"The devil is in the detail" – vein mineralogy and texture as an aid to exploration in the Hauraki Goldfield

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Epithermal quartz veins can vary dramatically in terms of size, texture, mineralogy and metal endowment. Vein size does matter in epithermal gold exploration, but large vein size does not necessarily equate with gold endowment. Vein texture and mineralogy give clues to mineral deposition processes, such as boiling (i.e. lattice textures, adularia), that can be highly conducive for gold precipitation. It follows that detailed description and analysis of vein textures and mineralogy, and their spatial changes, will be useful in determining vein prospectivity and vectors to mineralisation. Indeed, these features have been used as broad indicators of prospectivity, paleodepth and proximity to proposed optimum gold depositional environments, and they are reviewed in this paper. However, the deposits of the Hauraki Goldfield show that real life is more complex. For example, there are regional to vein scale differences in ore mineralogy that may result from "source" influences rather than depositional processes. Boiling indicators such as platy calcite, quartz psuedomorphed platy calcite and vein adularia, are more abundant in the southern part of the goldfield compared with the north, but it is likely that boiling was just as important in the north for depositing gold, as hinted by the presence of bonanza gold grades in veins at Coromandel and Thames. Similarly, arsenopyrite is present in many of the veins in the north, particularly in the deposits near Coromandel town, but absent in the south. Base metal sulphide, and precious metal telluride and selenide minerals are important minerals in some deposits, but not others. Differences in ore mineralogy are apparent even between veins of the same deposit (e.g. Waihi vein system), which cannot be attributed to differences in depositional environment, but instead suggest different source fluids. Some possible explanations are investigated.