STRATIGRAPHIC ASPECTS OF THE CASEYVILLE GROUP IN THE VICINITY OF POMONA, JACKSON COUNTY, ILLINOIS

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INTRODUCTION

The area studied in this investigation is situated along the margin of the Caseyville (basal Pennsylvanian) outcrop area in extreme southwestern Illinois (Fig. 1). In this report some stratigraphic aspects of the Caseyville rocks which are well exposed in the area and certain relationships of pre-Pennsylvanian channel development which have not been considered heretofore will be pointed out.

Part of the field work for this investigation was conducted between the fall of 1957 and the summer of 1958 as part of a mapping project in cooperation with the Illinois State Geological Survey. It is based on detailed field study and detailed geologic sections. The author is solely responsible for the opinions and conclusions expressed herein.

STRATIGRAPHY AND STRUCTURE

The study area is underlain dominantly by strata of Caseyville age

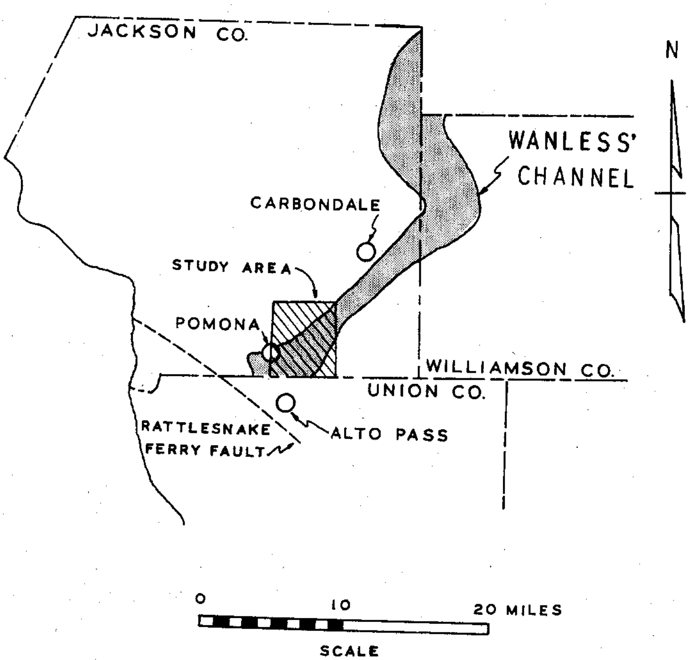

Fig. 1.—Index map of study area showing Wanless' channel.

TABLE 1.—Geologic column in Pomona and vicinity.

System	Group/Series	FORMATIONS	Thickness in Feet	LITHOLOGY
PENNSYLVANIAN SYSTEM	CASEYVILLE GROUP	POUNDS SANDSTONE (LOWER MAKANDA)	90–130	Sandstone, massive, cross-bedded, locally contains quartz pebbles.
		DRURY SHALE AND SANDSTONE	80–120	Shale and sandstone; carbonaceous shale, fine-grained sandstone, shale-pebble conglomerates.
		BATTERY ROCK SANDSTONE (LICK CREEK)	90–110	Sandstone, massive, cross-bedded, locally contains quartz and chert pebbles.
		LUSK FORMATION (WAYSIDE SHALE AND SANDSTONE)	30–60	Sandstone and shale; thin-bedded and fine-grained sandstones, arenaceous shale.
		UNCONFORMITY		
MISSISSIPPIAN SYSTEM	UPPER CHESTER SERIES	KINKAID LIMESTONE	0–70	Limestone, massive, cherty, fossiliferous; locally absent.
		DEGONIA SANDSTONE	40–80	Sandstone, massive and thin-bedded.
		CLORE FORMATION	20–70	Shale and limestone; calcareous shale; dark, dense, limestone, fossiliferous.
		PALESTINE SANDSTONE	20–30	Sandstone, thin-bedded, fine-grained.
		MENARD LIMESTONE	60–100	Limestone and shale, interbedded, fossiliferous.

which consist of interbedded sandstone and shale and include those superjacent to Chester strata and below the top of the Pounds sandstone (Table I). All of the Caseyville units discussed in this report were recognized by Lamar (1925, pp. 83-84).

Although it is not the purpose of this paper to discuss the structure of the area, a brief summary of it is necessary because it locally complicates the stratigraphy and both must be interpreted simultaneously.

Faults (Fig. 2) of both pre-Pennsylvanian and post-Pennsylvanian ages are common in the area and are numerous in secs. 28 and 33, T. 10 S., R. 2 W. (for greater detail see Desborough, 1957). In these two sections the pre-Pennsylvanian faulting is very complex, with tilted pre-Pennsylvanian strata truncated by basal Pennsylvanian sediments at a

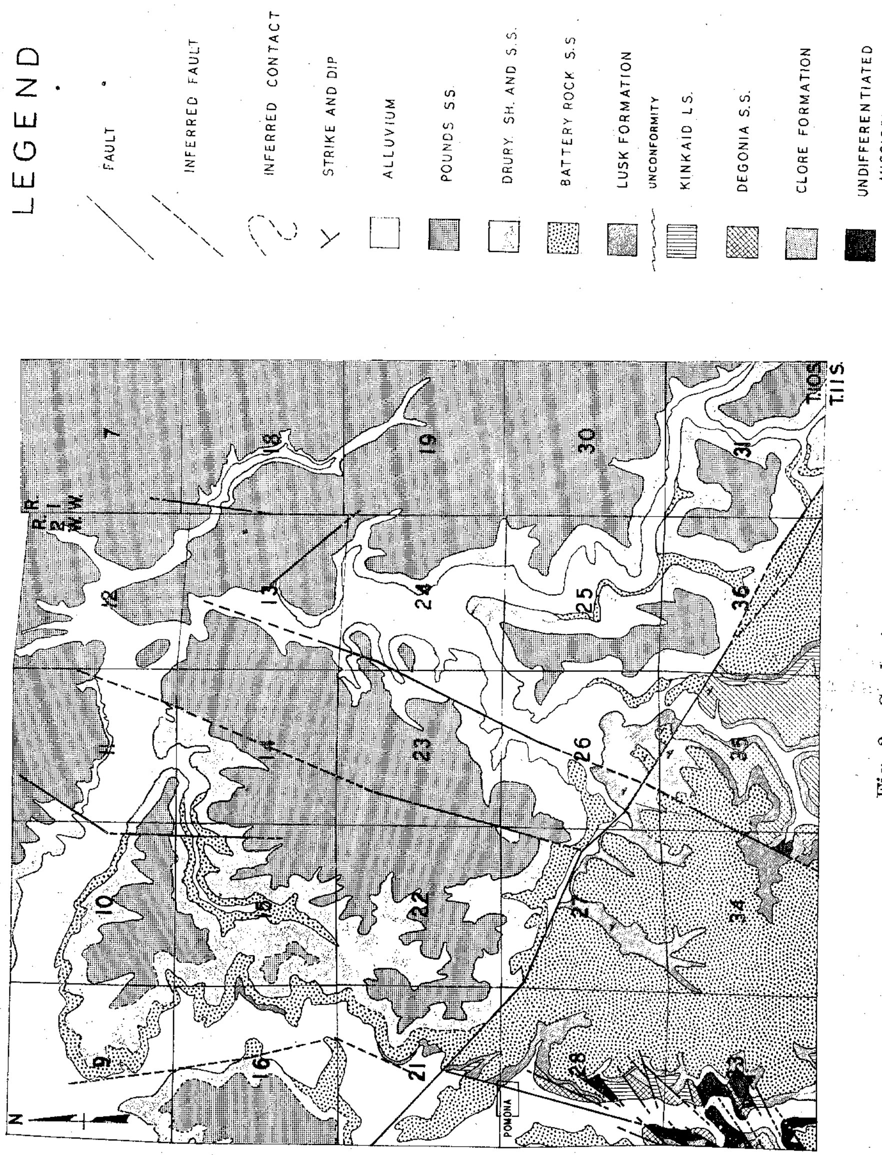

Fig. 2.—Geologic map of study area.

conspicuous angular unconformity that is not very irregular if post-Pennsylvanian faulting is disregarded. Post-Pennsylvanian faults may be more common than illustrated because the similarity of the Caseyville sediments makes it difficult to recognize faults in them.

The major fault which strikes N 40-60°W is important because it tends to obscure the thickness of the lower Caseyville and upper Chester sediments. This fault has recently been traced almost nine miles along its strike. The displacement is greatest northwest of Pomona where the Degonia sandstone on the south side of the fault lies adjacent to the Pounds sandstone on the north. The displacement decreases southeastward.

Certain inconsistencies in the apparent displacement along some of the faults are attributed to two movements along the same fault plane; one during pre-Pennsylvanian, the other during post-Pennsylvanian time. Evidence indicates that in some cases these two movements were in opposite directions (Desborough, 1957, p. 201).

Lusk Formation

This formation is represented by a sandstone which is the lowest Pennsylvanian formation in the area. It is the equivalent of Lamar's Wayside sandstone and shale (Lamar, 1925, p. 84). It rests unconformably upon the Kinkaid limestone where the latter has not been removed by post-Mississippian — pre-Pennsylvanian erosion. The unconformable relationship between the Lusk and the Kinkaid limestone is well exposed northeast of Pomona in the major stream in the SW¼ SE¼ sec. 21, T. 10 S., R. 2 W. The Lusk-Battery Rock sandstone contact is exposed in the road cut about one-tenth of a mile east of Pomona.

In this area the Lusk formation is typically a fine-grained, thin-bedded micaceous sandstone in which thin shale beds are locally developed. Although it is somewhat carbonaceous in character, no laterally persistent coal beds have been found. Massive beds of medium-grained, poorly sorted, conglomeratic sandstone less than 10 feet thick are found as lenses which are apparently local. One of these beds is exposed along the stream in the SW¼ SE¼ sec. 21, T. 10 S., R. 2 W. The cementing material of the Lusk sandstone consists primarily of authigenic quartz which gives the rock a quartzitic fracture. An argillaceous matrix is common and one thin bed of medium-grained sandstone has a calcareous matrix and contains interstitial pyrite in the form of subhedral crystals and massive disseminated pyrite. Color varies from white, pale yellow, brown, to gray on both outcrop and fresh fracture. Most of the thin beds contain well-sorted quartz grains, in contrast with the poorly-sorted massive beds. Ripple marks are common and the current type is dominant.

Plant fossils are replaced by marcasite or represented by impressions in the sandstone and are thus poorly preserved. They are most abundant along the stream in the NE¼ sec. 28, T. 10 S., R. 2 W.

The thickness of the Lusk sandstone varies slightly in the Pomona area due to the irregularity of the

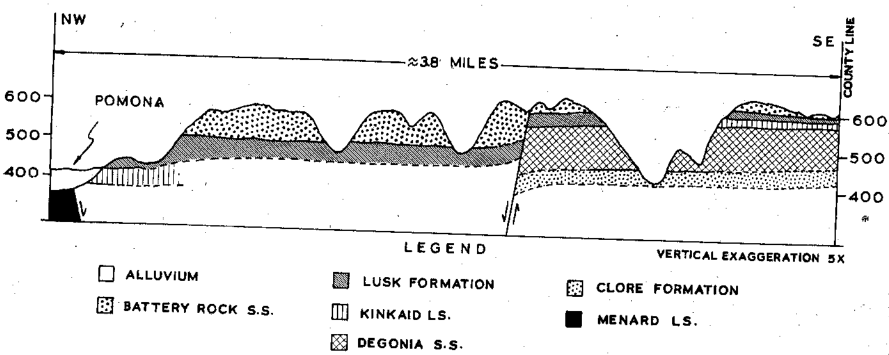

Fig. 3.—Cross-section from Pomona southeastward to the south side of sec. 36, T. 10 S., R. 2 W.

post-Mississippian — pre-Pennsylvanian erosion surface. The maximum thickness may exceed 60 feet. A good exposure of Lusk sandstone is found along the stream in the SW¼ SE¼ sec. 21, T. 10 S., R. 2 W.

In the stream bed of Topping Creek in the SW¼ SE¼ sec. 27, T. 10 S., R. 2 W., an arenaceous, ferruginous, limestone conglomerate is exposed. Due to slumping of the hillside, the thickness is undeterminable, but a bed one foot thick is exposed. The stratigraphic position of this unit is difficult to establish because a major fault (strike NW-SE) is situated a few hundred feet to the north of the exposure; however, stratigraphic relationships in the vicinity of the exposure indicate that the conglomerate is in the Lusk formation, perhaps the lower part. Large blocks of conglomeratic sandstone, similar to the Battery Rock, have slumped from the hill above and have come to rest near the limestone conglomerate.

The lithologic character of this limestone conglomerate is not like any rock-type recognized in the area. The matrix consists of arenaceous limestone, with subordinate crystalline limestone and calcareous, micaceous sandstone. The fragments are composed of dense limestone, ironstone and marcasite concretions, fine-grained, calcareous sandstone, chert pebbles, carbonized and silicified plant remains, coal, small quartz pebbles, and pale green discoidal clay inclusions, in order of abundance. The rock is well-cemented and resistant, and weathers with a knobby surface. Plant remains and one unidentifiable coral (solitary type) are the only fossils which have been recognized.

Excepting the chert and quartz pebbles in the conglomerate, the fragments are not appreciably rounded. Many of the larger fragments exceed three inches across and have an irregular shape. These characteristics imply that most of the heterogeneous rock was locally derived from pre-existing upper Chester strata. This conclusion is consistent with the findings of Siever

(1951, p. 548) who discussed a similar lithologic type.

Battery Rock Sandstone

This stratigraphic unit consists of medium-grained sandstone which is locally conglomeratic. It may be considered an orthoquartzite. Typically it is a massive, cross-bedded sandstone which forms prominent bluffs. It is the equivalent of Lamar's Lick Creek sandstone (1925, p. 85). A good exposure of the Battery Rock sandstone may be observed along the east valley-wall of Cave Creek north of Pomona where the resistant unit forms prominent cliffs and bluffs.

Both chert and quartz pebbles compose the conglomeratic elements of this sandstone. Along the base of the Battery Rock bluff about one-fifth of a mile northwest of Pomona, and east of the Gulf, Mobile and Ohio Railroad, chert pebbles as large as two inches in diameter have been found. This conglomeratic nature is not persistent, however, and for the most part the Battery Rock sandstone is not conglomeratic.

Cross-bedding and ripple marks are common features of the Battery Rock sandstone and the former feature is quite characteristic when contrasting this unit with the Drury sandstone above and the Lusk sandstone below.

Argillaceous material of primary origin is not common, although thin lenses of arenaceous shale were observed in the SW¼ sec. 21, T. 10 S., R. 2 W. Mica is generally rare and dark minerals are seldom conspicuous. Lithologically the Battery Rock sandstone is a clean quartzose sandstone in which secondary overgrowths are prominent in thin sections. Silica is the dominant cement but specimens obtained from most exposures contain secondary iron oxides as an interstitial component.

The Battery Rock sandstone is thought to have a maximum thickness of 110 feet in this area although no measurement has been made where stratigraphic relationships are clear. At Saltpeter Cave in the SW¼ NE¼ sec. 15, T. 10 S., R. 2W., the Battery Rock sandstone forms an overhang and here attains a thickness of about 90 feet.

Drury Formation

The Drury shale and sandstone, as described by Lamar (1925, pp. 91-95), lies stratigraphically above the Battery Rock sandstone and below the next persistent, thick, massive sandstone — the Pounds. Its variable lithology is perhaps the best criterion but the well-developed shale units and the fine-grained character of the sandstone also serve to distinguish the Drury formation from the massive Battery Rock and Pounds sandstones. Coal lenses are developed locally and plant fossils are abundant. The thickness of the Drury formation is thought to vary from 80 to 120 feet.

Correlation of individual sandstone or shale units within the Drury is difficult because they either are not persistent laterally or vary greatly in facies within short distances. Generally, described columnar sections less than one mile apart reveal no similarity.

A thin coal bed exposed about 10-15 feet below the Drury-Pounds contact along the south valley-wall of Cedar Creek in S.½ sec. 10, T. 10 S., R. 2 W., has been correlated across Cedar Creek Valley to the north, but about two miles southeast, in the stream in the NE¼ NE¼ sec. 24, where the Drury formation and the Pounds sandstone lie apparently conformable, the coal bed is absent and in its stead there are several feet of dark gray, carbonaceous shale.

Pounds Sandstone

The Pounds sandstone is equivalent to Lamar's (1925, p. 95) lower massive Makanda sandstone. It is very similar to the Battery Rock sandstone with respect to its massiveness, cross-bedded nature, and the presence of quartz pebbles. One exposure in the C. sec. 13, T. 10 S., R. 2 W., consists of 126 feet of massive, cross-bedded sandstone which contains quartz pebbles. A similar section 128 feet thick is exposed in the NE¼ sec. 23. The Pounds sandstone forms persistent bluffs throughout the area due to its resistant nature.

Lithologically the Pounds sandstone is a clean orthoquartzite and for the most part is medium-grained, with secondary iron oxide cement. Plant fossil impressions are present. An exposure in sec. 13 contains a few thin lenses of shale.

Pre-Pennsylvanian Channels

During earlier studies Weller (1940, p. 23) thought that no greater than 250 feet of sediments represented the Caseyville group in the Alto Pass quadrangle (in which the present study area lies). It has been found in this investigation that at least 340 feet of strata lie between the top of the Pounds sandstone and the Mississippian-Pennsylvanian unconformity (Table I). The maximum compiled thickness of the individual units in this interval (Lusk formation through Pounds sandstone inclusive) is locally 420 feet. Previously Potter and Siever (1956, p. 228) thought that the maximum thickness of the Caseyville group in Illinois was about 400 feet and occurred in southeastern Illinois. Potter and Glass (1958, p. 12) give an average thickness of about 350 feet for the Caseyville group, which is somewhat less than the average in this area. The local maximum thickness of 420 feet for the Caseyville group is as great as in any other area in southern Illinois and on the assumption that the greatest thickness of clastic sediments would accumulate in the area of maximum subsidence supports Potter and Siever's concept of a southwestward regional slope during Caseyville sedimentation (1956, p. 240).

As projected by Wanless (1955, pp. 1760-61) and Potter *et al.* (1958, p. 1035), the major pre-Pennsylvanian channel which Siever (1951, p. 561) indicated as occurring near northeastern Jackson County and continuing southwestward across the county crosses the present study area (Fig. 1). Wanless (1955, pp. 1760-61) depicted this pre-Pennsylvanian channel as incised into undifferentiated Degonia, Clore, and Palestine while Potter *et al.* (1958, p. 1035) indicated that the Degonia is cut out of the channel in Williamson and Jackson Counties. If this is the case: (1) there should be no

Kinkaid limestone or Degonia sandstone in the channel area; (2) if the interfluve areas were capped by Kinkaid limestone while the channel base consisted of Clore or Palestine formations, there should be a local relief of 100 to 200 feet on the Pennsylvanian surface; (3) with such a local relief, there should be concomitant variations in the thickness and lithology of the basal Pennsylvanian sediments.

However, contrary to (1), the Kinkaid limestone has been recognized near Pomona and at a number of other exposures in the area (Weller and Ekblaw, 1940, pl. I) and may be as thick as 70 feet (Desborough, 1957, p. 200). Weller and Ekblaw (1940, pl. I) have also recognized the Degonia sandstone in large fault blocks along the G. M. & O. Railroad just south of Pomona and in relatively continuous outcrop three miles north of Alto Pass.

The thickness and lithology of the Lusk formation (basal Pennsylvanian) in sec. 27, T. 10 S., R. 2 W., in the middle of the supposed pre-Pennsylvanian channel, are no different from those in the exposures a few miles west of Pomona (C. sec. 19, T. 10 S., R. 2 W., and SW¼ SE¼ and C. sec. 25, T. 10 S., R. 3 W.) and in a good exposure about two and one-half miles south of Pomona (NE¼ SE¼ sec. 5, T. 11 S., R. 2 W.), both of which are outside the channel. The uniform thickness and lithology is interpreted to indicate that the Lusk formation was deposited on a relatively flat surface (Fig. 3).

The author agrees with Wanless (1955, p. 1765) that Caseyville strata may be found in contact with Chester strata as low as Palestine sandstone. However this need not be due exclusively to pre-Pennsylvanian channel erosion. It has been shown by St. Clair (1917), Ekblaw (1925), and Desborough (1957) that post-Chesteran — pre-Pennsylvanian faulting has played an important role in the vicinity of Alto Pass and Pomona. Based on stratigraphic relationships (Desborough, 1957, p. 203), some of the displacements along the faults in the Pomona area are known to be 100 feet. Such displacements together with contemporaneous and subsequent erosion could account for unconformable relationships between Chester strata and the overlying Caseyville rocks. It is therefore concluded that the unconformable relations of the Chester and Pennsylvanian strata do not demonstrate the presence of a pre-Pennsylvanian channel in the area but can be adequately explained by post-Chesteran — pre-Pennsylvanian faulting with accompanying or subsequent erosion to a relatively flat surface on which the basal Pennsylvanian sediments were deposited.

Summary

1. There is no evidence to substantiate the presence of a pre-Pennsylvanian channel incised into the Degonia, Clore and Palestine formations in the vicinity of Pomona.
2. Pre-Pennsylvanian channel development in the vicinity of Pomona is not necessarily responsible for the local absence of the Kinkaid limestone and the Degonia sandstone. The absence of these formations locally is prob-

ably due to pre-Pennsylvanian faulting and subsequent erosion and weathering which reduced the local relief produced by the faulting.

3. The lack of considerable thickness and lithologic variation of the Lusk formation indicates it was locally deposited on an erosion surface of low relief.

4. The local maximum thickness of 420 feet for the Caseyville group is as great as any thickness measured along the outcrop belt and therefore may support the concept of a southwestward regional slope during Caseyville sedimentation.

Acknowledgments

I wish to thank Dr. Stanley E. Harris Jr. for criticism of the manuscript and helpful suggestions concerning field study. I acknowledge those students of Southern Illinois University who aided in describing and measuring about 6000 feet of strata distributed among more than 30 detailed geologic sections.

I am indebted to the Illinois Geological Survey for financial aid and transportation expenses during part of this study.

I also wish to thank Mr. K. Dean McIlravy for preparation of the finished illustrations.

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Manuscript received July, 1959.