



*Nodular peridotite from the Kylmäkoski nickel-copper deposit with a layer of sulfides (light gray). Photo E. Halme.*

## PREFACE

This issue of the Bulletin of the Geological Society of Finland is devoted to nickel deposits and their host rocks.

The progress made in ore genetic studies on nickel deposits in Fennoscandia, and particularly in Finland, has taken place simultaneously with the exploration and exploitation of nickel deposits. Especially well known are the studies, based on the nickel deposits then being mined in Norway, that Vogt carried out at the beginning of this century on the genesis and geochemistry of nickel ores. During the last 20 years much basic research has been conducted in Finland on the geochemistry of nickel in Finnish ultramafites and on the geology of the ore deposits. International cooperation has been maintained through our partnership in the IGCP project No 91 «Metallurgy of the Precambrian». Of particular importance for studies on nickel ores is our involvement in the recently established IGCP project No 161 «Sulfide deposits in mafic and ultramafic rocks». This project is to meet in

Fennoscandia in the second «Nickel Sulfide Field Conference» in 1980 to which this issue is dedicated.

In addition to the Finnish contributions in this issue the imprint of Fennoscandia is given by Thompson, Nixon and Sivertsen who describe the recently discovered Vakkerlien Ni-Cu deposit in the Kvikne area, central Norway. Though evidently younger in age, the occurrence is highly metamorphosed and has geological features that are similar and well comparable to those of the Precambrian Ni-Cu deposits in Finland.

The most important Proterozoic Sveco-karelian Ni-Cu deposits in Finland are located in a roughly circular zone surrounding the central Finland batholith. Some areas on the circle seem to be particularly favorable for Ni-Cu occurrences; such as the areas of Nivala, Kotalahti, Haukivesi, Taipalsaari and Pori-Kylmäkoski, all of which contain several, roughly similar occurrences.

The Haukivesi area, southeast of Kotalahti, is characterized by a number of small uneconomic occurrences. The most prominent is the Laukunkangas deposit, which is described by Grundström in this issue. The Ni-Cu sulfides occur mainly in the ultramafic member. The intrusion exhibits cryptic layering produced by separate magma pulses.

Papunen and Mäkelä have studied the isotopical composition of sulfur in some of the Ni-Cu occurrences and found that the bulk of the sulfur has  $\delta^{34}\text{S}$  values close to zero suggesting a magmatic origin for the sulfides. Only mixing with the wall-rock sulfides and ceratin metamorphic processes have caused local variation in isotope composition.

Gaál has attributed the structure around the Kotalahti deposit to five successive deformation phases. The first two phases were Archean in age; the third phase is associated with the intrusion of sulfide-bearing ultramafic magma. Gaál also gives the isotopic ages of the rocks and presumes that, in addition to the granite gneiss dome east of the Kotalahti intrusion, the banded gneisses adjacent to the ultramafic complex are Archean in age. The ultramafic body is Proterozoic and  $1883 \pm 6$  Ma old.

Papunen describes the sulfide-bearing Kylmäkoski ultramafic body. Despite its small

size, the body is very similar to the sulfide-bearing metaperidotite portion of the Stormi ultramafic body. The nodular and orbicular varieties of the Kylmäkoski peridotite are unique in texture and appearance.

As host rocks of the Archean nickel deposits the ultramafic volcanics, especially the komatiitic rocks, have aroused lively discussion during the last decade. As an example from the Fennoscandian shield Hanski describes well-preserved komatiitic and tholeiitic ultramafic volcanics from the Archean Kuhmo greenstone belt in eastern Finland. Although the associated nickel occurrences are small and of low grade, the existence and description of this rock type offers a new potential in the study of nickel occurrences in the more intensely metamorphosed greenstone belts of eastern Finland and Lapland.

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*Heikki Papunen*