

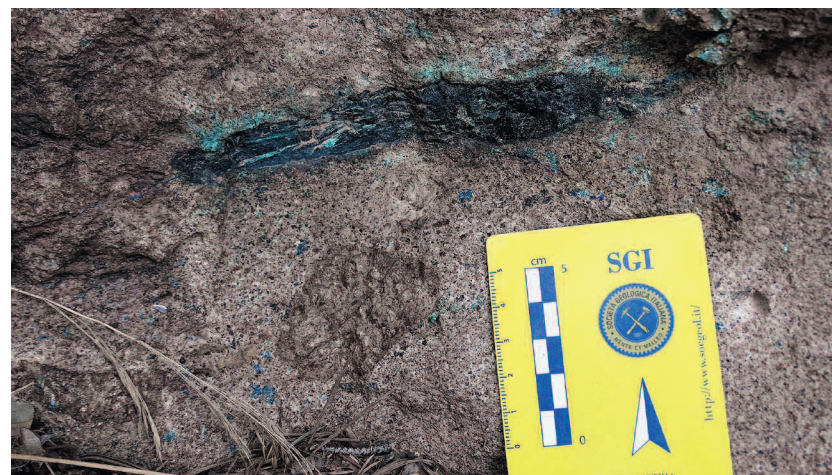
FIEMMEITE: A NEW COPPER OXALATE FROM SAN LUGANO (TRENTINO, DOLOMITES, ITALY)

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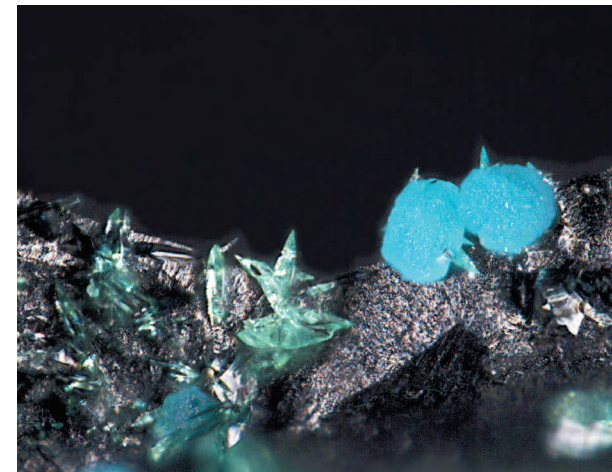


Fiemmeite: single crystal with **brochantite** on coalified wood.
 Specimen: Paolo Ferretti.
 Photo: Ivano Rocchetti.

The discovery of two interesting copper oxalates, among which the new mineral **fiemmeite**, originated almost by accident in September 2013, when we visited to an old copper mining site at San Lugano (Carano, Fiemme Valley, Trentino Alto-Adige, Italy). The mining activity was focused in the Val Gardena Sandstone where in the past discrete samples of malachite and azurite were collected. The fortunate intuition of collecting some coalified wood fragments made our trip fruitful. It is indeed known that in western Trentino (Chiese Valley and Rendena Valley) uranium and mixed sulfide mineralizations are common in the carbon levels at the base of Val Gardena Sandstone and this facies was the subject of a brief but intense season of mining research during the first half of the 50s of the last century, when interest in uranium for energy and military purposes was high. Some of the collected coals are well mineralized and the cracks often contain well-developed crystals. Among them are tiny yellow-greenish tablets of zeunerite-metazeunerite, but it was a mineral with a beautiful light blue hue that captured our attention. Preliminary screening by Raman spectroscopy – a procedure that characterizes the usual first step of our investigations – found no match in the RRUFF data-



Coalified wood rich of copper minerals mixed with the Val Gardena sandstone outcropping near the mining site of San Lugano.
 Photo: Paolo Ferretti.



Moolooite: globular aggregates with **brochantite** on coalified wood (base width 1.3 mm).
 Specimen and photo: Ivano Rocchetti.

Middlebackite (crystal about 0.8 mm) on coalified wood.
 Specimen: Paolo Ferretti.
 Photo: Bruno Fassina.



base. In February 2017 we proved that the mineral was **middlebackite**, a copper oxalate first discovered at the Iron Monarch quarry (Iron Knob, Middleback Range, Eyre Peninsula, Australia) approved by IMA only some months before, in April 2016 (Elliott, 2016). After the disappointment for what could have been a new Italian type locality, we decided to go back to the San Lugano site hoping for some more lucky days.

In the summer of 2017 we collected other alleged samples of **middlebackite** from the site but Raman analyses, that we used to distinguish **middlebackite** from minerals with similar appearance such as **devilline** or **langite**, highlighted that some of these "middlebackites" had a spectrum slightly different from the others. After a preliminary SEM-EDS screening showing C, O and Cu as the only constitutive elements, a new single crystal diffraction experiment was performed again.

This was our day: the structure solution excluded the mineral to be **middlebackite** and proved it to be a new copper oxalate. In December 2017, the proposal for the new species that we called 'fiemmeite' with reference to the area of origin (Fiemme Valley), was presented at the IMA-CNMNC. The new mineral was approved in April 2018 (IMA 2017-115) and its complete description was published in June 2018 (Demartin *et al.*, 2018).

Fiemmeite, $\text{Cu}_2(\text{C}_2\text{O}_4)(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ which is monoclinic, space group $P2_1/c$, forms elongated tabular crystals, with a maximum of 2 mm of development, characterized by the typical blue tone of copper oxalates; it is transparent, with vitreous luster and shows perfect cleavage along {010} or {001}. **Fiemmeite** is very rare, having been found only a dozen samples with idiomorphic crystals, to date exclusively in its type locality. The type specimen is deposited with the inventory number 5249 at the MUSE - Museo delle Scienze of Trento. A complete description of the paragenesis of the mineralogical site of San Lugano, which in addition to **fiemmeite** includes two other copper oxalates (**middle-**