

Electronic Appendix A. Description of the sampling sites, samples and zircons

Sampling site 1, sample PESA-2020-27.1 (A2568)

This sampling site is located in the Heinola area and is the northernmost of the study sites. The sampled rock represents a biotite paragneiss within the Häme migmatite suite. At the sampling site, the rock is gneissose and layered. The compositional variation in the rock plausibly represents pelitic and psammitic layers (10–15 cm). The rock is fine- to medium-grained and it has a grey weathering colour. Coarse-grained pegmatite occurs as dykes and melt patches in the paragneiss, but they are not found in the sample. The pervasive layer-parallel foliation has been folded by at least two folding events, where the youngest phase is characterized by steeply plunging to vertical parallel folds with steeply inclined to vertical NE–SW-trending axial surfaces. In thin section, the most abundant minerals of the rock are biotite, quartz, sillimanite, cordierite and plagioclase.

Zircons of sample A2568. Many zircons are somewhat fractured. They have an apparent detrital core and a narrow rim/overgrowth (thickness $\sim 1 \mu\text{m}$). Only a few grains have a prominent rim/overgrowth (thickness from a few μm to $>20 \mu\text{m}$). Most of the core domains are subhedral or nearly euhedral, but subrounded ones are also found.

Sampling site 2, sample PESA-2020-30.1 (A2569)

The sampling site 2 is located in the Orimattila area. The sampled rock represents biotite parashist within the Häme migmatite suite. The rock is fine grained and it has a grey weathering

colour. In the field, the paraschist includes possible andalusite pseudomorphs, but they are not found in the sample. The paraschist also includes coarse-grained dykes, which include at least quartz and possibly also feldspar, but these dykes are not found in the sample. At the sampling site, the paraschist displays two generations of folds, where the younger generation is seen as moderately to steeply W-plunging open folds. In thin section, the most abundant minerals of the paragneiss are quartz, biotite, plagioclase and cordierite.

No zircons could be extracted from sample A2569.

Sampling site 3, samples PESA-2020-31.1 (A2570) and PESA-2020-31.2 (A2571)

This sampling site is located in the Nurmijärvi area. Two samples were collected from the sampling site: the garnet-bearing paragneiss sample PESA-2020-31.1/A2570 and sample PESA-2020-31.2/A2571 from an intermediate dyke. The paragneiss belongs to the Häme migmatite suite. Microcline granite also crops out at this site.

Garnet-bearing paragneiss rock alternates with garnet-bearing microcline granite. Based on the field relationships, the granite is younger than the paragneiss. At the sampling site, the direction of main foliation is the same in both types of rocks, but its direction varies due to folding. The paragneiss is medium-grained and it has a grey weathering colour. The paragneiss is migmatitic, with granitic leucosome. There are also light-coloured pegmatite dykes in the paragneiss. The paragneiss sample also includes some leucosome and pegmatite. In thin section, the most abundant minerals of the paragneiss sample are feldspars and biotite. The amount of quartz is small. There are also garnet grains and cordierite in thin section. In the field, garnet is found in the paragneiss as large accumulations.

An intermediate dyke crosscuts the granite (**Fig. A-1**). The width of the dyke is ca. 1.5 m. The contact between the dyke and the granite has an approximate direction of 75°/180°. The dyke rock is fine- to medium-grained. It includes lighter coloured patches. These patches are also found in the sample material. In thin section, the most abundant minerals of the dyke are plagioclase, clinopyroxene, opaques and quartz.



Figure A-1. The contact between the granite and the dyke. Photo: Paula Salminen/Geological Survey of Finland. The length and the width of the compass are ca. 11.5 cm and 6.5 cm, respectively.

Zircons of sample A2570 (paragneiss). The zircons have an apparent detrital core and at least one rim/overgrowth (thickness usually from a few to $>20\ \mu\text{m}$), but in some grains they are weakly visible. The core domains have a subhedral, anhedral or subspherical shape.

Zircons of sample A2571 (dyke). The zircons in this sample typically appear fragmented and/or they have resorbed margins. Some have a subhedral or nearly euhedral shape, but there are also some relatively rounded grains. The grains, including the subspherical ones, show zoning.

Sampling site 4, sample PESA-2020-38.1 (A2577)

This sampling site is located in the Vihti area, within the area of the Häme migmatite suite. The sampled rock was interpreted as a paragneiss and it referred to as pyroxene-biotite paragneiss.

The paragneiss is fine- to medium-grained and it has a rusty weathering surface. In the field, the rock appears as a diatexite with preserved psammitic layers. Paragneiss, granite and pegmatite dykes are alternating at the site. The rocks display minor folds, with variably plunging fold axes and axial planar moderately ESE-inclined foliation. In thin section, the most abundant minerals of the paragneiss are biotite, orthopyroxene, plagioclase and quartz. In the field, the paragneiss includes garnet porphyroblasts. Some garnet is also found in the thin section.

Zircons of sample A2577. Most of the zircon grains have an apparent detrital core and at least one rim (thickness from $\sim 1\ \mu\text{m}$ to $>20\ \mu\text{m}$), but the rims are often only weakly visible. The core domains of these grains are often subspherical or anhedral, and at most subhedral. In addition, there are several needle-shaped grains, which also apparently have a narrow rim (thickness $\leq 1\ \mu\text{m}$). Some grains appear recrystallised/patchy and some grains are resorbed in the margins and/or fractured.

Sampling site 5, sample PESA-2020-37.1 (A2576)

This sampling site is located in Lohja within the area of the Häme migmatite suite. The rock is referred to as pyroxene–quartz–feldspar paragneiss in this study. In thin section, its most abundant minerals are plagioclase, quartz and clinopyroxene. The paragneiss has a grey weathering surface, and it is fine to small grained. Locally, it includes feldspar grains/clasts (1–3 mm in diameter) of uncertain origin. At the sampling site, the rock is gneissose and layered. Gently NE-plunging nearly upright tight F2 folding with spaced axial planar cleavage is characteristic for the sampled outcrop.

Zircons of sample A2576. The zircons have an apparent detrital core and one or more rims/overgrowths. The thickness of the rims varies from ~2 μm to >20 μm . The core domains are mainly subhedral or nearly euhedral. The zircons are somewhat fractured and sometimes also apparently resorbed in the margins. Some grains are apparently metamict.

Sampling site 6, sample PESA-2020-35.1 (A2574)

This sampling site is located in the Raasepori area. The rock represents biotite paragneiss, within the Kimito suite. The sampled rock is migmatitic/gneissose and layered. It also includes pegmatite veins. Some leucosome was also found in the collected sample, and the sample material for age determination also includes one thin (ca. 1–2 cm), layer-parallel pegmatite vein. The rock is fine- to medium-grained. In thin section, its most abundant minerals are quartz, biotite, plagioclase and cordierite. In the field, the rock includes garnet porphyroblasts. Some garnet grains are also found in thin section.

At the sampling site, layering and layer-parallel foliation have been folded by moderately SE-plunging nearly upright tight folds (F2) with penetrative axial planar foliation. Open to tight moderately SW-plunging folds (F3) with vertical spaced axial planar cleavage are also observed.

Zircons of sample A2574. Most of the zircons have an apparent detrital core and at least one rim/overgrowth (thickness ~1 to >20 μm). Some core domains are subhedral and some are subspherical, and some grains appear resorbed in the margins.

Sampling site 7, sample PESA-2020-36.1 (A2575)

This site is located in the Salo area. The sampled rock represents biotite paraschist within the area of the Kimito suite. At the sampling site, the paraschist includes minor pegmatite dykes and quartz patches. Locally, there are porphyroblasts, possibly of andalusite, but they were not found in the sample material. The schist is fine-grained and it has a grey weathering surface. It shows faint layering. Moderately NE-plunging open folds with a wavelength of a few metres and steeply inclined axial planar foliation are characteristic for this outcrop.

In thin section, the most abundant minerals are biotite and quartz. Tourmaline and opaques are also abundant. The amount of feldspars is small.

Zircons of sample A2575. The zircons typically have an apparent detrital core and a narrow rim (~1–2 μm), but a few have a more prominent rim/overgrowth (thickness from a few to >20 μm). The core domains are subhedral or subspherical. Most of the grains are fragmented/fractured and/or resorbed, and many grains appear recrystallised and/or patchy.

Sampling site 8, sample PESA-2020-32.1 (A2572)

This sampling site is located in the Särkisalo area in the municipality of Kemiö (Kimito). It is found in the area of the Kimito suite. In the bedrock map (Bedrock Map of Finland scale free, 2022), the sampling site is located within an area classified as biotite paragneiss, near the border with an area classified as quartz feldspar paraschist.

The rock is fine- to medium-grained and it appears somewhat granoblastic in thin section. The mineralogical examination of the rock revealed that it includes abundant quartz (perhaps even >70%) and notable amounts of amphibole and opaques. The rock also includes sulphides, at least sphalerite and pyrite. In the field, the rock includes garnet porphyroblasts, but garnet was not found in the thin section. There are few apparent feldspar grains, but despite this, the rock is named as *quartz-feldspar paraschist* in this study. Between the quartz grains, there are smaller mineral grains, which are difficult to identify; they probably include at least some feldspar and mica.

In the field, the rock has a rusty and slightly striped appearance and it is folded and schistose. The measured, intense main foliation (schistosity) has an orientation of 60°/125. Coarse-grained pegmatite is found as melt patches and small dykes in paragneiss, but pegmatite is not present in the sample.

Zircons of sample A2572. Only one zircon grain was extracted from the age determination sample of this site, and it is markedly fractured and angular.

Sampling site 9, sample PESA-2020-34.1 (A2573)

This sampling site is located in the area of the municipality of Kemiö (Kimito). The sampled quartz–feldspar paragneiss belongs to the Kimito suite. The rock has a light, brownish or reddish weathering surface and it is fine to medium grained. In the field, it shows faint layering. The rock locally includes apparent larger feldspar grains of uncertain origin. At the sampling site, the orientation of the pervasive, moderate or intense main foliation varies due to folding. In thin section, the most abundant minerals of the rock are quartz, feldspars and biotite.

Zircons of sample A2573. Only six zircons were extracted from this sample. Each zircon has an apparently detrital core and a narrow rim (~1–2 μm). Five of them have a euhedral/subhedral core domain, but one has a subspherical core domain. The zircons are fractured, and possibly also resorbed in the margins.

References

Bedrock of Finland scale free, 2022. Digital Map Database [Electronic Resource] (Referred in 19.12.2022). Geological Survey of Finland (GTK). Online-address: <http://hakku.gtk.fi>