Tourmaline from western and central Elba (Italy)

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In Western and Central Elba tourmaline occurs within aplites and pegmatites, which are related to different phases of the magmatic activity during the Miocene. The pegmatites were previously investigated in detail and contain tourmaline in gemstone quality whereas its occurrence in the aplites is relatively unexplored. The aplites consist of mostly quartz and feldspar with accessory mica, apatite and zircon and frequent tourmaline of variable shape and sizes.

Within the oldest aplite samples tourmaline occurs as nodules, patches or orbicules. In all other samples, tourmaline is presents as small (up to 1 cm) black needles or prims and also occur in the center of large K-feldspar phenocrysts of the Monte Capanne granodiorite host rock. Furthermore, tourmaline shows a graphic intergrowth with quartz in one of the younger samples. In the presumably youngest sample, tourmaline occurs as garben-like structures on joint surfaces and as prisms within small quartz-rich veins of 1–2 cm width.

Tourmaline in the studied samples is predominantly alkali-group tourmaline with a schorl-dravite solid solution. X-vacant-group ($^{X}\square$-group) tourmaline occurs in three of five samples, being always foitite with variable Mg contents. As Al is the dominant cation on the Y-site next to Fe and Mg, all tourmalines have an olenite component, but Al (and calculated Li) is generally too low to form elbaite. Measured F is always lower than 0.5 apfu, implying that no fluor-species of tourmaline occur, but an elevated F content is directly related increased Ca+Na+K contents (x-site charge) and vice versa. Elbaite and other Li-dominant tourmalines do not occur within the aplitic veins in Western and Central Elba. Their formation is therefore restricted to very late-stage miarolitic cavities and pegmatites.

An overall trend from Fe dominated schorl in the older samples to Mg-rich schorl to dravite and from Fe-rich foitite to more Mg-rich foitite in presumably younger samples is observed. This evolution is attributed to fractionated crystallisation from a primary magma.