FAULTING IN THE POMONA AREA, JACKSON COUNTY, ILLINOIS

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Introduction

Location and geologic relationships.—The Pomona Area is near the Union-Jackson County line in the Shawnee Hill section of southwestern Illinois on the southern edge of the Illinois Basin (Fig. 1). The rocks of the area belong to the Chesteran Series of Late Mississippian age and to the Caseyville group of Early Pennsylvanian age. A major unconformity marks the Mississippian-Pennsylvanian contact throughout the region and is locally an angular relationship.

Structurally the Pomona Area is complex. The major structural features are apparently related to the Rattlesnake Ferry Fault (Ste. Genevieve Fault) which is about two miles south of the area studied. This large fault was active in the post-Chesteran — pre-Pennsylvanian interval and during post-Pennsylvanian time (Weller, 1940:51). The strata studied appear to have been strongly affected by fault activity in both post-Chesteran—pre-Pennsylvanian and post-Pennsylvanian time.

Previous investigations in the area.—Preliminary areal geologic maps and structural geologic maps of the Pomona Area have been compiled in the past by the following men: St. Clair, 1916; Ekblaw, 1925; Weller, Ekblaw, and Savage, 1940.

The pertinent literature and maps published in the past were carefully examined and field re-examination of the mapped area was made. In some places interpretations differ from those made prior to this investigation.

Field work for this investigation was begun in the fall of 1956 and continued throughout the winter of 1957, as part of a mapping project being conducted by the Geology Department of Southern Illinois University in cooperation with the Illinois Geological Survey. The area was carefully covered on foot in an effort to search out every outcrop, and thus compile a detailed geologic map.

Dating of Strata

Repetition of lithologically similar sediments imposes some difficulty in the proper identification of stratigraphic units (Table 1). The absence of good "marker beds" has necessitated analysis of gross lithologic aspects and stratigraphic relationships and the use of ostracodes as index fossils to establish the true age of the strata in the area. The ostracodes were collected from the shales and weathered limestones of the Kinkaid and Clore formations where they were available. Identification of ostracodes was based on "Chester ostracodes of Illinois" (Cooper, 1941).

TABLE 1.—Geologic Column of the Pomona Area.

		Formations	Thickness in feet	Lithology
Pennsylvanian	Caseyville Group	Drury shale, sandstone....	70-100	sandstone and shale; interbedded
		Lick Creek sandstone.....	40-100	sandstone; massive, conglomeratic
		Wayside shale, sandstone..	0-60	sandstone; fine-grained, thin-bedded; locally absent
		Unconformity--		
Mississippian	Chester Series	Kinkaid limestone.....	0-70	limestone; massive, cherty, fossiliferous; locally absent
		Degonia sandstone.....	40-100	sandstone; massive, thin-bedded
		Clore formation.....	20-65	shale; calcareous; and limestone; dark, dense, fossiliferous
		Palestine sandstone.....	20-30	sandstone; thin -bedded
		Menard formation.....	30-60	limestone and shale; interbedded, fossiliferous
		Waltersburg sandstone....	.....	(not recognized in area)

Locally, the alteration of Chester limestones adjacent to fault planes results in lithologic changes and faunal deformation that make age determinations difficult.

Some of the apparent differences between the Chester and Caseyville sandstones are: 1) the Lick Creek sandstone is locally conglomeratic and generally coarser than the Palestine and Degonia sandstones; and 2) the Wayside member differs from the Degonia sandstone in being locally more argillaceous, somewhat thinner-bedded, and less resistant to weathering, and commonly contains plant fossils replaced by marcasite.

EVIDENCE OF FAULTING

A number of criteria were used in establishing the existence of the faults in the area. Some of these were: repetition of beds, slickensides, non-conforming dips of adjacent strata, age differences of adjacent beds, and direct observations of the fault-plane itself. The fault-plane is not commonly observed, but in the first railroad cut about one and one-half miles south of Pomona a fault-plane may be seen in the Degonia sandstone. In the W. ½ of sec. 29 the bluff is composed of Degonia sandstone whereas eastward at the same elevation on the opposite valley wall the bluff consists of Lick Creek sandstone (Fig. 3). In the S.E. ¼, sec. 32, repetition of beds can be seen in the east-flowing stream bed. Degonia strata are strongly slickensided in the N.W. ¼, sec. 33 where the formation is exposed on the hillside east of the road. Non-conforming dips of adjacent strata may be seen in the second railroad cut about two miles south of Po-

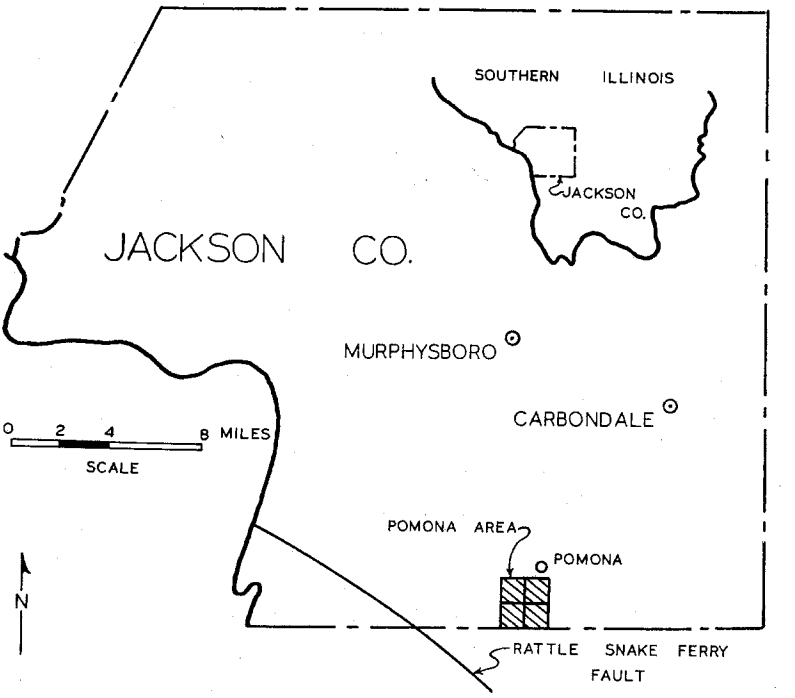

FIG. 1.—Index map of Pomona area.

mona. Here, strongly dipping Chester strata are subjacent to undisturbed Wayside shale and sandstone.

AGE OF FAULTING

The age of some of the faulting in the Pomona Area has previously been considered as post-Chesteran—pre-Pennsylvanian (Weller and Ekblaw, 1940: 26). Although post-Chesteran—pre-Pennsylvanian faulting is important, field evidence shows that considerable post-Pennsylvanian faulting exists in the immediate vicinity of Pomona. Post-Chesteran—pre-Pennsylvanian faults are considered to be those involving Chester strata but not the overlying undisturbed Caseyville rocks.

Study of the area revealed 28 normal faults. A total of 16 faults proved to be post-Pennsylvanian in age, 8 of post-Chesteran—pre-Pennsylvanian age, and the age of 4 has not been determined (Fig. 2). Some of the faults show evidence suggesting two periods of movement: post-Chesteran—pre-Pennsylvanian and later post-Pennsylvanian displacement. Strata on the opposite sides of the fault-plane dip in different directions. In some faults these displacements appear to have been in opposite directions. The pre-Pennsylvanian faults evidently served as weakened planes along which subsequent movements occurred in post-Pennsylvanian times.

The areal pattern of the faults

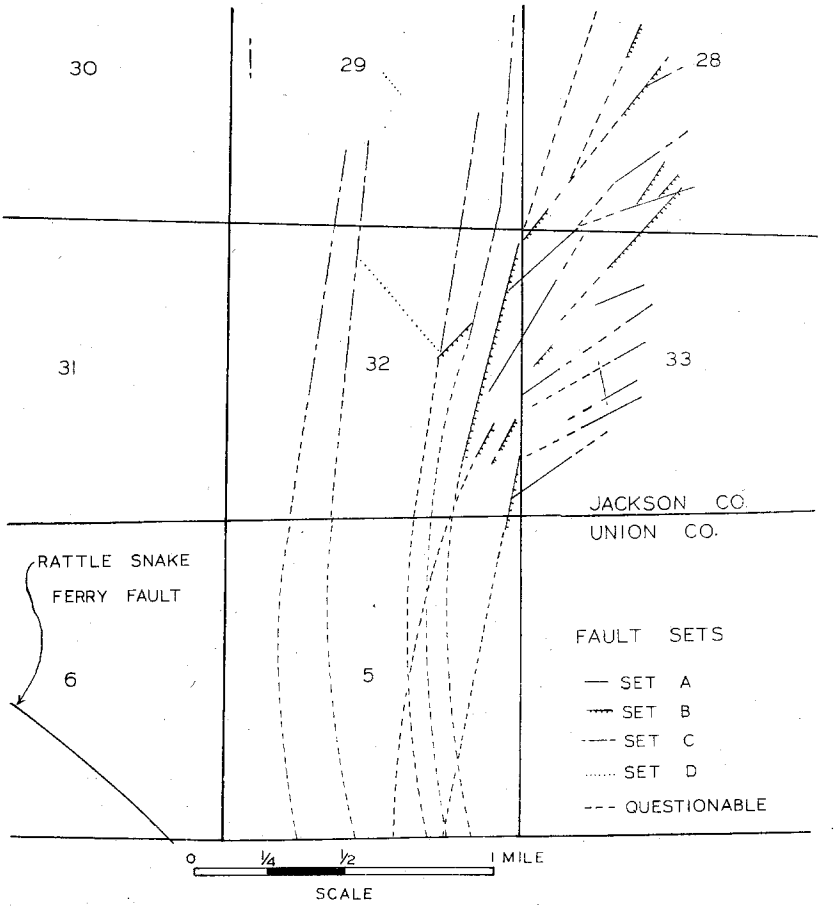

FIG. 2.—Areal pattern of faults in Pomona area.

suggests that both periods of faulting were a result of similarly oriented stresses (Fig. 2). Most of the post-Chesteran — pre-Pennsylvanian faults are open in nature, not having been sealed during or after the movement. Inasmuch as pre-Pennsylvanian faults would be planes of weakness, the pattern of the post-Pennsylvanian faults would probably not indicate proper stress orientation. Rather they would be pre-determined by the post-Chesteran—pre-Pennsylvanian structure. Thus, the areal pattern of the post-Pennsylvanian faults may not be a valid criterion for establishing post-Pennsylvanian orientation of stresses.

FAULT PATTERN

The faults of the area can be grouped into four sets, designated A, B, C, and D to facilitate discussion (Fig. 2). Set A consists of 10 faults which strike N.50-73°E. A total of nine faults (striking

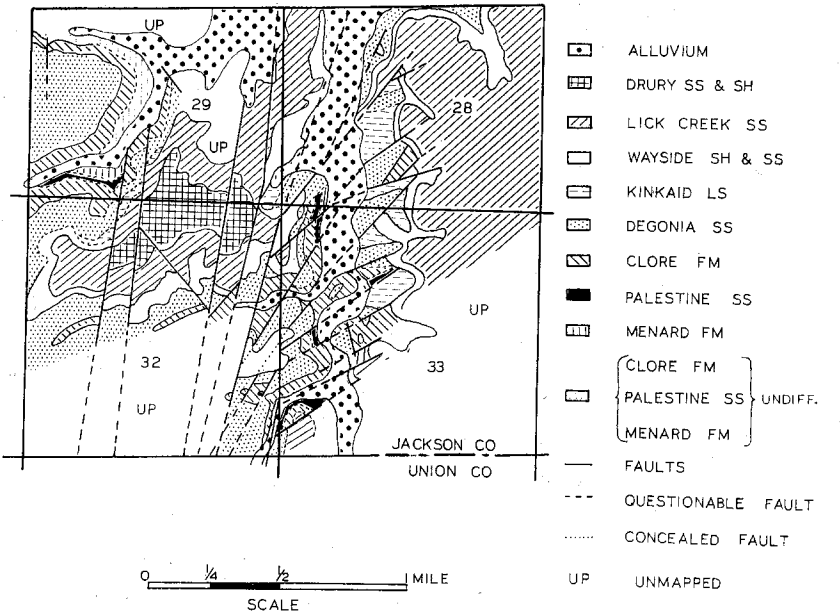

FIG. 3.—Areal geologic map of Pomona area.

N.25-43°E.) belong to set B. Set C includes seven faults which strike N.10-17°E. and two faults (striking N.39-40°W.) comprise set D.

The faults of set A have a maximum displacement of approximately 100 feet and average about 40 to 50 feet. The faults of this set are shorter than those of the other sets. The ten faults in this set have a mean direction of N.60°E. Of these ten faults, six are post-Pennsylvanian age, three pre-Pennsylvanian age, and one of an age which has not been determined.

The faults of set B have a maximum displacement of about 125 feet based on stratigraphic relationships, and average 40 to 60 feet displacement. These faults are longer than those in set A but shorter than in set C. This set has more post-Chesteran — pre-Pennsylvanian faults than any other. Of the nine faults in this set, five are of post-Chesteran—pre-Pennsylvanian age and four are post-Pennsylvanian in age. Their mean strike is N.34°E.

Set C consists of seven faults, five of which have considerable length. These are expected to be continuous southward, and they probably intersect the Rattlesnake Ferry Fault. The fault with a direction of N.17°E. is known to be continuous along its strike from the Union-Jackson County line in the SE. ½ sec. 32 northward through the town of Pomona. In this set, five of the faults are of post-Pennsylvanian age and two are of an age not determinable. The maximum displacement of these faults is approximately 100 feet; their average displacement is 50 feet. The mean strike of this set is N.50°E.

Set D comprises two faults, one with a strike N.40°W. and the other with a strike N.39°W. The fault with the greatest strike extent is of post-Pennsylvanian age. The age of the smaller fault is not determinable because it involves only Chesteran strata, and Pennsylvanian rocks are absent. The maximum displacement on each fault does not exceed 60 feet, and their minimum displacement is approximately 30 feet.

Conclusions

1. There have been at least two periods of faulting in the Pomona area—one of Post-Chesteran—pre-Pennsylvanian age, the other of post-Pennsylvanian age.

2. Post-Pennsylvanian faults are numerous in the Pomona area.

3. The areal fault pattern is not a valid criterion for establishing the orientation of the stresses which resulted in the post-Pennsylvanian fault pattern.

4. Subsequent movement along post-Chesteran —pre-Pennsylvanian faults occurred in post-Pennsylvanian time.

5. The structure of the Pomona area appears to be related to the Rattlesnake Ferry Fault. However, confirmation of this conclusion awaits additional studies in the region south of the Pomona area.

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