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STATE OF ARKANSAS

ARKANSAS GEOLOGICAL COMMISSION

Norman F. Williams, State Geologist

A GUIDEBOOK

TO THE

ORDOVICIAN–MISSISSIPPIAN ROCKS OF NORTH–CENTRAL ARKANSAS

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by
John David McFarland, III, William V. Bush,
Orville Wise, and Drew Holbrook
Arkansas Geological Commission

Prepared for the South-Central Section
Geological Society of America
Mt. View, Arkansas
April, 1979

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PREFACE

This guidebook was originally prepared for the 13th annual meeting of the south-central Section of the Geological Society of America. It has been slightly modified since that meeting to meet the needs of the spring 1982 meeting of the Southern Association of Student Geological Societies. The University of Arkansas at Monticello Geological Society and the Delta Sigma Chapter (UAM) of Sigma Gamma Epsilon would like to express their appreciation to the authors of the original guidebook and support they have given to make this trip a success.

The maps presented in this guidebook were compiled during the mapping program for the 1976 Geological Map of Arkansas with some modifications by the authors of this guidebook. Stops were selected to show the best exposures of units traversed and to display structural and depositional features. Figure 1 shows locations of stops along the route. The S.A.S.G.S. trip will cover stops 1, 2, 6 and the supplemental visit to Blanchard Springs Caverns. The other stops were left in the guide in the event that some of the groups might like to visit these on their own. Figure 2 is a stratigraphic chart of the units in the Arkansas Ozark Mountains.

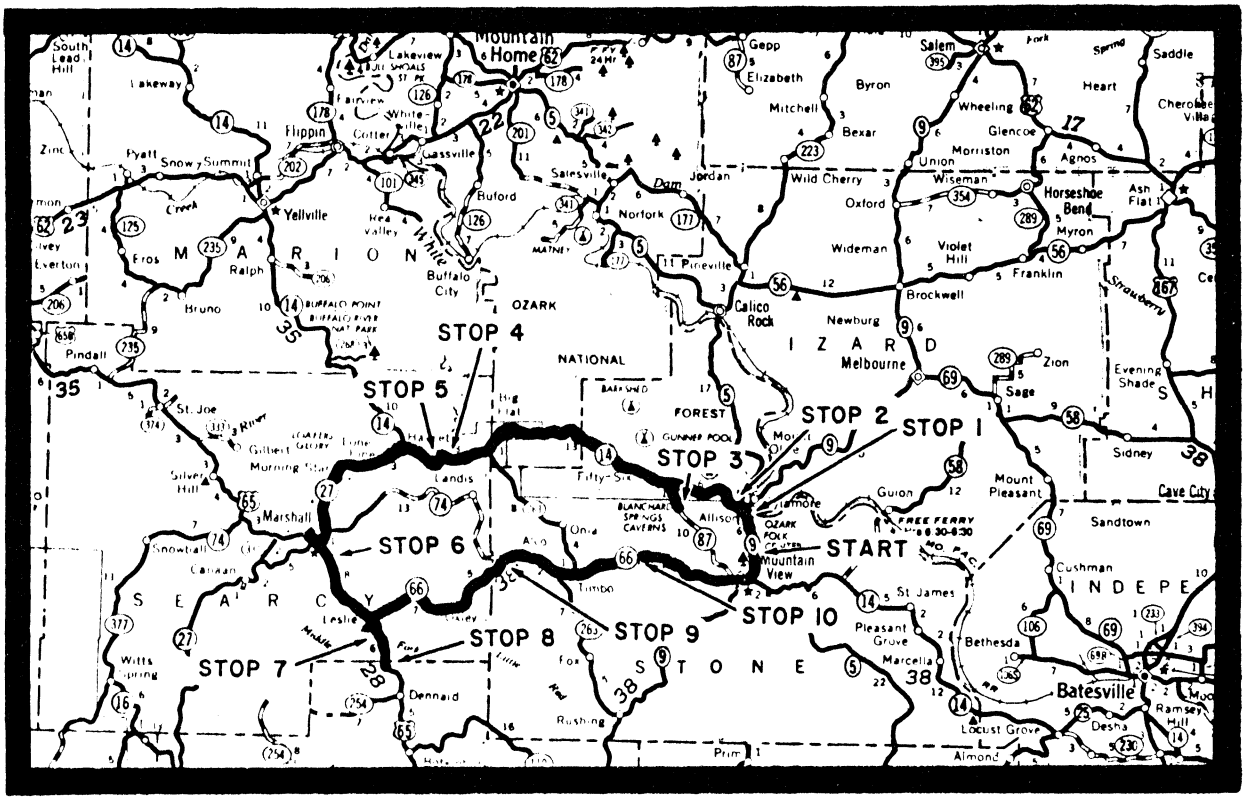


FIGURE 1 - INDEX MAP OF ROAD LOG

SCALE 1" = 13 miles

Field trip route ← Stop location

AGE		NORTH CENTRAL ARKANSAS	
PENNSYLVANIAN	ATOKA	ATOKA FORMATION	
	MORROW	BLOYD FORMATION	
		HALE FORMATION ?—?	PRAIRIE GROVE MB.
			CANE HILL MB.
MISSISSIPPIAN	UPPER	PITKIN LIMESTONE	
		FAYETTEVILLE SHALE	
		BATESVILLE SANDSTONE	
		MOOREFIELD FORMATION	
	LOWER	BOONE FORMATION	ST. JOE LIMESTONE MB.
		"BASAL MISSISSIPPIAN SANDSTONE"	
DEVONIAN	UPPER	CHATTANOOGA SHALE	SYLAMORE SS MB.
	MIDDLE	CLIFTY LIMESTONE	
	LOWER	PENTER'S CHERT	
SILURIAN	UPPER	MISSING	
	MIDDLE	LAFFERTY LIMESTONE	
		ST. CLAIR LIMESTONE	
	LOWER	BRASSFIELD LIMESTONE	
ORDOVICIAN	UPPER	CASON SHALE	
		FERNVALE LIMESTONE	
	MIDDLE	KIMMSWICK LIMESTONE	
		PLATTIN LIMESTONE	
		JOACHIM DOLOMITE	
		ST. PETER SANDSTONE	
		EVERTON FORMATION	
	LOWER	POWELL DOLOMITE	
		COTTER DOLOMITE	

FIGURE 2. STRATIGRAPHIC CHART OF UNITS EXPOSED IN NORTH CENTRAL ARKANSAS.

ROAD LOG

ORDOVICIAN-MISSISSIPPIAN ROCKS OF NORTH-CENTRAL ARKANSAS

by

John David McFarland, III, William V. Bush
Orville A. Wise and Drew Holbrook

Arkansas Geological Commission

MILEAGE	DESCRIPTION
0.0	Junction of Arkansas Highway 9 and Entrance to Ozark Folk Center. Proceed north on Highway 9.
0.3	Quarry in the Boone Formation (Mississippian) to the east. The reddish cherty regolith seen here is typical of Boone residuum.
2.9	Boone Formation exposed to the west. The Boone Formation, of Osagean and lower Meramecan (Lower Mississippian) age, consists of limestone, limestone and nodular chert, interbedded limestone and chert, and in some exposures just chert. It is widely exposed in northern Arkansas, southern Missouri and northeastern Oklahoma. It commonly underlies the Springfield Plateau surface. In northern Arkansas the Boone is 300 to 400 feet thick, probably thinning to the south. Marine fossils, mostly crinoids, bryozoans and brachiopods, are present throughout the unit.
3.3	Proceeding down the hill the Fernvale, Kimmswick and Plattin Limestones (Ordovician) are crossed. The exposures of these units are somewhat obscured by the drape of Boone regolith, but examples of each unit are exposed on the west side of the road.
3.5	**STOP 1** – Allison South. Plate I, Figures 3 and 4. As you proceed down this hill you can examine outcrops of (in descending order) the Plattin Limestone, Joachim Dolomite, St. Peter Sandstone, a fault and Joachim again. The Plattin is typically an even-bedded micrite with irregular blebs of sparry calcite scattered throughout (dismicrite). The Plattin is widely exposed in Independence, Izard, Searcy, Sharp and Stone Counties. Its thickness ranges from about 250 feet to a feather edge. The Joachim Dolomite (Middle Ordovician) is a gray to brown, fine-grained dolomite which is sandy in part. The Joachim rests on the St. Peter Sandstone and reaches a maximum thickness of about 150 feet although it is more commonly 40 to 100 feet thick. The unit is exposed from Newton County on the west to Independence County on the east where the Paleozoic rocks are covered by Quaternary deposits of the Mississippi Embayment. In this exposure the nature of the intertidal to supratidal depositional environment is indicated by the periodic development of laminated and mud cracked dolomite mudstones.

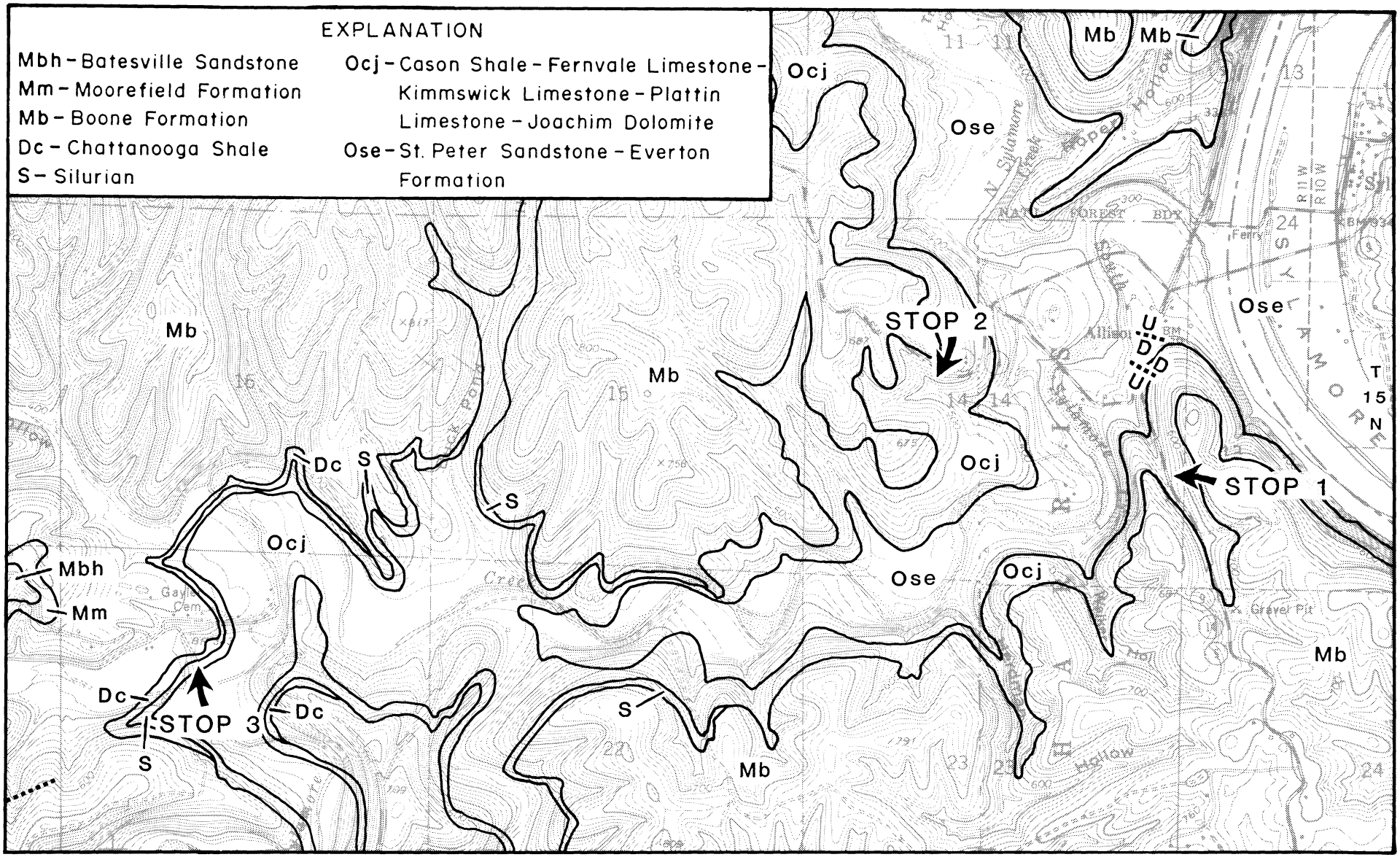


PLATE I. STOP 1 - ALLISON SOUTH, STOP 2 - ALLISON WEST and STOP 3 - SOUTH SYLAMORE CREEK.

Geology by E. E. Glick, modified by the authors

1000 0 1000 2000 3000 FEET

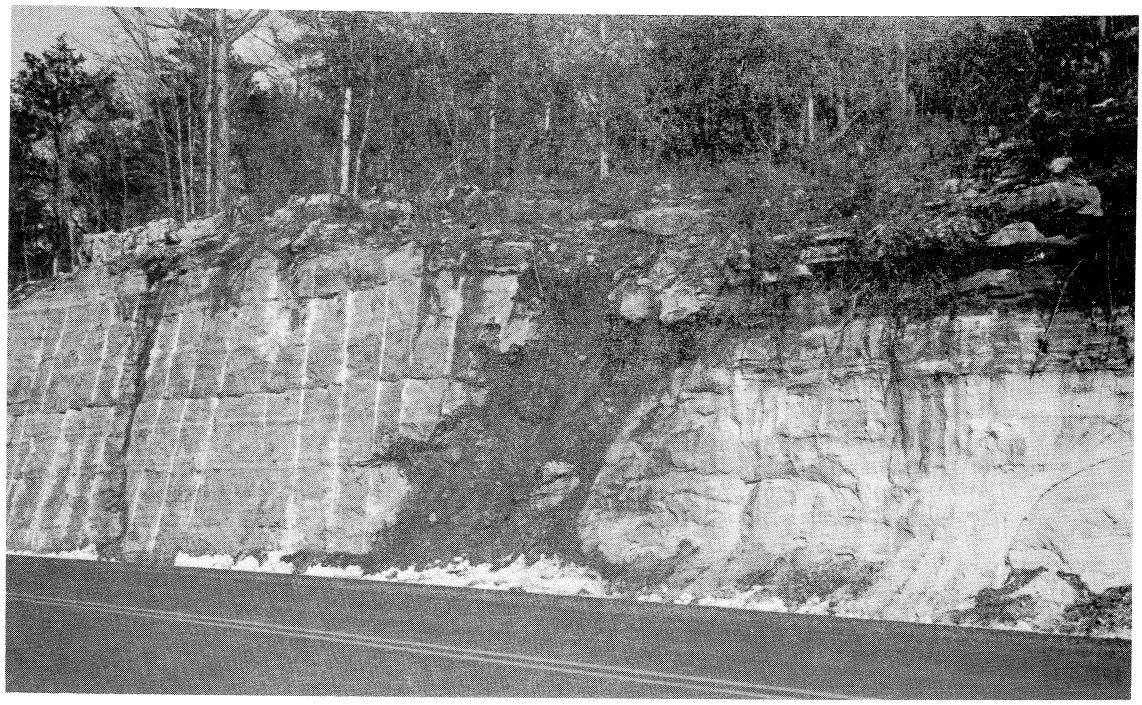


Figure 3. Stop 1. Normal fault with downthrown side to the north exposed in road cut south of Allison on Arkansas Highway 9. Joachim on the left and St. Peter on the right overlain by Joachim.

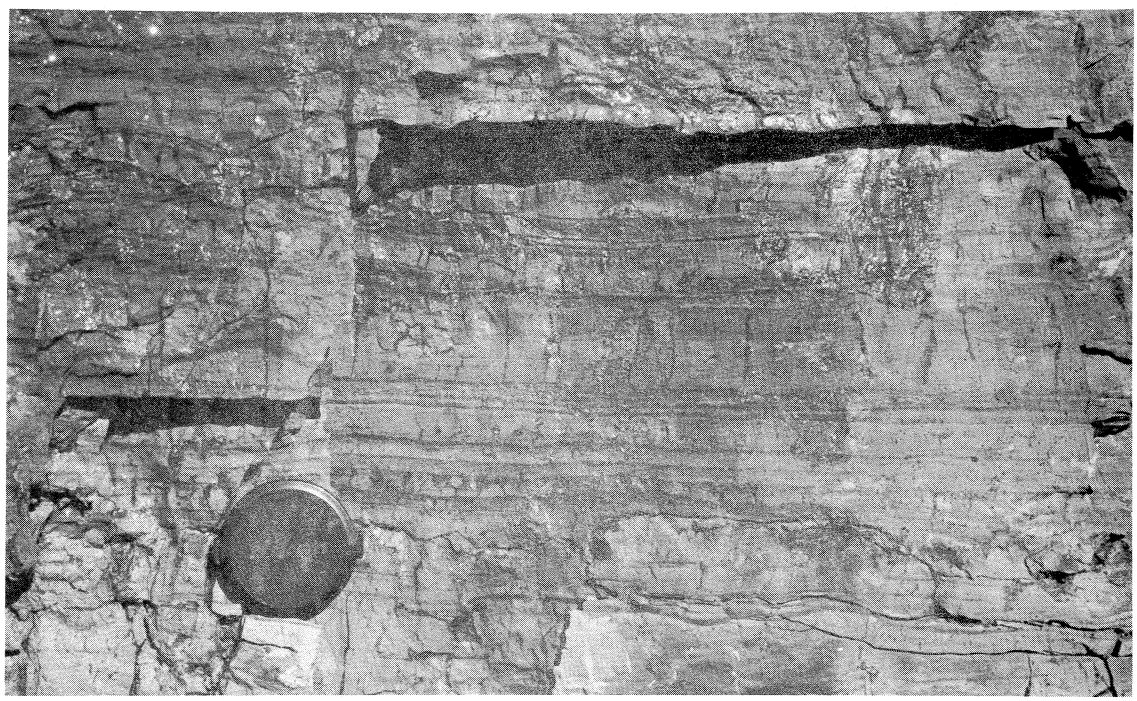


Figure 4. Stop 1. Mudcracks and laminations in the Joachim Dolomite indicating intertidal to supratidal depositional environment.

Some small normal faults can be seen in this outcrop. In the vicinity of the Joachim-Plattin contact there is an alternation of Joachim and Plattin lithologies, thus the position of the contact between the two formations is debatable. The St. Peter Sandstone consists of fine to coarse-grained, well-rounded, frosted, friable, occasionally well sorted, sometimes cross-bedded quartz arenite. The formation outcrops from Newton County on the west to the Mississippi Embayment on the east. The St. Peter ranges from a subsurface thickness of 300 feet in White County to a truncated edge to the north and west. A maximum outcrop thickness of 210 feet has been reported by H. D. Miser. The fault between the St. Peter Sandstone and the Joachim Dolomite is downthrown to the north and is but one of a series of faults in this valley.

4.0 Junction of Arkansas Highways 59 and 14. Turn west (left) onto Highway 14.

4.1 Bridge over Sylamore Creek.

4.2 St. Peter Sandstone exposed to the south.

4.5 Joachim Dolomite exposed in roadcut to the north.

4.6 Plattin Limestone exposed in roadcut to the north.

4.8 **STOP 2** – Allison West. Plate I, Figures 5 – 8. Parking area south side of road. The base of the outcrop on the north side of the road is Plattin Limestone. (Joachim and St. Peter are exposed further down the hill.) As you proceed up the hill, the sequence (in ascending order) is the Plattin and Kimmswick Limestones (Middle Ordovician) followed by the Fernvale Limestone (Upper Ordovician), a greenish shale of uncertain stratigraphic assignment, the thin "Basal Mississippian Sandstone " and the Boone Formation (Lower Mississippian). The Plattin Limestone at this stop is as described for Stop 1, but here we see the top of the unit well exposed. Many coral fossils are preserved in the upper beds. The Kimmswick Limestone is an even-bedded, fine to coarse-grained limestone, ocassionally oolitic or sandy, and is present locally along depositional strike in the adjacent counties to the east and west. The Kimmswick is generally less than 50 feet thick throughout its outcrop area. The upper and lower contacts are unconformable and can be examined in detail at this outcrop. The overlying Fernvale Limestone is dominantly a coarse-grained, often pinkish, pelmatozoan calcirudite. The Fernvale is well exposed in Independence, Izard and Stone Counties, but scattered outcrops are present outside this area. This unit when weathered is generally friable. The lower half of the Fernvale at this stop is cross-bedded which is a common feature of the formation. Nautiloid fossils can be found on the bench formed at the top of the Fernvale. The green shale between the Fernvale and the Boone has been variously identified as the Cason Shale (Ordovician-Silurian), the Chattanooga Shale (Devonian), or the Bachelor Formation (Lower Mississippian). Just below the Boone an interval known as the "Basal Mississippian Sandstone" is present. The Boone Formation caps the sequence at this stop. It should be noted that the widespread St. Joe Limestone is missing here.

4.9 The Boone Formation is well exposed here.

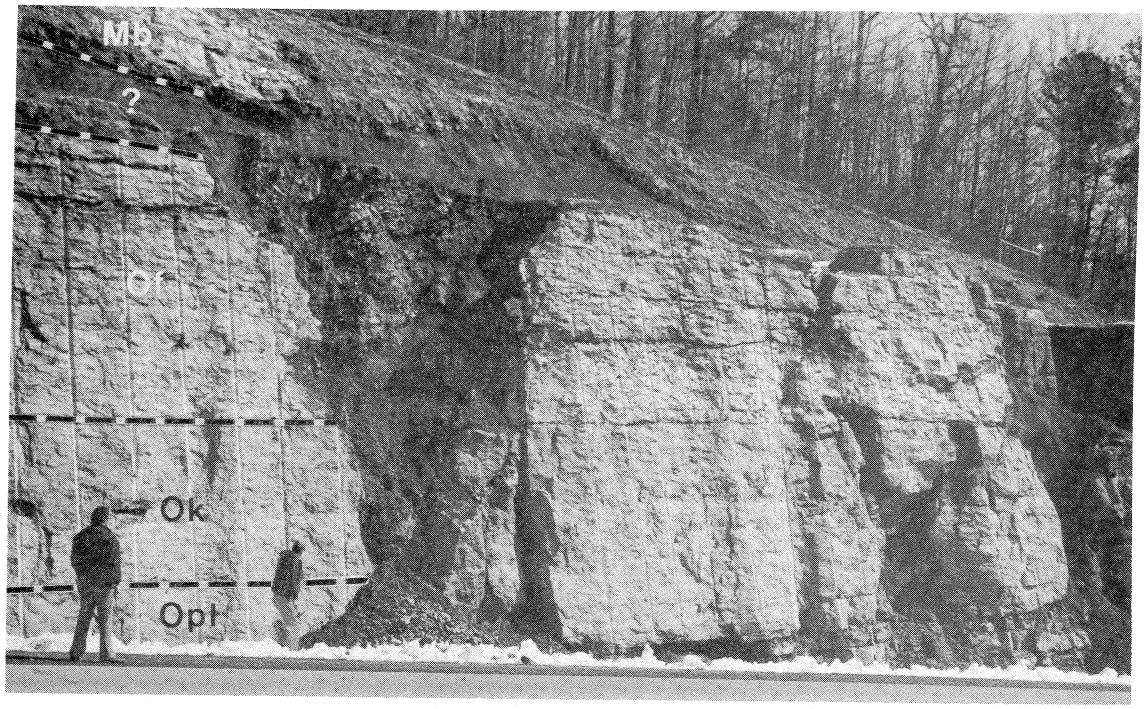


Figure 5. Stop 2. Sequence of Plattin Limestone (Opl), Kimmswick Limestone (Ok), Fernvale Limestone (Of), ? Cason–Chattanooga–Bachelor–"Basal Mississippian Sandstone" (?), and Boone Formation (Mb). Solution cavity is filled with Boone rubble.

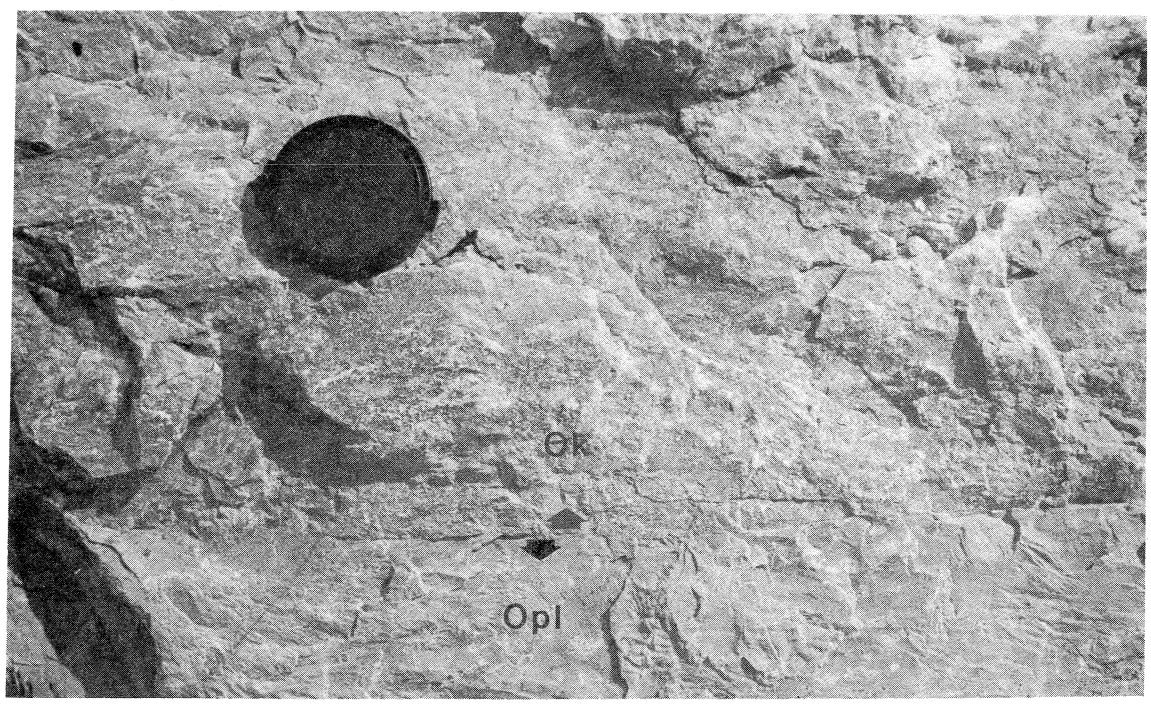


Figure 6. Stop 2. Contact between the Plattin and Kimmswick Limestones.

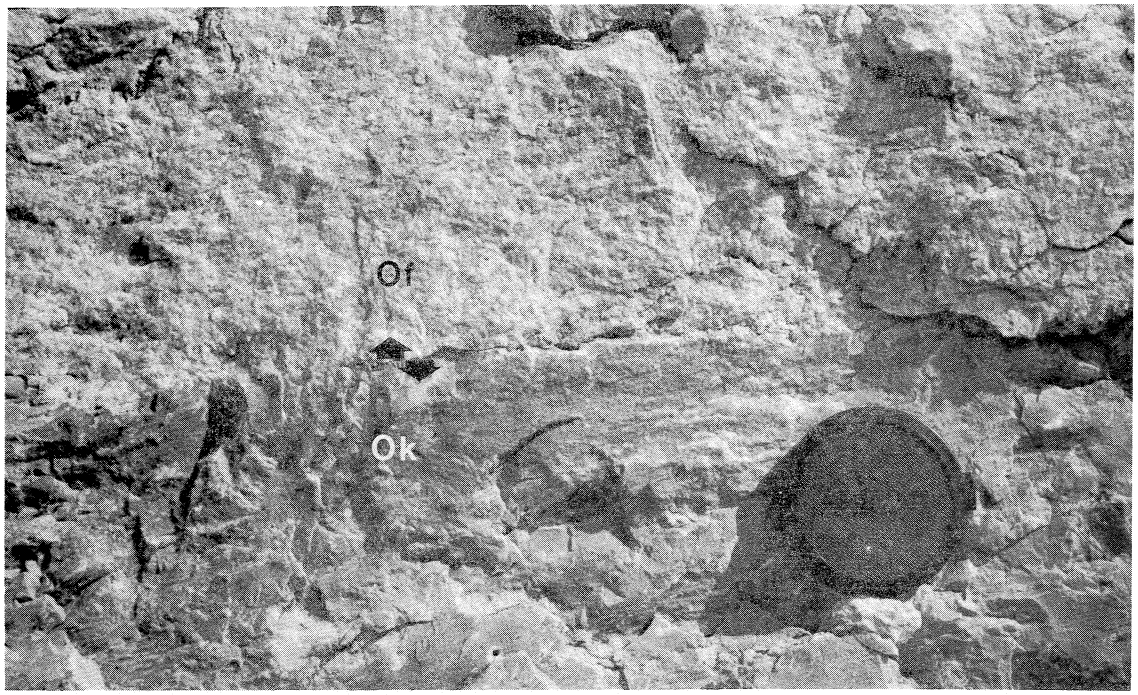


Figure 7. Stop 2. Contact between the Kimmswick Limestone and the Fernvale Limestone.

Figure 8. Stop 2. Boone Formation and "Basal Mississippian Sandstone" (SS) overlying an unassigned shale unit.

9.8 Junction of Arkansas Highways 14 and 87. Turn south (left) onto Highway 87.

12.8 Batesville-Moorefield in road cut.

13.2 Road forks. Turn left. Continue on Highway 87.

13.3 **STOP 3** – South Sylamore Creek. Plate I. Parking is available across the bridge on the gravel bar. The exposures along the north side of South Sylamore Creek are (in ascending order): The Fernvale Limestone, exposed near water level; the Lafferty Limestone ?(Silurian), here a very fine-grained limestone; the Chattanooga Shale with the basal Sylamore Sandstone Member; a sandstone which may be either upper Chattanooga or the "Basal Mississippian Sandstone"; and, the Boone Formation. Turn around and return to Highway 14.

16.8 Junction of Arkansas Highways 87 and 14. Turn west (left) onto Highway 14.

17.0 Road to Blanchard Springs Caverns to the north. Surface expression of a sink hole to the south (left).

17.4 Crossing fault downthrown to the south. This fault is not exposed along the route of the field trip, but its position has been determined by field mapping. This fault will be crossed several more times to mile 25.5.

18.0 Downtown Fifty Six, Arkansas. Roland Cave, which may connect to the Blanchard Springs Caverns, is located north of town.

18.9 Road to Gunner Pool Recreation Area to the north.

19.2 Fault, downthrown to the south.

19.5 Fault, downthrown to the south.

21.5 Fault, downthrown to the south. Stephens Cemetery to the north.

22.0 Fault, downthrown to the south.

22.6 Fault, downthrown to the south.

24.1 Stone County Line.

25.5 Fault, downthrown to the south.

26.5 Moorefield Formation (Mississippian) to the south. The Moorefield is generally a dark fissile shale.

26.6 Batesville Formation (Mississippian) caps this hill. The Batesville is generally a yellow to brown sandstone. The road is on Batesville to mile 31.7.

29.8 Downtown Big Flat, Arkansas. The town gets its name from the topographic flat which is commonly developed on the Batesville.

30.9 Junction of Arkansas Highways 14 and 263. Continue on Highway 14. Contact between the Batesville and Moorefield.

31.7 Contact between the Moorefield and Boone.

31.8 Boone exposures to the north.

33.8 The St. Joe Limestone (Lower Mississippian) is exposed to the north. At the west end of this outcrop the Plattin Limestone is faulted against the St. Joe.

34.0 Plattin Limestone to the north.

34.3 **STOP 4** — Bear Creek. Plate II, Figure 9. Kimmswick Limestone at road level overlain with angular unconformity by the Fernvale Limestone. The Kimmswick at this location exhibits a different facies than previously seen; beds of fine-grained sandstone and oolitic limestone are interbedded with the more typical fine to medium-grained calcarenites. The sandstones here are somewhat porous where the carbonate cement has been partially removed; in places where the carbonate cement has not been dissolved, a poikilotopic cement is evident.

34.7 Contact between the Joachim and St. Peter. Proceeding down the hill and around the corner a fault, downthrown to the north, is crossed. The St. Peter-Everton contact is exposed in the bluff to the south.

34.9 **STOP 5** — Big Creek. Plate II. The Everton Formation (Middle Ordovician) is at road level to the east with the St. Peter Sandstone unconformably overlying it. The Everton is exposed from northern Madison and southern Carroll Counties on the west to the Mississippi Embayment on the east. The Everton throughout its outcrop area consists of alternating beds of dolomite, limestone, and sandstone, none of which persist for any great distance laterally. Quartz sand of the St. Peter type is present in many of the carbonate beds in various amounts and geometries.

35.4 Exposures of Everton and St. Peter can be seen in the bluffs along Big Creek.

35.5 Bridge over Big Creek.

35.6 Everton and St. Peter exposed to the west.

36.1 Plattin exposed to the north.

36.2 Fernvale exposed to the north.

36.3 St. Joe Limestone exposed to the north.

36.4 Boone Formation to the north.

38.3 Junction of Arkansas Highways 14 and 27, downtown Harriet, Arkansas. Turn south (left) onto Highway 27.

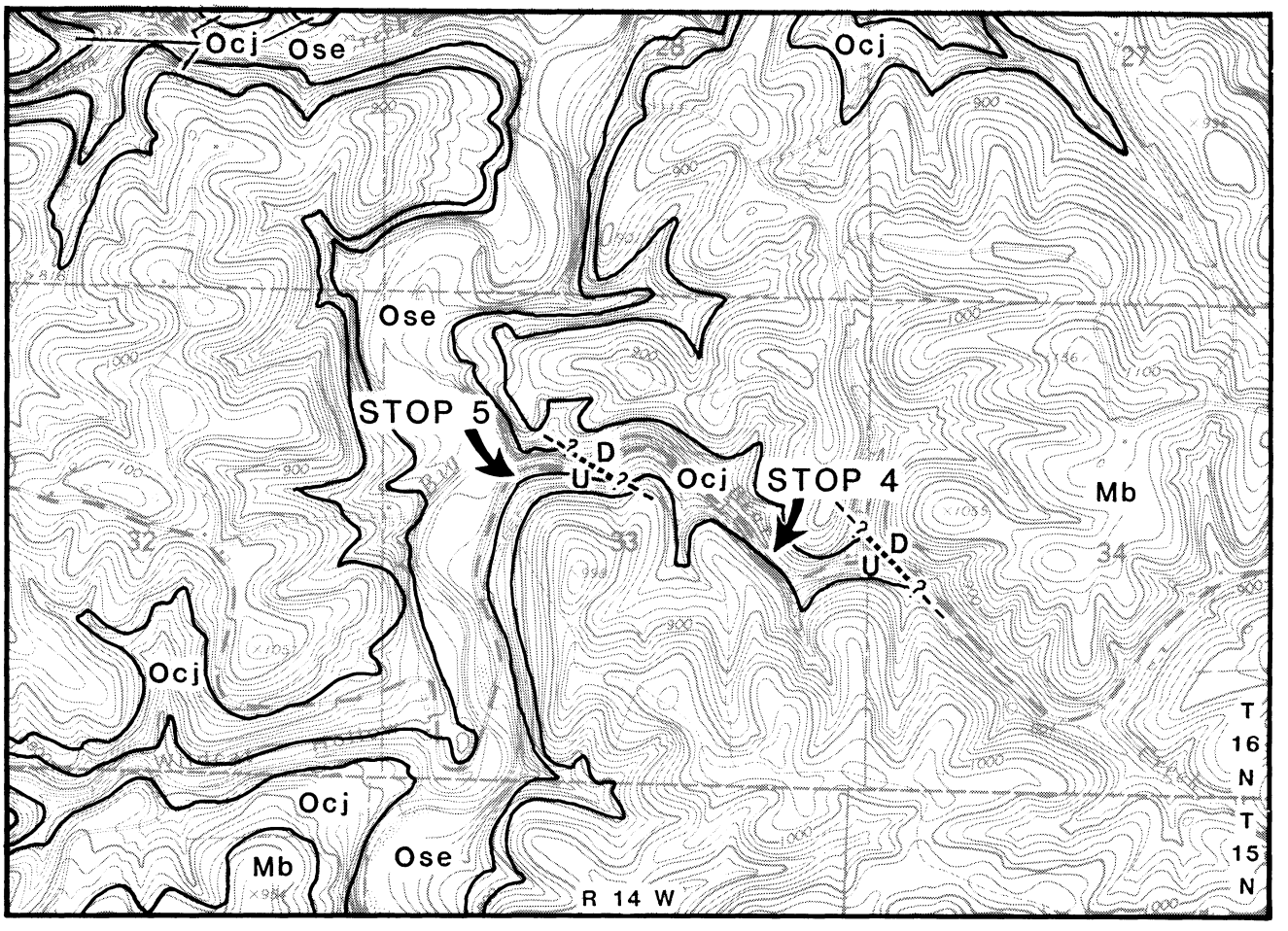


PLATE II. STOP 4 - BEAR CREEK and STOP 5 - BIG CREEK.

Geology by E. E. Glick, modified by the authors

1000 0 1000 2000 3000 FEET

EXPLANATION

Mb – Boone Formation

Ocj – Cason Shale - Fernvale Limestone - Kimmswick Limestone - Plattin Limestone - Joachim Dolomite

Ose – St. Peter Sandstone - Everton Formation

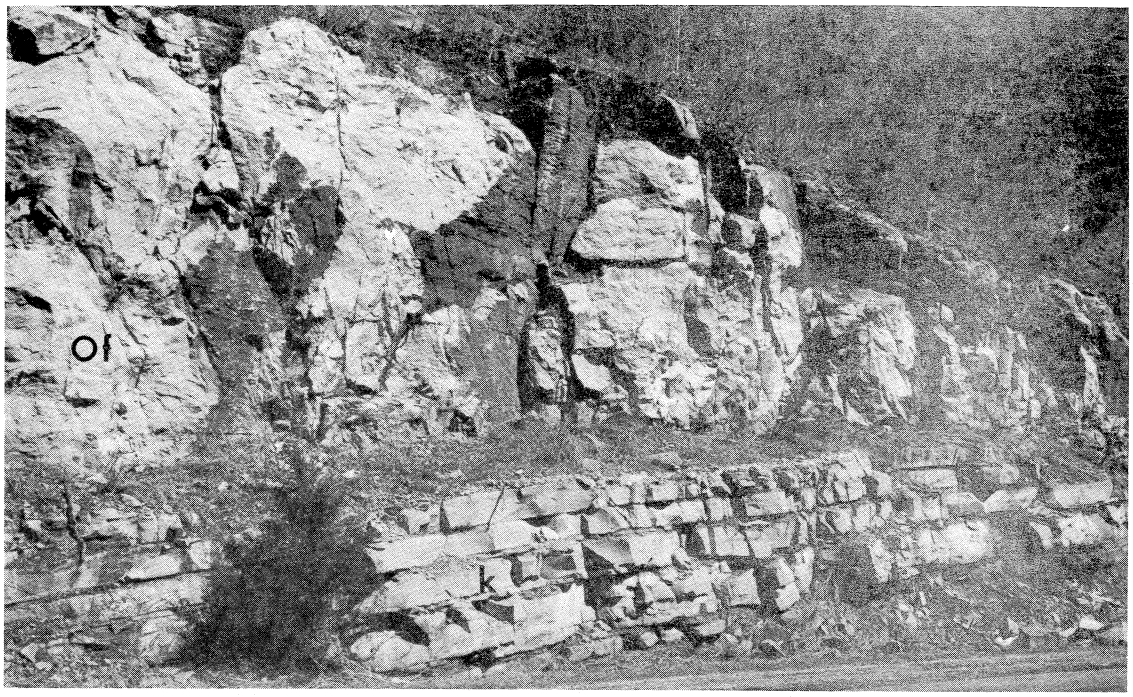


Figure 9. Stop 4. Angular unconformity between the Kimmswick Limestone and the Fernvale Limestone.

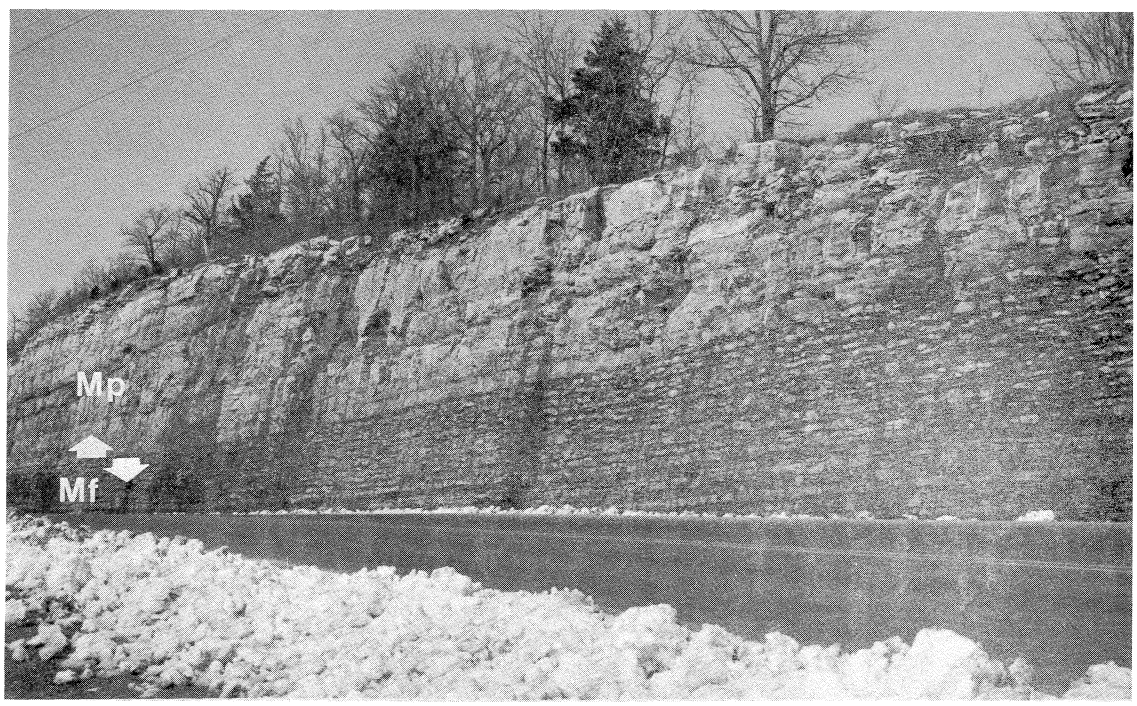


Figure 10. Stop 6. Interbedded dark micrite and black shale of the upper Fayetteville Shale (Mf) overlain by the Pitkin Limestone (Mp).

43.1 Downtown Morning Star, Arkansas. Moorefield and Batesville to the east.

43.5 Boone to the west.

46.8 Moorefield and Batesville to the east.

47.2 Junction of Arkansas Highways 27 and 74. Continue on Highway 27.

48.1 Marshall, Arkansas. Junction of Arkansas Highway 27 and U. S. Highway 65. Turn south (left) onto U. S. Highway 65.

48.5 Fayetteville Shale exposed to the east.

49.1 **STOP 6** — Marshall Roadcut. Plate III, Figure 10. This roadcut is one of the finest exposures of the Fayetteville Shale in north central Arkansas with an almost complete section exposed. The base of the Fayetteville is exposed in the creek bottoms at the foot of this hill to the south. The Fayetteville Shale is chiefly a black, fissile shale generally exposed on the lower slopes of the northern escarpment of the Boston Mountains. The micrite beds seen here in the upper part of the Fayetteville are common in this area but are absent in western Arkansas. The Pitkin Limestone conformably overlies the Fayetteville and the contact is placed where the interbedded dark micritic limestones and black shales give way to the lighter colored bioclastic calcarenites. Both units are Upper Mississippian age (Chesterian).

49.4 Fayetteville Shale to the west.

54.4 Crossing normal fault downthrown to the south.

54.5 Leslie, Arkansas. Junction of U. S. Highway 65 and Arkansas Highway 66. Continue south on U. S. Highway 65. Pitkin exposed in bluff to the west.

55.5 Bridge over Middle Fork of the Little Red River.

56.7 **STOP 7** — Leslie South. Plate IV, Figure 11. Pitkin Limestone Bluff. Note the small faults and a small cave at the south end of the outcrop. The Pitkin is generally exposed along the northern Boston Mountain Escarpment where it conformably overlies the Fayetteville Shale. It consists of light to dark gray, oolitic, bioclastic limestone. Crinoid fragments are common here along with the bryozoan Archimedes.

57.7 Bridge over Peyton Creek. Turn east (left) immediately after crossing the bridge onto dirt road.

58.0 **STOP 8** — Peyton Creek Phosphate Mine. Plate IV, Figures 12-14. The phosphate deposit was discovered in 1955 by uranium prospectors who detected a radioactive anomaly on the bluff south of Peyton Creek, the site of the present mine opening. Subsequent chemical analyses of samples by the Atomic Energy Commission and the Arkansas Geological Commission revealed that the radioactive rock was a phosphorite with a fractional percentage of uranium. Mapping

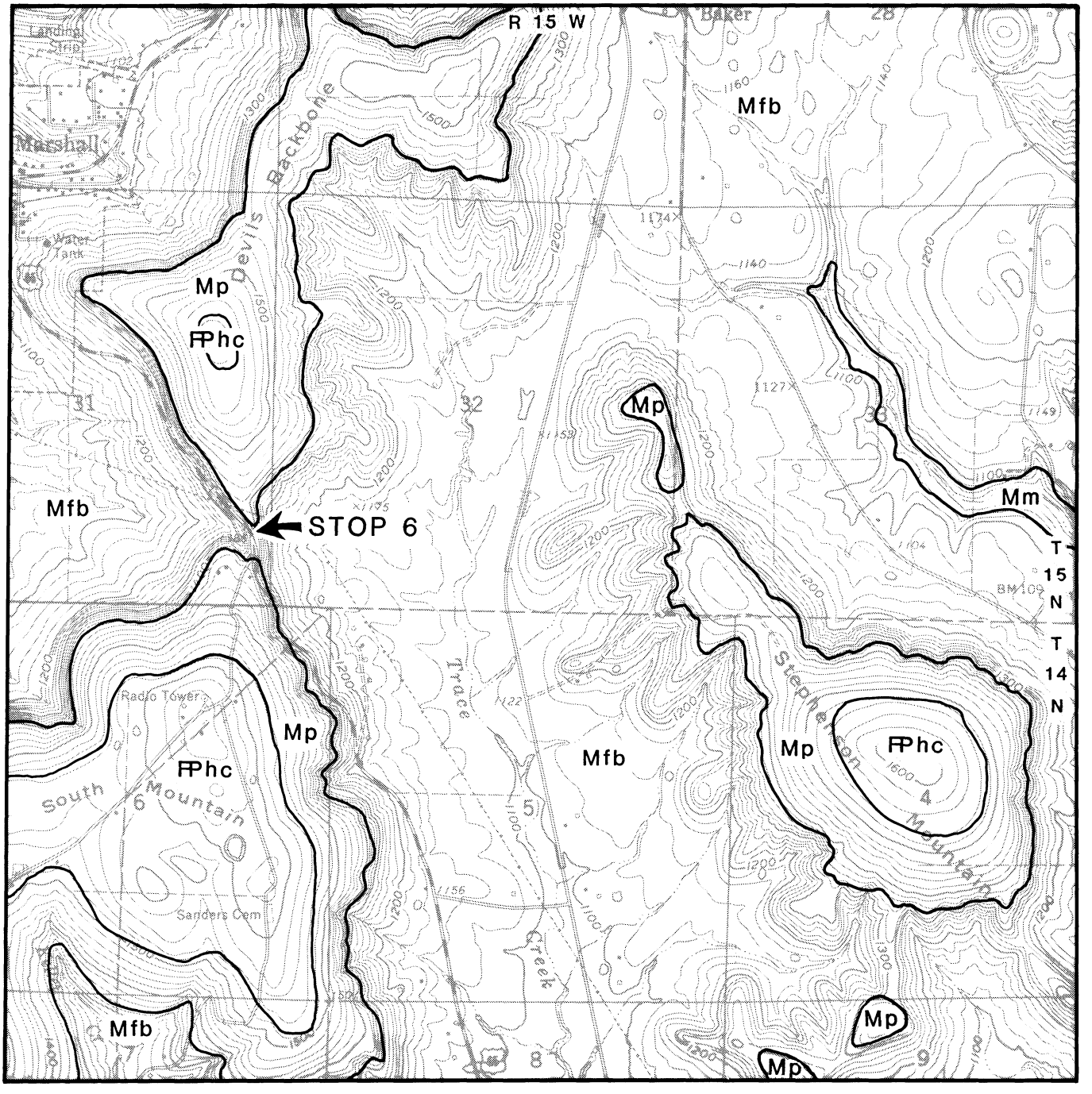


PLATE III. STOP 6 - MARSHALL ROADCUT.

Geology by E. E. Glick

1000 0 1000 2000 3000 FEET

EXPLANATION

PPhc – Cane Hill Member - Hale Formation

Mp – Pitkin Limestone

Mfb – Fayetteville Shale - Batesville Sandstone

Mm – Moorefield Formation

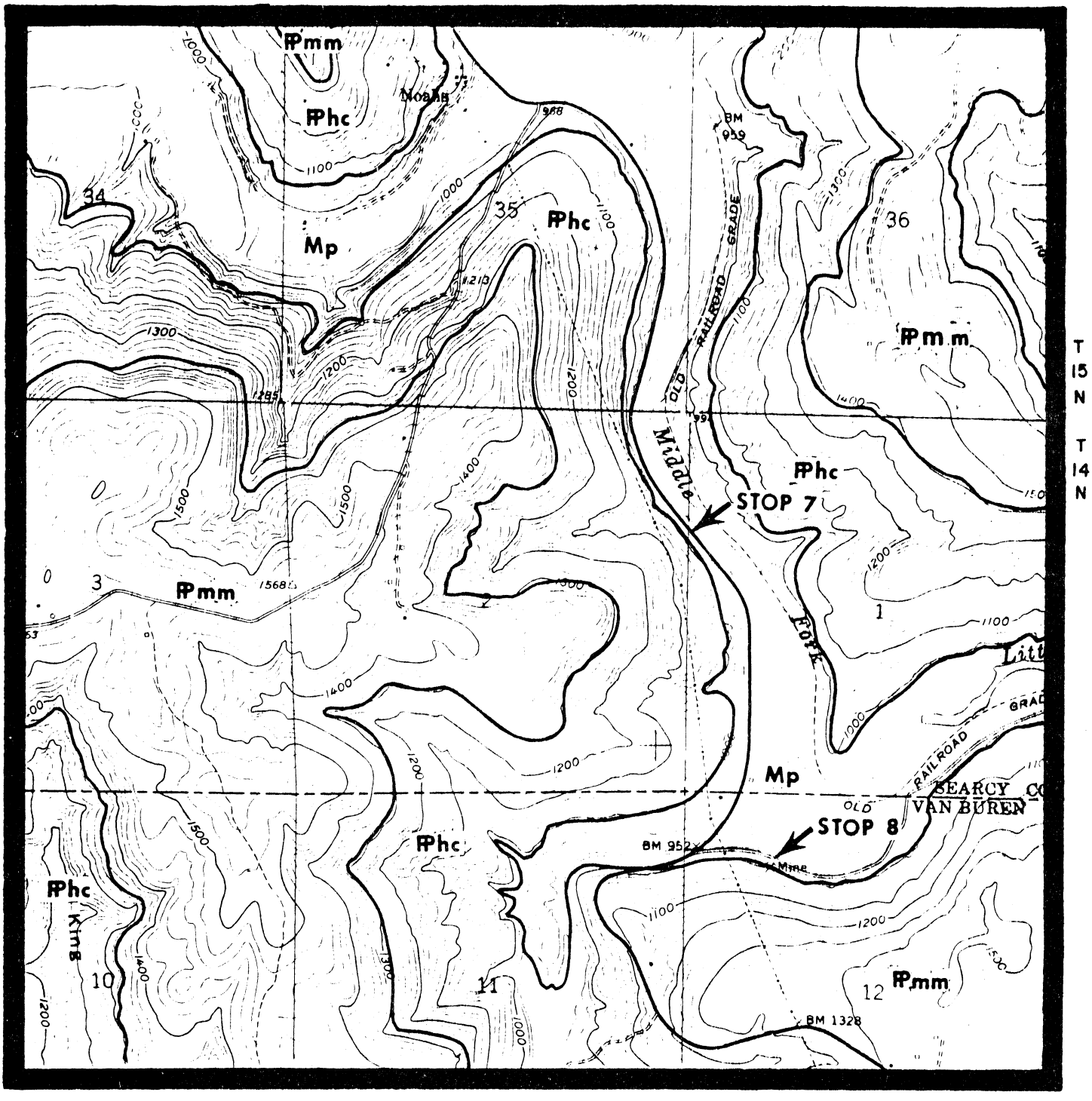


PLATE IV. STOP 7 – LESLIE SOUTH and STOP 8 – PEYTON CREEK PHOSPHATE MINE.

Geology by E. E. Glick

1000 0 1000 2000 3000 FEET

EXPLANATION

PPmm – Middle Morrow – Prairie Grove Member Hale Formation and Bloyd Shale

PPhc – Cane Hill Member – Hale Formation

Mp – Pitkin Limestone

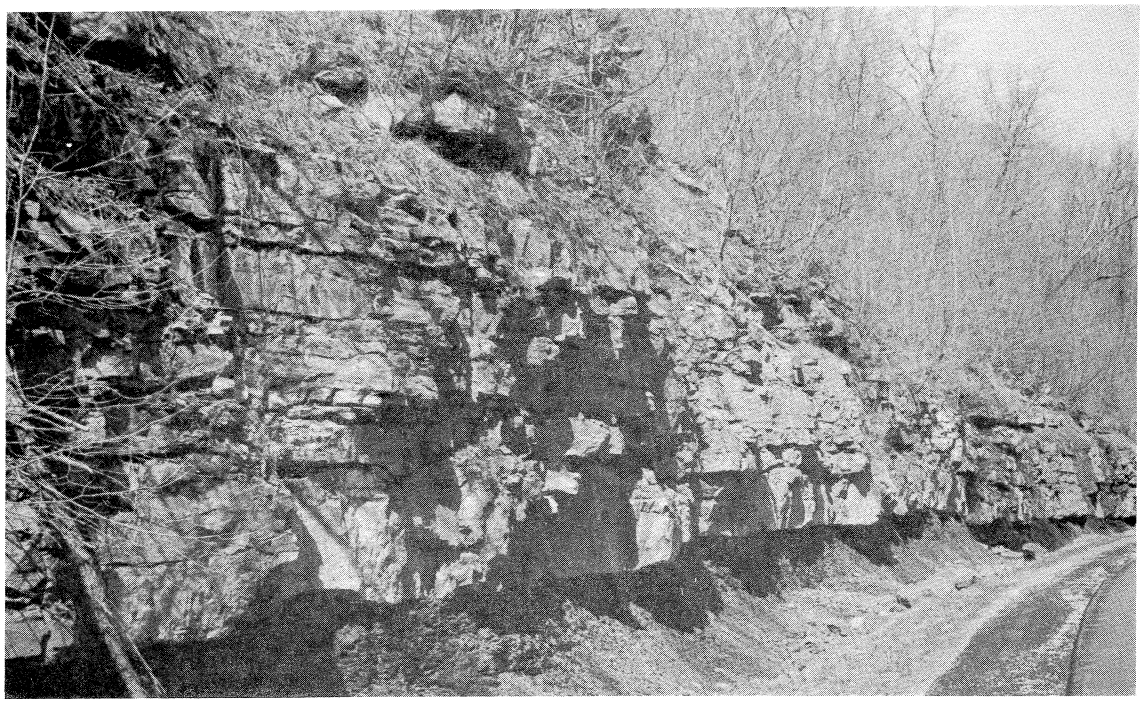


Figure 11. Stop 7. Pitkin Limestone in bluff along U. S. Highway 65 south of Leslie, Arkansas.

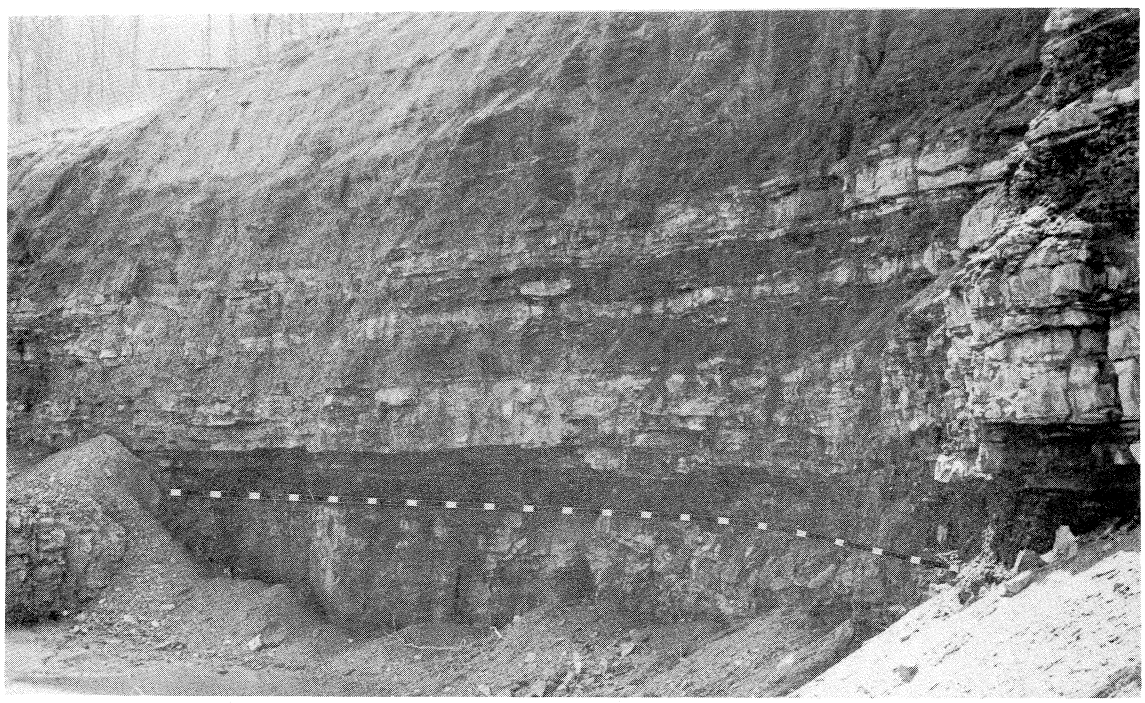


Figure 12. Stop 8. Peyton Creek Phosphate Mine. The phosphorite zone approximately 20 feet thick is at the base of highwall below the dashed line.

and core drilling by the Arkansas Geological Commission outlined a deposit of approximately 3 million tons of phosphate rock averaging 19 percent P_2O_5. A small tonnage was ground and sold for direct application to the soil in Missouri and a few thousand tons were shipped recently to TVA's electric furnace plant in Tennessee for the manufacture of elemental phosphorous. The maximum dimensions of the deposit are along the outcrop (21 feet thick by 1500 feet wide) and it tapers both in thickness and width back into the bluff. The top of the deposit is remarkably level, but the base is curved making it distinctly bowl shaped in cross section. The fresh phosphorite is a dark blue-gray, fine-grained oolite with a calcite cement; the oolites being essentially apatite. Minor constituents are quartz grains, marcasite, asphalt nodules, and ironstone grains. Limestone pebbles and cobbles are locally abundant in this rock. The phosphorite probably accumulated in a depression in the surface of the Pitkin Limestone and is presumed to be post-Pitkin Mississippian age.

Turn around and return to U. S. Highway 65.

58.2 U. S. Highway 65. Turn south (left) on Highway 65. The top of the Pitkin is exposed here as you start up this hill on the left. Overlying the Pitkin is the Upper Mississippian age portion of the Cane Hill Member of the Hale Formation. The following quote is taken from; Haley, Boyd R., in press, Mississippian and Pennsylvanian Systems (Carboniferous) in Arkansas; U. S. Geological Survey Professional Paper 1110.

> "In the northwestern part of the Ozark Region the contact between the Pennsylvanian and Mississippian age rocks has been placed at the base of a conglomerate at the base of the Cane Hill Member of the Hale Formation. Lithologically and paleontologically the contact is considered to be unconformable. In the northeastern part of the Ozark Region where the Cane Hill is much thicker the contact has been placed at the base of the conglomerate and has been considered to be unconformable. However, fossils correlatable to only the youngest of European Mississippian forms have been reported from above the basal conglomerate. On the basis of the age of these fossils, some authors have divided the present Cane Hill Member into the Cane Hill Formation of Pennsylvanian age and the underlying Imo Formation of Mississippian age, but the proposed Imo Formation is not a mappable or a recognizable lithologic unit, and its top can be established only by the existing upper limit of diagnostic Mississippian age fossils. Thus, in the northeastern part of the Ozark Region, the position and the nature of the contact between Pennsylvanian and Mississippian age rocks has yet to be determined."

58.8 An excellent Upper Mississippian fossil locality in the Cane Hill to the east.

59.0 Prairie Grove Member of the Hale Formation (Pennsylvanian) to the east.

59.2 Turn around and return to the north on U. S. Highway 65.

63.4 Leslie, Arkansas. Junction of U. S. Highway 65 and Arkansas Highway 66. Turn east (right) onto Highway 66.

STRATIGRAPHIC LOG

HOLE NO. S-2 LOCATION SE¼, NW¼, SEC. 12, T13N, R15W, Van Buren County

PAGE 1 OF 2 DATE 11-23-63 COLLAR ELEV. 1172 NOTES BY OAW, DEH, RVB

11-16-63

LITHOLOGIC NOTES

DEPTH	PROFILE	DESCRIPTION
0-22'		Weathered sandstone, clay and sandstone boulders
22'-58'		Sandstone; very fine grained varying from gray to blue gray to brown in color
58'-59'		Interbedded sandstone and shale
59'-59.2'		Conglomerate
59.2'-109.3'		Black clay shale; 3" fossil debris at 67.6', 6" fossil debris zone at 83.3', A few ½" siderite lenses 3" pyritic zone at 104.4', interbedded sand seams 106.4'-107.4'.
109.3'-113.2'		Sandstone; gray fine-grained cross bedded with 2-2" black shale layers
113.2'-175'		Black shale with scattered siderite lenses
175'-176.3'		Sandstone; fine grained some shale partings
176.3'-179.1'		Sandstone; fine grained light and dark gray, shale partings
179.1'-180.8'		Alternating layers of crossbedded brownish fine grained sandstone and black pyritic shale
180.8'-181.9'		Black shale-conglomeratic with siderite pebbles
181.9'-182.9'		Alternating black shale and gray fine-grained sandstone
182.9'-184.6'		Sandstone-fine grained gray, shale partings, carbonized plant fragments
184.6'-186.4'		Alternating gray sandstone and shale-plant imprints in sandstone
186.4'-188.9'		Black shale scattered siderite concretions

BORING NOTES

DEPTH FROM	DEPTH TO	INTERV.	CORE RECOV.	% RECOV.
0	22	22		
22	34.5	12.5		
34.5	42.6	8.1		
42.6	52.6	10.0		
52.6	61.4	8.8		
61.4	68.2	6.8		
68.2	86.1	17.9		
86.1	94.5	8.4		
94.5	104.9	10.4		
104.9	116.0	11.1		
116.0	158.0	42.0		
158.0	175	17.0		
175	186.7	11.7		
186.7	197.0	10.3		
197.0	216.8	19.8	19.4	98
216.8	227.3	10.5	10.4	99
227.3	237.3	10.0	9.7	97

SAMPLING NOTES

DEPTH FROM	DEPTH TO	INTERV.	SAMPLE NUMBER	% P_2O_5
204.9	205.4	0.5	S-2-1	26.3
205.9	207.1	1.2	S-2-2	26.9
208.9	215.3	6.4	S-2-3	18.4
215.3	223.3	8.0	S-2-4	18.3
232.3	236.7	4.4	S-2-5	5.42

Figure 13. Stratigraphic log drilled in 1963 on top of the hill at the Peyton Creek Phosphate Mine. The top of the Cane Hill is at a depth of 59.2' and the top of the Pitkin is at a depth of 236.7'. The phosphorite zone is between 204.9' – 236.7'.

STRATIGRAPHIC LOG

HOLE NO. S-2 LOCATION SE¼, NW¼, SEC. 12, T13N, R15W, Van Buren County

PAGE 2 OF 2 DATE 11-16-63 11-23-63 COLLAR ELEV. 1172 NOTES BY OAW, DFH, RVB

LITHOLOGIC NOTES

DEPTH	PROFILE	DESCRIPTION
188.9'-190.2'		Alternating layers of shale and sandstone
190.2'-196.7'		Sandstone; gray, fine grained shale partings
196.7'-197.4'		Black clay shale
197.4'-198.5'		Siltstone; gray, finely laminated
198.5'-200'		Interbedded black clay shale and gray siltstone
200'-203.7'		Black clay shale
203.7'-204.9'		Siltstone; gray, calcareous
204.9'-205.4'		Phosphorite
205.4'-205.9'		Sandstone; gray, calcareous
205.9'-207.1'		Phosphorite
207.1'-207.6'		Sandstone; gray, calcareous
207.6'-207.8'		Phosphorite
207.8'-208.9'		Sandstone; gray, calcareous
208.9'-214.4'		Phosphorite
214.4'-215.3'		Sandstone; gray, calcareous
215.3'-223.3'		Phosphorite
223.3'-226.3'		Sandstone; gray, calcareous with shale partings
226.3'-232.3'		Interbedded black shale and gray calcareous sandstone upper 3 feet mainly sandstone lower 3 feet mainly shale
232.3'-236.7'		Limestone conglomerate; black, coarsely crystalline, bituminous streaks, oolitic fossiliferous
236.7'-237.3'		Black clay shale

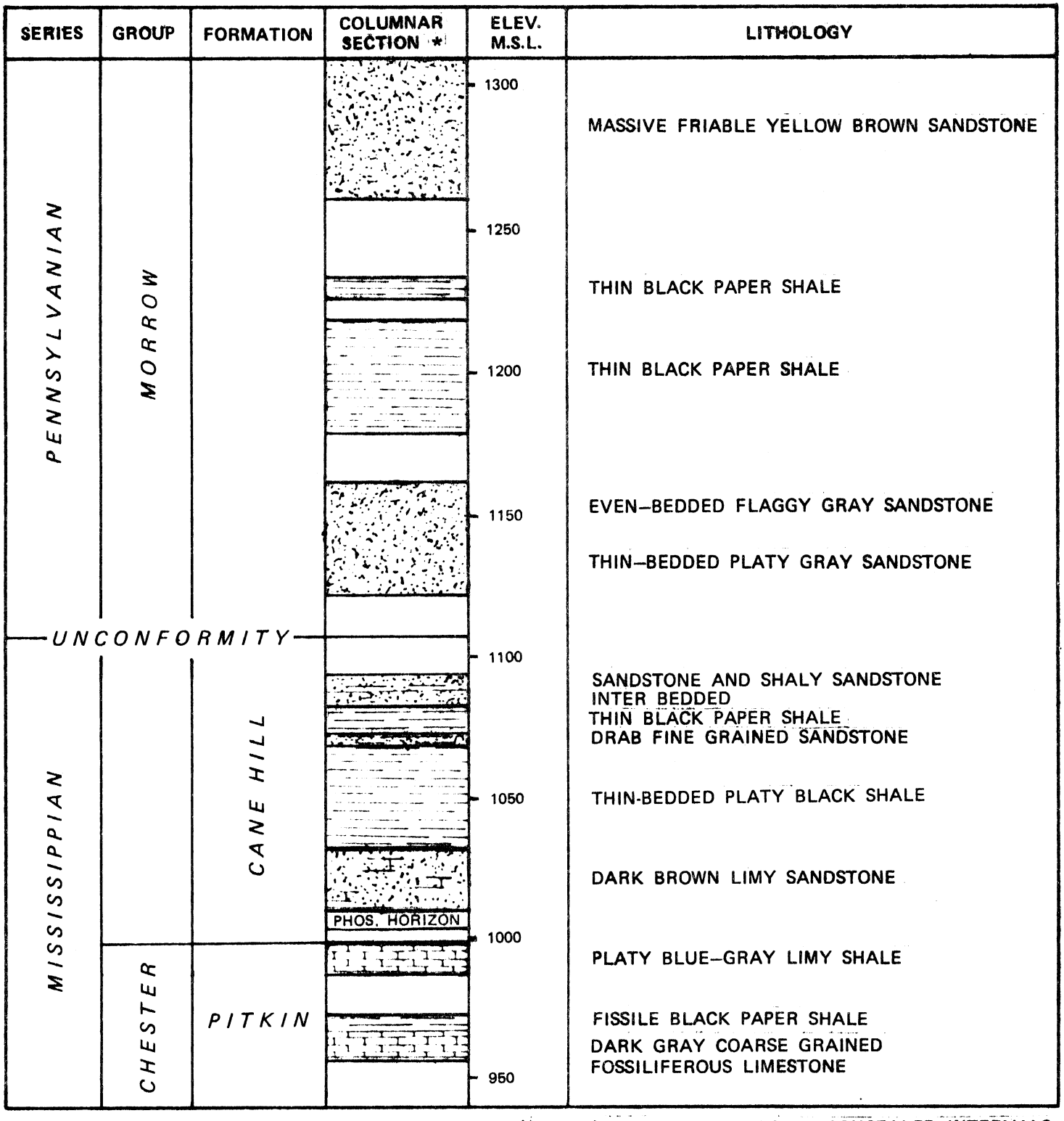
BORING NOTES

DEPTH FROM	DEPTH TO	INTERV.	CORE RECOV.	% RECOV.

SAMPLING NOTES

DEPTH FROM	DEPTH TO	INTERV.	SAMPLE NUMBER

COLUMNAR SECTION ALONG U.S. HIGHWAY 65 SOUTH FROM PEYTON CREEK BRIDGE



* BLANK PORTIONS REPRESENT CONCEALED INTERVALS

Figure 14.

63.5 Downtown Leslie, Arkansas. Follow Arkansas Highway 66.

63.9 Fault in the Pitkin downthrown to the south.

64.5 Cane Hill exposed to the south.

69.6 Downtown Oxley, Arkansas.

71.2 Pitkin exposed to the south.

71.4 Sandstone in the Cane Hill to the south.

72.8 Stone County Line.

73.2 Pitkin exposed to the south.

73.5 Fayetteville Shale to the east.

73.6 **STOP 9** – Lobe Patric Gap. Plate V, Figure 15. At this stop you can examine soft sediment deformation in the Fayetteville as well as the Fayetteville-Pitkin contact. Note the dark chert present in some of the limestone. Some of the Fayetteville limestone at this stop have well preserved silicified brachiopods of the suborder Productidina. Acid leaching of these rocks reveal these delicate fossils standing on long fragile spines.

73.8 Fayetteville Shale to the south.

74.7 Batesville Sandstone to the north – riding on Batesville to mile 76.6.

76.0 Downtown (?) Alco, Arkansas.

76.6 Moorefield Formation to the north.

77.5 Riding on the Boone Formation.

78.2 Junction of Arkansas Highways 66 and 263. Continue on Highway 66.

78.3 Riding on the Moorefield Formation.

78.6 Moorefield Formation exposed to the north.

79.1 Timbo, Arkansas. Junction of Arkansas Highways 66 and 263. Continue on Highway 66.

79.3 Pitkin is exposed in the bluffs on Panther Mountain to the north.

80.4 Batesville Sandstone outcrop to the north.

81.1 Moorefield Formation exposed.

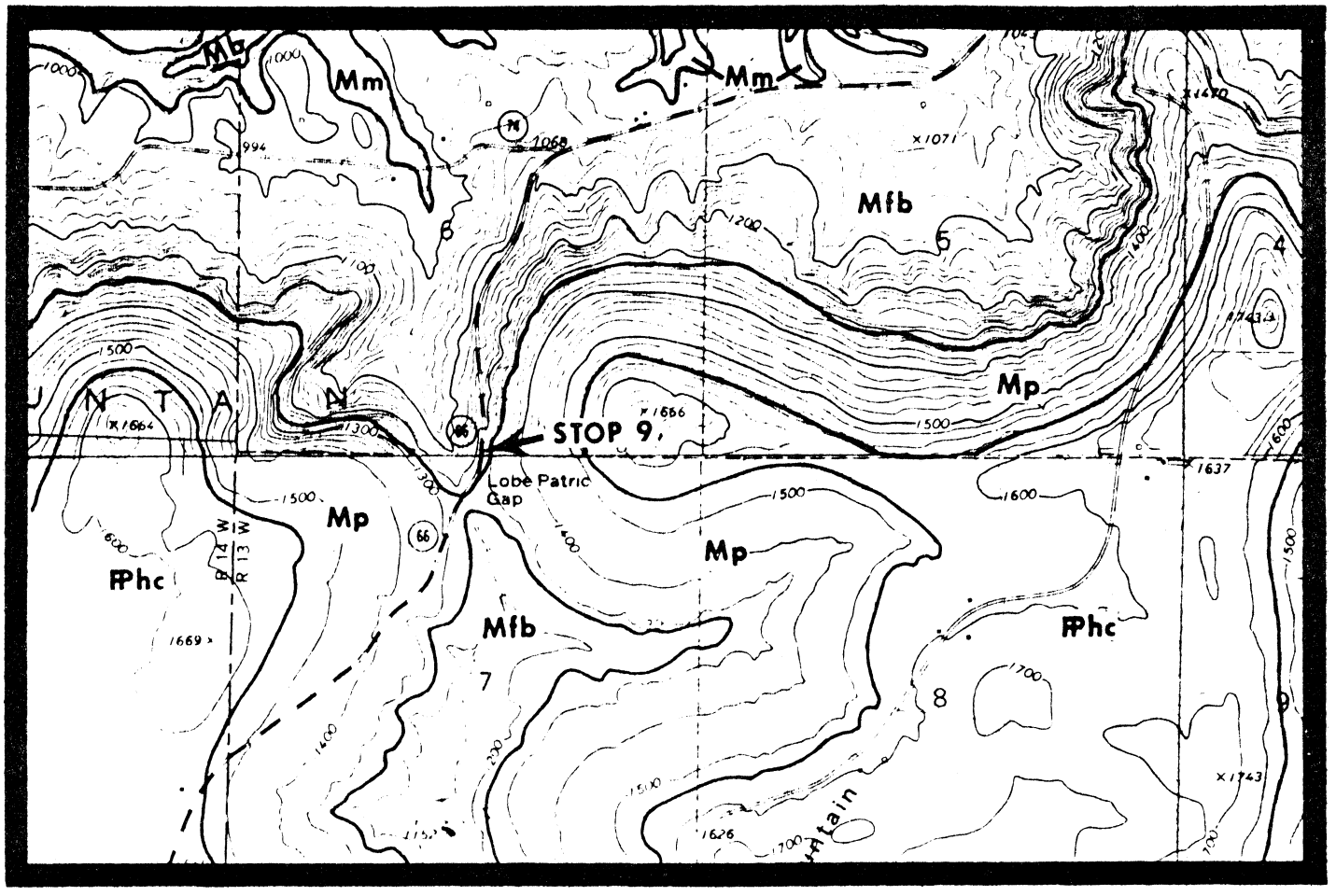


PLATE V. STOP 9 – LOBE PATRIC GAP.

Geology by E. E. Glick

1000 0 1000 2000 3000 FEET

EXPLANATION

Phc – Cane Hill Member - Hale Formation

Mp – Pitkin Limestone

Mfb – Fayetteville Shale - Batesville Sandstone

Mm – Moorefield Formation

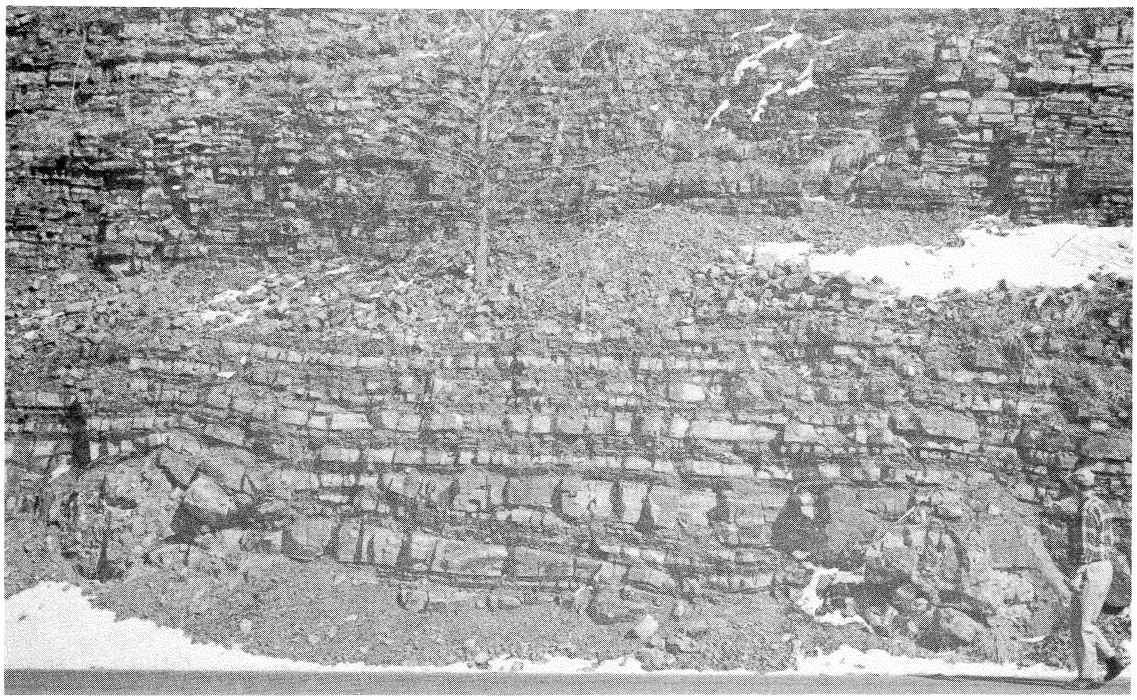


Figure 15. Stop 9. Interbedded micritic limestones and dark shales with soft sediment deformation features in the upper Fayetteville Shale.

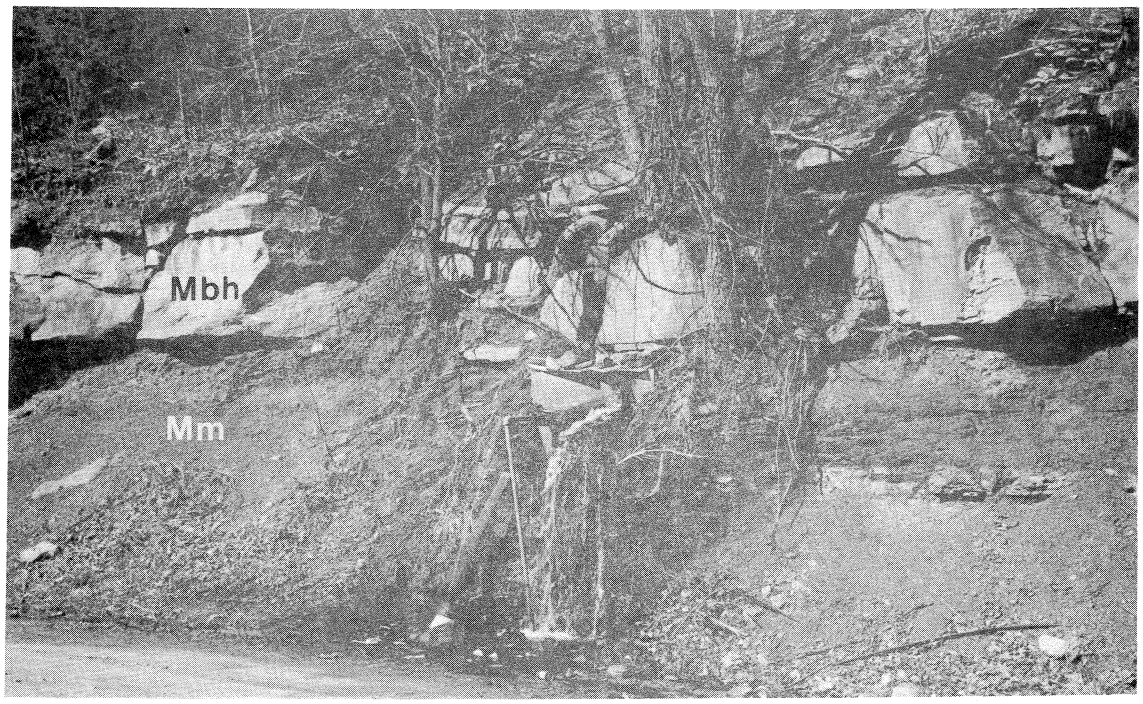


Figure 16. Stop 10. Contact between the Moorefield Formation (Mm) and the Batesville Sandstone (Mbh). Spring in the base of the sandstone is piped across the road for household use.

81.4 Boone Formation exposed.

82.8 Crossing fault downthrown to the north.

82.9 Outcrop of Batesville Sandstone to the north.

83.4 **STOP 10** — Newnata. Plate VI, Figure 16. This and the next outcrops across South Sylamore Creek are good exposures of the Moorefield Formation overlain by the Batesville Sandstone. The Moorefield Formation is a light gray, tan, or blue-black, fissile shale that is arenaceous in places. The Moorefield is best exposed near Batesville, Arkansas and absent west of St. Joe, Arkansas. The Batesville Sandstone is generally a medium-grained, buff to brownish sandstone exposed from western Arkansas to the Mississippi Embayment. It ranges in thickness from a feather edge in the west to over 200 feet in the east. Typically a spring has developed along the shale-sandstone contact. Watercress grows in the ditch, but when last sampled was somewhat bitter.

84.0 Moorefield Formation exposure.

84.1 Batesville Sandstone exposure.

85.9 Moorefield exposure.

87.7 Batesville exposures on both sides of the road.

91.0 Junction of Arkansas Highways 66 and 87. Continue on Highway 66.

91.2 Junction of Arkansas Highways 66 and 9. Downtown Mountain View, Arkansas. Continue on Highway 9 north, to the east.

91.9 Junction of Arkansas Highways 9 and 14, turn north (left).

92.8 Junction of Arkansas Highways 9 and 14 and the road to the Ozark Folk Center.

END OF FIELD TRIP!

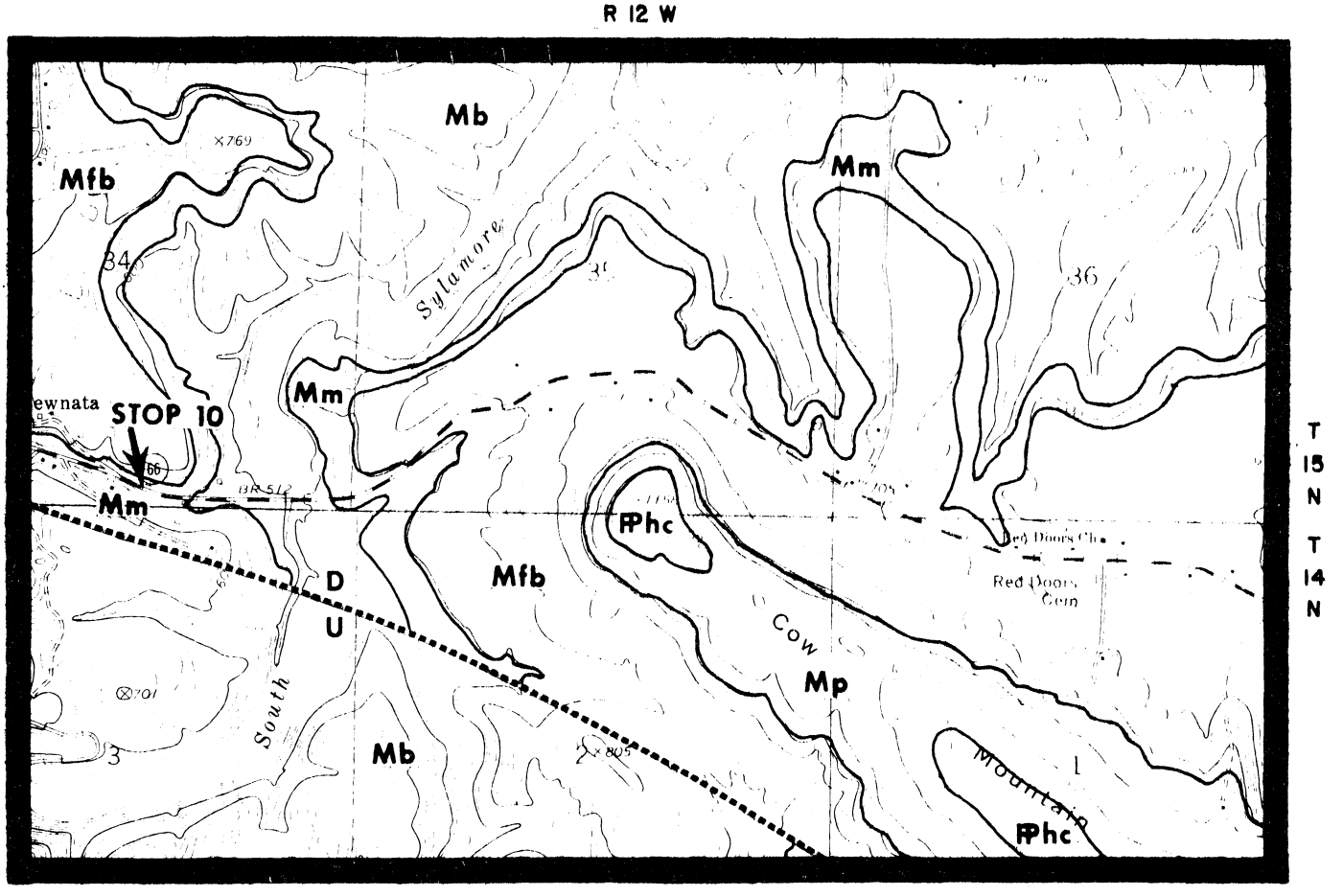


PLATE VI. STOP 10 - NEWNATA.

Geology by E. E. Glick

1000 0 1000 2000 3000 FEET

EXPLANATION

FPhc – Cane Hill Member - Hale Formation
Mp – Pitkin Limestone
Mfb – Fayetteville Shale - Batesville Sandstone
Mm – Moorefield Formation
Mb – Boone Formation

Blanchard Springs Caverns Stop

The first recorded account of 20th century man entering Blanchard Springs Caverns is given by Willard Hadley. He was a Forest Service recreation planner in 1934 when he explored the spring entrance to the point where the ceiling drops to within inches of the water level. A few days later he went down the natural entrance, a sinkhole that drops seventy feet to the stream that empties at Blanchard Springs.

In 1960 two other spelunkers, Hugh Shell and Hail Bryant, began more extensive exploration and mapped and photographed miles of cavern passages. As a result of their efforts, Half-Mile Cave's wealth of hidden dripstone treasures attracted wide attention. Their reports about the cave's outstanding room and formations aroused great interest within the Forest Service. Development of the caverns began in 1963. Shell and Bryant discovered the underground fantasyland that visitors view as they walk the Dripstone Trail.

There are certain facts about the caverns that you should know. Throughout the year, the temperature is a constant, cool 58 degrees, so a sweater or light jacket is always comfortable. Humidity is close to 100 percent. The senic tour covers seventenths of a mile in an hour and a half.

From the Dripstone Trail, you can enjoy practically every type of calcite formation found in limestone caves. Everything from delicate, hollow soda straws to massive flowstones and stalagmites. The trail takes you through two major rooms in the upper level of the cavern system. The Cathedral Room is long enough to hold three football fields and still have space left over. The many snow-white formations in the Coral Room are pure calcite, or calcium carbonate, the mineral that limestone is made of.

The limestone from which these incredibly varies formations develop was deposited during the Ordovician-Mississippian period of time. We can only speculate on how old the formations are. Take, for example, the impressive

Giant Column, which towers about seventy feet tall. It was probably formed by a stalactite, lengthening from the ceiling, and a stalagmite rising from the floor. No one knows how many thousands, hundreds of thousands, or millions of years it took for dripping water to deposit the calcite and other minerals that you see in the columns colors.

Depending on the amount of water that seeps into the caverns from the surface, formations sometimes grow as much as an inch or more in a few years. Or as little as a fraction of an inch in one hundred years. Or not at all during dry epochs.

A vast amount of dripstone is found in this portion of the caverns for two reasons. First, this section is higher than others, allowing air-chemistry changes which cause the dripstone to form. Then this portion is older than lower areas, giving the features more time to develop.

The all-inclusive name for cave formations is speleothems, cave deposits of every sort. The main mineral deposited in the speleothems of Blanchard Springs Caverns is calcite, the same mineral found in the limestone layers that make up the bedrock of the Ozarks Mountains.

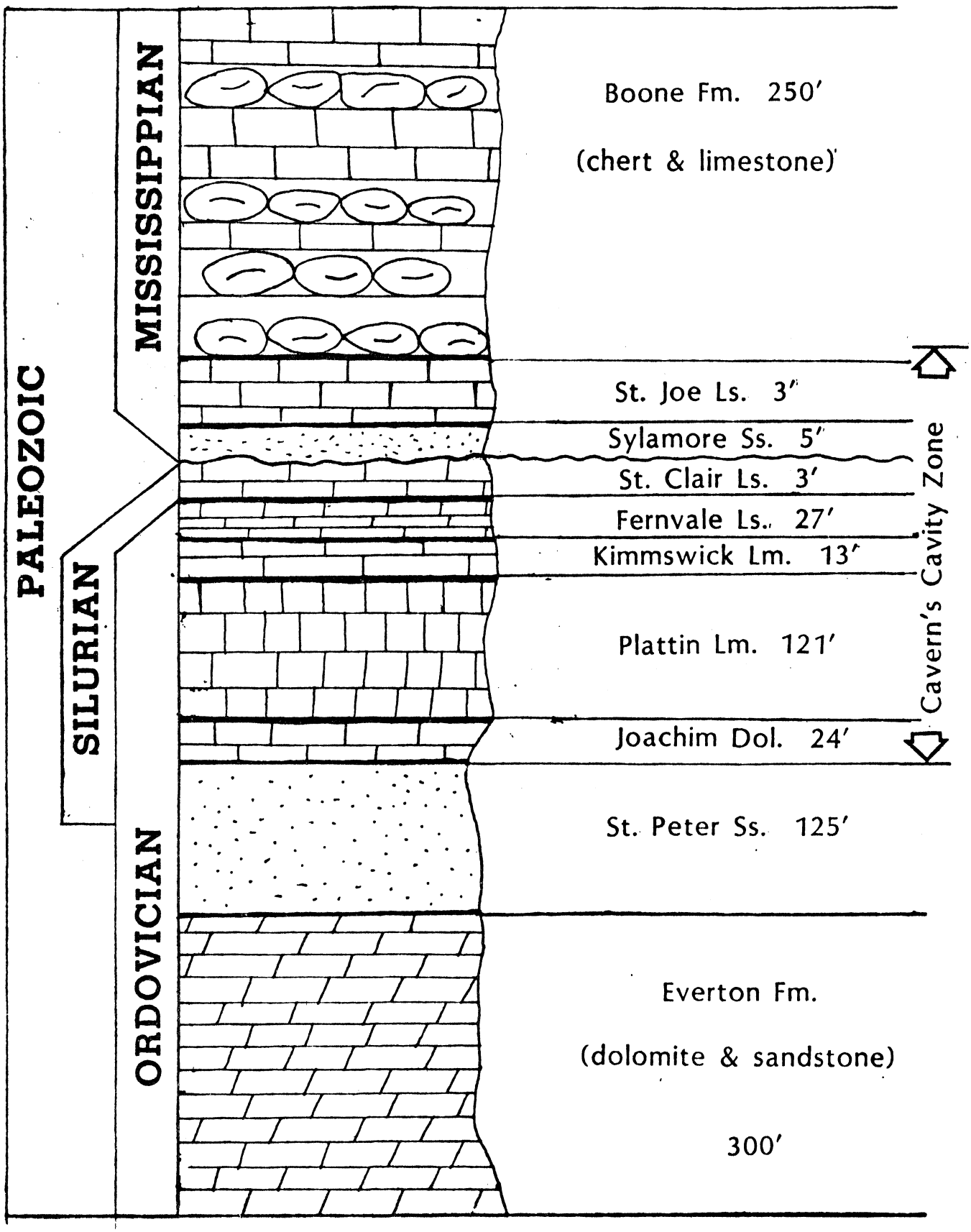
Calcite is dissolved from the limestone when surface water, containing carbonic acid absorbed from the air and soil, percolates down through the rock and into the cave. When this acid water -- carrying a calcium bicarbonate solution -- encounters the air inside the cave, the carbon dioxide is released. The water then deposits the calcite. Layer upon layer of calcite deposit will eventually shape the speleothem.

Many factors determine the shape that speleothems will take. How the acid water enters the caves -- by dripping, flowing, seeping, splashing -- and how it flows or stands after entering are just two of these factors.

Sometimes the calcite speleothems have pastel and earth colors, indicating that other minerals were deposited, continuously or at intervals. Iron oxides account for the shades of brown, yellow and red, while manganese gives shades of blue, black, and gray

BLANCHARD SPRINGS AREA

GENERALIZED GEOLOGIC COLUMN



(not to scale)