

AUTHOR NAME

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TITLE

Exploration geophysics at home: search for minerals.

ABSTRACT

Exploration geophysics is an applied branch of geophysics, which uses physical methods, such as seismic, gravitational, magnetic, electromagnetic etc, to measure the physical properties of the subsurface. It is most often used to detect or infer the presence and position of economically useful geological deposits, such as ore minerals. The paper shows the results of a mineral search at a feldspar mine with contact rocks wich are rich in peculiar minerals. Nickel and silver mineral were analyzed in this locality, some of them yet unidentified.

Exploration geophysics [1] at home: search for minerals.

Small specimens, I would say millimeter or submillimeter size.

Look at this one, photo 1. A beautiful red and a little yellow, too. Visually identified, possibly beudantite. FoV: 1 mm. Beudantite is in the Mindat Mineral List at this locality [2]. Very difficult photo for me. Heavily post processed.

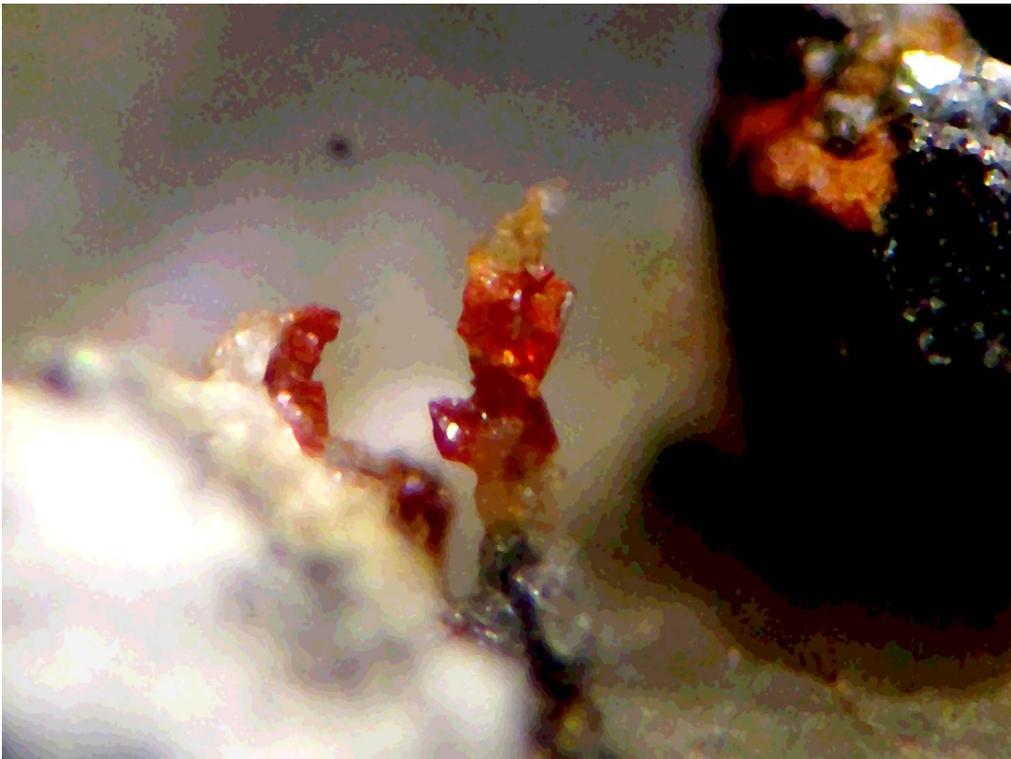


Photo 1 .-. Perhaps beudantite. FoV: 1 mm.

Locality: Maffei [2] and Montorsi [3]. They are the same thing. Indeed, Maffei (below), Montorsi (above).

All the samples I will show here have been extracted from calcite with hydrochloric acid.

Let's begin.

MINERALS

I took some pieces of calcite from my "hammermate" Silvana Cosmi. Overall size of the pieces, no more than 3x3x3 cm. Some of them, rhombohedral; cleavage rhombohedrons. For example, you can see picture 2, etched specimens. On the right side, a calcite cleavage rhombohedron in which I found pyrrhotite for the first time.



Photo2 – etched specimens.

In fact, at the beginning I was looking for pyrrhotite. And with patience and a job of many months I found many small crystals of pyrrhotite, ex. photos from 3 to 6. Some of them I have already published in my Mindat gallery [4]

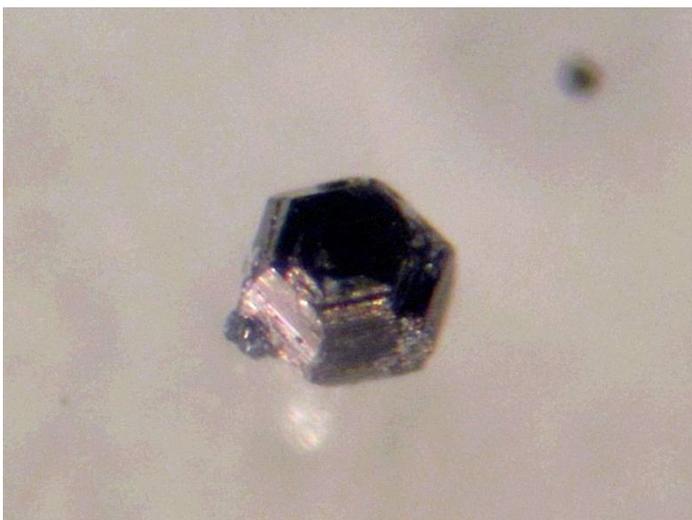


Photo3 - pyrrhotite, size 03mm

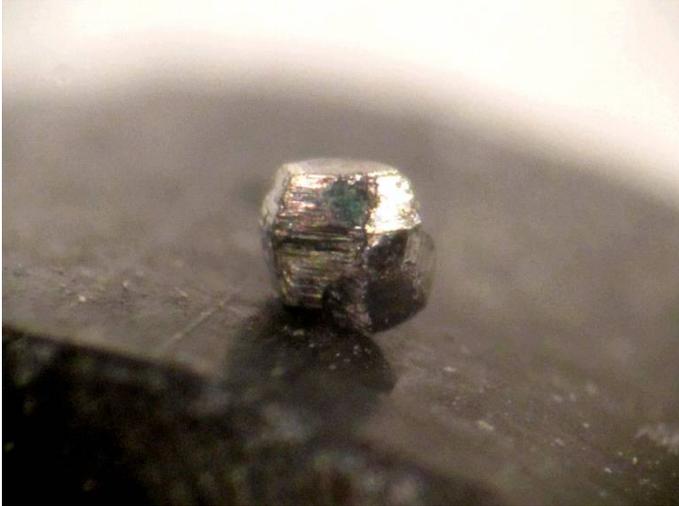


Photo4 – pyrrhotite. Attracted by a magnet.

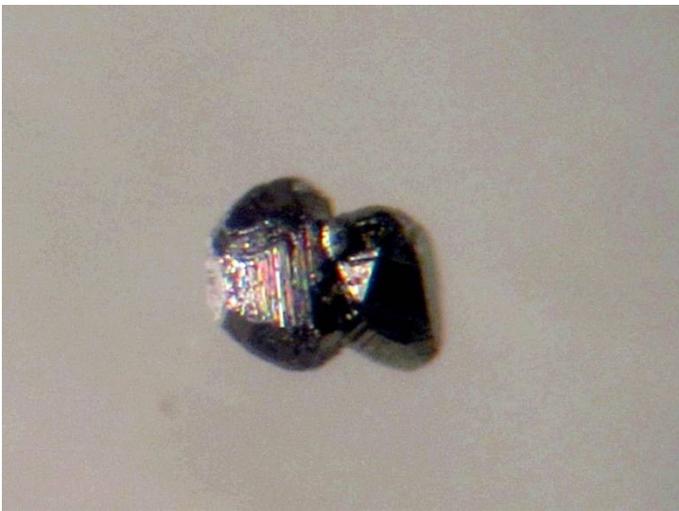


Photo5 - pyrrhotite, xmax 03mm

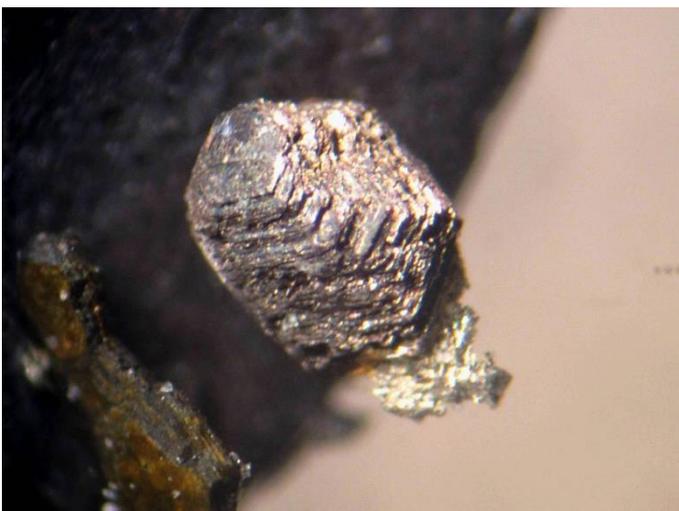


Photo 6 - pyrrhotite, xmax 06mm. Attracted by a magnet.

At this point I must say that, due to exotic reasons, my focus has been on other minerals. The "exotic reasons" were as follows: at that time, a friend of mine, Marco Bonifazi, was looking for copper and possibly silver, both incorporated into the calcite. In fact, another locality, that is Romito locality [5]

But ... I became curious. Is there something like this in my calcite pieces?
I started careful analysis under the microscope.

Arsenopyrite is certainly the most abundant mineral. There are masses of arsenopyrite generally microcrystallized, sometimes well-formed crystals. In the same way, that is, in micro-crystallized masses, sometimes well-formed crystals, pyrite is present. A good example is in photo 7

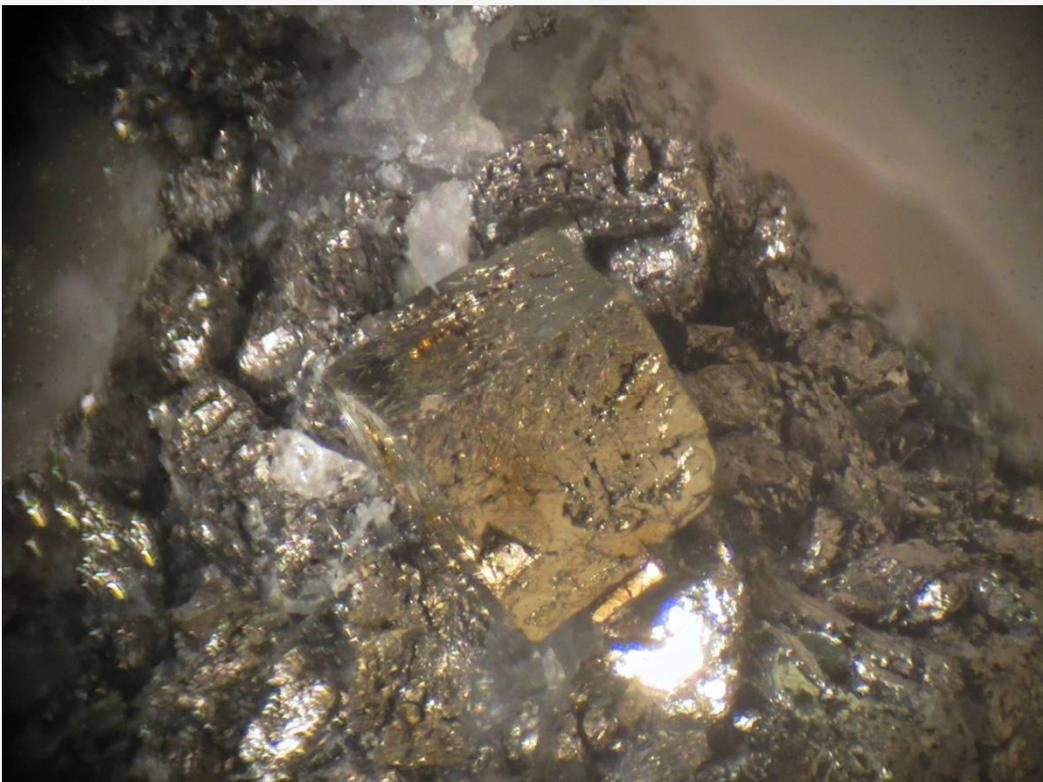


Photo7 – pyrite.

Then gradually, with the passage of time, and patiently examining the acid residues, I noticed the presence of a specific type of crystals. Well characteristic.

The reason?

I must confess that at that time I was already looking for silver. Always for the esoteric reasons that I said before. The Mindat list of the local minerals already reported silver and acanthite Ag_2S . So I had carefully examined the photos on Mindat of both acanthite and silver. I never found traces of silver in my pieces, in particular I never found curls, something that resembled filaments or curls. Instead I found something that could remember the acantite. See photo 8. Unidentified. Silvery.



Photo 8 – unidentified, silvery.

This is a type. Looking smooth, let's say it looks like it's melted.

Then there is another type, who always reminded me of the photos of acantihte published on Mindat. This second type had, has, a lead gray color and as Rob Lavinsky says is nubby, sparkly. Or isolated, or accompanied by silvery masses.

Photo 9 gives an idea of what I'm talking about.



Photo 9 - unidentified, lead gray, nubby.

In conclusion, apart from the well-formed crystals, the acid residuals that I have identified are of 4 types.

- Silvery smooth**
- Silvery complex**
- Yellow**
- Lead gray.**



Photo 10.11, 12, 13 - Silvery smooth, silvery complex, yellow, gray lead.

In the photos 14,15,16 some gray lead masses.

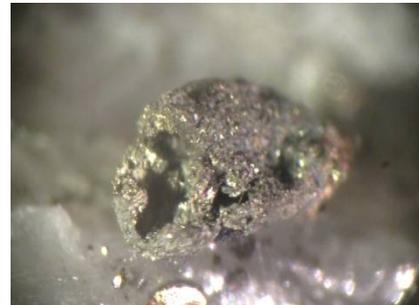
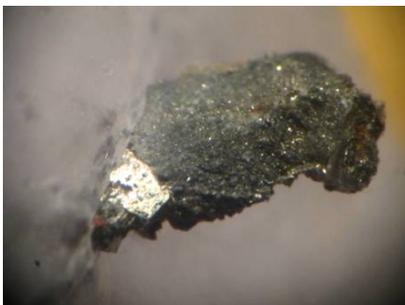


Photo 14,15,16 - gray lead masses.

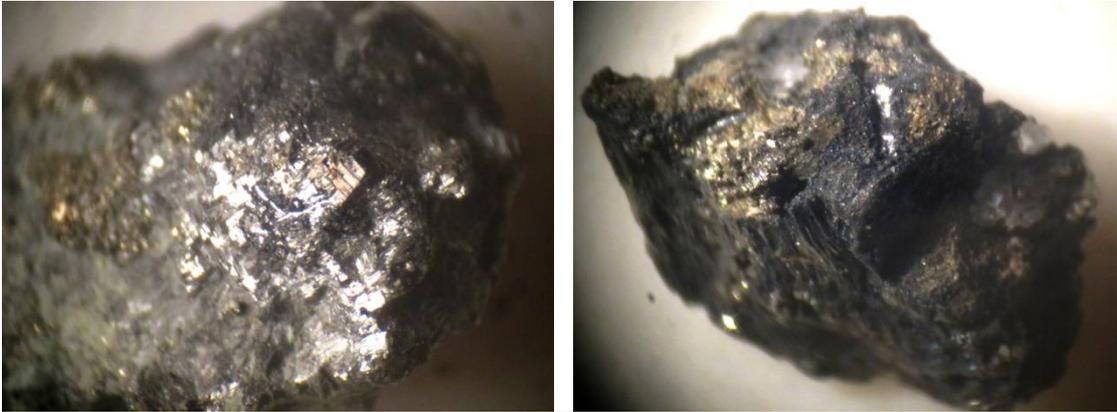
And here instead, photos 17, 18, 19, 20, some silvery smooth crystals, all millimetric or sub millimetric.



Photos 17, 18, 19, 20 - some smooth silvery crystals.

HARDNESS TEST

At first I tried to scratch two gray-colored samples with a pin. Here in the photos 21 and 22, the result of the scratching tests.



Photos 21 and 22 - hardness tests.

Both photos show quite well the scratching lines, and the color below, which is silver. I did several tests, some even with a copper wire, and the gray material was very tender. I would be inclined to estimate a hardness of less than 3.

It seemed to me that the faces of some silvery crystals were also scratched.

Therefore, with a pin, and with many difficulties given the smallness of the specimens I also tried the hardness of the silver crystals.

A proof was found not only very significant, but also very photographable. Photo 23, scratched silvery crystal.

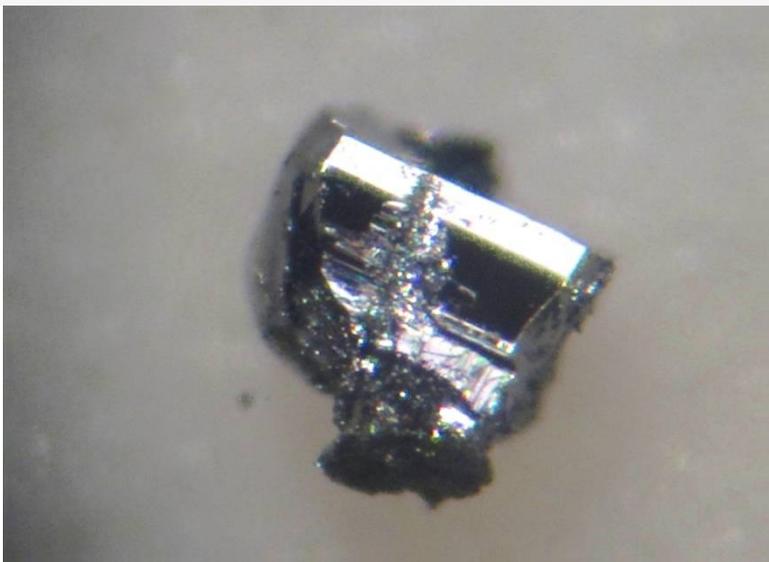


Photo 23 - scratched silvery crystal.

Unfortunately I could only use a pin tip, which is therefore not suitable for estimating a very soft mineral. However I must note that the tip, just resting and without any pressure, only touching the face of the crystal, has caused a showy rifling. Therefore I would be led to estimate a hardness far below 3.

Then I have another crystal, photos 24-25, of which I have the photographs before and after the rifling.



Photo 24 and 25 - silvery crystal.

Finally, a crystal still partially immersed in calcite allowed me to take a picture by holding the piece firmly with my hands. This was possible because the sample is quite large, 2 cm. On it shines a flat, silvery face, which I was able to scratch and photograph. Here is the result. Once again it is a very soft metal.

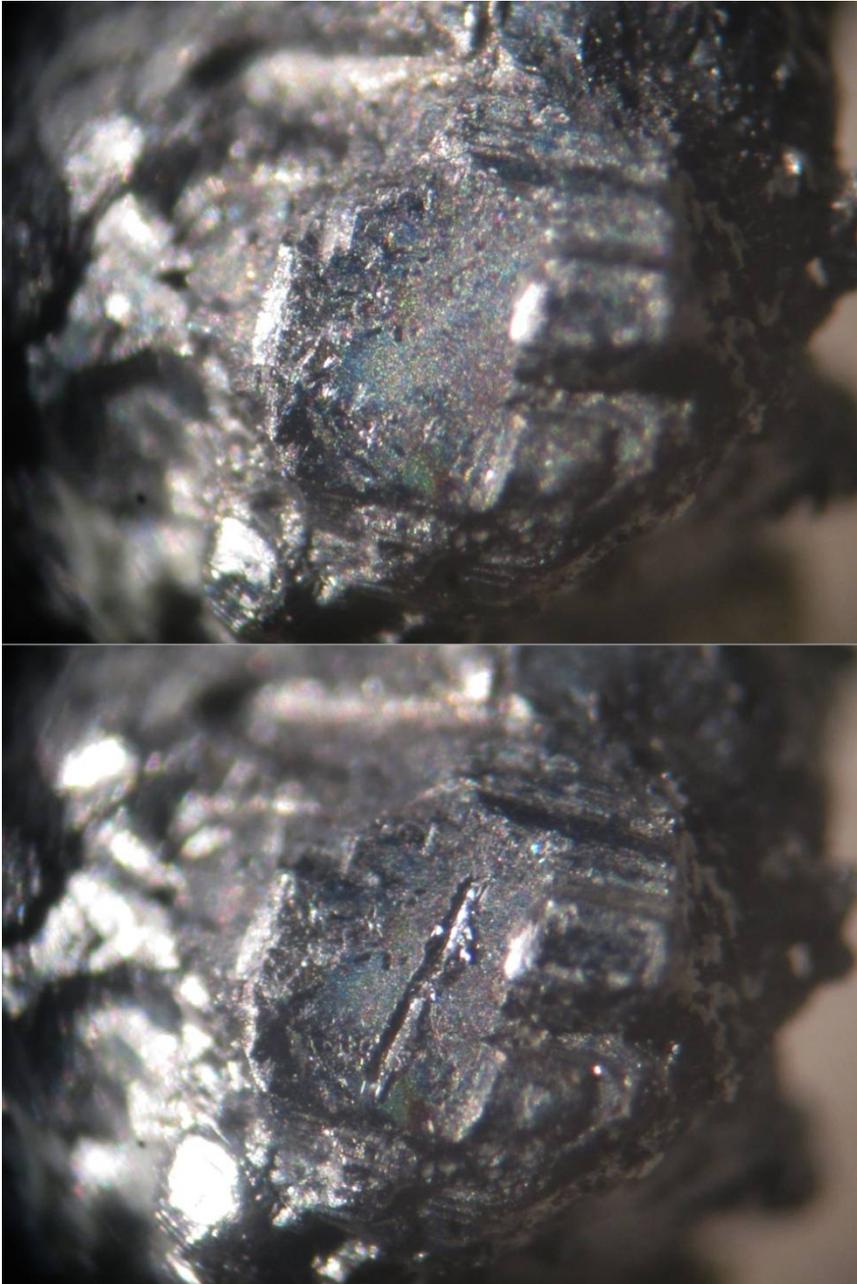


Photo 26 - Hardness test on a flat crystalline face.

CONCLUSIONS

Silver, I do not find evident traces, acanthite, perhaps it is present, the last one, that perfectly shows the 90° , leaves me perplexed.

References

- [1] Exploration geophysics https://en.wikipedia.org/wiki/Exploration_geophysics
- [2] Maffei mine at <https://www.mindat.org/loc-29185.html>
- [3] Montorsi mine at <https://www.mindat.org/loc-189670.html>
- [4] Photo Gallery at <https://www.mindat.org/gallery-37793.html>
- [5] Romito locality at <https://www.mindat.org/loc-30962.html>