

SUBSURFACE STRATIGRAPHIC SECTIONS NEAR TYPE CHESTER LOCALITIES IN SOUTHWESTERN ILLINOIS¹

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Introduction.—The correlation of the Chester formations in southwestern Illinois has been greatly aided by the study of cuttings from wells which are located near the type localities of these formations. Descriptions of outcrops and well cuttings agree closely. Most outcrops do not expose a complete formation and its relationship to formations above and below it. Therefore, subsurface stratigraphic sections of seven Chester formations having type localities in southwestern Illinois are presented to enable geologists to observe these relations and make direct comparisons with other stratigraphic sections.

Aux Vases Sandstone.—In 1892, C. R. Keyes (1, p. 298)² proposed the name Aux Vases for the "ferruginous sandstone" described by Shumard, typically exposed at the mouth of Aux Vases Creek, Ste. Genevieve County, Missouri. The Aux Vases sandstone is now recognized as the basal formation of the Chester series. It overlies the Ste. Genevieve limestone unconformably and is in turn overlain by the Renault formation.

In the type locality the Aux Vases (4, p. 229) formation consists of two zones, each 18 feet thick. The lower zone is made up of interbedded variegated shales and sandstones, and the upper is massive fine-grained sandstone. It is overlain by the Renault formation, consisting of 2 to 4 feet of sandstone and sandy green clay overlain by purple shales.

The Anderson-Cassoutt No. 1 well (fig. 1B) is located 7 miles east of the type locality of the Aux Vases sandstone. In this well the Aux Vases is represented by 56 feet of fine-grained to coarse-grained angular sandstone. The base is a sandstone conglomerate containing pink and white chert and a few limestone fragments. This is indicative of the uncon-

formity recognized at the base of the Aux Vases formation. The Aux Vases becomes increasingly finer-grained upward. It is here overlain by very fine-grained pink pyritic sandstone and interbedded variegated shales of the Renault formation.

Renault Formation.—Stuart Weller (2, pp. 122-124) proposed the name Renault for the series of limestones, sandstones, and variegated shales that lie above the Brewerville, now the Aux Vases sandstone, and below the Yankeetown chert. The Renault formation is typically developed along the tributary to Dry Fork of Horse Creek in sec. 23, T. 4 S., R. 9 W., Monroe County, Illinois, and consists of the following zones in ascending order (5):

- (4) 5 feet of limestone with some shale partings.
- (3) 15 feet of calcareous fossiliferous shale with numerous thin limestone layers.
- (2) 2 to 3 feet of arenaceous limestone.
- (1) 3 feet of massive sandstone.

The Renault formation as represented in the Ames-Nicholson No. 1 well (fig. 2A), located 4 miles south of the type locality, is, in part, almost identical. Zone 1 of the outcrop is represented in the well by 23 feet of yellow and greenish partly spotted reddish-brown, very fine-grained compact sandstone with a few thin stringers of sandy limestone and greenish-gray and purple shales; Zone 2 by 5 feet of sandy limestone; Zone 3 by 24 feet of red, purple, and gray calcareous shale, interbedded with very calcareous siltstone; and Zone 4 by 7 feet of cherty coarsely crystalline green limestone and white lithographic limestone.

Yankeetown Chert.—The Yankeetown formation (2, pp. 124-125) is a hard per-

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² Numbers in parentheses refer to references at end of article.

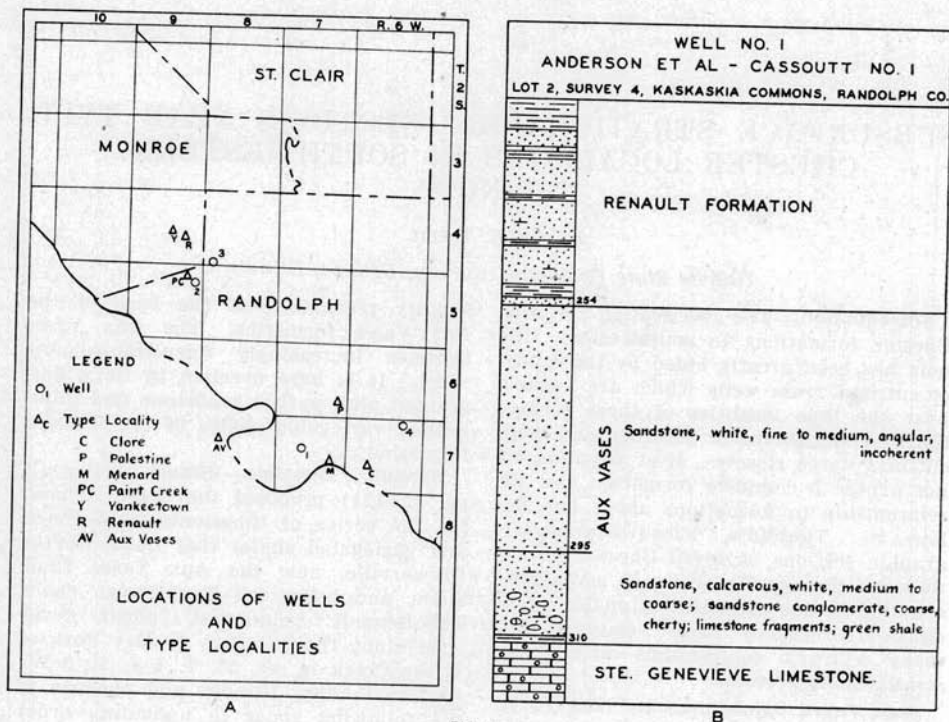


FIG. 1

sistent siliceous stratum, typically developed as an arenaceous chert near Yankeetown School in southeastern Monroe County, Illinois.

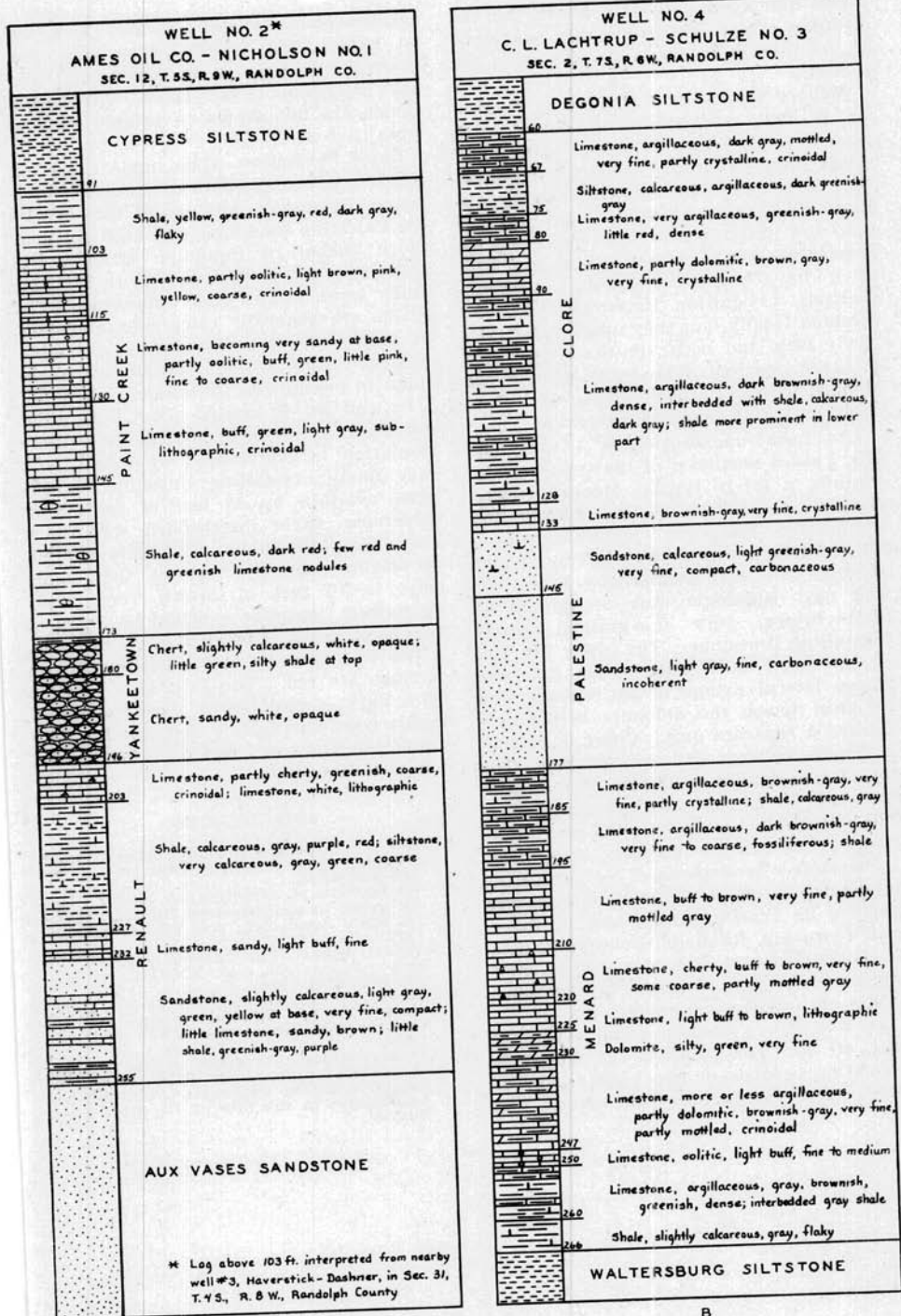
Only a few subsurface records show the Yankeetown chert in its typical outcrop form. In the Ames-Nicholson No. 1 well, 5 miles southeast of the type locality, the Yankeetown formation is represented by a sandy chert in the lower 16 feet and by a slightly calcareous chert in the upper 7 feet. A few miles to the east of the outcrop belt, the Yankeetown formation becomes a very fine-grained sandstone that continues into the Illinois basin.

Paint Creek Formation.—The name Paint Creek (2, pp. 125-126) was proposed by Stuart Weller for the red shale and limestone above the Yankeetown chert and below the variegated shales and sandstone of the Ruma formation. The Paint Creek formation is typically developed along the tributary to Paint Creek in sec. 2, T. 5 S., R. 9 W., Randolph County, Illinois. Weller recognized two zones of the Paint Creek: The lower zone consists of 20 to 25 feet of deep red clay

with a few limestone nodules; the upper zone is more calcareous and shaly below, grades upward into more massive limestone beds, and totals 30 to 40 feet in thickness. In 1920, Weller (3, p. 298) extended the Paint Creek to include the variegated shales in the lower part of the Ruma formation and suggested that the name Ruma be discontinued as a formation name. This would establish a third zone in the Paint Creek.

In the composite log of the Ames-Nicholson No. 1 and the Haverstick-Dashner wells, respectively one mile southeast and two miles northeast of the type locality, all three zones are present. The lower red shale zone with limestone nodules is 28 feet thick. The middle limestone zone consists of a lowermost sub-lithographic limestone 15 feet thick, a middle sandy limestone 15 feet thick, and an uppermost light brown and pink, partly oolitic and partly coarsely crystalline limestone 12 feet thick. The third zone is 12 feet of variegated shale.

An additional zone, not noted in outcrops but generally recorded in wells, is a thin very fine-grained sandstone or silt-



stone that occurs directly above the red nodular shale. However, this sandstone is not present in the Ames-Nicholson No. 1 well.

Menard Formation.—The name Menard (2, p. 128) was proposed for the moderately thick-bedded limestone with numerous shale partings, typically exposed in the Mississippi River bluffs at Menard in Randolph County, Illinois. In the outcrop the limestones are generally bluish-gray, close-textured, and fine-grained and often have a small amount of chert. Coarsely crystalline limestones may be common locally, but they are usually relatively thin and occur in the upper part of the formation. The lower part of the Menard is usually marked by a dark gray shale with thin limestone streaks.

The Lachtrup-Schulze No. 1 well (fig. 2B), 7 miles northeast of the type locality, exhibits a fairly typical Menard succession. At the base is 16 feet of shale and argillaceous limestone. Above this is a 3-foot oolitic limestone followed by 17 feet of more or less argillaceous limestone. The next lithologic unit is 35 feet of light brown, very fine-grained partly crystalline limestone. The lower five feet of this unit is a silty green dolomite whose lateral extent is not known, and for this reason the dolomite is not considered a separate unit. Chert is present at depths between 210 and 220 feet. The top of the Menard is 18 feet of fossiliferous shaly limestone and dark gray shale. The limestone is generally very fine-grained but some is coarsely crystalline.

Palestine Sandstone.—The Palestine sandstone (2, pp. 128-129) was so named because its type exposures are in Palestine Township, Randolph County, Illinois. It consists in part of heavy beds of sandstone and in part of thinly bedded sandstones or arenaceous shales.

In well No. 4, located about six miles east of the type locality, the Palestine formation consists of two zones: a lower light gray fine-grained incoherent and

carbonaceous sandstone 32 feet thick, and an upper light greenish-gray very fine-grained calcareous carbonaceous and compact sandstone 12 feet thick. Arenaceous shales are not shown in sample cuttings from this well.

Clore Formation.—The name Clore (2, p. 129) was applied to a series of interbedded limestones and shales that overlies the Palestine sandstone and crop out near Clore School in Randolph County, Illinois. In many places the Clore includes much more shale than limestone. The shales are generally calcareous and dark in color. The limestones are variable, grading from dense argillaceous limestone to crystalline limestone.

In well No. 3, located about four miles northeast of the type locality, the Clore formation is represented by 5 feet of a very finely crystalline limestone at the base, overlain by 38 feet of dark gray calcareous shale interbedded with dark gray shaly limestone, the shale content decreasing upward. Above this shaly zone is 10 feet of brown very finely crystalline limestone overlain by 5 feet of very argillaceous greenish-gray limestone. A few fragments of this limestone in the cuttings are red. The next unit consists of a dark greenish-gray calcareous and argillaceous siltstone, 8 feet thick. The top of the Clore is 7 feet of mottled gray, crinoidal limestone.

REFERENCES

1. Keyes, C. R., The principal Mississippian section: *Geol. Soc. Am. Bull.*, vol. 3, pp. 283-300, 1892.
2. Weller, Stuart, Stratigraphy of the Chester group in southwestern Illinois: *Trans. Ill. State Acad. Sci.*, vol. VI, pp. 118-129, 1913.
3. Weller, Stuart, The Chester series in Illinois: *Jour. Geol.*, vol. XXVIII, pp. 281-303, 395-416, 1920.
4. Weller, Stuart, Geology of the Ste. Genevieve County, Missouri: *Mo. Bur. of Geology and Mines*, vol. XXII, 2nd ser., 1928.
5. Weller, Stuart, A report on the geology of parts of Monroe, St. Clair, and Randolph counties, Illinois: Unpublished manuscript in the files of Ill. State Geol. Survey.