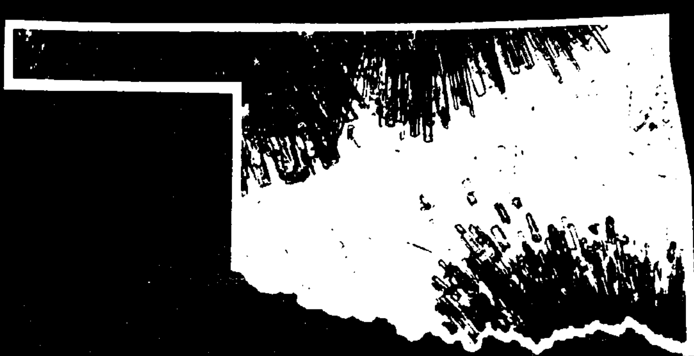
OKLAHOMA GEOLOGY NOTES



VOLUME 26 • NUMBER 11 NOVEMBER 1966

Cover Picture

Malachite in the Flowerpot Shale

The acicular crystals shown in the photomicrograph on this month's cover are malachite (x23, plain light), one of the principal members of a suite of copper minerals occurring in the Permian Flowerpot Shale of southwestern Oklahoma. The malachite needles and the enclosing clear gypsum are cavity fillings in a malachite-impregnated nodule that weathered from a copper-rich shale bed approximately 10 feet below the Kiser Bed near Creta, Jackson County.

The copper minerals identified in the Flowerpot Shale are malachite, chalcocite, brochantite, azurite, and possible cuprite. All geologic considerations suggest that the copper was deposited from sea water syngenetically with the shale beds. Presumably, the primary mineral was chalcocite, from which the other minerals, predominantly malachite, were derived epigenetically.

The occurrence of copper minerals in the Flowerpot Shale was first described in 1964 by W. E. Ham and K. S. Johnson in Oklahoma Geological Survey Circular 64, from which the cover picture is reproduced. The deposit has since proved to be commercially workable and has yielded the first significant production of copper ore in the State's history.

—*Alex. Nicholson*

Patterns of Oklahoma Prairie Mounds

Carl C. Branson

Prairie mounds occur in Oklahoma southeast of a line from the northeast corner of the State to Lake Texoma. They are most numerous in McCurtain, Choctaw, Bryan, and Pittsburg Counties, where there are at least 500,000 of them. These mounds are also known as pimple mounds, soil mounds, natural mounds, and flower mounds. The mounds range from 3 to 7 feet in height and 30 to 100 feet in diameter. Most mounds are in random arrangement and are circular in ground plan. The rare areas of different arrangement provide exceptions which make it difficult to explain the origin of the mounds.

All mounds are on Pleistocene terrace deposits or, in some cases, have apparently been let down upon bedrock by erosion of the mounds and intervening material. The fact that they occur upon all terrace levels indicates that they were formed late in Wisconsin time. Like mounds occur in northeastern Texas, western and southern Arkansas, northwestern and central-western Louisiana, and southern Missouri.

Several types of anomalous nonrandom mound patterns occur in Oklahoma, and it is the purpose of this paper to describe and illustrate these types.

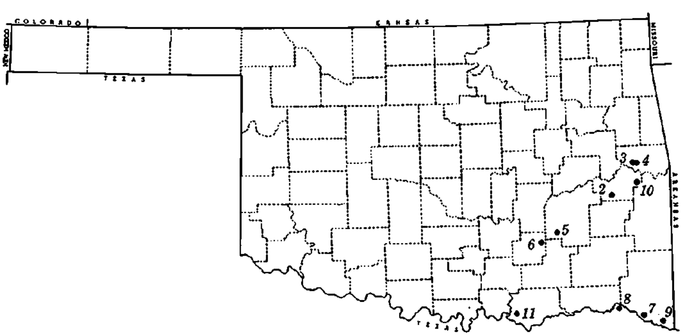


Figure 1. Index map showing locations of areas of prairie mounds illustrated in this paper. Numbers refer to the aerial photographs which appear on pages 264-273.

Figure 2. Aligned prairie mounds at Kinta, Haskell County, Tps. 7, 8 N., R. 20 E.
(Photographic mosaic courtesy Edgar Tobin Aerial Surveys; approx. scale: 1 inch = 1 mile)

The mounds shown in figure 2 occur on terrace deposits at elevations of 530 to 560 feet above mean sea level. Over most of the area the mounds are in normal random distribution, but in the central part they are in rough northwest-southeast alignment and, in the center at the top of the photograph over about half a section, they are aligned on a southwest-northeast trend. The bedrock is McAlester Shale. The northwesterly trends are parallel to the drainage on the shales; the northeasterly trends parallel the strike of the strata.

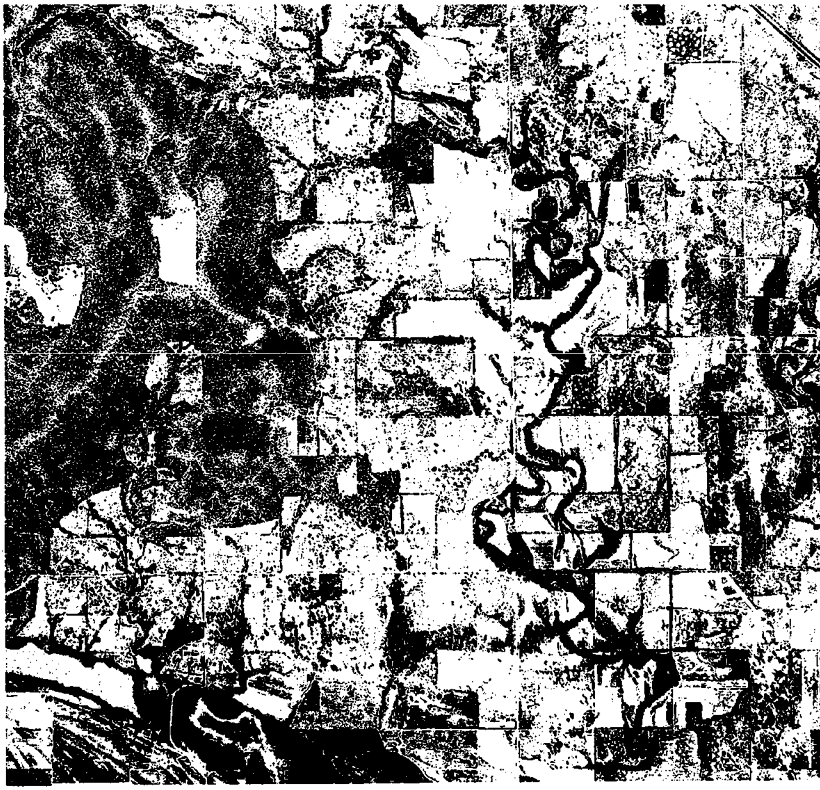


Figure 3. Prairie mounds bordering banks of abandoned stream courses in Sequoyah County, sec. 34, T. 12 N., R. 22 E.
(Sept. 19, 1952; approx. scale: 1 inch = ½ mile)

Mounds are abundant on terrace deposits of 480-foot elevation near Vian Creek (fig. 3). At the right center and lower right of the picture small mounds are beaded along the banks of abandoned meanders. The mounds are small compared to those in the upper right on the terrace deposits at 530 feet.

Figure 4. Radially aligned mounds in Sequoyah County, sec. 36, T. 12 N., R. 22 E.
(Sept. 19, 1952; approx. scale: 1 inch = ½ mile)

The photograph of figure 4 overlaps that of figure 3 on the left side. Mounds in the eastern half of the area shown tend to be radially arranged. Elevation is 520 to 540 feet.

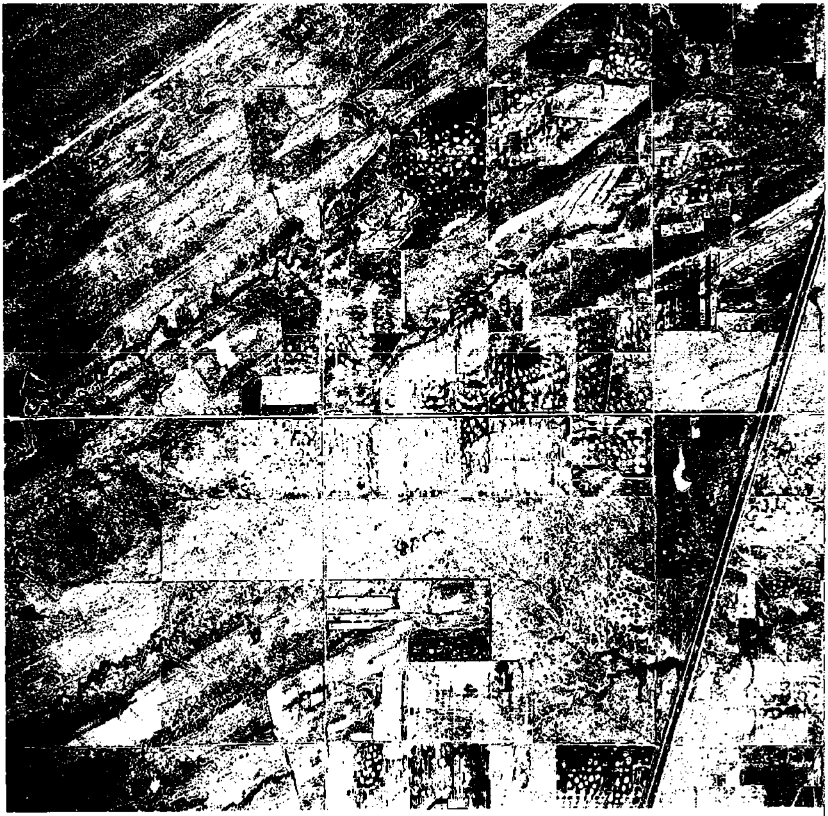


Figure 5. Linear mounds at Kiowa, Pittsburg County, secs. 2, 3, 10, 11, 14, 15, T. 3 N., R. 13 E.
(Jan. 13, 1948; approx. scale: 1 inch = ½ mile)

Mounds in the central part of the photograph of figure 5 are aligned parallel to the strike of the bedrock units. These units are the Hartshorne, McAlester, and Savanna Formations on the Savanna anticline. The mounds have a greater variation in diameter than in most areas. Elevation is 720 feet.

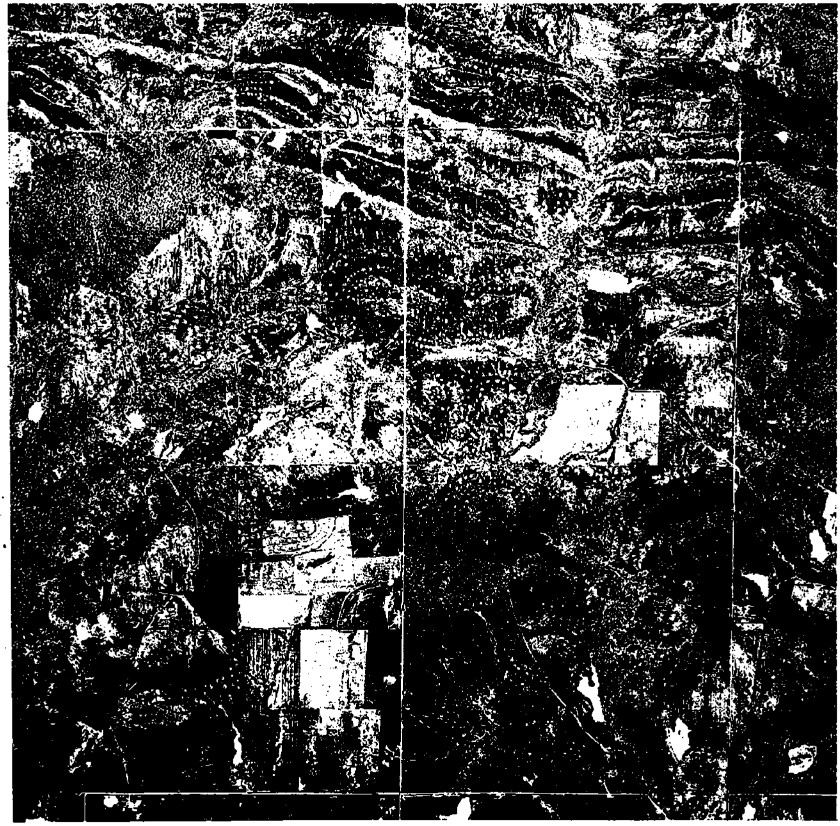


Figure 6. Linear mounds in Coal County, secs. 8, 9, 16, 17, T. 2 N., R. 11 E.
(March 22, 1955; approx. scale: 1 inch = ½ mile)

In the upper part of the photograph of figure 6, small mounds are aligned in single rows, some rows being more than 2 miles long. The rows are on sandstone beds of the Boggy Formation and follow the strike. In the lower part of the picture is an area of radial rows at the head of a small drainage basin.

Figure 7. Radial and linear mounds on low terrace in McCurtain County, secs. 29, 30, 31, 32, T. 8 S., R. 24 E.
(Sept. 23, 1938; approx. scale: 1 inch = ½ mile)

The photograph of figure 7 shows radially arranged mounds bordering an abandoned meander (upper left). The presence of mounds within abandoned meanders (lower center) proves that the mounds were formed before the meanders. The mounds are on fluviatile terrace deposits mapped as Qtl on the Texarkana sheet of the Geologic Atlas of Texas.

Figure 8. Linear arrangement of mounds along south side of the Red River, opposite McCurtain-Choctaw county line, in Red River County, Texas.
(Sept. 23, 1938; approx. scale: 1 inch = ½ mile)

In low areas near drainage (fig. 8), mounds are in chains secondarily formed from randomly distributed mounds. The mounds are on fluviatile terrace deposits mapped as Qt1 on the Texarkana sheet of the Geologic Atlas of Texas.

Figure 9. Radial alignment of mounds 2 miles north of Red River in McCurtain County, secs. 2, 3, 4, T. 10 S., R. 25 E.
(Sept. 22, 1938; approx. scale: 1 inch = ½ mile)

The mounds shown in figure 9 border abandoned meanders older than the oxbow lake (Long Log Lake). Lineation is secondarily developed by drainage into abandoned meanders. Elevation is 340 feet.

Figure 10. Mounds bordering abandoned drainage courses in Haskell County, sec. 21, T. 9 N., R. 23 E.
(Aug. 28, 1939; approx. scale: 1 inch = ½ mile)

Above and to the right of the center of the picture (fig. 10) mounds are beaded along the banks of abandoned stream courses. Similar patterns occur in the center of the lower left. Elevation is 540 feet.

Figure 11. Linear mound patterns near Platter, Bryan County, secs. 25, 36, T. 7 S., R. 7 E.; secs. 30, 31, T. 7 S., R. 8 E.
(Jan. 3, 1948; approx. scale: 1 inch = ½ mile)

The mounds shown in figure 11 appear to have been elongated and made linear during cultivation and by grading near the railroad. Elevation is 700 feet. Lake Texoma is at the left; the town of Platter is in the lower left corner.

Stain Technique for Studying Silicified-Wood Sections

L. R. Wilson

Definition of cellular detail in colorless silicified-wood sections is commonly difficult to obtain and many specimens, which under reflected light and hand-lens magnification, appear to have well-preserved morphological structures, cannot be studied by transmitted light of the compound microscope.

During grinding, the thin sections are checked under the microscope while the rock surfaces are wet, and some structures, although they appear sufficiently distinct when the surface is wet, disappear upon drying. The definition generally is not improved after the sections have been sealed with Canada balsam and cover glasses. Rarely can the use of various filters aid in resolving the definition of the cellular structure.

Experiments with several biological stains have shown that most silicified wood sections can be made usable for morphological studies if, after final grinding and thorough drying, the sections are painted with a dark stain and allowed to dry again before mounting in Canada balsam. A disadvantage of this technique is the uneven concentration of stain and the accumulation of opaque stain particles in critical study areas.

The use of stained Hoyer's solution as a mountant, similar to that used by Sanders (1966) with modern conifer pollen, has resulted in the production of much better morphological preparations of colorless silicified wood. The preparation of Hoyer's solution and stain suggested by Sanders is 0.05 gm of Bismarck brown Y powder to 10 gm of Hoyer's solution. This preparation results in a dark reddish-brown solution which is adequate for studying most silicified-wood sections, but better results are obtained with slightly more stain in the solution. Care should be taken that all of the Bismarck brown Y particles are dissolved before using. If the solution is permitted to stand in a sealed container for several days or longer the particles will dissolve. Hoyer's solution is a water-miscible mountant, its preparation and comparison with other palynological mountants was described by Wilson (1962). Included in that note is the following statement:

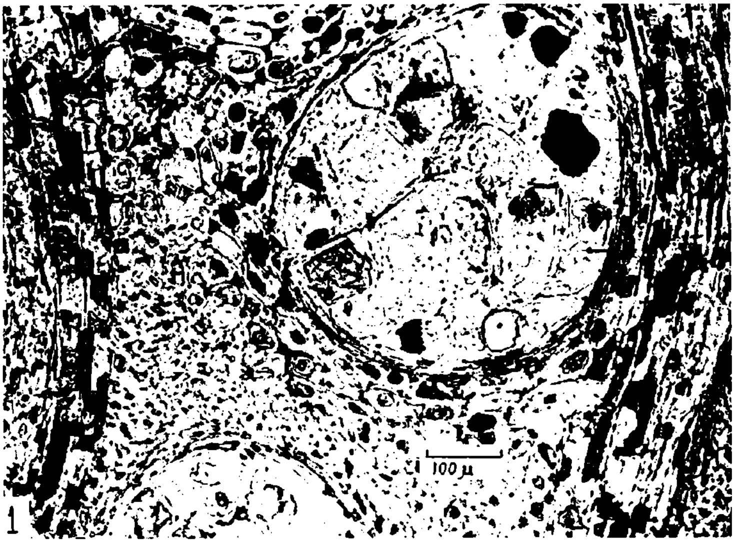
"The preparation of Hoyer's solution published by Anderson (1954) is as follows:

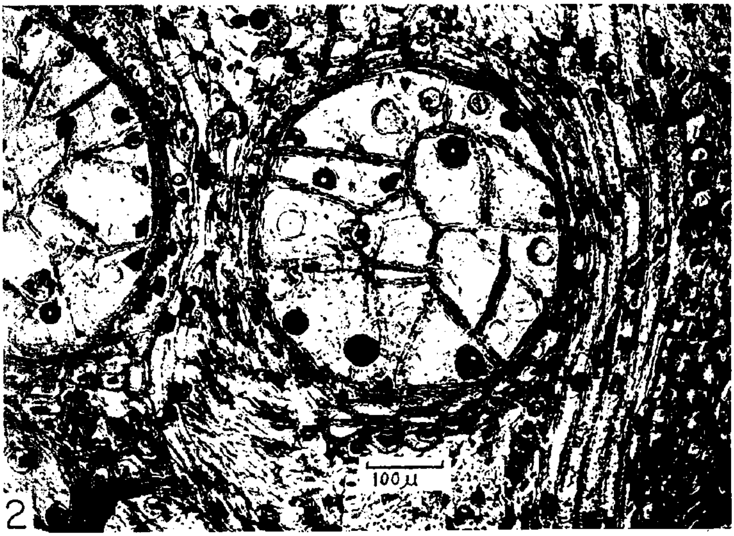
Explanation of Plate I

Figure 1. Transverse section of a colorless silicified Tertiary wood mounted in Canada balsam. Note the lack of visible detailed cell structure. Specimen from Beaver County, Oklahoma, collected by Mart P. Schemel.

Figure 2. Transverse section of a colorless silicified Tertiary wood mounted in Hoyer's solution, stained with Bismarck brown Y. Note the detailed cellular structures not visible in figure 1. Section cut from same specimen as that of figure 1.

Plate I





Distilled water	50 cc
Gum arabic (U.S.P. Flake)	30 g
Chloral hydrate	200 g
Glycerine	20 cc

"It is of prime importance that the gum arabic be in flake form so that it will go readily into solution. The ingredients should be mixed in the order listed above and should not be heated at higher than room temperature. A magnetic mixture is a definite aid in speeding the combination of the ingredients. After the solution has been prepared, it should be stored in a bottle with an airtight stopper."

Stained Hoyer's solution should be spread uniformly on a dry microscope-slide section of silicified wood and a cover glass immediately placed over it. The section is then ready for study but it is not a permanent mount until it has been dried several days in an oven at approximately 40° C. The oven treatment appears to improve the color concentration in wall structures of silicified wood. On plate I, figure 1 illustrates a transverse section of a Tertiary silicified wood mounted in clear Canada balsam and figure 2 shows one mounted in stained Hoyer's solution. The photomicrographs were taken with a Zeiss Photomicroscope using Adox KB14 film with a medium-green filter at a magnification of x250. The thin sections were prepared by Mr. Ralph Morgan.

References Cited

Anderson, L. E., 1954, Hoyer's solution as a rapid permanent mounting medium for bryophytes: Bryologist, vol. 57, p. 242-244.

Sanders, R. B., 1966, Technique for mounting saccate pollen grains: Okla. Geol. Survey, Okla. Geology Notes, vol. 26, p. 257-258.

Wilson, L. R., 1962, Use of Hoyer's solution as a palynological mounting medium: Okla. Geol. Survey, Okla. Geology Notes, vol. 22, p. 26-27.

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