

## Petrographic study of the Al-rich phosphate mineral associations of the Rubindi-Kabilizi pegmatite, Gatumba area, Rwanda.

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In the open pit of the Rubindi - Kabilizi mine, the loose blocks show K-feldspars and cleavelandite, both deeply altered. Besides remnants of the quartz core, we noticed a few masses of quartz with fragments of completely kaolinized spodumene crystals, as well as coarse-grained masses of green mica mixed with quartz similar to the greisens described by Varlamoff (1963). These field observations lead us to conclude that Rubindi-Kabilizi was another lithium-rich pegmatite, strongly albitized in the Gatumba field. We also reported striking phosphate associations with dominant amblygonite-montebbrasite recalling the aluminium-rich phosphate associations already known in Buranga (Von Knorring, 1970) or in Rusororo (Fransolet, 1989).

In these associations, on the basis of the ratio F/(F + OH) (Černa *et al.*, 1973), three members of the amblygonite - montebbrasite series, LiAlPO<sub>4</sub>(F,OH), were distinguished.

The F-richest montebbrasite (2.6 wt. % F) shows exsolutions of lacroixite and is intimately associated with scorzalite I, FeAl<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>, (1.7 wt. % Mg). The petrographic textures strongly suggest a sincrystallization of montebbrasite and scorzalite.

The second generation of montebbrasite (about 1 wt. % F) forms a chess-board texture with augelite, Al<sub>2</sub>(PO<sub>4</sub>)(OH)<sub>3</sub>, and occurs in a more complex association, with prevailing brazilianite, NaAl<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>4</sub>, scorzalite II (0.25 wt. % Mg), and ferrosemaryite, NaFe<sup>2+</sup>Fe<sup>3+</sup>Al(PO<sub>4</sub>)<sub>3</sub>, (Hatert *et al.*, 2005) and subordinate trolleite, Al<sub>4</sub>(PO<sub>4</sub>)<sub>3</sub>(OH)<sub>3</sub>.

The last generation of a virtually pure montebbrasite, associated with quartz and sometimes trolleite and berlinite, AlPO<sub>4</sub>, is rare.

These mineral associations are crosscutted by veins containing bertossaite, Li<sub>2</sub>Ca Al<sub>4</sub>(PO<sub>4</sub>)<sub>4</sub>(OH)<sub>4</sub>, which occurs as a late hydrothermal product. The Rubindi-Kabilizi mine constitutes the second occurrence of this relatively rare mineral, previously described in the Buranga pegmatite (Von Knorring and Mrose, 1966).

Variscite, wavellite, childrenite, souzalite, and turquoise have been identified as usual weathering minerals.

A paragenetic sequence can be proposed: montebbrasite I + scorzalite I + lacroixite (?) ⇒ montebbrasite II + scorzalite II + ferrosemaryite + augelite + brazilianite ⇒ montebbrasite III + berlinite + trolleite ⇒ bertossaite. Selected crystallochemical features, dealing with Fe, Li, Na, and Ca, are discussed.

### References

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