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**PALYNOLOGICAL EVIDENCE FOR AGE ASSIGNMENT  
OF BASAL CHEROKEE (PENNSYLVANIAN) STRATA IN  
SOUTHEASTERN KANSAS**

by

L. R. Wilson

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CHEROKEE (PENNSYLVANIAN) STRATA IN SOUTHEASTERN KANSAS

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Oklahoma Geological Survey, The University of Oklahoma, Norman, OK.

Re: Eagle-Picher Industries, Inc. No. 1 Velie Swalley well core. See also: Nodine-Zeller, D. E., and Thompson, T. L., 1977, Age and Structure of Subsurface Beds in Cherokee County, Kansas--Implications from Endothyrid Foraminifera and Conodonts: Kansas Geological Survey Bulletin 211, Part 3.

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**Palynological Evidence for Age Assignment of Basal Cherokee (Pennsylvanian)  
Strata in Southeastern Kansas**

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In southeastern Kansas, shales of the Cherokee Group (Pennsylvanian, Upper Carboniferous) rest unconformably upon Mississippian (Lower Carboniferous) limestone of the Chester Series. Although the Cherokee Group is known to be of Pennsylvanian age some doubt exists as to the correct stratigraphic assignment of the basal shales recovered from the No. 1 Velie Swalley well of the Eagle-Picher Industries, Inc. This well is located in Section 3, Township 35 South, Range 24 East in Cherokee County, Kansas. As an aid to resolving the problem of age assignment palynological evidence has been sought and the results of that investigation are presented in this report.

The Cherokee Group was defined in Kansas where it received its name from exposures in Cherokee County as the strata occurring between Mississippian rocks below the Fort Scott Limestone above. It is recognized as the lower portion of the Desmoinesian Series. The upper portion of that series is known as the Marmaton Group. In Oklahoma the Cherokee Group is divided into

the Krebs Group (below) and the Cabanis Group (above). In Kansas these two groups have been treated as subgroups of the Cherokee Group. The basal formation of the Krebs Group in Oklahoma is presently the Hartshorne; however, there is palynological evidence that the underlying Atoka Formation should also be included in the group. There is a general opinion that in southeastern Kansas, the Hartshorne Formation and a portion of the overlying McAlester Formation are not present. Also there was a possibility that the basal shales in the No. 1 Velie Swalley were older than the Cherokee Group.

Six shale samples were collected from cores of the well at intervals between 32 and 50.5 feet. These were processed by a standard method for palynologic study and all except the top 3 foot sample produced a wealth of fossils. The top sample was a weathered shale, and the bottom sample was in contact with the Mississippian limestone. In addition to the well samples, others were collected from the lowest Cherokee coal, the Riverton, in Cherokee County, Kansas, and at one east-central Oklahoma location in Muskogee County. These coals were collected for interstate correlation and the possibility that the well shales might belong to the Riverton Cyclothem, the lowest in the Kansan Cherokee Group and in Oklahoma a member of the McAlester Formation.

The No. 1 Velie Swalley shales contain 45 species in 37 genera, the Kansas Riverton coal (a channel sample) contains 22 species in 15 genera, and the Oklahoma Riverton coal (segment samples) 18 species in 7 genera. Investigation of the Oklahoma coal is continuing. The genera with the largest number of specimens in the shales are *Lycospora* 12-45%, *Densosporites* 12-20%, *Crassispora* 4-17%, and *Torispora* 4-9%. By contrast the Kansas Riverton coal has *Lycospora* 33%, *Laevigatosporites* 14%, *Torispora* 8%, *Triquitrites* 8% and *Calamospora* 7%. A comparison of the assemblages indicates floristic similarity but statistical and possibly ecological differences are typical of associated coal and shale deposits. The shales contain in addition to specimens of yellow to light brown color, which are considered synchronous with sediment deposition, a number of spores that are dark brown to black and which undoubtedly were recycled from the underlying Chester Series (Mississippian) and possibly Morrowan Series (lowest Pennsylvanian) rocks. Some genera from the Mississippian rocks are species of *Densosporites*, *Cirratriradites*, and *Knoxisporites*. From the Morrowan rocks some species of *Densosporites*, *Cristatisporites*, *Spencerisporites* and *Costatocyclus* appear to have been recycled.

Palynological evidence for an age assignment for the basal Pennsylvanian shales in the No. 1 Velie Swalley well hinges largely on the general composition of the floristic assemblage and certain genera and species of palynomorphs with restricted ranges. The flora listed above reports the genera with greatest abundance and the majority of additional palynomorphs like the former are common Desmoinesian genera and species. Several range from the Mississippian to the lower Desmoinesian strata as for example the genus *Densosporites* which occurs no higher than the middle of the Desmoinesian Series except as recycled specimens. *Cirratriradites saturnii* has approximately the same range. *Alatisporites hoffmeisterii* is known in Oklahoma only from the Rowe coal, Savanna Formation, which overlies the McAlester Formation. In Illinois it is reported from

Relative Abundance of Palynomorph Genera in 1 Velle Swalley Well  
and Adjacent Riverton Coal Seam

Depths below surface and assemblage percentages

|                          | 50-50.5 ft | 49 ft | 48-45 ft | 43-45 ft | 38-40 ft | Riverton coal |
|--------------------------|------------|-------|----------|----------|----------|---------------|
| <i>Acanthotriletes</i>   | 1.0        | 0.5   | 0        | 1.0      | ---      | 0             |
| <i>Alatisporites</i>     | .5         | 0     | 0        | 0        | 1.0      | 0             |
| <i>Calamospora</i>       | .5         | 0     | 3.0      | 0        | 1.0      | 7.0           |
| <i>Cirratriradites</i>   | 2.0        | 2.0   | 3.0      | 2.0      | 3.0      | 1.0           |
| <i>Convolutispora</i>    | 0          | .5    | 0        | 0        | 0        | 1.0           |
| <i>Crassispora</i>       | 4.0        | 4.5   | 17.0     | 7.0      | 4.0      | 1.0           |
| <i>Cristatisporites</i>  | 0          | 0     | 0        | 0        | 1.0      | 0             |
| <i>Densosporites</i>     | 17.5       | 19.0  | 12.0     | 12.0     | 15.0     | 1.0           |
| <i>Dictyotriletes</i>    | 3.5        | 6.0   | 5.0      | 2.0      | 1.0      | 0             |
| <i>Endosporites</i>      | 2.5        | .5    | 6.0      | 2.0      | 3.0      | 4.0           |
| <i>Florinites</i>        | 1.0        | 1.5   | 6.0      | 5.0      | 1.0      | 1.0           |
| <i>Granulatisporites</i> | 3.0        | 2.0   | 5.0      | 3.0      | 2.0      | 5.0           |
| <i>Laevigatosporites</i> | 4.5        | 3.0   | 5.0      | 2.0      | 2.0      | 14.0          |
| <i>Leiotriletes</i>      | 1.5        | 1.5   | 0        | 2.0      | 1.0      | 2.0           |
| <i>Lescheckisporis</i>   | .5         | 0     | 0        | 0        | 0        | 0             |
| <i>Lophotriletes</i>     | 0          | 0     | 0        | 0        | 0        | 3.0           |
| <i>Lundbladispota</i>    | 3.5        | 4.0   | 4.0      | 2.0      | 2.0      | 1.0           |
| <i>Lycospora</i>         | 37.5       | 38.0  | 15.0     | 38.0     | 40.0     | 33.0          |
| <i>Punctatisporites</i>  | 5.0        | 1.5   | 8.0      | 9.0      | 7.0      | 6.0           |
| <i>Raistrickia</i>       | .5         | 1.0   | 0        | 0        | 1.0      | 3.0           |
| <i>Reinschispora</i>     | .5         | .5    | 0        | 0        | 0        | 0             |
| <i>Simozonetriletes</i>  | 0          | .5    | 0        | 0        | 0        | 0             |
| <i>Spencerisporites</i>  | 0          | .5    | 0        | 0        | 0        | 0             |
| <i>Torispora</i>         | 9.0        | 6.0   | 3.0      | 3.0      | 7.0      | 8.0           |
| <i>Triquitrites</i>      | 1.0        | 4.0   | 1.0      | 5.0      | 1.0      | 8.0           |
| <i>Vestispora</i>        | .5         | 1.0   | 4.0      | 0        | 0        | 1.0           |
| <i>Wilsonites</i>        | .5         | 2.0   | 3.0      | 5.0      | 7.0      | 0             |

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the Fithian Cyclothem in the McLeansboro Group which is in higher Pennsylvanian position than the Cherokee. *Columinispora ovalis* and *Zosterosporites triangularis* are reported as new occurrences in Kansas. The former occurs in the Murphysboro coal of Illinois which is near the top of the Krebs Group of the Cherokee. The latter was described from the Princess coal of Kentucky, a position near the top of the Cherokee in Kansas. Other genera, *Lueckisporites*, *Striatites*, and *Lundbladispora*, have not been observed lower than the Cabaniss Group of the Cherokee; consequently these occurrences are range extensions. A number of observed species range from older Pennsylvanian strata upward into Cabaniss strata, consequently as age indicators for the basal shales in the No. 1 Velie Swalley well, they have no value. Some species extend into the overlying Permian rocks. The total palynologic assemblage of the basal shales in the No. 1 Velie Swalley well resembles most closely in composition the studied shales and coals of the McAlester Formation in Oklahoma and they are probably best assigned to the McCurtain Shale Member of the McAlester Formation.

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