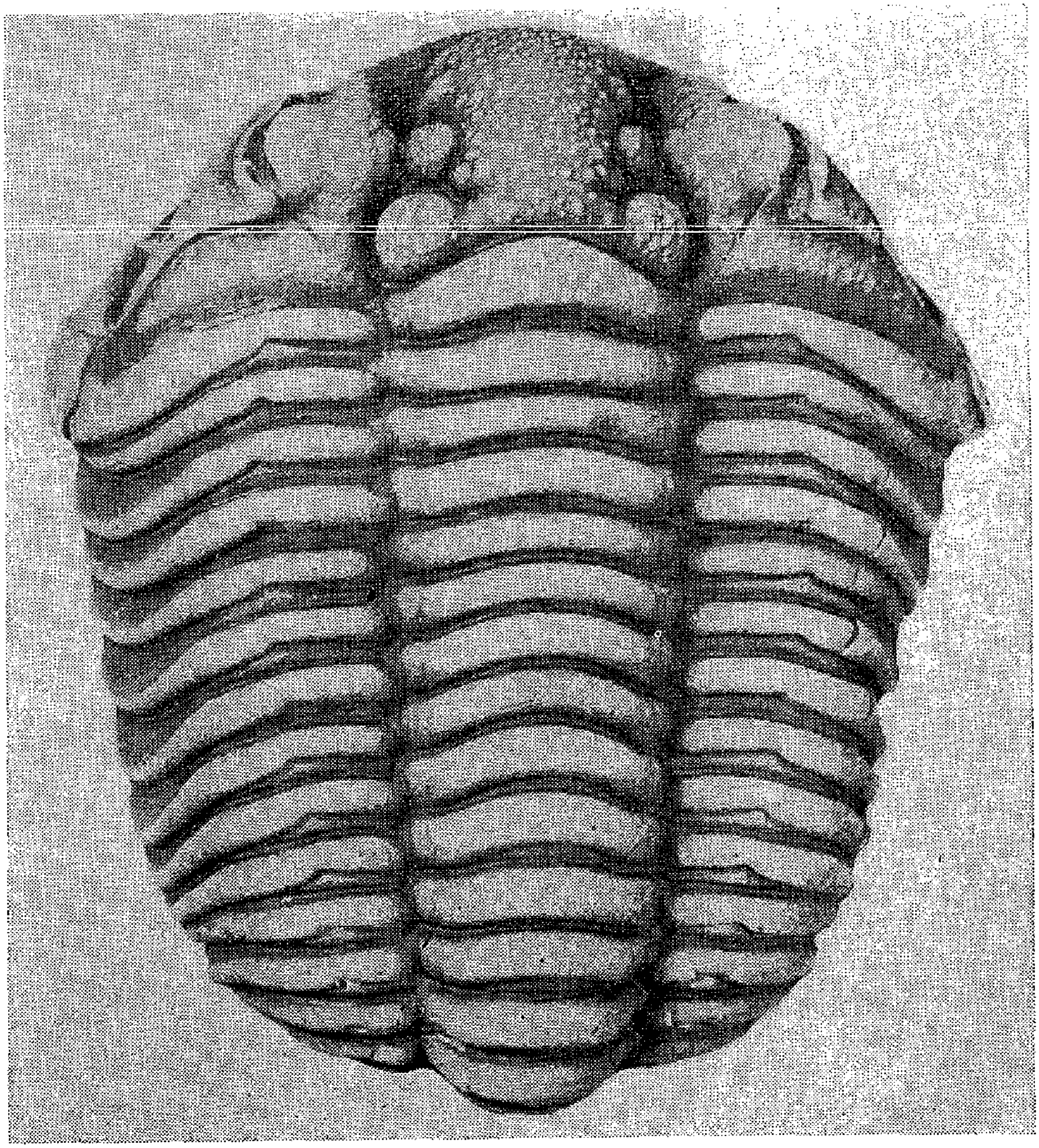
OKLAHOMA GEOLOGY NOTES



OKLAHOMA GEOLOGICAL SURVEY

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The Cover

The cover photograph was taken by Dr. T. W. Amsden with the paleontological camera of the School of Geology.

The specimen is a *Calymene* collected and prepared by Dr. Amsden. It came from the Henryhouse formation on Chimneyhill Creek in Pontotoc County. The specimen is 45 mm long and the cover photograph is nearly 3 times natural size.

American Association of Petroleum Landmen

This fine organization, designed to improve the status of petroleum landmen and to provide a means of exchange of ideas, now has nearly 3,000 members. It has 33 affiliated local associations in the western states and two Canadian provinces. It publishes a monthly journal "The Landman," a highly readable periodical. It issues TIP cards weekly, presenting economic facts briefly.

The association holds regional institutes as short courses on pertinent subjects. The second institute was held at the University of Oklahoma on October 13 to 17, 1958. A curriculum leading to the landman's degree is offered at the University and the Association has established a scholarship. President is T. G. Kelliher of Houston. The vigorous and growing association is a highly desirable organization for men in this extremely complex field of work.

C. C. B.

Tulsa Rock and Mineral Society

Recently a new society was organized in Tulsa, the Tulsa Rock and Mineral Society, and there are now 150 enthusiastic members. The club takes Sunday field trips and two of us from the Survey recently saw 28 car-loads of members cheerfully plod through the mud and ignore the rain as they collected fossil plants from the waste heap of a strip-pit. Dues are two dollars for adults, one dollar for junior members. Officers are: E. L. Gilmore, President; Dean Burch, 1st Vice President; Al Kidwell, 2nd Vice President; Myrna Wade, Recording Secretary; Harlon West, Corresponding Secretary; Tom Southgate, Treasurer. The Club displayed specimens in the Fourth National Bank of Tulsa on November 17-28. The Oklahoma Mineral and Gem Society has been active for some 15 years. Its new president is Norman G. Flaigg. Its former president, Domer L. Howard is now president of the Rocky Mountain Federation of Mineralogical Societies, a federation of 12 amateur groups.

The Survey welcomes such societies and asks for their help. The Survey has nine regularly active geologists and relatively few part-time field geologists. The hundreds of society members range widely and we would appreciate their aid in reporting mineral and fossil localities.

C. C. B.

PLEISTOCENE COURSE OF THE SOUTH CANADIAN RIVER IN CENTRAL WESTERN OKLAHOMA

ROBERT O. FAY, Oklahoma Geological Survey
and University of Oklahoma, Norman

The South Canadian River originates in New Mexico, flows in an east-northeastward direction through the Texas panhandle, makes three large loops in west-central Oklahoma, flows southeastward for 160 miles, and finally flows northeastward again to empty into the Arkansas River in east-central Oklahoma (see figure 1).

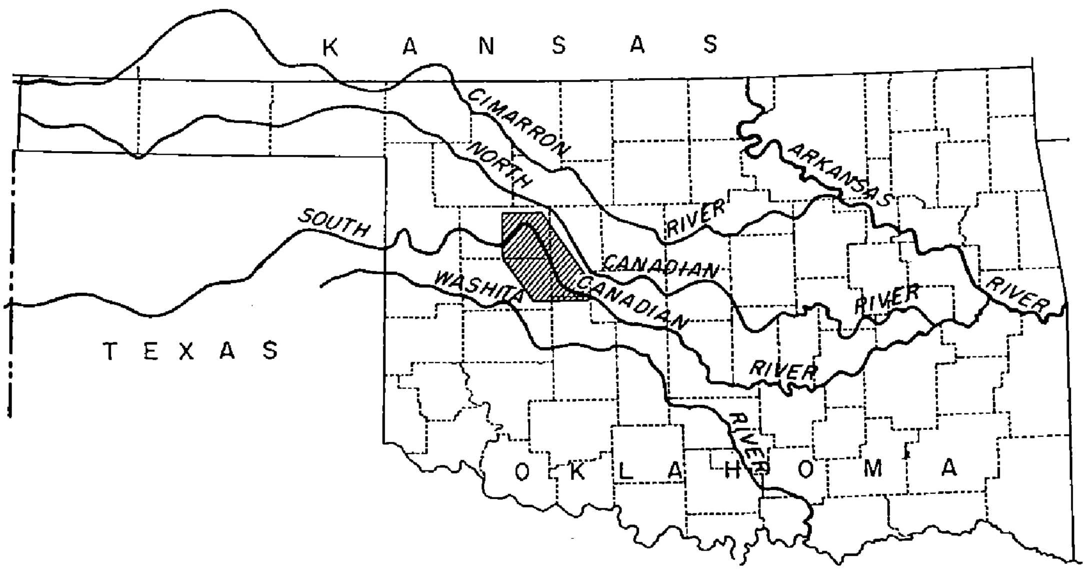

FIGURE 1. Index map of Oklahoma showing location of area (lined) and major streams in west-central part of state.

It will be demonstrated that the last two of the three large loops and the southeastward course of the channel are a direct result of (a) structural control by Permian red beds and (b) Pleistocene stream piracy of the South Canadian River by one of its own tributaries.

Underlying bedrock and structure

The surface rocks of this region belong to the Permian system, and consist mainly of red beds named (descending) Cloud Chief formation, Rush Springs sandstone and Marlow formation of the Whitehorse group, and Dog Creek shale. These beds, together with the underlying Blaine formation and Flowerpot shale, have a westward component of dip, thus forming steep east-facing escarpments where resistant rocks are exposed. A broad syncline, with a north-northeast axis, occupies the area east of Taloga and north of Thomas (see figure 2).

Near Taloga, the last large northward-bending loop of the South Canadian River corresponds closely with the margins of this syncline and with apparent collapsed Cloud Chief gypsum structures. Some of the structures appear to be depositional, but others clearly show edges of bedding projecting at high angles with as much as 115 feet of displacement. Pleistocene gravels overlie the Cloud Chief formation in this region, showing that the ancient river once flowed over this formation. The present river flows through the Whitehorse group and Dog Creek shale, following the strike of the beds east of Taloga to Bridgeport.

The headwaters of Deer Creek begin in the Cloud Chief formation, descend through the Rush Springs sandstone, and finally reach the Marlow formation at the mouth west of Bridgeport (see figure 2). The high ridge

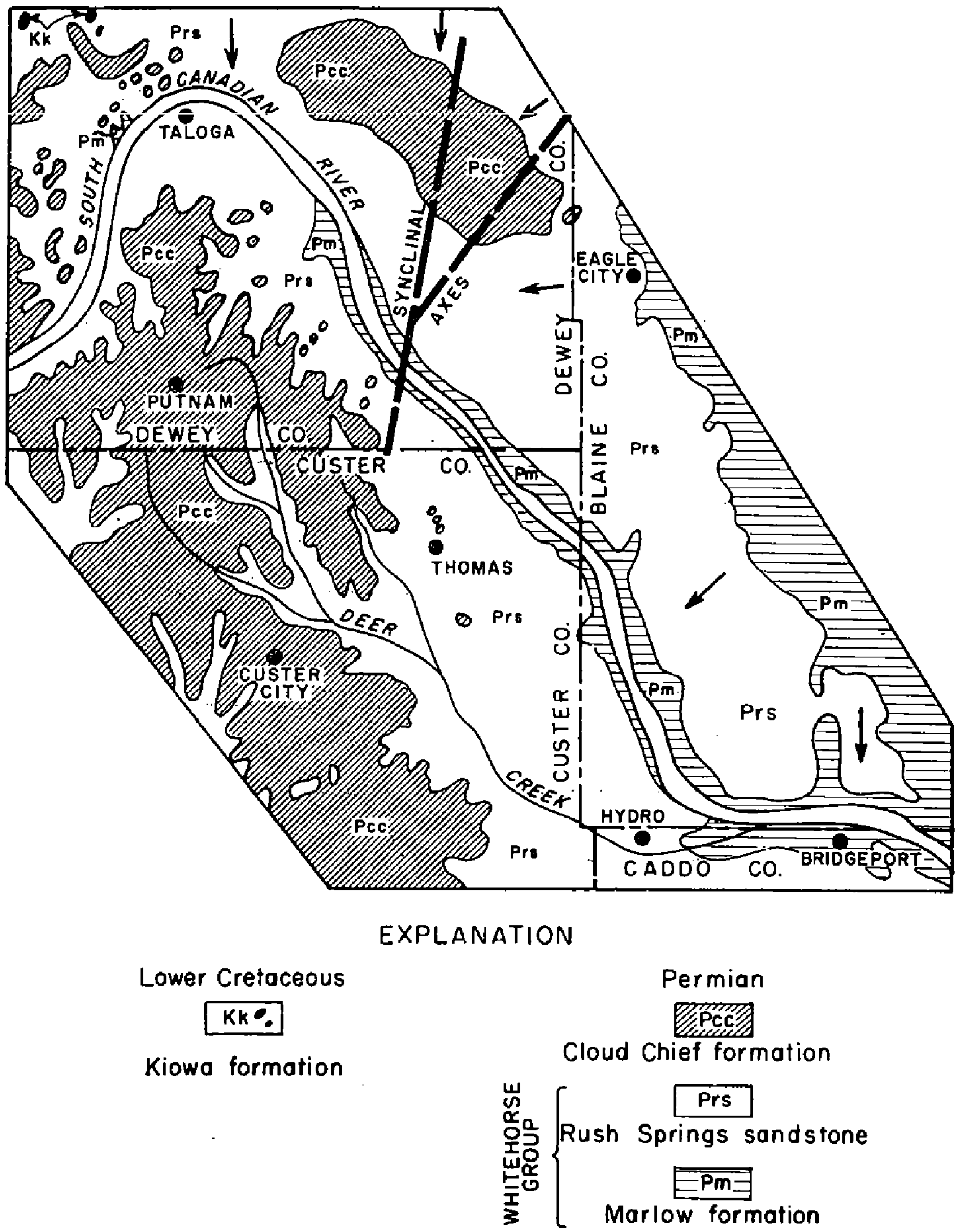

FIGURE 2. Bedrock geologic map. Arrows indicate direction of regional dip.

west of Deer Creek contains rocks of the Cloud Chief formation, overlain by Pleistocene gravels. This shows that another ancient channel was present upon the Cloud Chief formation and that this river flowed southeastward to eastward.

In every instance, the ancient channels and the present channels follow the strike of the bedrock.

Topography, relief, and drainage

The area under consideration lies in the Western Sandstone Hills region of Curtis and Ham, or the Second Line of Hills in earlier reports of older geologists. These hills consist of rocks in the Cloud Chief formation and Whitehorse group.

The normal topography developed upon these formations is one of gently rolling hills of approximately the same elevation. Average relief in this area is about 350 feet and total relief is almost 600 feet. In the Thomas-Eagle City-Putnam area, small isolated knobs of Cloud Chief dolomite, gypsum, and sandstone project prominently above the countryside.

The South Canadian River and Deer Creek may be classified as mature and underfit streams respectively whereas all others are in youth. Where well developed, the smaller streams have steep V-shaped valleys, are intermittent, flow into the main streams at right angles, and have steep vertical walls 40-60 feet high near their headwaters at the contact between the softer Marlow formation below and the harder Rush Springs sandstone above. These valleys are heavily wooded. The uplands are covered with grass or are cultivated, but where thick Pleistocene deposits occur, there is scrub oak and dense vegetation.

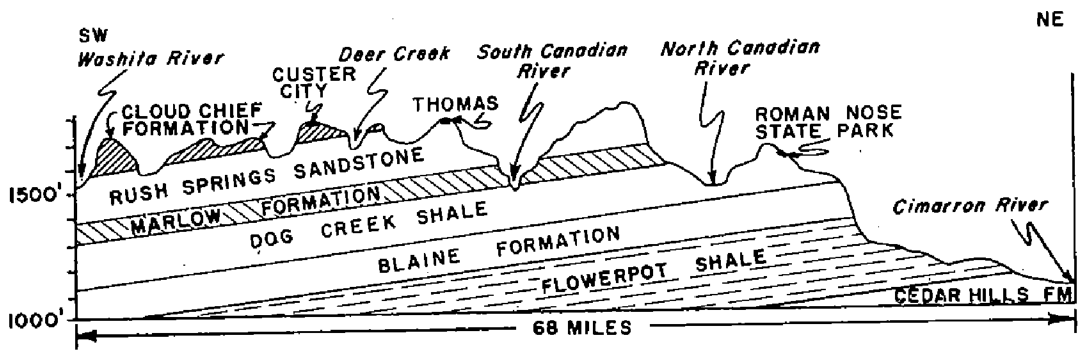

FIGURE 3. Cross section of major rivers showing relations to bed rock.

There are three parallel divides in the area, following the trend of the present South Canadian River (see figure 2). The first one is east and north of the South Canadian River, consisting of Pleistocene gravel and dune sand overlying the Cloud Chief formation and Rush Springs sandstone. The second ridge is between Deer Creek and the South Canadian River, consisting of a thin veneer of sand and silt overlying the Rush Springs sandstone. The third divide is southwest of Deer Creek, with gravel, sand, silt, clay, and volcanic ash, resting upon the Cloud Chief formation and subordinate portions of the Rush Springs sandstone. These latter two divides meet at the headwaters of Deer Creek and form one divide that trends westward and separates the Washita River to the south from the South Canadian River to the north. At the junction of these ridges there is a thin veneer of gravel at an elevation of 2,000 feet or more, which represents the highest elevation in the area studied. All divides are highest to the northwest, ranging in elevation from 2,000 to 1,900 feet, and lowest to the southeast, ranging from 1,800 to 1,700 feet. The South Canadian River enters the area at an elevation of approximately 1,700 feet and leaves at 1,400 feet, which represents the lowest elevation in the region.

Relations to bedrock

The South Canadian and North Canadian Rivers actually flow upon a broad ridge that is approximately 400 feet above the Cimarron River to the northeast (see figure 3). The reason for this difference in elevation is that the Cimarron River now flows and has flowed in the past upon softer beds below the resistant Blaine formation. In addition, there is evidence of extensive pre-Pleistocene erosion, accounting for the initial topography upon which the Pleistocene rivers flowed and for the differences in elevation. For example, the Cloud Chief formation and Whitehorse group, exposed in the divide northeast of the South Canadian River, crop out a full 100 feet above the highest Pleistocene deposits of the North Canadian River, which is the only possible river that could erode the northeast side of this divide. These pre-Pleistocene rivers, once initiated, carved downward into softer beds and formed the many rock benches and east-facing escarpments now present. The Pleistocene streams merely filled in the valleys of these ancient streams and cut back the escarpments laterally in a downdip direction to the southwest. Detailed evidence will be presented to show precisely how this was accomplished by the South Canadian River as it followed and cut through the Cloud Chief formation into the Whitehorse group.

Distribution of Pleistocene deposits

The Pleistocene sediments may be divided into 4 main types which have been deposited at different times under slightly different conditions (see figure 4).

(1) In the southwestern part of the area occur sporadic deposits, 5 to 40 feet thick, consisting of gravel and sand with volcanic ash, silt, and clay. These comprise the surficial cover of Deer Creek valley and the ridge southwest of Deer Creek. Fine sand, silt, and clay are on the ridge between Deer Creek and the South Canadian River.

The gravels found at all elevations along Deer Creek are isolated from those of the Washita River and the South Canadian River, and appear to represent an independent stream channel, the highest and oldest portion of which lies to the southwest along the ridge of the Cloud Chief formation. There is a linear pattern to these gravels, which trend southeastward following the strike of the underlying rocks. In the Putnam area, these gravels appear to merge with ones that correlate with those of the South Canadian River, northeast of Taloga, thus suggesting a common connection between these two gravel areas. In the Bridgeport-Hydro area, the Deer Creek gravels also seem to tie in with those of the South Canadian River, the former having an eastward trend and the latter a southward trend. All trends appear to be directly controlled by the structure and type of under-

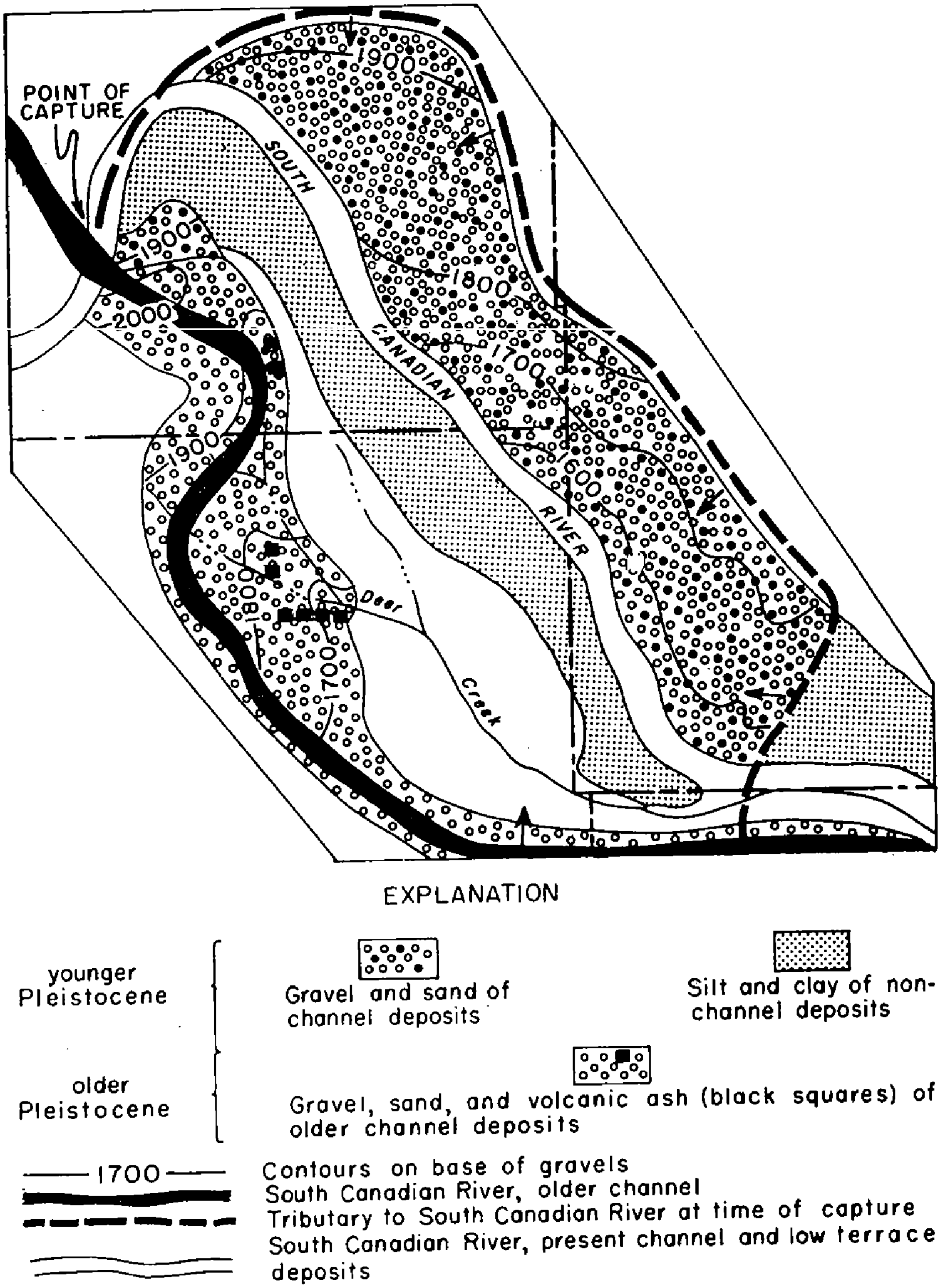

FIGURE 4. Geologic map of the Pleistocene deposits showing probable position of the older South Canadian River and its tributary. Arrows show direction of shift of channels after piracy.

lying bedrock. Contour lines drawn on elevations at the base of the gravels show the approximate position of the old river channel.

(2) The deposits immediately southwest of the South Canadian River are invariably clay and fine silt, 0-20 feet thick, forming a thin veneer over cut benches in the bedrock.

(3) Gravel and sand deposits 90 feet or more thick, overlain by silt and clay, occur on the north and east side of the South Canadian River, covering the top of the divide in this area. The northern end of this divide turns abruptly westward for approximately 15 miles, where, near Taloga, the gravels end suddenly. Water wells drilled just 5 miles northeast of Taloga passed through thicknesses of gravel and sand ranging from 43 feet to 88 feet, and yet just north of Taloga, gravels are absent and bedrock is exposed. Near the southeastern end of this divide, northwest of Bridgeport, the gravels also end abruptly along a north-south line. Contour lines drawn on elevations at the base of the gravels were used to ascertain the initial position of the first river channel in this area (see figure 4). The higher levels are covered by sand dunes with a thick growth of oak trees and similar vegetation, suggesting that these dunes were formed during the Pleistocene epoch. No volcanic ash has been reported from these deposits.

(4) Low terrace deposits of sand, silt, clay, and possibly some gravel, that conform with the present South Canadian River and Deer Creek, were laid down at a distinctly higher elevation than the floodplains of the present streams.

The gravel of the above deposits is termed a Rocky Mountain type because it consists primarily of quartzite cobbles and pebbles, derived by erosion of rocks exposed in the Rocky Mountains. The volcanic ash, which occurs only in the highest terrace north of Custer City and east of Putnam, has been considered by Ham to be of the Pearlette (late Kansan) type. The ash is directly associated with river gravels so these deposits probably were laid down in small lakes on a floodplain of a Pleistocene river. The finer silt and clay were probably deposited by water away from the channel, perhaps during flood stages, whereas the gravels and sands were deposited in channels by actively running water.

From the above facts it is readily seen that the gravels of areas (1) and (3) represent channel deposits, separated by a low ridge of nonchannel deposits. This means that at least two separate Pleistocene channel systems existed in this region. The former channel, which Deer Creek follows, has volcanic ash in it, thus suggesting a different age than the latter one, which is followed by the South Canadian River and contains no ash. Both channels must have merged upstream near Taloga and downstream near Bridgeport, early in the Pleistocene. In the remainder of this paper reference will be made to the former deposits as belonging to the older South Canadian River or channel system, and to the latter as belonging to the younger South Canadian River or channel system.

Terrace levels

South Canadian River. Approximately 5 terrace levels of probable Pleistocene age are discernable along the South Canadian River (see figure 5). They are 300, 270, 220, 150, and 50 feet above the present floodplain. The highest are invariably farther away laterally from the river and the lowest are next to it. This means that the channel system of the younger South Canadian River coincided with the north and east edge of the present divide in that area. From this initial position during early Pleistocene time it shifted its channel laterally southwestward with the dip of the beds; this shift explains the progressively lower terraces next to the river.

Deer Creek. All levels of the South Canadian River pass up Deer Creek, disappearing or becoming steeper upstream in an orderly succession. The youngest is near the mouth, and the oldest and highest covers not only the area of the headwaters of Deer Creek but extends beyond this region to the northwest. This highest terrace level is the only one that contains volcanic ash and thick gravel deposits. From Putnam to Custer City, the higher portions of this terrace follow the southeastward-trending ridge of the Cloud Chief formation. In the Hydro-Bridgeport area, the highest gravel portion is south of Deer Creek, parallel to the creek, with progressively lower levels to the north adjacent to the creek. This suggests that the older South Canadian River channel shifted slightly to the northwest or north, following the strike of the bedrock. Gravel is present on both sides of Deer Creek on all terrace levels of that creek. These are considered to be secondarily derived from the highest terrace deposit because Deer Creek does not extend beyond this area into the Rocky Mountains. Deer Creek, therefore, must have later eroded into this highest terrace and yet it seems to have been part of this older South Canadian River channel system at one time.

It is concluded that in the Putnam-Taloga area, probably in late Kansan time, the older South Canadian River was probably diverted northward or northeastward. The old channel began to dry up and was transformed into an underfit stream, Deer Creek, which became a tributary to the younger South Canadian River newly formed to the northeast.

Stream piracy

Stream piracy of the older South Canadian River by one of its tributaries must have taken place early in the Pleistocene at a point northwest of Putnam and southwest of Taloga. In this region the tributary must have flowed northward following the present position of the South Canadian River, with headwaters working southward toward Putnam. Northeast of Taloga the stream curved eastward to southeastward, following the northeasternmost edge of the plunging syncline in the Cloud Chief formation on this divide. The stream flowed southeastward into Blaine County, where, about 10 miles north and 5 miles west of Bridgeport, the stream began to flow directly southward. It emptied into the older South Canadian River near the mouth of the present Deer Creek, but in a position south of the present South Canadian River (see figure 4).

In the Taloga-Putnam region, probably during late Kansan time or later, this tributary worked its way headward into the area of collapsed structures of the Cloud Chief formation. It followed the strike of the western edge of the broad syncline in the Cloud Chief, working its way southward directly toward the older South Canadian River channel. After having pirated the older channel at this point, the younger South Canadian River channel was initiated. The old river, between Putnam and the mouth of the tributary, then became Deer Creek, which now follows this old channel system.

Stream adjustment

The channel had to adjust to its new environment. Northwest of Putnam, the river now flowed in a southward-eroding loop, having had to change from a southeastward to a northeastward direction. Northeast of Taloga the younger South Canadian River followed the broad northward loop of its new channel and began to adjust to the strike and dip of the Cloud Chief formation. This loop was so broad that very little northward erosion took place, but throughout the Pleistocene the river shifted its channel downdip laterally to the southwest with the dip of the bedrock. This gradually accentuated the degree of curvature of this last loop in the river and accounts for the strong U-shaped pattern seen in the present course of the stream.

West of Bridgeport, the old river flowed eastward following the strike of the Rush Springs sandstone. The newly formed river then started to flow southward into the old river near the mouth of what is now Deer Creek. The younger South Canadian River adjusted itself to the strike of the bedrock, thus accounting for the sharp turn from the southeast to the east in the course of the present river west of Bridgeport. A large southward-eroding loop did not occur here because the mouth of Deer Creek acted as a pivot point or bulwark against southward erosion at this point.

Deer Creek had no other choice but to adjust to the valley of the older South Canadian River. This adjustment took place immediately after stream piracy in late Kansan time or later, thus accounting for the same terrace levels on this creek and the South Canadian River.

Chronology

To date, the only fact useful in dating the Pleistocene deposits in this region is the occurrence of volcanic ash of probable Pearlette (late Kansan) age. The ash nowhere occurs in the highest part of the oldest terrace and it is possible that the oldest terrace may be composite and include sediments older than Kansan age. The highest terrace of the older South Canadian River is in part older than the highest terrace of the younger South Canadian River, but both are probably close to late Kansan in age.

The second terrace down from the top appears to be closely related to the first terrace and may also be of Kansan age. These high two terrace levels are overlain by sand dunes, are only about 30 feet apart, and are highly dissected. The next two appear to be closely related because they are normally devoid of sand dunes, have well-defined boundaries above and below but a gentler surface between, and are about 100 feet higher than the next lowest terrace. These may be Illinoian in age and the last one, which has extremely clear-cut boundaries and follows the margins of the floodplain of the present river, may be Wisconsinan.

Correlation

There is a striking similarity between the Pleistocene in this area with that of the South Canadian River in Hughes County and adjoining area of southeastern Oklahoma. Weaver reports 4 distinct terraces on the South Canadian River, being 10-15, 30-40, 65-80, and 200 feet above the present floodplain. The highest level includes an odd channel deposit of the South Canadian River termed the Gerty sand. This does not conform with the present river and is much thicker than the general high level gravels. Ham reports volcanic ash in the Gerty of Haskell, Pontotoc, and Garvin Counties. This deposit is interpreted by Hendricks to be sediment that was deposited by a former channel of the South Canadian River that has since been pirated by a tributary of the same river, in exactly the same manner and direction as outlined for the Blaine-Dewey-Custer County area.

It is possible that there is a one to one correlation of the terraces between these two areas, accepting the fact that the higher two levels of Blaine, Dewey, and Custer Counties may equal the one high level of Hughes County. This means that the highest level or higher levels along the South Canadian River, and on tops of the divides quite some distance from the river, are at least late Kansan in age and possibly older. The more pronounced terraces along the immediate river valleys would then be Illinoian and younger.

It is concluded that most high level gravels that are scattered over the countryside probably are of Kansan age and that radical changes in stream channels took place during that time. Although all major streams must have existed during Nebraskan time, probably little glaciation took place in the Rocky Mountains during this age and these deposits were inconsequential. The Illinoian and Wisconsinan deposits filled in the valleys of the post-Kansan streams and these streams later adjusted to the bedrock.

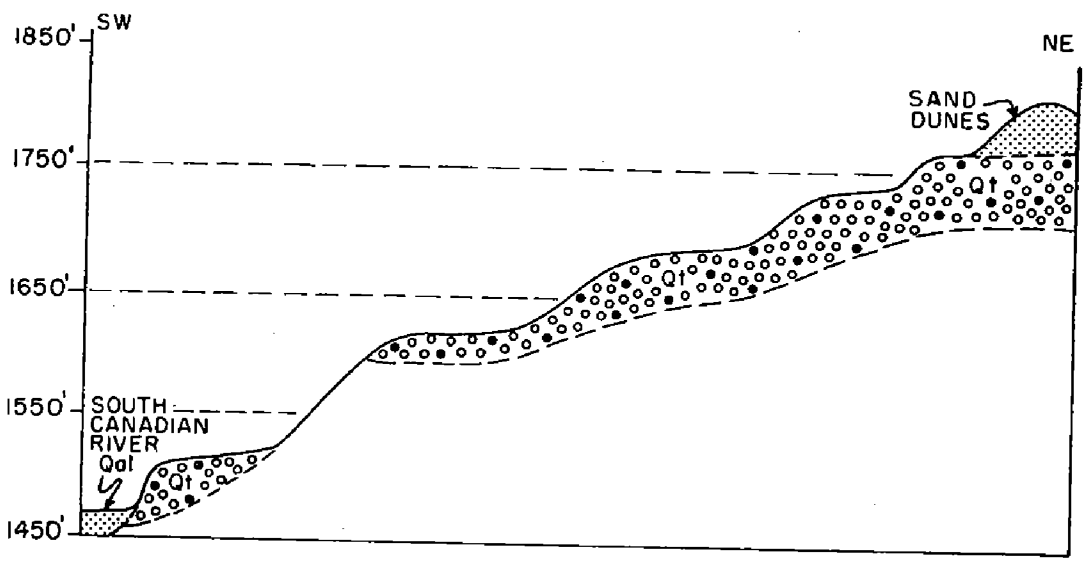

FIGURE 5. Schematic diagram of terrace levels on the northeast side of the South Canadian River in S½ T. 15 N., R. 13 W., Blaine County, Oklahoma. Qt, terrace deposits; Qal, alluvium.

Preliminary study of the North Canadian and Cimarron Rivers shows a similar history. Five terrace levels, with volcanic ash and sand dunes in the higher levels, gravels to the northeast and silts and clays to the southwest of the present rivers, and lateral southwestward adjustment to bedrock are all features similar to those of the South Canadian River. These facts show that pre-Pleistocene rivers were the same named rivers as the present ones, and must have been the same streams that deposited late Tertiary material farther west.

Pre-Pleistocene history

All evidence seems to show that the South Canadian River and other major streams must have been initiated during the Tertiary as a result of the Laramide orogeny. No Cretaceous rocks have been found in the area studied, but they do occur about 8 miles northwest, 10 miles north, and 20 miles west of Taloga and are scattered from western Washita County to northwestern Woods County. They belong to the Kiowa formation of the lower part of the Cretaceous system and rest upon rocks of the Quartermaster group, Cloud Chief formation, and Rush Springs sandstone. None of these rocks occurs east of the 99° meridian, except for a small area 10 miles north of Taloga which is almost on the 99° line. It is seriously doubted that the Cretaceous rocks were ever deposited east of this line because (1) no actual evidence of outcrops is present, (2) scattered erosional remnants of Cretaceous rocks are not found, and (3) Pleistocene streams could not have their pattern if they were initiated upon any other surface other than the Permian. Most of the major streams flow eastward until they reach the eastern edge of the Tertiary and Cretaceous beds, then they begin to adjust in a southeastward direction to the underlying Permian beds.

The Cretaceous rocks probably formed an eastward-dipping floor from the Rocky Mountains to the western edge of Oklahoma in early Tertiary time. As the Laramide orogeny progressed erosion took place and the present named major streams in the region were initiated. They probably deposited major portions of the Tertiary deposits, and established a general eastward-flowing course during this time. Upon reaching the Permian red beds farther east they immediately began to adjust to the bedrock of the Anadarko Basin, turning southeastward and carving out escarpments laterally downdip to the southwest.

Conclusion

At the beginning of the Pleistocene the stage was set for extensive alluviation of the old valleys, more lateral downcutting, and minor shifts of channels of these old established streams, as has been demonstrated for the South Canadian River. Nebraskan streams probably carried some sediment but it was not until Kansan time that extensive sheets of gravel were laid down over wide areas. After stream piracy and adjustment during the Kansan age, the Illinoian and Wisconsinan streams laid down deposits at lower levels along the present stream courses, thus accounting for the peculiar distribution of sediments and for the stream patterns seen at present, as evidenced by study of the Pleistocene course of the South Canadian River.

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Ralph Allen Brant (1899-1958)

By Earl T. Peterson

Jack Brant, a vigorous, active, generous friend of geology and geologists, died on September 30, 1958, in Tulsa of the effects of Encephalitis. He was born on May 25, 1899, in Canton, Illinois, and was christened Ralph Allen. After secondary education in Canton schools, he attended the State University of Iowa (1921), University of Nevada (1921-22), and received his bachelor's degree from the University of Chicago in 1925. He was awarded the first Master of Science degree given by Tulsa University in geology (1942).

First employed in the oil industry by Shaffer Oil Co. in Tulsa, 1925-29, he began doing subsurface geology at the time microscope examination of well samples was just getting under way. He then was employed by the Atlantic Refining Co. in 1929, as a subsurface geologist. At the time of his death, he was regional research geologist for Atlantic. He enlisted and served with Company B, 108th Engineers, 33rd Division in World War I, saw seven months of active duty in northern France and Belgium and served seven more months in the Army of Occupation.

Professionally he led a very active life. A member of the American Association of Petroleum Geologists since 1926, he served twice on committees. While the Tulsa Stratigraphic Society functioned, he was an active member and officer.

As a member of the Tulsa Geological Society since 1925, he was in charge of many field trips and was serving, at the time of his death, on an employment council set up to interview graduating geology students. Following is his list of offices held:

Second Vice-President, 1932
Assistant Editor, 1933
Second Vice-President, 1943 and 1951
First Vice-President, 1955-56
President, 1956-57

In 1953, he was made an honorary charter member of the Beta Lambda chapter of Sigma Gamma Epsilon at Tulsa University in recognition of his teaching classes in subsurface geology seven separate years between 1938 and 1954. He volunteered his services and asked no compensation.

Other organizations with which he was affiliated are:

National Archery Association, 1929-40 (edited "Archery" magazine 1929-34, and was president twice)
Morning Star Masonic Lodge, Canton, Ill.
Boy Scout Merit Badge councillor, 1929-40
Oklahoma Genealogical Society
Life member—Oklahoma Historical Society
Honorary member—Oklahoma Academy of Science

His hobbies, always pursued with great zest, included outcrop geology, fishing, genealogy, fishing, photography, and fishing. Jack was never too busy to discuss geology with his friends or to help students in their geologic work.

He is survived by his wife Frieda, his daughter Mrs. Jerry J. Brown, a granddaughter, three brothers and one sister.

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Federal Survey List of Publications

The United States Geological Survey has just issued a list of its publications from 1882 to May 1958. The 455-page book contains 126 pages of index to the contents of the publications. Under the index heading OKLAHOMA (pages 386-387) are listed 101 publications of various types. Twenty-nine contain incidental references to Oklahoma in general reports on such matters as gypsum, water, or coal. Fourteen are records of boundaries, of area, of surveying and one is on forests. Twenty-nine are short papers of interest at the time. Earliest geologic report is Taff's on the McAlester-Lehigh coal field (1899).

The more significant early reports are Gould's Water-Supply Paper 148 (1905), the preliminary report on the Arbuckle and Wichita Mountians (1904), and the five folios, Coalgate (1901), Atoka (1902), Tishomingo (1933), Tahlequah (1905), and Muscogee (1906). The folios which were never published are also of interest, Wyandotte by Siebenthal, Vinita and Nowata by Ohern, Sallisaw and Sanbois by Taff, Claremore and Pryor by Smith. The two Osage County reports (Bulletins 686 and 900) are the best of the twenties. Six Oil and Gas Investigations maps and one chart have been significant. Coal reports have been the more frequent type in the last 25 years, of which Bulletin 874 was especially fine, and Bulletins 1015f and 1042j have been recent and useful. The large Professional Paper on water loss on Lake Hefner appeared in 1954. Curiously, no Oklahoma topic has appeared in the Monograph series, the last of which was published in 1929.

Federal Survey geologists have contributed more widely to Oklahoma geology than the rather meager list since 1922 would suggest. Their papers have been released to be printed in professional journals and at least 14 have been issued by the Oklahoma Geological Survey.

C. C. B.

Photograph of Geologists of 1911

V. E. Monnett

In Oklahoma Geology Notes, volume 18, number 10, appeared an article by Charles A. Long entitled, "A Geological Excursion to the Arbuckle Mountains, April 1903." Accompanying the article was a group photograph of the Pick and Hammer Club on a field trip. The illustration does not show the members of the 1903 party but does show a group of students and faculty sometime in 1911. According to J. B. Newby, who was a major student in geology at Oklahoma University at th the picture was taken just west of the location of the present administration building. The blocks of limestone shown are stones which were used in the construction of Evans Hall, the administration building. After the larger blocks were in place in the wall, many of them were carved into the gargoyles and other forms now to be seen near the top of the walls.

Many of the men shown in the picture are well known in the geological profession and an effort has been made to identify as many as possible. The assistance of L. E. Trout of Wichita Falls and Frank Buttram of Oklahoma City is gratefully acknowledged. Unfortunately there is one in the group whom none of us could identify but the following list includes others of the group.

From left to right those sitting are: Dr. L. C. Snider, deceased, former assistant state geologist of Oklahoma and author of many technical articles, bulletins and books; L. E. Trout, consulting geologist now located in Wichita Falls, Texas; Ben Young, address unknown; Dr. Charles N. Gould, deceased, first head of department of geology at Oklahoma University and first director of the Oklahoma Geological Survey; Howard Cook, a resident of Chickasha, Oklahoma; Robert Garrett, deceased, for many years a geologist in Tulsa; Unidentified; George Meyer, consulting geologist in Tulsa, Oklahoma; Frank Buttram, Oklahoma City, President of Buttram Petroleum Company; Louis Roark, deceased, for many years a geologist in Tulsa.

Those standing are, from left to right: Charles H. Taylor, Oklahoma City, former head of department of Geology at Oklahoma University and now capitalist and consultant; Ray H. Haun, New Rochelle, New York, formerly advertising manager of *This Week* magazine and now a consultant in the field of advertising; Victor E. Monnett, Norman, Oklahoma, David Ross Boyd Professor of Geology at Oklahoma University; Robert H. Wood, deceased, former member of the firm of Broswood Oil Company of Tulsa, Oklahoma; Richard A. Conkling, deceased, once chief geologist of the Roxana Petroleum Company and later consulting geologist in Oklahoma City; Dr. D. W. Ohern, deceased, former head of department and director of Oklahoma Geological Survey; J. Cleveland Thompson, deceased, lost his life while in military service; Everett Z. Carpenter, Oklahoma City, one of the first administrative geologists in the southwest and now with the Porter Oil and Gas Company; John M. Herald, Nocona, Texas, after many years of geological work with major oil companies he left the profession; Charles W. Hamilton, Upper Montclair, New Jersey, retired last year as vice-president of the Gulf Oil Company.

New Topographic Maps

Since the August-September issue of the Notes the Enid sheet of the 1 to 250,000 series has been issued. This makes complete coverage of Oklahoma available on 14 sheets.

In the Semi-Centennial report, issued in July, the map on page 134 showed available topographic maps on a scale of 1 to 62,500 or larger. Since July, the following quadrangles have been issued:

15 minute quadrangles:

Name	*County*
Butler	Custer
Clinton	Custer
Dill City	Washita-Custer
Cordell	Washita-Custer
Randlett	Cotton
Burkburnett	Cotton-Tillman

7½ minute quadrangles:

Name	*County*
Coalgate	Coal
Coalgate SE	Coal-Pittsburg
Limestone Gap	Atoka
Lehigh	Coal-Atoka
Stringtown	Atoka
Lane NW	Atoka
Lane NE	Atoka-Pushmataha
Jumbo	Pushmataha
Bruno	Atoka
Lane	Atoka
Farris	Atoka-Pushmataha
Moyers	Pushmataha
Bixby	Tulsa
Leonard	Tulsa

There are currently 32 15-minute quadrangles and 33 7½-minute quadrangles in preparation. A new index to topographic mapping in Oklahoma was issued in October, 1958. C. C. B.