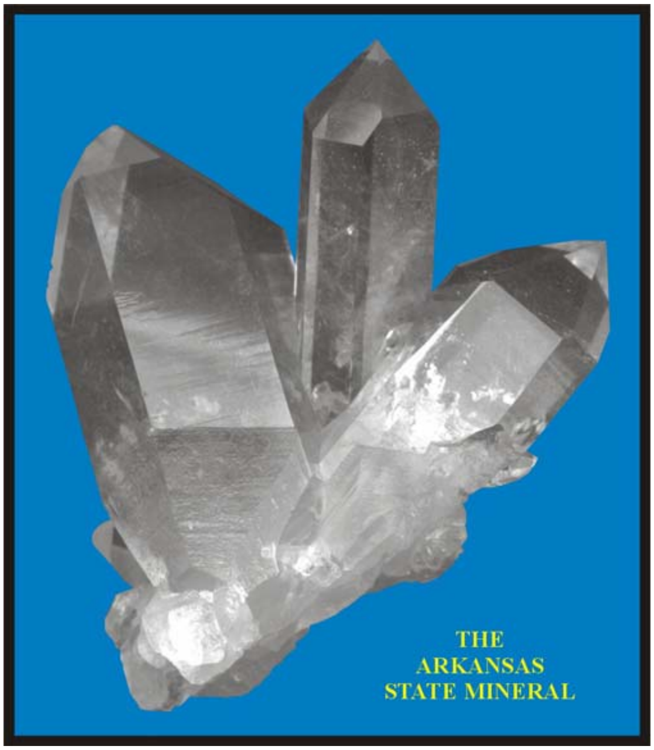
A.G.E.S.
Brochure Series 001

Arkansas Quartz Crystals



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Arkansas Geological Survey

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Introduction

Quartz, or silica (SiO_2), is a hard, brittle, durable mineral that exhibits considerable resistance to weathering. It occurs in nature in many varieties, but is best known from Arkansas as prismatic, elongate, transparent, vitreous crystals. Arkansas is known worldwide for the production of quartz crystals by both collectors and scientists. Because of this, and the popularity of quartz with the many tourists who visit Arkansas each year, the Arkansas General Assembly of 1976 established Act 128, designating quartz crystal as the official State Mineral.

History

The existence of quartz crystal in the Ouachita Mountains has been known since humans first occupied the area. According to H.D. Miser, DeSoto's men found that native Americans had chipped projectile points from quartz crystals. In 1819, nearly 300 years after DeSoto, H.R. Schoolcraft described quartz crystals from the region. The principal early source of crystal appears to have been the Crystal Mountains in Montgomery County. By 1890, crystal was also being mined from deposits in both Garland and Saline County.

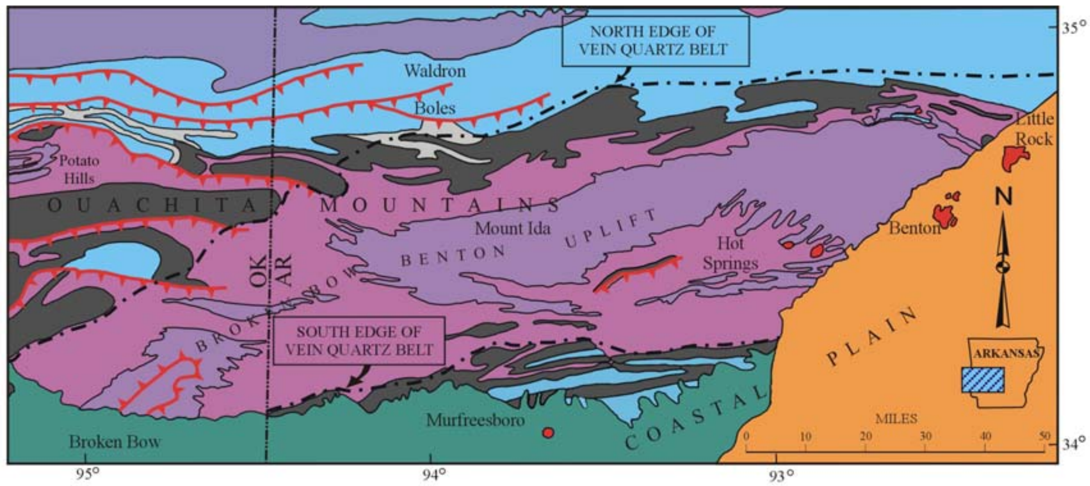
Few restrictions or legal problems hindered the early miners, even though most crystal deposits were on land owned by either the Federal Government or private timber companies. Patented claims of leases were rarely obtained by diggers. So long as timber was left undamaged and openings did not become pitfalls for livestock, the miner was free to dig where he dropped his pick and "scratcher" (an iron rod, commonly 1 to 2 feet in length and bent at a right angle several inches from the point, used to scratch out loose crystals). During World War II, the critical need for oscillator-grade quartz in communication equipment brought about a rapid expansion of prospecting and mining. With Federal agencies and private mining companies participating, mining rights received more careful scrutiny and free-for-all operations dwindled. As part of the Federal program to stimulate domestic production of oscillator quartz for the war effort, the Metals Reserved Company established a buying station at Hot Springs in June of 1943. About 75 percent of the oscillator quartz mined in the district during this year, amounting to more than 4,000 pounds, was tested at this station.

During the 1950's, techniques were developed by General Electric company for growing quartz artificially and the demand for Arkansas quartz was mostly limited to the expanding tourist and museum markets. Some crystals were cut into semi-precious "Hot Springs diamonds" for jewelry purposes. The present commercial use of quartz is as a high purity feedstock (lasca) for the growth of synthetic quartz crystal. These man-made crystals have many chemical, thermal and electrical applications.

With the increased demand by tourists, collectors and museums, the price for quartz crystals has risen in recent years. Some exquisitely developed quartz clusters are reportedly valued at tens of thousands of dollars.

General Geology

Most of the quartz veins/crystals are restricted to a belt about 30-40 miles wide that extends a distance of about 170 miles west southwest from Little Rock, Arkansas, to eastern Oklahoma (see map). This area corresponds to the core region of the Ouachita Mountains.



GEOLOGIC MAP OF OUACHITA MOUNTAINS SHOWING AREA OF OCCURRENCE OF VEIN QUARTZ

Adapted from H. D. Miser (1959)
Digital Compilation by Walter Mayfield
December 2001

EXPLANATION

Tertiary rocks

Cretaceous rocks

Hartshorne Sandstone and younger rocks (Pennsylvanian)

Atoka Formation (Pennsylvanian) includes some older rocks

Johns Valley Shale (Pennsylvanian)

Jackfork Formation (Pennsylvanian) includes some younger Pennsylvanian rocks

Stanley Shale and Hot Springs sandstone (Mississippian)

Cambrian to lower Mississippian (Arkansas Novaculite and older rocks, including Blakely Sandstone and Crystal Mountain sandstone)

Igneous rocks (Cretaceous)

THRUST FAULT

CONTACT

The most productive quartz veins are present in both Paleozoic sandstones and shales, but those having shale as the host rock typically are massive milky vein deposits with a smaller proportion of clear well developed crystals. Deposits in sandstone units may be in the form of veins, sheeted zones and stockworks. Sandstone-hosted deposits usually contain less quartz volumetrically than shale-hosted deposits, but often yield a higher percentage of clear crystals in cavities or pockets. Many crystal-bearing pockets were distorted or crushed by structural adjustments during the Ouachita orogeny (mountain-building episode) after initial quartz deposition. The deformation commonly caused the veins to show complex fabrics.

The quartz veins were formed by the filling of open fissures and display little evidence of significant replacement of wall rock. Milky quartz crystals and associated vein minerals of the Ouachita Mountains were deposited from hot water during the closing stages of mountain building, some 280 to 245 million years ago. The veins attain a maximum width of 60 feet in Arkansas and nearly 100 feet in Oklahoma. They are most numerous along the central core of the Ouachita Mountain region, where they are present in shale, slate, sandstone and other rock types. Along and near the borders of this region, the veins are usually confined to sandstone beds encased within thick shale units.

Quartz veins in the Blakely Sandstone, Miller Mountain, Arkansas.

Most of the collectible quartz crystal is obtained from deposits in the Blakely and Crystal Mountain Sandstones (both Ordovician), but attractive quartz crystal may occasionally be recovered from any of the Paleozoic units. The more than 25,000 feet of Paleozoic rocks exposed in the Ouachita Mountains have been deformed into complex gently plunging folds that trend nearly east-west. Steeply dipping fractures, closely related to the major folds and faults of the region controlled the location and deposition of most of the quartz.

Types

Most of the quartz in the Ouachita Mountains occurs as milky veins. The principal difference between milky quartz and clear rock crystal is the presence of innumerable microscopic bubbles in fluid-filled cavities in the former. These cavities scatter the light that otherwise would pass through as in clear crystal.

In addition to rock crystal and milky quartz, other varieties are present in this region. Smoky quartz occurs adjacent to Cretaceous igneous rocks near Magnet Cove in Hot Spring County. The dark color is due to defects in the crystal lattice caused by radioactivity that irradiated the crystal during or shortly after its formation. Growth zoning is common in crystals from this area. Some natural smoky quartz has also been recovered from sites in Garland County, although most smoky quartz present in local rock shops is rock crystal that has been artificially irradiated. Quartz with fluid inclusions (locally termed "bubble" quartz) and negative or skeletal crystal are present in the younger formations (Stanley and Atoka) of the Ouachita Mountains. Generally, these types resemble quartz from Herkimer, New York, and formed in calcite veins which commonly weather away, leaving the crystals suspended in clay.

Smoky Quartz, Hot Spring Co.
(1.4 cm crystals)

Chlorite in milky quartz, Garland Co
(9.5 cm long)

Phantom quartz is caused by temporary interruption(s) of the growth process resulting in small bubbles which adhered to the crystal faces or by the settling of particles of shale or fine-grained minerals onto the crystal faces of the forming quartz. Phantoms, therefore, express some of the complex growth history of the mineral.

Quartz with chlorite phantom,
Garland Co. (9 cm long)

Quartz with phantoms
Montgomery County

Amethyst (purple or blue-violet quartz) occurs associated with Cretaceous igneous intrusive rocks, particularly in calcite veins at the Crater of Diamonds State Park in Pike County, and as veins associated with serpentine bodies in northern Saline County.

Amethyst, Saline Co.
(crystals 4 mm diameter)

Across the northern limits of major vein-quartz deposition (see Map), “solution” quartz is present. This variety was so called because it was first thought by local collectors to still be forming in the original clay mineral host. This variety is unusual because much of it grew as suspended or unattached crystals or cluster (burrs) in a clay mineral—rectorite. Specimens of these more unusual varieties from Arkansas are prized by collectors for their beauty and scarcity.

Several minerals are associated with Arkansas quartz, although quartz usually composes 90 percent or more of the cavity fillings. Clay minerals, including dickite and nontronite, are widespread. Calcite is a common associate, especially in veins cutting limestone or calcareous siltstone beds. Adularia and chlorite are present in veins cutting certain shales. Black shale particles, commonly mistaken for carbon or manganese oxides are often captured during crystal growth. Less common accessory minerals are brookite, rectorite, cookeite, the carbonates ankerite and siderite, and the sulfides of lead, zinc, antimony and mercury.

Shale inclusions in quartz, Montgomery Co. (7.5 cm long)

Ankerite on quartz, Pulaski Co. discoids 2 cm diameter)

Iron oxide on quartz with calcite Garland Co. (17.8 cm across)

Iron oxide stained cookeite on quartz, Pulaski Co. (rosettes 2.5 mm diameter)

DIG YOUR OWN QUARTZ FOR A FEE

MINE	LOCATION	TELEPHONE*	FEE*
Crystal Heaven	Mount Ida, AR	870-867-4625	$20.00
Crystal Springs	Royal, AR	501-991-3557	$10.00
Ron Coleman	Jessieville, AR	501-984-5396	$20.00
Fiddler's Ridge	Mount Ida, AR	501-867-2127	$10.00
Leatherhead	Pencil Bluff, AR	870-326-4871	$20.00
Miller Mountain	Jessieville, AR	501-984-5752	$10.00
Merle Robins	Mount Ida, AR	870-867-2530	$10.00
Stanley Mines	Mount Ida, AR	870-867-3556	$ 4.00
Starfire Mines	Mount Ida, AR	870-867-2431	$20.00
Sweet Surrender	Mount Ida, AR	870-867-2443	$20.00
Willis Mine	Paron, AR	501-594-5228	$10.00

*Fees and telephone numbers in 2005

For more information contact: Arkansas Geological Survey
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