Geologic Guidebook I, Department of Geology, University of Illinois

GUIDE TO THE GEOLOGY OF THE CAGLE'S MILL SPILLWAY, TURKEY RUN STATE PARK AND THE PENNSYLVANIAN SEQUENCE AT MONTEZUMA, INDIANA

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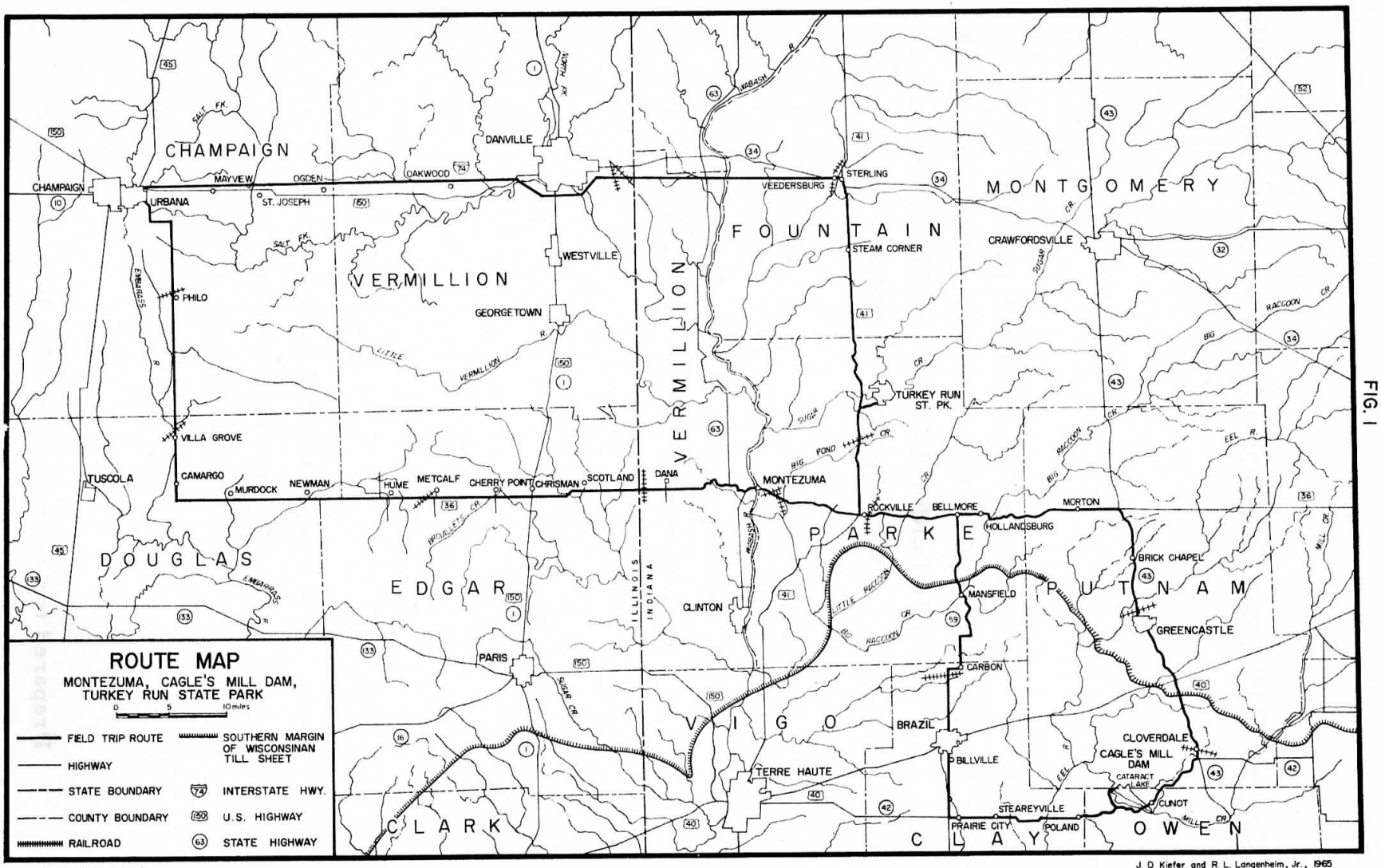
CHAMPAIGN
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URBANA
MAYVIEW
OGDEN
OAKWOOD
DANVILLE
STERLING
VEEDERSBURG
WESTVILLE
STEAM CORNER
CRAWFORDSVILLE
PHILO
GEORGETOWN
TURKEY RUN ST. PK.
VILLA GROVE
TUSCOLA
CAMARGO
MURDOCK
NEWMAN
HUME
METCALF
CHERRY POINT
CHRISMAN
SCOTLAND
DANA
MONTEZUMA
ROCKVILLE
BELLMORE
MORTON
HOLLANDSBURG
BRICK CHAPEL
MANSFIELD
GREENCASTLE
CLINTON
PARIS
CARBON
BRAZIL
TERRE HAUTE
BILLVILLE
CLOVERDALE
CAGLE'S MILL DAM
CATARACT LAKE
CUNOT
STEAREYVILLE
PRAIRIE CITY
POLAND
ROUTE MAP
MONTEZUMA, CAGLE'S MILL DAM, TURKEY RUN STATE PARK
0 5 10 miles
FIELD TRIP ROUTE
HIGHWAY
STATE BOUNDARY
COUNTY BOUNDARY
RAILROAD
SOUTHERN MARGIN OF WISCONSINAN TILL SHEET
INTERSTATE HWY.
U.S. HIGHWAY
STATE HIGHWAY
Drafted by B. Parhami
J D Kiefer and R L. Langenheim, Jr., 1965

FIG. 1

INTRODUCTION

This guidebook has been prepared for use of students taking Geology 102, Historical Geology, which is the second semester of the elementary geology course presented in the Department of Geology of the University of Illinois at Urbana. The present edition, prepared by R. L. Langenheim, Jr., John D. Kiefer, R. N. Farvolden, and A. V. Carozzi, is based, in part, upon earlier mimeographed and dittoed material prepared with the aid of teaching assistants in the course. Dr. Norbert Cygan, now of the Standard Oil Company of Texas, was especially active in this respect.

Pennsylvanian bedrock exposures in the road cuts on U.S. Highway 36 east of Montezuma, Indiana, in the flood spillway of the Cagles's Mill dam southeast of Brazil, Indiana and in the gorge of Sugar Creek in Turkey Run State Park, Indiana will be visited and are described in detail along with the Pleistocene exposure at Cagle's Mill. In addition, salient geologic and cultural features visible along the route are briefly cited in the roadlog. The left-hand column of figures in the log gives the cumulative mileage from Urbana via Montezuma to Greencastle, Indiana, and from Greencastle to Urbana via Turkey Run Park (Fig. 1). The right-hand column gives cumulative mileages in the reverse direction and the middle column gives the distance between successive observation points.

Almost the entire route lies within the boundaries of Wisconsinan glaciation and the remainder is within the boundaries of both Illinoisan and Kansan glaciation (Fig. 1). As a consequence, over most of the route, outcrops of bedrock are confined to only the deeper stream valleys and roadcuts. Topography is featureless and marked by only the broadest, most gentle and very inconspicuous morainal ridges. These conditions are most characteristic of Champaign, Douglas, Edgar and western Vermillion Counties in Illinois. Outside the Wisconsinan terminal moraine, glacial cover is generally confined to the uplands, topography is more rugged, and bedrock exposures are more widespread.

Most of the route is underlain by Pennsylvanian rocks ranging from Morrowan to Missourian age. In the Cagle's Mill-Greencastle area, however, rocks as old as Meremecian are exposed on the route (Figs. 1, 2, 3). All of these rocks are exposed in a broad syncline, the axis of which crosses the route east of Ogden, Illinois and near Cherry Point, Illinois (Fig. 2). Rocks to the west of the axis form part of the crest and east flank of the LaSalle Anticline. This feature, an asymmetrical anticline having its steep flank on the west, is a major structural feature bounding the east side of the Illinois Basin. Rocks to the west of the synclinal axis rise gently toward the Cincinnati Arch, one of the major tectonic features of the North American stable platform.

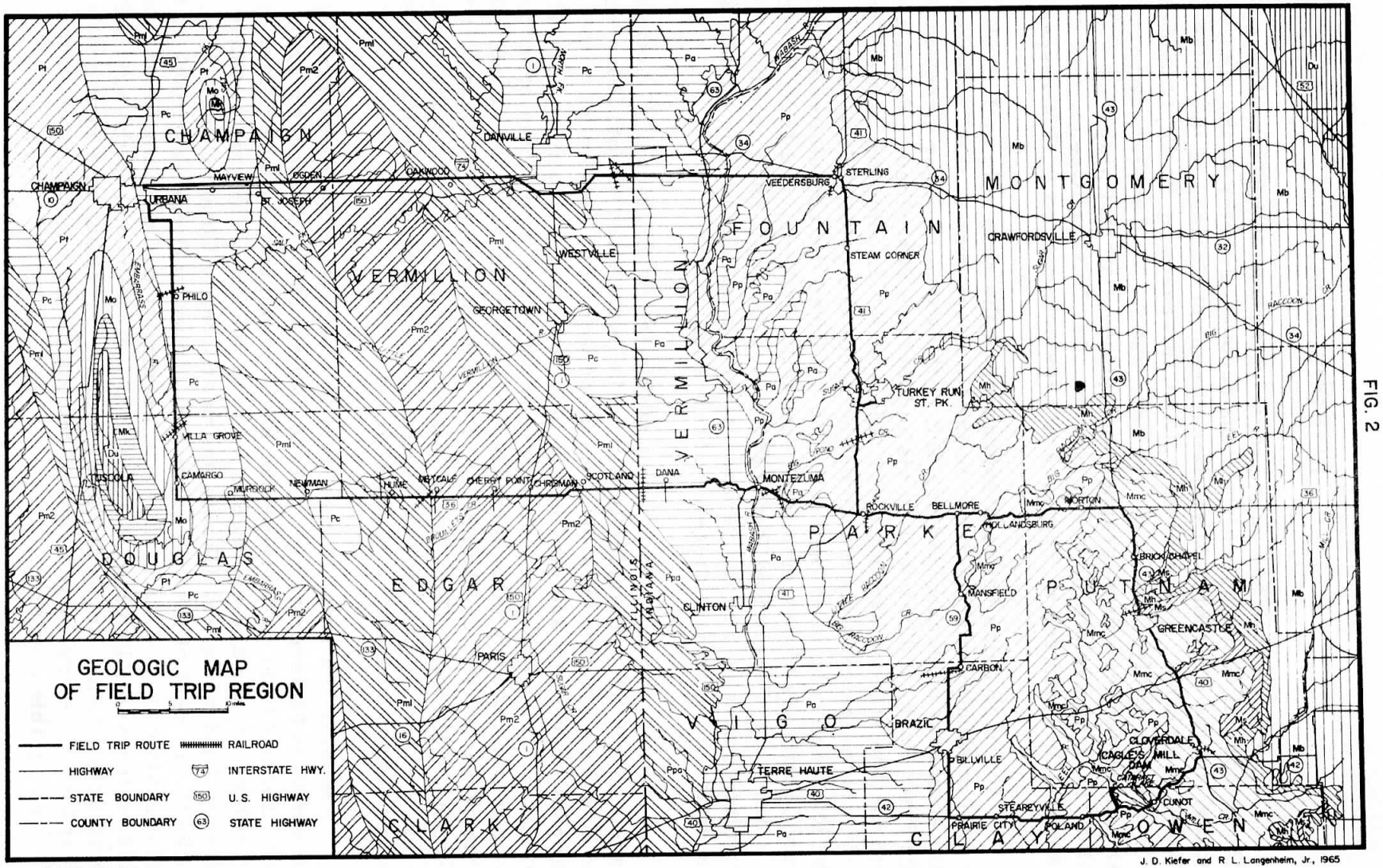
GEOLOGIC MAP
OF FIELD TRIP REGION
FIELD TRIP ROUTE
RAILROAD
HIGHWAY
INTERSTATE HWY.
STATE BOUNDARY
U.S. HIGHWAY
COUNTY BOUNDARY
STATE HIGHWAY
CHAMPAIGN
VERMILLION
FOUNTAIN
MONTGOMERY
PARKE
PUTNAM
DOUGLAS
EDGAR
CLARK
VIGO
CLAY
OWEN
CHAMPAIGN
URBANA
DANVILLE
MAYVIEW
OGDEN
OAKWOOD
ST. JOSEPH
PHILO
WESTVILLE
GEORGETOWN
VILLA GROVE
TUSCOLA
CAMARGO
MURDOCK
NEWMAN
HUME
METCALF
CHERRY POINT
CHRISMAN
SCOTLAND
DANA
MONTEZUMA
VEEDERSBURG
STERLING
CRAWFORDSVILLE
STEAM CORNER
TURKEY RUN ST. PK.
ROCKVILLE
BELLMORE
MOLL
LANDSBURG
MORTON
BRICK CHAPEL
MANSFIELD
GREENCASTLE
CLINTON
PARIS
CARBON
BRAZIL
TERRE HAUTE
BILLVILLE
CLOVERDALE
EAGLE'S MILL DAM
CUNOT
STEAREYVILLE
PRAIRIE CITY
POLAND
ILLINOIS
WABASH
VERMILLION
EMBARRASS
SUGAR
RACCOON
BIG
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FIG. 2

LEGEND FOR GEOLOGIC MAP

MAP SYMBOLS (Indiana)	MAP SYMBOLS (Illinois)	INDIANA ROCK UNITS	ILLINOIS ROCK UNITS	SERIES	SYSTEM
—	Pm2	Removed by erosion	Upper Portion of the McLeansboro Formation	Missourian	PENNSYLVANIAN
Ppa	Pml	Post Allegheny "Groups"	Lower Portion of the McLeansboro Formation	Desmoinesian	
Pa	Pc	Allegheny Group: Petersburg Formation	Carbondale Formation		
		Allegheny Group: Staunton Formation			
Pp	Pt	Pottsville Group: Brazil Formation	Tradewater Group	Atokan	
		Pottsville Group: Mansfield Sandstone		Morrowan	
Mmc	—	St Louis Limestone, Ste. Genevieve Limestone and Chesterian Rocks	Hiatus	Chesterian	MISSISSIPPIAN
Ms	—	Salem Limestone		Meramecian	
Mh	—	Harrodsburg Limestone			
Mb	Mo	Borden Group and Rockford Limestone	Equivalents of the Fern Glen Formation, Burlington Limestone and Keokuk Limestone	Osagian	
—	Mk	Not exposed in map area	Kinderhook Group and New Albany Shale	Kinderhookian	
					DEVONIAN

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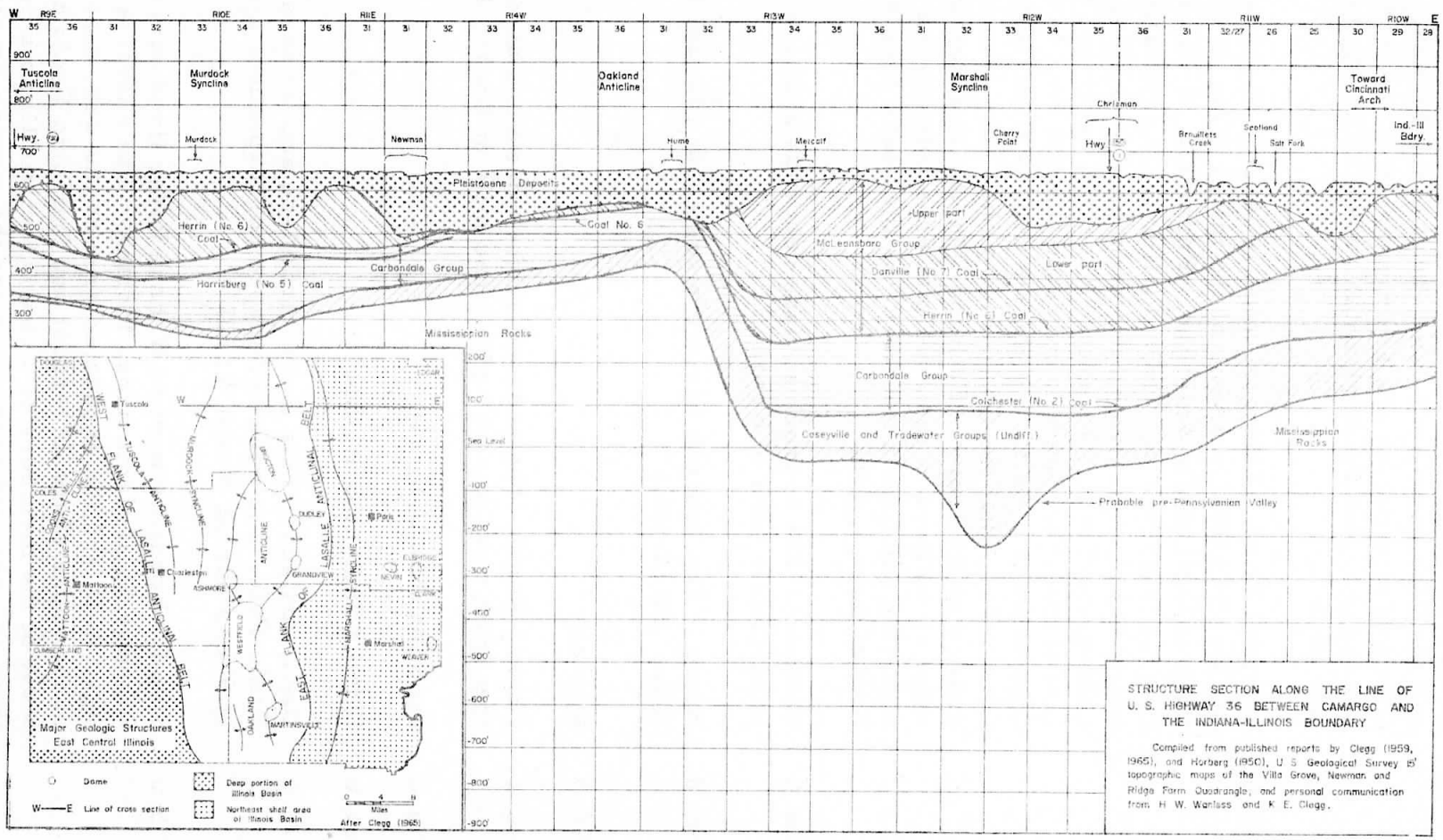
FIG. 3

ROAD LOG

Miles		
0.0	143.0	Natural History Building, University of Illinois campus. Proceed to Illinois Route 130 (End of Trip)
3.0		
3.0	140.0	Crossing Yankee Ridge. Yankee Ridge is a part of the Champaign Moraine, a recessional moraine of Wisconsinan age. Although this is not an impressive topographic feature, it may be traced many miles east and west of this point and has been an important clue in unraveling the glacial history of Illinois.
7.0		
10.0	133.0	Philo.
10.0		
20.0	123.0	Villa Grove, pancake capital of the World. Cross the Embarass River. This river rises on the campus of the University of Illinois. Villa Grovers are of the opinion that the increased flooding of the Embarass River results from the continued extension of street paving and storm sewers in Champaign-Urbana.
5.0		
25.0	118.0	Camargo. Junction with U.S. 36; turn east. (Turn north on Illinois 130). From Camargo, Illinois to Dana, Indiana the route crosses a flat plain covered with as much as 200 feet of glacial till; mostly of Wisconsinan age. Beneath this surface, however, there is a mature topographic surface cut into gently folded Pennsylvanian rocks. Wells drilled for water, in attempts to find oil and in order to locate mineable coal beds have provided much data regarding the bedrock surface and the geology beneath. Figure 4 is a structure section compiled from these data and showing conditions beneath the field trip route. Please note that the vertical scale on this section is greatly exaggerated. The "squares" are only 100 feet high but are 5,280 feet across, providing a vertical exaggeration of 52.8 to 1!

A bedrock valley, more than 75 feet deep and almost two miles wide, is completely filled between Camargo and Murdock. Similar valleys or comparable slopes are present about a mile east of Murdock, at Newman, between Hume and Metcalf, at Cherry Point and about one and one-half miles west of the Indiana-Illinois boundary.

The Tuscola and Oakland Anticlines and the Murdock Syncline are lesser structures superimposed on the east flank of the LaSalle Anticline. These minor folds, as well as the LaSalle Anticline itself, probably are "drape folds" in which the sedimentary cover has adjusted to faulting in



STRUCTURE SECTION ALONG THE LINE OF U. S. HIGHWAY 36 BETWEEN CAMARGO AND THE INDIANA-ILLINOIS BOUNDARY

Compiled from published reports by Clegg (1959, 1965), and Horberg (1950), U. S. Geological Survey 15' topographic maps of the Villa Grove, Newman and Ridge Farm Quadrangle, and personal communication from H. W. Wanless and K. E. Clegg.

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FIG. 4

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7.0		the crystalline rocks below. The Marshall Syncline is part of the major synclinal fold separating the LaSalle Anticline and the Cincinnati Arch, and rocks of the McLeansboro Group of Missourian age are preserved in its center. These are the youngest Pennsylvanian rocks occurring in the field trip area.
32.0	111.0	Murdock Mine. This coal mine is located in the center of the Murdock Syncline, one of the minor folds on the east flank of the LaSalle Anticline. Formerly, it was thought that the Danville (No. 7) Coal (Illinois classification),
5.0		which is mined at Danville in strip pits, was being mined underground at this locality. Recently, however, examination of fossil spores has indicated that the coal in the Murdock Mine is actually the Herrin (No. 6) Coal (Illinois Classification) and that the Danville Coal has been removed by erosion at this point. Both the Danville and Herrin Coals exist as outliers in the synclinal area between the LaSalle Anticline and Cincinnati Arch, as they have been eroded from both of these uplifts.
37.0	106.0	Newman. The bedrock surface descends almost 125 feet immediately west of Newman.
6.2		
43.2	99.8	Hume. The bedrock surface rises about 100 feet between Hume and Metcalf.
3.3		
46.5	96.5	Metcalf.
4.3		
50.8	92.2	Cherry Point. The bedrock surface descends about 100 feet from west to east within one mile at Cherry Point.
2.2		
53.0	90.0	Junction with U.S. 150.
9.0		
62.0	81.0	Illinois-Indiana State line.
3.0		
65.0	78.0	Dana, Indiana. This is the birthplace and boyhood home of Ernie Pyle, a famous newspaper correspondent killed at
3.0		Ie Shima during World War II.
68.0	75.0	Stop I. Roadcuts west of Wabash River floodplain on U.S. Highway 36 at Montezuma, Indiana. The roadcuts (Pl. I, figs. A-D) and the excavated area to the west expose most of the rocks of the Liverpool and Summum Cyclothems. Most of the members of a characteristic Illinois cyclothem are exposed here excepting the marine limestone beds and associated marine rocks (Pl. I, figs. E-F). This locality, however, is near the eastern margin of deposition of these rocks (figs. 6-7) and the marine environments were not well-developed and probably did not persist for long periods of time.

PLATE I

FIG. A NORTH SIDE, HIGHWAY 36 ROADCUT WEST OF MONTEZUMA, INDIANA

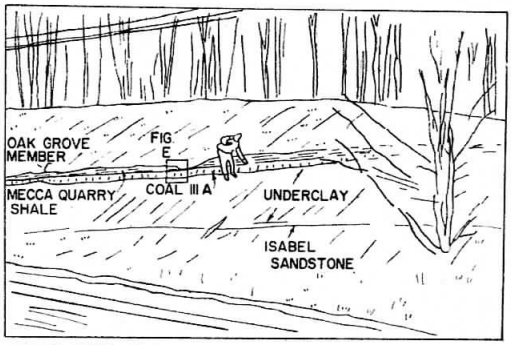

FIG. B LINE DRAWING OF VIEW IN FIGURE A. FRAME OUTLINES AREA SHOWN IN FIGURE E.

FIG. C SOUTH SIDE, HIGHWAY 36 ROADCUT WEST OF MONTEZUMA, INDIANA

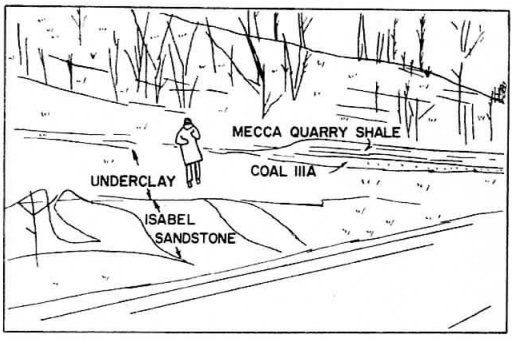

FIG. D LINE DRAWING OF VIEW IN FIGURE C.

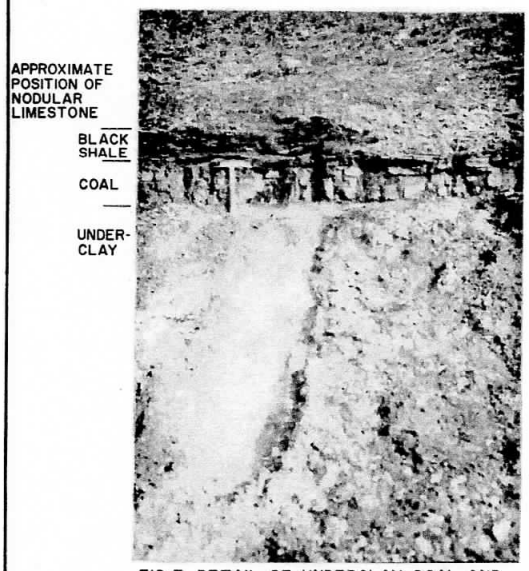

FIG. E DETAIL OF UNDERCLAY, COAL AND BLACK SHEETY SHALE IN FIG. A & B

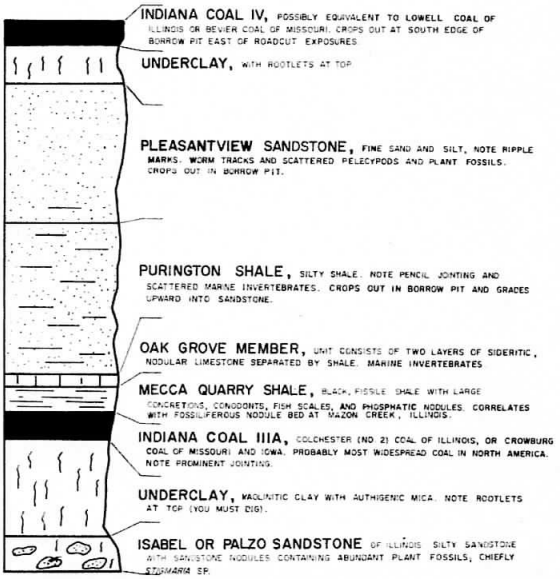

FIG. F COLUMNAR SECTION AT HIGHWAY 36 ROADCUT WEST OF MONTEZUMA, INDIANA

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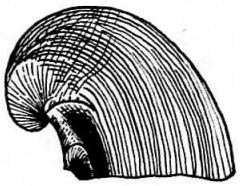
Figure 5 illustrates some of the more abundant fossils occurring here. The marine invertebrates may be found in the limestone portions of the Oak Grove Member. Petrodus occidentalis, along with conodonts (invisible to the unaided eye) and shark spines occur in the Mecca Quarry Shale, and plant fossils are scattered through the Isabel Sandstone, Purington Shale and Pleasantview Sandstone.

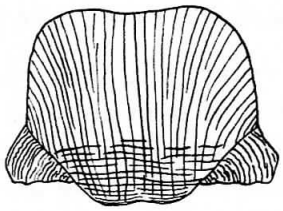
Repetition of relatively thin rock units representing a cyclical succession of marine and non-marine environments is a remarkable feature of Pennsylvanian deposition in the Midcontinent region. Here the sequence from the Isabel Sandstone through the Colchester Coal represents a succession of environments from alluvial floodplain to coal swamp. The Mecca Quarry Shale indicates an influx of marine or brackish water under extreme reducing conditions. In this environment a unique assemblage of sharks, conodont-bearing animals (probably fish), linguloid brachiopods, and aberrant invertebrates accumulated. This environment was then altered by the influx of relatively normal marine waters in which the Oak Grove beds, including limestone layers, were laid down with a fauna of brachiopods, molluscs and echinoderms. Thereafter, a higher proportion of mud entered the area, forming the Purington Shale, and presaging the return of alluvial plain deposition in the Pleasantview Sandstone. Thus the cycle went full circle and the process began to be repeated with formation of another coal swamp. The relatively pure, kaolinitic underclay beneath the coals is an economic resource much used in the ceramic industry--especially in the manufacture of fire-clay, and these clays are dug for that purpose in this area. The underclay often contains rootlets of coal swamp plants and may represent the soil in which the swamp became established. Its peculiar mineralogic properties, however, suggest that substantial leaching and alteration took place subsequent to establishment of the swamp.

The individual members of cyclothems in the Midcontinent Pennsylvanian are notably widespread and, through correlation of surface exposures and well records, it has been possible to trace many of these units through much of Ohio, Kentucky, Illinois, Missouri, Iowa, Nebraska, Kansas and Oklahoma. As a consequence it has been possible to reconstruct the paleogeography represented by one of these units or the surface upon which such a unit was deposited. Figures 6 and 7 show an environmental interpretation of the Mecca Quarry Shale throughout much of its known distribution and of the surface upon which the Colchester Coal was deposited. (Both of these maps are a product of research in the laboratory of Prof. H. R. Wanless of the Department

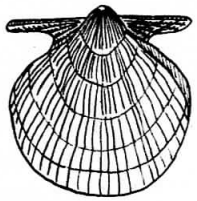
FIG. 5

MARINE INVERTEBRATES

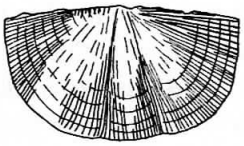




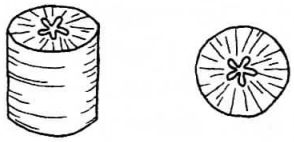
Dictyoclostus sp.
— a productid brachiopod



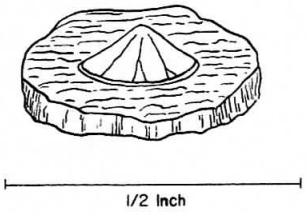
Dunbarella sp.
— a pectinoid pelecypod



Mesolobus sp.
— a chonetid brachiopod



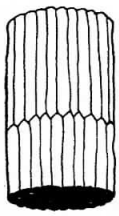
Crinoid columnals



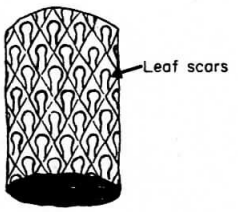
Petrodus occidentalis
— a shark denticle

LAND PLANTS

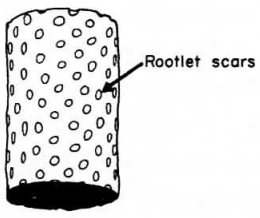
Cordaites sp.
— a leaf



Calamites sp.
— branch or trunk



Lepidodendron sp.
— branch or trunk



Stigmaria sp.
— root of *Lepidodendron*

Pecopteris sp.
— a seed fern

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1.0 of Geology of the University of Illinois and are reproduced herethrough his kind permission.) You will note the Mecca Quarry Shale was produced in an environment that either covered a very large area for a short period of time or left behind a thin, uniform sheet of sediment as it migrated over a large area. You should also note that Montezuma was located at the northwestern margin of a large delta, heading toward the east, at the time of deposition of the Colchester Coal. The pattern of distributaries in this delta rather strongly suggests that much of the sand and mud of this portion of the Pennsylvanian sequence here was derived from the east, probably from the Appalachian area.

69.0 74.0 Cross Wabash River. Note floodplain and natural levee on the west side of the river.

1.0

70.0 73.0 Enter Montezuma, Indiana.

3.0

73.0 70.0 Covered bridge to the right (south) of the road.

1.0

74.0 69.0 Covered bridge to the right, south of the road. This county is noted for the large number--reputedly 40--of these bridges. These examples are exceptionally well-preserved, because they were built by an ex-shipwright who insisted upon using the finest oak timbers and employed high standards of construction normally suited to ship's hulls. Bridges such as these were formerly very abundant and are reported to have been built in this manner to protect the structure from rot or to prevent horses from taking fright in crossing. Where built less substantially or located in more "progressive" areas they have become rare.

4.0

Also note the numerous small stock ponds along the road. These generally indicate poor ground water conditions, requiring ponding of water for livestock.

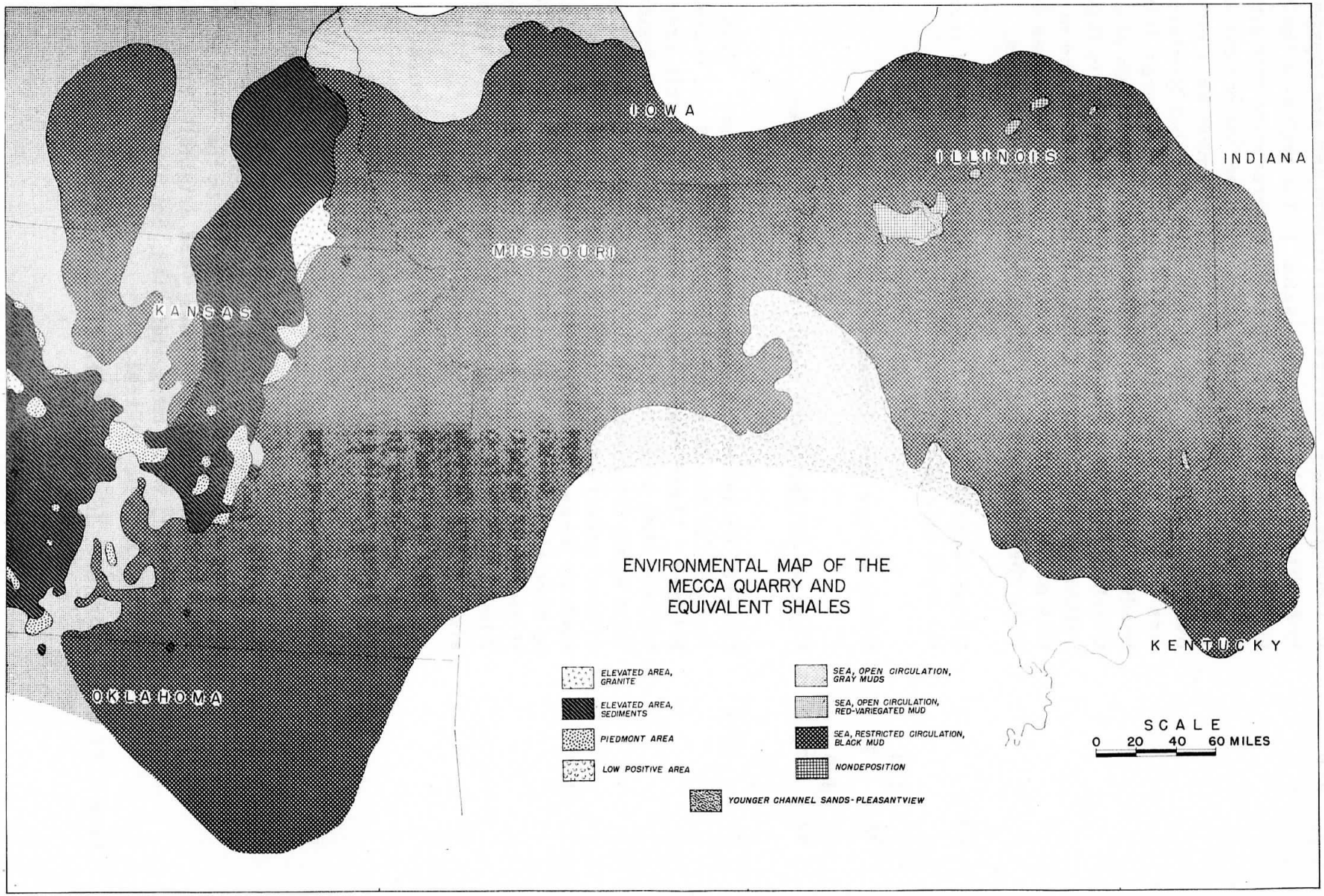
78.0 65.0 Radar training station.

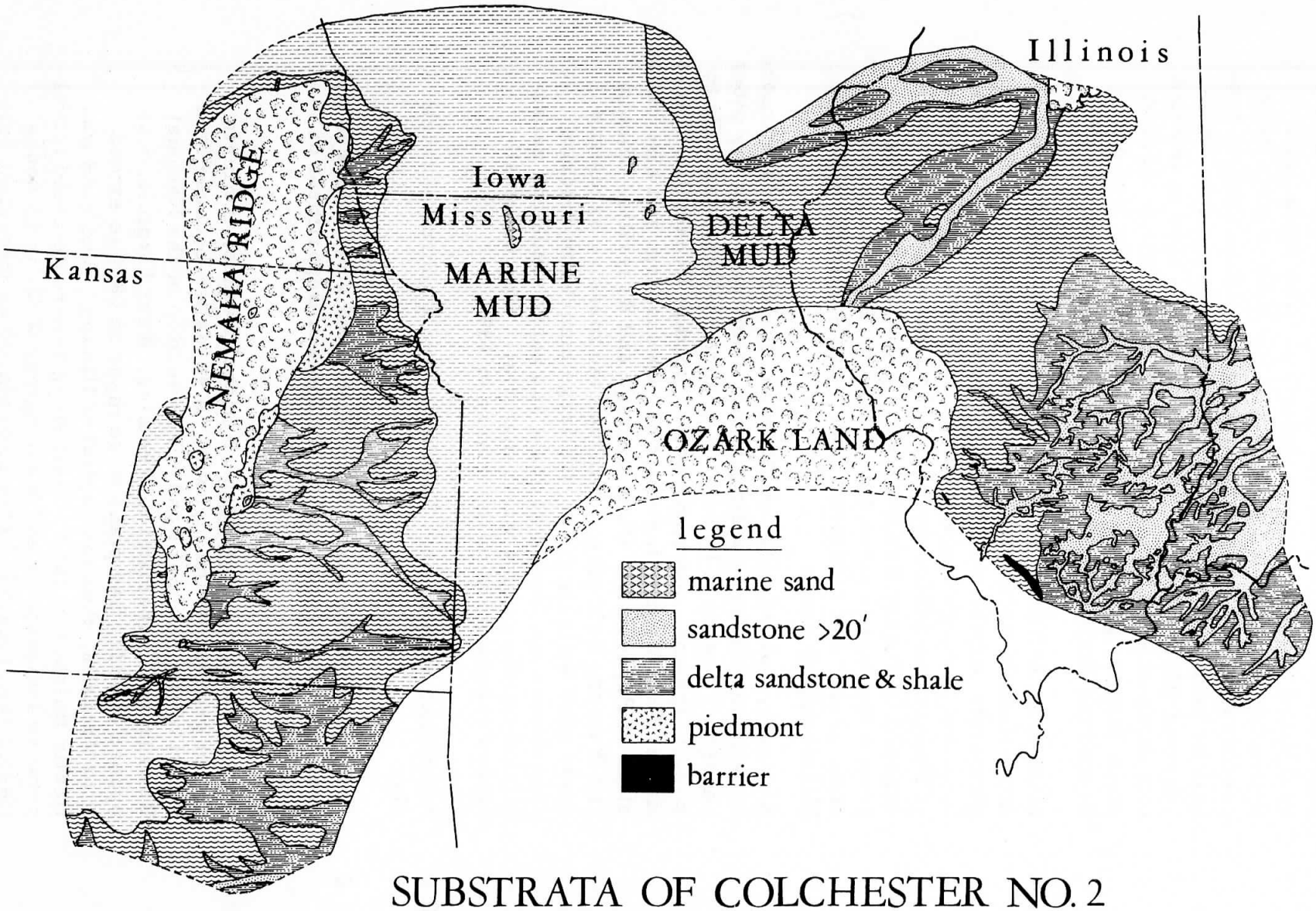
1.0

79.0 64.0 Rockville, Indiana, Seat of Parke County. Note the outstanding example of American Gothic in the form of a county court house. These buildings were originally considered magnificent, were later ridiculed, but are now the object of much artistic interest.

7.0

86.0 57.0 Bellmore, Indiana. Turn south on Indiana Highway 59. (Turn west on U.S. 36)


IOWA
ILLINOIS
INDIANA
MISSOURI
KANSAS
OKLAHOMA
KENTUCKY
ENVIRONMENTAL MAP OF THE
MECCA QUARRY AND
EQUIVALENT SHALES
ELEVATED AREA, GRANITE
ELEVATED AREA, SEDIMENTS
PIEDMONT AREA
LOW POSITIVE AREA
SEA, OPEN CIRCULATION, GRAY MUDS
SEA, OPEN CIRCULATION, RED-VARIEGATED MUD
SEA, RESTRICTED CIRCULATION, BLACK MUD
NONDEPOSITION
YOUNGER CHANNEL SANDS-PLEASANTVIEW
SCALE
0 20 40 60 MILES



SUBSTRATA OF COLCHESTER NO. 2 (CROWEBURG) COAL

scale

0 20 40 60

miles

2.0

88.0 55.0 Maple Grove Mine. Forest here is of Beech-Maple type which is the dominant natural vegetation established in this area since the Wisconsinan glaciation. The pines are not native but were planted as a part of the Indiana strip mine conservation and reforestation program. Pine forests once

4.0 existed here immediately after the glaciers melted. Wisconsinan till (Shelbyville equivalent) in this area is leached to a depth of 50 to 70 inches. The Illinoian till is leached much deeper, generally 120 to 200 inches. We will pass beyond the limit of the Wisconsinan glaciation in this area.

92.0 51.0 Mansfield, Indiana. Type locality of the Mansfield sandstone (Quarry north of town). This sandstone and conglomerate formation is the basal Pennsylvanian unit in this area and is roughly equivalent to the Pottsville Sandstone of Pennsylvania (Morrowan). This same sandstone is well exposed in Turkey Run State Park. Its thickness ranges from a few feet to more than 100 feet. It is succeeded by coal, shale, and sandstone, and it rests unconformably on Mississippian rocks.

3.0 A quarry, opened north of Mansfield in 1887, produced more brownstone (actually a dirty brown sandstone) than any other sandstone quarry in Indiana. A branch railroad was built to Brazil, Indiana, and stone was shipped to Evansville, Terre Haute, Fort Wayne, Indianapolis, Owensburg; and also out of state to Paynesville, Ohio; Chicago and Roseville, Illinois; and Wymar, Nebraska. Although the massive sandstone made good building stone, the large number of siderite concretions and lenses of shale and shaly sandstone necessitated handling much waste material. This eventually forced abandonment of the quarry in 1894.

95.0 48.0 Abandoned strip mine. The dumps are a source of brick clay.

1.0

96.0 47.0 Brick plant to the east. Many abandoned strip mines in this area are being reclaimed by the Indiana Department of Conservation.

4.0

100.0 43.0 Brazil, Indiana. Rest Stop. National Avenue, the main street crossed by the highway, is so-called because it is a part of the National Road. The section of the National Road from Cumberland to Wheeling, West Virginia, was opened in 1811, and plans were made in 1824 to extend it to Vandalia, then the capital of Illinois. The road was

6.0 finally finished in 1852. Mail along this route could travel between Indianapolis and Washington, D.C. in 65 hours (faster than today?). This road played an important role in opening the old Northwest Territories to settlement.

Brazil has given its name to the Brazil Formation which rests on the Mansfield Formation and is an important coal bearing stratigraphic unit in this vicinity.

106.0	37.0	Turn left (east) on Indiana Highway 42. (Turn right on Indiana Highway 59). The lakes and pine covered hills are useful for
	1.0	hunting and fishing and may eventually be a source of timber. Note exceptionally large trees on fairly old pits 3 miles east of the intersection.
107.0	36.0	Railroad crossing.
	3.6	
110.6	32.4	Note the old covered bridge on the right which has been displaced with respect to the road. Three hotly contested theor-
	0.4	ies have been advanced to explain this unusual phenomenon: 1. Continental drift. 2. Displacement caused by faulting. 3. A shifting of the structure caused by the glacial advances.
111.0	32.0	Cross Eel River. This river drains the lake behind the
	0.5	Cagle's Mill Dam.
111.5	31.5	Note the numbered post on the right, erected to show the water depth on the road during floods.
	1.5	
113.0	30.0	Poland, Indiana.
	3.0	
116.0	27.0	Oak Hollow Bridge. Sharp left turn 0.3 miles beyond. Follow winding gravel road northward. Very rough. Steep ravines to the east.
	1.0	
117.0	26.0	Old pioneer cabin.
	0.3	
117.3	25.7	Fertig Cemetary.
	2.7	
120.0	23.0	Stop IIa. Cagle's Mill Spillway.

Stop IIb. Cagle's Mill Dam Outlet Tunnel.

Stop IIa. -- Cagle's Mill Spillway Section

North Wall

The cut exposes the Early Pennsylvanian Mansfield Formation.

The major Pennsylvanian feature here is the huge channel filling which trends diagonally to the present spillway (Pl. II, III). Exposed at the bottom of the channel is a bed of coal overlain by a black shale which grades upward into a thick deposit of carbonaceous shaly sandstone. Above this a bed of relatively clean, thin-bedded sandstone forms the top of the cliff. Note that the coal overlaps the flanks of the channel and is thinner on the banks outside of the channel.

PLATE II

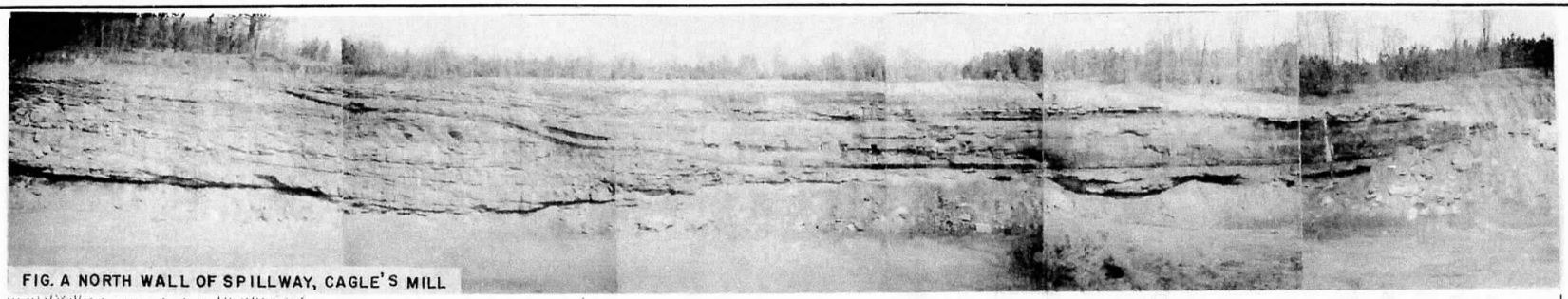


FIG. A NORTH WALL OF SPILLWAY, CAGLE'S MILL

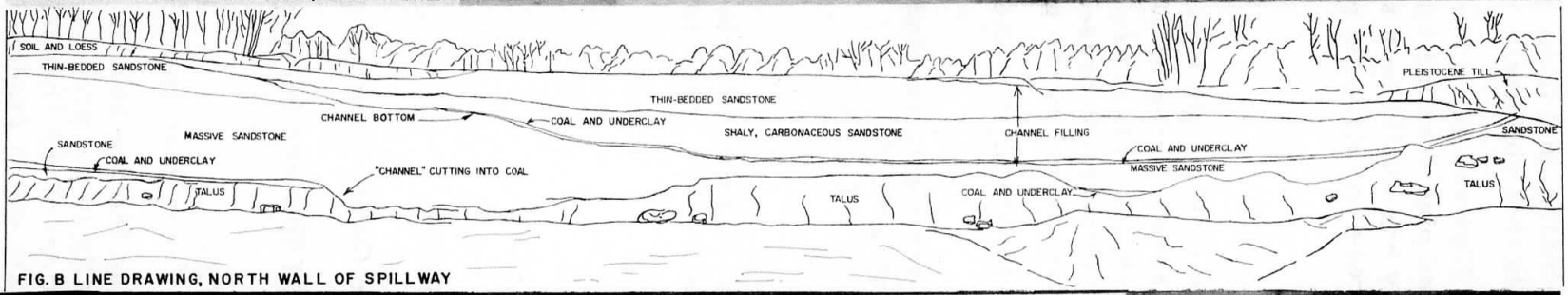


FIG. B LINE DRAWING, NORTH WALL OF SPILLWAY

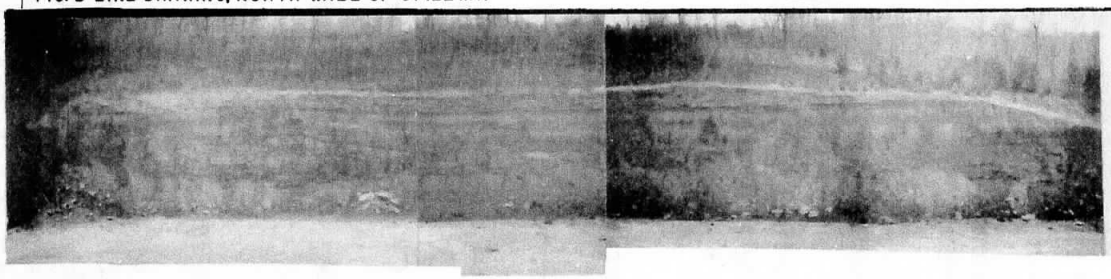


FIG. C SOUTH WALL OF SPILLWAY, CAGLE'S MILL

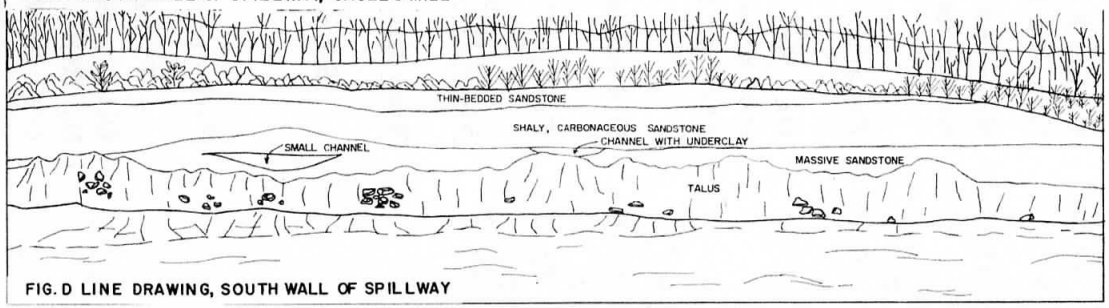


FIG. D LINE DRAWING, SOUTH WALL OF SPILLWAY

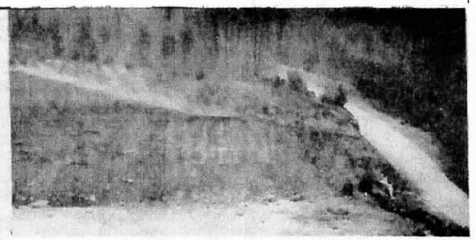


FIG. E WEST END OF SOUTH WALL OF SPILLWAY, CAGLE'S MILL

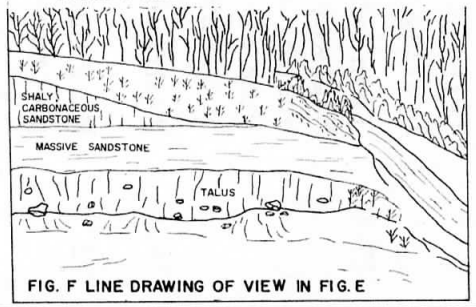


FIG. F LINE DRAWING OF VIEW IN FIG. E

DRAFTED BY B PARHAMI

R L LANGENHEIM, JR., 1965

PLATE III

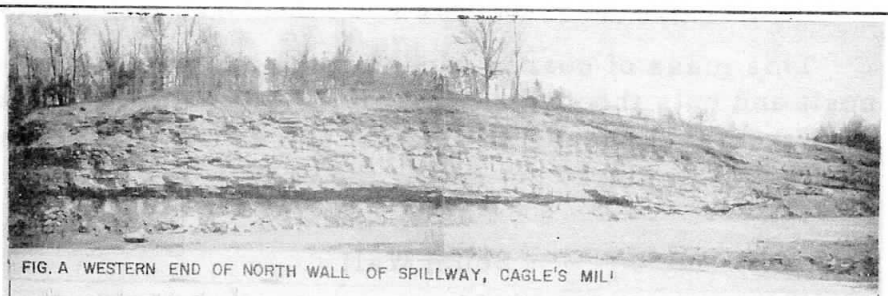


FIG. A WESTERN END OF NORTH WALL OF SPILLWAY, CAGLE'S MILL

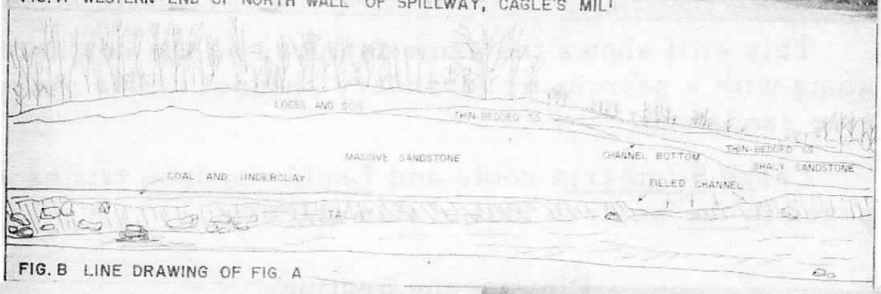


FIG. B LINE DRAWING OF FIG. A

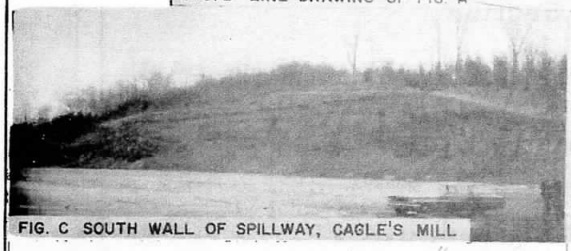


FIG. C SOUTH WALL OF SPILLWAY, CAGLE'S MILL

FIG. E CENTRAL PORTION OF NORTH WALL OF SPILLWAY, CAGLE'S MILL

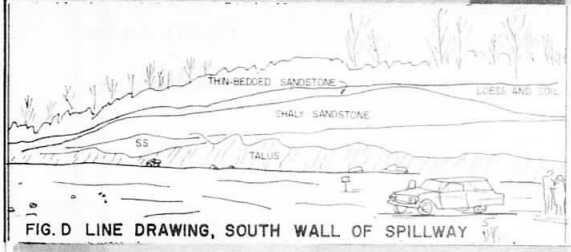


FIG. D LINE DRAWING, SOUTH WALL OF SPILLWAY

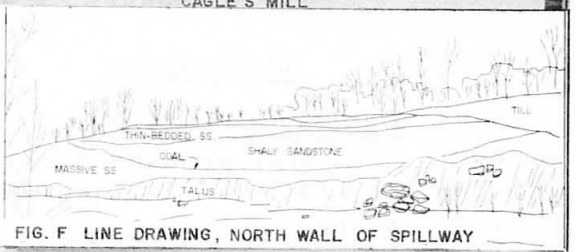


FIG. F LINE DRAWING, NORTH WALL OF SPILLWAY

FIG. G EASTERN END OF JESSUP FORMATION OUTCROP, PLEISTOCENE, NORTH WALL OF SPILLWAY, CAGLE'S MILL

FIG. I WESTERN END OF JESSUP FORMATION OUTCROP, PLEISTOCENE, NORTH WALL OF SPILLWAY, CAGLE'S MILL

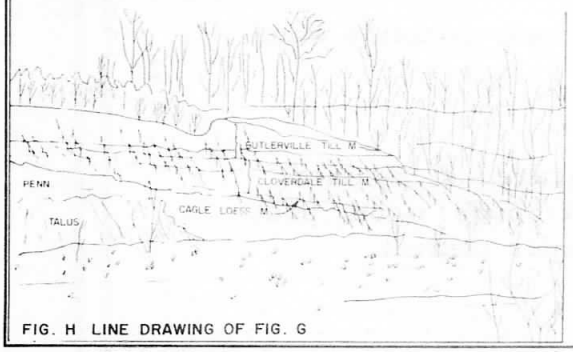


FIG. H LINE DRAWING OF FIG. G

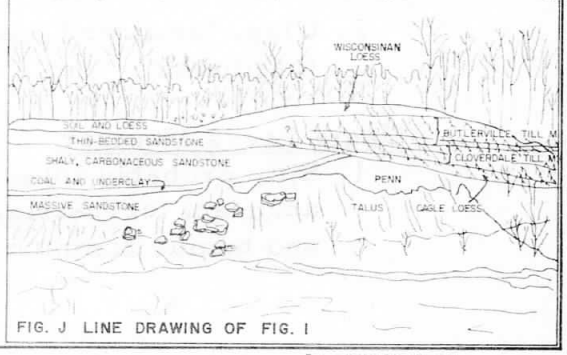


FIG. J LINE DRAWING OF FIG. I

DRAFTED BY B. PARHAM

R. L. LANGENHEIM, JR., 1965

Below the main channel the middle portion of the cliff is made up of a thick mass of coarse, fairly clean sandstone which contains cross-bedded and lenticular structures.

This mass of coarse sandstone is itself a channel deposit and cuts through an underlying sequence of underclay, coal, and shaly coal. In several places the coal and shaly coal are completely cut out by the channel.

South Wall

This cliff shows the same features as the northern wall along with a prominent secondary channel inside the massive sandstone.

Large Stigmaria roots and Lepidodendron trunks are exposed in the western half of this outcrop.

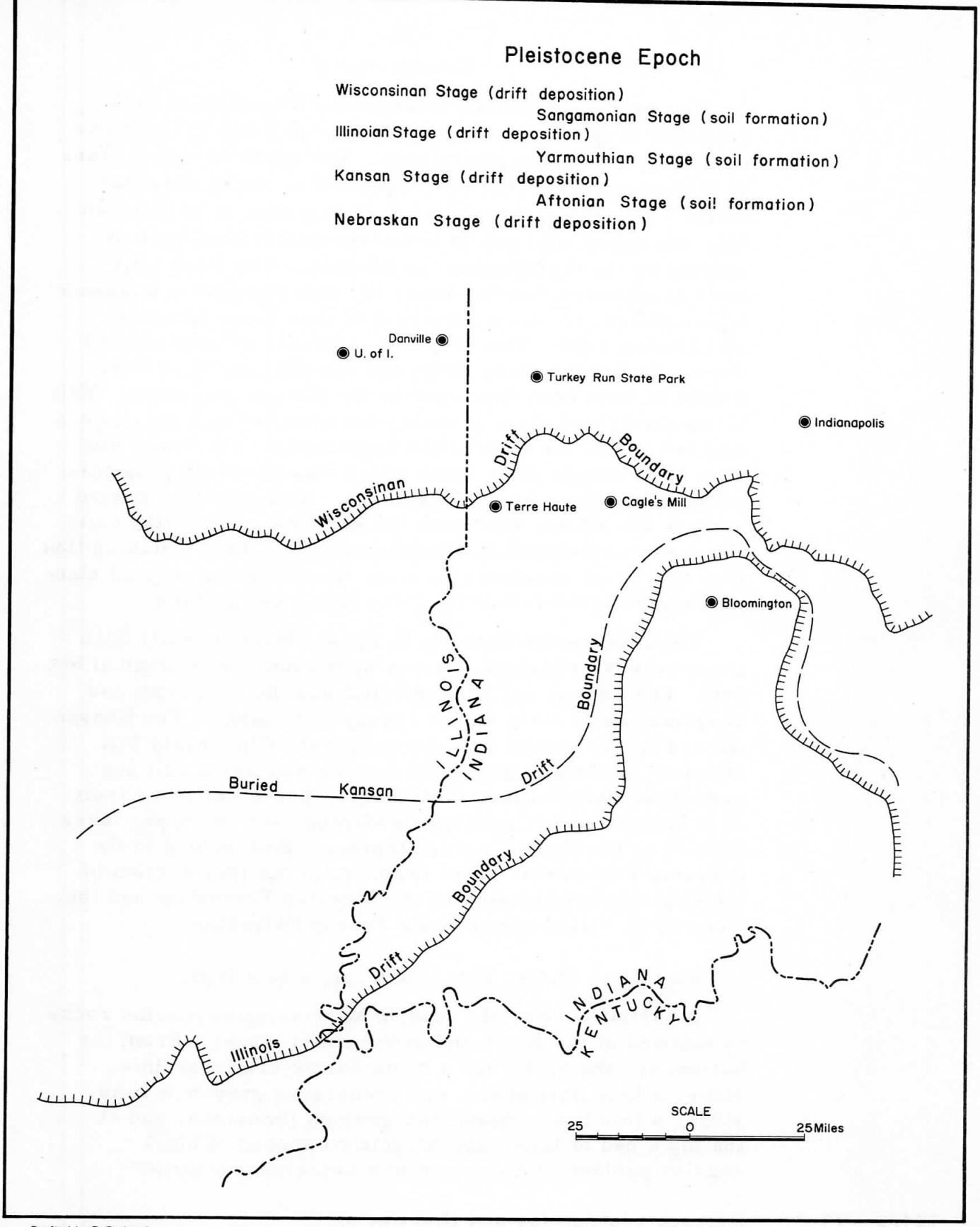
Pleistocene Section

The Pleistocene exposure at the east end of the north wall is one of the best sections in the Midwest (Pl. II, III). It is from sections such as this that the Pleistocene history of the north-central United States has been interpreted.

The cut exposes the following sediments:

Description	Thickness in feet
Peoria Loess Member	
7. Silt, probably loess	3
Butlerville Till Member	
6. Soil, oxidized (brown), not calcareous	12
5. Till, calcareous, lower 6 feet unoxidized (gray)	11
Cloverdale Till Member	
4. Soil, oxidized (brown), not calcareous	12
3. Till, calcareous, lower 12 feet unoxidized (gray) except along joints; contains wood fragments in lower portion.	15
2. Clay, laminated, calcareous, contains wood fragments.	2
Cagle Loess Member	
1. Silt, probably loess, calcareous, contains abundant terrestrial gastropods; wood, peat, and humus common at upper contact.	3

FIG. 8



Drafted by B. Parhami

R. L. Langenheim, Jr., 1966

Interpretation

The section is located south of the Wisconsinan drift boundary (Fig. 8) and the two tills (units 3 and 5) therefore must belong to older glaciations. The surficial silt is loess of Wisconsinan age that was deposited on top of the older drifts. Because the surface till in this area is of Illinoian age, the upper till (unit 5) is interpreted to have been deposited by the the Illinoian ice advance. The thick soil (unit 4) indicates that the lower till was exposed to weathering conditions for a long interval of time prior to burial by Illinoian drift. This soil is interpreted to have formed during the Yarmouthian Stage and the till (unit 3) is interpreted to have been deposited by the Kansan glaciation. Unit 2, the laminated clay, probably accumulated in a small pond that formed as the Kansan ice approached. The lower silt (unit 1) is thought to be loess which was blown off proglacial valley-train deposits of Kansan age. Note that both buried soils in the section are much thicker than present day soils which have developed in Wisconsinan till. This indicates that they represent considerably more time than has elapsed since the retreat of the last glacier in Illinois and Indiana.

The Pleistocene deposits in Indiana have recently been given rock-stratigraphic names by the Indiana Geological Survey. The Kansan and Illinoian tills and the Yarmouth and Sangamon soils make up the Jessup Formation. The Kansan till and the Yarmouth soil are named the Cloverdale Till Member, and the Illinoian till and the Sangamon soil are named the Butlerville Till Member. The lower loess (unit 1) is known as the Cagle Loess Member and the upper loess (unit 7) as the Peoria Loess Member. Both belong to the Atherton Formation. This exposure is the type section of the Cagle Loess Member of the Atherton Formation and the Cloverdale Till Member of the Jessup Formation.

Stop IIb -- Outlet Tunnel of Cagle's Mill Dam

A partial section of middle Mississippian marine rocks is exposed at the lower end of the outlet tunnel. From the bottom up, the rocks are a white oolitic crinoidal limestone, a blue limy shale, and arenaceous grey-buff limestone, a thin bed of white fine-grained limestone, and at the top a bed of limestone breccia composed of black angular pebbles of limestone in a calcareous matrix.

124.0	19.0	Retrace route to Indiana Highway 42.
	9.0	
133.0	10.0	Junction with U.S. 31. Turn north. (Junction with Indiana 42 turn west).

	10.0	
143.0	0.0	Greencastle, Indiana. Seat of Putnam County and home of DePauw University, a liberal arts college. Rest Stop. An example of the German "Buzz Bomb" or V-1, the original guided missile, is on a pedestal in the courthouse square.
		Log Leaving Greencastle, proceeding to Urbana, via Turkey Run State Park. Leave Greencastle proceeding north on Indiana 43.
0.0	107.8	New York Central Railroad underpass north of Greencastle.
	0.7	
0.7	107.1	Big Walnut Creek. This Creek joins with Mill Creek to form the Eel River. There is no flood control structure on this branch.
	3.0	
3.7	104.1	Bridge.
	0.2	
3.9	103.9	Brick Chapel.
	1.1	
5.0	102.8	Good example of early Victorian architecture in the house to the east of the road.
	2.0	
7.0	100.8	Bridge over Owl Creek.
	0.3	
7.3	100.5	Stockpiled crushed limestone.
	0.4	
7.7	100.1	Intersection U.S. 36 and Indiana 43. Turn west on Indiana 43. (Turn south on U.S. 36)
	1.1	
8.8	99.0	Bridge.
	0.8	
9.6	98.2	Bridge.
	0.6	
10.2-	97.6-	
10.5	97.3	Within city limits of Morton, Indiana.
	1.0	
11.5	96.3	Brick bridge.
	1.1	
12.6	95.2	Good example of Late Classical Revival, presumably older than early Victorian style homes. circa 1830-1850.
	4.1	
16.7	91.1	Bridge over Raccoon Lake. This is the Mansfield Flood Control Project on Raccoon Creek - also a part of the Wabash Valley flood control system.
	1.0	
17.7	90.1	Entrance to Raccoon Lake Recreational Area.

1.0		
18.7	89.1	Bridge.
0.5		
19.2	88.6	Bellmore, Indiana, junction with Indiana Highway 59. Continue west, retracing route to Rockville, mile 86.0 to mile 79.0 on Urbana to Cagle's Mill Log. (Continue east for
1.4		trip in reverse).
20.6	87.2	Creek crossing.
2.6		
23.2	84.6	Steel truss bridge, enter floodplain of Little Raccoon Creek.
1.1		
24.3	83.5	Leave floodplain of Little Raccoon Creek. Note great width of floodplain in relation to the size of the stream. Can you
1.0		offer an explanation?
25.3	82.5	Bridge.
0.4		
25.7	82.1	Cutbanks in glacial till.
0.4		
26.1	81.7	Rockville, Indiana, Pennsylvania Railroad crossing.
0.3		
26.4	81.4	Parke County Courthouse.
0.4		
26.8	81.0	Intersection. U.S. 36 and U.S. 41 Turn north on 41. (Turn east on 36 for reverse trip).
2.0		
28.8	79.0	Bridge.
2.2		
31.0	76.8	Bridge.
0.7		
31.7	76.1	Bridge over Big Pond Creek
0.2		
31.9	75.9	Railroad underpass.
1.7		
33.6	74.2	Intersection, Indiana 136, continue straight ahead.
0.7		
34.3	73.5	Bridge over tributary to Sugar Creek.
0.3		
34.6	73.2	Indiana 47 turns east to Turkey Run State Park. Follow 47
1.6		
36.2	71.6	Bridge over tributary to Sugar Creek.
0.1		
36.3	71.5	Entrance to Turkey Run State Park. Stop III

Turkey Run State Park

Turkey Run State Park contains deep and steep bluffs cut by Sugar Creek and its tributaries in the basal Pennsylvanian Mansfield Sandstone. The stop here affords an opportunity to examine geomorphologic features in a superposed stream valley and sedimentary structures characteristic of stream channel deposition. In addition, Mississippian fossils may be collected in the chert cobbles on gravel bars in Sugar Creek.

Sugar Creek is a tributary to the Wabash River. Subsequent to the retreat of the Wisconsinan ice, streams in this area were established on a surface underlain by glacial deposits which more or less completely masked the preglacial topography. The Wabash River, one of the major streams draining the glacial meltwaters, relatively quickly cut its present valley, thus causing its tributaries to deepen their channels. The tributaries, including Sugar Creek, carried less water and, as a consequence, have generally not advanced development of their valleys to as great an extent as the Wabash River. Thus, Sugar Creek, superposed on the massive sandstone of the channel phase of the Mansfield Formation in Turkey Run Park, has produced the deep gorges characteristic of an early stage of valley development. Other parts of Sugar Creek Valley, still cutting in till or having encountered softer bedrock, have relatively open valleys characteristic of a somewhat more advanced stage of valley development.

The basal Pennsylvanian rocks of this region were deposited on a broad alluvial plain separating marine environments to the south and west from land undergoing erosion to the north and east. As time passed, the marine environments gradually expanded and, as a consequence, the oldest Pennsylvanian rocks at any given point were deposited at the landward edge of the alluvial plain and are succeeded by rocks representing environments which, in general, are successively more oceanward. Thus the basal Pennsylvanian cyclothems are dominated by non-marine rocks and by relatively coarse-grained sandstone in contrast to the mixture of finer-grained non-marine sedimentary rocks and marine rocks in the younger cyclothems.

The sandstone exposed in the cliffs along Sugar Creek is cross-bedded, shows cut-and-fill structure, slumped cross-beds, and includes pebbly layers. In addition it is relatively thick and has few or no interbeds of shale. All of this indicates that it was deposited by relatively rapidly moving currents. The absence of marine fossils and the geometric pattern of such sandstone occurrences indicate that these sand bodies accumulated in distributary channels draining a land area to the northeast. Areas between the distributaries are occupied by finer-grained sandstone, siltstone, shale, underclay and coal. Smaller-scale channel deposits, as well as floodplain deposits, are well-displayed at the Cagle's Mill stop.

36.3	71.5	Leave Turkey Run State Park.
1.7		
38.0	69.8	Junction with U.S. 41, turn north. (Turn south on reverse trip).
0.8		
38.8	69.0	Bridge over Sugar Creek. Pennsylvanian sandstone and shale exposed in roadcuts in valley wall to north and south of creek.
0.4		
39.2	68.6	Bridge over Sugar Mill Creek.
0.3		
39.5	68.3	Note covered bridge to the east, crossing Mill Creek.
4.0		
43.5	64.3	Parke-Fountain County line.
0.9		
44.4	63.4	Junction with Indiana 234, continue straight ahead.
1.0		
45.4	62.4	Strip mines in the Brazil Block coal.
4.1		
49.5	58.3	Junction with Indiana 32, continue straight ahead.
2.9		
52.4	55.4	Bridge.
0.9		
53.3	54.5	Bridge over East Fork of Coal Creek.
0.4		
53.7	54.1	Intersection with U.S. 136. 136 and 41 continue together. Sterling, Indiana.
0.6		
54.3	53.5	U.S. 41 diverges to the west. Follow U.S. 136 towards Veedersburg. (Junction with U.S. 41 south. Take U.S. 41 south for trip in reverse).
0.3		
54.6	53.2	Coal Creek.
0.3		
54.9	52.9	Railroad crossing, enter Veedersburg, Indiana.
0.3		
55.2	52.6	Second and Newton in Veedersburg, Indiana. Note peculiar porch on house on the southwest corner.
0.6		
55.8	52.0	Western limit of Veedersburg.
2.4		
58.2	49.6	Junction with Interstate 74. Leave U.S. 136 entering interstate. (Leave Interstate 74 taking U.S. 136 east for reverse trip).
3.3		
61.5	46.3	Covington exit.
1.4		
62.9	44.9	Wabash River.
2.3		
65.2	42.6	West Lebanon-Newport exit.

	4.4		
69.6		38.2	Danville, eastern exit
	3.2		
72.8		35.0	Bridge crossing Stony Creek and railroad.
	0.4		
73.2		34.6	Bowman Avenue exit, Danville.
	0.5		
73.7		34.1	Strip mining of coal number 7 of the Illinois classification. This coal is mined between this point and the west side of Danville.
	1.1		
74.8		33.0	U.S. 150 and Illinois 1 exit.
	0.7		
75.5		32.3	G. Street-Tilton, Danville exits.
	0.4		
75.9		31.9	Brick kilns to the north.
	2.2		
78.1		29.7	Vermillion River crossing.
	0.9		
79.0		28.8	U.S. 150 exit west edge of Danville.
	0.4		
79.4		28.4	
80.0		27.8	Strip mines for coal.
	0.4		
80.4		27.4	Middle Fork Vermillion River crossing.
	1.2		
81.6		26.2	Oakwood-Collison exit.
	14.7		
96.3		11.5	St. Joseph-Flatville exit.
	0.5		
96.8		11.0	Crossing of Salt Fork, Vermillion River.
	6.1		
102.9		4.9	Urbana east exit. U.S. 150 crossover at interchange.
	1.4		
104.3		3.5	Cross U.S. 45 at interchange.
	1.2		
105.5		2.3	Lincoln Avenue, Urbana exit.
	2.3		
107.8		0.0	Natural History Building, Goodwin Avenue entrance.