

FAMOUS MINERAL LOCALITIES. 5. THE BLACK HILLS OF SOUTH DAKOTA

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It is not the purpose of this article to attempt to give anything approaching a complete account of the minerals of this very prolific region; there is already available a 250-page publication in which they are fully described.¹ But it seems well worth while to outline what the mineralogist who can spend but a few days in the Black Hills may reasonably hope to find, according to the writer's experience, covering about a week early in May, 1917, collecting for the National Museum. The best time of year to make such a trip is probably the month of June, after all chance of heavy snow is over—several inches fell during the writer's visit—and before the hot dry weather of late summer sets in.

Four railroad lines lead from Chicago into the Black Hills region, named for short the Burlington, Milwaukee, and Northwestern (two routes). At the advice of Dr. Freeman Ward, the state geologist, the writer took the one which from the time-table seemed the least desirable, the Chamberlain-Rapid City route of the Chicago, Milwaukee and St. Paul Railway. Leaving Sioux City, Iowa, which is 100 miles north of Omaha, and 500 miles west of Chicago, in the early evening, the monotonous plains country is traversed at night and in the morning the traveller finds himself at Murdo-Mackenzie. Here he must leave the luxurious Pullman, and board a combined passenger, smoker, baggage, observation, and nursery car attached to the rear of a freight train, which is scheduled to stop ten or fifteen minutes at each station to discharge freight, but which, if there is no freight, stops anyway. The route traverses the famous Big Bad Lands, and the leisurely trip furnishes a splendid opportunity to gain an idea of the remarkable erosion forms shown by the soft strata, which anyone interested in geology will greatly appreciate. Rapid City is reached early in the afternoon—an hour being gained by the fact that mountain time is used there. The South Dakota School of Mines is located about a mile south of the center of town, and is well worth a visit if one has a few hours to spare. Their collections of Black Hills minerals and ores are very complete.

There are stage lines running from Rapid City thru the heart of the Black Hills region, and the famous mineral district around Keystone can easily be reached in half a day by one of them, information as to the schedules of which can be obtained at the

¹ "The minerals of the Black Hills," Victor Ziegler, *S. Dak. Sch. Mines, Bull.* 10, Dept. Min. Geol., Rapid City, 1914.

post-office. Keystone is a tiny mining town, occupying a narrow valley, or rather a group of valleys, in the midst of magnificent mountain scenery. Fairly good lodging can be obtained there, and at least two days should be devoted to the visit.

The principal features of mineralogic interest around Keystone are the rare-metal-bearing pegmatites, which are worked primarily as a source of lithium compounds. The veins outcrop at the summits of sharp hills near the town; the collector, if newly arrived from the east, will find climbing these makes him puff considerably, and may wonder what can be the matter, until he chances to look at the topographic map—the Hermosa quadrangle covers this region—and discovers that the hilltops are nearly a mile above sea level, and the air correspondingly is much more highly rarefied than that to which he is accustomed.

The most famous locality is the Etta mine or quarry—originally opened as a tin mine—a mile south of the town, where the most remarkably developed mineral is spodumene, lithium aluminium metasilicate. This occurs in huge columnar crystals known to the workmen as logs extending thru the rock in all directions; some of these are recorded as attaining a length of over 40 feet, and at the time of the writer's visit one wall of the quarry showed the impression of one nearly as long as this, the spodumene itself having been broken away. There are hundreds of crystals of over a foot in diameter, and indeed this mineral largely takes the place of the feldspar which is usually the most prominent constituent of pegmatites. Scattered thru the rock are also good-sized masses of white beryl, and bunches of triphylite which weathers to a characteristic bronzy color, owing to the oxidation of the manganese. Now and then a zone is encountered where blades of columbite traverse the rock, and excellent specimens of this rare mineral can readily be obtained. Cassiterite occurs mostly as tiny grains scattered thru a somewhat crumbly greenish muscovite mica. Rarer minerals are strueverite, which resembles both cassiterite and columbite, and can be certainly distinguished from them only by chemical tests, and stannite, which is altered to bright green or brown colloidal tin hydroxide minerals, known broadly as "cuprocassiterite." Then there is a peculiar dull dark-blue mineral, imbedded in quartz or feldspar, which seems to be mostly apatite, altho some iolite of similar aspect is said to have been found. Uranium minerals are extremely rare in this pegmatite, but the superintendent of the quarry kindly presented the writer with a fragment showing a trace of autunite.

A short distance west of the Etta mine is the Hugo, a similar tho less extensive quarry, near the summit of another hill. This was not in operation at the time of the writer's visit, and only a few specimens of an unusually bright blue apatite were obtained from its dumps. But the Peerless mine, just southwest of the town, proved to be another interesting place. Here spodumene

is practically absent, but in its place occurs the rare mineral amblygonite, lithium aluminium fluo-phosphate, in enormous masses, sometimes weighing hundreds of pounds. About the same accessory minerals occur as at the other localities.

There are a number of other mines and quarries in the general neighborhood of Keystone, but they had practically all been unworked for years at the time of the writer's visit. At the Columbia gold mine, at one end of the town, translucent quartz containing a little visible gold and lamellar calcite¹ were noted; but the writer's time was so limited that no other localities in this neighborhood could be visited.

Instead of returning by the same route as was followed coming to Keystone, the collector will find it worth while to leave by the stage going in the opposite direction, to Hill City, about 10 miles west of Keystone. A splendid view of Harney Peak, the highest in the Hills, is obtained on the way. In the vicinity of Hill City there are several mines worked especially for tungsten, the ore consisting of wolframite blades traversing white quartz. Some cassiterite occurs here also, usually in distinctly larger masses than are found at the Etta mine, and in fact in sufficient amount to pay for working, on a limited scale, with the metal tin bringing war prices. The Deadwood line of the Burlington railroad passes thru Hill City, so that other points of interest can be readily reached, or the return trip started, from that place. At Lead (pronounced leed) about 50 miles to the north, is the famous Homestake gold mine. The writer did not visit this because the snow was so deep in the region at the time that transportation, hiking, and collecting were unusually difficult. Near the town of Custer, 15 miles south of Hill City, there are several mineral localities, especially rose quartz workings, but these were reported to be idle in 1917. About the only other mineral which the writer saw on his trip was gypsum, which occurs in clays on the plains south of the Hills, formed by the action of sulfuric acid, derived from the decomposition of pyrite, upon calcite in the clay. From Edgmont, the southern terminus of the Deadwood line, Denver may be reached by an overnight trip, or Omaha in a night and a day.

The officials in charge of the several mines visited were most courteous, extending free permission to collect all specimens desired. At Keystone the writer had the good fortune to meet Mr. Emil E. Hesnard, who lives down the hill from the Etta mine, and who is well posted on the minerals of the region. Any mineralogist visiting that vicinity should certainly not fail to look him up, and see his collection of the local minerals.

Mr. Herbert P. Whitlock, since 1904 Mineralogist in the New York State Museum, at Albany, has been appointed Curator of Mineralogy in the American Museum of Natural History, New York City, as successor to the late Louis P. Gratacap.

¹ *Am. Min.*, 2, 139, 1917.