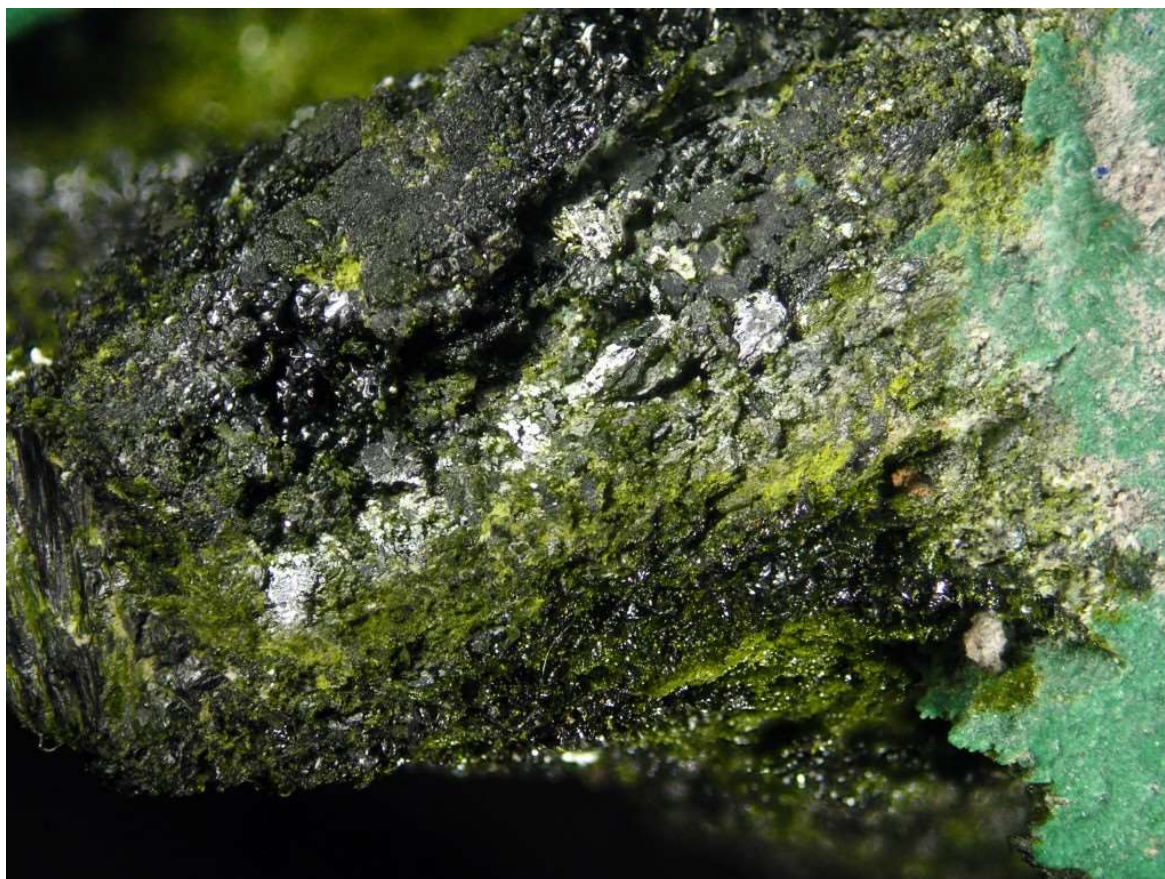


Volborthite and tangeite from Milpillas mine (Mexico)

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The [Milpillas mine](#) (Municipio de Santa Cruz, Sonora, Mexico) benefits a porphyry copper deposit, characterized by a potent oxidation zone and enrichment zone with secondary copper sulfides. The primary ore is constituted by chalcopyrite and bornite. The oxidation lead to the formation of a complex secondary mineral assemblage, with a lot of well crystallized and rare species.

Recently, we studied some copper vanadates from the Milpillas mine. Both labelled as Vésigniéite, a barium and copper vanadate, the samples are formed by olive green to yellowish green aggregates of scales and pseudo-hexagonal crystals forming lamellae. Actually, the analysis revealed that the label assignation was incorrect:



Volborthite from Milpillas mine

The result of analysis of this sample, with a centimeter size aggregate of scaly crystals, indicates that is one of the best **Volborthite** specimens we observed. The Volborthite (a copper polyvanadate) is not distinguishable *de visu* from Vésigniéite, thus requiring analytic confirmation in any case .



crystalline aggregates of Volborthite from Milpillas mine



Volborthite from Milpillas mine. FOV of all pictures:
1.2 cm.

Other mineral found was the **Tangeite**, also known as calciovolborthite in the literature. The Tangeite forms scaly aggregates, rosettes and occasionally aggregates of small crystals, with color between yellowish green to dark green.

The Tangeite is a copper and calcium vanadate.



Tangeite on malachite from Milpillas mine

The results obtained suggests that the non analyzed specimens of supposed Vésignéite from Milpillas mine should be examined to clarify its identification.