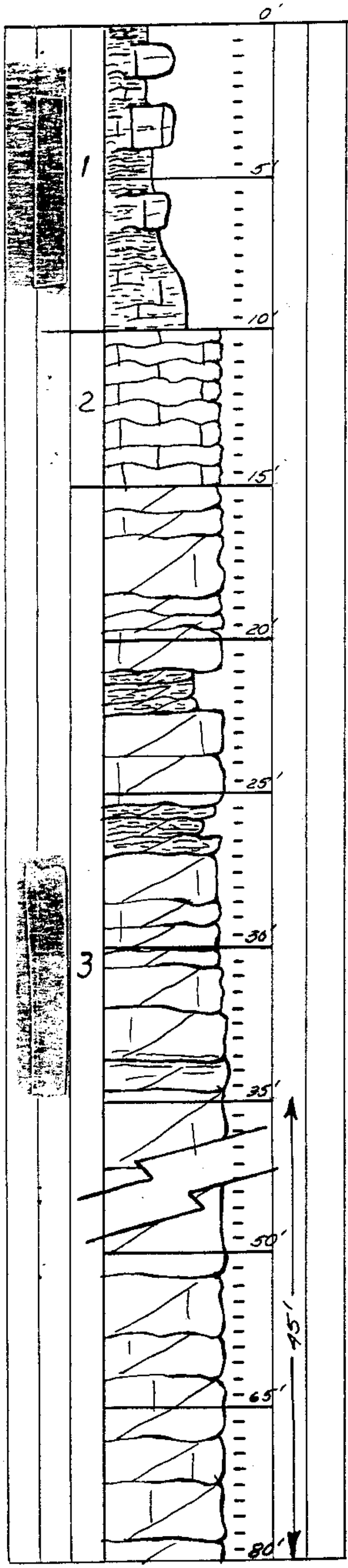
Bed:	Description	Ft.:Th
	STOP 5.	
1.	Limestone; gray-brown; fine grained; hard; beds average 0.5' thick; numerous atrypoid brachiopods.	±7.0
2.	Limestone, dolomitic; brecciated in zones, gray fine to sublithographic limestone fragments in brown dolomitic matrix; badly weathered with numerous soft zones filled with clay, box work pattern characteristic; very irregular and indistinct base.	±12.0
3.	Limestone, gray-brown to pinkish-gray; fine grained to sublithographic; hard; bedding indistinct, cross bedded and brecciated in zones; 3.0' light-gray, laminated and petroliferous zone near middle which is not continuous; base very irregular with box work weathering pattern; lower 3.0' highly brecciated.	±15.0
4.	Shale; greenish-buff, calcareous; badly exposed; non-fossiliferous; base quite calcareous.	+12.0
5.	Limestone, dolomitic; gray; fine grained, earthy; soft; non fossiliferous; beds average 0.4' thick.	3.0
6.	Limestone, breccia; gray-brown; fine to sublithographic crackle breccia; very hard; as two even beds; numerous colonial corals; rhombohedral calcite masses; irregular base with soft shaley zone.	2.0
7.	Dolomite; brown; fine grained; hard; vuggy and vesicular, numerous irregulat shaped white rhombohedral calcite masses; beds average 1.0' thick.	+15.0

Note: Bed 4 same zone as shale at top of Spillville quarry in 20-97-9.

REFER TO SECTION OF QUARRY IN 20-97-9 FOR DRAWING OF BEDS.

13 STOP 6

Iowa State Highway Commission



Location: NECor. SE¼ Sec. 20 T. 97 R. 9 Co. Winneshiek
Quarry at north side of #325

Remarks:

Measured by: R. D. Michael Date: 3/29/62

Bed:	Description	Ft.: Th
00.	Overburden: silty clay.	± 10.
[redacted]		
1.	Shale; brownish-green; calcareous in zones.	± 10.
	Solon member: ± 70.0'.	
2.	Ls.; gray; uneven bedded.	± 5.
3.	Dol.; calcitic; fine grained; hard; upper half thinner bedded (av. 0.8' thick), lower more massive (up to 8.0' thick beds); numerous colonial corals and atrypoid brachiopods (mostly near top); lower massive beds have numerous white rhombohedral calcite masses and have characteristic pitted surface from weathering; numerous soft zones throughout.	± 64.

NOTE: Face is inaccessable; measurements made by dropping tape over side.
Quarry is worked as one lift including the shale at top.

Probably same horizon as rock in Niemann's Eldorado quarry. Quality is not as good but this quarry could be improved by ledging.
R.D. Michael

D

Rock in highlands is Rapid-Solon. Calvin's calcite zone of Solon is below dam underlain by his Productella zone which is well exposed further downstream.

Consider here a tie-in of these beds with those which you have seen further south.

Drive north ½ mile.

Stop 7 - 30 minutes - Balk's quarry in SE^4 28-99-11 Howard County. See geologic description. There is general acceptance of these beds as Cedar Valley formation but their member status is controversial. They lie 30 to 40 feet above the rock at the dam site. This covered interval contains a breccia at the top, a platy unit in the middle, and a dolomitic shale or siltstone at the base. Is this interval lower Rapid or does it correlate with the Wapsipinicon breccia and platy beds to the south? The "crackle" limestone, which should be at the base of this interval, has never been found in the area immediately south of Cresco.

Drive north into Cresco and take blacktop north out of town. Follow highway as it turns west. 2 miles from curve going west is Grupp's Eckerman quarry.

Stop 8 - 40 minutes - Grupp's Eckerman quarry, NW^4 33-100-11 Howard. See geologic description. The correlations on this description are those of the Iowa State Highway Commission. The Iowa Geological Survey would put the upper 35' in the Rapid member and the lower 65' as Solon.

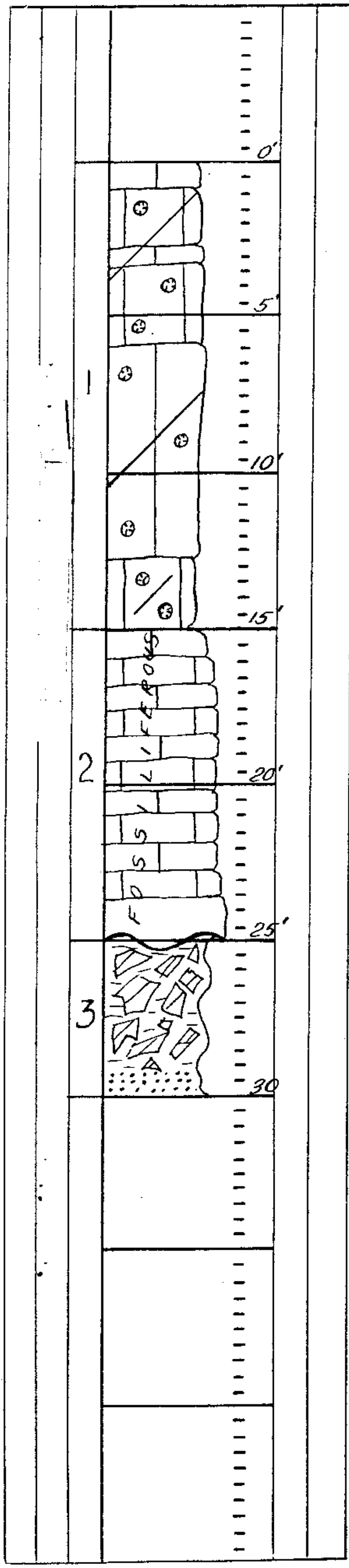
The written description is from the original cores. The actual quarried area reveals beds 5 through the middle of bed 10. Beds 1 through 4 are poorly exposed in roadcut to west.

The quarried area has also shown that the "crackle" limestone (bed 7A) may vary in thickness from 0 to almost 20 feet. It may be completely cut out by the silty shale of bed 6. In this area this unit has a definite biostromal appearance.

Calvin refers this lithographic limestone to that exposed in Mitchell, Worth, Cerro Gordo, and as far south as Johnson Counties. This would give a correlation as Coralville member of the Cedar Valley formation.

The problem here is; does this stone represent a northward thickening of the Lower Cedar Valley or is this equivalent to "Eldorado" beds and therefore of Silurian age? A possible third correlation is that the Wapsipinicon was greatly thickened to the north and this stone represents the Otis-Coggon of Linn County. Calvin identified Spirifer subumbona in equivalent beds in the area

Iowa State Highway Commission



Location: Cent. SE¼ Sec. 28 T. 99 R. 11 Co. Howard
Walk Quarry Elevation top of rock 1246'

Remarks: Section measured by Fred H. Dorheim

Measured by: Checked by R. D. Michael Date: 12/13/60

Bed:	Description	Thk
00.	Overburden: Soil and residual clay.	± 6

STOP 7.

Bed:	Description	Thk
1.	Ls.; dolomitic; yellowish-brown; numerous cavities lined with calcite crystals; secondary calcite scale on bedding planes; massive to heavy bedded. (Upper Calcite Zone)	15
2.	Ls.; bluish-gray; hard; numerous brachiopod fragments mostly Atrypa type; even beds less than 1.0' to quarry floor.	10

Following description added on 5/7/65

Bed:	Description	Thk
3.	Breccia, earthy; dolomitic; greenish-buff broken fragments in a soft calc. shaley matrix; a sandstone	± 5.0

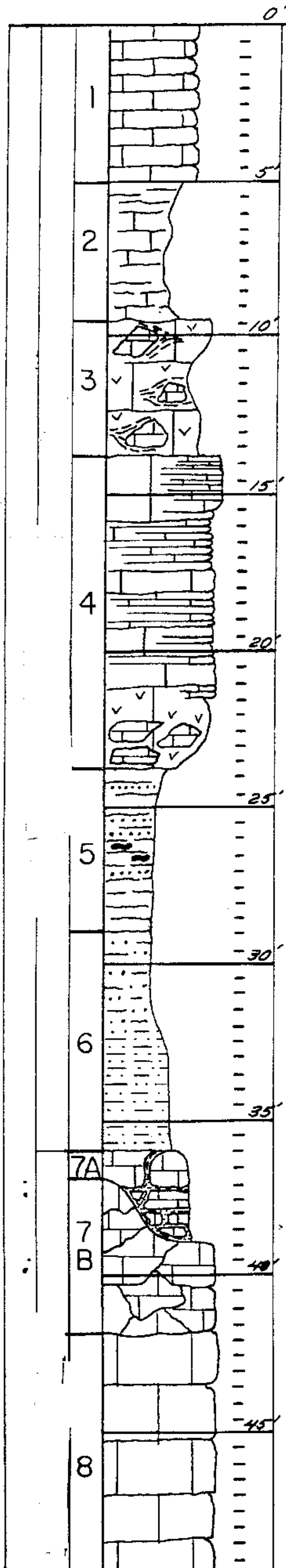
NOTE: Quarry worked as one lift Beds 1-2.

(continued from above)
with small chert fragments is near base; top of unit is highly undulating; dark-blue silty bed in floor.

GEOLOGY
FASSBINDER
PRODUCER
SURVEY

16.

Iowa State Highway Commission



Location: NE¼ NW¼ Sec. 33 T. ___ R. ___ Co. ___
N. of S¼ Cor. 28-100-11, Howard County

Remarks: Grupp's Eckerman & Hughes Options; Gen.Sec. of 7 Co[illegible]

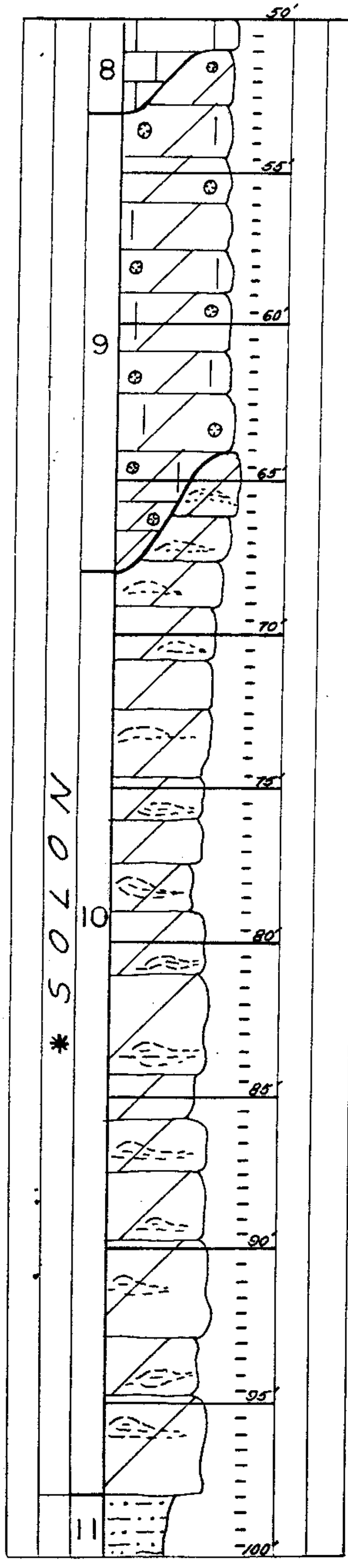
Measured by: R. D. Michael Date: 6-22-61

STOP 8.

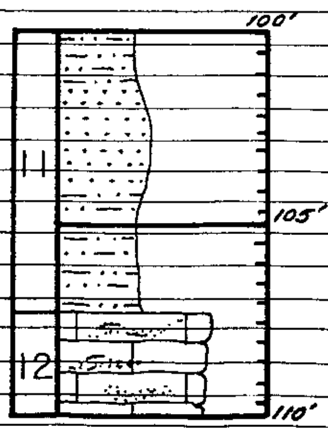
Bed:	Description	Ft.:Th
	Overburden	0.8-32
1.	Limestone; tan with seconlary red color banding throughout, some lark-brown zones; finely crystalline; light-colored banded areas are leached and quite soft, darker zones are unleached and very hard; beds average 0.2' thick.	5.0
2.	Mudstone; cream colored; calcareous in zones.	4.4
3.	Limestone; light-brown; finely crystalline; extremely vuggy and vesicular, cavities may be filled with clay; may appear brecciated; bedding indistinct.	4.4
4.	Limestone; cream to tan with reddish laminations; fine grained to finely crystalline; hard; mostly laminated but base may become coarsely crystalline and massive; base also may become vuggy, soft, and brecciated appearing; petroliferous.	9.5-10
5.	Mudstone; cream; black silicious sand grains prominent; brecciated appearing; may have dark-brown cherty zones.	3.2-5
6.	Siltstone; gray, quite soft and earthy at top, becomes quite hard and calcareous at base; bedding indistinct.	±7.1
7A.	Limestone, breccia; light-gray to cream lithographic fragments surrounded by green siltstone or silty limestone; rock breaks around fragments; bedding indistinct; some Stromatopora-like structures and Favosite corals poorly preserved.	0.8-3
7B.	Limestone; breccia; light-gray to cream with darker gray fragments, but may appear all of one color with a "pudding stone" character; lithographic to sublithographic; very hard and dense; small white calcite masses, stringers, and some geodes throughout; beds average 1.5' thick, grades into bed below, few brachiopod fragments.	2.9-5

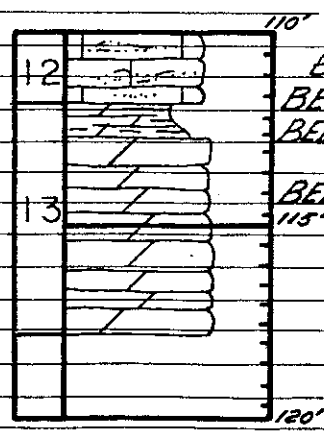
Iowa State Highway Commission

Location: NE¼ NW¼ Sec. 33 T. R. Co.
N. of S¼ Cor. 28-100-11, Howard County
Remarks: Grupp's Eckerman & Hughes Options; Gen. Sec. of 7 Co
Measured by: R. D. Michael Date: 6-22-61



Bed:	Description	
8.	Limestone; light-gray with cream mottling; fine grained to sublithographic; appears similar to Bed 7 except for brecciated character; becomes slightly dolomitic near base; grades into bed below; beds average 1.0'.	8.3-12
9.	Dolomite, calcitic; brown with large white rhombohedral calcite masses throughout; medium hard; finely crystalline; highly vesicular, some geode cavities; a few brachiopod, coral molds, and Stromatopora-like structures, shale partings on some bedding planes; beds average 2.0' thick.	9.1-15
10.	Dolomite, slightly calcitic; brown to dark-brown; fine grained to finely crystalline in zones with earthy texture; vesicular; hard to soft in zones; numerous black shale partings throughout giving a nodular appearance to rock; occassional small white calcite mass; few brachiopod and coral molds; beds average 2.0' thick.	30.0-34
	MAQUOKETA FORMATION: 19.8'	
11.	Siltstone, dolomitic; greenish-gray; may have beds of sandstone up to 2.0 thick; mostly hard and consolidated.	9.3
12.	Limestone; gray-brown; medium crystalline; hard; numerous lenses of green siltstone throughout; beds average 0.4' with green siltstone on bedding planes.	4.5
13.	Dolomite; dark gray-brown with lighter color mottling; medium crystalline; hard; very silty throughout with numerous shale partings; some small white calcite masses; top 0.5' very shaley; beds average 1.0' thick.	6.0





BED 1	CEDAR VALLEY
BEDS 2-6	WAPSIPINICON
BEDS 7A-10	LOWER WAPSIPINIC OR SILURIAN
BEDS 11-13	MAQUOKETA

2-9-65 RD

and it was also identified at the top of the Otis ledge in Linn County. The Survey identifies 40 feet of white lithographic stone in the subsurface at LaPorte City as being transitional between Wapsipinicon and Silurian.

Follow leader to quarry 2 miles east and 1½ miles north on east side of black top.

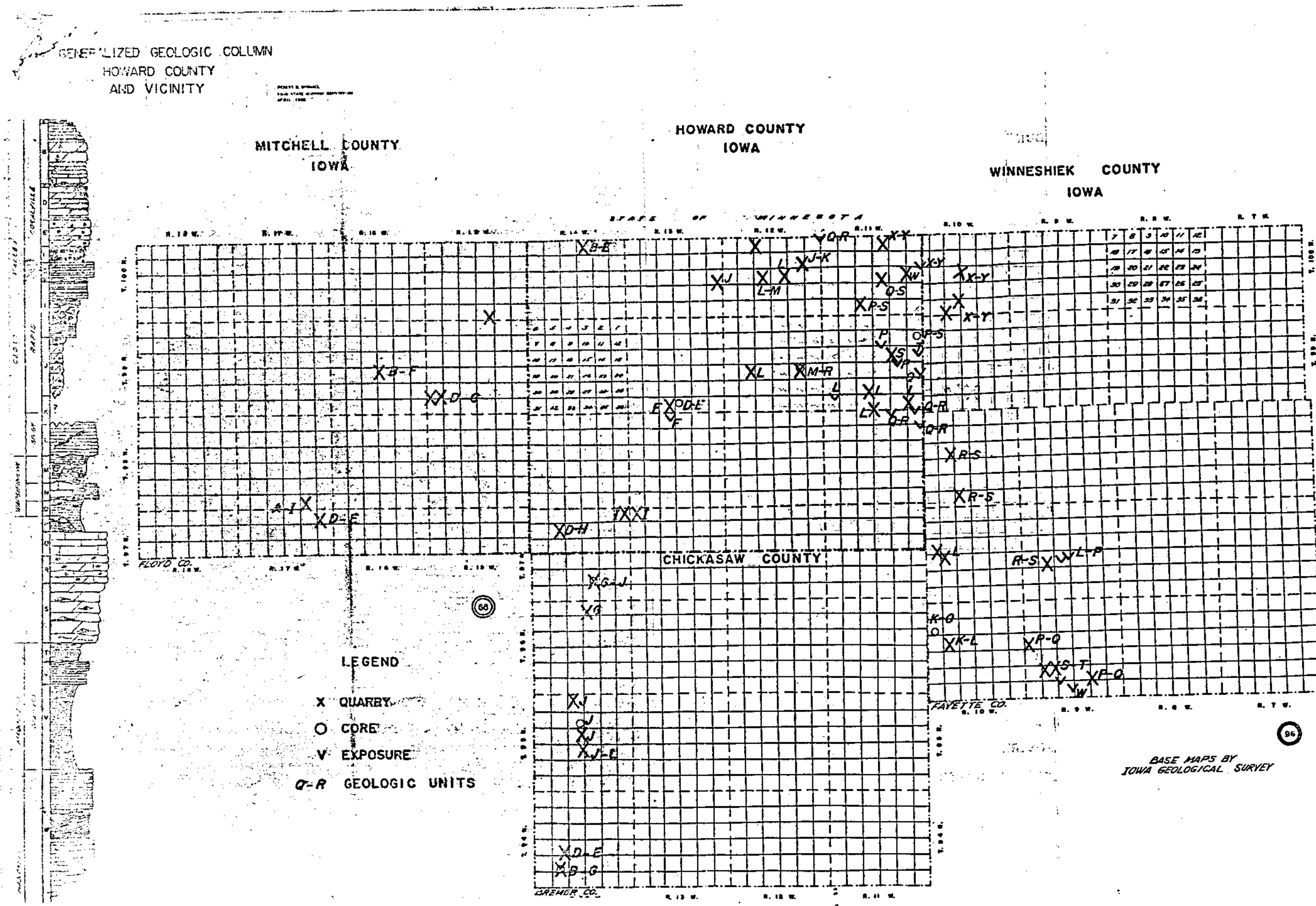
Stop 9 - 20 minutes (you're on your own time after this). Balk's quarry in SE¼ 22-100-11 Howard. About 40 feet of dolomite here equivalent stratigraphically to lower rock in quarry at previous stop. The "crackle" limestone is exposed in weathered blocks in the meadow to the south and about 30 feet higher.

This will end the formal part of the field trip.

For those who may want to follow the geologic section down, there is a quarry east 1½ miles, in NW corner 24-100-11 Howard, which exposes about 70' of Elgin beds. Then on the county line, across the road from the NE Corner of 24-100-11 Howard, the top beds of the Galena are exposed.

This sharp westerly dip of the beds is generally reflected all the way across the county, although there is a somewhat shallowing of the angle going west. The dip also continues east into Winneshiek as seen by the outcropping of progressively older strata in that direction.

NOTE: The generalized geologic column of Howard county and vicinity with accompanying quarry and exposure map was compiled to aid stone producers in their search for aggregate sources. It should be regarded only as a tool, not as an official publication, by the stratigrapher.



GENERALIZED GEOLOGIC COLUMN
HOWARD COUNTY
AND VICINITY
MITCHELL COUNTY
IOWA
HOWARD COUNTY
IOWA
WINNESHIEK COUNTY
IOWA
STATE OF MINNESOTA
CHICKASAW COUNTY
FLOYD CO.
FAYETTE CO.
BREMER CO.
ALLAMAKEE
LEGEND
X QUARRY
O CORE
V EXPOSURE
Q-R GEOLOGIC UNITS
BASE MAPS BY
IOWA GEOLOGICAL SURVEY