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Origin of rubies from the Paranesti region, North-Eastern Greece

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Figure 1: Paranesti ruby location map [1]

Gem-quality rubies occur in the Paranesti region of north-eastern Greece [1] and were first found by prospectors after road construction. To date, no systematic detailed research has been conducted on these. The rubies are hosted in boudins of metamorphic ferroactinolite schists, along with uncommon muscovite, kyanite and rare feldspars. The deposit is structurally-bound by the synmetamorphic nappe-system (Rhodope Mountain) of Alpine age that formed during the Cretaceous to Mid-Tertiary collision of the palaeo Europe tectonic regime.

A review of published data on existing corundum deposits compared to the chemical and mineralogical studies undertaken on the samples allows for a better understanding of the conditions of formation for these Greek rubies. To date, the deep-red rubies collected have been analysed for oxygen isotopes ($\delta^{18}O$, by laser fluorination) and trace element signatures (LA-ICP-MS method). Oxygen isotope values

($\delta^{18}O$) for the Paranesti rubies have been found to be ~1%, the same as sea-water, and possibly indicating a potential subduction zone genetic environment [2]. Whole rock XRF analyses suggest a mafic precursor with SiO_2 (40 wt%), Al_2O_3 (21 wt%), MgO (16wt%), Fe_2O_3 (6 wt%) along with trace Cr (10745 ppm), Ni (388 ppm) and Zn (282 ppm).

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In terms of trace elements, the deep-red ruby samples from Paranesti have an average concentration of Cr (3284 ppm), moderate Fe (678 ppm), very low Ti (6 ppm), Ga (5 ppm) and V (1 ppm) and no appreciable other trace elements.

Mineral inclusions of kyanite and rutile and the textural evidence of pressure shadows around associated muscovite grains, combined with enclosing gneisses around the deposit and the regional metamorphic history indicate a potential retrogression from ultrahigh-pressure (UHP) metamorphic facies such as eclogite to lower P-T amphibolite/upper greenschist facies [3]. These rubies thus provide important additional information on the metamorphic/tectonic evolution of the Rhodope Metamorphic Province which has been shown to consist of at least three difference stages in terms of P-T evolution [4].

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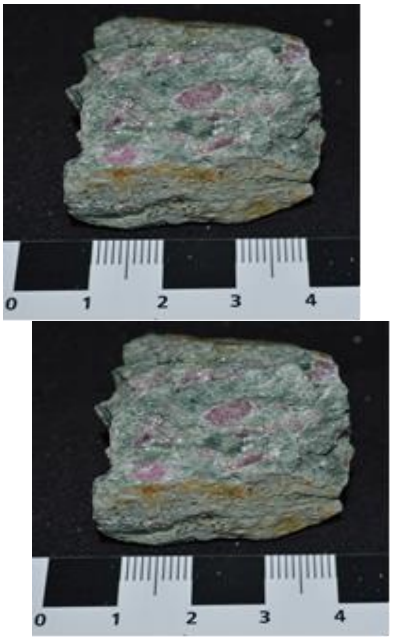

Figure 2. Coarse-grained actinolite schist with subhedral rubies to 20mm.

Figure 3. Gem-quality ruby grain, Paranesti

References:

[1] Google Earth v 7.1.5.1557 (14 Dec 2015) Paranesti, Greece (Basarsoft 2016 & Orion Me 2016)
[2] Giuliani et al. (2005) Geology 33(4): 249-252.
[3] Voudouris et al. (2010), 13th Quad IAGOD Symp. 69: 429430.

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[3] Voudouris et al. (2010), 13th Quad IAGOD Symp. 69: 429430.
[4]Mposkos et al. (2001) Conf. Abstr. Workshop on Fluid/Slab/Mantle Interactions and Ultrahigh-P Minerals, Waseda University.