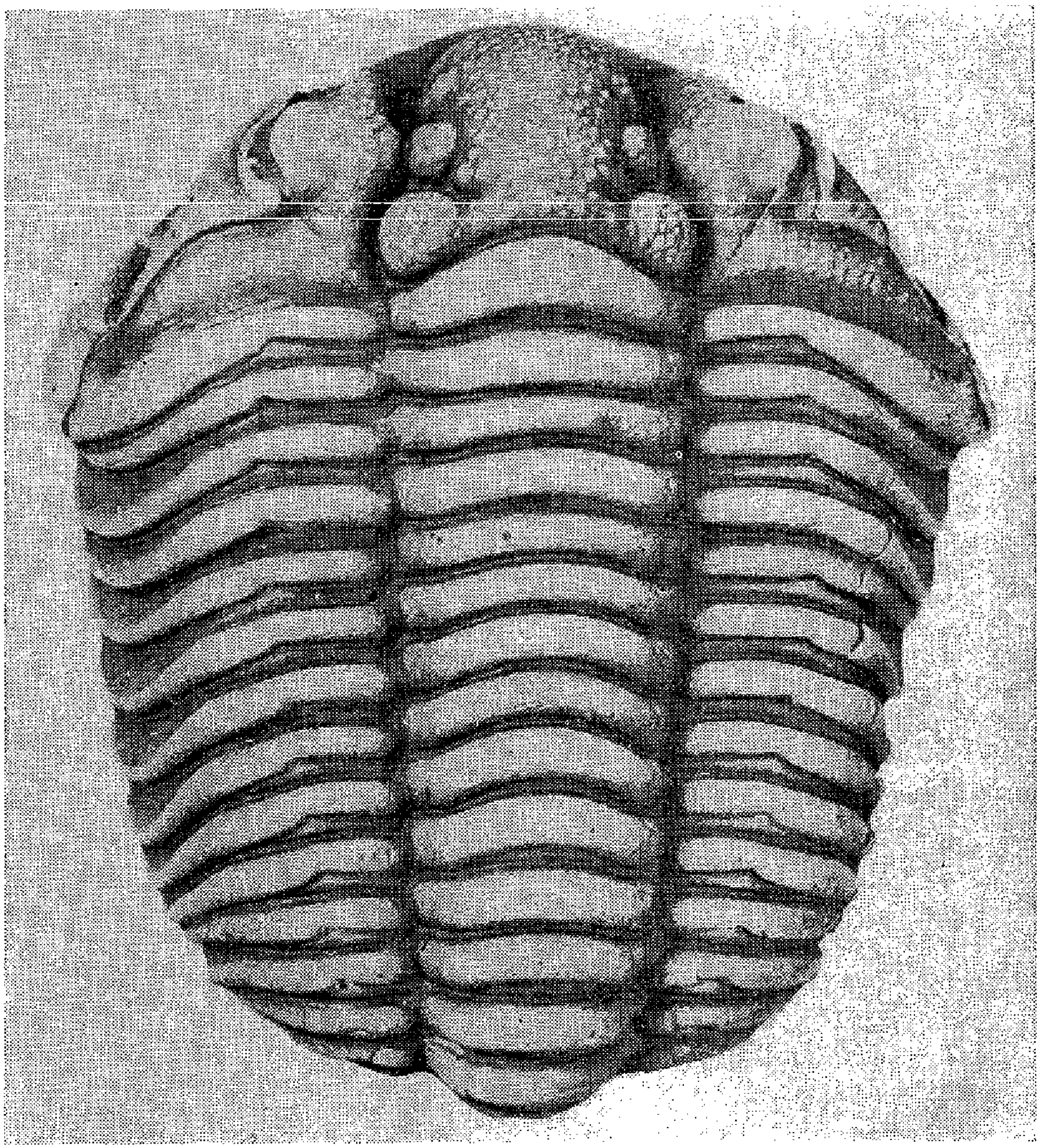
OKLAHOMA GEOLOGY NOTES



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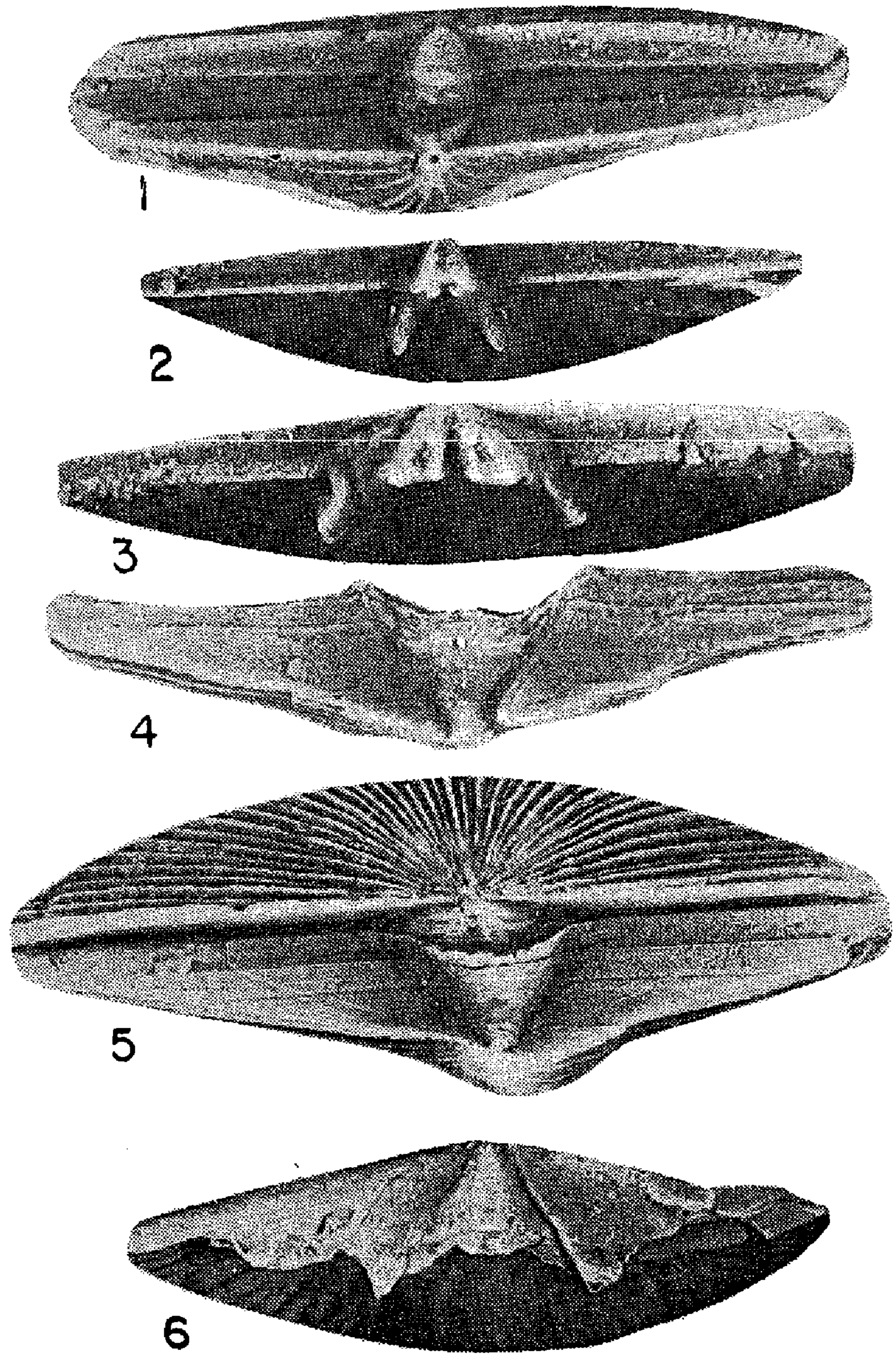

PLATE I

FIGURE 1. *Chilidiopsis reedsi* (Amsden); posterior view, x 8 (OU 3126); Henryhouse formation, SE¼ sec. 4, T. 2 N., R. 6 E., Pontotoc Co., Okla. (TWA P3-P).

FIGURE 2. *C. reedsi* (Amsden); posterior view of brachial valve, x 8 (OU 3125); Henryhouse formation, NW¼ SW¼ sec. 4, T. 2 N., R. 6 E., Pontotoc Co., Okla. (TWA P1-R).

FIGURE 3. *Schuchertella attenuata* (Amsden); posterior view of brachial valve, x 8, (OU 1098); Henryhouse formation (Amsden 1958, pl. 14, fig. 31).

FIGURE 4. *S. attenuata* (Amsden); pedicle palintrope, x 8 (OU 1099); Henryhouse formation (Amsden 1958, pl. 14, fig. 29).

FIGURE 5. *Schuchertella haraganensis* Amsden; posterior view, x 5 (OU 1116); Haragan formation (Amsden 1958, pl. 13, figs. 18-20).

FIGURE 6. *Schellwienella marcidula* Amsden; pedicle palintrope, x 3, (OU 996); Bois d'Arc formation (Amsden 1958, pl. 5, fig. 5).

Chilidiopsis Boucot: A Recently Described Brachiopod Genus, With Some Remarks on the Hunton Orthotetacea

THOMAS W. AMSDEN

In a recent issue of the Journal of Paleontology A. J. Boucot (1959, p. 25-26) has erected a new genus, *Chilidiopsis*, the type species being *Fardenia reedsi* Amsden (1951, p. 84, pl. 17, figs. 1-8) from the Henryhouse formation of Oklahoma. This genus embraces almost all of the American Silurian orthotetacids which were formerly assigned to Lamont's genus, *Fardenia*; in addition to the genotype, it includes *Schuchertella roemeri* Foerste (1909, p. 82-83, pl. 2, figs. 27a-c; Amsden 1949, p. 53, pl. 5, figs. 23-28) from the Brownsport formation, *Strophomena subplana* Conrad (1842, p. 258) from the Lockport formation, and *Strophomena alterniradiata* Shaler (1865, p. 63) from the Gun River formation of Anticosti. The primary difference between *Chilidiopsis* and *Fardenia* (Boucot 1959, p. 26, fig. 1) is in the structure of the chilidium; in *Fardenia* the brachial opening is only partly closed by discrete chilidial plates, whereas in *Chilidiopsis* these plates are fused into a large, tent-like chilidium (both genera have dental plates). According to Boucot, *Fardenia* is confined to the Ordovician and Early Silurian whereas *Chilidiopsis* ranges from the Early Silurian (late Llandoverian) to the late Silurian (early Ludlovian).

The orthotetacid brachiopods are known to be represented in the Hunton group by the following species (fig. 1): *Chilidiopsis reedsi* (Amsden) and *Schuchertella attenuata* (Amsden 1951, p. 84-85, pl. 17, figs. 9-14; 1958A, pl. 14, figs. 26-31) from the Henryhouse formation; *Schuchertella haraganensis* Amsden (1958A, p. 88, pl. 5, figs. 1-2; pl. 10, figs. 27-30; pl. 11, figs. 1-4; pl. 13, figs. 18-20) from the Haragan and Bois d'Arc formations; *Schellwienella marcidula* Amsden (1958A, p. 90, pl. 5, figs. 3-9; pl. 13, fig. 25; 1958B, p. 66, pl. 2, figs. 16-17) from the Bois d'Arc formation. It should be noted that both *Schuchertella* and *Schellwienella* are used in a broad sense as the type species have never been adequately defined for either genus (Amsden 1958A, p. 89, 152). Two of the aforementioned species, *C. reedsi* and *S. marcidula*, have well-developed dental plates, whereas in *S. attenuata* and *S. haraganensis* the plates are lacking (fig. 1).

Some of the more interesting and diagnostic features of these orthotetacid brachiopods are found in the structures modifying the delthyrium and notothyrium. The notothyrium of *Chilidiopsis* is closed by a conspicuous arched chilidium which forms a hood over the posterior end of the cardinal process (pl. I, figs. 1, 2); the pedicle delthyrium, on the other hand, is largely open, being only slightly restricted by a pseudodeltidium along the postero-lateral margins (pl. I, fig. 1). *Schuchertella attenuata* (Amsden) which is found associated with *C. reedsi* in the Henryhouse strata, shows an almost complete reversal of these structures; the chilidium is small and inconspicuous (pl. I, fig. 3), whereas the delthyrium is closed by a large arched pseudodeltidium (pl. I, fig. 4). The Haragan-Bois d'Arc species, *Schuchertella haraganensis*, has a chilidium and pseudodeltidium like that of *S. attenuata* (pl. I, fig. 5). The Bois d'Arc species, *Schellwienella marcidula* Amsden, has a conspicuous pseudodeltidium like that of *S. attenuata* and *S. haraganensis;* none of my specimens clearly show the chilidium, but there is enough material to indicate a structure like that of the schuchertellas.

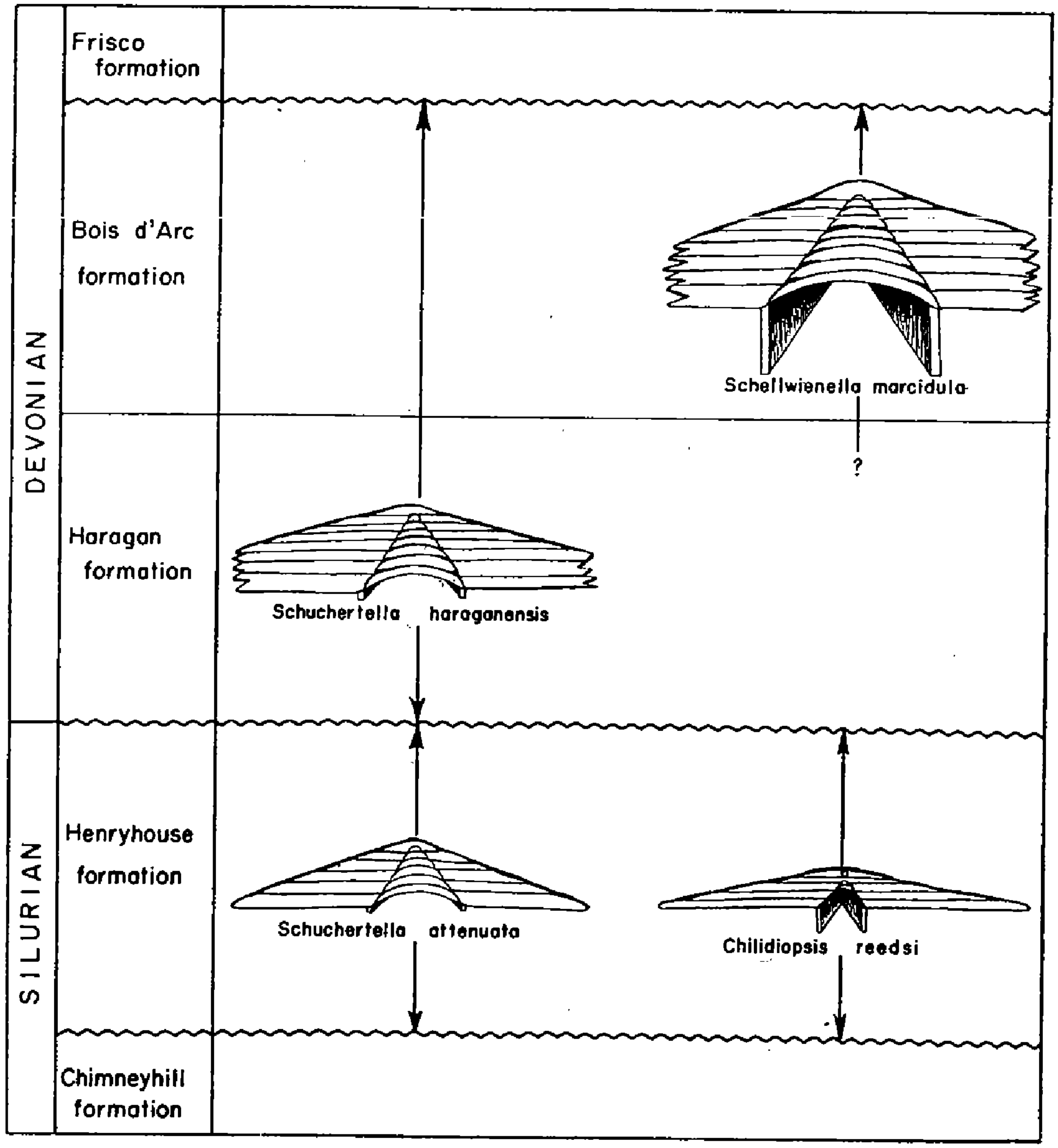

FIGURE 1. Chart showing the range of Hunton orthotetacid brachiopods.

C. reedsi has a pedicle opening at the posterior end (pl. I, fig. 1) but I suspect this was not functional at maturity. This species has no tendency towards asymmetrical growth of the pedicle valve, but a few shells of *S. attenuata* show a slight distortion of this valve which may be primary. Some mature shells of *S. haraganensis* show a distinct twisting of the pedicle valve (pl. I, fig. 5), although this is in no case as marked as in some of the later Orthotetacea.

The Hunton species show some interesting stages in the development of the Orthotetacea. Several paleontologists have studied the phylogeny of this group of brachiopods, one of the earliest studies being that of Dunbar and Condra (1932, p. 73, fig. 2) with an interesting graphic chart showing the inferred relationship for the entire superfamily. Considerable new information has come to light in the last 25 years and these data have been incorporated in the phylogeny proposed by Stehli (1954, fig. 11) and, more recently, by Boucot (1959, p. 26, fig. 1). Present information indicates that the orthotetacid brachiopods arose in the Ordovician with *Fardenia*, or some similar type, representing the ancestral form. *Fardenia* has a weakly biconvex shell with narrow, subequal pedicle and brachial palintropes; it has discrete, narrow, chilidial plates, a small pseudodeltidium, and dental plates. By Henryhouse time (early Ludlovian) at least two distinct stocks were present: *Chilidiopsis* with its conspicuous chilidium and well developed dental plates, and *Schuchertella* s. l. with a prominent pseudodeltidium and no dental plates (dental lamellae are present only as ridges bordering the delthyrium and touch the valve floor only at the posterior end). The Henryhouse representatives of these two genera have weak, subequally biconvex shells with moderate pedicle palintropes and no tendency towards resupination. By Haragan time (Helderbergian), however, the representatives of *Schuchertella* s. l. had developed an unequal convexity, the brachial valve being distinctly the deepest, and on some shells (pl. I, fig. 5) the pedicle umbo shows a distinct distortion. The Bois d'Arc (Helderbergian) representatives of *Schellwienella* s. l. have a prominent pedicle palintrope (pl. I, fig. 6), a deep, almost swollen brachial valve, and a flat to weakly resupinate pedicle valve.

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Stehli, F. G., 1954. Lower Leonardian Brachiopoda of the Sierra Diablo: Amer. Museum Natural History, Bull., vol. 105, article 3, p. 1-358, pls. 17-27, text figs.

Sixth Geological Symposium

At the Sixth Geological Symposium sponsored by the School of Geology and the Extension Division of the University of Oklahoma and held February 24 and 25, papers on the geological problems of stratigraphy, sedimentation, paleontology and hydrocarbon production of Mississippian rocks in Oklahoma and Kansas were presented and discussed before an audience of some 200 geologists. Carl C. Branson opened the symposium by posing the problems of Mississippian boundaries and subdivisions in the Mid-Continent area. George C. Huffman described the stratigraphy and tectonics of the Oklahoma Ozark area. A regional picture of the depositional environments of Mississippian limestones in Oklahoma was advanced by Doris M. Curtis and S. C. Champlin. L. R. Wilson discussed the use of fossil spores in the resolution of Mississippian stratigraphic problems.

Stratigraphy and thickness maps of Mississippian rocks in the subsurface of northeastern Oklahoma and the McAlester basin were presented in two papers by Louise Jordan and T. L. Rowland, and B. W. Lynch respectively. P. A. Chenoweth described the lithology, stratigraphy and age of the Sycamore limestone and related formations in the Ardmore Basin, Arbuckle Mountains and area to the north. C. A. Caswell showed a pre-Pontotoc subcrop map of the Komalty area along the Wichita Mountain front. The structure and stratigraphy of Mississippian system and oil and gas occurrence in these rocks in southeastern and southwestern Kansas, Oklahoma and Texas panhandles and northwestern Oklahoma were described and illustrated in three papers by four geologists,—Daniel F. Merriam and E. D. Goebel, Victor Veroda and B. W. Beede. Mississippian oil production and problems related to production were discussed by Rick P. Clinton.

Copies of symposium papers will be available in about two months from the Business and Industrial Services of the Extension Division, University of Oklahoma. L. J.

Rates of Chemical Reactions in Nature

By ALBERT L. BURWELL

Chemical reactions are taking place between components of the earth's crust at this very moment just as they have been taking place over the ages. Normally chemical reactions appear to progress in one direction only but it should be remembered that the direction may be reversed under certain conditions, the factors controlling the direction include temperature, pressure, presence or lack of moisture, the escape or removal of a product or products from the system, and if the materials are in solution, the concentration of the several reactants and products. However, from the chemist's viewpoint most of the chemical reactions in Nature take place at what to him is a very slow rate, especially the changes in rocks and minerals. The changes that occur in the growth of vegetation are more rapid but often are distressingly slow when compared with what may be desired. Nature requires from six weeks to six months, usually, to change nitrogenous matter, phosphatic matter, carbon dioxide, and other materials into cellulose, protein, oil or fat, and mineral matter that are the major constituents of vegetation, whereas Nature may require many years to change a crystal of iron sulfide to a hydrated iron oxide. In the first instance, Nature makes use of photosynthesis, but in the second instance depends upon a slow oxidation whereby the sulfide sulfur is converted to a gaseous or water-soluble sulfur derivative that is readily removed from the environment of the parent material. Perhaps the currently popular phrase "with all deliberate speed" should be applied to the rate of reactions in Nature.

The word *deliberate* has at least two meanings, one is *slow* and the other is *cautious*. Similarly, the word *speed* may refer to *rate* or *velocity* or it may mean *to go fast*. Obviously when the courts used the phrase "with all deliberate speed" in the decision involving civil rights they had in mind a definite procedure but they did not interpret the intent. As a result the decision is confusing. If the phrase is applied to chemical reactions in Nature, it implies *slow rate of* speed.

The question arise as to whether the changes that occur naturally in rocks and minerals always proceed "with all deliberate speed" or are there conditions prevailing in some instances which may either decrease or accelerate the rate at which the reactions take place. In the laboratory the chemist may control the rate of reaction, using inhibitors to decrease the rate and catalysts to increase the rate. Are there instances in Nature where there are naturally occurring inhibitors or naturally occurring catalysts which influence the rate of reaction?

Few persons seem to realize that preservatives are actually used to delay an expected chemical reaction, or that the presence of small amounts of certain salts will retard oxidation and corrosion, or that tetraethyl lead retards the rate of burning of gasoline, or that the control-rods in a nuclear pile, by removing neutrons in controlled amounts, decrease the rate of reaction and permit the harnessing of nuclear energy.

Robert T. Hill, An Anecdote

ROBERT O. FAY

In a book of incidents and people on the old Chisholm Trail, a story is related about Robert Thomas Hill (1858-1941), prominent early Texas geologist. The Chisholm Trail roughly follows the 98th meridian starting at the Red River at Doan's Crossing, extending north into Oklahoma near Duncan, Chickasha, El Reno, Kingfisher, Hennessey, Enid, and ending in Dodge City, Kansas. It was used mostly for cattle drives northward from Texas to the railroad at Dodge City. The following is quoted from "The Chisholm Trail and other routes," by T. U. Taylor, pp. 183-186, Frontier Times, Bandera, Texas, 1936.

'All the former references have dealt with experiences on the trail while going north. Many of the cowboys had individual thrills on the return trip. Some of them became broke in Abilene and Dodge City and had to hobo it back to Texas. There was Robert T. Hill, now the great geologist. In 1877 he arrived in Dodge City with the Holmsley herd from Comanche. Once he stated that one side of the street in Dodge City was built up with rather high-toned business houses, while on the other side the saloons, gambling houses, and painted women were thick.

Some way or some how, at the end of two days, Robert T. Hill found himself flat broke, with not a cent in his pocket and Comanche, Texas, some five hundred miles away. A train load of cattle was leaving Dodge

City for St. Louis, and he made arrangements with the owner of the cattle to make the trip for his board. His duties were to punch the cattle with a sharp stick whenever they tried to lie down. At every station some steers would lie down and endanger their lives by being trampled to death. There were several boys whose sole duty was to stay awake and let no steer lie down. The trip from Dodge City to St. Louis was through the states of Kansas and Missouri. He arrived in St. Louis flat broke, hungry and dirty but with plenty of pride. He visited a relative and was welcomed to his home. This uncle said, "Bob, you had better hand your Aunt Ellen your money purse or wallet so she can keep it safe for you while you are in St. Louis."

"I had no wallet, no purse, and no money; so I promptly replied, 'I left my purse in the stockyards.' I left the stockyards in Dodge City."

He soon pulled away for Texas, beating his way on the trains. When he had to quit one train, he struck a job for his meals. He saw a man floating cross ties out of a lake or stream. He applied for the job, and here the great scientist spent hours with a long pole, hooking, snaring, and dragging cross ties from the water out on the bank.

The freight train finally reached the Ozarks, and Hill was hungry; he appealed to a farmer for work and was assured by the farmer that a good hand was needed to cut up corn. The "cut up corn" followed the custom of the North and East. Hook knives with long handles were used. Each stalk of corn was grasped with the hand above the ear, and the hook knife cut the corn about two inches from the ground. A good cutter could cut about a dozen hills and collect them in the crook of his left arm. These were taken to the center of a square about forty feet on the sides, or sixteen rows each way. This would make some 250 stalks in a shock. Here the tops were tied together, and they were permitted to stay here until late fall. The embryo geologist and cowboy cut up corn for a full week for a Missouri farmer, before he started again.

Farther down the road he landed a job as a section hand on the railroad. His special duties were to help pump the old hand car from the storing bin to the place of work. It was up grade and down grade. He had to force that hand car to the place of work for the day.

On another occasion he crawled into a lumber car that had shingles on top. He crawled in early and went to the back of the car. Later about thirty or forty tramps crawled into the same car. Some time before daylight a brakeman suddenly appeared in the car with a lantern and a six shooter and made every man in the car shell out every cent he had. But then he let them go back to sleep. It was highway robbery at the muzzle of a six shooter.

At last he arrived on Texas soil at Denison, dead broke and hungry. Here, with others, he waited for a box car. He crawled in and went to sleep with the intention of jumping off at Dallas. He awoke in Waco, where he landed as a boy several years before; and again, for the second time, he was in Waco flat broke, and to this day he cannot remember how he got to Comanche.'

Robert Thomas Hill was born in August 1858 in Nashville, Tennessee, where he spent his childhood. In 1873, at the age of 15, he went to Comanche, Texas, where he worked on the newspaper "The Comanche

Chief" for 8 years. As a representative for the newspaper he traveled to many places, one of which was Dodge City as related above. Hill began to study the abundant fossils that occur around Comanche, thus starting his career as a geologist. He left Comanche in 1881 for Ithaca, New York, where he enrolled at Cornell University in 1882 and graduated in 1886. He then joined the United States Geological Survey and published his first work in 1886. In 1888 he helped to establish the Texas Geological Survey and for a short while was an assistant professor of geology in the State University while still working for the United States Geological Survey. He returned to Washington in 1892 and worked on the geology of Texas, Mexico, Oklahoma, Kansas, West Indies, and Central America. The majority of his 148 publications are on the Cretaceous system of these areas.

In 1903 he resigned from the Survey and became a consulting geologist in New York until 1910 or 1911 when he moved to Los Angeles. He remained here until 1931 and then went to Dallas, Texas, where he was a feature writer for the Sunday edition of the "Dallas Morning News." He continued to publish geologic articles on a wide variety of subjects, with his last article appearing in 1937.

He died on July 28, 1941 and his ashes were scattered over Round Mountain, Comanche County, Texas, the place from which he began his geological career. More detailed biographical data is given by Thomas Wayland Vaughan's "Memorial to Robert Thomas Hill" in the Proceedings of the Geological Society of America, Annual Report for 1943, p. 141-168, plate 5, April 1944.

Grain Size in Silica Sand for Glass Manufacture

Not many years ago writers on glass manufacture were critical of Oklahoma silica sand; not account of its chemical composition, but because of its smaller particle size as compared with sand from other sources. As if to prove the old adage among scientists "What is true today may be false tomorrow," now research on glass refining as reported in the August (1958) issue of the Glass Industry (p. 435-6) has shown that "decreasing the sand grain size increases the number of seed formed but shortened the batch-free time, increased the rate at which a particular size of bubble disappeared, increased the average size of seed, and so the rate of refining, and also improved the homogeneity of the melt. As a result, well-refined and homogeneous glass was produced most quickly by using the finest sand." Perhaps Oklahoma glass makers have known this all along.

A. L. B.

Oil and Gas Field Map

A map showing the oil and gas fields of Oklahoma was issued in early 1958 by Research Oil Reports, Oklahoma City. Oil fields in green, gas fields and highways in red are printed over a black base showing county lines, public land divisions, towns, cities and names of fields. The map called Oil-Road Atlas is 32 x 44 inches, a convenient size for desk or wall display, and is on a scale of one inch equals 10 miles. L. J.

SOME PROBLEMATICAL FOSSILS

CARL C. BRANSON

Conical fluted bodies have been found in Pennsylvanian rocks at a few scattered localities, and these have been generally referred to the genus *Conostichus*. The genus was described by Lesquereux (1876, p. 142) from a single specimen which he considered a marine alga. The synonymy of the genus is as follows:

Conostichus Lesquereux, 1876, Indiana Geol. Survey, 7th Annual Report, p. 142.

Conostichus Lesquereux, 1880, Penn. Geol. Survey, Report of Progress P1, p. 15, 16, 16, 899, and explanation of Plate B (p. 1 in Atlas).

Conostychus Lesquereux, 1880, same, p. 14, 883, 933.

Conostychus Lesquereux, 1883, Indiana, Dept. Geology Nat. History 13th Annual Report, p. 34-35.

The genotype by monotypy is *Conostichus ornatus* Lesquereux, 1876 The synonymy of the species is:

Conostichus ornatus Lesquereux, 1876, Indiana Geol. Survey, 7th Annual Report, p. 142-144, pl. 1, fig. 6.

Conostichus ornatus Lesquereux, 1880, Penn. Geol. Survey, Report of Progress P 1, vol. 1, p. 17, Atlas pl. B, fig. 4.

Conostychus ornatus Lesquereux, 1883. Indiana Dept. Geology Nat History, 13th Annual Report, p. 35, pl. 2, fig. 5.

Conostychus ornatus Lesquereux, Lesley, 1889, Penn. Geol. Survey Report of Progress P 4, p. 143, text figure.

The type locality was given as "a sandstone bed of the coal measures between coal No. 1 and No. 2 of the Illinois Geological Reports, or the stratum No. 5, in section p. 230, vol. 5, of the same report." The bed is clearly not Bed No. 5 (a limestone, Seville?), but Bed No. 4, in the Liverpool cyclothem, basal part of the Carbondale group, below the Colchester coal. The locality is on Walnut Creek, Rock Isand County, Illinois. Lesquereux mentioned that other and larger specimens were in the collection of the Illinois Geology Survey.

The species was described as a series of six successive layers increasing in size, divided into short lobes apparently coming like rays from the smallest disk, which is divided into equal wedge-like segments. The specimen was illustrated with smallest disk upwards and the lobes were shown as alternating in position in the second and third layers, serial in the last three. The smallest disk is divided into ten equal wedge-like segments lobed at the outside, and there is a circular inner core.

EXPLANATION OF PLATE

FIGURE 1. Fluted cone. A specimen from the Coffeyville formation near Berryhill Oklahoma. Collected by Jack Hood.

FIGURE 2. Lateral view of same specimen.

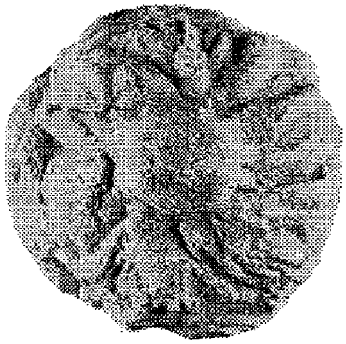
FIGURE 3. Constricted type of fluted cone, lateral view. Collected by Jack Hood from the Holdenville formation.

FIGURE 4. Basal view of same specimen.

FIGURE 5. An Indian head. Lateral view of a broken compound fluted cone from the Coffeyville formation.

FIGURE 6. Lateral view of a cylindrical form with paired rows of nodes. Holdenville shale, Tulsa.

Photographs by Dr. Thomas W. Amsden; all natural size.



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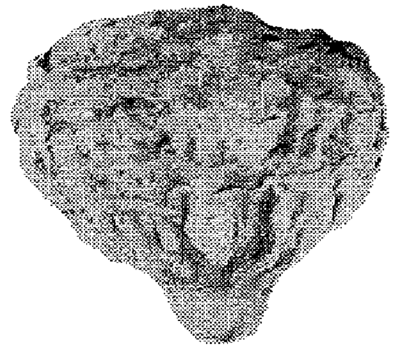

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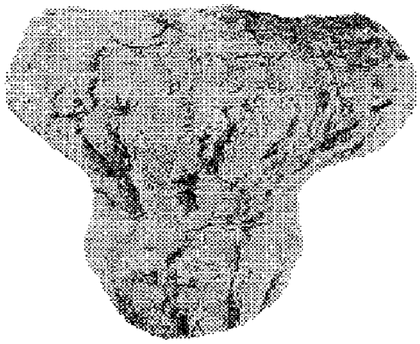

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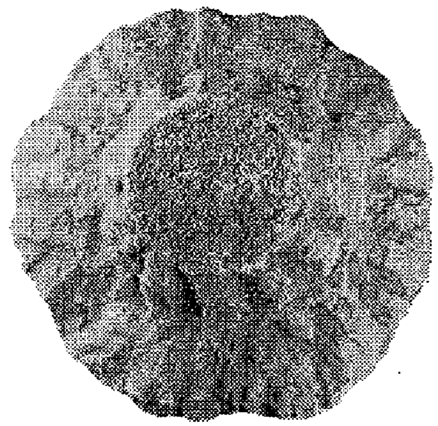

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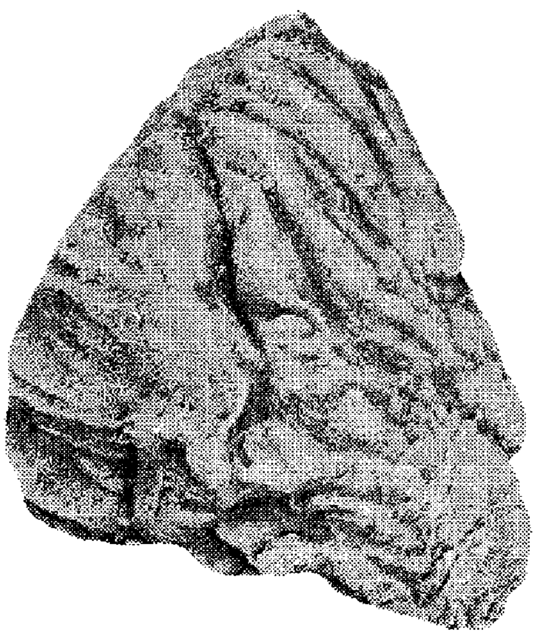

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In 1880 the specimen was shown (pl. B, fig. 4) with small end down and the lobes were shown more or less in series throughout. The 188 figure (pl. 2, fig. 5) is a crude reproduction of the 1880 figure. The speci men was described as composed of superposed layers increasing in widtl from the base upward, and regularly lobate diverging from the basal disk

The species is utterly unlike any of the forms subsequently describe and referred to the genus, and those species are here removed fron *Conostichus.*

No second specimen of this general type was described until Stou (1956, p. 31, figures 1-2) illustrated specimens with lobate basal disk, bu without lobate annular layers. His specimens came from Pottsville shale below the Quakertown coal in Scioto County, Ohio, a bed commonly be lieved to be equivalent to part of the Atoka formation.

King figured like lobate discs (1955, pl. 1, figs. 3-4) from the Hickor Creek member of the Plattsburg formation, Johnson County, Kansas, an established the species as genotype of a new genus of medusoids, *Duodeci medusa.* He described a second species of the genus from the Lower De vonian of Bolivia, and a third species from the Calhoun shale of Green wood County, Kansas.

Masters found an excellent specimen (Branson, 1956, p. 23) in th shale between the Reading and Elmont limestones, Emporia formation, i Lincoln County, Oklahoma. The specimen is like the illustrated specimen o Lesquereux' genotype in that there is a twelve-part basal disk succeeded b layers with plate-like lobes. It differs in that there are 12 lobes in eacl layer and the specimen is nearly cylindrical. A poorly preserved specime from a sandstone in Kansas City, Kansas, is in the University of Oklahom collections, and a lobate basal disk from the Hogshooter limestone nea Bristow, Creek County, Oklahoma, is also in the collections.

Conostichus ornatus and the Lincoln County specimen are alike in hav ing serial plate-like lobes in annular sequence, but the lobes in *C. ornatu* may alternate in the first three rows. King's specimens, Stout's specimens and possibly the Hogshooter specimen are related to each other. Lesque reux and White believed the genus to be algal in nature, and Stout (1956 thought it a fresh-water or brackish water plant.

An occurrence of *Conostichus ornatus* was found by Jack G. Blyth in the Atoka formation (NW¼ sec. 10, T. 17 N., R. 19 E., Cherokee Coun ty, Oklahoma) in a roadcut on Oklahoma Highway 51 in a sandstone abou 40 feet above the base of the formation. Two specimens, neither well pre served, are in the collection. They have a twelve-lobed basal disk, abov which are layers of plate-like structures arranged in series and piled so a to form a cone and to present a scalloped outer edge. One specimen show 12 layers in the cone. The specimens occur with more numerous specimen of the fluted cones of the *broadheadi* type and with subcylindrical bodie which seem to be made up of phosphatic pellets.

Lesquereux in 1880 described two additional species, *C. broadhead* and *C. prolifer,* both from the sandy clay below the Bluejacket sandstone He redescribed these in 1883 (p. 34-35) and White expanded the descrip tion (1899, p. 12-13). *C. prolifer* is a synonym of *C. broadheadi,* being n more than a succession of specimens cupped one within another, a type o occurrence which is uncommon, but observed at many places. The cone invariably lie with pointed end down and there are as many as four stacked specimens (Greene, personal communication).

(Conostichus) broadheadi Lesquereux 1880 Penn. Geol. Survey, Report of Progress, P, vol. 1, p. 15-16, pl. B, figs. 1-2. From shale below the Bluejacket sandstone, Savanna formation, Krebs group, Desmoinesian. Shale slope above Warner sandstone bluff in SW$\frac{1}{4}$ sec. 5, T. 35 N., R. 32 W., Vernon Co., Mo. White (1899, p. 12) refers to his plate 2, figure 4 as an example from Arkansas, but p. 314 states that figures 3-5 are of the same specimen.

(Conostichus) prolifer Lesquereux 1880 Penn. Geol. Survey, Report of Progress, P, vol. 1, p. 16, pl. B, fig. 3. Same locality and horizon as *C. broadheadi*. Other specimens from an unspecified locality and horizon in Kentucky. The species is obviously a series of specimens cupped one in the other, a type of occurrence recognized frequently. The species is here referred to the synonymy of *C. broadheadi*.

A specimen was found by Richard Alexander in the Savanna shale below the Bluejacket sandstone near Eufaula, Oklahoma. This specimen has four raised striated bands extending from the point to the four sides of the broad part of the cone. Frank Greene reports finding (letter of May 14, 1954) cupped specimens and notes that A. C. Carpenter has found a similar form in the Muncie Creek shale west of Kansas City. This writer found poorly preserved specimens in the Atokan on the slope of Horse Ridge northeast of Alamogordo, New Mexico.

Mr. Jack Hood of Berryhill, Oklahoma, found thousands of specimens in the Coffeyville shales near Red Fork. As boys, he and his friends collected them and called them Indian heads. Specimens with a broken side look in profile like a chief in war-bonnet. The specimens he collected vary from simple cones to multiple cones, a few have tubes, and the cones are of all shapes and with all types of longitudinal flutings and grooves. The occurrence is in layers through some 50 feet of shales, probably near the top of Oakes' Zone 1 (1952, p. 58).

Conical forms of this type are clearly not referable to *Conostichus* since they lack the lobate basal disk and are not segmented. They are irregularly fluted, and some consist of a small simple basal cone expanding suddenly into a fluted larger upper part. The specimens illustrated by Stout are like them excepting in the presence in Stout's specimens of a lobate basal disk. The fluted cones and Stout's specimens occur in the non-marine portion of cyclothems. Fossil wood and *Asterophycus* but no other organisms have been found in association. King's specimens, the Lincoln County specimen, and the Hogshooter specimen were in beds with abundant marine invertebrates.

Pogue and Parks (1958) reported upon fluted conical pits in the basal sandstone of the Waldrip shale (Wolfcampian) of Brown County, Texas. These marks had been considered amphibian tracks, but the authors show that a tube leads from below into the conical opening, and they conclude that the features are burrows of marine worms. These specimens are believed to be the reopened molds of the burrows, whereas the fluted cones of the *broadheadi* type are sand casts of the burrows.

Specimens of similar form were called "roots of Buthotrephis" by Hall (1852). The specimens are from the Clinton group in Oneida County, New York. They were named by Chadwick (1918) as follows:

Roots of Buthotrephis? sp. Hall, 1852, pl. 7, fig. 2: Conostichus? medusa Chadwick 1918, p. 342, 366. Sanquoit beds.

Roots of Buthotrephis Hall, 1852, pl. 10, figs. 9, 10: Conostichus? polygonatus Chadwick 1918, p. 342, 366. Sanquoit beds.

Root of a marine plant, Hall 1852, p. 25, pl. 10, fig. 4: Conostichus? circulus Chadwick 1918, p. 366.

None of these species is believed to belong to the genus *Conostichus*, but they are quite probably worm burrows.

Mr. Hood has recently found a new locality and has collected fluted cones from it in a zone in the Holdenville shale. His specimens range from pointed fluted cones to 12-lobed steep-sided cones which expand abruptly above a constriction into broad fluted cones. His collection includes specimens of a cylindrical unrelated form which has a rounded base and is marked longitudinally by five pairs of nodose ridges. One specimen penetrates diagonally the upper part of a fluted cone. Dr. L. R. Wilson and the writer visited Hood's Holdenville locality and in a little over an hour collected the following:

53 fluted cones, only one of which was paired, none retained the pointed end, and none was cupped in another
8 constricted cones, only two complete
108 cylindrical specimens with paired nodose ridges
23 worm casts
2 annular trails of worms (?)

No marine organism was found, and our collection represents the total megafauna. Dr. Wilson has found spores and woody tissue in insoluble residues from within the cylindrical bodies, a normal occurrence in a pit filling. The fossils occur in gray shale with siltstone and sandstone layers through a zone about six feet thick below a sandstone member. The locality is on Interstate Highway 44 in the cuts west of Sheridan Avenue in the center of SE¼ SE¼ sec. 22, T. 19 N., R. 13 E., Tulsa County.

Dr. R. M. Kosanke has lent two specimens from the Illinois Geological Survey collections (No. 8689). The specimens are labeled *Conostichus broadheadi*, Lower Coal Measures, Rock Island County, Illinois. One has a tape fastened to it which reads "S 15-T 8 R 7 Worthen" (?). The two specimens are clearly of the *broadheadi* type. The larger is 80 mm in diameter, 48 mm high; the smaller is 72 mm in diameter, 60 mm high.

The history of work on these problematic organisms is indeed a humorous one. Lesquereux repeatedly misspelled his own generic name. Marple (1956) placed the topotype locality in Pennsylvania. White wrote erroneously of an Arkansas specimen. Marple gives the wrong date for the genus. Lesquereux erred in his data on the stratigraphic level. Authors variously have referred to the forms as roots of *Buthotrephis*, stems of *Asterophycus*, sponges, jelly fish, worm borings, algae related to Acetabulariae, and the resemblance of some specimens to cone-in-cone is evident. Even Andrews (1955, p. 135), who spells the generic name correctly and wisely lists the genus as incertae sedis, places the locality as Indiana.

A comparison of size may be of some value.

	height	breadth
Conostichus ornatus	3.5 cm	4.0 cm
(specimens four times as thick said to have been seen).		
(C.) broadheadi	5.0 cm	8.0 cm
Stout's specimen	14.4	7.4
Coffeyville specimens	2.3-5.9	2.4-4.8
Holdenville cones	3.5-5.7	3.8-9.5
Duodecimedusa typica	5.0	2.8-3.0
D. wycherleyi	0.2	1.0-1.1
D. ulrichi	0.6	3.3-3.4
pentamerous cylinders	3.0-6.0	1.9-2.2

The pentameral symmetry and 12-part symmetry of the cylindrical Holdenville form and of *Conostichus ornatus* and the supposed jellyfish suggest echinodermal affinities, but some of the occurrences are in fresh-water deposits. The fresh-water specimens are not likely to be algae nor can they be jellyfish.

It is possible to state at this time that the genus *Conostichus* has but the one species, *C. ornatus;* that some of the marine specimens may be medusoids; that some of the types are probably burrows of marine worms. Close examination of specimens in place in the rock and of the associated biota is necessary to a real understanding of these four similar types of fossil.

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Spring Meeting of the Oklahoma Academy of Science

The Spring Meeting of the Oklahoma Academy of Science will be held at Camp Egan about 10 miles east of Tahlequah, Oklahoma, on Friday, Saturday and Sunday, May 1-3, 1959. This meeting is primarily a field meeting and all members of the Academy and others interested in any phase of science are urged to attend. According to the constitution, the arrangements for this meeting shall be the responsibility mainly of the chairman of Section A (Biological). The members of the committee in charge of arrangements this spring are Dr. Doyle McCoy, Chairman, of East Central State College, Dr. Cecil Williams of Phillips University and Dr. David Kitts of the University of Oklahoma.

Field trips are being planned for those interested in Botany, Zoology, Entomology, Birds, Geology, Geography, Conservation, etc. Programs are being arranged for Friday and Saturday evenings in which the field trip leaders will speak and outline the biological and physical features of the areas to be visited the next day. All who are interested in the geology of the area may hear Dr. George G. Huffman on the Friday evening program and accompany him on the field trip on Saturday. Dr. Huffman has directed many masters theses in this part of northeastern Oklahoma and all who attend will find the trip very worthwhile.

The details concerning the total program, meals and accommodations at Camp Egan will be mailed to all members of the Academy and publicized in newspapers by April 1st. Mark this date on your calendar and plan to attend.

E. L. Lucas, President

Second Deepest Hole in the World in Elk City Field, Beckham County

LOUISE JORDAN

Shell Oil Company's deep test (No. 5 Rumberger C SW¼ sec. 16, T. 10 N., R. 21 W.), in the Elk City Field of Beckham County, Oklahoma, drilled to a depth of 24,002 feet is the second deepest hole in the world. It ranks second after the Phillips Petroleum No. EE-1 University, a dry hole drilled into the Ellenburger to 25,340 feet in Pecos County, Texas. Shell's test exploring for deeper production was spudded July 12, 1957 and drilling was completed October 4, 1958, a total of 450 days. Drilling of this deep venture was apparently accomplished without any great time-consuming difficulties but did demonstrate the need for advances in technique and equipment for such tests. Various types of diamond bits were used to drill from 20,250 to 23,953 feet and two 25-foot cores were cut from 23,953 to 24,004 feet with recoveries of 88 and 100 percent respectively. These are the deepest cores ever recovered (*Petroleum Week*, vol. 7, no. 19, Nov. 7, 1958, p. 27).

The Rumberger test is on the southwest flank of the elongate and narrow northwest-trending Elk City anticline. Oil and gas-condensate production is obtained from arkose sand conglomerate (granite wash), Missourian in age, between the depths of 8,800 and 10,300 feet in an area about eight and one-half miles long and three miles wide. The gross productive section in the Elk City Field is approximately 1,500 feet thick with a net average of about 100 feet. These 100 feet represent a total of eight productive zones and there is no well in which all zones are productive. The deep Rumberger test is about 200 feet lower than wells at the crest of the anticline based on a structure map contoured on an electric log marker within the Missourian sequence near the middle of the productive section.

The Permian Quartermaster formation crops out at the surface, and in the No. 5 Rumberger (elevation: 2,019 feet), Permian rocks are penetrated to a depth of 6,480 feet where the top of the Pennsylvanian Virgilian series is placed. The depths below surface of Pennsylvanian series are reported as follows: Virgilian, 6,480 feet; Missourian, 8,275 feet; Desmoinesian, 10,630 feet; Atokan (tentative), 12,215 feet; Morrowan (tentative), 17,142 feet; Springeran (tentative), 21,475 feet. At 22,948 feet, the lithology changes from the sandstone and shale section above to a calcareous shale or marlstone which was penetrated to total depth. This lower section is thought to be most probably Mississippian in age. Some geologists believe that those rocks called Springeran are also Mississippian. Thus the thickness of Pennsylvanian rocks penetrated is either 14,995 or 16,468 feet depending on placement of Mississippian boundary. At any rate the Pennsylvanian-Mississippian boundary is considerably lower in the column than that commonly reported in published literature and based on information obtained from the Continental No. 1 Proctor (sec. 28, T. 10 N., R. 20 W.), total depth, 14,582 feet.

Shell Oil Company has tested Springeran sandstones without obtaining commercial production. In February of 1959, the well was plugged back to 14,965 feet and testing of possible productive zones in rocks below the present producing reservoirs of the field is now proceeding.

Citation of References to Periodicals

Geologists have spent hundreds of hours searching in libraries for references incorrectly or incompletely cited. This expenditure of time is unnecessary and the author who forces his colleagues to waste their time in such manner is either careless or inconsiderate. An author should remember that his citation may be used by a Chinese, a Spaniard, or a Russian and it may be used a hundred years after his time. He should express his citation with exactness and in an international form.

An example is:

Bulletin of the State Geological Survey of Kansas. The scientist can look in the library under Bulletin, under State, under Geological Survey, and still find no such card entry. The correct citation is:

Kansas, State Geological Survey, Bulletin.

The difficulty is compounded when the citation is of a journal in an unfamiliar language, such as: Trudy Geol. Inst.

This citation should read: Akademiia Nauk SSSR, Geologicheskii Institut, Trudy.

One author cited: Journal of Geology (Kiev).

This journal is Akademiia Nauk Ukrainskoi RSR, Instytut geologii, Geologichnyi Zhurnal.

Some of the difficulty arises from transliteration of languages not in the Latin alphabet or from translation to other languages. A recent author rendered "Akad. d. Wiss. d. Ud SSR." The actual citation is of Akademiia Nauk SSSR. Institut Geologicheskikh Nauk, Trudy.

We must have some standards and the following are used by the Oklahoma Geological Survey.

1. Transliteration of non-Latin alphabets. Use the system of the Library of Congress. Cards showing the system are available from that library for a small charge.

2. Form of citation. In general use form of the Union List of Serial Publications and the List of Serial Publications of Foreign Governments. Use the present title of the serial or cite the present form in parenthesis after the title of the time of the reference. For instance,

Russkoe paleontologicheskoe obshchestvo (Vsesoiuznoe paleontologicheskoe obshchestvo), Ezhegodnik.

Oil Weekly (World Oil).

3. Abbreviations

Use U. S. Geol. Survey, Suggestions to authors of the reports of the United States Geological Survey, Fifth Edition, 1958, p. 111-122, excepting use Amer. for American, agri. for agricultural, publ. for publication(s) and in general do not abbreviate non-English words.

4. Form of citation in list of references.

Cite all references in the order and with punctuation as given.

Name of author, surname first, comma, initials or full given name if the author uses only one, but avoid confusion in such cases as Williams, James Steele and Williams, James Stewart by giving full name.

Initials are followed by comma and year, then comma.

Title of article, initial letter and initial leters of proper names capitalized (use no abbreviations other than those used by author); followed by colon.

Periodical name, given as in Union List.

Examples: Bureau of Geology [Oklahoma], Bulletin
Psyche (Cambridge Entomological Club)
Denmark, Kommision for ledelsen af de geologii i geografi undersøgelser i Grønland, Meddelelser om Grønland

The name of the publishing organization is set off from the title of the journal by a comma, and the particles of the citation are separated by commas (unlike style of U. S. Geological Survey).

Example: Amer. Assoc. Petroleum Geologists, Bull., vol. 27, p. 86-88.

The words standing for volume, part, page, plate, figure are rendered in English. All numbers are in Arabic numerals. Page and pages are abbreviated p.

A proper citation enables a scientist to proceed directly to the card catalog of the library and to find the journal without further trouble. An author owes his colleagues the courtesy of a complete and accurate citation.

C. C. B.

A Method of Determining a Useful Microfossil Assemblage for Correlation

L. R. Wilson

Palynological studies are well suited to utilize statistical methods in stratigraphic correlation. The minute sizes of spores and pollen permit fossilization of complete structures in many more deposits than is probable for larger organisms. Their great abundance and their dispersal by wind and water make them common fossils in most sedimentary deposits.

The problems of sampling and analyzing palynological assemblages have received considerable attention in the writings of Erdtman (1931), Bowman (1931), Barkley (1934), Wilson (1946), and Faegri and Ottestad (1949). In the analysis of a palynological sample the number of spores and pollen grains that must be identified and counted to obtain a sufficiently reliable count for correlation has been placed from 100 to 1,800 by various authors. Two factors appear in the problem of correlation. These are the number of similar species and the composition of the fossil assemblages. A fossil assemblage must also be recognized as representing only that biota which was preserved, and that it may not accurately reflect the paleoecology from which it came.

Palynologists are now generally agreed that the average sample will be sufficiently analyzed if between 150 and 200 grains are counted. In stratigraphic studies involving many thousands of feet of samples, one frequently encounters strata that contain several score of species and a count of two hundred grains does not appear to be sufficient to secure a reliable spectrum for the sample. In other instances one or two species may be exceedingly abundant and when only two hundred fossils are counted, the less abundant species may not be recorded in the assemblage. In order to secure a graphic evaluation of the assemblage, the following method may be used to determine the number of grains that should be counted for correlation purposes. The method proposed is here called a species-stratum curve in contrast to the species-area curve long in use by plant ecologists (Cain, 1938, Rice and Kelting, 1955). Whereas the species-area curve utilizes quadrat areas for comparison of species assemblages, the species-stratum curve is concerned with volume of sedimentary rock from specific stratigraphic positions. The construction of the graph is similar to the species-area curve except *specimens* replace *quadrats* on one axis of the graph. In practice the plotted curve trends upward as the number of species observed increases with additional counted specimens and continues thus until the number of species in the assemblage is nearly exhausted; then the curve flattens strongly. At this point in the flattening of the curve, few additional species will be added regardless of the number of specimens counted (Fig. 1). This point in the counting has been referred to as the "break-off point" and it is usually the practical stopping place for the correlation of palynological assemblages. In Fig. 1 the "break-off points" are indicated at A, B, C, D, and E for five palynological assemblages and vertical dashed lines are drawn downward to the number of specimens counted for each.

Several mechanical factors that control the rise of the curve may be noted. (1) If the entire count is made from one microslide, there tends to be fewer species recorded than if the count is made from several microslides. (2) More species are observed while using the high magnifications of the microscope. (3) Microslides that are thinly spread with microfossils permit the distinction of more species. (4) Method of sample preparation usually determines the abundance of the microfossils and similar methods should be used wherever possible when comparing fossil assemblages.

Some intrinsic factors in the study of fossil assemblages are the type of lithology and speed of sediment deposition in which the preservation took place. Assemblages with an abundance of species, but with few individuals of these species, require larger counts than assemblages containing fewer species and moderately abundant individuals of each. If the assemblage contains a few exceedingly abundant species with others that are scarce, large counts are also required in order to overcome the masking affect of the few.

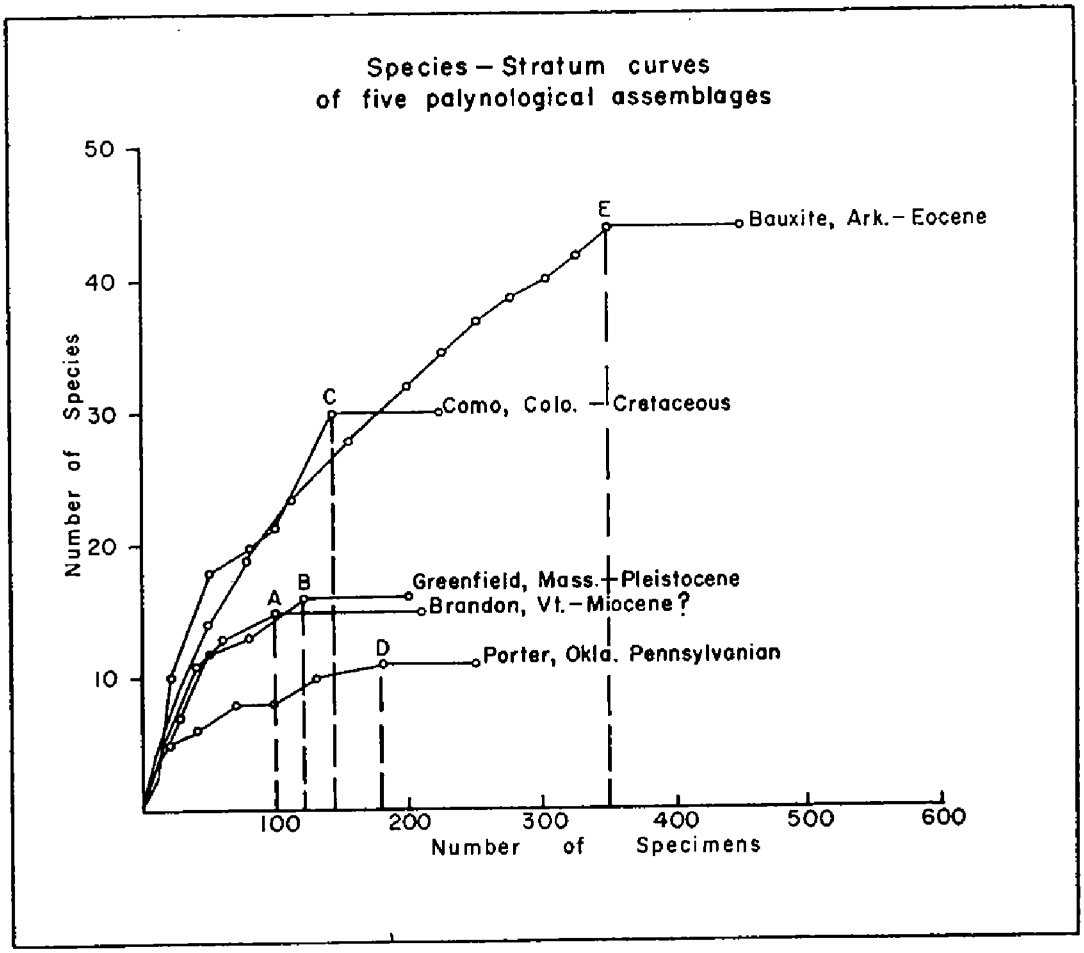

Figure 1

The five palynological assemblages shown in Fig. 1 illustrate a number of the factors mentioned above. The Porter, Oklahoma, coal is a 19-inch Pennsylvanian bituminous deposit that contains 21 species of spores. This coal has been studied as four segments of a channel sample and the "break-off point" in each occurs between 100 and 150 specimens. The stratum used in the illustration had its "break-off point" at 175 specimens. No more species were recorded in the next 90 specimens.

The species-stratum curve of the Brandon, Vermont, lignite shows a strong flattening at 100 specimens and no more species were encountered in the next 100 specimens. This deposit, according to Traverse (1955), contains a fossil spore and pollen flora of 76 species. The small sample from a single stratum examined by the writer contains only 15 species.

The Greenfield, Massachusetts, Pleistocene peat deposit contains a total of 25 observed species. In the stratum illustrated in Fig. 1, 11 species are present and the curve flattened at 125 specimens. In the vicinity of the Greenfield peat deposit the living flora consists of nearly 300 species of vascular plants.

The fossil assemblages of the Como, Colorado (Cretaceous) coal and Bauxite, Arkansas (Eocene, Wilcox) coal are much richer in species than the other assemblages. The Como species-stratum curve flattened at 150 specimens, but the Bauxite species-stratum curve did not reach the "break-off point" until the 350 specimen count. Ames (1951) reported 44 species of spores and pollen in the Como deposit. The Bauxite fossil spore and pollen flora consists of more than 100 species in a one-foot core sample studied by the writer. A one-inch stratum from the core contains 44 species.

The Bauxite palynological assemblage is an example of a fossil biota of many species with relatively few individuals of each, the Greenfield assemblage suggests fewer species with relatively greater number of individuals of each, and the Porter assemblage has a predominance of individuals of a few species.

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Re: Shale for Lightweight Aggregate

When sampling a shale outcrop to determine the bloating properties of the shale it would be well to remember that the greater the ratio of ferrous iron to ferric iron the greater the probability of a satisfactory bloat. This is the gist of an address by W. Arthur White at the Mid-America Minerals Conference during October 1958. He calls attention to the fact that outcrops are weathered and the iron content of the shale has oxidized but if the weathered material is stripped away the unoxidized material of most of the samples examined was found to be self-expanding, that is, needed no additive. In other words, bring in unweathered material only.

A. L. B.

Generic Assignment of Some Fossil Clams

CARL C. BRANSON

Two papers appeared in January which affect classification of important Oklahoma fossils. In one of these Wilson (1959) follows the history of the naming of *Allorisma* King and shows that the genus is an objective synonym of *Edmondia* de Koninck; both genera being based upon *Hiatella sulcata* Fleming 1828 (*Sanguinolaria sulcata=Allorisma sulcata=Edmondia sulcata*). Accordingly Wilson suppresses *Allorisma* and establishes the generic name *Wilkingia*, a name apparently contrived from the given name and family name of William King, for the shells long called *Allorisma*. The genotype is *Venus elliptica* Phillips, 1836; the species which King identified as *Allorisma sulcata*. Curiously, Girty rendered the generic name *Allerisma*, a more correct form from a classical point of view.

Some species in the Oklahoma area and elsewhere which must now be transferred are:

Allorisma costatum Meek and Worthen = Wilkingia costata (Meek and Worthen)
Desmoinesian: Ill., Ohio, Iowa, Okla., Mo.
Allerisma terminale Hall = Wilkingia terminalis (Hall)
Desmoinesian: Kansas, Okla.
Allorisma walkeri Weller = Wilkingia walkeri (Weller)
Batesville sandstone, Arkansas
Allerisma neglectum Girty = Edmondia neglecta (Girty)
Batesville sandstone, Arkansas
Allorisma subcuneatum Meek and Hayden, 1858 = Wilkingia subcuneata (Hind, 1900, p. 418 incorrectly placed in synonymy of A. maxima (Portlock).
Allorisma? albequus Beede 1907 = Edmondia albequus
Doe Creek sandstone, Oklahoma
Allorisma chouteauense Branson, 1938 = Wilkingia chouteauensis
Chouteau limestone, Missouri
Allorisma snideri Elias, 1957 = Edmondia snideri
Goddard fm., Oklahoma
Allorisma maynardwhitei Elias, 1957 = Edmondia maynardwhitei
Goddard fm., Oklahoma
Allorisma girtyi Elias, 1957 = Edmondia girtyi
Batesville sandstone, Arkansas
Allerisma wyomingense Branson, 1930 = Wilkingia wyomingensis
Phosphoria formation, Wyoming
Allorisma rothi Newell 1940 = Wilkingia rothi
Dozier dolomite and Doe Creek member, Whitehorse sandstone

It further appears that many species referred to *Allorisma* do not belong to *Wilkingia*. *A. geinitzi* and *A. costatum*, for instance, have features unlike those of the genotype.

In the same journal, Ramsbottom (1959) discusses the American genus *Caneyella* Girty in its relationship to *Posidoniella* de Koninck and to *Posidonia* Bronn. The author separates these genera as follows:

Posidoniella de Koninck 1885

Genotype Inoceramus vetustus Sowerby 1829

Umbo terminal, hinge edentulous

P. vetusta (Sowerby) 1829

P. variabilis Hind 1879

Caneyella wapanuckensis Girty (part) fig. 9

All other species referred here are more probably species of *Posidonia*, a name for which the name *Posidonomya* was illegally substituted.

Posidonia Bronn 1828

Genotype Posidonia becheri Bronn 1828

Restricted to noncostate species with umbo centrally placed on short hinge-line.

P. becheri Bronn 1828

P. corrugata Etheridge

P. obliquata (Brown) 1841

P. insignis (Jackson) 1927

P. gibsoni Salter 1862

Caneyella wapanuckensis (part), figs. 6, 7, 11

Caneyella Girty 1909

Genotype Caneyella richardsoni Girty 1909

Restricted to costate and a few non-costate species with long hinge-line and with umbo towards anterior end.

C. richardsoni Girty 1909

C. membranacea (McCoy) 1855 new comb., Ramsbottom

C. nasuta Girty 1909—referred to C. membranacea

not C. vaughani Girty—referred to Posidonia becheri

C. semisulcata (Hind) 1897, new comb., Ramsbottom

C. rugata (Jackson) 1927, new comb., Ramsbottom

C. multirugata (Jackson) 1927, new comb., Ramsbottom

C. percostata Girty 1909

C. hopkinsi (Weller) 1897 = Posidoniella? hopkinsi

It would seem inadvisable to suppress Girty's *C. nasuta* as a synonym of *C. membranacea* without comparison of specimens. These forms are known only from crushed specimens.

The papers referred to are:

Wilson, R. B., 1959, *Wilkingia* gen. nov. to replace *Allorisma* for a genus of Upper Palaeozoic lamellibranchs: Palaeontology, vol. 1, part 4, p. 401-404, pl. 71, figs. 1-7.

Ramsbottom, W. H. C., 1959, Distinctions between the Carboniferous lamellibranch genera *Caneyella, Posidonia,* and *Posidoniella*: Palaeontology, vol. 1, part 4, p. 405-406, pl. 71, figs. 8-15.

Fort Smith Geological Society Announces Field Trip

The newest geological society of this region has announced that it will sponsor a field trip in the western Arkansas gas area April 30 to May 2, 1959. Registration will be in the lobby of the Ward Hotel in Fort Smith from 2:30 to 6:00 P. M. on Thursday, April 30. A banquet is scheduled at 7:30 at Fort Chaffee Officers Club; to be followed by short talks by Norman F. Williams, B. W. Miller, and James H. Quinn.

The first day's trip will be led by Dr. James H. Quinn of the University of Arkansas and will be to illustrate his material on buried structures of the Boston Mountain region. The second day's trip; leader, Charles S. Bartlett of Gulf Oil Corporation, is on structure and stratigraphy of the southwest Arkansas Valley province.

Room reservations must be made with the Housing Committee, Fort Smith Geological Society, Box 1037, Station A, Fort Smith, Arkansas, and must be made and paid for by April 27. Cost of the trip, including registration, guidebook and two field lunches will be $13.00.

Covered Wagon Geologist

The University of Oklahoma Press has announced publication of the autobiography of Charles N. Gould under the above title. Gould was the first teacher of geology at the University of Oklahoma, where he taught from 1901 to 1908. He served as geologist on the Territorial Department of Geology and Natural History, and became State Geologist in 1908 when the Oklahoma Geological Survey opened its doors. From 1911 to 1924 he was engaged in petroleum exploration, and from 1924 to 1931 was again State Geologist.

During his long career he published 261 papers on geologic subjects. His interests were extremely wide, as is shown by a sampling of titles of his published papers, "The Oklahoma salt plains," "Geography of Oklahoma," "Geology of natural gas," "Radiate structure of sand barite crystal masses," "The usefulness of the useless," "My friend *Glyptodon* and his pals."

The book is sponsored by the Oklahoma City Geological Society. It contains 272 pages, and is available at a price of $4.00.

C. C. B.