A view of Tick Canyon looking up toward the basalt area, beyond the lower dumps.

Besides being a lodestone for cutters, there is a wonderful suite of minerals, as we found at —

TICK CANYON REVISITED

By George E. Masimer
Mineral Research Society of California

Within 45 miles of downtown Los Angeles, California, there is to be found the only site in Los Angeles County where borates are found. This is the Lang (Sterling) Mine of the Sterling Borax Company, located in Tick Canyon near Lang, California.

Recently, while learning the operation of the polarizing microscope, Michael Kokinos, well known mineral collector and officer of the California Federation of Mineralogical Societies, and I decided to identify some microscopic crystals he had collected on the dumps in Tick Canyon. We found that we needed more of this mineral to complete our identification so, on the 5th of March, 1966, we returned to the area. Also collecting on this same date were members of the Indian Wells Gem and Mineral Society which was having a field trip there.

We had such success collecting, even after all these years, that I decided to write this article and report that all the minerals that are to be found at this locality are still there for the serious collector. We were working a spot at the base of the top dump where we collected howlite, veatchite, bakerite, calcite, celestite, probertite and ulexite. On the other side of this dump we collected microscopic, but perfectly formed, crystals of gypsum (var. selenite) and mountain leather, a variety of amphibole. Later, we walked up to the basalts and collected specimens of analcime and natrolite. These crystals are small but they make excellent micromounts.

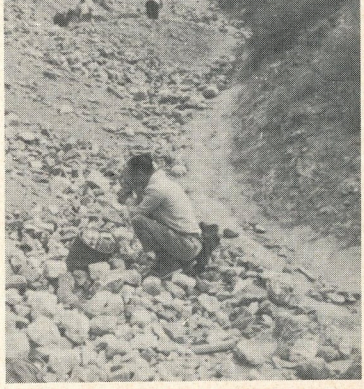
The following is a brief history of the Lang Mine and the geology of the area. These descriptions were reported in *Mines and Mineral Deposits of Los Angeles County* by T. E. Gay, Jr., and S. R. Hoffman, of the California Division of Mines, in the *California Journal of Mines and Geology*, Vol. 50, Nos. 3 & 4, July-October 1954.

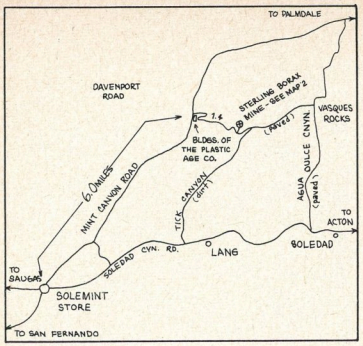
Historically, the Lang Mine was active from 1908 until 1922 and was the only source of borates in Los Angeles County. Colemanite was discovered on the property in November 1907, but production did not commence until 1908. The deposit was acquired by the Sterling Borax Company. Ore from the mine was shipped, on a standard gauge railroad that was especially built, to Lang Siding on the Southern Pacific Railroad and then on to several eastern refineries of the company for conversion into commercial borax. Unpublished records of the California Division of Mines indicate that total production during the 16 years of life of the mine was about 100,000 tons of ore, valued at about three million dollars.

During the latter portion of the 1911-1919 period, during which the deposit was nearly mined out, the Pacific Coast Borax Company entered into a sales agreement with the Sterling Borax Company but did not own or operate the mine at this time. Later, faced with declining prices for borax, and, as the mine grew deeper, with rising mining costs, the property was sold to the Pacific Coast Borax Company in 1921. The new owners conducted a scavenging operation by which nearly all the remaining colemanite was removed. This depletion of the known reserves of colemanite led to the final closing of the mine in 1922 and the dismantling of the plant in 1926.

Geologically the borate minerals occur in beds of shale in the nonmarine Vasquez Series of the Oligocene Age. The Vasquez Series is composed principally of arkose (which is in part tuffaceous), basalt, conglomerate with subordinate limestone and shale members. The Vasquez Series in the vicinity of the mine has been deformed into northeast trending folds modified by many cross-faults and longitudinal faults. The interlayering of competent volcanic rocks, with incompetent sedimentary sequences, has contributed to the structural complexity of the area.

Mike Kokinos collecting at the base of the dump at the Lang (Sterling) Mine in Tick Canyon.





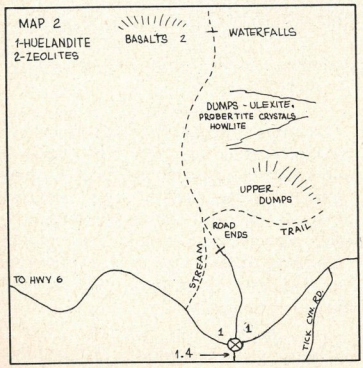
The dominantly sedimentary, nonmarine Miocene Tick Canyon and Mint Canyon formations uncomformably overlap the distorted Vasquez beds north and south of the mine area.

The origin of the deposit is discussed by H. S. Gale in the U.S. Geologic Survey Professional Paper No. 85, *The Origin of Colemanite Deposits*, in which he quotes from A. E. Eakle's publication of 1911, *Neocolemanite, a Variety of Colemanite, and Howlite from Lang, Los Angeles County, California.* This was published in the University of California, *Department of Geology Bulletin*, Vol. 6, No. 9, and says, "It seems probable that the original site of the deposit was a marsh containing marl and calc tufa with mud and considerable organic growth, and that later waters charged with boracic acid flowed into the basin and converted the carbonate of lime into the borates — the origin of the boric acid is presumably volcanic." The strongly monomineralic character of the deposit and lack of mixed alkali salts indicate that it was not formed by evaporation of desert lake waters.

Now to return to the collecting. I am sure that every local mineral collector and follower of the lapidary arts has visited this area at least once. The howlite here has seams of a black carbonaceous material and, as the howlite takes a fine polish, this material is excellent for bookends and desk sets. Also of interest to the polisher are seams of agate that occur here, but these seams are a bit harder to find than the howlite. Some green jasper with spots of red jasper occur here also, but what this writer has seen seems too fractured to be of any use.

The mineral collector has a better choice as howlite crystals as well as veatchite crystals are still to be found. This is one of only two places where howlite crystals are found and it is the only locality noted in *Dana's*, 7th Edition, for veatchite. Other minerals to be collected include calcite, celestite. probertite, ulexite, bakerite, gypsum, colemanite, analcime, natrolite, amphibole, huelandite, and realgar. The writer has not collected realgar at this spot but knows of specimens in other collections. As one leaves the paved road and turns in to the road to the dumps, he passes between two banks of a dark, greenish, shale-like rock. Huelandite occurs here as small crystals on the fracture surfaces of this rock. If one follows the small stream that flows through the canyon, past the lower dumps, for a short distance beyond the so-called waterfalls, he will come to a path leading up to the left that leads to the basalt area. In the basalt are small vugs containing crystals of both analcime and natrolite.

Howlite crystals coating massive howlite.

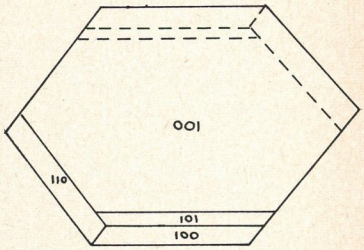


The following is a brief description of the minerals that are found on the dumps:

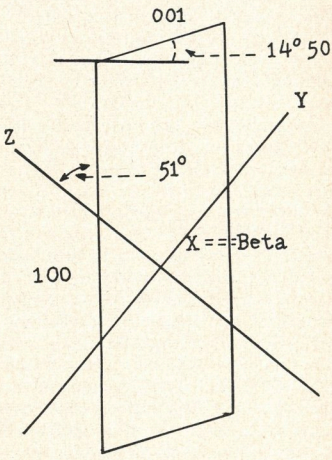
Howlite

Silico-borate. Occurs as masses resembling cauliflower heads. Some of the massive type has veins of a black carbonaceous material which adds to its appeal when cut and polished. Some of the howlite also has a brown organic material as an inclusion which shows a weak fluorescence under ultraviolet light. Howlite is monoclinic. The howlite crystals that are found here were

Howlite crystals enlarged to show typical orientation.



Howlite, typical crystal habit. Sterling Mine, Tick Canyon, Lang, Los Angeles County, California. 001, basal pinacoid; 100, orthopinacoid; 011, clinodome; 101, orthodome.



Optical orientation of howlite.

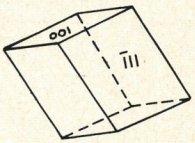
Crystal drawing after Professor Joseph Murduch in "American Mineralogist."

Photos By
GEORGE E. MASIMER

described by Professor Joseph Murduch in an article in the *American Mineralogist*, Vol. 42, 1957. Professor Murduch was very kind in allowing the writer to include this description here. "The crystals are tabular parallel to the 100 face and terminated by the 011 face which gives them a sharply pointed appearance. The basal pinacoid 001 bevels and is comparable in size to the clinodome 001. The above faces are present on all the crystals. Other faces present include the 101, 102, and the 104, all of which are within the orthodome zone, but these faces are narrow and in poor position."

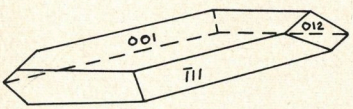
Bakerite

Hydrated strontium borate. Monoclinic. It occurs here as nodules and veins, and as botryoidal coatings, in



Bakerite crystal, stout, prismatic habit. Sterling Mine, Lang, California.

the vugs in the shale. It has the appearance of chalcedony (for which it may be mistaken). Bakerite crystals were found by Professor Murduch and described by him in the *American Mineralogist*: "The crystals of bakerite occur as a coating on the surface of massive bakerite or of a mixture of clay-like material, this matrix occurs as porous or vuggy masses, grayish in color and often showing irregular, laminar crustification, most of the bakerite surfaces are fine-grained, botryoidal and drusy, but in favorable localities clusters of recognizable individuals or single crystals are present. The crystals were identified as bakerite from the x-ray powder pattern, which exactly matches that of the usual massive material. The crystals occur in two distinct habits, which are normally separate, but may occur together in the same aggregate. One type appears as a stout rhombic prism with oblique termination, and the other as relatively thin diamond shaped tablets. The prismatic crystals are sometimes clear and colorless, sometimes transluscent or even opaque, due to the presence of disseminated clay-

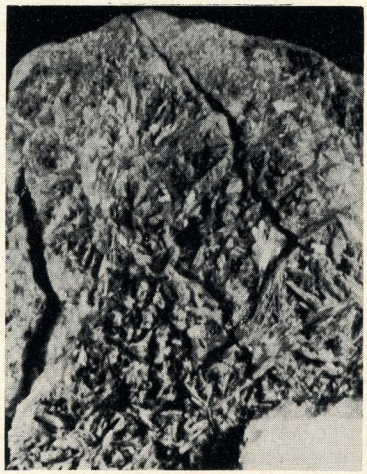


Bakerite crystal, thin, tabular habit. Sterling Mine, Lang, California.

like inclusions. The tabular crystals are clear and colorless, but often with a core or base of opaque material which apparently represents the foundation on which the crystals have grown. None of the crystals are much over 0.2mm in the largest dimension, and most are considerably smaller, prismatic crystals may be up to 0.2x0.1mm and the tabular up to 0.2x0.2x0.05mm. All the faces are of rather poor quality." Crystals occur in two distinct habits: stout prismatic with 001 and $\bar{1}11$ only; and thin tabular with 001 dominant and $\bar{1}11$ and 012 as narrow modifying faces.

Veatchite

Hydrated strontium borate. Monoclinic. It occurs as cross-fibers in veins in limestone and howlite, also as crystals on colemanite and howlite. The crystals



Veatchite crystals covering massive howlite.

are platy and flattened on the 010 face and elongated with the 001 face. Cleavage along the 010 face is easy and perfect. Pearly on the cleavages. Vitreous luster. Transparent to white.

Colemanite

Hydrated calcium borate. Occurs here as prismatic, radiating crystals that are glassy. Colemanite is easily recognized as no other mineral here looks like it.

Calcite

Calcium carbonate. Rhombohedral. Found as coatings on the bakerite, also as crystals on and with the bakerite. Larger, pale yellow rhombs of calcite, found in the vugs in the shales, fluoresces a pinkish orange under the long wave light.

Celestite

Strontium sulfate. Orthorhombic. Occurs here with bakerite in vugs in the shales. Crystals observed by the bakerite in vugs in the shales. Crystals

Celestite crystals, prismatic type. These are extremely small.

observed by the writer included some that were tabular, radiating outward from the contact with the matrix. Others are prismatic, elongated parallel to the 010 axis. This type could be mistaken for calcite at first glance, but upon closer inspection the orthorhombic crystallization becomes apparent. A flame test for strontium is a quick way to identify celestite.

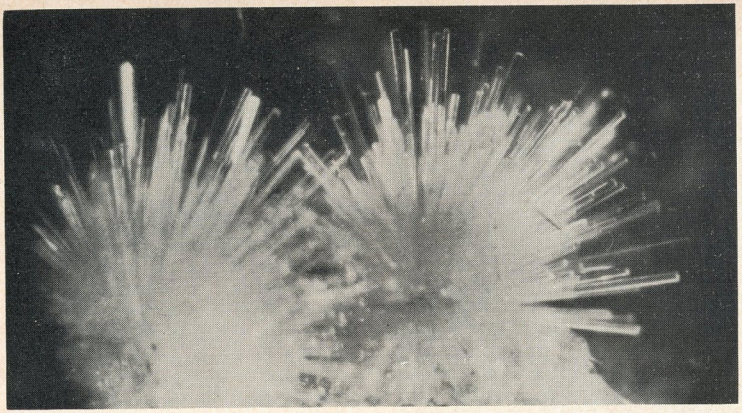
Radiating, tabular type celestite crystals.

Analcime

Isometric. Occurs here as well formed trapezohedrons in vugs with bakerite and celestite. Also found in the basalt further up the canyon with natrolite crystals. This is a very interesting mineral, especially to the student of the polarizing microscope, as it is isometric but will also show both uniaxial and biaxial optic figures.

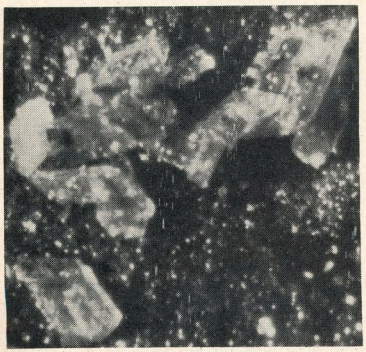
Gypsum var. Selenite

Hydrous calcium sulfate. Monoclinic.



Analcime crystals as they occur in the vugs.

Occurs beyond the top of the upper dump. Found as small but perfectly formed crystals on fracture surfaces of a tan colored, decomposing wall rock which has been discarded on the dump. Also coating these rocks and associated with the gypsum is an organic matter which is a dark brown color.



Gypsum, variety selenite.

Probertite

Hydrated borate of sodium and calcium. Monoclinic. Found here are radiating groups of needles. One group will be found intergrown with another to form a mass of crystals. Some of the probertite will be altered, in part, to ulexite. Probertite may be identified as it is more compact and glassy appearing than the ulexite.

Ulexite

Hydrated borate of sodium and calcium. Triclinic. In small nodules or lens-like masses of capillary or acicular crystals. White color. Softer than probertite, otherwise similar in occurence. Some of the ulexite may be pseudomorphic after probertite.

Realgar

Arsenic monosulfide. Monoclinic. This mineral is quite rare here. I have just a trace of it on a specimen of howlite crystals. Jack Schwartz, of Montebello, California, has realgar that he collected at this locality. Earl Pemberton, of the Mineral Research Society of California, also has realgar from here. Earl also has a fine specimen of celestite crystals that he collected here.

Natrolite

Hydrous sodium and aluminum silicate. Orthorhombic. Occurs in the basalts, near the head of Tick Canyon, as slender crystals, with analcime crystals in amydaloidal cavities. These specimens make excellent micromounts. Some of the cavities also contain calcite crystals.

Huelandite

Hydrous calcium, sodium, and aluminum silicate. Monoclinic. This zeolite occurs at the entrance to Tick Canyon in a greenish colored, shale-like rock as small dark tannish colored crystals on the fracture surfaces of the shale.

There are, no doubt, other minerals that occur at this locality. If enough collectors will microscopically search through the material they have collected, I am sure we will add to this list.

I would like to thank the members of the Polarizing Microscope Study Group, especially Mike Kokinos, Margaret Gross, Stan Alexander, William Mollar and Richard Bideaux for their help with the identification of the microscopic crystals of celestite from this locality.

Photomicrograph of natrolite crystals.

? QUESTIONS ?

If you have a question, let us know. If we can't answer it, we will try to find an answer. If you know the answer to any of the unanswered questions below, let us know so we may pass your answer on to other readers. Address your questions to:

Questions, Gems & Minerals
P.O. Box 687
Mentone, California 92359

H. A., San Francisco, California, wants to know how to clean ulexite specimens.

Ulexite can be washed in water to which 2 tablespoons of White King water softener per gallon have been added. Dunk the specimen, crystal side down, in the solution. Then rinse in clear water and set it on a paper towel, crystal side up, to dry. This information was taken from an series on mineral cleaning which was featured in the June and August 1963 issues of *The Mineralogist*. Copies of these issues are still available from GEMS & MINERALS for 35c each.

U. E., Indianapolis, Indiana, would like to know if "synthetic" alexandrite duplicates the natural material.

The material sold as "synthetic alexandrite" is actually a synthetic corundum which changes color under different lights. According to Federal Trade Commission rulings, it should be called alexandrite-like synthetic corundum, never "synthetic alexandrite." Natural alexandrite, a variety of chrysoberyl, is green in daylight and red under incandescent light. The corundum material is blue in daylight and violet under an incandescent lamp.

E. K., Rodeo, California, would like to know how to clean the crust from abalone shells.

Sometimes the crust can be removed with a wire brush. Often, other methods are needed. The crust can usually be ground or sanded away. This operation should be done *wet* in a well ventilated area, preferably outside, because abalone shell releases noxious fumes if sanded or ground dry. There is usually an unpleasant odor even when it is worked wet. Another method to remove the crust is to use nitric acid. This treatment should also be done outdoors on a breezy day. Protect your hands with rubber gloves. The acid can be applied with a wooden stick that has been pounded into a sort of a brush. To stop the acid's action, wash the shell with household ammonia and then with clear water. *All acids are dangerous and should be used with extreme care.* ED.

Correction, Tick Canyon

An error was made in the placement of picture captions in the article, "Tick Canyon Revisited," G&M, August 1966, page 23. The picture at the top of the page shows the natrolite crystals, the one at the bottom of column two the analcime. Our apologies to George Masimer, the author. He knows the difference between natrolite and analcime even if we apparently don't.

Gems and Minerals
September 1966