NOTE ON THE ALTERATION OF KYANITE IN THE ECLOGITES FROM THE NORDFJORD AREA, NORWAY

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Electron micro-probe investigations of two kyanite bearing eclogites from Kjöde, Selje, have shown spinel and plagioclase in a symplectite zone around kyanite.

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Lappin (1960) and later Bryhni (1966) have described the alteration of kyanite in eclogites from the Nordfjord area, Norway. They found an inner zone around the kyanite to consist of a plagioclase-corundum-symplectite and an outer zone to consist of plagioclase in the initial stages of alteration. The corundum was identified by Lappin by X-ray methods and the identification was later repeated by Bryhni. Electron micro-probe investigations of two kyanite bearing eclogites from Kjöde, Selje, have now shown spinel to be the main phase together with plagioclase in the inner symplectite zone around the kyanite. Corundum was not found.

The analyses of the inner reaction rim were rather difficult because of the fine-grained nature of the phases in the spinel-plagioclase symplectite. The composition determinations, as shown below, have been made on an area containing a fairly coarse-grained spinel-plagioclase symplectite. This eclogite sample has been taken from Eskola's (1921) original material by kind permission of Prof. H. Neumann, Oslo. The photo of the electron image and the distribution of Fe, Mg, Ca, Al and Ti in the analyzed area are shown in Fig. 1 and the phases present are sketched in Fig. 2. Fig. 3 shows the same type of reaction rims in another sample with lower magnification. The composition of the spinel was determined to be

$(Fe_{0.34}Mg_{0.69})\ Al_{1.92}Si_{0.04}O_4$

and that of the plagioclase around An_{40}. In the outer plagioclase zone a varia-

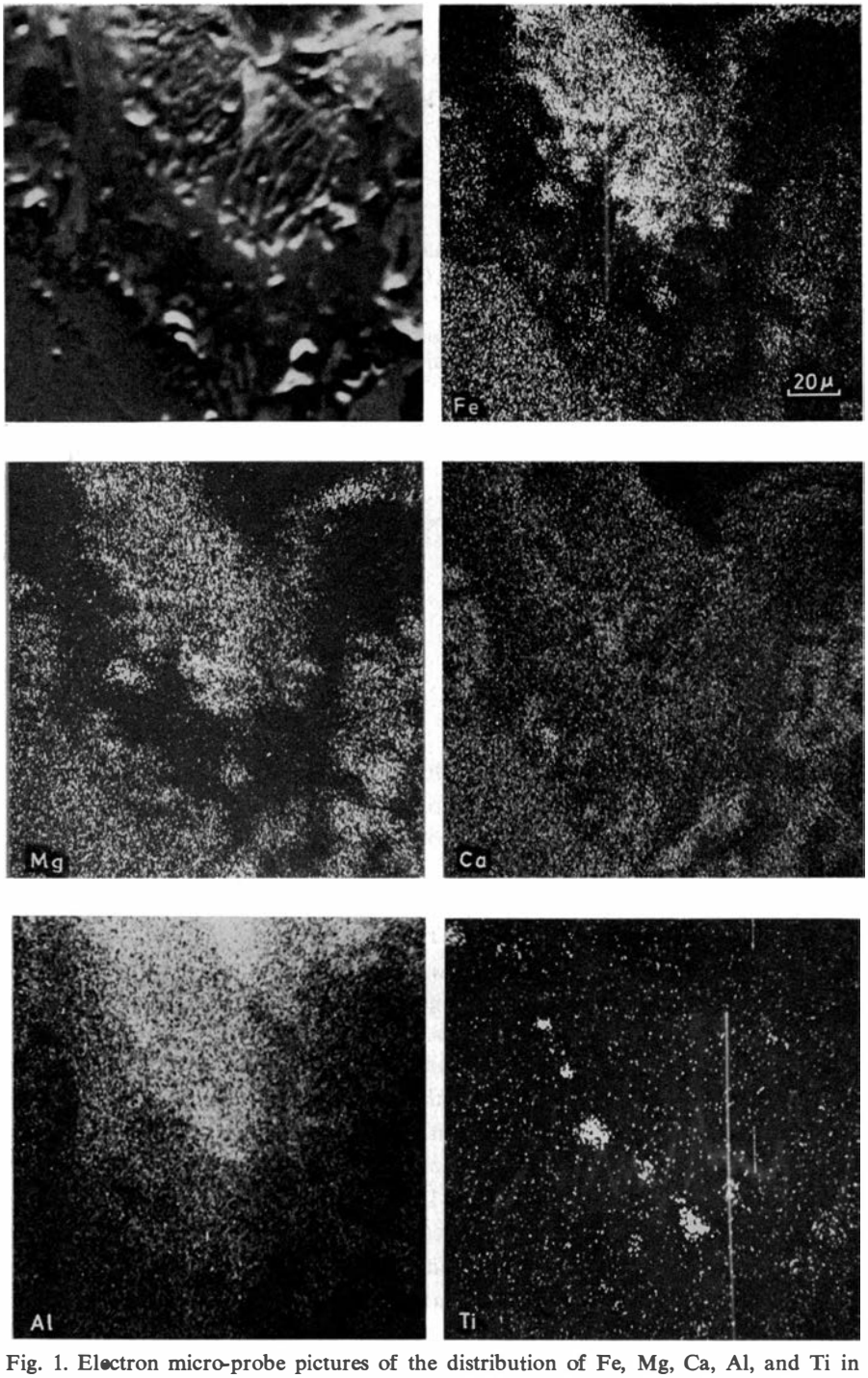

Fig. 1. Electron micro-probe pictures of the distribution of Fe, Mg, Ca, Al, and Ti in the investigated area in sample E 1, Kjöde, Selje. Photo of the electron image in the upper left corner. For explanation of the phases present, see Fig. 2.

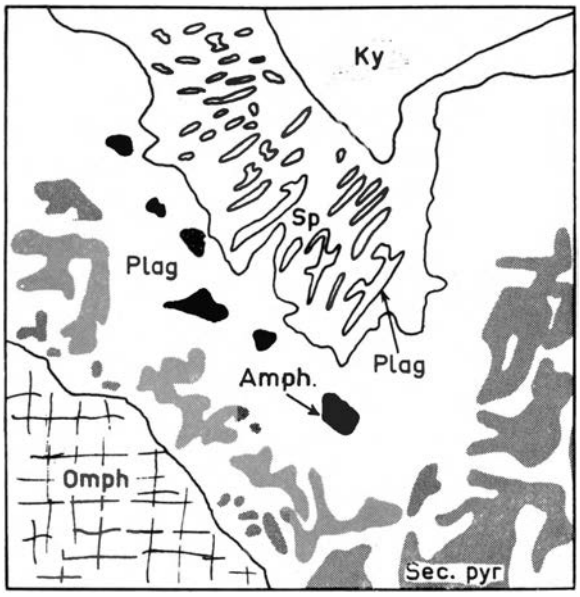

Fig. 2. Explanation of the phases present in Fig. 1. *Legend:* Ky = kyanite, Sp = spinel, Pl = plagioclase, Amph = amphibole, Sec. pyr. = residual pyroxene grain from the pyroxene-plagioclase symplectites, Omph = omphacite.

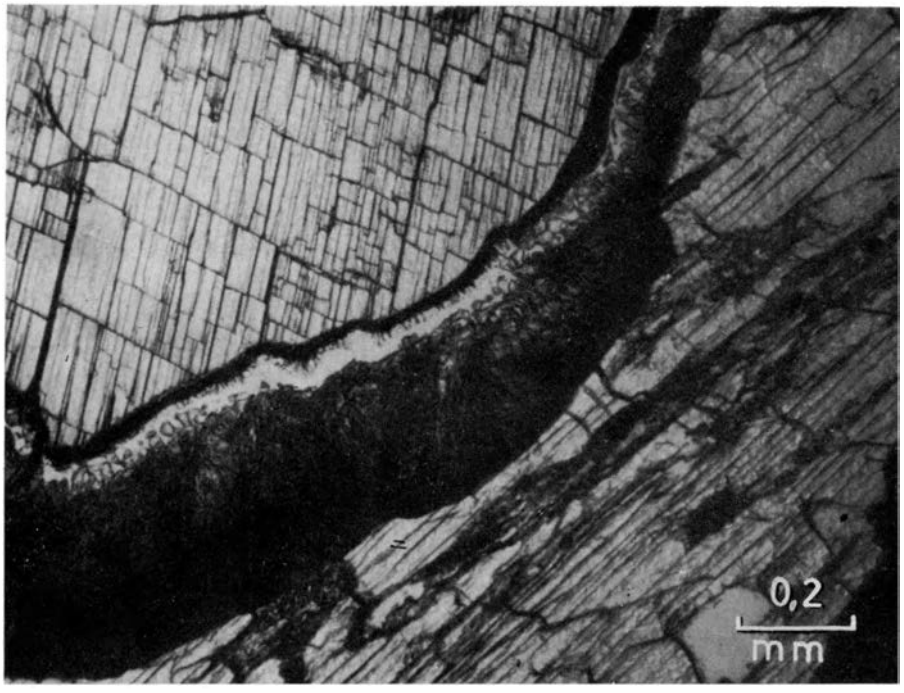

Fig. 3. Photo of a kyanite grain (in the upper left corner) surrounded by a black spinel-plagioclase symplectite, a clear plagioclase zone and a pyroxene-plagioclase symplectite. Omphacite in the lower right part of the photo. Sample 8015, Kjöde, Selje. One nicol.

tion in composition was found. Close to the spinel-plagioclase symplectite the composition was around An_{20}. This variation can be traced in Fig. 1 for the distribution of calcium in the plagioclase zone. The composition of the residual pyroxene grains of the original pyroxene plagioclase-symplectites was

$(Na_{0.18}Ca_{0.82})\ (Mg_{0.70}Fe_{0.09}Al_{0.22})\ Al_{0.05}Si_{1.95}O_6$

and the composition of the small amphibole grains within the plagioclase zone was determined to be

$(Na_{0.87}Ca_{1.59})\ (Mg_{2.81}Fe_{0.52}Ti_{0.29}Al_{1.14})\ Al_{1.48}Si_{6.52}\ (OH)_2$

(A correction has here been made for an abnormally high silica determination due to interference from the surrounding plagioclase.)
The composition of the unaltered omphacite was determined to be

$(Na_{0.40}Ca_{0.65})\ (Mg_{0.48}Fe_{0.09}Al_{0.46})\ Al_{0.05}Si_{1.95}O_6$

The reaction zones described have only been found in connection with the pyroxene-plagioclase symplectite formed by unmixing of omphacite. One kyanite grain was observed which was partly bordering some calcite grains. Here the outer plagioclase zone was absent. The pyroxene-plagioclase-symplectite is sometimes extensively consumed as shown in Figs. 1 and 2, but it is more often only partly dissolved as in Fig. 3.

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