The new discovery of a LCT pegmatite in the Adamello massif, Central Southern Alps, Italy

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In November 1999, Mr. Giancarlo Celio, a mineral collector of the Camonica Valley, discovered a gemmy green elbaite, 1 cm long, in a pegmatitic boulder in Poya Creek at the western border of the Adamello massif, Central Southern Alps, Italy. This was the beginning of one of the most important mineralogical discoveries of the last decades in the Alpine region.

After the melting of snow in the late spring of 2000, the mineral collector and two friends started further investigation in the area. After many excurions, the group discovered a large boulder hosting a significant portion of a highly evolved pegmatite in a gully (Forcel Rosso) at the northern slope of the Foppa mountain (2752 m). A few beautiful polychrome tourmalines and matrix specimens of lepidolite, smoky quartz, amethyst, albite and K-feldspar were collected by hand in some miarolitic cavities exposed at the surface of that boulder.

When informed of this discovery, we made our first visit to this place with the mineral collectors in August 2000. Others blocks containing portions of such pegmatite were discovered in the nearby area, and part of the vein (with a less evolved mineralogy) was recognized in the rock walls above the place. More pegmatites with primitive mineralogy and minor miarolitic cavities were observed in the nearby area. Besides the extraordinary scientific and mineralogical interest of such pegmatites, it was surprising that this mineralization, totally new for the Alps, was found in one of the most geologically studied portions of the Alpine chain.

Field investigations showed that these pegmatites are a part of a pegmatite field hosted in the thermometamorphic aureole of the tonalitic Adamello pluton (Alpine age). These pegmatites, hosted in metasediments of the Permian-Mesozoic sequence that experienced contact metamorphism, are horizontal and locally rich in miarolitic cavities, confirming the shallow depth of the Adamello intrusion. The maximum size of the veins is up to 1.5 m in thickness and many tens of meters in length.

The area is included within the limits of a special natural reservation of the Adamello Regional Park. To proceed with the fieldwork, therefore, a joint project of benefit to science and to museum preservation of samples was organized between the Museum of Natural History of Milan and the administration of the Regional Park. In consideration of the significant potential of the pegmatite for producing exceptional mineral specimens, a portion of the dike was identified for a limiting mining effort.

Because of the time necessary to secure all the permissions and because of the exceptional quantity of snow fall during the winter, the fieldwork and mining started only in August 2001. A little camp was prepared at the place, with all equipment transported by helicopter. Two Alpine guides collaborated in removing a series of dangerous rocks during the first days of the work. A volume of about 12 cubic meters of pegmatite was mined and sampled in detail during 20 days. Eight main miarolitic pockets were discovered, ranging from 20x15x4 cm to 45x23x13 cm, together with a large number of minor

cavities. An saw with a large diamond disk was very helpful in recovering the best crystals groups undamaged from the walls of the pockets. All the materials collected (rock samples, mineral specimens from millimeter size to some decimeters across, clay of the cavities, etc.) were transported to the laboratories of the Museum of Natural History of Milan to be selected and prepared for study, for preservation and for exhibit (one permanent exhibit is planned at the Museum of Milan, and one at a Museum in the area of the Adamello Regional Park).

The largest crystals of polychrome tourmaline, up to 10 cm in length and 1 cm across, occurred as doubly terminated "pencils" isolated in the cavities. Matrix specimens host tourmaline crystals up to some centimeters in length. The following colors of tourmaline crystals have been observed: green, yellow, orange, amber, brownish-pink, azure, and purple. Besides smoky quartz, white albite and K-feldspar, the cavities are rich in polychrome micas (from muscovite to lepidolite), locally green and purple fluorite, and abundant calcite in at least three generations. Apatite (at present under study) forms relatively large crystals (up to 2 cm across) of white-grey to pink to emerald-green color. No beryl has been identified up to now in these pegmatites.

Chemical analyses revealed tourmaline to be mainly elbaite. Significantly Ca-rich liddicoatite characterizes the antilogous pole of orange color of the tourmalines of some pockets. Among the rarities, the following minerals have been identified: hafnium-rich zircon, bismutotantalite, bismutocolumbite, stibiotantalite, stibiocolumbite, manganocolumbite, romeite, microlite, pyrochlore, betafite, stibiobetafite, and stibiomicrolite. In particular, romeite is relatively abundant in numerous small (up to 1 mm across) octahedrons on the faces of the crystals of many other minerals. Moreover, a further mineral of the pyrochlore-group ("stibiopyrochlore", never described before in literature), occurring as exsolution structures inside romeite crystals, has been identified.

Figure 1. Elbaite crystal, 3.5 cm long, partially encrusted by lepidolite, quartz, albite and calcite, from the new discovery of an LCT gem pegmatite at Forcel Rosso, Adamello Massif, Southern Alps, Italy (specimen in the collection of the Natural History Museum of Milan, photo by R. Appiani).