FAMOUS COLORADO MINERAL LOCALITIES: TABLE MOUNTAIN AND ITS ZEOLITES

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North Table Mountain near Golden, Colorado, has long been recognized as a mineral locality prolific in splendid museum specimens of various zeolites.

The mountain is an irregular shaped mesa having an area of about three square miles. It consists of basalt flows underlain by early Tertiary sediments. There are two lava flows over most of the mountain. Much of the upper portion of the lower flow has been removed by erosion. Between the two layers is a belt of scoriaceous and highly vesicular material forming the top of the lower flow. This bed varies from five to twenty feet in thickness. Cavities are of all sizes, from a fraction of an inch up to over six feet across. They are usually elongated along the direction of flow.

The zeolites principally occur in (1) the amygdaloidal cavities in the upper portion of the lower flow, (2) as a filling in numerous cracks or fissures in the upper portion of this flow, and (3) in irregular spaces along the contact of the two flows.

These minerals have attracted the attention of many people and have received some careful study. About 40 years ago Cross and Hillebrand, after several preliminary studies[1] published considerable material.[2] The specimens on which these studies were based were obtained principally from the south side of Table Mountain where large quarries were worked for a number of years. Later the Colorado School of Mines opened a small quarry on the east side of the mountain and obtained a wealth of new mineral material. This showed some interesting variations in character and habit from the specimens previously studied from the other locality. Dr. H. B. Patton made a detailed study based on this material.[3]

The minerals noted from these localities include: analcite, apophyllite, chabazite, levynite, thomsonite, mesolite, natrolite, scolecite, stilbite, laumontite, bole, calcite and aragonite.

[1] *Am. J. Sci.*, 3d Series, **XXIII**, 452, (1882) and **XXIV**, 129.

[2] *U. S. G. S., Bulletin* **20**, (1885).

[3] Thomsonite, Mesolite, and Chabazite from Golden, Colorado. *Bull. Geol. Soc. Am.*, **2**, 461-474, (June), 1900.

The zeolites are divided into two groups by Cross and Hillebrand according to their method of occurrence. The first group includes laumontite and stilbite in granular masses usually reddish in color occupying the floors of some of the cavities and often times lining or filling fissures in the upper crust of the lava.

In the second group the minerals are usually colorless and frequently well crystallized. The following order of deposition was noted by Cross and Hillebrand on the southern side of the mountain: laumontite, stilbite (red or yellowish), thomsonite, calcite (yellow), stilbite, chabazite, thomsonite, analcite, apophyllite, calcite (colorless) and mesolite.

The minerals from the east side of the mountain resemble those from the south side, excepting for the thomsonite, which is unusual in that each generation has a different crystal habit and general appearance.

The chabazite from all the localities is usually well crystallized and colorless or light in color. The crystals are often simple rhombohedrons which on casual observation resemble an isometric or tetragonal form. Many occur as penetration twins. From the eastern locality a number of twins with a highly complex form were noted. These contained several rhombohedrons modified and striated by scalenohedrons.

Analcite is very common in the southern localities. It is rarer at the eastern quarry. This mineral, often beautifully crystallized in trapezohedrons, is usually white in color although very small crystals are colorless and transparent. Crystals several inches in diameter have been noted although the usual size is much smaller (half to an inch or less).

Apophyllite occurs in well developed crystals. The usual form is the prism of the first order modified by a steeply inclined pyramid of the second order. Basal pinacoids occur on some specimens. A few small transparent crystals recently noted appeared also to be modified by a slightly developed pyramid of the same order as the prism. Apophyllite crystals are usually small, seldom attaining a length of more than a quarter of an inch. Many are colorless and transparent; others, especially the larger ones, are white and opaque. This appears to be due largely to the development of an alteration product on the outer surfaces and inward along fractures on the basal cleavages. The largest apophyllite crystals seem to occur in small cavities, smaller ones in large

cavities. A few cavities have been found which were virtually filled with a loose granular mass of small perfectly clear crystals. Apophyllite often occurs associated with and partially imbedded in analcite.

Mesolite forms some of the most beautiful and distinctive specimens from the Table Mountain. It frequently occurs in extremely delicate aggregates of long slender hair-like threads. Cavities several inches in diameter have been found completely filled with a cotton-like mass of these fibers. In other specimens the mineral appears as felt-like aggregates. Sometimes gauzy membrane-like deposits occur. Rarely the mesolite forms bristle-like surfaces.

Natrolite occurs sometimes in rounded masses with a well developed radiating fibrous structure. A few large cavities have been found lined with white stubby bristle-like growths of this mineral.

The other minerals listed are either rare in occurrence or usually occur in poorly crystallized condition.

These minerals weather so easily that good specimens can be obtained only in fresh exposures as in quarries. At the present time some material of fairly good grade may still be obtained from the old tramway quarries on the south side of the mountain. The quarries on the east have not been worked for a number of years and little, if anything, can be found there. During the past year a new quarry has been opened on the northwestern edge of the mountain. So far very few specimens have been obtained from it as in general the vesicular cavities are very small, the lava apparently being closer to the point of outflow.

BENTONITE AS A ONE-DIMENSIONAL COLLOID

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Crystal grains may be conveniently classed with respect to their size into four categories, macroscopic, microscopic, colloidal and molecular. When the grains of a given substance are essentially equidimensional, they fit definitely into one or another of these size-classes; but when the habit is strongly fibrous or tabular they may fall simultaneously into two (or even three) classes.