XXX. RADIATE STRUCTURE OF SAND BARITE CRYSTAL MASSES

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When the Eighty-niners who came to Cleveland County thirty years ago, settled in the jackoak country six miles east of Norman, they found scattered around their fields great numbers of unusual forms of concretions. They were red in color, as was all the sandstone in the region, and varied much in size. To those unusual forms various fanciful names were given such as "rosettes," "petrified walnuts," or "petrified roses." The names themselves are significant.

The first year the writer was on this campus, 1900, his attention was called to those peculiar forms, and several trips with horse and buggy were made to the locality, and specimens were secured from several farms. Later, a collection of several hundred of these specimens was sent to the Oklahoma mineral exhibit at the St. Louis World's Fair in 1904, where they attracted much attention from a number of geologists and mineralogists. Among others was Prof. H. W. Nichols of the Field Museum at Chicago, who secured a number of specimens and lated published on them.[1] It was Prof. Nichols who first proposed the name "sand barite crystals" which has since been generally employed. Specimens from the vicinity of Norman have since found their way into many of the leading museums both in this country and abroad.

So far as I have been able to learn, there have been but three attempts by Oklahoma scientists to describe these forms of crystals. One by Norman Meland in 1922, as part one of a master thesis (unpublished) now on file in the library of Oklahoma University, one by W. Ross Gahring in 1924 (also unpublished) now in the University Library, and the third by A. C. Shead in 1922, published in the Transactions of the Oklahoma Academy of Science.

Meland presents a brief but comprehensive theoretical discussion of the origin and formation of the crystals, quoting

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[1]Nichols, Henry W., New forms of concretions, Field Columbian Museum, Publication III, vol. III, No. 3, pp. 31-35, 1906.

[2]Shead A. C., Notes on Barite in Oklahoma with chemical analyses of sand barites, Okla. Acad. Sci. vol. III; Univ. of Okla. Bull. No. 271. Univ. Studies No. 16 pp. 102-106, Oct. 1923.

liberally from various authors, in many parts of the world. His description of the various forms follows:

"The specimens found range from simple rounded tablets to complex intergrowths and range in size from less than an inch to several inches in diameter. The roses are generally red or brownish in color, with a granular appearance due to the slight protrusion of quartz grains from the baritic cement. In lustre they closely resemble maple sugar.

"The only crystal face present is the basal plane 'c' (001) which however, is universally developed and controls the habit of both unit and compound.

"The simplest form which may be considered the fundamental one as it enters into the makeup of every aggregate is a flat crystal bounded above and below by basal planes and circular in outline with scalloped borders.

"A second type which is more complicated is made by the interpenetration of two or more plates similar to the one just described. There is universally a central tablet to which the others are variously inclined. The several components apparently possess a 'b' axis in common.

"Other still more involved growths have in addition to plates crossing with a 'b' axis in common, other plates variously inclined to these. In these forms one or more of the plates fail to have any axis in common with the other plates which possess a common 'b' axis.

"A fourth type consists of spherical skeleton forms composed of thin plates of nearly equal diameter.

"Upon the four types just described are frequently subsidiary growths giving rise to strange and distorted looking forms. There is little or no regularity in the manner of attachment of the secondary members. Two aggregates are frequently found intergrown.

An additional type appears to contain little if any sand and is therefore not definitely a sand-barite. These forms are of a dull gray color and are spherical in outline. Upon being broken, they appeared to be composed of numerous elongate radial plates diverging from a common center."

The best theoretical discussion of the origin of the crystals is also from Meland's paper from which I quote from page 15.

"It has been suggested that at various times in the formation of the Red Beds, inland lakes of a temporary nature have developed. Assuming the existence of such a lake, evaporation would

eventually reduce it to a condition of salinity. Accepting the statements of Professor Lindgren that barite is particularly soluble in appreciable amounts in salt water. As such a lake approached extinction, numerous small lagoonal ponds of various size may be assumed to have relatively small localized areas similar in extent to those in which they are now found. Precipitation would take place in the order of insolubility of the dissolved salts. The great resistance of barite to weathering however, would cause the sand-barites to remain intact long after the associated salts such as calcium and magnesium carbonate, calcium sulphate and solium chloride, and even the mother sediment had been eroded away."

In addition to the popular names "rosettes", "petrified walnuts", and "petrified roses", and the name "sand barite crystals" first used by Nichols, other names have been used for the crystals, such as, "sand crystals", "barite rosettes", "sand barite rosettes", and "sand barites".

While these crystals have been found more abundantly in eastern Cleveland County than at any other place with which the writer is acquainted, they are not confined to that area alone. Specimens are known to occur in Logan, Lincoln, Okfuskee, Oklahoma, Cleveland, Pottawatomie, McClain, and Garvin counties. Similar crystals from the Permian have been reported from Saline County, in northeast Kansas. It is the writer's present belief that the principal zone containing the sand barites in Oklahoma is perhaps not over 100 feet thick, and that this horizon outcrops on the surface along a north and south line from the vicinity of Pauls Valley posibly as far as Guthrie, a distance of about 80 miles. Undoubtedly, however, there are other horizons at a lower level stratigraphically which contain the crystals.

The chief forms of the crystals as they occur in great abundance in Cleveland County is so well known to most of us as to require little demonstration at this time.

The chief object of this paper, however, is to call attention to some very unusual crystal aggregates, or groups of crystals, that have recently come to light. The larger specimen shown herewith was found on the Shadrack farm, sec. 29, T. 9N., R. 1 W., 6 miles east of Norman by my young friend Keith Kahle. This aggregate may be briefly described as follows: The mass weighs approximately 125 lbs., and includes two aggregates, one nearly complete, the other a broken fragment. The frag-

ment and the larger complete mass are attached near their respective peripheries, by the twinning of the plate crystals. The complete aggregate is in shape roughly conical, or cauliflower-shaped, with a diameter of 17 inches, and a height of 10 inches. It consists of about 20 radiating arms, (branches, spokes, radii, extensions), composed of overlapping tabular sandbarite crystals. The size of the individual crystals increases systematically from the apex or focus of the cone to the sides, being 1-2 to 3-4 inch in diameter near the center, and from 3 to 4 inches near the periphery. Part of the radiating arms are arranged parallel to the plane of the slant side of the cone while others are arranged perpendicular to the sides.

Several of the radiating arms not only increase in size toward the perpiphery, but also divide fan-shaped into two or more parts, each arm in itself having the appearance of a high slender cone.

The smaller aggregate shown herewith has been on the campus for several years but no one seems to know where it came from. Its general appearance is that of the broken fragment of the larger mass. The general structure is flaringly fan-shaped and the individual crystals increase in size from the apex to the perphery.