

**KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 79-2**

**UPPER ORDOVICIAN AND DEVONIAN CONODONTS FROM
SUPPOSED VIOLA ROCKS IN SUBSURFACE
OF SOUTHWESTERN KANSAS**

by

**E.D. Goebel
W.C. Sweet
P.L. Hilpman**

D.E. Nodine-Zeller, (complier)

Disclaimer

The Kansas Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations based on data used in the production of this document or decisions based thereon. This report is intended to make results of research available at the earliest possible date, but is not intended to constitute final or formal publications.

**Kansas Geological Survey
1930 Constant Avenue
University of Kansas
Lawrence, KS 66047-3726**

February 9, 1979

KGS
OF
79-2

OPEN FILE REPORT

Upper Ordovician and Devonian Conodonts from Supposed Viola Rocks
in Subsurface of Southwestern Kansas

by

Goebel, E. D., Sweet, W. C., and Hilpman, P. L.

Compiled by Doris E. Nodine-Zeller

Conodonts were recovered from Core #3 (7838-7861 feet) in supposed Viola Limestone in the Mobil Oil Company #1 Cunningham Estate borehole, C SW SE section 13, T 34 S, R 37 W, Stevens County, Kansas.

An abstract for a paper delivered at the North Central Section of the Geological Society of America in 1969b (Goebel, Sweet, and Hilpman) follows:

Carbonate strata of undoubted Devonian age have not previously been reported from western Kansas, where Mississippian rocks, some with reworked Devonian conodonts, lie unconformably on Middle and Lower Ordovician carbonate rocks in many places. However, conodonts from the upper 18 feet of a 23-foot core between 7838 and 7861 feet in the Mobil Oil Company No. 1 Cunningham Estate borehole verify the presence of Devonian rocks in the Voorhees Field of Stevens County, Kansas. On the basis of lithologic correlation by the petroleum industry, the strata in question have been identified as Middle Ordovician Viola Limestone or "Simpson Group."

To a depth of 7856 feet, acetic-acid insoluble residues from 22 samples in the cored interval yield a mixture of Middle and Upper Ordovician conodonts (e.g., Belodina, Panderodus) with a few Middle or Upper Devonian specimens (e.g., Icriodus, Palmatolepis). Specimens exhibit little evidence of reworking. Other genera represented include: Apatognathus, Cordylodus, Cyrtoniodus, Dichognathus, Drepanodus, Oistodus, Ozarkodina, Phragmodus, Polygnathus, Spathognathodus, and Trichonodella. We conclude that the rocks from 7838 to 7856 feet are Devonian (probably Upper Devonian), and that they do not represent the Viola or Simpson strata with which they have been identified.

In the ensuing years, Sweet has completed field work on rocks of similar age, viz. the Whitewood Dolomite (Upper Ordovician) in South

Dakota (overlies Deadwood Formation, Cambrian; underlies Englewood dolomite, Devonian-Mississippian, with angular unconformity). He (1979) states:

In the summer of 1968, I was sent the acid residues from 24 samples, taken at one-foot intervals between 7838 ft and 7861 ft in the Cunningham Estate borehole. Of these, 23 contained conodonts; only one (7860) was barren. Altogether, as the enclosed data sheet shows, I collected 2,614 Upper Ordovician conodonts from these samples. There are 3 re-worked Middle Ordovician forms scattered through the 24 samples, and there are also 159 specimens that are certainly post-Silurian and were identified as Upper Devonian forms by Paul Hilpman. The distribution of all of these specimens is shown in the enclosed table [Table 1.]

Except for a copy of Kansas Sample Log Service Log 8880 [Davies log], I have no other information about the rocks or other fossils from the Ordovician rocks in this borehole. It is unfortunate that I was unable to get any material from the 173 ft of cherty dolomite above 7838 ft, which is also logged as "Viola," but evidently such material was just not available.

Sometime in late 1968 or early 1969, I sent the "Devonian" conodonts I had collected from samples between 7838 and 7853 ft to Paul Hilpman, who identified a number of specimens (including Icriodus and Palmatolepis) that he regarded as Upper Devonian. Subsequently, the slides with these specimens were returned to me so all the Cunningham Estate material would be in one place. However, upon checking through the non-Ordovician slides, I am unable to identify any specimens as Icriodus or Palmatolepis. Probably, Paul kept the identifiable forms (or at least the stratigraphically significant ones) in Lawrence, for I believe he was working on his dissertation at the time. Amongst the specimens logged as "Devonian/Mississippian conodonts" on the enclosed table, however, there are a few that look like Apatognathus, quite a number that are Polygnathus and Spathognathodus (inform-taxonomy), and a large number of fragmentary ramiform elements, which are not much help except to indicate a post-Silurian age.

As indicated on the second sheet enclosed [Table 2], this fauna is Late Edenian and earliest Maysvillian in age. Elsewhere in the Kansas subsurface, components of this fauna are found with specimens of Amorphognathus ordovicicus (species 1 on the diagram enclosed), but species 37 (Pseudobelodina? obtusa) drops out, so I believe those rocks are younger. However, I would expect to see P.? obtusa disappear somewhere in the 173 ft of dolomite above the cored interval in Cunningham Estate, too, and perhaps also to find specimens of A. ordovicicus somewhere in that interval.

Were it not for the "Devonian or Mississippian" specimens in numerous samples from the so-called "Viola" in the Cunningham Estate core, I would not have suspected that there was anything wrong with the sequence. The Ordovician association is quite typical; the specimens do not seem to be in especially bad shape; and even fragile ones are preserved. The "Devonian/Mississippian" specimens, on the other hand, are all fragments, except for a very few that are complete enough to identify, and all of them appear to be somewhat considerably "beat up."

In 1969, when the Goebel-Sweet-Hilpman abstract was written, it seemed most logical that the Upper Ordovician forms were re-worked and that the "Devonian/Mississippian" specimens were "telling the stratigraphic truth." Particularly because there are also a few re-worked Middle Ordovician forms here and there in the cored interval.

However, since then, I have encountered almost the same situation in a surface section of the Whitewood of South Dakota. In that section, there is no doubt but that the rocks are Upper Ordovician. They are overlain by Mississippian strata (the Englewood), and there has been obvious solution of the Whitewood prior to deposition of the Mississippian. Despite very careful sampling, however, we still came up with at least a few, very "beat up" Mississippian conodonts in virtually every Whitewood sample from the upper half of the section. So, it is obviously possible for such "leaks" to be very subtle, and I am no longer as confident as I was in 1969 that the Cunningham Estate well provides an example of extensive late Devonian re-working of Upper Ordovician conodonts.

The 2,614 Upper Ordovician conodonts from the Cunningham Estate borehole are parts of a distinctive fauna that is quite widespread in the North American Midcontinent Province. It is typical of at least the lower part of the "Fernvale" of northern Arkansas and northeast Oklahoma; it also occurs in the Whitewood of South Dakota, the lower massive Bighorn of northern Wyoming; the Fish Haven of northeast Utah; the Fremont of Colorado; and the Second Value Formation (Upham Member) of the Montoya Group in west Texas and southern New Mexico.

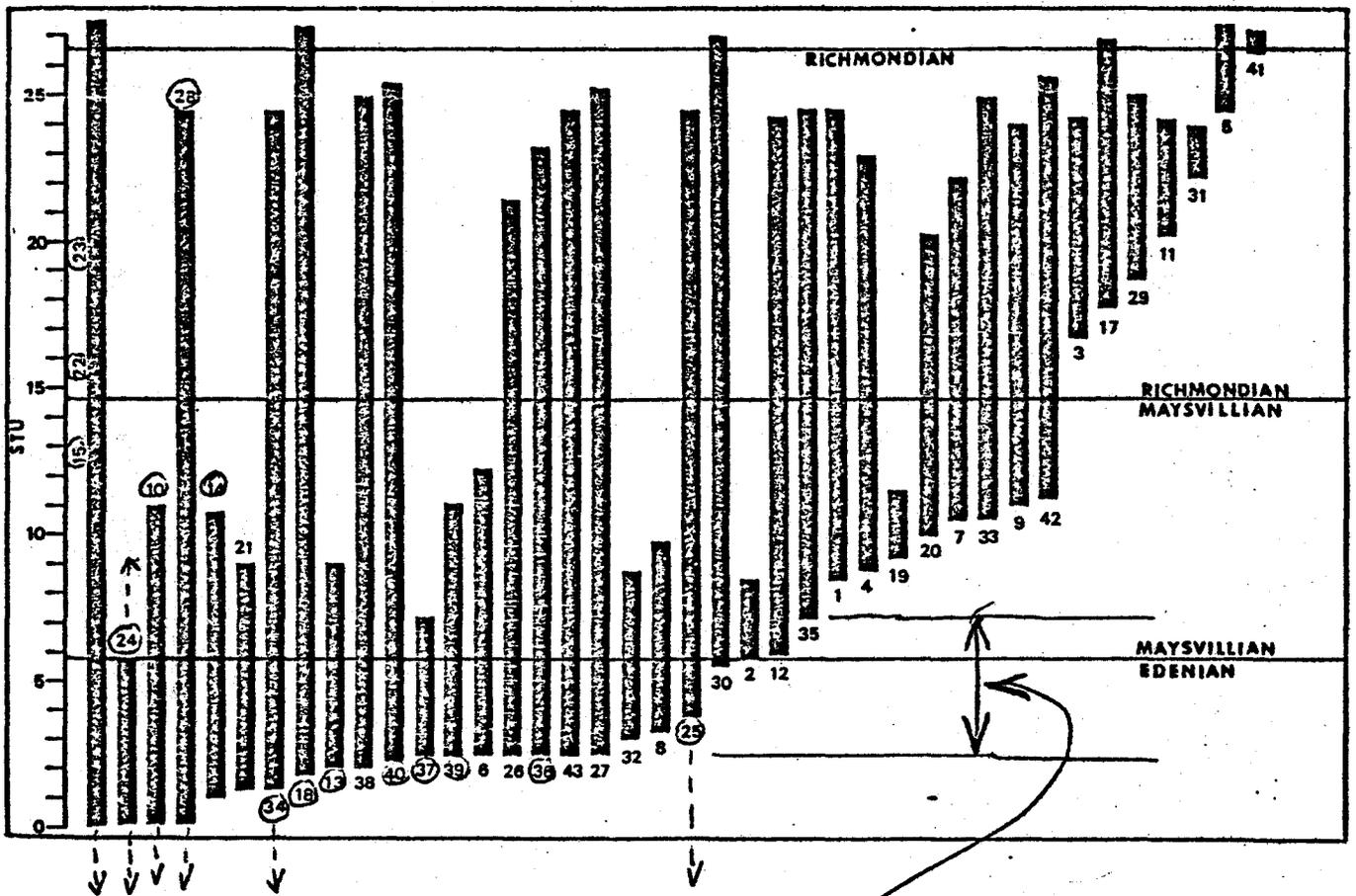
Perhaps your studies will add some concrete evidence to the puzzle. Since I have never seen the rocks, or any of the other fossils (if any) from this part of the CE borehole, I can go no further in the way of interpretations. Quite obviously, however, strata of "Fernvale" age were present in this part of Stevens County at one time.

Perhaps all of the ones logged as "Viola" really are Late Ordovician rocks that have been extensively fractured by solution channels, into which Devonian and/or Mississippian conodonts have "leaked." Or, possibly the whole works is younger than logged.

References

- Goebel, E. D., Sweet, W. C., and Hilpman, P. L., 1969a, [Abstract] Devonian Rocks in Kansas and Their Epeirogenic Significance: Geol. Soc. America, Abstracts with Programs, pt. 6, p. 10.
- _____, 1969b, [Abstract] Late Devonian Age of a Mixed Conodont Fauna from a Core in Southwestern Kansas: Abstracts with Programs for 1969, Geol. Soc. America, North-Central Section, Columbus, Ohio, Part 6, p. 18.
- Hilpman, P. L., 1969a, Western Mid-Continent Stratigraphy and the Kaskaskia Sequence: Programs for 1969, Pt. 2, p. 14.
- _____, 1969b, Devonian Rocks in Kansas and Their Epeirogenic Significance: Unpub. Ph.D. dissertation, Dept. Geol., Univ. of Kansas, 73 p.
- Sweet, W. C., 1979, personal communication with D. E. Nodine-Zeller, letter of January 21, 1979.

TABLE II



Known ranges of conodont species in the Upper Ordovician of the western Piedmontian Province, U.S. (Composite of range data from Whitewood, Bejbaru, Fish Haven, Fremont and Hookton).

probable stratigraphic interval represented by the Ordovician conodonts in the Cunningham Estate 'Viola' between 7838-7856' (78

Numbers circled are species also represented in samples between 7838-78



Dieter Production Co.

OIL PRODUCTION MANAGEMENT

Phone (913)-388-2332

P. O. Box 186

LONGFORD, KANSAS 67458

23 April 1973



Kas Geological Survey,
Lawrence,
Kansas.

Gentlemen:

I have just noted that Phillips Petroleum Co. has donated some 4,000 log o~~s~~ shallow core and Seismic shots of Kas. information to the Geological survey.

I am preparing to drill a "wild cat" well in Southern Dick~~en~~^{er}son Counties ne^{ar} the Marion County line. would their~~#~~ be any information availaibe covering this general area and if so when would it be available.

THANK YOU!

Respectfully yours,

January 16, 1974

Mr. Delbert J. Costa
415 Page Court-200 W. Douglas
Wichita, Kansas 67202

Dear Delbert:

It was very nice of you to take the time to write such a pleasant letter as the one concerning the Amoco Report. Of course, the Survey can't take any credit for producing the report, but we are pleased to know that our efforts in obtaining its release were worthwhile.

The type of work described in that study is the type I would like to be doing more of. As time goes by, I hope to contribute something under the Survey name which will also be useful to the industry in its exploration for oil and gas. Unfortunately (I guess), the Survey is obligated to cover many water fronts with too few longshoremen.

I would personally appreciate more chance to get the opinion of persons like yourself as to the future exploration potential in Kansas and where the emphasis of our studies in subsurface geology should be. Looking forward to seeing you Friday evening at the KGS banquet, I remain

Cordially yours,

W. J. Ebanks, Jr.
Chief

WJE:mgl

January 14, 1974

Mr. Wm. J. Ebanks
% Kansas Geological Survey
University of Kansas
Lawrence, Kansas 66044

Dear Jim:

The members of the Kansas Geological Society are truly indebted to you. The paper relating to Pennsylvanian Carbonate Banks in Southwestern Kansas is priceless.

Following are some observations that may give some background to my feelings and those of several other geologists who realize to some degree the scope and tremendous amount of work that covers over 10,000 square miles in western Kansas.

This study was being done when Dr. Harbaugh led the 27th field trip in 1962, dealing with the Pennsylvanian Marine Banks in Southeast Kansas. The trip created a great deal of interest and there was some talk of re-tracing part and studying (at key localities) the ground-up fragments with the microscope, to bridge the gap between outcrop fragments and how they might appear in rotary cuttings.

After the 1962 trip to Southeastern Kansas, many of the fellows started adding the descriptive terms that would, in some cases, aid a man trained in carbonate lithology to evaluate the cyclic nature of the formations described.

The major companies at that time were pursuing carbonate studies. The small independent companies and consulting geologists did not have the facilities nor the man-power to do this type of research.

Because of the economic value of these studies, it was some time before some of the work done by petroleum research geologists became - through the literature - available to the independent and consulting geologists.

The methods used and the criteria for the evaluation of the water depth and cyclic nature of the rocks should aid most of us a great deal in our particular problems.

I feel sure that the study of this work will help us make in some cases, a better educated guess in exploration and development programs.

In the last few months there has been a tremendous increase in the number of geological reports given to the Kansas Geological Society Library.

Those reports with carefully written sample descriptions, the availability of cuttings at the Survey Well Library and the guidelines that are indicated in the report on Pennsylvanian Carbonate Banks in Southwestern Kansas will surely lead to a better understanding of where more oil may be found.

Thank you again.

Sincerely,



DELBERT J. COSTA

415 Page Court - 200 West Douglas
Wichita, Kansas 67202

:lc