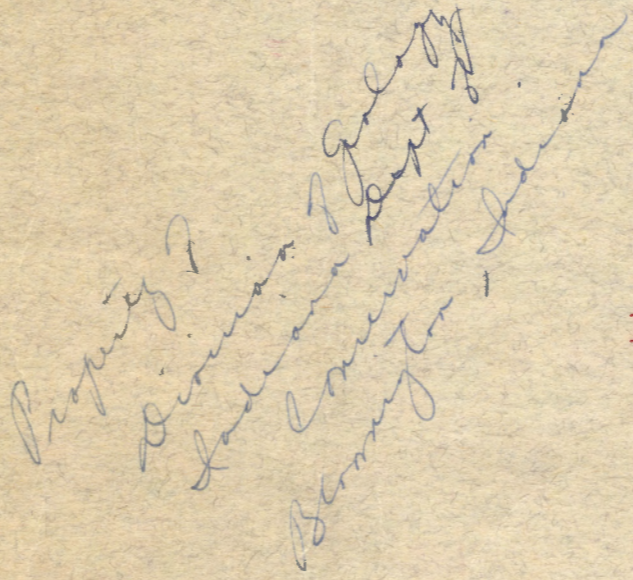
GUIDE BOOK

Indiana Geologic Field Conference

Silurian And Devonian Rocks

of

Southeastern Indiana



1947

GUIDE BOOK

First Post-War Geologic Field Conference

April 25, 26, and 27, 1947

on

SILURIAN AND DEVONIAN FORMATIONS IN SOUTHEASTERN INDIANA

Conference Leader
Ralph E. Esarey

Sponsored by

Department of Geology, Indiana University, and
Division of Geology, Indiana Department of Conservation,
Charles F. Deiss, Chairman and State Geologist.

Compiled by
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Indiana University.

Bloomington, Indiana
April, 1947.

Contents

ILLUSTRATIONS

INTRODUCTION

The conference is planned to provide an opportunity to observe and discuss the outcrop sections of the Silurian and Devonian rocks in southeastern Indiana. The broad aspects of the stratigraphy and fauna will be emphasized since most persons attending will not be intimately familiar with these formations.

We hope that the discussions will assist in the solution of many unsolved problems concerning these rocks. Any assistance that can be provided in the subsurface identification and correlation of the counterparts of these formations in the surrounding basin areas will help make the conference a success. Campbell's (1942) recent reclassification of the Devonian will be especially interesting to those familiar with the older classification and terminology.

The opportunity to become acquainted and to discuss our mutual problems is an important part of the program.

SUMMARY OF PROGRAM

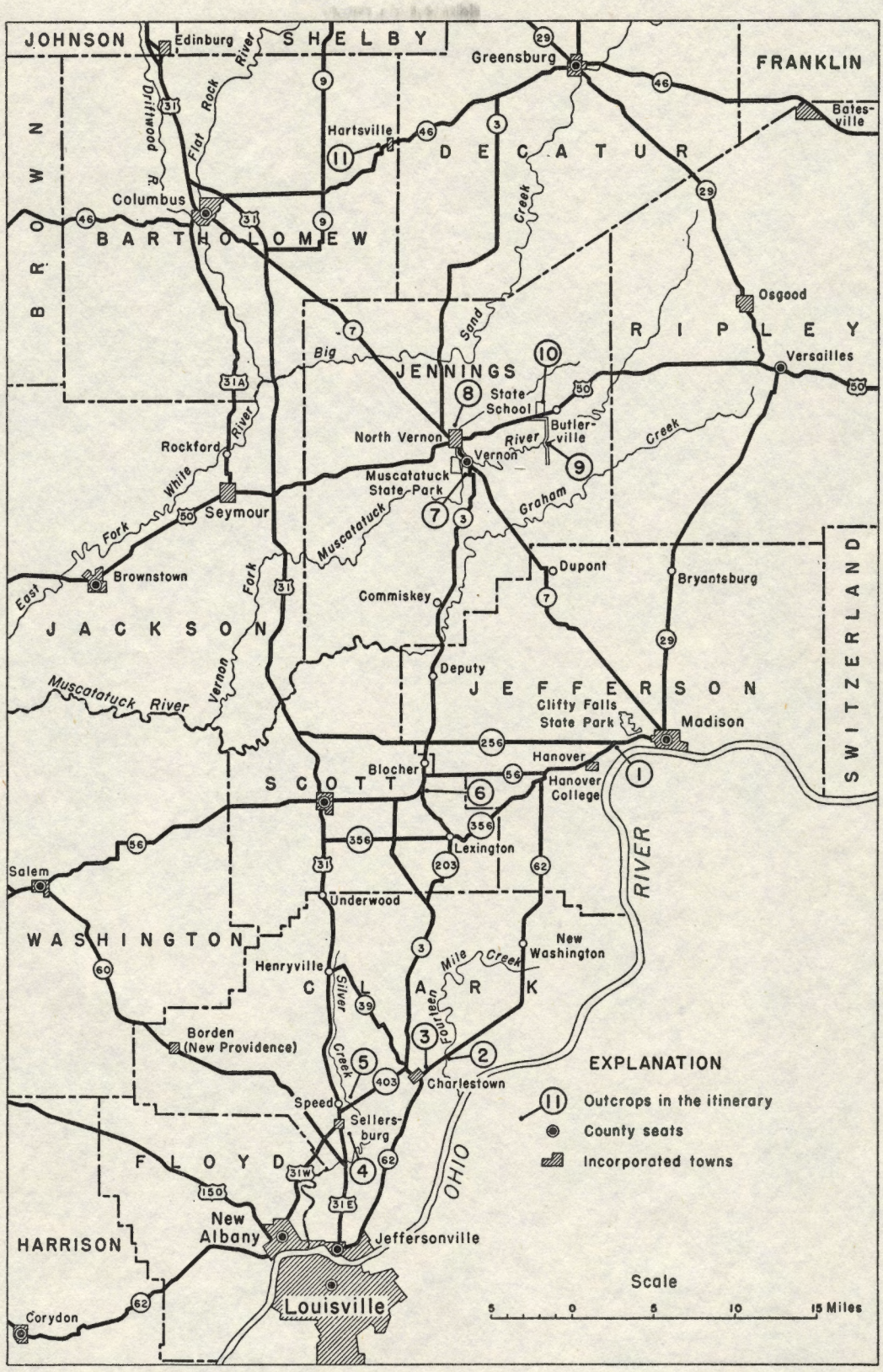
Headquarters for the conference is Clifty Inn, Clifty Falls State Park, Madison, Indiana, on state highways 62 and 107.

The conference opens Friday evening, 7:30, April 25, with an informal discussion of the stratigraphy, structure, and fauna of the Silurian and Devonian formations. Short talks will be made by Professor C. A. Malott, Indiana University, Mrs. Louise B. Freeman, Kentucky State Survey, Professor Grant T. Wickwire, Hanover College, Mr. Guy Campbell, Corydon, Indiana, and Professor Ralph E. Esarey, Indiana University. The meeting is open for informal discussions in which you are invited to participate.

On Saturday morning, April 26, at 8:00 o'clock, the party leaves Clifty Inn for the first stop on the itinerary. Lunch will be served at Speed, Indiana, by the Louisville Cement Company. Dinner in the evening can be obtained at Clifty Inn by all members who wish to eat there. A program is not planned for Saturday evening.

On Sunday morning, April 27, at 8:00 o'clock, the party leaves Clifty Inn for North Vernon, Indiana, which is the first stop of the day. The conference disbands at noon, at Hartsville, Bartholomew County. No arrangements have been made for Sunday dinner.

Guests of Clifty Inn should check out before leaving Sunday morning unless they plan to return to the Park.



ROUTE MAP OF FIELD CONFERENCE ON SILURIAN
AND DEVONIAN FORMATIONS IN SOUTHEASTERN INDIANA

ITINERARY AND STRATIGRAPHIC SECTIONS

First Day of Field Conference, Saturday, April 26, 1947.

Start: Leave Clifty Inn, Clifty Falls State Park, Madison, Indiana, 0.0 miles. at 8:00 a.m.

Proceed to south entrance of Park on state highway 62. Set speedometers here. From Park entrance turn west (right) on highway 62 and drive 1.8 miles to the deep road cut for stop #1. (Please drive cars up the hill to intersection of highway 256, at filling station, for parking. Traffic is heavy on this highway.)

Stop #1. Section at Madison
1.8 miles. ($NE\frac{1}{4}$ sec. 6, T. 3 N., R. 10 W., Jefferson County)

Upper Ordovician and Lower Silurian.

This is one of the best exposures of upper Ordovician in Indiana. The lower part of the cut starts in the Eden shales and all of the beds up to and through the Laurel are exposed. The section is approximately as follows:

	Feet
Laurel limestone: tan, cherty, even-bedded, disconformable	30
Osgood shale: tan to gray shales and interbedded limestones, disconformable	11
Brassfield limestone: tan to brown, crystalline, shaly; green and pink mottled	3
Unconformity. Ordovician-Silurian contact.	
Whitewater formation: hard, gray limestones with interbedded gray fossiliferous shales	3.5
Saluda formation: massive, sandy, brown and green banded dolomite. Includes the 8-foot coral zone in gray shale at base	52
Liberty formation: mostly thin limestones with interbedded gray shales, very fossiliferous	40
Waynesville formation: largely gray shales and thin limestones, very fossiliferous	50
(The following Ordovician formations are not included in the field study but are added for completeness.)	
Arnheim formation	90

ITINERARY AND STRATIGRAPHIC SECTIONS

	Feet
Mt. Auburn formation (Maysville group)	20
Corryville formation	20
Bellevue formation	25
Fairmount and Mt. Hope formations	90
Eden shales (Eden group)	50 plus

Proceed on highway 62 a distance of 24.9 miles to stop #2. The route crosses the Muscatatuck regional slope physiographic province, developed on the Silurian and Devonian limestones. The eastern margin of the province has an elevation of 875 feet, the western edge about 500 feet along the Ohio River. This stop is a road cut in the eastern valley wall of Fourteen Mile Creek.

Stop #2. Section at Fourteen Mile Creek
26.9 miles. (S. corner Survey 121, Clark County)

Complete Silurian Section.

	Feet
Jeffersonville limestone (Devonian): brachiopod zone at highest exposure on hill, coral zone about 10 ft. lower, actual Silurian-Devonian contact covered . . .	10 plus
Louisville limestone (Silurian): dolomitic, gray to tan, thick-bedded	64
Waldron shale: blue to gray, calcareous, barren	13
Osgood formation: blue shale, 2 ft.; massive limestone and shale, 4.5 ft.; blue-gray shale, 8 ft.; sandy limestone, 1 ft.; gray shale, 3 ft.	18
Brassfield limestone: tan, shaly, in part sandy; disconformable at top, unconformable at base	2
Whitewater formation (Ordovician): green shale, hard gray limestone, and gray-green shale	1.5
Saluda formation: massive, banded brown and green dolomite.	11 plus

Continue westward on highway 62 for 2.4 miles to stop #3. The road cuts show the same stratigraphy as above. Turn northwest (right) on stone road leading to rock quarry, 300 feet from the highway, at northeast edge of city of Charlestown.

ITINERARY AND STRATIGRAPHIC SECTIONS

Stop #3. Section in Charlestown Quarry
29.3 miles. (S. part of Survey 118, Clark County)

Feet

Louisville-Jeffersonville Contact.

Jeffersonville limestone: dolomitic limestone, massive, gray to tan, beds 0.5 to 2.0 ft. thick, fossiliferous, but few good specimens available; upper 14 ft. dolomitic, massive, gray; lower 8 ft. tan to brown, very carbonaceous and coralline 22.5

Louisville limestone: dolomitic, light gray to tan, massive, fossils mostly obliterated, contact with Jeffersonville limestone not a prominent eroded surface here, lower part of formation covered . . . . . 20 plus

Leaving the quarry, we continue west on highway 62 for 0.8 mile to the city limit sign of Charlestown at the junction of highway 3. Turn northwest (right) on highway 3, through the underpass of the railway. Drive 1.2 miles north through Charlestown to the intersection of highway 403. Turn west (left) onto highway 403 and drive 5.1 miles to the junction of highway 31 in the town of Speed. Turn south (left) on highway 31 and continue for 0.7 mile to the main intersection of the town of Sellersburg. Turn east (left) into Sellersburg and continue straight through the town (beyond the stop light) for 0.8 mile. The road bears southeast and crosses the railway. This is stop #4.

Stop #4. Section in Sellersburg Quarry
38.1 miles. (Cen. E½ Survey 89, Clark County)

The Sellersburg quarry is visited especially to show the disconformity between the Louisville and Jeffersonville limestones. The upper surface of the Louisville appears weathered and eroded, and contains the characteristic "chain" corals, chert, and some conglomeritic zones.

A complete section of the Devonian occurs in the quarry, but the formations are not easily accessible. The Speed quarry at the next stop is the best place, by far, to study and collect from the formations. The approximate section is included here for your convenience.

ITINERARY AND STRATIGRAPHIC SECTIONS

	Feet
New Albany shale	15 plus
Beechwood limestone	3.5
Silver Creek formation	18
Jeffersonville limestone	40
Louisville limestone	20 plus

Lunch stop. 39.6 miles. From the Sellersburg quarry, the party retraces its route to the town Speed. The Louisville Cement Company has invited the party to be its guests for lunch at the community house. The above company has offered, most graciously, all of its facilities to the conference. After lunch, Mr. H. H. Roerk, Geologist for the company, will conduct the party through the plant and quarry.

The Speed quarry of the Louisville Cement Company is about one mile northeast of the plant. Drive back south in Speed to the junction of highway 403 (you are on highway 31). Turn east (left) on 403 and drive 1.4 miles to the road marked quarry entrance. Turn north (left) on this road to the quarry, 0.3 mile.

Stop #5. 41.3 miles. Section in Speed Quarry ($W\frac{1}{2}$ of Survey 132, Clark County)

This quarry contains the best exposures of the Devonian formations to be seen on the trip. A few feet of New Albany shale appear at the top of the south face of the quarry. The upper few feet of the Louisville limestone are exposed in the very lowest part of the quarry. The main floor lies, approximately, at the Silurian-Devonian contact.

	Feet
New Albany shale:	10
Beechwood limestone: gray, crinoidal, spiny crinoid stems, phosphate pebbles at base	3
Silver Creek formation: cherty in upper part, Speed member at base 3.5 ft. thick	16
Jeffersonville limestone: gray, fossiliferous, hard limestone with great profusion of bryozoa, 4 ft.; brown to gray limestone with Spirifer acuminatus, 13 ft.; gray, fossiliferous limestone, very coralline, 12 ft.; brown, carbonaceous, coralline limestone near base, 12 ft.	39
Louisville limestone: found in lowest part of quarry floor	6

ITINERARY AND STRATIGRAPHIC SECTIONS

Leave Speed quarry and drive back to Speed. Proceed north on highway 31 approximately 20 miles to Scottsburg. The Borden or Knobstone escarpment developed in the lower Mississippian sandstones can be seen west of the highway. This is the largest and most prominent topographic feature in Indiana. The highway follows the Scottsburg lowland, developed in the New Albany shale. In the city of Scottsburg turn east (right) on highway 56 and continue northeast about 8 miles to the intersection of highway 203. The Blocher quarry is visible southeast of this intersection.

Stop #6. Section in Blocher Quarry
72.2 miles. (Sec. 20, T. 3 N., R. 8 E., Scott County)

This is the first exposure with Geneva dolomite present. The Geneva is absent or very thin in Clark County, but thickens northward and rests on the Louisville, Waldron, and Laurel formations.

	Feet
New Albany shale	2
Beechwood limestone: medium- to fine-grained, not as highly crinoidal as usual	4
Silver Creek formation: brownish gray, darker than usual, distinct conchoidal fracture	5.8
Jeffersonville limestone: upper 42 ft. massive limestone and dolomitic limestone, darker and more dolomitic toward base, portions very fossiliferous, Stropheodonta prolific; lower 8 ft. very coralline, brown, dolomite	50
Geneva dolomite: dark gray, bluish, and mottled, saccharoidal, unfossiliferous; water covering lower part . .	20

From Blocher drive north on highway 3, (leave highway 56, which turns east) for 21 miles, or almost to its intersection with highway 7. Stop 0.3 mile south of this intersection. This is the Tunnel Mill section and stop. The complete section of rocks starts in the road cut and continues down the valley wall of the Muscatatuck River west of the highway. The abandoned quarry just west of the highway is included, and the section is completed in the bed of the river, about one-half mile west. The tunnel in the Waldron shale at the old mill connects two meanders of the Muscatatuck River. The Waldron shale is fossiliferous and offers excellent collecting.

ITINERARY AND STRATIGRAPHIC SECTIONS

Stop #7. Section at Tunnel Mill
93.2 miles. (SW¼ sec. 11, T. 6 N., R. 8 E., Jennings County)

	Feet
New Albany shale:	20 plus
North Vernon ~~Beechwood~~ limestone: dark gray, coarse, crystalline . . .	2
Jeffersonville limestone: brown, gray, cherty, many Spirifer acuminatus and Stropheodonta; soft, whitish limestone, 4 ft.; laminated limestone, 6 ft.; hard, dense limestone, 2 ft.; coarse, brown, coralline limestone, 12 ft.	38
Geneva dolomite: dark brown, massive, with calcite masses	15
Louisville limestone: hard, gray, dolomitic limestone . .	7
Waldron shale: blue to gray, calcareous, fossiliferous .	4.5
Laurel limestone: gray to tan, cherty, thin-bedded, (extends to water level in river)	22

This is the last scheduled stop for the first day. Those who are staying at Clifty Inn will take highway 7 (at junction of highways 3 and 7) to Madison. Dinner can be obtained at the Inn for all members desiring to eat there.

No program is planned for Saturday evening.

Second Day of Field Conference, Sunday, April 27, 1947.

Leave Clifty Inn, 8:00 a.m. Arrival at first stop, #8, 8:45 a.m.

The party will re-assemble officially at the Paul Frank quarry in the northeast edge of North Vernon, Jennings County. Those coming into the city on highway 7, turn right (a sharp turn; do not cross the railway tracks) at the intersection of highway 50 near the center of North Vernon. This is the main business district. Continue entirely through the city on this street (Fifth Street), leaving highway 50, which turns east. For others coming in on different highways, the quarry is 0.2 mile north of the city limits on Fifth Street. This street is the main business street of the city.

ITINERARY AND STRATIGRAPHIC SECTIONS

Stop #8. Section in Paul Frank Quarry
0.0 miles. (N½ sec. 34, T. 7 N., R. 8 E., Jennings County)

A good section of the lower 40 feet of the New Albany shale is exhibited in the quarry. The Silver Creek has disappeared. The section is approximately as follows:

	Feet
New Albany shale: black shale, 15 ft.; green and green-gray banded shale, 15 ft.; black shale, 10 ft.; pyritic and conglomeritic beds in green shale	40
Beechwood limestone: dark gray, crinoidal, phosphatic pebbles, conglomeritic, 5 ft.; tan to gray, crystalline, dense limestone, 2.5 ft.; dark gray, phosphatic pebbles, crinoidal, conglomeritic, 1.0 ft.	4
Jeffersonville limestone: dolomitic, massive, tan, cherty, very fossiliferous at top, green calcite masses, 10 ft.; dolomite, tan to gray, coarsely banded and mottled, 6 ft.; highly laminated dolomite, 6 ft.	30
Geneva dolomite: exposed in floor of quarry; brown, massive, calcite masses, variegated, barren of fossils .	5 plus

Return to state highway 50 in North Vernon, which is 0.45 mile from the quarry. Turn east (left) on highway 50 for 5.8 miles to a narrow stone road which extends due east from highway 50. Turn east (right) on this road for 0.45 mile to a stone road leading south. Turn south (right) for 1.9 miles to a stone and concrete bridge across the South Fork of Muscatatuck River.

Stop #9. Section at Muscatatuck River
8.2 miles. (SW¼ sec. 34, T. 2 N., R. 9 E., Jennings County)

	Feet
Jeffersonville limestone: upper part chalky, middle portion gray and fine-grained, lower part brown to gray, porous, fossiliferous dolomite	13
Geneva dolomite: brown, massive, sandy	30
Laurel limestone: tan, thin-bedded, cherty	50

ITINERARY AND STRATIGRAPHIC SECTIONS

Return to highway 50, 2.45 miles, and turn west (left). Drive 0.4 miles and turn north (right) into the entrance of the Muscatatuck State School marked by the sign. Follow the black top road north for 2.1 miles to the quarry which is beyond all of the buildings.

Stop #10. Section in Muscatatuck School Quarry
13.1 miles. (N½ sec. 21, T. 7 N., R. 9 E., Jennings County)

This section shows the Geneva resting on the Laurel. The basal Geneva is a sandstone. The section is a composite one for the local area.

	Feet
Jeffersonville limestone:	2 plus
Geneva dolomite: weathered, brown dolomite, 20 ft.; coarse, brown to white sandstone, 6 ft.	26 plus
Laurel limestone: note the excessive amount of chert in the Laurel	20 plus

Return to highway 50 and turn west (right) to North Vernon. At the intersection of highway 50 and 7, take highway 7 and turn northwest (right) out of North Vernon. From the city limit sign drive 13.2 miles northwest to a full intersection of a black top road with a sign pointing west to Elizabethtown. Turn EAST (right) at this point and continue 1.8 miles to a "T" road leading north. A sign reads old road 9, Turn north (left) here and follow the black top road for 1.2 miles to the next intersection. Turn left for 100 feet to state road 9. The road merely jogs 100 feet west. Turn north (right) on state highway 9 and drive 7 miles to the intersection of highway 46. Turn east (right) on highway 46 and proceed 4.2 miles to stop #11, at the bridge across Clifty Creek where the city limit sign for Hartsville is placed. The best exposure is in the quarry and road cut across the creek to the west.

ITINERARY AND STRATIGRAPHIC SECTIONS

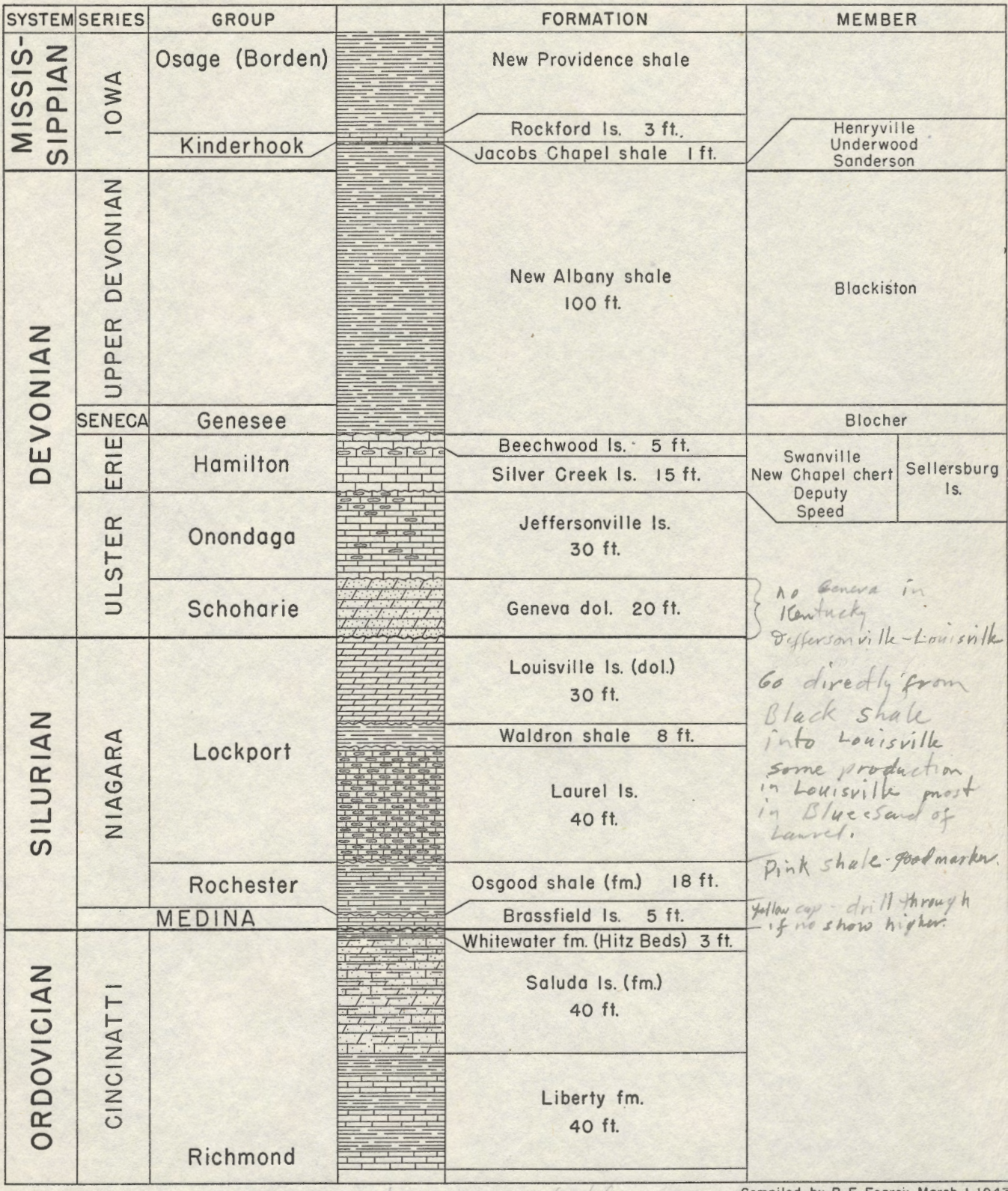
Stop #11. Section in Hartsville Quarry
48.6 miles. (NE¼ sec. 2, T. 9 N., R. 7 E., Bartholomew County)

	Feet
Glacial drift	10 plus
Geneva dolomite: brown, massive, finely crystalline, with calcite concretions; lower 20 ft. very massive . . .	35 plus
Waldron shale: blue to gray, calcareous, fossiliferous; good collecting in this area	10
Laurel limestone: gray, thin-bedded, cherty	15 plus

On the southeast side of the road large blocks of Geneva dolomite can be seen. The underlying Waldron shale in the road cuts is quite fossiliferous.

This concludes the field conference.

COMPOSITE STRATIGRAPHIC COLUMN OF SILURIAN, DEVONIAN, AND ADJACENT ROCKS IN SOUTHERN INDIANA



Compiled by R. E. Esarey March 1, 1947

Greensburg - Kentucky Survey field office
Hauser or Noson.
New Map of Green County showing locations @ 1:50 from Ky Survey.

DESCRIPTION OF FORMATIONS

The following descriptions of the formations and members are offered to aid in their identification. The descriptions are generalized and do not necessarily describe all outcrops. Thicknesses are taken from the type localities or are averages. Only the important index fossils and the abundant fossils are listed. The beds are described from oldest to youngest.

Saluda limestone. Upper Richmond (Ordovician). Type section on Saluda Creek, near Hanover, Indiana. Lower 10 ft. gray, calcareous, fossiliferous shale. Upper 30 ft. massive, brown and green banded, sandy, unfossiliferous dolomite. Ripple marked and sun-cracked.

Fauna:

Corals
Columnaria alveolata
Tetradium minus

Ostracods
Leperditia caecigina
Leperditella glabra
Eurychilina stiatomarginata

Brachiopods
Hebertella occidentalis
Strophomena sulcata

A few bryozoa

Whitewater formation. (Hitz beds) Upper Richmond (Ordovician). Type section on Whitewater River near Richmond, Indiana. Unconformable with overlying Silurian. Increases from one foot at Madison to 80 ft. in thickness in Wayne County. Occasionally absent, irregular in occurrence. Gray to white, rubbly, mottled, thin limestone beds intercalated with gray, calcareous shale.

Fauna:

Brachiopods
Rhynchotrema capax
Lophospira hammeli
Hebertella occidentalis

Ostracods numerous

Bryozoa abundant

DESCRIPTION OF FORMATIONS

Brassfield limestone. Medina (Silurian). Basal Silurian in Indiana. Type section at Brassfield, Kentucky. Six inches to 10 ft. thick, but occasionally absent. Hard, coarsely crystalline, greenish-gray to salmon-pink to red, mottled limestone. Upper part sometimes sandy or shaly.

Fauna:

Brachiopods
Leptaena rhomboidalis
Orthis flabellites
Dalmanella elegantula
Rhipidomella hybrida
Triplecia ortoni
Atrypa marginalis
Camarotoechia convexa

Trilobites
Illaenus daytonensis
Calymene niagarensis
Phacops pulchellus

Osgood shale. Rochester (basal Niagaran of Indiana). Type section at Osgood, Indiana. Averages 22 ft. in thickness. Lower or basal limestone gray to tan, 1 to 6 ft. thick. Lower shale soft, blue, 1 to 2 ft. thick. Upper limestone gray to tan, crinoidal, fossiliferous, 6 ft. thick. Upper shale gray, calcareous, fossiliferous, 11 ft. thick.

Fauna:

Corals
Duncanella borealis
Enterolasma caliculum

Cystoids
Caryocrinites, several species
Holocystites, several species

Brachiopods
Atrypa reticularis
Camarotoechia indianensis
Spirifer niagarensis
Whitfieldella quadrangularis

Trilobites
Calymene niagarensis
Dalmanites limulurus

Laurel limestone. Lockport (Niagaran, Silurian). Type section at Laurel, Indiana. Usually thin-bedded and evenly bedded, white to tan, hard limestone. Drusy, cherty, and sometimes argillaceous. The cliff rock of the Ohio River bluffs. Used for building stone in some areas. Approximately 40 ft. thick.

Fauna:

Corals
Amplexus cinctus
Favosites spinigerus

Cephalopods
Cyrtoceras howardi
Dawsonoceras annulatum

Trilobites
Calymene niagarensis

Brachiopods
Conocardium elrodi

Crinoids
Allocrinus benedicti
Cyphocrinus gorbyi
Melocrinites aequalis
Pereichocrinus ornatus

DESCRIPTION OF FORMATIONS

Waldron shale. Lockport (Niagaran, Silurian). Type section Waldron, Indiana. Clay shale, calcareous, gray to green to blue in color; About 10 ft. thick. Very fossiliferous locally.

Fauna:

Corals
Duncanella borealis
Favosites forbesi occidentalis

Crinoids
Eucalyptocrinites crassus
E. ellipticus
E. elrodi
E. ovalis

Cephalopods
Dawsonoceras annulatum

Gastropods
Diaphorostoma niagarense

Trilobites
Calymene niagarensis
Dalmanites halli
D. verrucosus
Cyphaspis cristyi

Brachiopods
Anastrophia internascens
Atrypa reticularis
Bilbites bilobus
Camerotoechia acinus
C. indianensis
C. neglecta
C. whitei
Dalmanella elegantula
Homoeospira evax
H. sobrina
Leptaena rhomboidalis
Meristina maria
Rhipidomella hybrida
Rhynchotreta americana
Schuchertella subplana
Spirifer crispus
Spirifer radiatus
Uncinulus stricklandi
Whitfieldella nitida

Louisville limestone. Lockport (Niagaran, Silurian). Type section at Louisville, Kentucky. Dolomitic limestone, gray to tan, fine-grained, thick-bedded, varying in composition from top to bottom. Averages 30 ft. in thickness. Locally quite fossiliferous.

Fauna:

Corals
Alveolites, several species
Amplexus shumardi
Blothrophyllum cinctum
Cladopora, several species
Cystiphyllum niagarense
Eridophyllum rugosum
Favosites favosus, and other species
Halysites catenularia
H. labyrinthicus
Heliolites inerstinctus
Heliophyllum, several species
Plasmopora follis
Strombodes pentagonus
Thecia major
Zaphrentis, several species

Brachiopods
Conchidium knappi
Leptaena rhomboidalis
Pentamerus oblongus
Wilsonia saffordi

Stromotoporoids
Clathrodictyon vesiculosum

Trilobites
Bumastis ioxus

DESCRIPTION OF FORMATIONS

Geneva dolomite. Schoharie (Ulsterian, Devonian). Type section, Geneva, Indiana. Lies unconformably on Silurian. Buff- to chocolate-colored, massive, soft, fine-grained, saccharoidal, concretionary. Changes to almost pure sandstone at base in local areas. 0 to 50 ft. thick. Generally unfossiliferous.

Fauna:

Fossils very rare. Sometimes contains external molds of corals.

Jeffersonville limestone. Onondaga (Ulsterian, Devonian). Type section at Jeffersonville, Indiana. Dolomitic, massive, crystalline, light-colored, coarse-grained, cherty, coralline limestone. Thickness 30 ft. or more. Fossils usually scarce but sometimes occur in enormous numbers.

Fauna:

Corals
Alveolites, several species
Aulopora, several species
Blothrophyllum, many species
Favosites, 28 species
Hadrophyllum d'orbignyi
Heliophyllum, 5 species
Syringopora, many species
Zaphrentis, 15 species
Cladopora, many species
Cyathophyllum, 32 species
Emmonsia
Prismatophyllum prisma

Brachiopods
Athyris fultonensis
Atrypa reticularis
Camarotoechia tethys
Spirifer acuminatus
S. audaculus
S. gregarius
S. varicosus
Stropheodonta hemispherica

Trilobites
Calymene platys
Dalmanites anciops
Phacops rana
Proetus crassimarginatus

Silver Creek limestone. Hamilton (Erian, Devonian). Type section at Silver Creek, Indiana. Homogeneous, fine-grained, bluish to drab or gray, argillaceous, magnesian limestone. Thickness about 15 ft. The famous natural cement rock of Clark County. Fossils usually scarce.

Fauna:

Brachiopods
Athyris fultonensis
Stropheodonta demissa
Rhipidomella vanuxemi
Tropidoleptus carinatus
Spirifer fornacula
Chonetes yandellanus
Spirifer oweni

Gastropods
Loxonema hydraulicum

Pelecypods
Paracyclus lirata

DESCRIPTION OF FORMATIONS

Speed formation. Hamilton (Erian, Devonian). Type section, Speed, Indiana. Hard, blue, crystalline limestone. Weathers in spalls. One to 3 ft. thick.

Fauna:

Corals
Hadrophyllum d'orbignyi, numerous

Brachiopods
Rhipidomella vanuxemi, abundant
Spirifer byrnesi
Stropheodonta demissa
Athyris fultonensis

Deputy "formation". Hamilton (Erian, Devonian). Type section at Deputy, Indiana. Blue to gray, weathers light gray. Difficult to distinguish from Speed except by fossils. About 3 ft. thick.

Fauna:

Brachiopods
Spirifer mucronatus
Pholidostrophia iowaensis
Cyrtina hamiltonensis
Stropheodonta concava

Cyrtina beaks abundant on weathered surfaces.

New Chapel chert. Part of Silver Creek formation. A zone of chert nodules and thin beds in upper part of Silver Creek.

Swanville "formation". Hamilton (Erian, Devonian). Type section at Swanville, Indiana. Thick-bedded, hard, bluish to gray, crystalline limestone. Similar to Beechwood. About 3 ft. thick.

Fauna:

Corals
Dendropora osculata
Drymopora auloporoidea

Pelecypods
Gosseletia sp.

Brachiopods
Tropidoleptus carinatus
Chonetes coronatus
Spirifer iowensis
Atrypa reticularis

DESCRIPTION OF FORMATIONS

Beechwood limestone. Hamilton (Erian, Devonian). Type section, Beechwood, Indiana. Thick-bedded, hard, gray, crystalline limestone. Average thickness about 3 ft. Very fossiliferous.

Fauna:

Corals
Heliophyllum juvens
Pelecypods
Clinopistha antiqua
Modiomorpha concentraica
Cephalopods
Gromphoceras turbiniforme
Brachiopods
Spirifer hobbsi
Chonetes acutiradiatus
Productella subaculeata cataracta
Pentagonia unisulcata
Ambocoelia umbonata

New Albany shale. Upper Devonian, except upper ten feet placed in Mississippian. Type section New Albany, Indiana. About 100 ft. thick. Brown to black, some portions gray to green, laminated, fissile, carbonaceous shale. Known as an oil shale. Weathers gray to whitish. Pyrite layer, one to six inches thick, often conglomeritic, found at base.

Blocher "formation". Genesee (Senecan, Devonian). Type section at Blocher, Indiana. Lower 8 to 10 ft. of New Albany shale. Mostly black, fissile shale, but some beds of sandstone. Pyritic, calcareous at base.

Fauna:

Brachiopods
Chonetes lepidus
Leiorhynchus quadricostatum
Conodonts
(common in upper 8 ft. only)
44 species identified
Pteropods
Styliolina fissurella intermittens
(common in lower 2 ft.)

Blackiston "formation". Upper Devonian. Type section at Blackiston, Indiana. Consists of middle portion of New Albany. About 75 ft. thick. Some layers of green and gray shale. Fissile black shale, coarsely laminated, with conchoidal fracture. Occasional sandstone beds.

Fauna:

Brachiopods
Barroisella campbelli
Conodonts
Spores
Fish remains
Worm trails
Wood
Callixylon newberryi

DESCRIPTION OF FORMATIONS

Sanderson "formation". Upper Devonian or Mississippian. Type section, Sanderson, Indiana, Ten ft. of black shale in upper part of New Albany. Phosphatic nodules at base. Cannot be distinguished by lithology from remainder of New Albany. Fauna is mostly conodonts. Called the plant bed from plant remains found in it.

Underwood "formation". Upper Devonian or Mississippian. Type locality at Underwood, Indiana. Six inches thick. Near top of New Albany shale. Soft, green, nodular and concretionary shale. Layer of phosphatic nodules at top.

Fauna:

Brachiopods
Chonetes seymourensis
Camarotoechia mutata

Henryville "formation". Upper Devonian or Mississippian. Top of New Albany shale. Type section at Henryville, Indiana. Fissile black shale, similar to Sanderson. About one ft. thick. Fauna mostly conodonts.

Jacobs Chapel shale. Iowa (lower Mississippian). Type section at Jacobs Chapel Church. Soft, green, glauconitic shale. Thickness about nine inches. Usually included with the Rockford limestone.

Rockford limestone. Kinderhook (Mississippian). Type section at Rockford, Indiana. Gray to greenish, mottled limestone. Sometimes nodular and erratic in thickness. Usually about 3 ft. thick. Hard, fine-grained. Called the goniatite limestone.

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