Gold in Southern Finland: Results of GTK studies 1998–2011
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GOLD MINERALISATION IN SOUTHWESTERN FINLAND

by
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The bedrock of southwestern Finland was chiefly formed during the composite Svecofennian orogeny at 1.9–1.8 Ga. The orogeny evolved through accretion and attempted collapse to collisional stages. This complex evolution produced several genetic types of gold mineralisation: 1) The most common type is orogenic gold, which probably occurs in all major supracrustal belts of the region. 2) Metamorphosed epithermal gold is present in the Tampere and, apparently, Uusimaa belts, whereas indications of epithermal mineralisation are less clear or not present in all the other belts. 3) One deposit, Haveri, probably belongs to the Au-rich VMS type; the gold-rich base-metal deposits of the Uusimaa belt may also be of the VMS type, if they are not epithermal. 4) Indications of porphyry and/or other types of granitoid-related Au-Cu mineralisation have been detected in the Häme belt. The presence of high-sulphidation epithermal gold mineralisation in the Tampere belt points towards the possibility of porphyry Cu(-Au) mineralisation also occurring in that area.

Keywords (GeoRef Thesaurus, AGI): gold ores, metallogeny, tectonics, Svecofennian Orogeny, orogenic belts, Paleoproterozoic, Southwestern Finland

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INTRODUCTION

Two active and one closed mine, and a large number of prospects in various stages of exploration indicate the potential for economic gold mineralisation in SW Finland (Fig. 1; Appendix 1). The style of gold mineralisation indicates rather large variation in the area, as at least orogenic, porphyry and other intrusion-related, epithermal and VMS styles of mineralisation have been suggested (Eilu 2007). Such extensive genetic variation suggests a complex geological evolution of the area. Hence, I first briefly review the geological evolution of SW Finland and then discuss the various genetic types of mineralisation suggested to exist in the area.

GEOLOGICAL SETTING AND EVOLUTION OF THE CRUST IN SW FINLAND

The bedrock of southwestern Finland essentially comprises, from south to north, the Uusimaa, Häme, Pirkanmaa and Tampere, and the southern part of the Pohjanmaa supracrustal belts with syn- to late-orogenic intrusion (Vaasjoki et al. 2005). In addition, the SW part of the Central Finland Granitoid Complex occupies a large area between the Tampere and Pohjanmaa belts (Fig. 1). Rocks in the region mostly show ages between 1.9 and 1.8 Ga, indicating deposition, intrusion and evolution during the composite Svecofennian orogeny (Lahtinen et al. 2005, 2008, Kähkönen 2005, Nironen 2005).

The oldest unambiguously dated stages of plate-tectonic evolution in the area relate to microcontinent accretion with an Archaean craton to the northeast, beyond the area under consideration in this report, and the simultaneous northward subduction of an igneous arc (Tampere belt) and an accretionary complex (Pirkanmaa belt) under a microcontinent (Central Finland Granitoid Complex) during 1.91−1.89 Ga. Almost contemporaneously, during 1.90−1.87 Ga, the Tampere−Pirkanmaa igneous arc−accretionary complex also subducted to the south under the Bergslagen microcontinent, that is, under the Häme and Uusimaa belts. Subduction of the Tampere and Pirkanmaa belts towards the north ended at 1.89 Ga. This was followed, during 1.89−1.87 Ga, by the first major stage of deformation, regional metamorphism and N-S shortening in southern Finland. After an interlude of attempted orogenic collapse, the second major orogenic stage, with extensive magmatism, high-T metamorphism and transpressional deformation followed during 1.84−1.79 Ga. The latter stage was related to continent−continent collision in the southeast during 1.84−1.82 Ga and in the west during 1.82−1.80 Ga, beyond the area discussed in this report. Instead of merely continent−continent collision-related processes, the orogenic evolution of southern Finland (and Central Sweden) during 1.84−1.79 Ga could, at least partly, also be explained by a southward retreating Andean-type active margin system. In any case, most of the active orogenic evolution of the area, including all ductile deformation, ended by 1.79 Ga. (Kilpeläinen 1998, Kähkönen 2005, Lahtinen et al. 2005, 2008)

GOLD DEPOSIT TYPES DETECTED AND THEIR RELATIONSHIP TO CRUSTAL EVOLUTION

The types of gold mineralisation detected or suspected to occur in SW Finland include: 1) Au-rich VMS, 2) epithermal gold, 3) porphyry and/or other types of granitoid-related Au-Cu, and 4) orogenic gold (Appendix 1). In this paper, their geological context is briefly discussed, whereas more detailed descriptions of investigated occurrences are provided in other papers of this publication.

All hosts to gold in the region are within the age range of 1.9−1.8 Ga. Some mineralisation appear to be syngenetic, many postdate the intrusion or extrusion of the igneous hosts and at least the earliest deformation, and all predate the post-1.79 Ga brittle structures (e.g., Väisänen et al. 2002, Lahtinen et al. 2005, 2008, Kärkkäinen 2007, Saalmann et al. 2008, Eilu & Pankka 2009). This indicates that gold mineralisation in southwestern Finland is related to various stages of orogenic development in the area. It also means that the metallogeny of gold of the region is closely related to one of the globally main stages (Goldfarb et al. 2001) of formation of the continental crust.

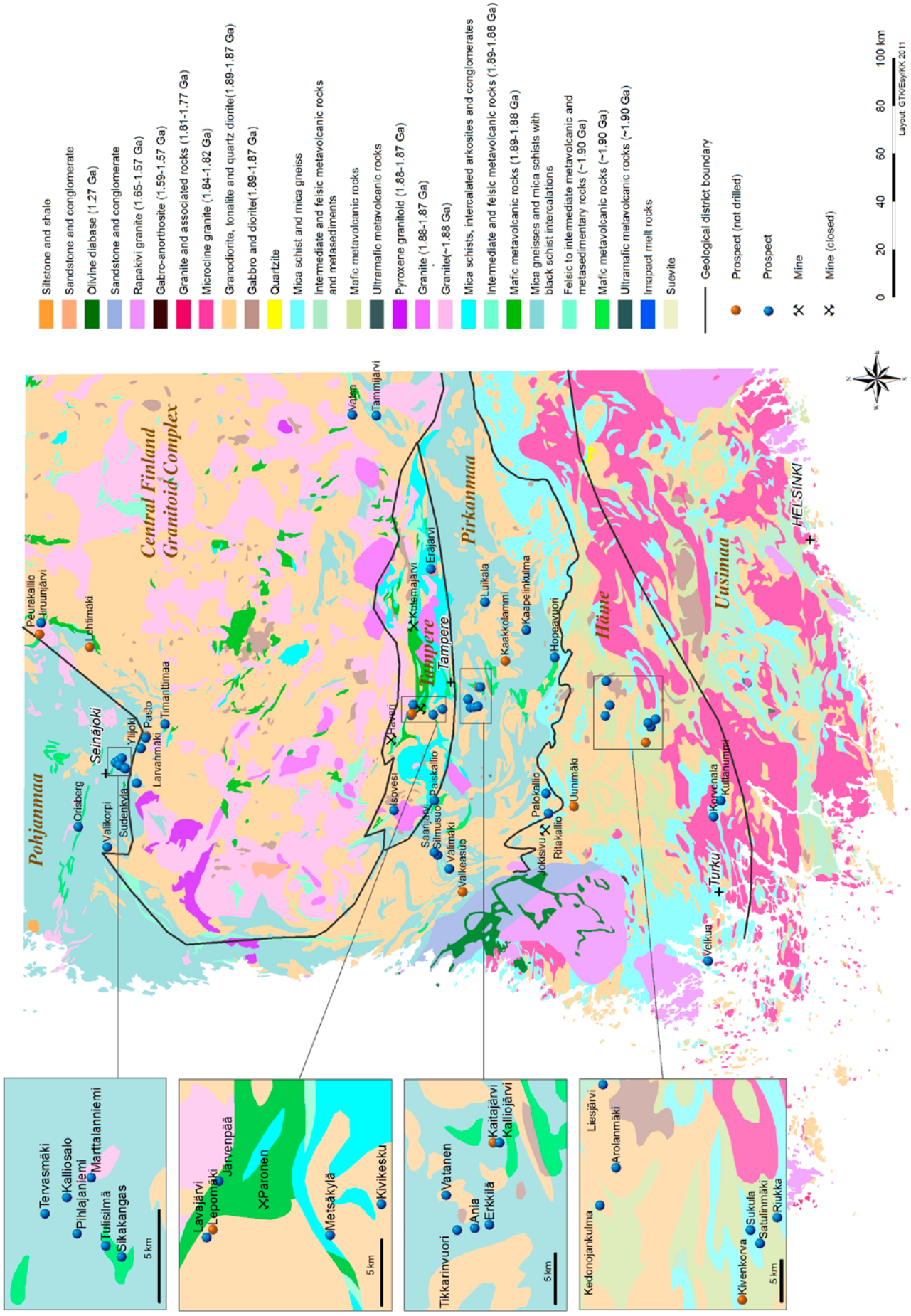

Figure 1. Geology of southwestern Finland and gold deposits and occurrences detected in the area. Geology from Vaasjoki et al. (2005) and GTK (Bedrock of Finland – DigiKP), gold occurrences after Eilu & Pankka (2009) and recent exploration by GTK (Kärkkäinen et al. 2003, Kärkkäinen 2007, and unpublished GTK data). Boundary between Häme and Pirkanmaa belts is according to Sipilä et al. (2011).

There is very little radiometric age data for gold mineralisation in the region, and the timing must chiefly be constrained from indirect indications essentially resulting from structural investigations. The VMS and epithermal mineralisation probably took place during ca. 1.905–1.889 Ga in the Tampere belt and at ca. 1.89 Ga in the Uusimaa belt (Väisänen et al. 2002, Skyttä et al. 2005, Kähkönen 2005, Väisänen & Kirkland 2008). Hence, all such deposits have metamorphosed after mineralisation. Mineralisation was probably related to mafic submarine volcanism in a back-arc setting in the western Tampere belt and of bimodal, submarine to subaerial, volcanism and synvolcanic intrusion in igneous arcs above subduction zones in both belts. Such tectonic settings are favourable for both VMS and epithermal styles of mineralisation. If there was epithermal mineralisation in the Häme belt, it took place during the synvolcanic evolution of the belt, perhaps at ca. 1.89–1.88 Ga. Granitoid-related Au-Cu mineralisation, if there is any in the region, took place in the same tectonic setting and in roughly the same time interval as epithermal mineralisation. Orogenic gold mineralisation, by definition, is formed by orogenic fluids and takes place close to the peak of regional metamorphism under a compressive to transpressive tectonic regime typical for accretionary and continent–continent collisional settings (Goldfarb et al. 2001, Groves et al. 2003). This gives two possible periods for orogenic gold mineralisation in SW Finland: the main deformation and metamorphic stages of 1.89–1.87 Ga and 1.84–1.80 Ga.

VMS and epithermal gold

VMS-style base metal mineralisation occurs in the western parts of the Uusimaa, Häme and Tampere belts. In nearly all cases, as is typical for most VMS mineralisation anywhere, there is minor gold (0.1–1 ppm) in the deposits (Latvalahti 1979, Eilu et al. 2003). This typically means a possibility of by-product gold, which is not discussed any further here. However, two major exceptions to the low gold–base metal ratio in VMS settings of SW Finland have been detected: at Haveri in the Tampere belt and at Iilijärvi in the Uusimaa belt (Fig. 1, Appendix 1). Haveri probably represents the roots of a submarine Cu-Au VMS system partially remobilised by deformation (e.g., Mäkelä 1980, Eilu & Pankka 2009), and is discussed in more detail in a separate paper in this publication.

Iilijärvi is either a gold-rich VMS deposit or an epithermal deposit at least spatially related to VMS mineralisation (Mäkelä 1989, Eilu 2007). The metal association at Iilijärvi is Ag-Au-Cu-Pb-Zn, and there is some metal zoning with the gold-rich parts being somewhat separate from the Ag-Pb-Zn-rich parts (Mäkelä 1989). The parts rich in gold are characterised by quartz-andalusite-muscovite gangue (Isomäki 1988), suggesting acid fluids typical for epithermal processes (Hedenquist et al. 1996). Like Iilijärvi, a few other gold occurrences in the western Uusimaa belt are in apparently sericitised rocks (Eilu 2007). However, not enough work has been done to be sure of the genetic type of these occurrences. This also holds for the possible epithermal occurrences of the Häme belt, including the Kultanummi, Velkua, Satulinmäki and Riukka occurrences (Appendix 1). The latter two are characterised by abundant K mica in gangue, whereas their structures and preliminary age dating suggest a syn-peak orogenic timing (Saalmann et al. 2008), which would mean that they belong to the category of orogenic gold mineralisation *sensu* Goldfarb et al. (2001), as suggested in the section on the Somero–Tammela area below. The argument for Kultanummi being a metamorphosed epithermal occurrence essentially lies in gold being closely related to a deformed sillimanite-rich zone (Grönholm et al. 2005); this suggests an early timing and an intense argillic alteration during mineralisation – possibly analogous to Enåsen, central Sweden (Hallberg 1994).

The most obvious and most extensively studied case for an epithermal mineralisation in SW Finland is the Kutemajärvi (Orivesi) mine in the Tampere belt (Fig. 1, Appendix 1). There, practically all reported features (Luukkonen 1994, Poutiainen & Grönholm 1996, Kojonen et al. 1999, Talikka & Mänttäri 2005) indicate metamorphosed epithermal gold mineralisation without any later introduction of gold. The deposit is characterised by strong leaching out of major elements, intense silicification, and the formation of pyrophyllite. Locally, phosphates and F-rich minerals (e.g., topaz, lazulite) occur in the alteration assemblage. No carbonatisation, potassic or sodic alteration, nor auriferous quartz veining has been detected. These features suggest high-sulphidation epithermal mineralisation in the sense defined by Hedenquist et al. (1996). The relative timing of alteration and, most probably, also for mineralisation predate all deformation. The Järvenpää Au-Ag-

Cu-Zn occurrence, 30 km west of Kutemajärvi, occurs in roughly the same stratigraphic position and has most features similar to the latter (Luukkonen 1994, Dragon Mining 2005).

Granitoid-related gold

Lavajärvi and Tammijärvi in the Tampere belt, and Liesjärvi and Kedonojankulma in the Häme belt have features that would locate them in the broad category of granitoid-related gold mineralisation, indicating that they were immediate products of fluids produced by the hosting granitoids or by granitoids whose immediate country rocks host the mineralisation. Typical features for these occurrences include (Kokkola 1986, Luukkonen 1994, Kärkkäinen et al. 2003, Kärkkäinen 2007, Tiainen et al. 2012): an elevated copper content, a disseminated style of sulphide−gold mineralisation, abundant tourmaline, only a minor volume of quartz veins, and the main host being a granodiorite (or a synorogenic granodiorite occurs near the mineralisation). However, none of these occurrences have been investigated in significant detail. Hence, it is possible that they occur in or near a granitoid just because the structural setting in those locations during deformation was suitable for orogenic gold mineralisation, and that the mineralisation significantly postdates its hosts.

Orogenic gold

Orogenic gold mineralisation seems to occur in all belts of SW Finland (Appendix 1; Eilu & Pankka 2009). In the Pirkanmaa and Pohjanmaa belts, all occurrences probably belong to this category. This may also be the case for the Häme belt, although the available information is not as unequivocal as for the former belts. In the Uusimaa and Tampere belts, the orogenic type seems to have a minor proportion of the total number of gold occurrences so far detected.

Orogenic gold occurrences in SW Finland are all hosted by rocks metamorphosed under amphibolite-facies conditions. Their location is structurally controlled: they are in secondary to tertiary shear zones hosted by the locally most competent lithological units (e.g., Rosenberg 1997, Ojala 2003, Vuori et al. 2005). They are gold-only deposits and the main ore minerals typically include, in decreasing order, pyrrhotite, arsenopyrite, pyrite, and löllingite. Gold occurs in native grains associated with gangue and the sulphides, in quartz veins and in the host rock. Structural studies indicate that the timing of mineralisation is syn-peak deformation, significantly postdating the formation of the host rocks (Rosenberg 1997, Ojala 2003). The few radiometric ages on host rocks and mineralisation also support this age relationship (Saalmann et al. 2008). It remains unclear, however, whether all mineralisation took place during the 1.89−1.87 Ga accretionary stage of the Svecofennian evolution, whether there was also significant mineralisation during the 1.84−1.80 Ga collisional stage, or whether it all took place during 1.84−1.80 Ga. Many of the occurrences in the Seinäjoki area of the Pohjanmaa belt differ from the common style in having such a high antimony content that Sb can be regarded as a major commodity in them (Appelqvist 1993). More details on the orogenic gold occurrences of SW Finland can be found in the following sections of this publication.

CONCLUSIONS

Southwestern Finland chiefly comprises orogenic rocks of 1.9 to 1.8 Ga in age. These were produced by the complex, accretionary to collisional orogenic evolution of Fennoscandia. Much work is still to be done before the genetic types of all the known gold occurrences in SW Finland are firmly established. Nevertheless, we can rather safely say that the multi-stage evolution of the crust has resulted into several genetic types of gold mineralisation in the region:

1. The most common type is orogenic gold, which appears to occur in all major domains of SW Finland.
2. Evidence for the presence of metamorphosed epithermal gold is most convincing in the Tampere and Uusimaa belts, whereas indications of epithermal mineralisation are less obvious or non-existent in other areas.

3. The Haveri gold-copper deposit probably belongs to the VMS type. It has a synorogenic deformational overprint, however, and the possibility of orogenic gold overprinting VMS-style Cu or Cu-Au mineralisation cannot be completely rejected. The gold-rich base-metal deposits of the Uusimaa belt, such as Iilijärvi, are, if not epithermal, also of the VMS type.
4. The Häme belt contains indications of porphyry and/or other types of granitoid-related Au-Cu mineralisation. However, the amount of investigation still is too limited to state anything with certainty about the genetic types of those occurrences within and near synorogenic granitoids of the Häme belt. The presence of high-sulphidation epithermal gold mineralisation in the Tampere belt suggests that porphyry Cu(-Au) deposits could occur also there.

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Appendix 1. Gold deposits and drilling-indicated occurrences in southwestern Finland. Location of the occurrences is indicated in Figure 1.

Deposit / Prospect (parallel name)	Size / Best sections	Geological district	Main host rocks	Main ore minerals[1]	Siting of gold[1]	Commo-dity associa-tion	Genetic type[2]	References
Mine								
Haveri	26.26 Mt @ 1 ppm Au, 0.5 % Cu	Tampere	Basalt	Po, Apy, Cpy	Native with gangue, Apy, Cob, Cpy	Au-Cu	VMS	Mäkelä (1980), Lappland Goldminers (2008)
Kutemajärvi (Orivesi)	2.8 Mt @ 9 ppm Au	Tampere	Intermediate volcanic rock	Alt, Py, Apy	Free native with Qz, Py, Apy, Te	Au	Epithermal	Poutiainen & Grönholm (1996), Dragon Mining (2009)
Paronen (Ylöjärvi)	4.013 Mt @ 14 ppm Ag, 0.04 ppm Au, 0.75 % Cu, 0.11 % W[3]	Tampere	Granodiorite	Apy, Cpy, Sch, Po	Not reported	Cu-W(-Ag, Au)	Intrusion-related	Himmi et al. (1979)
Jokisivu	1.567 Mt @ 6.5 ppm Au	Pirkanmaa	Gabbro	Po, Apy	Free native in Qz veins, related to Apy, with Te	Au	Orogenic	Luukkonen (1994), Dragon Mining (2009)
Prospect, drilled								
Arolanmäki	2 m @ 0.8-1.6 ppm Au	Häme	Granitoid	Cpy, Py, Po	Not reported	Au-Cu	Intrusion-related	GTK unpublished data
Kedonojankulma	1 m @ 8 ppm, 3 m @ 1.1-3.7 ppm Au	Häme	Granitoid	Cpy, Cc, Py, Apy	Not reported	Au-Cu	Intrusion-related	GTK unpublished data
Korvenala	5.5 m @ 1 ppm Au	Häme	Plagioclase porphyry	Apy	Not reported	Au	Orogenic	Rosenberg (2000c)
Kultanummi	1-6 m sections @ 0.5-10 ppm Au	Häme	Intermediate volcanic rock	Py, Po, Apy	Free native in host rock and Qz vein, with Apy	Au	Epithermal?	Grönholm et al. (2005)
Liesjärvi	6 m @ 2 ppm Au	Häme	Granodiorite	Apy, Löl, Po, Cpy	Not reported	Au-Cu	Orogenic	Kokkola (1986)
Riukka	9 m @ 4.3 ppm Au; 6.5 m @ 6.7 ppm Au, 0.4 % Zn, 0.04 % Cu, 0.29 % Pb	Häme	Mafic-Intermediate volcanic rock	Apy, Po, Löl, SP, Ga	Native and Ele as inclusions in silicates, Apy, Löl	Au (-Cu, Pb, Zn)	Orogenic or epithermal	Etelämäki (2007)
Satulinmäki	0.36 Mt @ 2.23 ppm Au	Häme	Intermediate volcanic rock	Apy, Po	Native in Qz-Tou veins and in host rock; assoc with Apy, Bi and Sb minerals	Au	Orogenic	Kärkkäinen et al. (2006b)
Sukula	1 m @ 1.7 ppm Au	Häme	Intermediate volcanic rock	Apy, Po, Py	Not reported	Au	Orogenic	GTK unpublished data
Uunimäki	1 m @ 12.2 ppm	Häme	Gabbro	Po	Not reported	Au, W	Orogenic	GTK unpublished data
Velkua	6 m @ 5.5 ppm Au	Häme	Amphibolite	Po, Apy	Free native in gangue > inclusions in Apy,	Au	Epithermal?	GTK unpublished data
Ania	0.5-0.8 m sections @ 3.3-4.2 ppm Au	Pirkanmaa	Greywacke	Apy, Po, Löl	Native free in gangue, inclusions in Apy	Au	Orogenic	Kärkkäinen et al. (2006a)
Erkkilä	3-6 m sections @ 1-8 ppm Au	Pirkanmaa	Greywacke, black schist	Po, Apy	Native free in gangue	Au	Orogenic	Kärkkäinen et al. (2003)
Eräjärvi	1 m @ 1 ppm Au	Pirkanmaa	gabbro	Apy, Po	Native inclusions in Apy	Au	Orogenic	GTK unpublished data
Hopeavuori	17.5 m @ 13.1 ppm Au	Pirkanmaa	Intermediate volcanic rock	Apy	Not reported	Au	Orogenic	Lindmark & Koistinen (1996)
Isovesi	3.7 m @ 5.3 ppm Au	Pirkanmaa	Intermediate tuffite	Apy	Native free with gangue, Apy, Bi	Au	Orogenic	Luukkonen (1994)

Appendix 1. cont.

Deposit / Prospect (parallel name)	Size / Best sections	Geological district	Main host rocks	Main ore minerals[1]	Siting of gold[1]	Commo-dity associa-tion	Genetic type[2]	References
Kaapelinkulma	0.127 Mt @ 8.15 ppm Au	Pirkanmaa	Quartz diorite	Apy, Po	Free native with Qz, Bi; inclusions in Apy	Au	Orogenic	Rosenberg (1997), Dragon Mining (2009)
Kaitajärvi	1 m @ 0.6 ppm Au	Pirkanmaa	Greywacke	Po, Py	Not reported	Au	Orogenic	Lehto (2004a)
Kalliojärvi	4.3 m @ 7.2 ppm Au	Pirkanmaa	Greywacke	Apy	Not reported	Au	Orogenic	Lehto (2000), Rosenberg (2000a)
Kivikesku	5 m @ 3.4 m Au	Pirkanmaa	Greywacke	Apy, Po	Free native and inclusions in Apy	Au	Orogenic	Lindmark (1995)
Palokallio	1 m @ 1-41.8 ppm	Pirkanmaa	Gabbro	Po, Apy, Löl	Inclusions in Apy-Löl and silicates	Au	Orogenic	GTK unpublished data
Ritakallio	4.7 m @ 1.7 ppm Au	Pirkanmaa	Gabbro	Apy, Löl, Po	Free native in gangue and inclusions in Apy, with Bi, Sb and Te minerals	Au	Orogenic	Vuori et al. (2005)
Saarijärvi	1 @ 2.3 ppm Au	Pirkanmaa	Mafic metavolcanic rock	Po, Apy	Free native in gangue and inclusions in Apy	Au	Orogenic	GTK unpublished data
Silmussuo	1.2 m @ 3.2 ppm Au	Pirkanmaa	Mica gneiss	Apy, Mgt			Orogenic?	Kokkola (1991)
Tikkarinvuori	1 m @ 8.1 ppm (76 ppm in hand specimen)	Pirkanmaa	Greywacke	Apy, Löl, Po	Native, free, visible in Qz vein margins	Au	Orogenic	Rosenberg (1998)
Vatanen	10 m @ 0.5 ppm Au	Pirkanmaa	Granodiorite	Apy	Free native with Qz, inclusions in Apy	Au	Orogenic	Rosenberg (1990)
Välimäki	1 m sections @ 2-18 ppm Au	Pirkanmaa	Mica gneiss	Py, Po, Apy	Free native and Au-Bi-Te grains in gangue, inclusions in Apy-Löll	Au	Orogenic	Lehto & Kärkkäinen (2006)
Kalliosalo	0.3 Mt @ 0.85% Sb, 1.0 ppm Au	Pohjanmaa	Plagioclase porphyrite	Apy, Löl, Sb	Aust; native inclusions Löl and Apy	Au-Sb	Orogenic	Tyni (1983), Kärkkäinen (1992a), Appelqvist (1993)
Larvanmäki	1 m @ 4.85 ppm Au	Pohjanmaa	Plagioclase porphyry	Apy	Native	Au	Orogenic	GTK unpublished data
Marttalanniemi	1 m @ 14.8 ppm Au	Pohjanmaa	Plagioclase porphyry	Py, Po, Apy	Native in Tou-Qz veins, and in host rock	Au	Orogenic	Kärkkäinen (1990)
Pihlajaniemi	1 m @ 1 ppm Au	Pohjanmaa	Plagioclase porphyrite	Native Sb, Apy	Not reported	Au-Sb	orogenic	Oivanen (1982)
Sikakangas (Tulisilmä)	3 m @ 27.24 ppm Au	Pohjanmaa	Plagioclase porphyry	Apy	Native in host rock, Qz-veins	Au	Orogenic	Kärkkäinen (1993a), Isomaa at al. (2010)
Sudenkylä (Haudankylä)	1 m @ 3.5 ppm Au	Pohjanmaa	Mafic volcanic rock	Apy, Po, Py	Not reported	Au-Sb	Orogenic	Lestinen et al. (1991)
Tervasmäki	5 m @ 1.3 ppm Au, 0.55% Sb	Pohjanmaa	Plagioclase porphyry	Sb, Apy	Not reported	Au-Sb	Orogenic	Oivanen (1982)
Timanttimaa	1 Mt @ 1 ppm Au	Pohjanmaa	Plagioclase porphyry	Po, Apy	Free native in Qz veins	Au	Orogenic	Kärkkäinen (1993b)
Välikorpi	1 m @ 10.3 ppm Au	Pohjanmaa	Interm. volcanic rock	Apy, Po	Native	Au	Orogenic	GTK unpublished data

Appendix 1. cont.

Deposit / Prospect (parallel name)	Size / Best sections	Geological district	Main host rocks	Main ore minerals[1]	Siting of gold[1]	Commo-dity associa-tion	Genetic type[2]	References
Ylijoki	7 m @ 1 ppm Au	Pohjanmaa	Greywacke	Apy, Po	Native	Au	Orogenic	Kärkkäinen (1992b)
Järvenpää	2.3 m @ 2.6 ppm Au, 0.8 % Cu, 0.8 % Zn; 1.6-3.4 m @ 1.0-2.2 ppm Au, 10.4-22.4 ppm Ag	Tampere	Intermediate volcanic rock	Py, Po	Ele with sulphides and Pb-Sb minerals, some as native and in Aust	Au-Ag-Cu-Zn	Epithermal?	Luukkonen (1994)
Lavajärvi (Pässärinvuori)	4 m @ 1 ppm Au	Tampere	Granodiorite, felsic volc rock	Py, Apy	Native with Apy in veins and host rocks	Au	Orogenic or intrusion-related	Lehto & Vuori (2006)
Lepomäki	13.8 ppm Au in outcrop grab sample	Tampere	Qz-Tour vein in volcanic rock	Apy, Po	Not reported	Au	Intrusian related	Lehto & Vuori (2006)
Metsäkylä	1 m @ 27.6 ppm Au	Tampere	Plagioclase porphyry	Apy, Cpy, Po	Free native	Au(-Cu)	Orogenic?	Lehto (2004b)
Paiskallio	0.5-2 m sections @ 0.16-62.9 ppm Au	Tampere	Amphibolite	Apy	Free native in Qz veins	Au	Orogenic	Rosenberg (2000b)
Pääjärvi	1 m @ 2.9 ppm Au with up to 3% Cu	Tampere	Mica schist		Not reported	Au-Cu	Orogenic?	Mäkelä (1981)
Tammijärvi	4.5 m @ 0.4 ppm Au and 0.84% Cu; 6 m at 0.92% W	Tampere	Greywacke		Mainly Ele with Bi, some native with Te	Au-Cu, W	Orogenic + skarn?	Luukkonen (1994)
Vatsa	7 m @ 6.5 ppm Au	Tampere	Gabbro	Apy, Py	Not reported	Au	Orogenic	William Resources (1997)
Stenmo (Bjensböle)	1 m @ 4 ppm Au	Uusimaa	Felsic(?) volcanic rock		Not reported	Au	Epithermal or orogenic	Lindroos & Ehlers (2005)
Iilinjärvi (lililammi)	45,000 t @ 30 ppm Ag, 4 ppm Au, 0.6 % Cu, 0.6 % Pb, 1.3 % Zn	Uusimaa	Felsic to intermed. volcanic rocks	Apy, Po, Py, Sp, Gn, Cpy, Tet	Not reported	Au-Zn-Cu-Ag-Pb	VMS or epithermal	Mäkelä (1989)
Pyhälammi	1.5 m @ 6.7 ppm Au, 0.01-0.12% Cu	Uusimaa	Quartz rock (chert?)		Not reported	Au-Cu	VMS or epithermal	Isomäki (1987)
Prospect, not drilled								
Kivenkorva	16.6 ppm Au in outcrop grab sample	Häme	Intermediate volcanic rock	Py, Apy	Not reported	Au	Orogenic?	GTK unpublished data
Kaakkolammi (Lastusenkulma)	4-7 ppm in outcrop grab samples	Pirkanmaa	Gabbro	Apy	Not reported	Au	Orogenic	GTK unpublished data
Valkeasuo	31-70 ppm in outcrop grab samples	Pirkanmaa	Granitoid	Cpy	Native in host rock and in Cpy	Au-Cu	Intrusian related	GTK unpublished data
Luikala	0.3 ppm Au in outcrop grab sample	Pirkanmaa	Mica gneiss	Ele	Visible gold in prehnite veins	Ag-Au	Post-orogenic?	Oivanen (1977)
Iiruunjärvi	Up to 55.5 ppm Au in boulders	Pohjanmaa	Intermediate volcanic rock		Not reported	Au	Orogenic	Laxström (2010)
Lehtimäki	3.7-3.9 ppm Au in outcrop grab sample	Pohjanmaa	Granitoid		Not reported	Au±Mo	Orogenic	Kärkkäinen (1991)
Orisberg	1.1-3.3 ppm Au in local boulders	Pohjanmaa	Amphibolite	Po, Apy	Not reported	Au	Orogenic	Kärkkäinen & Huuskonen (1992)

Appendix 1. cont.

Deposit / Prospect (parallel name)	Size / Best sections	Geological district	Main host rocks	Main ore minerals[1]	Siting of gold[1]	Commo-dity associa-tion	Genetic type[2]	References
Peurakallio	9.5 ppm in outcrop grab sample	Pohjanmaa	Tonalite	Apy	Not reported	Au	Orogenic	GTK unpublished data
Mickelsängs-bergen	1 m @ 1-2 ppm Au in channel samples	Uusimaa	Felsic or intermed volc rock			Au	VMS or epithermal	Isomäki (1987)

1) Alt = altaite, Apy = arsenopyrite, Aust = aurostibite, Bi = native bismuth, Cc = chalcocite, Cob = cobaltite, Cpy = chalcopyrite, Ele = electrum, Gn = galena, Grs = gersdorffite, Löl = löllingite, Mgt = magnetite, Qz = quartz, Po = pyrrhotite, Py = pyrite, Sb = native antimony, Sch = scheelite, Sp = sphalerite, Te = tellurides, Tet = tetrahedrite, Tou = tourmaline. Minerals are mentioned in the order of descending abundance
2) Orogenic: as defined by Goldfarb et al. (2001)
3) Only the mined amount is available.