

The Many Habits of Olivenite

Henk Smeets

In my collection I have quite a large number of olivenite specimens, about 80 % of which I collected myself over the years at the famous Clara Mine in the Black Forest of Germany. The Clara truly is one of the best places in the world for fine and mostly well crystallized olivenite, and so is the Christiana Mine near Lavrion in Greece, but the type locality is the Carharrack Mine, Gwennap, Cornwall, UK. This short note is meant to show the impressive variety in crystal habits that the mineral can take.

Olivenite is a secondary copper arsenate, with the formula $\text{Cu}_2(\text{AsO}_4)(\text{OH})$, and it crystallizes in the monoclinic system. It is the copper endmember of the adamite-olivenite series with adamite $\text{Zn}_2(\text{AsO}_4)(\text{OH})$ as the zinc endmember. The two minerals can form a solid solution series with interchangeable copper and zinc cations. Its colour typically is olive green - hence the naming - but the thinner it is, the lighter it becomes, to even yellowish. The different habits of olivenite can roughly be described in five categories:

- Prismatic crystals, often sharply edged and with well-developed end faces;
- Acicular crystals, often in bundles;
- Fibres, even hairy, mostly irregularly grown together;
- Globular or as sheaves;
- As lamellae, sometimes bent but most often parallel to each other.

Henk continues to encourage us to feast on his mouth watering photographs in the hope of improving our mineral identification skills. This time he tackles olivenite.

Zincolivenite is perhaps worth mentioning as it is structurally distinct from olivenite. Visually the difference between olivenite and zincolivenite is almost impossible to determine, but there is one feature that sometimes can give a clue: olivenite is monoclinic, zincolivenite is orthorhombic (as is adamite). Zincolivenite has (ideally) a Cu:Zn ratio of 50:50 (although it can vary by 25% either way) and the zinc and copper cations are ordered on two differently coordinated sites. It is well worth the effort of comparing the crystal structures diagrams of olivenite, zincolivenite and adamite. These are on Mindat but I find that www.mineralienatlas.de is much better.

And finally there is also cobalt-bearing olivenite, usually of pink to brown colour, where the Cu is partly replaced by Co. This variety is quite rare, only known from five locations worldwide, three of which are in Spain. During my last visit to one of those in 2024 I indeed found one single specimen, but the crystals are simply too small for me to take a decent photo.

All the photos below are taken by me and represent the different habits as accurately as possible. These and many more (zinc)olivenites can be found on my website www.tomeikminerals.com.



Prismatic Olivenite Clara Mine, Germany FOV 2 mm



Prismatic Olivenite Clara Mine, Germany FOV 2 mm



Acicular Olivenite Christiana Mine, Lavrion FOV 2 mm



Acicular Olivenite Clara Mine, Germany FOV 3 mm



Fibrous Olivenite Clara Mine, Germany FOV 5 mm



Globular Olivenite Brixlegg, Austria FOV 2 mm



Lamellae Olivenite Christiana Mine, Lavrion FOV 1.5 mm



Fibrous Olivenite Clara Mine, Germany FOV 5 mm



Globular & sheaf Zincolivenite Christiana Mine FOV 8 mm



Prismatic Zincolivenite Christiana Mine FOV 1.5 mm