

CLINOCLASITE FROM MAJUBA HILL, NEVADA

VINCENT P. GIANELLA, *University of Nevada, Reno, Nevada.*

Clinoclasite, a rare copper arsenate, has been known to be present at Majuba Hill for many years,¹ but good crystals were rare. During development work, in the fall of 1941, Mr. Charles Yetter² found some dark blue-green crystals which he submitted to the writer for determination. The mineral proved to be exceptionally well crystallized clinoclasite. Because of some unusual features of this occurrence samples were sent to Professor Charles Palache for further study.

Majuba Hill (erroneously designated Majuba Mountain, on the U. S. Geol. Survey Lovelock quadrangle) rises to an elevation of 6,886 feet in the Antelope Mountains, a northern continuation of the Trinity Range in Pershing County, Nevada. It lies in sec. 2, T. 32 N., R. 31 E. Mount Diablo base and meridian. The mountain consists of a rhyolite plug intruded into Triassic (?) sediments.³ The sediments are dominantly slate, phyllite, hornfels, and quartzite. The sediments strike northeast and dip steeply to the northwest. The plug is roughly oval in outline with a length of about one mile and a width of about 0.8 mile. The longer axis, and many of the larger associated dikes, trend parallel to the strike of the sediments. In many places the rhyolite is brecciated with the fragments set in a matrix of finely-crystallized black tourmaline. Thin veinlets of tourmaline, with minor amounts of fluorite and quartz, are abundant in some parts of the rhyolite and commonly the sanidine phenocrysts have been entirely replaced by an aggregate of fine needles of tourmaline and slender doubly-terminated quartz crystals.

In 1916 copper ore was discovered on a fault striking N. 50° W. and dipping 60° southwest. This ore body is reached through an adit entering the south side of the mountain at an elevation of 6,250 feet. The primary ore consists largely of chalcopyrite, arsenopyrite, and pyrite, with minor amounts of cassiterite. There is also much cuprite and some chalcotrichite, chalcocite, native silver, azurite, malachite, bornite, and many other secondary minerals. In driving the adit farther into the mountain, a shoot of tin ore was discovered in 1917 about 200 feet beyond the copper ore body. The tin ore is in the hanging wall but a short distance from the fault. The ore is composed of cassiterite⁴ in a matrix of doubly-terminated

¹ Gianella, V. P., Nevada's Common Minerals: *University of Nevada, Bull.* 35, no. 6, p. 95 (1941).

² Engineer for The Freeport Texas Company.

³ Smith, Ward C., and Gianella, V. P., Tin deposit at Majuba Hill, Pershing County, Nevada: *U. S. Geol. Survey, Bull.*, 931-C (1942).

⁴ Knopf, Adolph, *Mineral Resources* (1917), Pt. I, pp. 64-65 (1918). Also, *Mineral Resources* (1918), Pt. I, pp. 22-23 (1919).

quartz crystals, black tourmaline, and iron oxides. Some scorodite is present and, in places, numerous fine crystals of olivenite. No ore was extracted from this ore body at that time. In the fall of 1941 the Freeport Texas Company took over the property and during their exploration a raise was driven along the fault to further explore the tin-bearing area. The excellent crystals of clinoclase were discovered a short distance above the tin stope. The clinoclase is associated with malachite, azurite, olivenite, and hydrated oxides of iron. The clinoclase occurs in radiating crystals up to six millimeters in length and also as tufts of small crystals and as drusy incrustations in fractures in the tourmalinized rhyolite. Some of these fractures are coated with iron oxide upon which are deposited small crystals of olivenite and clinoclase. Clinoclase and other copper arsenates are found in the slightly oxidized primary ore. The arsenates are apparently derived from the primary copper minerals and arsenopyrite through weathering and carried downward by meteoric waters penetrating the faulted and brecciated rhyolite.

The writer wishes to acknowledge his appreciation of the Freeport Texas Company for accommodations while visiting the property and to its employees for many courtesies they extended.