the Project Team and Project Board at Birmingham's Lapworth Museum that oversaw a £2.7m redevelopment project. He's also an accomplished author and photographer and his self-funded books on aspects of British mineralogy past and present are enjoyed by enthusiasts around the world.

This is not the first time that Roy's achievements have been recognised. In 2016, Roy was the first recipient of The Marsh Award for Mineralogy. This award recognises 'unsung heroes' who have made a major contribution to the promotion of palaeontology or mineralogy in the UK and abroad.

Slag minerals from La Marsiliana in Tuscany

Henk Smeets

History La Marsiliana near Massa Marittima is one of the localities in Tuscany where slag minerals can still be found and date back to mining by the Etruscans. Archaeological and mineralogical finds have been dated back to the 6th century BC which was when the Etruscan culture was at its peak and indicate the intensive processing of ores of iron, copper and silver during that time. The Etruscan culture developed in pre-Roman times, around the 7th century BC until its downfall in the 1st century BC, when the Etruscans got increasingly absorbed in the Roman Empire. Although the basis of the Etruscan culture was mainly agricultural (wheat, wine, animal breeding), mining was a fair part of its existence. Especially when iron got more and more important and started to replace the former bronze period, the culture came into its heyday. The iron ore was mined mainly on the island of Elba, but was processed for a large part on the mainland, especially around Populonia, and also further inland. Slag localities that can still be visited today are the beach of Baratti near Populonia, Madonna di Fucinaia near Campiglia Marittima, Podere del Cancellino near Sassetta, and the locality on which this article emphasizes, La Marsiliana near Massa Marittima.

Henk gets stuck into another fabulous micro location - this time he visits a slag locality in Italy. And, as always, takes some superb photos of the very small.

Location The slag heaps are located approximately 6 km west from Massa Marittima, and 3.5 km northwest from Valpiana. Coming from Massa you take the SP 143 at the roundabout just outside the town. The road goes north for a few hundred metres, and then turns west. Follow the road for about 5 km, until it joins the road from Valpiana from the south. Keep following the SP 143 for a few hundred metres, and on the right you find a small dirt road that is closed by a metal chain. That's where you want to be, the slags are in the bushes on the right hand side of the dirt road. Coming from Follonica you follow the SS 3439, the main road to Massa, until Valpiana. Before Valpiana you leave the main road, turn right into the village. Then drive through the whole village. A few hundred metres outside the village take the road to the left, and after some 3.5 km

you'll come to the SP 143, where you turn left until you reach the dirt road with the chain. It is known that there are some more slag heaps in the vicinity, three of which are situated on the southside of the SP 143, but all the finds presented in this article were found at the described location.

The Minerals The listing in www.mindat.org tells us that there are 45 valid minerals found so far at La Marsiliana. With just a few exceptions (that are mentioned in the captions of the photos), this article describes only the finds in my own collection from a few visits over the last 15 years, including one species that was found there in 2022 for the first time. Marco Bonifazi and I visited the location twice in July 2022. Some of the finds were unfamiliar to us, they have been analysed with EDX and/or Raman Spectroscopy by Mineralienanalytik in Germany. All the photos are made by the author, and are available on my website www.tomeikminerals.com.

Atacamite FOV 2 mm Collection Felix Maassen

Atacamite $Cu_2(OH)_3Cl$

Atacamite is very abundant, if not the most abundant mineral of all at the location. It can take quite a lot of different habits, which makes it a difficult job to recognize them visually as such. It can appear as thick prisms or platy crystals (see below) and it can even look like the leaves of a plant as can be seen on the left. The colour is always green, but the thicker the crystals become, the less transparent and darker they get – some even look almost black. Atacamite might easily be confused with other green minerals like malachite or brochantite.

Atacamite (plates) FOV 0.5 mm

Atacamite (Prismatic) FOV 0.5 mm

Azurite $Cu_3(CO_3)_2(OH)_2$

Azurite is present, but almost only in the form of not very attractive blue spherical structures.

Brochantite with malachite FOV 0.5 mm

Brochantite $Cu_4(SO_4)(OH)_6$

Brochantite mostly is not very attractive, but relatively easy to recognize. The crystals show colouration shifting from darker to lighter green, they are mostly elongated flat with irregular termination, and almost always in the presence of much lighter coloured malachite.

Calcite $CaCO_3$

Calcite seems to be quite rare at the location, so far we have only found one sample that was confirmed by EDX and Raman Spectroscopy – with a morphology that doesn't look like what you normally would expect from calcite, which is why visually we had no idea what it could be.

Calcite FOV 3 mm

Chrysocolla

$Cu_{2-x}Al_x(H_{2-x}Si_2O_5)(OH)_4 \cdot nH_2O,\ x < 1$

The photo shows elongated prismatic chrysocolla, that is stained by Fe-(hydr)oxides – hence the colouration of the specimen. On visual inspection chrysocolla definitely would not have sprung to mind, but the EDX-report was conclusive.

Fe-(hydr)oxides stained chrysocolla FOV 1 mm

Connellite $Cu_{19}(SO_4)(OH)_{32}Cl_4 \cdot 3H_2O$

Connellite is also one of the most abundant minerals at La Marsiliana. It always forms needles that are arranged in spherical aggregates or in sheaves, whose size never exceeds half millimetre.

Connellite spheres, with spangolite. FOV 0.5 mm

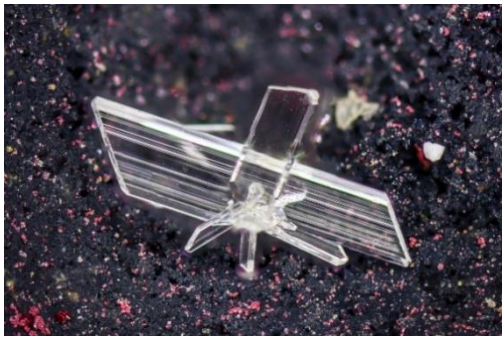
Cuprite Cu_2O

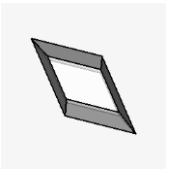
The isometric structure of cuprite is always clearly visible, albeit with different faces, from octahedral to cubic, and mixes of those – but always very small and easily overlooked.

Cuprite as octahedral crystals FOV 0.3 mm

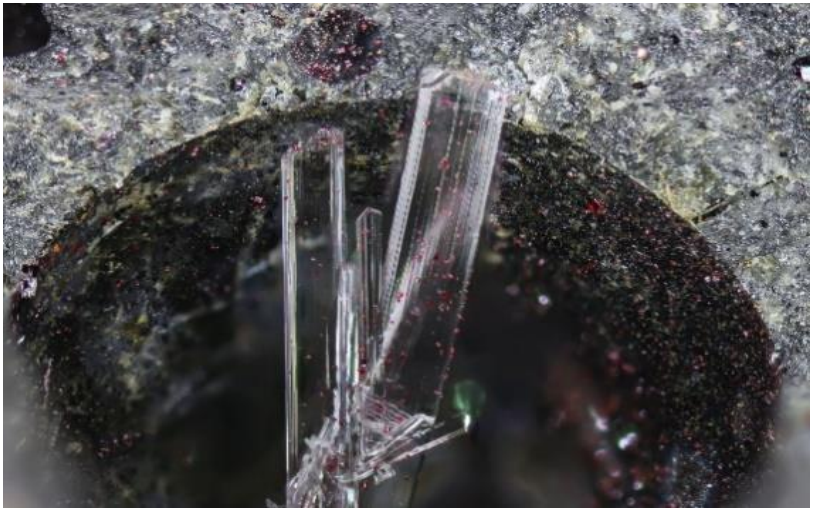
Slightly etched cuprite in a more cubic habit, on a bed of (probably) smectite FOV 2 mm

Gypsum $CaSO_4 \cdot 2H_2O$ Gypsum is quite easy to recognize, because the crystals almost always exactly match the ideal form, as depicted in the drawing.





Gypsum, double terminated crystal
1 mm long.
Crystal drawing derived from
www.smorf.nl.



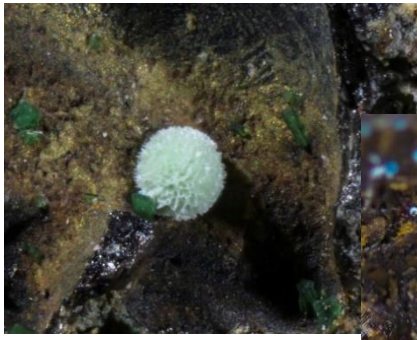
Gypsum crystals, 1 mm high, with tiny cuprites scattered on them.

Langite FOV 1 mm

Langite $Cu_4(SO_4)(OH)_6 \cdot 2H_2O$
Though not fully analysed, this specimen sufficiently matches the characteristics of langite: blocky crystals in the typical colour that makes langite more or less the only candidate.

Malachite $Cu_2(CO_3)(OH)_2$

Malachite at the location almost always is coloured very light green, and therefore quite easy to distinguish from the other green minerals like atacamite and brochantite. Just to be sure one of the specimens has been confirmed by EDX.

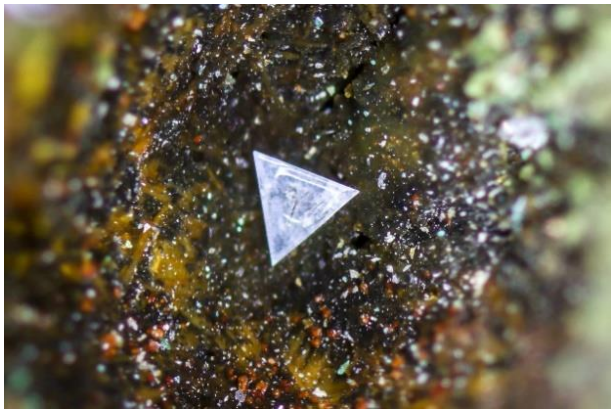


Spherical malachite 0.3 mm wide
EDX and Raman confirmed

Malachite with tiny connellites FOV 0.8 mm

Nantokite ***CuCl***

Although this specimen has not been formally analysed, it speaks for itself. Nantokite is quite rare at La Marsiliana, but nevertheless the identification is easy: the triangular crystal shape is so characteristic that misinterpretation is not feasible. Nantokite is very sensitive: crystals should be kept in the dark as much as possible, because they will decay rapidly when exposed to too much light.



Nantokite Crystal 0.3 mm

Native copper Cu

Native copper is, of course, one of the main components of copper-based slags like these, but well-developed crystals are quite rare. Most of the visible native copper are specks or chunky material. So specimens as the one in the photo are not too common at this location.

Native copper FOV 0.5 mm

Rhodochrosite, containing some zinc FOV 0.5 mm

Rhodochrosite $MnCO_3$

This one was quite a surprise, as rhodochrosite was not described at La Marsiliana until now. It was identified by its Raman spectrum and the EDX-analysis showed that it also contains some zinc so it might best be described as "zinc-bearing rhodochrosite". It remains unclear whether or not the presence of zinc explains the brown colour.

Smectite Group

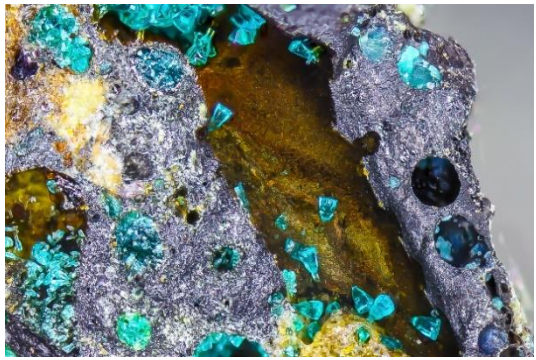
Smectite Group $A_{0.3}D_{2-3}[T_4O_{10}]Z_2 \cdot nH_2O$

Smectite is a group name for platy "phyllosilicates". The Smectite group is divided into two subgroups: Saponite which are trioctahedral and montmorillonite which are dioctahedral. Prior to 1975, the smectite group was called the "montmorillonite-saponite" group. Smectite are clay-like minerals which have large surface to volume ratios and swell dramatically in the presence of water - as exhibited by vermiculite and bentonite. Smectite is commonly a primary constituent of bentonite.

Minerals of the smectite group were found in different habits. The most observed were brown-yellowish spheres, confirmed as such by EDX, with the connotation that further analysis through XRD would be necessary to find out the exact smectite variety.

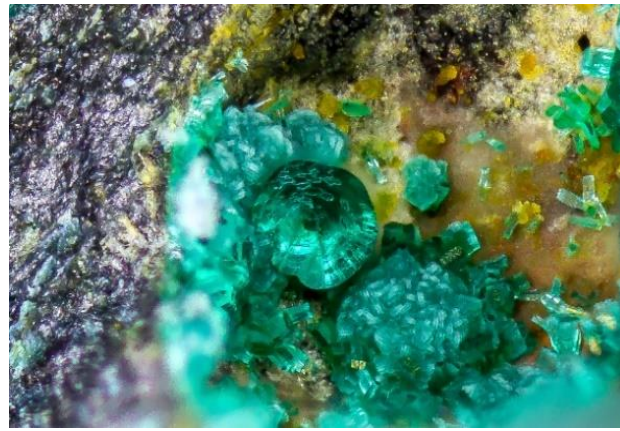
Spherical aggregates of smectite, FOV 1 mm

Spangolite - $Cu_6Al(SO_4)(OH)_{12}Cl \cdot 3H_2O$



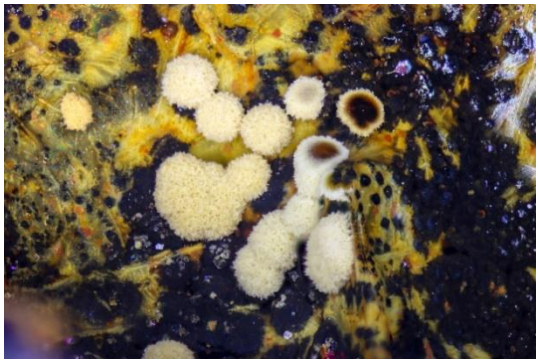
Spangolite FOV 1.2 mm

The most attractive and therefore probably most wanted species at the slags of La Marsiliana is undoubtedly spangolite. It comes in colour variations from blue to deep green, almost always forms toll-shaped crystals with trigonal or pseudohexagonal faces. They are always very small, which makes photographing them not an easy challenge.



Spangolite, main crystal 0.2 mm

Yakhontovite - $(Ca,Na)_{0.5}(Cu,Fe,Mg)_2(Si_4O_{10})(OH)_2 \cdot 3H_2O$



Yakhontovite FOV 0.5 mm

Yakhontovite is a member of the smectite group, that hardly ever forms visible crystallization. The specimens on the photo are therefore a great find in two respects: they show good crystals, and are described at the location for the very first time. The analysis is not completely conclusive though: EDX confirms it to be yakhontovite, but the report recommended further investigation.

Pink Diamonds, Scottish Geology Festival and the Joy of Early Morning Discoveries

Clive Cornwall

Opening the daily newspaper in North-East Scotland (Press & Journal, Aberdeen) has become an eagerly anticipated voyage of discovery. What geological goodies have been unearthed by the team of investigative journalists that prompt my rush to fire up the computer and dig deeper into the supporting material? Let me share with you two examples from mid-September, which aroused my curiosity: pink diamonds and the Scottish Geology Festival.

Pink Diamonds

The Argyle Diamond Mine, located in a remote corner of Western Australia's east Kimberley region, 1900 miles from Perth, the state's capital. Before its closure in 2020, the mine was one of the world's largest producers of diamonds, with a total output of more than 865 million carats. It was also the largest supplier of natural-coloured diamonds – including white, champagne, cognac, blue, violet and the rare, and the highly-coveted,