

The Geode Beds of Iowa

During the years from 1847 to 1850 a party of scientists under the direction of David Dale Owen, United States Geologist, made an intensive survey of the Upper Mississippi Valley from St. Louis to the Canadian border. The results of this study were presented in a thick volume entitled *Report of a Geological Survey of Wisconsin, Iowa, and Minnesota*, published in 1852. In describing the formations in southern and western Iowa, Owen wrote of one series of carboniferous limestones: "At its base we have beds . . . especially characterized by enclosed *Geodes*, lined with crystals of quartz and calcareous spar." This may have been the earliest scientific note on the subject of geodes in Iowa to be found in geologic literature. These geodiferous beds" have a maximum thickness of some forty feet.

These geodes were nothing new to the geologists of Owen's party. In certain strata of the Mississippian rock of southeastern Iowa, northeastern Missouri, and western Illinois there are, perhaps, the most famous geode beds in all America. Only Russia, it is said, has formations containing geodes equalling those of Iowa in the

quantity and quality of the geodes they produce. Not all Iowans, however, are familiar with these geological curiosities. What, where, and why is a geode?

The earliest mention of the term "geode" dates from 1619, so it will be seen that it is not by any means a new word. Coming from the Greek word meaning earth, or like the earth, the word literally means earthy. Early mineralogists supposed that all true geodes should contain some loose or earthy material, such as loose crystals of quartz, calcite, pyrite, dry mud, or other mineral substances.

John Hill, in his *History of Fossils*, published in 1748, used the word geode in its modern connotation and showed a colored plate with fine engravings of geodes. What is probably the first formal definition ever written for these unique objects, appears in William Phillips' treatise on mineralogy, second edition, dated 1823: "A geode is a hollow ball; at Oberstein, in Saxony, are found hollow balls of agate (chalcedony) lined with crystals of quartz, or amethyst, which are termed Geodes." This usage, first introduced by German mineralogists to designate a hollow nodule of any mineral substance, often lined with crystals, still holds good today.

Geologically, the term geode became common

in this country almost simultaneously with the first settlement in Iowa. When the early pioneers filtered into the southeast corner of the territory, many were impressed, no doubt, with the singular beauty of these objects, which in certain sections lay scattered over the ground like "potatoes in the field." They were soon recognized by their correct name and the term geode became, and yet remains, almost a common household word in that section of Iowa.

In Volume I, of the *Report of the Geological Survey of the State of Iowa*, published in 1858, State Geologist James Hall noted that, "Below the Magnesian limestone, we find a deposit of marly clays and argillaceous limestones filled with spherical masses of siliceous material, termed *geodes*; many of which are hollow, and, on being broken, present magnificent crystals of quartz, calc spar, dolomite, zinc blende and iron pyrites, as well as mammillary and botryoid forms of chalcedony."

Charles A. White, in his *Report on the Survey of the State of Iowa*, published twelve years later, in 1870, likewise mentions the "Geode beds" and gives a good description of their character and extent. Geodes, White says, "are more or less spherical masses of silex, usually hollow and lined with crystals of quartz. The outer crust is rough

and unsightly, but the crystals which stud the interior cavity are often very beautiful. The prevailing kinds of crystals are of quartz, but those of calcite are quite common in the same geode. Sometimes they also contain crystals of the sulphuretes of iron and zinc. They vary in size from that of a walnut to a foot in diameter. The crust of the geodes in this formation is invariably silicious, but geodes are found in the soft magnesium limestone of Devonian age in Bremer county, the crust and lining crystals of which are carbonate of lime, some of which are quite free from silex."

These "geode beds" of southeastern Iowa are exposed in many places along the deeply eroded valleys of the Skunk, Des Moines, and Mississippi rivers, and their tributary streams. Throughout the years they have been visited by literally thousands of individuals bent on collecting geodes. For more than a century this has been a favorite pastime, not only for the "natives" of the region, but for others, often coming from great distances. In early days, numerous scientists and collectors of Europe were also frequent visitors, and practically every famous geologist in America has visited the region, marveling at the great diversity and beauty of the geodes found so abundantly.

Geodes have been collected with many objects in view. They have been much appreciated lo-

cally for their true loveliness and beauty, but they have been considered largely as curiosities and used principally for ornamental purposes; they have adorned the yard of the humble pioneer's cabin and have been placed proudly upon the "whatnot" in the mansion of the city dweller among the choicest bric-a-brac. Great quantities have been used in the construction of rockeries and grottoes, and for borders along walks and flower beds on private lawns, as well as in many parks and public places. A footbridge in Saunders Park at Mount Pleasant is built almost entirely of geodes, some of the finest of the region; and a grotto at West Burlington contains literally thousands of the choicest geodes obtainable.

Throughout past years, geodes have been gathered and carted away by the hundreds of thousands, even whole truckloads at a time, but so numerous were they in the beginning that the supply, though gradually becoming depleted, is still far from exhausted. They may still be found in abundance by those who seek diligently for them, especially along the creek beds after a freshet, where the flood waters have disturbed the gravel beds. They are also to be found at low water below the mouths of the tributary streams entering the larger rivers.

Externally, geodes are most unattractive. They

might even be noticed for their sheer ugliness, being only slightly more prepossessing in outward appearance than any ordinary cobblestone. Internally, however, they may properly be classed as one of Nature's "heavenly" treasures, for they are filled with crystals of indescribable beauty. These are exposed to view only when the geode is broken open. Until that is done, no one can actually tell what each one will yield. Many are the rare prizes found therein, but some turn out to be duds.

Those most highly prized by collectors are partially hollow and lined with crystals, but in many cases the process of growth was prolonged until the cavity was entirely filled. In most instances geodes consist of a relatively thin shell of chalcedony, lined with bright, transparent crystals of quartz. These sparkle brilliantly in the sunlight, when first exposed to the light of day, after having existed in midnight darkness for perhaps millions of years.

Some less common geodes are lined with white or bluish-gray botryoidal (grape like) chalcedony, or, perhaps, with colorless crystals of calcite. In addition to the principal minerals which line it, the cavity frequently contains accessory minerals such as crystals of lead (galena), zinc and iron sulphide, and (more rarely) innumerable other

minerals, more than forty in number. Some exotic ones have their entire openings filled with powdery white kaolin; others are filled with water. In the bed of a small creek, opposite Fort Madison, near Niota, Illinois, peculiar geodes have been found entirely filled with black viscous bitumen (petroleum). Near Farmington, on the Des Moines River, brownish and reddish geodes may be found. These appear to have been vitrified by intense heat.

Geodes are not always rounded; in fact, some do not even remotely resemble this shape, being irregular and nodular. A few are even flattened, apparently having been crushed by the weight of overlying layers of rock. They vary in size from those no larger than a peanut, found between Montrose and Keokuk, up to giant geodes as much as three feet in diameter, which may be seen in the collection of R. G. Veith of Keokuk. In general, however, geodes are from three to six inches in diameter, and all sizes, more or less, are to be found at almost any given horizon or locality. Apparently the matter of size is purely incidental.

The size and shape of each geode, of course, depends upon the size and shape of the pre-existing cavity in which it was formed. While the origin of geodes is largely a matter of academic speculation it has also been of more or less interest to

laymen. Any child may recognize a geode, but even geologists are not fully agreed as to how they are formed. It is evident that they were made by the deposition of silicious and other material carried by percolating ground-water passing through the rocks, but neither the cause of the cavities nor the material in solution is known for certainty.

Naturally there have been no lack of theories to account for the origin of geodes. One of the earliest was presented by James Dwight Dana in his *Manual of Geology*: he held that geodes were formed by the deposition of mineral matter in cavities, formerly occupied by sponges. This idea is now practically abandoned for lack of substantiation. A similar theory advanced by Nathaniel Southgate Shaler, in 1878, suggested that the cavities were formed by the heads of crinoids, but this idea was also later abandoned, since no plates of the crinoids were ever found directly associated with the geodes. The bulbous roots of certain crinoids were likewise considered as the cause of cavities, but it remained for Dr. F. M. Van Tuyl, writing in the reports of the Iowa Geological Survey, to advance what appears now to be the most acceptable idea. He concludes that the origin of geodes was intimately related to the calcareous concretions which may be observed in some of the exposures. These nodules, he main-

tains, may be readily removed by solution, thus providing the necessary cavities in which the geodes could be formed.

While the "geode beds" underlie much of southeastern Iowa, it is only where they have been exposed along streams that geodes may be found. Obviously it will be impossible to list every location, even though all were known. One of the best, and perhaps the classic area for collecting geodes, is along Mud Creek, a mile or so east of Lowell, in Henry County. Here great quantities have been weathered out of the shales, and have been collected in the bed of the stream near where it empties into Skunk River.

It is here, in a beautiful nature setting, along the boundary line between Henry and Des Moines counties, that Geode State Park has been located. Several hundred acres of land have been acquired, on which a large artificial lake is to be built, and the park is to be developed into a fine recreational center for southeastern Iowa. Already a splendid shelter house has been built out of native limestone by C.C.C. boys of depression days. This building is said to contain one of the largest open fireplaces in any of the parks in the United States.

In the vicinity of Keokuk, along Soap Creek, there are also excellent opportunities for collecting geodes. Here they are more numerous than in

other areas, but they are also more fragile and great care must be taken in "cracking" them or they will shatter into a large number of pieces. The beauty of the interior of the geodes obtained here is often enhanced by the presence of crystals of dolomite and ankerite.

Good geodes may also be found in numerous exposures on both sides starting just below Keokuk and proceeding up the Des Moines River almost as far as Farmington. There are also geode beds in Missouri, along the Fox River, near Wayland, and in Illinois between Nauvoo and Quincy.

The State of Iowa may be justly noted for her fine educational institutions, for her corn and her hogs, and for the excellence of her manufactured products, but in the mineralogical field she is probably as widely known for her famous "geode beds", which have contributed thousands of specimens of unexcelled beauty and rarity to almost every museum in the world, both large and small, and to the cabinets of hundreds of private collectors scattered far and wide. Without doubt the many beautiful geodes found within her borders have added much to the interest of scientists, as well as of curio hunters, in the State of Iowa.

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