The Bergby LCT-type granitic pegmatite field in the Ljusdal lithotectonic unit, central Sweden

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The Bergby LCT-type granitic pegmatite field is located in the Hamrånge area in the southeastern part of the Ljusdal lithotectonic unit. It is the most recently discovered lithium-rich granitic pegmatite field in Sweden. It was identified *in situ* in outcrops and by core drilling in 2016-17, some 10 years after the first find of a spodumene pegmatite boulder in the area, and nearly 200 years after the discovery of the element Li in the new mineral petalite from the island of Utö in the Stockholm archipelago. Since 2021, extensive boulder mapping and drilling by United Lithium, the current license holder, led to the discovery of several additional LCT-pegmatite swarms in the area.

The Bergby LCT-pegmatites are hosted in a metasupracrustal unit comprising mica schists, 1.89 Ga felsic to mafic metavolcanic rocks and quartzites with provenance ages between 2.7 and 1.85 Ga (Bergman et al. 2008). The metasupracrustal rocks were metamorphosed at c. 1.83 Ga in LP amphibolite facies, grading from the stability fields of andalusite in the east, to sillimanite in the west. These rocks have experienced several episodes of ductile deformation including early asymmetric folds and associated thrusts, which are in turn refolded to an easterly plunging synform (the Hamrånge synform) and sheared along wide, c. 1.81 Ga steeply dipping deformation zones (Högdahl et al. 2009), established at the limb of the latter. Granitic pegmatites, including LCT-type ones, within these late-Svecokarelian shear zones were variously affected by this deformation phase, which thus gives a minimum age of their emplacement. Other intrusions in the Hamrånge syncline that post-date peak metamorphism and folding are small granite, quartzmonzodiorite and gabbro intrusions.

Simple and barren granitic pegmatites are common in the western part of the area, whereas the LCT-pegmatites have this far only been identified in the most competent lithologies, represented by the mafic and intermediate metavolcanic rocks and the quartzite in the central part of the synform, overall covering an area of more than 50 km^2. They occur as swarms with individual dykes ranging in width from a few decimeters to more than 10 meters. The Li-ore mineralogy in the different dykes varies; some dykes host both spodumene and petalite, whereas others are seemingly only spodumene-bearing. In some dykes primary petalite is replaced by massive intergrowths of fine-grained spodumene and quartz, so called SQUI. With the present data at hand the LCT-pegmatite field appears to be zoned with dykes rich in petalite and with high Cs-Ta contents in the central part while low Cs-Ta and petalite-poor dykes occur at its margin. In addition to the main ore minerals petalite and spodumene, Li is also hosted by phyllosilicates including cookeite, amblygonite-montebrasite series minerals, tourmalines, and Mn-Fe±Li phosphates. Other minerals characteristic of highly fractionated LCT systems like pollucite and tantalite minerals have also been identified, but the Cs and Ta-Nb contents vary greatly in and between different dykes. Within the framework of the recently started ULiBS project based at Uppsala University, drill cores from Bergby are analysed by the Orexplore GeoCore X10 that conducts simultaneous XCT-XRF scans. Results from a spodumene-bearing pegmatite shows that the measured concentrations of this phase in the core and the calculated Li-contents correlate well (R^2=0.967-0.974) with ore assay data conducted on half-cores.

References

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