

POST-CHESTER, PRE-PENNSYLVANIAN
FAULTING IN THE ALTO PASS AREA

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A suspicion that post-Chester, pre-Pennsylvanian faulting occurs in Illinois has existed since St. Clair's reconnaissance of oil structures in southern Illinois.¹ This suspected relation was established as a fact in the summer of 1924, when the geology of the Alto Pass quadrangle was mapped for the Illinois State Geological Survey. Mr. Frank Krey, formerly of the Survey, inaugurated and collaborated in the work which established the relation as a fact. Mr. Russell S. Poor assisted both Mr. Krey and the author in the field.

The area under discussion comprises seventeen square miles, lying in a belt that extends from Pomona nearly to Mountain Glen and passes just west of Alto Pass. Erosion is in a mature stage, and the loess that mantles the area is so thick that great difficulty is encountered in finding outcrops satisfactory for correlation. Nevertheless, assiduous search revealed data sufficient to warrant the presentation of the following statements concerning the faults in the area as facts.

Fault No. 1. This is the major fault of the region. It is composed of several segments that vary slightly in direction, but the resultant general trend is northwest-southeast. It doubtless continues across the Mississippi Bottoms to the faulted area of Grand Tower, and thence across the Mississippi River into Missouri. It dies out two miles northwest of Mountain Glen. The maximum throw of the fault, measured southwest of Alto Pass, is approximately 2,000 feet if the zone of drag is ignored. This is sufficient to bring the Clear Creek chert of Devonian age level with and above Lower Pennsylvanian sandstone. However, along the immediate fault zone Lower Mississippian strata are in juxtaposition with the Clear Creek chert. The actual fault is rarely seen. The evidence allows the age of the fault to be determined no closer than post-Mississippian.

¹St. Clair, Stuart., Oil Investigations in Illinois in 1916—Parts of Williamson, Union, and Jackson counties: Ill. State Geol. Survey Bulletin 35, 1917, p. 53.

Fault No. 3. This fault establishes the thesis of this article. The fault was actually seen in three places, so that its direction is determined. The strata that are visibly affected are Palestine shale, Clore limestone, and Degonia sandstone, all younger Chester in age. They have a strong dip to the east, so that the section from east to west exposed on either side of the fault is sandstone, limestone, and shale. Therefore, the throw of the fault is approximately 100 feet. Immediately overlying these deformed strata is horizontal, basal Pennsylvanian sandstone. Thus the age of the fault is unquestionably determined as post-Chester and pre-Pennsylvanian.

Fault No. 4. This fault originally raised the question which is now answered. The actual fault is exposed in a railroad cut and has a trend N. 55° E. On the northwest side of the fault the strata, presumably upper Chester, lie horizontal, but on the other side massive Chester limestone dips sharply towards the fault, doubtless as a result of drag. Overlying all the strata is Pennsylvanian sandstone, so that this fault, too, is unquestionably post-Chester, pre-Pennsylvanian in age.

Fault No. 5. This fault is plainly exposed in a small gully south of Pomona. Its apparent direction is N. 55° E. On the northwest side forty feet of thinly bedded Chester sandstone are exposed in the gully below the fault. At the fault calcareous shale containing irregular limestone beds abuts this sandstone and is immediately overlain by a sandstone that is assumed to be the same formation. Thus the throw is determined to be at least forty feet. The age of the fault is post-Chester and probably pre-Pennsylvanian.

Fault No. 6. The approximate position of this fault is determined by otherwise unreconcilable stratigraphic relations on either side of Cave Creek. As no continuation of fault No. 5 or of any of several other possible faults that are suspected to exist on the east side of the valley between and parallel to faults No. 4 and No. 5 is found on the west side, some fault must cause their termination. Possibly this fault may be projected to intersect No. 2.

Fault No. 9. Two small faults, probably intersecting, are included. The west one trends N. 20° E., and the

east one N. 50° E. Along the west one the strata dip eastward; along the east one they dip westward. Only Chester strata appear to be affected, but the complete relations have not as yet been ascertained.

Fault No. 10. This small fault, trend N. 5°-10° W., visibly affects only the Degonia sandstone.

Fault No. 11. This fault trends N. 65° W., and has a throw of probably only thirty feet. It visibly affects only middle Chester strata.

Fault No. 12. The relations of this fault are very obscure. The strata affected are probably middle Chester. They have a strong dip along a strike N. 50° W., while Pennsylvanian strata immediately to the east are horizontal.

Fault No. 2. This northnorthwest-southsoutheast trending fault has not been actually seen. However, in its northern portion, the stratigraphic and normal structural conditions leave no doubt that a fault exists, and a projected southern continuation is supported by stratigraphic relations. Its throw is probably not over one hundred feet. Its age can be determined as post-Mississippian.

Fault Area D. Unusual relations of the Mississippian strata in this area can be explained only by the introduction of several faults, none of which have been actually seen, and whose ages can therefore be assigned only as post-Mississippian.

In addition to these examples, there are other minor faults which are post-Pennsylvanian age. A few of such examples are explained below.

Fault No. 7. The position of this fault is determined by three facts. First, a forty-foot Degonia sandstone bluff that can be traced continuously around the ravines at the head of the valley terminates abruptly at the point mapped as the southern extremity of the fault. Second, this same sandstone bluff can be traced continuously also along the western side of the lower part of the valley, but its counterpart is lacking on the eastern side. Third, along the east bank of the creek, steeply dipping sandstone is frequently exposed. This fault has an approximate trend N. 30° E., and an estimated throw of

more than one hundred feet. Since Pennsylvanian sandstone is apparently included in this movement, the age of the fault is presumably Post-Pennsylvanian.

Fault No. 8. This is a small fault, trend N. 15° E., that visibly affects only Pennsylvanian sandstones.

Fault Area A. This area includes three small faults, all visibly affecting only Pennsylvanian strata. The north fault of the group trends N. 70° W., the east one N. 25° W., and the south one N. 45° W. They appear to mark the limits on three sides of a graben block.

Fault Area B. This area includes several small faults whose relations are not as yet established. There is some evidence that they are the consequences solely of slumping of large masses of Chester formations.

Fault Area C. This area is similar to area B, but the fault-like conditions are more prominent.

Many other minor faults might be cited, but the examples that have been explained are sufficient to show (1) that the Alto Pass area is an intricate maze of normal faults, (2) that these faults occurred during at least two periods of deformation, and (3) that while the age of one of these two periods is post-Pennsylvanian, the other is post-Chester and pre-Pennsylvanian.