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OKLAHOMA GEOLOGY NOTES

HUGH DINSMORE MISER

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Cover Picture

Hugh Dinsmore Miser

Hugh Dinsmore Miser was born in Pea Ridge, Arkansas, December 18, 1884. He began his career as a field assistant to a U. S. Geological Survey party in 1907. The University of Arkansas granted him a Bachelor of Arts degree in 1908 and a Master of Arts degree in 1912. He served as a junior geologist for the U. S. Geological Survey in 1911 and became an associate geologist the next year. He was Chief of the Fuels Section from 1928 to 1949 and Staff Geologist from 1948 to 1954. Although now in his eighty-first year and officially retired, he continues to serve in a part-time capacity. The American Association of Petroleum Geologists made him an honorary member in 1948, and the University of Arkansas awarded him an LL. D. degree in 1949.

The *Bibliography of North American Geology* lists more than 80 publications by Hugh Miser from 1913 to 1960. Most of these deal with the geology of Arkansas and Oklahoma, with major reports covering the Eureka Springs-Harrison quadrangle, DeQueen-Caddo Gap quadrangle, the Batesville district in Arkansas, the structure of the Ouachita Mountains of Oklahoma and Arkansas, and quartz veins in the Ouachita Mountains. Miser collected quartz crystals as a hobby and has given collections of these to the University of Arkansas and to the Stovall Museum at The University of Oklahoma.

By 1920, Oklahoma had become an oil-producing state, and the need for a state geologic map became apparent. In 1923, Miser was assigned to the Oklahoma map project. He worked closely with other geologists and petroleum companies and, in 1926, the first geologic map of Oklahoma was completed.

In 1947, Miser was again assigned to Oklahoma, this time to make a new state map. He enlisted the help of the staff of the Oklahoma Geological Survey, the faculty and graduate students of The University of Oklahoma Geology School, and geologists throughout the State. Once more he was able to gain access to oil-company information and to win the cooperation of dozens of geologists. The new *Geologic Map of Oklahoma* was published by the Oklahoma Geological Survey and the U. S. Geological Survey in 1954 and was officially released during his seventieth birthday month.

Miser jokingly compared the *Geologic Map of Oklahoma* with the color display of a rising sun, the Arbuckle Mountains representing the sun as it appeared over the Cretaceous horizon, the radiating bands of Permo-Pennsylvanian rocks the rays of the morning sun, and the Ozarks a dark cloud hanging in the eastern sky.

—G. G. H.

THE MINERAL INDUSTRY OF OKLAHOMA IN 1964*
(Preliminary)

ROBERT B. MCDOUGAL†

Oklahoma's mineral industry output, valued at an estimated $895 million in 1964, was more than $17 million or nearly 2 percent greater than in 1963, according to the Bartlesville, Oklahoma, office of the Bureau of Mines, U. S. Department of the Interior. Increased production values were noted in natural gas and natural-gas liquids in the fuels segment; cement, gypsum, lime, pumice, salt, and tripoli in the nonmetals segment; and lead and zinc in the metals. The over-all improvement in the mineral industry was due entirely to increased production of natural gas. Mineral fuels accounted for more than 90 percent of the total value in 1964; nonmetals accounted for most of the remainder.

MINERAL FUELS

Coal.—Coal production declined for the second consecutive year in Oklahoma to nearly 5 percent below the previous year's output.

Natural gas.—Preliminary 1964 estimates of marketed output of natural gas indicated an increase of more than 10 percent in quantity and nearly 12 percent in value.

Natural-gas liquids.—Condensable liquids, stripped from natural gas by about 79 natural-gasoline plants and 4 cycling plants, established a new record of 1,425 million gallons in 1964. Included in the above total were four new products plants completed in 1964; one in Garfield County, two in Dewey County, and one in Texas County.

Storage capacity for LP gases totaled 959,000 barrels at seven underground sites. When completed in February 1965, an eighth site in a shale formation in Creek County will add another 220,000 barrels to the State total.

Petroleum.—Production of crude petroleum, estimated at 201 million barrels, declined for the second straight year as allowable production was reduced to bring it in closer balance with demand. The daily petroleum allowable production was retained by the Corporation Commission at 30 percent of the basic depth-acreage formula through April; the May rate was reduced to 26 percent and retained until December, when the rate was raised to 30 percent.

Activity was centered primarily in exploration-well drilling. The Oil and Gas Journal reported a total of 4,098 exploratory and development wells drilled in the first 11 months compared with 4,133 wells for the same period in 1963. This represented a decline of 17 percent in test-well drilling over the corresponding period in 1963.

*This report, U. S. Bureau of Mines, Mineral Industry Surveys Area Report IV-183, was prepared December 10, 1964.

†Geologist, U. S. Bureau of Mines, Division of Mineral Resources, Region IV.

On January 1, 1964, the Oil and Gas Journal reported 13 refineries operating in the State. The refineries' total capacity was 415,070 barrels of crude oil per calendar day, a slight increase above that of 1963. A six-year, $30 million expansion program culminated in August when Sunray DX Oil Co. completed the final unit—a $3.4 million solvent-extraction plant—at its Tulsa refinery. The plant replaced several older facilities and boosted finished lubricating-oil capacity to 6,000 barrels per day.

Great Lakes Carbon Corp. began erecting a petroleum-coke calcining plant north of Enid about midyear.

HELIUM

Marketable production and value of helium, extracted from natural gas at the Federal Bureau of Mines Keyes plant, was nearly 3 percent below 1963.

TABLE I.—MINERAL PRODUCTION IN OKLAHOMA[1]

MINERAL	1963 QUANTITY	1963 VALUE (THOUSANDS)	1964 (PRELIMINARY) QUANTITY	1964 (PRELIMINARY) VALUE (THOUSANDS)
Clays[2] (thousand short tons)	898	$ 911	840	$ 858
Coal (bituminous) (thousand short tons)	1,008	5,667	960	[3]
Gypsum (thousand short tons)	531	1,462	577	1,543
Helium (thousand cubic feet)	237,201	8,302	230,886	8,081
Lead (recoverable content of ores, etc.) (short tons)	3,192	689	2,780	739
Natural gas (million cubic feet)	1,233,883	160,405	1,360,000	179,500
Natural-gas liquids:				
Natural gasoline and cycle products (thousand gallons)	555,467	35,131	575,800	36,900
LP gases (thousand gallons)	810,894	28,981	848,900	31,400
Petroleum (crude) (thousand 42-gallon barrels)	201,962	587,709	200,515	581,494
Salt (thousand short tons)	4	26	6	31
Sand and gravel (thousand short tons)	5,420	6,116	5,100	6,000
Stone (thousand short tons)	13,817	16,160	13,679	16,000
Zinc (recoverable content of ores, etc.) (short tons)	13,245	3,046	12,100	3,267
Value of items that cannot be disclosed: Bentonite, cement, lime, pumice, tripoli, and value indicated by footnote 3	----	22,929	----	28,885
Total Oklahoma	----	$877,534[4]	----	$894,698

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producer).
[2]Excludes bentonite; included with "Value of items that cannot be disclosed."
[3]Included with "Value of items that cannot be disclosed."
[4]Revised figure.

NONMETALS

The estimated value of nonmetals (cement, clays, gypsum, lime, pumice, salt, sand and gravel, stone, and tripoli) produced in Oklahoma in 1964 totaled more than $47.9 million, a slight gain from the previous year.

In June, St. Clair Lime Co. completed a new $1 million lime plant, capable of producing nearly 240 tons of quicklime per day. Located at Marble City, the plant will augment present facilities at Sallisaw.

Operations began in September at the Republic Gypsum Co. new $4 million, 400,000-square-foot-per-day wallboard plant at Duke.

Total outlay for construction in the first 10 months of 1964 was nearly 5 percent greater than that for the same period in 1963. Residential building was more than 5 percent greater in 1964 than in the comparable period of 1963. Although commercial building continued a downward trend, the total volume was nearly 33 percent ahead of the first 10 months of 1963. Public-utility and public-works construction were up from the same period in 1963; State highway construction was more than 26 percent below the volume at this time a year ago.

Formal dedication ceremonies were held by the U. S. Army Corps of Engineers, Tulsa district, on September 25 at the $120 million Eufaula Dam situated on the South Canadian River, between Haskell and McIntosh Counties. Earlier, on July 1, ceremonies observed closing of the temporary sluices at Keystone Dam, under construction by the Corps of Engineers on the Arkansas River in Tulsa County, as the structure neared completion. The Grand River Dam Authority's newly completed Markham Ferry Project on Grand River, north of Locust Grove in Mayes County, was formally dedicated on October 17.

METALS

Mine production in terms of recoverable lead and zinc, entirely from Ottawa County, decreased nearly 13 percent and 9 percent respectively; value increased more than 7 percent for both lead and zinc. Concentrates recovered in 1964 amounted to 2,780 tons of recoverable lead and 12,100 tons of recoverable zinc.

Smelters.—Three horizontal-retort zinc plants operated in 1963: American Metal Climax, Inc., at Blackwell; The Eagle-Picher Co., at Henryetta; and National Zinc Co., at Bartlesville. In July, National Zinc Co. began a $1 million expansion and repair program at its Bartlesville plant. New furnaces being installed will have 15 percent more capacity than the older furnaces which are being replaced. Standard Magnesium & Chemical Co., Tulsa, largest domestic secondary magnesium smelter was acquired about mid-March by the Kaiser Aluminum & Chemical Corp., Kaiser Chemicals Division.

Tri-State District.—Oklahoma produced 64 percent of the district's lead concentrates and 67 percent of the zinc concentrates; Kansas produced 36 percent of the district's lead concentrate and 33 percent of the zinc concentrate. Output in the southwest Missouri portion of the district was last reported seven years ago.

Some West Spring Creek (Ordovician Arbuckle) Conodonts from Oklahoma

R. W. Harris and Beth Harris

The following described seven conodont species were obtained from acidized residues of West Spring Creek (topmost Arbuckle) Limestone outcrops along U. S. Highway 77, SE¼ SE¼ sec. 24, T. 2 S., R. 1 E., south side of Arbuckle Mountains, Carter County, Oklahoma. At this locality 1,560 feet of West Spring Creek Limestone (Ham, 1955, fig. 1) rests unconformably below the Joins Formation of the basal Simpson Group (Harris, 1962, p. 199).

Neither of two species of *Cordylodus* described by Müller in 1959, from Cambrian Signal Mountain (lower Arbuckle) limestones near this locality, was recovered from the upper half of the West Spring Creek sequence.

SYSTEMATIC DESCRIPTIONS

Order CONODONTOPHORIDA Eichenberg, 1930
Family DISTACODONTIDAE Bassler, 1925

Genus *Acodus* Pander, 1856

Type species: **Acodus erectus** Pander, 1856

Acodus Pander, 1856, Monographie der fossilen Fische des silurischen Systems der russisch-baltischen Gouvernements: St. Petersburg, K. Akad. Wiss., p. 21.

The genus *Acodus* is characterized by a simple, straight to recurved, asymmetrical cusp upon a slightly expanded, subpyramidal base with distinct aboral cavity. Outer surface of cusp is smoothly convex and keeled along both edges; more steeply convex inner surface is subdivided by a near-median keel into somewhat flattened anterior and posterior slopes. The three sharp edges of the cusp are produced through the pyramidal base into three sharp basal corners, so that in both aboral view and cross section the cusp is subtriangular.

Geologic range.—Approximately thirty species of this asymmetrically subtriangular (section) genus have been described from strata of Early Ordovician to Middle Silurian age.

At least four species of the genus occur commonly in West Spring Creek and overlying Joins (basal Simpson) Formations, the following described alate species being most distinctive.

Acodus auritus, new species

Plate I, figures 2a-c

Pyramidal, excavated base with smooth, slender, asymmetrical, subtriangular (section), recurved acodid cusp with its three keeled

edges produced through basal angles into prominent, flattened, subspinose alars or "ears."

In aboral profile the pyramidal base is subtriangular, the outer margin more rounded; the fairly deep aboral cavity is slightly extended laterally into the three corner angles, apex of cavity near anterior face; growth axis is straight.

Cusp is bent abruptly posteriorly (approximately 35 degrees) at position directly above pyramidal base, vertical plane of posterior bend lies within vertical plane through the two outer basal angles. Outer face of cusp smoothly and broadly rounded from median-anterior to median-posterior position. Sharp keels on both edges of cusp are accented along inner side by exceptionally faint bordering channel (posterior keel of holotype possibly faintly channeled also along its outer edge). Inner face of cusp sharply convex and keeled, anterior slope of inner face possibly flatter and wider than posterior slope, although the slopes are essentially equal on pyramidal base.

The distinctive alars, flattened extensions of the three keels at basal angles, are subspinose (posterior especially) and slightly upturned, particularly their lower margins. In dorsal view the anterior alar displays slight inward flexure, the posterior, slight outward flexure; the inner alar projects laterally.

Occurrence.—This distinctive species, in association with other simple, basally alate conodonts, characterizes uppermost West Spring Creek (Arbuckle) and possibly basal Joins (Simpson) strata.

Holotype OMC 139 and paratype OMC 140 from horizon 10 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side of Arbuckle Mountains, Oklahoma.

Remarks.—The distinctive basal "ears" of this acodid, in conjunction with its apparently limited stratigraphic range (Lower and Middle Ordovician), probably justify erection of a new genus, comparable to alate *Pteracontiodus,* new genus (described herein).

The species most closely resembles the Jefferson City form *Acodus delicatus* Branson and Mehl (1933b, p. 56, pl. 4, fig. 10). The original description of this established species states that its inner keel is "high and conspicuous at the base, but rapidly diminishes in height and disappears at about midlength of the blade." The new Oklahoma species differs from the established form in its three alars, its curved, nonflexed blade, and in the fact that its aboral cavity is not elongate posteriorly.

The carinae of the new species extend through basal angles as distinct, indented alars or "ears," not as continuous thin keels, as in *Acodus expansus* Graves and Ellison (1941, p. 8, pl. 1, fig. 6), from middle Marathon of Texas, and *Acodus similaris* Rhodes (1955, p. 124, pl. 10, figs. 7, 10, 14, 16, 18, 23, 26-28, 30), from Keisley Limestone of Great Britain; the base of the new form is much more equally triangular (aboral view) than laterally compressed *A. similaris.*

The trivial name is the Latin word auritus, "eared," referring to the distinctive flattened "ear" of each basal angle.

Genus *Scolopodus* Pander, 1856

Type species: **Scolopodus sublaevis** Pander, 1856

Scolopodus Pander, 1856, Monographie der fossilen Fische des silurischen Systems der russisch-baltischen Gouvernements: St. Petersburg, K. Akad. Wiss., p. 25.

Pander described and illustrated six species of *Scolopodus* when he erected the genus, utilizing as type species the first described and illustrated form, *S. sublaevis*. Although Pander's six species display some common characteristics, at least two genera are represented in the assortment.

Explanation of Plate I

(Magnification x23, except figure 6, x45)

Figure 1. Chosonodina? lunata, **new species**
West Spring Creek holotype OMC 133
a. Anterior surface
b. Posterior surface
c. Oral view

Figure 2. Acodus auritus, **new species**
West Spring Creek holotype OMC 139
a. Inner surface
b. Aboral view
c. Oral view

Figure 3. Pteracontiodus aquilatus, **new species**
West Spring Creek holotype OMC 136
a. Oral view
b. Posterior surface
c. Aboral view

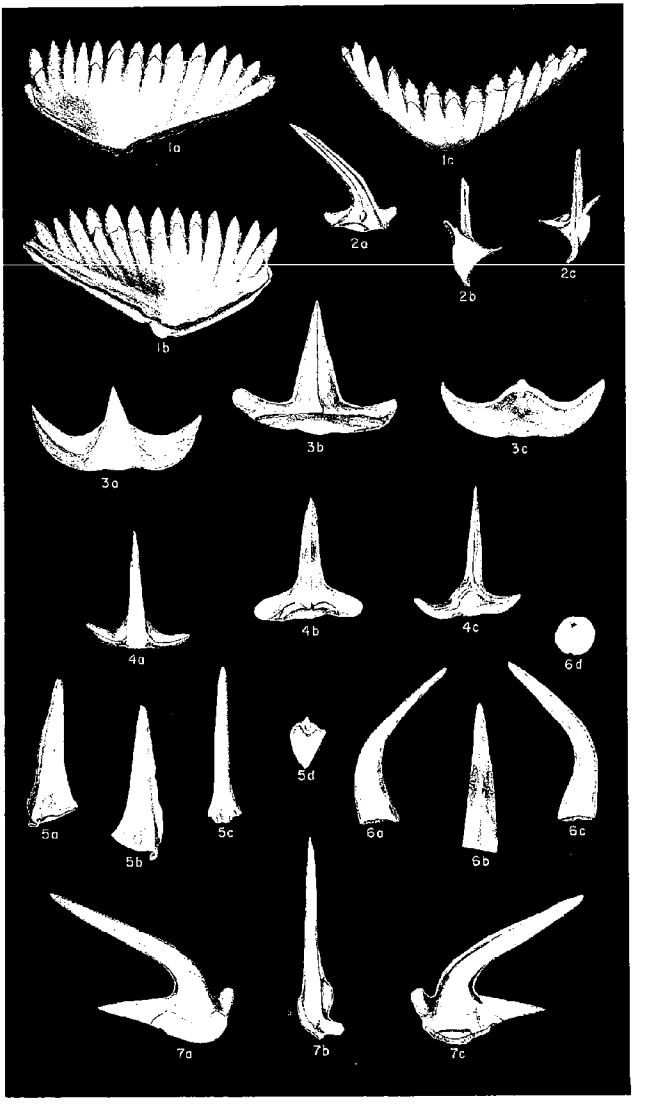
Figure 4. Pteracontiodus exilis, **new species**
West Spring Creek holotype OMC 137
a. Oral view
b. Posterior surface
c. Aboral view

Figure 5. Ulrichodina cristata, **new species**
West Spring Creek holotype OMC 138
a. Lateral surface
b. Opposite lateral surface
c. Anterior surface
d. Aboral view

Figure 6. Scolopodus striolatus, **new species**
West Spring Creek holotype OMC 134
a. Lateral surface
b. Posterior surface
c. Opposite lateral surface
d. Aboral profile

Figure 7. Neomultioistodus compressus, **new species**
West Spring Creek holotype OMC 141
a. Outer surface
b. Oral view
c. Inner surface

Plate I



All six species consist of simple, essentially symmetrical, laterally costate, striate, or grooved, subacicular cusps strongly recurved upon an excavated, nonflaring base. Most of the species are multicostate.

S. sublaevis, the type species, is laterally and posteriorly grooved. Accordingly, Fay (1952, p. 14, fig. 30) and Hass (1962, p. W44, fig. 22-3a, b) considered these features diagnostic of the genus. Lindström (1954, p. 594-595) defined the genus as a multicostate, symmetrical, simple conodont with or without anterior and posterior keels, in contrast to similarly multicostate, although asymmetrical, *Paltodus* Pander. Sweet and others (1959, p. 1063) included in the genus . . . "only bilaterally symmetrical, multicostate simple cones . . . whether or not anterior and posterior margins are round or sharp."

In diagnosing descriptions and illustrations of Pander's six species of *Scolopodus*, *S. sublaevis* (the type species) and *S. striatus*, the two most primitive and conservative species of the group, display several peculiarities not shared as typically by the other four species. In the first place, these two cones are the most acicular or "pinlike," most bilaterally symmetrical; accordingly, their cross section and aboral profiles approach a circle more than do those of other species of the group (thus, oneotodid). Furthermore, the bases of these two species are not only typically subcylindrical and nonflaring, but they appear to be the only bases of the group that are smooth and polished; except for posterior channeling, no ornamentation is on bases of these two species. In the third place, ornamentation of these two species is most conservative and symmetrical on either side of the cusp. A faint furrow characterizes either side of the type cusp, and exceptionally fine striae, *S. striatus*. Other species of the genus are somewhat irregularly multicostate on opposite sides of the cusp. *S. sublaevis* and *S. striatus* apparently are both characterized by posterior channeling that extends from basal margin to distal end of cusp.

In adapting characteristics of the type species and *S. striatus* (and other similar species later described and illustrated) to generic definition, *Scolopodus* may be defined as a subcylindrical, nonflaring, aborally excavated base (in type species smooth and polished) graduated into a bilaterally symmetrical, acicular or "pinlike," symmetrically and conservatively laterally grooved, striated, or corrugated cusp (in type species posteriorly channeled).

Although several species of *Scolopodus* with typical smooth, polished base, posterior channeling, and conservative ornamentation have been reported (including the following species), a more liberal definition of the genus obtains at the present time. Hence, the scolopodid base is not necessarily smooth and polished, nor is the posterior face necessarily channeled. Ornamentation of the genus, however, should be restricted to striae, grooves, and corrugations; scolopodid forms with thin, sharp carinae should be assigned to another genus.

Scolopodus striolatus, new species

Plate I, figures 6a-d

Simple, nonflaring, deeply excavated, smooth, cylindrical base (dark amber in holotype) graduated into tapering, finely striated

(12 to 15 per side) cusp posteriorly recurved at position slightly below midlength. Narrow, shallow fluting or channeling extends along midposterior face from basal margin to end of cusp (channel also striate). Aboral and sectional profiles are subcircular, except for indentation of posterior channel.

Lateral view reveals the base faintly produced and aboral margin slightly reclined posteriorly, thus resulting in slightly longer and more gently inclined oral slope (anterior face of cusp below bend is shorter and more vertical). Apex of deep, conical aboral cavity is near frontal face of cusp. The growth axis is but faintly curved directly above apex of cavity, thence straight to distal end of cusp.

Occurrence.—Rare in upper 260 feet of West Spring Creek sequence.

Holotype OMC 134 and paratype OMC 135 from horizon 53 feet below top of West Spring Creek Formation, 50 yards west of U. S. Highway 77, south side of Arbuckle Mountains, Oklahoma.

Remarks.—The new species closely resembles *Scolopodus filosus* Ethington and Clark (1964, p. 699, pl. 114, figs. 12, 17-19, text-fig. 2E), from El Paso Formation of Texas, in graceful posterior curvature and numerous fine striae; the Oklahoma species differs in its characteristic posterior channeling, and possibly in less flexure of cusp.

The new species also closely resembles *S. striatus* Pander (1856, p. 26, pl. 2, figs. 8a, b), from Lower Ordovician of the Baltics, from which it differs in its more finely striate surface and higher stretch of smoothly polished base; the posterior channel of the new species apparently is more pronounced.

The species resembles also *Scolopodus? peselephantis* Lindström (1954, p. 595, pl. 2, figs. 19, 20, text-fig. 3Q), and Hamar (1964, p. 283, pl. 1, fig. 11), from lowermost Ordovician of Sweden, and Middle Ordovician of Norway, respectively, in its tapering, striated, "pinshaped" cusp, subcircular sectional profile, and nonflaring, smooth, dark base. The Oklahoma form has a higher bend, deeper aboral cavity, and distinct posterior channeling.

The trivial name involves the Latin diminutive striola, "small furrow, line," referring to numerous vertical striae on the cusp.

Genus *Ulrichodina* Furnish, 1938

Type species: **Ulrichodina prima** Furnish, 1938

Ulrichodina Furnish, 1938, Conodonts from the Prairie du Chien (Lower Ordovician beds of the upper Mississippi Valley: Jour. Paleontology, vol. 12, p. 321, 334-336; Lindström, 1954, Conodonts from the lowermost Ordovician strata of south-central Sweden: Geol. Fören. Förhandl., vol. 76, no. 4, p. 556; Fay, 1958, A key to conodont genera and subgenera: Okla. Geology Notes, vol. 18, p. 104, 107, text-fig. 21.
Additional synonymy in Fay, 1952, p. 200.

In 1938 Furnish established *Ulrichodina* for bilaterally symmetrical, smooth to ornate, somewhat laterally flattened, aborally excavated, simple cusps anteriorly thickened and posteriorly keeled, with anterior nose characteristically depressed and creased. Furnish originally

described the type species *U. prima* and two other species from Shakopee (upper Prairie du Chien) strata from Wisconsin and Minnesota.

Branson and Mehl (1933b, p. 57, pl. 4, fig. 25) had previously described from Jefferson City strata of Missouri *Acontiodus abnormalis* that later was assigned to the genus *Ulrichodina* by Mehl and Ryan (*in* Branson, 1944, pl. 6, figs. 4-8) in association with three other undescribed species of the genus from Jefferson City strata of Missouri.

Graves and Ellison (1941, p. 5, 7, pl. 2, fig. 11) recorded and illustrated *Ulrichodina* sp. from Ft. Peña (Middle Ordovician) strata of southwestern Texas. This subcylindrical, elongate, costate form does not appear to be typical *Ulrichodina* in lower Ordovician strata. If so, then the geologic range of the genus must be extended to include Middle Ordovician.

Fay (1952, p. 14; 1958, p. 104) mentioned that lateral faces of *Ulrichodina* may be costate and that the anterior nose is extended and depressed below base line, thus resembling a blunt anticusp.

Lindström (1954, p. 556) noted resemblance of Lower Ordovician Swedish *Distacodus peracutus* to *Ulrichodina wisconsinensis* Furnish (Shakopee strata), except for the characteristic ulrichodinid depression at anterobasal angle. Lindström suggested the possibility that *Ulrichodina* may be a synonym of *Distacodus*.

The following described new species of *Ulrichodina*, from uppermost Arbuckle of Oklahoma, conforms with the typical laterally flattened, anteriorly thickened, posteriorly keeled ulrichodinids with anterior nose depressed below base line, as reported from Prairie du Chien and Jefferson City Lower Ordovician strata of Wisconsin, Minnesota, and Missouri.

Ulrichodina cristata, new species
Plate I, figures 5a-d

Simple, smooth, laterally flattened, symmetrical, anteriorly rounded, thickened, and keeled, posteriorly compressed and keeled, aborally excavated cusp with depressed anterior nose extended below basal plane.

Base of cusp is slightly flared laterally; aboral cavity shallow, with apex near anterior face; growth axis distinct, straight; aboral profile subtriangular to heart shaped. In lateral profile aboral margin is inclined anteriorly.

Anterior face bluntly curved into sloping, flattened sides. Prominent anteromedian keel extends from tip of cusp to upper edge of depression in basal nose. Sides are smooth, not striate nor costate. Posterior edge is sharply keeled throughout its length.

Occurrence.—Recovered from single horizon 165 feet below top of West Spring Creek Formation.

Holotype OMC 138 from horizon 165 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side of Arbuckle Mountains, Oklahoma.

Remarks.—The species is distinctive in its frontal keel, thus differing from all described species of the genus, including *U. prima* Furnish and *U. wisconsinensis* Furnish. The new species lacks the few

fine striations such as those on anterior face of *U. abnormalis* (Branson and Mehl). It does not have heavy lateral plications as has *Ulrichodina* sp. illustrated by Mehl and Ryan (*in* Branson, 1944, pl. 6, figs. 1-3).

The trivial name is the Latin word cristata, "tufted, crested," referring to the distinguishing keel along anterior face of the cusp.

Genus *Pteracontiodus*, new genus

Type species: **Pteracontiodus aquilatus**, new species

Symmetrical, smooth to ornate, aborally excavated, simple, subtriangular to subrhomboidal (section) acontiodid to distacodid cusp with lateral angles produced into distinct, flaring, terminally rounded to subacute processes (not denticles).

Geologic range.—Lower and Middle Ordovician.

Remarks.—Anterior face of the erect to recurved, symmetrical cusp may be angled, flattened, or rounded, with or without a central keel; lateral edges may be blunted or keeled. The posterior face may be simply concave or bluntly to sharply angled, with or without a central keel; postmedian basal angle (if present) is simple, spinose, or alate. The distinct aboral cavity extends into lateral alars that are terminally rounded to pointed, although not developed into true denticles; in lateral projection the alars may bend at an angle.

The new genus differs from *Acontiodus* Pander (1856, p. 28) and *Distacodus* Hinde (1879, p. 357) essentially in its produced, alate lateral processes.

The generic name is formed from the Greek word pteron, "feather, wing," as prefix to established genus *Acontiodus*, the combination meaning winged *Acontiodus*.

Pterocontiodus aquilatus, new species
Plate I, figures 3a-c

Relatively stout, wide, basally flaring, symmetrical conodont consisting of a laterally expanded, subpyramidal, excavated base with a short, wide, symmetrical, triangular (section) central cusp posteriorly inclined at angle of approximately 35 degrees, with its lateral angles extended and produced into strongly recurved, subacutely rounded, alate processes. Anterior face of cusp is but faintly convex, slightly depressed within peripheral keels; anterior nose of cusp slightly depressed and produced, though gradually rounded into thickened, recurved lateral wings. Posterior face of cusp acutely angled and keeled; lateral slopes evenly and faintly convex; bluntly pointed median basal angle produced posteriorly into line with tips of lateral wings. Lateral wings narrow in height, with upper and lower surfaces essentially parallel. Subpyramidal aboral cavity central and shallow, with apex near anterior face; growth axis distinct and straight. In aboral cavity traces of expanding growth rings may be observed extending into lateral wings.

Occurrence.—Rare in uppermost 15 feet of West Spring Creek Formation.

Holotype OMC 136 from horizon 10 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side Arbuckle Mountains, Oklahoma.

Remarks.—The new species is readily recognizable by its symmetrical shape, short, stout central cusp, and widely flaring, strongly recurved lateral wings.

The new species differs from *Distacodus rhombicus* Lindström (1954, p. 556, pl. 3, figs. 35, 36) in flatter anterior face (without central keel), much more erect cusp, distinct recurved lateral wings, and wider aboral cavity.

Stauffer (1935b, p. 615) observed that aboral surface of asymmetrical, tuberculate, platelike *Polyplacognathus* displays growth lines, apparently similar to those in this new West Spring Creek species.

The new species has a shorter, wider, more robust cusp, flatter anterior face, and much more recurved lateral alars than has the contemporary species, *Pteracontiodus exilis*, new species.

The trivial name is derived from the Latin word aquila, "eagle," and suffix atus, "resembling," the combination (eaglelike) referring to the beaklike cusp and its recurved, talonlike alars.

Pteracontiodus exilis, new species
Plate I, figures 4a-c

Laterally expanded, subpyramidal base with rather abruptly recurved (beyond 45 degrees), slender, elongate cusp sloping into thin, subrounded alars at basal lateral angles.

Anterior face of cusp strongly convex, with lateral keels in midaxial line. Posterior face subacutely angled, lateral slopes gently convex on either side of a distinct median keel; slopes and keel are abruptly produced into an apically pointed, subpyramidal projection at midbasal angle. In frontal view the lateral alars curve slightly below base line of cusp, resulting in a somewhat sinuous frontal aboral profile. The aboral cavity is wide and symmetrically conical in frontal view, extending relatively deep into cusp; its apex near front face. Aborally the cavity spreads into the lateral alars.

Occurrence.—In upper 80 feet of West Spring Creek Formation.

Holotype OMC 137, from horizon 75 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side of Arbuckle Mountains, Oklahoma.

Remarks.—The cusp of this species is more slender, elongate, subcylindrical (subcircular section) than that of *Pteracontiodus aquilatus*, new species; furthermore, its alars are thinner, more spatulate and pendant, and not so strongly recurved posteriorly.

The trivial name is the Latin word exilis, "thin, slender, weak," referring to the slender cusp and alars of the conodont.

Family MULTIOISTODIDAE Harris, 1964

Genus *Multioistodus* Cullison, 1938
Subgenus *Neomultioistodus*, new subgenus

Type species: **Neomultioistodus compressus**, new species

Subpyramidal, excavated base, with simple, asymmetrical scan-

dodid to subdrepanodid cusp with anterior and posterior keels extended into basal angles, where they are developed into distinct, subspinose alars to elongate denticles.

Geologic range.—Lower and Middle Ordovician.

Remarks.—This subgenus is a descendant of scandodid subgenus *Multioistodus* Harris (1964, p. 110), through the expedient of having developed an anterior alar, spine, or denticle. Thus, *Multioistodus*, with posteriorly projecting basal spine, becomes *Neomultioistodus* with addition of an anterior alar or spine.

The new subgenus differs from *Dirhadicodus* Harris (1964, p. 114), which also has two basal denticles, in at least three respects: the cusp of *Dirhadicodus* is acodid (not scandodid to subdrepanodid); *Dirhadicodus* lacks an anterior denticle, its two denticles originating from posterior and inner lateral basal angles; and the two denticles of *Dirhadicodus* project essentially posteriorly (anterior alar or spine of the new genus may project laterally and upward; possibly distally recurving posteriorly in some species).

The new subgenus differs essentially from *Strachanognathus* Rhodes (1955, p. 131) in that its basal denticles developed from an acontiodid to subdrepanodid cusp (rather than a single anterior denticle upon a drepanodid cusp).

Amsden and Miller (1942, p. 303, pl. 41, figs. 12, 13, 16) recorded and illustrated an incomplete simple cone with anterior basal denticle as *Polycaulodus* sp. from Bighorn (Middle Ordovician) strata of Wyoming. In lateral views this form appears to be a strachanognathid, with single anterior denticle (not bearing both anterior and posterior alars or denticles).

At least three species of the new subgenus were recovered from West Spring Creek strata in the Arbuckle Mountains.

The subgeneric name, involving the Greek prefix neo, implies development from the subgenus *Multioistodus*.

Neomultioistodus compressus, new species
Plate I, figures 7a-c

Flattened, excavated, subpyramidal base (lateral view) with elongate, slender, smooth, bicarinate, straight, asymmetrical, scandodid cusp recurved directly above base in basal plane at 45-degree angle.

Outer face of cusp broadly rounded, its leading edge produced as a fairly wide keel that is accented by undercut inner face; this anterior keel is continued basally across edges of a short, compressed, inwardly flexed, subacute anterobasal spine that projects forward, inward, and upward. The sharp, straight, narrow posterior keel is extended basally through posterior angle as a short, compressed, posteriorly projecting spine with straight, sloping upper margin and horizontal lower margin.

Aboral profile of base subelliptical, the inner margin flatter; the profile of outer aboral margin is sinuous because of indentations separating basal spines from central rounded basal margin of cusp. Relatively deep aboral cavity extends into the basal angles; apex of cavity at bend of cusp; growth axis distinct and straight.

Inner face of cusp broadly and gently convex, flattened along overhang of anterior keel.

Occurrence.—Uppermost 50 feet of West Spring Creek Formation.

Holotype OMC 141 from horizon 40 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side of Arbuckle Mountains.

Remarks.—This species is characterized by its short, flattened spines projecting from angles of the laterally flattened base.

The species differs from *Dirhadicodus lateralis* (Cullison), from Dutchtown of Missouri and lower Simpson of Oklahoma, in having shorter, compressed spines projecting from base in opposite directions (not both projecting posteriorly).

The trivial name is the Latin word compressus, "squeezed, pressed together," referring to the laterally compressed base of the conodont.

Family COLEODONTIDAE Branson and Mehl, 1944
Subfamily COLEODONTINAE Branson and Mehl, 1944

Genus *Chosonodina* Müller, 1964

Type species: **Chosonodina herfurthi** Müller, 1964

Chosonodina Müller, 1964, Conodonten aus dem unteren Ordovizium von Südkorea: N. Jb. Geol. Paläont., Abh., vol. 119, p. 99.

This genus was established to include a subsymmetrical, concavo-convex (back-front), fanshaped, multidenticulated Lower Ordovician form with elongate, distally widened cavity extending the entire length of the curved aboral edge.

The type species *C. herfurthi,* displays seven fused denticles, terminally discrete; the central denticle is thickened basally on the posterior surface. The aboral cavity widens distally on the two limbs.

Geologic range.—Lower Ordovician.

Remarks.—The West Spring Creek specimen described herein as *C.? lunata,* new species, is a multidenticulate, bladelike, laterally bowed, coleodid form with fused (terminally discrete), compressed, essentially uniform denticles (central denticle nonspecialized). A narrow groove of essentially uniform width extends the length of the thin, platelike, bowed aboral surface, as in *Coleodus* Branson and Mehl (1933a, p. 24).

Although Müller assigned *Chosonodina* to the family Westergaardodinidae Müller, 1959, the Oklahoma form apparently descended from flattened, straight *Coleodus* (with fused denticles) by development of a bowed axis and terminally discrete denticles (growth axes distinct in all denticles of holotype).

The form differs from *Neocoleodus* Branson and Mehl (1933a, p. 24) in the same respect as does *Coleodus;* that is, denticles of the new form are less discrete, and they are more compressed, not subcylindrical.

The new form is more primitive than Middle Ordovician *Chirognathus* Branson and Mehl (1933a, p. 28) and *Leptochirognathus* Bran-

son and Mehl (1943, p. 377). The new form is not as palmate, and its aboral cavity is not centralized as in the former genus; it lacks the inflated basal ridge, central aboral process, and specialized denticles of the latter.

Upper Ordovician *Rhipidognathus* Branson, Mehl, and Branson (1951, p. 10) displays a thickened, trowel-like anteromedian aboral process, thickened ridge at base of denticles, and a short, vertical ridge at base of inner face, all evolutionary developments beyond the new West Spring Creek form.

Chosonodina lunata, new species

Plate I, figures 1a-c

Thin, asymmetrical, bladelike coleodid form with twelve to fifteen uniform, narrow, compressed, fused denticles (distally free). The form is strongly bowed posteriorly (slightly bowed vertically), resulting in a concave posterior face. An aboral groove of uniform width and depth extends the length of the curved base. Growth axes are distinctly visible in all denticles.

Occurrence.—Two specimens recovered from uppermost 15 feet of West Spring Creek outcrops, Arbuckle Mountains, Oklahoma.

Holotype OMC 133, from horizon 12 feet below top of West Spring Creek Formation, in outcrop 50 yards west of U. S. Highway 77, south side Arbuckle Mountains, Oklahoma.

Remarks.—This species is a bowed development of contemporary primitive and flattened *Coleodus* in West Spring Creek strata. The entire form is thin and fragile, including the platelike base. Inner surface is essentially smooth for at least half the height of the conodont; no distinct inflation occurs along base of denticles. Although depressions separate denticles and corrugate the upper part of the form, the denticles are discrete only at termini. The holotype displays thirteen denticles of uniform width and compression (longer arm of bow has seven inclined denticles beyond central denticle; shorter arm, five). Central denticles are longer, the others progressively shorter laterally.

The narrow, relatively deep aboral groove is depressed between thin, fragile, platelike rims. The outer rim is slightly wider and apparently bears a faint, pinched, pitted process at anterobasal nose. A faint, circular depression is suggested on posterior face directly within basal nose.

The Oklahoma species is less symmetrical than is *C. herfurthi* and differs further in having more numerous denticles, all of which are more uniform and more smoothly fused (with growth axes); the central denticle is not basally thickened. Furthermore, the aboral cavity of the new species is more uniform in width.

The species resembles *Chirognathus multidens*, described from Harding Formation of Colorado (Branson and Mehl, 1933a, p. 34, pl. 2, fig. 43; Sweet, 1955, p. 239, pl. 27, fig. 1), Glenwood of Minnesota (Stauffer, 1935a, p. 138, 139, pl. 9, figs. 39, 40), and Bighorn of Wyoming (Amsden and Miller, 1942, p. 303, pl. 41, fig. 28), in its

dozen or more denticles inclined upon a narrow base, but the new species has longer and more uniform denticles, less specialized central denticle, and an elongate, narrow coleodid groove (not centralized).

The new species is so simple in coleodid characteristics of uniformly fused, nonspecialized denticles, and narrow, uniform aboral cavity that its assignment to the genus *Chosonodina* is questioned herein.

The trivial name is the Latin word lunata, "lunate, shaped like a crescent moon," referring to the bowed axis of the conodont.

Selected References

Amsden, T. W., and **Miller, A. K.,** 1942, Ordovician conodonts from the Bighorn Mountains of Wyoming: Jour. Paleontology, vol. 16, p. 301-306, pl. 41, 2 figs.

Ash, S. R., 1961, Bibliography and index of conodonts, 1949-1958: Micropaleontology, vol. 7, p. 213-244, table.

———— 1963, Bibliography and index of conodonts, 1959-1963: Brigham Young Univ., Geol. Studies, vol. 10, p. 3-50.

Bergström, S. M., 1961, Conodonts from the Ludibundus limestone (Middle Ordovician) of the Tvären area (S. E. Sweden): Arkiv för Mineralogi och Geologi (K. Svenska Vetenskapsakademien), vol. 3, no. 1, p. 1-61, pls. 1-5.

Branson, E. B., 1944, The geology of Missouri: Mo., Univ., Studies, vol. 19, no. 3, 535 p., 49 pls., 48 text-figs.

Branson, E. B., and **Mehl, M. G.,** 1933a, Conodonts from the Harding sandstone of Colorado: Mo., Univ., Studies, vol. 8, no. 1, p. 19-38, 2 pls.

———— 1933b, Conodonts from the Jefferson City (Lower Ordovician) of Missouri: Mo., Univ., Studies, vol. 8, no. 1, p. 53-64, pl. 4, map.

———— 1943, Ordovician conodont faunas from Oklahoma: Jour. Paleontology, vol. 17, p. 374-387, pls. 63, 64.

Branson, E. B., Mehl, M. G., and **Branson, C. C.,** 1951, Richmond conodonts of Kentucky and Indiana: Jour. Paleontology, vol. 25, p. 1-17, 2 pls., 2 figs., table.

Ellison, S. P., Jr., 1946, Conodonts as Paleozoic guide fossils: Amer. Assoc. Petroleum Geologists, Bull., vol. 30, p. 93-110.

———— 1962, Annotated bibliography and index of conodonts: Texas, Univ., Pub. 6210, 128 p., 6 pls.

———— 1963, Supplement to annotated bibliography and index of conodonts: Texas Jour. Science, vol. 15, p. 50-67.

Ethington, R. L., 1959, Conodonts of the Ordovician Galena formation: Jour. Paleontology, vol. 33, p. 257-292, pls. 39-41, 2 text-figs., 2 tables.

Ethington, R. L., and **Clark, D. L.,** 1964, Conodonts from the El Paso Formation (Ordovician) of Texas and Arizona: Jour. Paleontology, vol. 38, p. 685-703, pls. 113, 114, 2 figs.

Fay, R. O., 1952, Catalogue of conodonts: Kans., Univ., Paleont. Contr. [no. 12], Vertebrata, art. 3, 206 p., 109 figs.

———— 1958, A key to conodont genera and subgenera: Okla. Geol. Survey, Okla. Geology Notes, vol. 18, p. 103-120, 132 figs.

Furnish, W. M., 1938, Conodonts from the Prairie du Chien (Lower Ordovician) beds of the upper Mississippi Valley: Jour. Paleontology, vol. 12, p. 318-340, pls. 41, 42, 2 figs.

Graves, R. W., Jr., and **Ellison, S. P., Jr.,** 1941, Ordovician conodonts of the Marathon basin, Texas: Mo., Univ., School Mines Metallurgy, Bull., Tech. Ser., vol. 14, no. 2, p. 1-16, pls. 1-3.

Ham, W. E., 1955, Field conference on geology of the Arbuckle Mountain region: Okla. Geol. Survey, Guidebook III, 61 p., 21 figs., 1 table, map.
Hamar, György, 1964, The Middle Ordovician of the Oslo region, Norway 17. Conodonts from the lower Middle Ordovician of Ringerike: Norsk Geologisk Tidsskrift, vol. 44, pt. 2, p. 243-292, 6 pls., 6 figs., table.
Harris, R. W., 1962, New conodonts from Joins (Ordovician) Formation of Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 22, p. 199-211, 1 pl., 2 text-figs.
———— 1964, Subgenera of the conodont genus **Multioistodus** in Simpson-Burgen (Ordovician) of Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 24, p. 108-118, 1 pl.
Hass, W. H., 1962, Conodonts, in Miscellanea, pt. W of Moore, R. C., ed., Treatise on invertebrate paleontology: Geol. Soc. America and Univ. Kans. Press, p. 3-69, figs. 1-42.
Hass, W. H., Häntzschel, Walter, Fisher, D. W., Howell, B. F., Rhodes, F. H. T., Müller, K. J., and **Moore, R. C.**, 1962, Miscellanea, pt. W. of Moore, R. C., ed., Treatise on invertebrate paleontology: Geol. Soc. America and Univ. Kans. Press, p. 1-98, 49 figs.
Hinde, G. J., 1879, On conodonts from the Chazy and Cincinnati group of the Cambro-Silurian and from the Hamilton and Genesee shale divisions of the Devonian, in Canada and the United States: Geol. Soc. London, Quart. Jour., vol. 35, p. 351-369, pls. 15-17.
Lindström, Maurits, 1954, Conodonts from the lowermost Ordovician strata of south-central Sweden: Geologiska Föreningens, Stockholm, Förhandlingar, vol. 76, no. 4, p. 517-604, pls. 2-10, 4 figs., range chart.
Lochman, Christina, 1964, Basal Ordovician faunas from the Williston basin, Montana: Jour. Paleontology, vol. 38, p. 455, 459, 474, pl. 65, figs. 8-10.
Müller, K. J., 1959, Kambrische Conodonten: Deutsche Geologische Gesellschaft, Zeitschrift, vol. 111, p. 434-485, pls. 11-15, 11 text-figs., 3 tables.
———— 1964, Conodonten aus dem unteren Ordovizium von Südkorea: Neues Jahrbuch Geologie Paläontologie, Abhandlungen, vol. 119, p. 93-102, pls. 12, 13, text-fig.
Pander, C. H., 1856, Monographie der fossilen Fische des silurischen Systems der russisch-baltischen Gouvernements: St. Petersburg, K. Akademie Wissenschaft, 91 p., 7 pls.
Rhodes, F. H. T., 1955, The conodont fauna of the Keisley limestone: Geol. Soc. London, Quart. Jour., vol. 111, p. 117-142, pls. 7-10.
Ryan, W. A., 1940, Some Jefferson City conodonts from Missouri: Mo., Univ., unpublished Master of Science thesis.
Sergeeva, S. P., 1963, Conodonts from the Lower Ordovician of the Leningrad region: Paleontologicheskii Zhurnal [1963], no. 2, p. 93-108, 11 text-figs., pls. 7, 8.
Stauffer, C. R., 1935a, Conodonts of the Glenwood beds: Geol. Soc. America, Bull., vol. 46, p. 125-168, pls. 9-12.
———— 1935b, The conodont fauna of the Decorah shale: Jour. Paleontology, vol. 9, p. 596-620, pls. 72-75, correlation chart.
Sweet, W. C., 1955, Conodonts from the Harding formation (Middle Ordovician) of Colorado: Jour. Paleontology, vol. 29, p. 226-262, pls. 27-29, 17 text-figs., 2 tables.
Sweet, W. C., and **Bergström, S. M.**, 1962, Conodonts from the Pratt Ferry Formation (Middle Ordovician) of Alabama: Jour. Paleontology, vol. 36, p. 1214-1252, pls. 168-171, 5 figs., table.
Sweet, W. C., Turco, C. A., Warner, Earl, Jr., and **Wilkie, L. C.**, 1959, Eden conodonts from the Cincinnati region of Ohio and Kentucky, pt. 1 of The American Upper Ordovician standard: Jour. Paleontology, vol. 33, p. 1029-1068, pls. 130-133.

F. Mabry Hoover
1902-1964

Mabry Hoover was born to Mr. and Mrs. James F. Hoover on May 23, 1902, in Mountain View, Oklahoma, where he attended grade school and high school. He entered The University of Oklahoma in September 1920 and received a B. S. degree in Geology in 1925. He served as laboratory assistant in geology and as geological assistant, Oklahoma Geological Survey, while completing his degree requirements. He was active in band and cross-country track and was a member of Sigma Gamma Epsilon, honorary geology fraternity, and Kappa Kappa Phi.

On August 11, 1933, Mabry was united in marriage with Roberta L. Scott at Pratt, Kansas. On May 12, 1934, their first child, Jean Roberta, was born. Their second child, Susan Evelyn, was born August 26, 1936. Jean Roberta is now Mrs. Larry D. Horner, Overland Park, Kansas, and Susan Evelyn is Mrs. Willis H. Ellis, Denver, Colorado.

Mabry had a long and fruitful career in petroleum geology and geophysics. In September 1926, he became a geological trainee for Empire Gas and Fuel Company. He was promoted to geologist in 1927 and served in the Shawnee, Oklahoma, office for two years. In May 1929, he was named district geologist for Empire Oil and Refining Company at Ardmore, Oklahoma, and in January 1933 he became district geologist in the Oklahoma City office. From March 1933 to February 1936, he was assistant observer, computer, interpreter, and party chief for a geophysical party in western Kansas. In February 1936, he returned to Oklahoma City as district geologist for Empire Oil and Refining Company, which became Cities Service Oil Company in 1937. He remained in that capacity until May 1953, at which time he was named division research geologist, Mid-Continent Division. In 1955 his area was expanded to include the Rocky Mountains and Appalachian regions. He retired from Cities Service in 1963 and became an independent geologist.

As is normal with many major-oil-company geologists, his publications are limited in number. His major contributions are incorporated in the files of Cities Service Oil Company. He was active in the development of many Oklahoma oil fields, including West Edmond,

Pauls Valley, Maysville, and Lindsay. Much of his time was spent working with young geologists and junior engineers, and he has been described by them as a wonderful teacher and an excellent geologist.

Mabry was active in civic, professional, and church organizations. He was a member of Oklahoma City Chamber of Commerce; district representative, American Association of Petroleum Geologists; member Oklahoma City Geological Society and Ardmore Geological Society; member Oklahoma City Home Workshop Club; member Sportsman's Club; member University of Oklahoma Alumni Association and Dads' Club; past vice president, Monticello Dads' Club; member Oklahoma Camera Club; and member St. Paul's Episcopal Cathedral, Oklahoma City.

Mabry's hobbies included woodworking, camping, fishing, and photography, and he excelled in all of these. Most of all, he loved people. He will be remembered by many as a gracious host and a loyal friend.

In June 1964, the Hoovers left Oklahoma City for a summer vacation in the Rocky Mountains region. Loaded with fishing and camping equipment, they headed for Denver, where they spent a few days with their daughter and her family. From there they traveled to Yellowstone Park, where they spent several weeks, after which they continued northward to Banff, Alberta. On the night of their arrival in Banff, July 18, Mabry suffered a serious heart attack. He spent seven weeks in the hospital there and recovered sufficiently to start the journey home. While stopping at a service station in Laramie, Wyoming, on September 12, Mabry suffered a fatal heart attack. Death came instantly and without pain.

Because of his love of the Rocky Mountains region and his fondness for Laramie and the University of Wyoming, it was decided to make Laramie his final resting place. Services were held on September 15, 1964, at St. Matthew's Cathedral, and he was laid to rest in Laramie. Survivors include his widow, Roberta L.; two daughters, Jean Roberta Horner and Susan Evelyn Ellis; his mother, Mrs. James F. Hoover; a brother, J. S. Hoover; and four grandchildren. His death was unexpected and his passing was a great shock to his family and friends.

—G. G. H.

New Theses Added to O. U. Geology Library

The following Master of Science thesis was added to The University of Oklahoma Geology Library in January 1965.

Regional surface and subsurface study of the Marmaton Group, Pennsylvanian (Desmoinesian), of northeastern Oklahoma, by J. Glenn Cole.

Schizophoria oklahomae

CARL C. BRANSON

The brachiopod genus *Schizophoria* was named by King (1850, p. 105, 106), with type species designated as *Conchyliolithus Anomites resupinatus* Martin, 1809. Martin's specimens were from the Lower Carboniferous (Mississippian) of England. His illustrations (pl. 49, figs. 13, 14) appear to be of a shell generically like ours.

The species *Schizophoria oklahomae* was described by Dunbar and Condra (1932, p. 58-59, pl. 24, figs. 3-5) from Wapanucka Limestone in Oklahoma "about 15 miles southeast of Ada" upon the basis of two designated cotypes, both interiors of the ventral valve. Another illustrated specimen is a ventral valve from Vian, Sequoyah County, Oklahoma. Mather's *S. resupinoides* was in part (Mather, 1915, pl. 8, fig. 8) referred to the species (Dunbar and Condra, 1932, p. 57-58). Mather's specimen came from the Morrow Group, 3 miles northwest of Gore, Muskogee County, Oklahoma.

S. oklahomae seems to be the youngest authentic member of the genus. The related genus *Orthotichia* Girty can receive such higher Pennsylvanian species as *O. morganiana* (Derby), the type species, *O. schucherti* Girty, and some of the Permian species.

A fine specimen of a ventral valve is in our collection (OU 4529). The interior is well preserved and is illustrated (fig. 1). The dental lamellae and muscle scars are highly developed. Much of the shell surface carries specimens of the sessile foraminifer *Minammodytes*, and this occurrence is the oldest yet reported. The exterior of the valve is nearly covered by concretionary deposits.

The specimen was collected by Allen Graffham from a blue shale zone in the Wapanucka Limestone on Canyon Creek in NW¼ SW¼ sec. 8, T. 1 N., R. 7 E., Pontotoc County, Oklahoma. This would appear to be the type locality of the species as it is approximately "15 miles southeast of Ada."

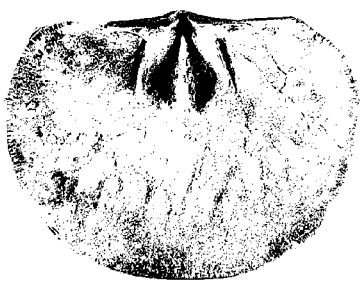


Figure 1. Interior of a ventral valve of Schizophoria oklahomae, **x1, OU 4529. Wapanucka Limestone, Pontotoc County, Oklahoma.**
(Photograph by Jan Cannon)

References Cited

Dunbar, C. O. and **Condra, G. E.**, 1932, Brachiopoda of the Pennsylvanian System in Nebraska: Nebr. Geol. Survey, Bull. 5, 2d ser., 377 p.

King, William, 1850, A monograph of Permian fossils: Palaeont. Soc. London.

Martin, William, 1809, Petrificata Derbiensia, **or** Figures and descriptions of petrifications collected in Derbyshire: Wigan, England, D. Lyon.

Mather, K. F., 1915, The fauna of the Morrow Group of Arkansas and Oklahoma: Denison Univ., Sci. Laboratories, Bull., vol. 18, p. 59-284.

Resume of New Nomenclature Published in Oklahoma Geology Notes

January 1964 through December 1964

The following is a list of new taxa published in *Oklahoma Geology Notes* during 1964. It supplements lists published in January 1962 and December 1963.

NAME	AUTHOR	VOLUME	PAGES
Plantae (microfossils)			
Lycospora intermedia, n. comb.	Wilson & Hoffmeister	24	33-35
Potonieisporites elegans, n. comb.*	Wilson & Venkatachala	24	67-68
Trilobita			
Encrinuroides capitonis, n. sp.	Frederickson	24	71-75
Calliops divaricatus, n. sp.			
Homotelus bromidensis, n. sp.	Esker	24	195-209
Dolichoharpes procliva, n. sp.			
Eoceraurus, n. subgen.			
Ceraurus (Eoceraurus) trapezoidalis, n. sp.			
Pandaspinapyga salsa, n. sp.			
Amphilichas subpunctatus, n. sp.			
Vertebrata			
Helicampodus changhsingensis, n. comb.*	Branson	24	78-80
Goniopholis stovalli, n. sp.	Mook	24	283-287
Blastoidea			
Decaschismatinae, n. subfam.	Fay	24	81-90
Hyperoblastinae, n. subfam.			
Sphaeroschismatinae, n. subfam.			
Heteroschismatinae, n. subfam.			
Microblastinae, n. subfam.			
Sagittoblastinae, n. subfam.			
Pentremitideinae, n. subfam.			

*Not an Oklahoma form.

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