

GENESIS OF ULTRABASIC-BASIC ROCKS («OPHIOLITES») OF NORTH HUNGARY

by

I. KUBOVICS

Petrological and Geochemical Department,
Eötvös University
1088. Budapest, Muzeum-krt 4/A. Hungary

ABSTRACT

Most of the researchers consider the ultrabasic-basic magmatites of North Hungary (Bükk Mountains) to be an ophiolitic complex. Nevertheless, on the basis of the comparative analyses of the igneous formations with the typical (South-European, from Asia Minor, etc.) ophiolites, considerable petrological-petrogenetic difference can be established. The most characteristic difference is shown in the change of FeO^+/MgO as a function of silica. Dissimilarly of the typical ophiolites, the FeO^+/MgO ratio decreases parallel and unambiguously with the increase of silica. Its highest value is found within the given sequence in certain ultrabasites (3 to 4). The oxidation degree is also considerably lower than in the ophiolites cited. On the basis of this as well as of the crystallization sequence it can be stated without doubt, that the ultrabasic-basic complex of North Hungary was produced by an «inverse crystallization

differentiation», i.e. during crystallization and simultaneously with the increase of total iron in terms of FeO (but dissimilarly of the «fractionated crystallization» deduced by Fenner) the concentration of silica was gradually decreased. Thus, the sequence of rock formation is as follows: diabase ($\text{SiO}_2 = 47,7\%$) gabbro ($\text{SiO}_2 = 45,0\%$), ultrabasite ($\text{SiO}_2 = 41-30\%$). Since the gabbro forms considerable masses, the average SiO_2 content of the complex remains below 46%. Under microscope it can be unambiguously established that first labradorite containing 56-52% SiO_2 was formed from the melt of diabase and gabbro. This was followed by the precipitation of different mafic constituents (augite, diallage, amphibole). The quantity of opaque minerals is relatively small, which shows higher concentrations rather in the subsequent magmatites. In harmony with calculations this is due to the low oxidation degree being insufficient to the crystallization of magnetite. As a result of this process, during crystallization the silica and alumina contents of the melt gradually decreased, while the FeO and TiO_2 concentrations increased which considerably lowered the crystallization temperature and promoted the crystallization capacity. This process produced the formation of ultrabasic rock masses of high FeO-content in the final phase of crystallization.

Thus, the conclusion can be drawn that the material of mantle origin of the North-Hungarian (Bükk Mountains) ultrabasites-basites protruded in the near-surface level or to the surface along deep faults. The rapid magma formation proved to be favourable to the increase of total iron content, the relatively short time restricted the release of the more strongly bound MgO, and decreased the possibility of oxidation. This process might reach approximately the state of the Red Sea in our days.