Illinois once led the United States in the production of fluorite, our state mineral.

The Gem in Your Toothpaste

Story By Rachel Mahan
Photo By Adele Hodde

Illinois is unique for many familiar reasons, but even natives may not realize that it is what lies underground that makes this state a real diamond in the rough.

Southern Illinois is home to a "gem" found in your toothpaste, in the manufacture of the steel for your car, and in ceramics in your kitchen.

It's called fluorite, and, according to the Illinois State Geological Survey, Illinois produced more fluorite than any other state over the years it was mined here. No wonder it was named the state mineral in 1965.

This attractive mineral, also known as fluorspar in the mining industry, comes in an array of colors. Described as transparent to translucent, it can be purple, blue, green, yellow, white and clear.

The pure mineral, also called calcium fluoride, is made of calcium and fluorine and has no color. So fluorite's rainbow palette comes from small amounts of other elements that take the place of calcium in the crystal structure.

The colors also may be due to tiny vacancies where an atom should be found but isn't, said Richard Fifarek, an associate professor of geology at Southern Illinois University at Carbondale. The way light interacts with these vacancies may cause color differences.

Fluorite can be banded and multicolored. Some even fluoresces, or glows, under ultraviolet light. In fact, fluorite lends its name to this property.

While these characteristics make fluorite seem like a gemstone, it rarely is used like one.

"It's not commonly used because of its softness," said Fifarek, who also is an economic geologist specializing in mineral deposits. "You really have to be careful with it."

On a hardness scale from one to 10, where 10 is the hardness of a diamond, fluorite is a four, he said. Sometimes, though, it is set in necklaces or brooches or added to mineral collectors' shelves. Miners used to chip the crystals into octahedral "diamonds" for display, according to the ISGS.

In this area of the country, fluorite occurs in a small portion of southeastern Illinois and western Kentucky

called the Illinois-Kentucky Fluorspar Mining District.

It was here, millions of years ago, that hot fluid containing fluorite and metals, such as zinc and lead, rose up into cracks in the rock, cooled, and deposited veins of fluorspar, writes geologist Zakaria Lasemi in an article in the forthcoming "Geology of Illinois" published by the Illinois State Geological Survey, Institute of National Resource Sustainability, University of Illinois. Veins, he writes, can be as thin as a feather or up to 30 feet wide.

These veins are the dominant type of formation, said Fifarek. But fluorspar can also be found in "bedding deposits," which run almost parallel to the earth's surface. Bedding deposits formed when the rocks dissolved and fluorite took their place.

An historical marker in Rosiclare in Hardin County tells how fluorite was discovered in this mining district. In the mid-1800s, fluorite deposits were found while digging a well. At first, fluorite was merely treated as a waste product. But in the late 1800s it began to be used in the making of steel.

Today, the ISGS cites some of its uses: smelting metal alloys, refining aluminum and uranium, and use in optics, lubricants, toothpastes and plastics. In the past it was used to make refrigerants. However, the chloro-fluorocarbons in these refrigerants are believed to damage the ozone layer and are banned, said Fifarek.

In 1942, Illinois led the United States in fluorite production, writes Lasemi, who also studies and maps mineral deposits for the ISGS. In the 1990s, though, more and more fluorite was coming from overseas, from places such as China or Mexico. Illinois became the sole U.S. producer, but in 1995, the last mine in the country shut down because it was too expensive to mine fluorspar and because of the foreign competition, according to the ISGS.

Now, writes Lasemi, there is a possibility that mining may begin again in the Illinois-Kentucky Fluorspar District, partly because of uncertainty in obtaining fluorspar from foreign sources.

The legacy of the mining industry still remains: Fluorite enthusiasts can visit the old office building that belonged to the Rosiclare Lead and Fluorspar Mining Company. It is now home to The American Fluorite Museum and its specimens, photographs and mining information. According to Lasemi, Rosiclare and nearby Cave-in-Rock and Elizabethtown once were the fluorspar mining "headquarters."

Wherever you are in Illinois or beyond, be sure to enjoy the many colors of this mineral and its interesting history: underground millions of years ago and at the end of your toothbrush today.

Rachel Mahan is a freelance writer and native of southern Illinois.

A transparent to transluscent mineral, small amounts of other elements in the crystal structure are responsilbe for the rich diversity of colors found in fluorite.