Michigan's Colorful Minerals

By Robert W. Kelley

Color photo by John R. Byerlay and Robert W. Kelly

Have you ever wondered what our world would be like without color — if everything Jul appeared in shades of gray? To what extent would this appearance affect our thinking and our way of life?

But the world we know abounds with color, particularly in nature. Most of the time we take it for granted, being awed only by the spectacular — like rainbows, sunsets, and aurora borealis in the panorama of the sky, or on a smaller scale, the vivid flowers and birds of the field. Whence this lovely color?

The most familiar colors in nature are exhibited by the living things. Yet our understanding of this category of color is meager. The chemical and physical relationships are very complex. Yet long before plants and animals evolved, mineral substances were displaying colors on a lifeless earth. Eventually living things developed colors by re-constituting the basic components of no-living things.

Minerals are important agents of color. Altogether, about 2,000 different minerals are known today. Briefly defined, they are natural inorganic chemical compounds having certain characteristics — color being the most obvious.

Although minerals are relatively pure or homogeneous, slight impurities often impart variations in color. Generally, however, a given mineral occurs in predictable colors. For example, sulphur is always yellowish. Amethyst, a variety of quartz, is always violet or purple. Halite (rock salt) and pure quartz (rock crystal) have no color, being transparent.

The main reason these colorful objects are not very familiar is because occurrences that would otherwise be easily recognized are usually mantled by vegetation and water, or else deeply buried within the earth. Furthermore, when they are exposed on the surface, weathering processes inevitably reduce them to exceedingly minute particles incorporated in soils.

The purpose here is to show that even the commonest minerals are colorful and attractive. The small group of randomly selected nonmetallic specimens in the color photo illustrates the range and variety of colors found in our own state. Several of them also demonstrate another trait of minerals — crystallinity. No attempt was made to gather unusual rare, or otherwise showy specimens; these are often-found Michigan minerals. In fact, pink gypsum, another of our important industrial minerals, would also have been appropriate. All express a form of beauty and loveliness that can hardly be expressed in words.

If these examples are fascinating, then a wonderful new world of color awaits you in the mineral halls in Michigan museums. Outstanding exhibits may be seen at Cranbrook Institute of Science, Bloomfield Hills; University of Michigan, Ann Arbor; Michigan State University, East Lansing; Michigan Technological University, Houghton; and Grand Rapids Public Museum, Grand Rapids.

Specimens are illustrated at roughly two-thirds their true size. Numbers appearing on the color plate are keyed to the following descriptions:

1 — SULPHUR. Also spelled sulfur. A basic chemical element (S) that occurs frequently in native form. An important industrial chemical used in making sulphuric acid. In Michigan, dispersed in very limited quantities in limestone formations. Specimen from Monroe County.

2 — CELESTITE. Sulphate of strontium ($SrSO_4$). This mineral forms tabular or platy minerals and is the chief source of strontium compounds needed in refining beet sugar, as well as imparting the intense red glow to fireworks and flares. Specimen from Wayne County.

3 — CALCITE. A sharp-pointed crystal variety called "Dogtooth spar." Carbonate of calcium ($CaCO_3$). The chief constituent of limestone, an important industrial mineral, comprising a large part of the earth's crust. Specimen from Monroe County.

4 — CALCITE. Same as specimen No. 3 except this unusual crystal is pointed at both ends. It is also "twinned".

5 — CALCITE. Same as specimen No. 3 except crystals are small.

6 — CALCITE. Though these crystals superficially resemble cubes, they are actually blunt-pointed "dogtooth." This specimen associated with celestite in sandstone formation in Wayne County.

7 — CALCITE. Same as specimen No. 3 except crystals are exceedingly small and stained with sulphur.

8 — FLUORITE. From Latin "to flow," because of low melting point. Fluoride of Calcium (CaF_2). Known as fluorspar in industry. Commonly occurs in cube-shaped crystals. Important in making steel, glass, and hydrofluoric acid. In Michigan, occurs in cavities in limestone but rarely found. Specimen is from Lucas County, Ohio, a few miles south of Michigan boundary.

9 — STRONTIANITE. Carbonate of Strontium ($SrCO_3$). The other source of strontium though not as important as celestite. In Michigan, occurs with celestite, sulphur, and fluorite in limestone formations, but seldom found. Specimen from Lucas County, Ohio, a couple miles south of Michigan boundary.

10 — AMETHYST. From Greek "not to intoxicate" because sobering effects were attributed to it. The most valuable gem variety of quartz (see No. 11). Violet to dark purple color is due to inclusion of iron, manganese, or boron. Specimens are from Keweenaw County.

11 — QUARTZ. Oxide of Silicon (SiO_2). Pure and crystalline form called “Rock Crystal.” Quartz is one of the most abundant minerals in the earth’s crust. Crystals are usually pointed prisms. Occurs in all types of rock formations but these specimens came from Precambrian basalts in Houghton County.

12 — QUARTZ. Same as specimen No. 11 except this cluster is colored with an olive green mineral called epidote. Specimen from Houghton County.

13 — QUARTZ. Cluster of crystals stained red by the metallic mineral, hematite, an Oxide of Iron (Fe_2O_3). Specimen from Marquette County.

14 — PSEUDO-GARNETS. These 12-sided crystals are composed of a very complex iron-magnesium silicate mineral called chlorite. Originally garnet, but replaced by chlorite. Specimens from Marquette County.

15 — HALITE. The mineral form of pure rock salt, Chloride of Sodium (NaCl). Many minerals have a tendency to break or cleave smoothly in definite directions. Halite is a good example of cubic cleavage. Probably no other industrial mineral has as many uses as rock salt. It occurs extensively in deep-seated layers throughout southern Michigan. Specimen from Wayne County.