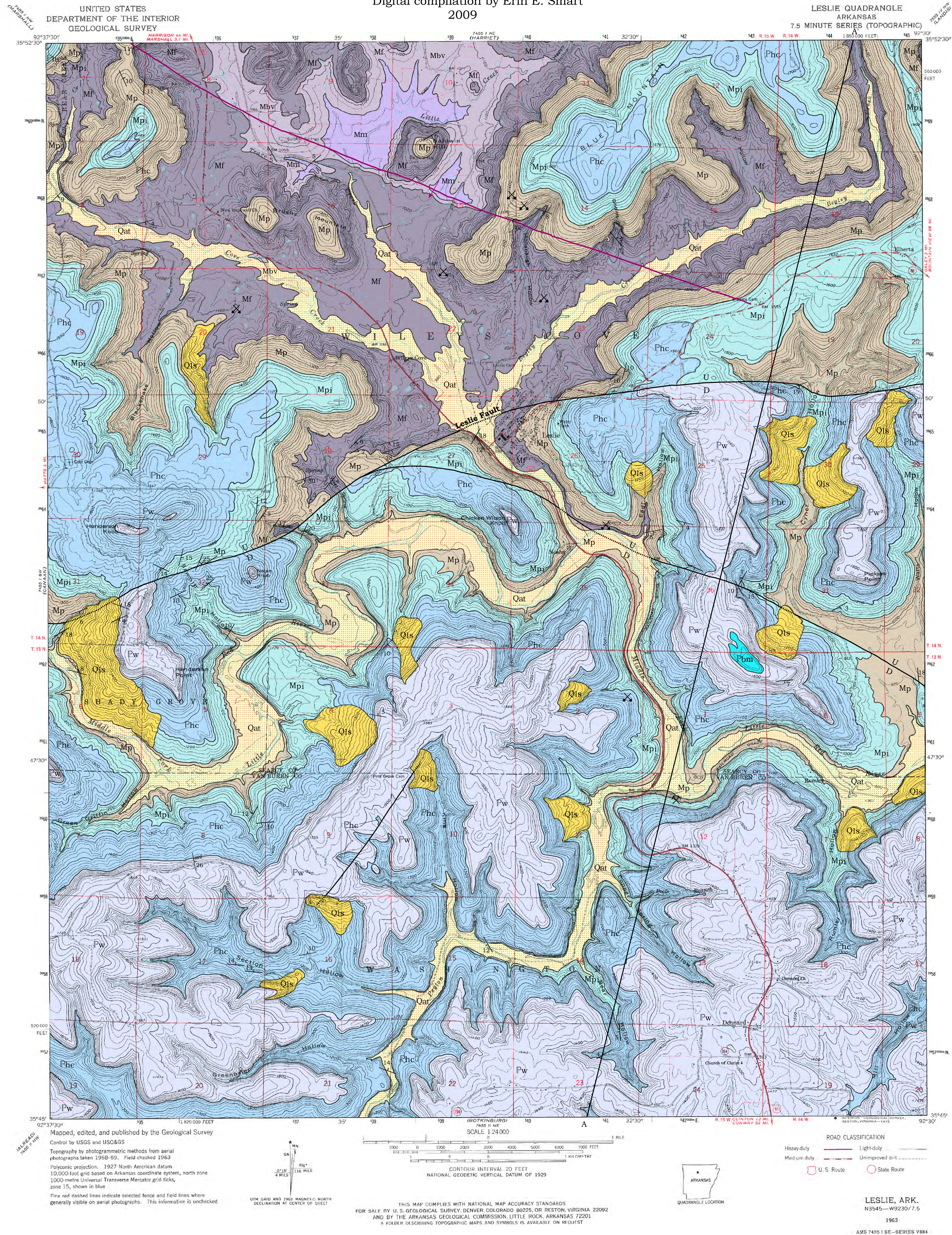
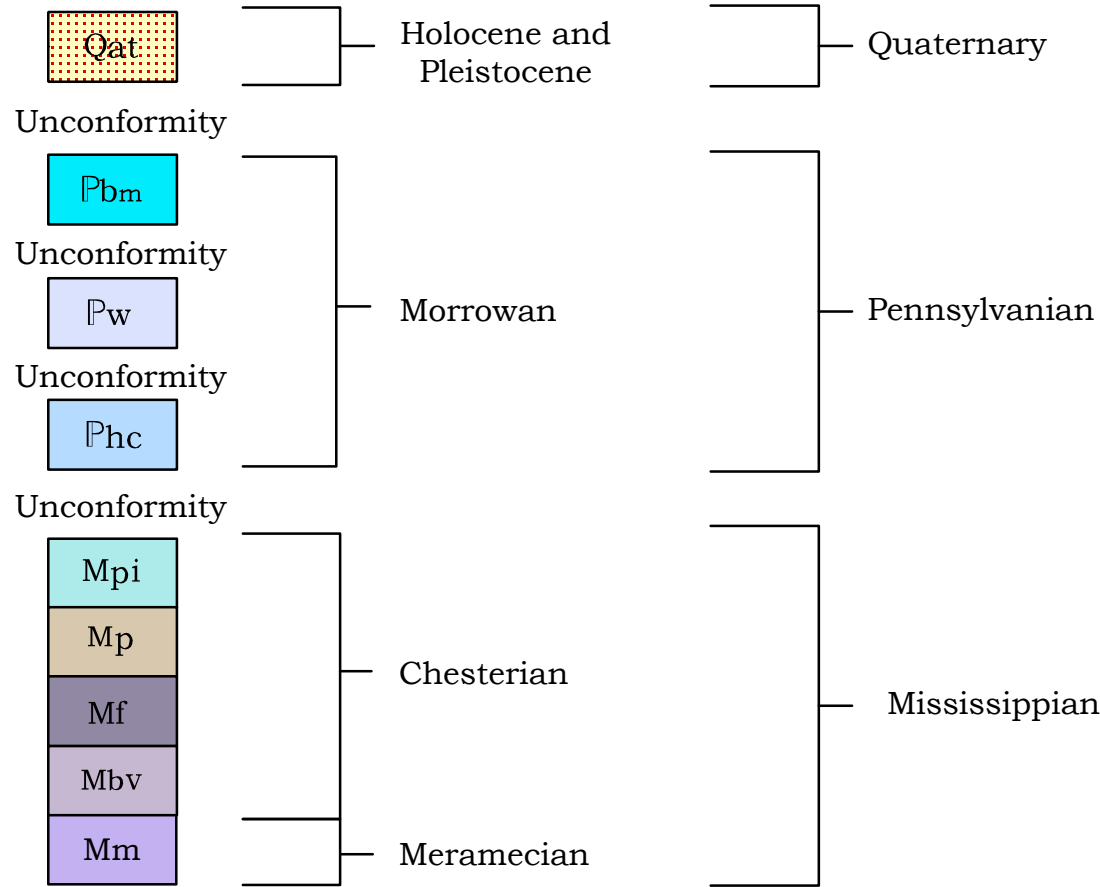


# GEOLOGIC MAP OF THE LESLIE QUADRANGLE, SEARCY AND VAN BUREN COUNTIES, ARKANSAS

Geology by Richard S. Hutto, Erin E. Smart and Daniel S. Rains  
Digital compilation by Erin E. Smart  
2009



## Correlation of Map Units



## Introduction

This map graphically summarizes the bedrock geology of the Leslie 7.5-minute quadrangle. In this area over 990 feet (299 meters) of Lower Mississippian to Lower Pennsylvanian carbonate and clastic sedimentary rocks are exposed. The mapped area lies on the northern edge of the Boston Mountains Plateau, the highest in a series of south-dipping plateau surfaces composed of progressively younger rocks in the Ozark Plateau Region.

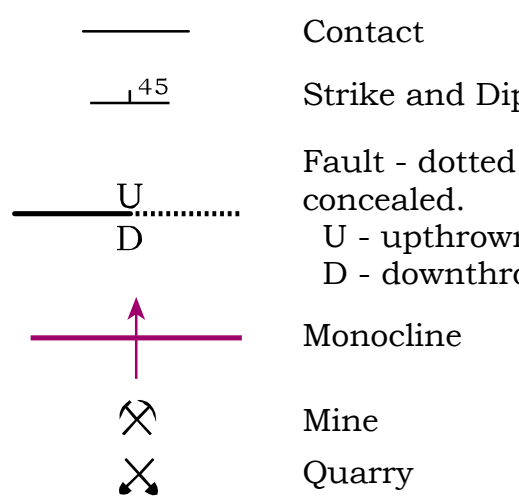
The major structure in this area is the Leslie Fault which runs the width of this map and beyond. It is a normal fault downthrown to the south that offsets the rocks from approximately 240-400 feet (73-122 meters) from west to east. A minor fault splays off of this fault to the southeast. The major drainage in this area is the Middle Fork of the Little Red River which flows southeast to Greers Ferry Lake.

The geology of this area was mapped in 1973 by Glick for the 1:500,000 scale Geologic Map of Arkansas. The current mapping builds on the previous work, but uses a revised stratigraphy and adds certain structural details. The contacts and structural features on the map were derived from field observations made from July 2008 through April 2009. Site locations were generated with the aid of a global positioning satellite receiver. Bedrock dipping at less than 2° was considered horizontal.

## Description of Map Units

- Qat Alluvium and terrace deposits (Quaternary)** - composed of unconsolidated clay, silt, sand and gravel deposited by major streams, including deposits on one or more terrace levels.
- Qls Landslide deposits (Quaternary)** - typically derived from Morrowan units, especially brecciated of thin-bedded, flaggy sandstone in the Cane Hill Member and undercutting of massive-bedded, blocky sandstone in the basal Wits Springs Formation. Primarily develop on the Morrowan shales and to a lesser extent on the Chesterian shales.
- Pbm Middle Bloyd sandstone** - a thin- to very thick, massive, cross-bedded sandstone. Grains are medium to very coarse, well-sorted, subangular to subrounded and silica- or iron-cemented. Fresh surfaces are white to buff or reddish to brownish-tan. Weathered surfaces are tan, gray or reddish to dark-brown. Typically contains well-rounded, milky quartz pebbles. Exhibits minor honeycomb weathering and lileegang banding. Unconformable with the Wits Springs below. Reaches a maximum thickness of approximately 60 feet (18 meters).
- Pw Wits Springs Formation (Lower Pennsylvanian, Morrowan)** - equivalent to the "lower part" of the Bloyd Formation below the "middle Bloyd sandstone" (Braden, et al., 2003; Smith, et al., 2007), and the Prairie Grove Member of the Hale Formation. Unconformable with the Cane Hill Member below, and in some places has obviously scoured into it. Total thickness ranges from approximately 200-220 feet (61-67 meters). Main body - primarily a very thin- to massive-bedded, very fine- to medium-grained, subangular to rounded, locally calcareous sandstone with some interbedded shale and siltstone. Fresh surfaces are orangey-brown to gray and weather gray to brown. Ranges from approximately 140-160 feet (43-49 meters) in thickness. Basal sandstone - typically a massive-bedded, blocky to concave-weathering, micaceous sandstone. Grains are fine to medium, poorly to moderately well-sorted and subangular to subrounded. May also be present as a package of stacked, thin- to medium, cross-bedded channel sands. Fresh surfaces are tan or dark-orange to brown, and weather dark-orange to brown or gray. Commonly contains small fossils and shale pebbles along bedding planes or external molds where they have weathered out. Honeycomb weathering and lileegang banding are present locally. Unit thickness ranges from approximately 40-60 feet (12-18 meters).

## Symbols



**Hale Formation (Lower Pennsylvanian, Morrowan)** - consists of two members: the Prairie Grove and the Cane Hill. Only the Cane Hill Member is present in this quadrangle. Rocks equivalent to the Prairie Grove Member are mapped with the Wits Springs Formation.

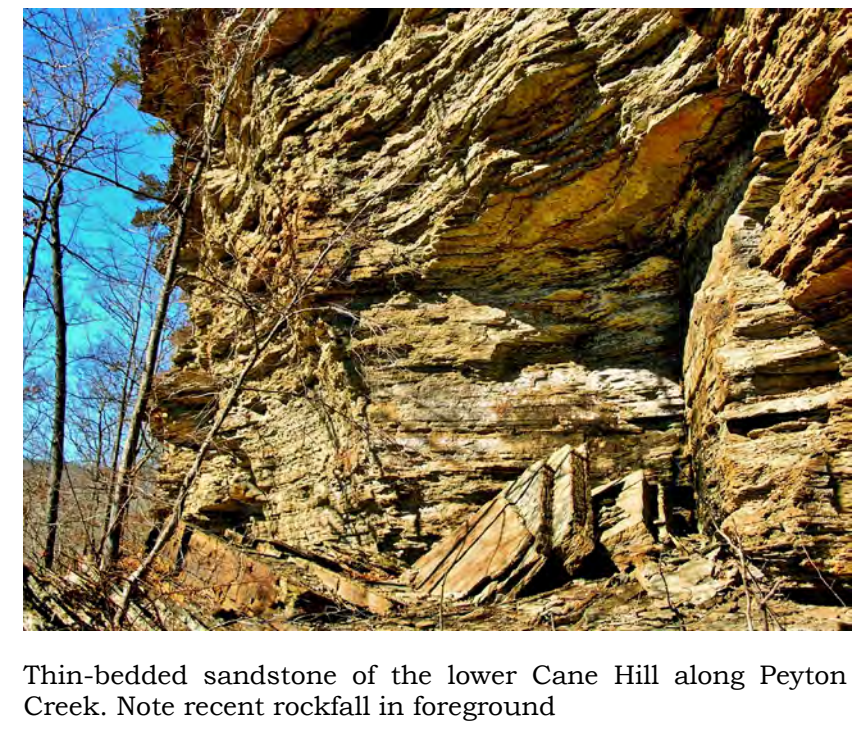
**Cane Hill Member** - typically a fossiliferous siltstone to clay shale that contains ironstone nodules and discontinuous, thin-bedded, limonitic siltstone that weathers to form boxworks. Fresh exposures are dark-gray to black, and weather tan to light-orange-brown. Units of very thin- to thin-, ripple-bedded, very fine- to fine-grained, micaceous siltstone with shale partings are present throughout the Cane Hill. On the east side of the quadrangle, these sandstone units are increasingly dominant. Near the base is an especially competent sandstone unit that is typically light- to dark-gray on fresh surfaces, and weathers tan or dark-gray to dark-brown. It ranges from approximately 40-80 feet (12-24 meters) in thickness, and erodes to form a thick, flaggy colluvium that is commonly collected for building stone. At the lower contact, a discontinuous, orangey-brown, limonitic shale-pebble conglomerate is present that is approximately 12-36 inches (30-91 centimeters) thick. Unconformable with the "Imo shale" below. Ranges from approximately 200-340 feet (61-104 meters) in thickness.

**Pitkin Formation (Upper Mississippian, Chesterian)** - informally divided into two members, the Pitkin Limestone and the "Imo shale". Lower contact of the "Imo" placed at the top of the final limestone bed in the Pitkin, and upper contact placed below the base of a competent, very thin- to thin-, ripple-bedded, siltstone sandstone that is the first recognizable unit in the Cane Hill Member (Smith, et al., 2007).

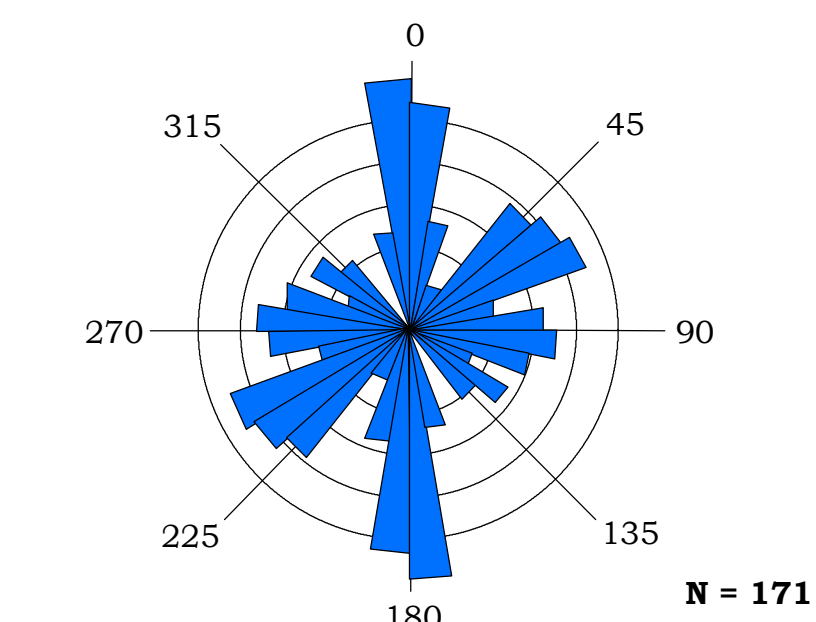
**Imo shale (Upper Mississippian, Chesterian)** - consists of several shale units with intervening sandstone units. The lowest unit is a light-gray, calcareous or dark-gray, non-calcareous, fossiliferous shale with interbedded, discontinuous sandstone and limestone. This limestone commonly takes the form of small, yellowish, platy concretions encrusted with fossils, especially *Chonetes*, or light-gray, lenticular, septarian concretions. Locally, loosely accreted, clear-sized, crinoid stems weather out. Above this shale is a persistent, fine- to medium-grained, thick to massive, and locally cross-bedded sandstone. Fresh surfaces are buff to tan and locally mottled or banded with dark-red iron blebs. Weathers dark-orange-brown to gray and blocky. Commonly exhibits pronounced stylolites, lileegang banding, and honeycomb weathering. Locally, a sandy fossiliferous limestone caps the unit. Unit thickness ranges from approximately 15-40 feet (5-12 meters). Above this sandstone is a fossil-bearing, dark-gray to black, fossiliferous shale. Fossils are abundant and include bivalves (commonly *Myolites*), cephalopods (commonly *Nautilus*), solitary corals (commonly *Rugosa*), crinoids, brachiopods, gastropods, trilobites, and plant material. Typically contains lenticular, orange to dark-colored fossiliferous limestone tempestites, rounded, non-fossiliferous ironstone concretions, and secondary, fibrous calcite partings. Additional discontinuous, thin-bedded sandstone and limestone beds are interbedded within this upper shale unit. The limestone beds are dark-gray on fresh surfaces, and weather dark-red. They are fine- to coarse-grained, oolitic and fossiliferous. Conformable with the underlying Pitkin. Ranges from approximately 100-160 feet (30-49 meters) in thickness.

**Pitkin Limestone (Upper Mississippian, Chesterian)** - a thin- to very thick, massive-bedded, fine- to coarse-grained, locally oolitic, fossiliferous limestone. Contains abundant fossils including crinoid fragments, the bryozoan *Archimedes*, corals, nautilus, brachiopods, gastropods, and trilobites. Fresh surfaces are light- to dark-gray, and usually weather light- to medium-gray. Grades to a tan color near the upper contact due to an increase in silt content. Commonly has a petrolierous odor when freshly broken. About half way up the section, there is a black shale interval that typically forms a bench. Conformable with the underlying Fayetteville Shale. Ranges from approximately 160-240 feet (49-73 meters) in thickness.

**Mf Fayetteville Shale (Upper Mississippian, Chesterian)** - a black, fossiliferous shale which is increasingly dominated by thin- to medium-bedded, dark-gray, micritic to finely crystalline limestone in its upper part. The shale forms only very thin partings between the beds of micritic limestone near the contact with the overlying Pitkin Limestone. Also near the upper contact, nodular or discontinuous, thin-bedded black chert is commonly present. The micritic beds usually have a petrolierous odor when broken, and are sparsely fossiliferous. Septarian concretions are common in the upper part, but isolated zones may be found in the lower, shaly part. Conformable with the underlying Batesville Sandstone. Ranges from approximately 180-200 feet (55-61 meters) in thickness.



## Joint Frequency



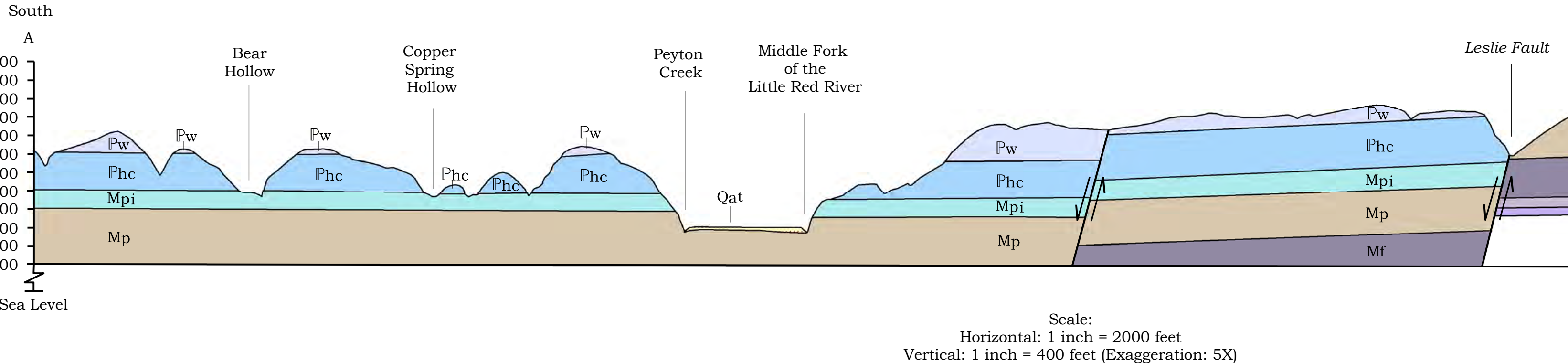
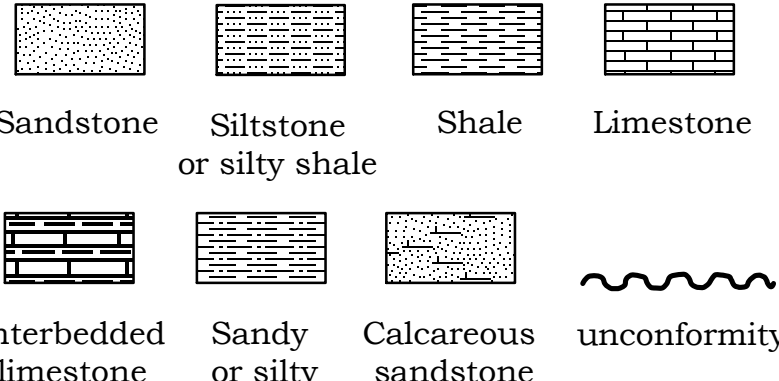
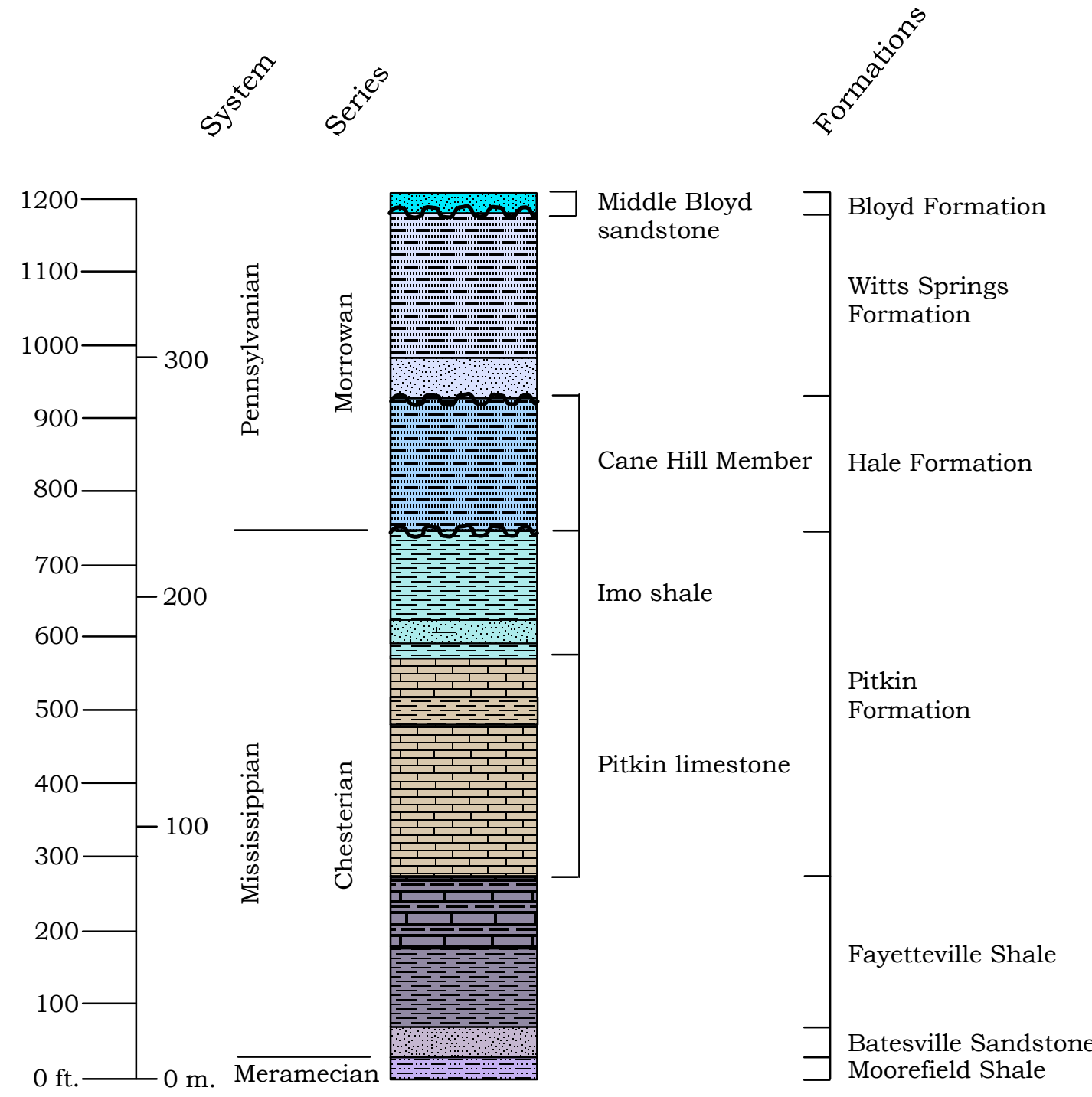
**Mbv Batesville Sandstone (Upper Mississippian, Chesterian)** - a thin- to medium- and locally cross-bedded sandstone. Grains are very fine to medium, moderately well-sorted, subangular and carbonate-cemented. Fresh surfaces are dark-gray to dark-brown and weather reddish-brown or tan to buff. Rarely fossiliferous, but locally contains external molds where fossils have weathered out. Conformable with the underlying Moorefield Shale. Ranges from approximately 60-80 feet (18-24 meters) in thickness.

**Moorefield Shale (Upper Mississippian, Meramecian)** - a siltstone with interbedded very thin- to thin-bedded siltstone. Shaly zones are usually dark-gray to black on fresh surfaces, but weather medium-gray to yellowish-brown. Siltstone is dark-gray to dark-brown on fresh surfaces, but weathers light-gray to buff. Unconformable with the Boone Limestone below. Reaches a maximum exposure of approximately 50 feet (15 meters).

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## Stratigraphic Column



LESLE, ARK.  
N3945—W9230/7.5  
1963  
AMS 7499 | SE-SERIES Y884

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