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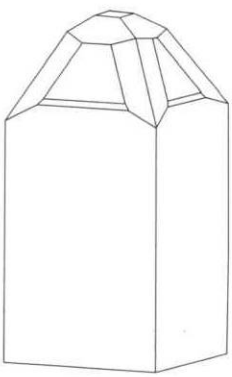

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CONTENTS

MINERALOGIA POLONICA – SPECIAL PAPERS
Volume 28, 2006

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ROCK-FORMING MINERALS OF LAMPROPHYRES FROM THE DITRĂU ALKALINE MASSIF, ROMANIA

INTRODUCTION

Lamprophyres are a group of alkali-rich igneous rocks containing essential amphibole and/or phlogopite with no feldspar or quartz phenocrysts. They typically form subvolcanic dykes, sills, plugs, stocks or vents (Rock 1991).

This paper reports new results on the mineralogy of lamprophyres, which were slightly discussed in former works of the Ditrău Alkaline Massif, Romania.

GEOLOGICAL SETTINGS

The Ditrău Alkaline Massif (DAM) is a Mesozoic alkaline igneous complex and situated in the S-SW part of the Giurgeu Alps belonging to the Eastern Carpathians (Romania). This body intruded into the pre-Alpine metamorphic basement complexes of the Bucovinian Nappe Complex located on the east side of the Culimani-Gurghiu-Harghita Neogene-Quarternary calc-alkaline volcanic arc, and took part in the Alpine tectonic events together with these metamorphic rocks (Pál-Molnár 2000). The centre of the DAM was formed by nepheline syenite, which is surrounded by syenite and monzonite. The northwestern and northeastern parts are composed of hornblendite, diorite (called Tarncia Complex, Pál-Molnár 2000), monzonite and alkali granite. The whole complex is cut by late-stage lamprophyre, alkali feldspar syenite and tinguaite dykes.

METHODS

Mineral compositions for six selected samples were determined by Cameca SX-50 electron microprobe at the Department of Earth Sciences, University of Uppsala, Sweden. Operating conditions were probe current of 15 nA and acceleration voltage of 20 kV. Representative results can be seen in Table 1.

RESULTS

The studied area is the northern part of the Orotva Creek, Ditrău Alkaline Massif. Samples were collected from nine natural outcrops of six creeks. Lamprophyres collected from Tarnica Complex (Orotva, Tászok, Fülöp and Gudu Creeks) crosscut hornblendites, diorites and syenitoids. Other lamprophyres from Török and Nagyág Creeks intersect granitoids. The dykes are 20cm to 2m wide. Contacts of the dykes with the wall rock are sharp. The lamprophyre dykes show

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felsic globular structures up to 11 mm in size. Their texture is typically panidiomorphic, porphyritic and at some places vitrous in contact zones.

Petrographic investigations show that DAM lamprophyres can be divided into two main groups: (1) Dark-grey, greenish-grey mafic (melanocratic) rocks, which are amphibole rich and plagioclase-bearing called camtonites (in all the studied creeks).

Table 1. Representative diopside, amphibole and phlogopite compositions from the DAM lamprophyres.

Mineral	diopside	diopside	krs	hs	eck	phl	phl	phl
Rock-type	campt.	vog.	campt.	campt.	vog.	campt.	campt.	minette
Locality	Tarncia Complex	Nagyág Creek	Tarncia Complex	Török Creek	Nagyág Creek	Tarncia Complex	Török Creek	Török Creek
SiO_2	46.12	47.21	38.49	39.44	52.89	35.70	34.99	38.08
TiO_2	2.14	1.97	6.67	1.89	0.00	1.66	2.44	0.27
Al_2O_3	7.05	6.49	13.55	12.11	1.73	14.69	15.53	16.62
FeO^t	7.19	7.68	10.46	19.48	22.99	17.05	20.51	9.59
MnO	0.09	0.15	0.11	0.41	0.92	0.14	0.27	0.66
MgO	12.91	13.13	12.02	8.69	3.34	13.71	11.61	16.77
CaO	21.85	22.19	11.87	11.79	6.79	0.30	0.00	0.00
Na_2O	0.73	0.60	2.55	1.98	9.59	0.00	0.06	0.03
K_2O	0.00	0.00	1.01	1.75	0.00	9.40	9.59	10.08
Total	98.12	99.45	96.79	97.57	98.29	92.76	95.02	92.13
mg#	-	-	0.67	0.49	0.20	0.60	0.50	0.76

t – total Fe as FeO; mg# - Mg/(Mg+Fe); krs – kaersutite, eck – eckermannite, hs – hastingsite, phl – phlogopite, campt. – camptonite, vog. – vogesite

(2) Two varieties of less mafic, light-grey, intermediate (mesocratic) rocks: *(a)* phlogopite and K-feldspar rich minettes (Török Creek); *(b)* amphibole and K-feldspar rich vogesites (Nagyág Creek).

Camptonites from Tarnica Complex carry aluminian subsilicic ferroan diopside ($Ca_{0.9}Mg_{0.7}Fe_{0.2}Al_{0.26}Si_{1.73}O_6$) phenocrysts (Fig. 1A), reddish-brown kaersutite, subordinate strongly magnesian annite to phlogopite microphenocrysts up to mg# = 0.73 (Fig. 1B) and interstitial plagioclase (An_{04-34}). Kaersutites occur as euhedral groundmass minerals with up to 6.6 wt.% TiO_2 (Table 1). Camptonites from Török and Nagyág Creek have only groundmass minerals with no phenocrysts. The groundmass consist of elongated magnesian hastingsite crystals (mg# = 0.49-0.55) displaying preferred orientation due to magma flow, annite (Fig. 1B) represented by small crystals with moderate mg# (0.47-0.50) and interstitial plagioclase (An_{05-16}). Apatite, titanite and magnetite are common minor phases in the studied camptonites. Secondary phases are tremolite to actinolite, pycnochlorite, muscovite and allanite-(Ce).

Minettes from Török Creek contain andradite phenocrysts, phlogopite (mg# = 0.70-0.76) (Table 1; Fig. 1B), nearly pure albite (An_{01}), K-feldspar (Or_{97}) and

haüyne in the groundmass. The Ti-bearing andradites are surrounded by secondary phlogopite, pycnochlorite and magnetite. Feldspars are strongly sericitized. Other secondary phases are calcite and epidote.

Vogesites from Nagyág Creek carry diopside phenocrysts (Fig. 1A), ferro-eckermanite (FeO^t 21-26 wt.%), ferrorichterite (FeO^t 20.5 wt.%), small amount of phlogopite (mg# = 0.50-0.67), pure albite (An_{00}), K-feldspar (Or_{96}) and haüyne in the groundmass. Accessory minerals are apatite, titanite, magnetite and zircon in vogezites and minettes as well.

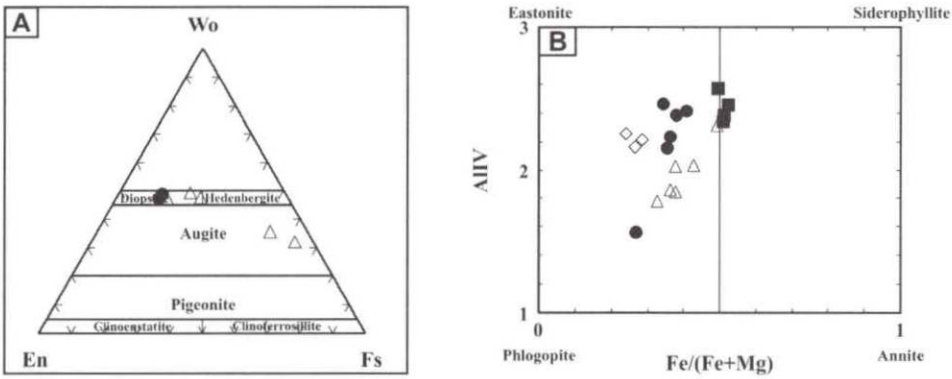

Fig. 1 Variations in composition of (A) clinopyroxenes and (B) dark micas from the DAM lamprophyres; ● camptonites – Tarnica Complex, ■ camptonites – Török and Nagyág Creeks; ◇ minettes – Török Creek; △ vogesites – Nagyág Creek

CONCLUSIONS

The main rock-forming minerals in the studied camptonites, minettes and vogesites which are considered to be primary are dark micas close to phlogopite composition, kaersutites rich in Ti, magnesian hastingsites, eckermanites and richterites rich in Fe, Al-, Fe-bearing diopsides, Ti-bearing andradites, intermediate plagioclases and alkali feldspars. The mineral compositions show similarities from individual rock types within the whole area with only weak regional differences.

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