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MIOCENE PYROCLASTICS IN THE PAZSAG-VALLEY, BÜKK-MOUNTAINS, HUNGARY

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ABSTRACT

The Miocene acidic pyroclastics of the Bükk-Mountains are first of all limited to the marginal parts of the mountains. Only a few small-size disaggregated occurrneces can be found in its central mass. New outcrops were found near the Pazsag- and Hosszú-valleys, beside the foresty road, overlying middle-upper Triassic grey, cherty limestone and argillaceous slate. The pyroclastic material deposited on terrestrial area contains spherical concretions formed around grains of pumice. It has dactitc composition dated about 16 Ma. by K-Ar method.

INTRODUCTION

The rhyolitic tuffs of the Bükk-Mountains have been described first of all from the marginal parts of the mountains. In the central mass of the mountains only a few, decomposed small-size outcrops have been mentioned. BALOGH (1964) found some remains of decomposed tuffs lying south of Nagy-Ökrös. In the karstic holes of the mountains there are some eroded tuffites near Csipkéskút (BALOGH 1957) and Mélysárbérc (JÁMBOR 1961). Based on foraminifers the latters are marine sediments and were deposited in the Middle Miocene.

GEOLOGICAL SETTING

The new outcrops discussed in this study can be found west of Répáshuta, beside the foresty road in Pazsag-valley (*Fig. 1.*). The tuff can be traced in four, morfologically separated plain area of 100—200 m in diameter. At (1) and (3) (*Fig. 1*) there are only fragments of tuffs, while at (2) and (4) real outcrops can be seen. In the case of (1), (2) and (3) the tuff has been preserved in the tectonically preformed karstic dolines of triassic cherty limestone. At the outcrop (4) the tuff is deposited on dark-grey, cross-lamination aleuritic shale. The contact is covered in every case. The tuff is unstratified, but at (2) it has a banked form (*Fig. 2*).

PETROLOGICAL EXAMINATIONS

The studied pyroclastic is a greyish-white, non-decomposed, hard rock. Its main mass consists of fine-grained slightly molten fragments of volcanic glass.

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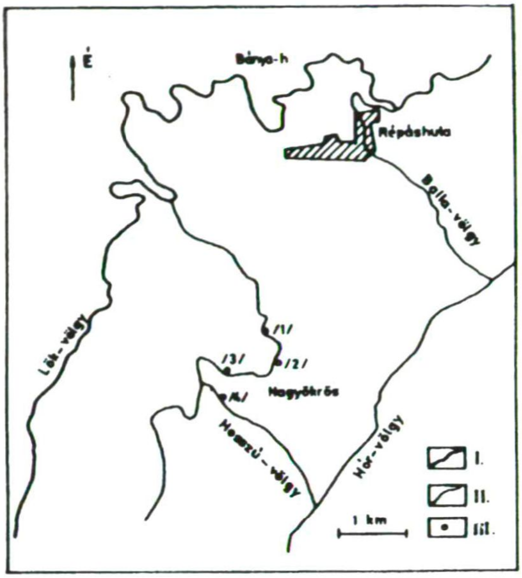

Fig. 1. A sketch about the rhyolite tuff outcrops. Explanation: I. Outcrop locality, II. Road Eger-Miskolc, III. Forestry roads

Fig. 2. Banked dacite tuff in the outcrop

The sizes of the quartz, slightly decomposed felspars and fresh biotite crystals are up to 2 mm. Besides the fragments of crystals it contains dark-grey shale xenoliths of 2—4 mm and flattened pumices of 1—8 cm.

The microscopic texture is vitroclastic, in some places vitro-crystalloclastic. The matrix consists of partially molten fragments of volcanic glass, and it is slightly recrystallized. The sizes of volcanic glass fragments change between 20—150 μ, concave forms are abundant. There are some spheroid-like forms among them. The contours of the glassy fragments are dim, and zeolite, crystobalite and a small amount of clay minerals were formed by the transformation of the matrix. Among the crystal fragments of 0,5—2 mm, the dominant one is the plagioclase (8%), frequently twin-laminated, in some cases it has a zonal structure and its composition is oligoclase — andesine. The fragments of quartz (3%) have a resorption rim in many cases, gas inclusions are frequent. The biotites (4%) are fresh and have pleochroism, in some places — mainly in pumices-underwent a chloritic decay. The amount of the potassium felspars in negligible. Accessory minerals are apatite (80 μ), amphibole (200 μ), zircon (50 μ). The pumice stones are flattened, their piped structure can be noticed as fine fibres. In some cases they have a plastic deformation, the marginal parts are molten, there is no sharp contour to the matrix. Their size extends from 300 μ to a few cm. As xenoliths some fragments of argillaceous shales can be seen (*Fig. 3—6.*).

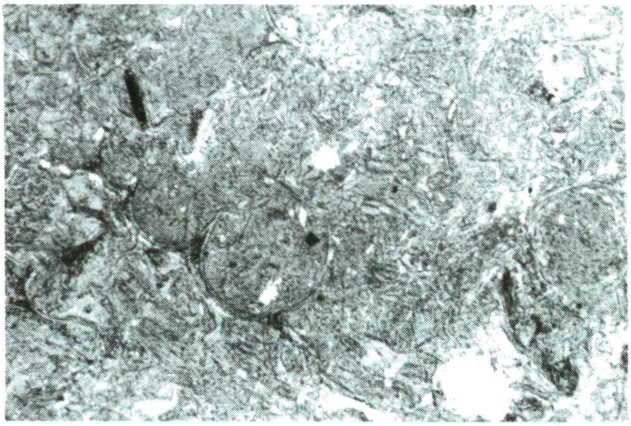

Fig. 3. Slightly baked glassy matrix with spheroid initiatives, plastically deformed glass fragments (N+, 20x)

The data of X-ray diffraction confirm the above mineralogical composition. The microscopically observed zeolite proved to be clinoptilolite (Table 1.). The results of the differential thermal analysis are in conformity with the above ones (*Fig. 7.*). The spectroscopic analysis shows that the distributions of trace elements in the dacitic tuffs from the Pazsag-valley and Hosszú-valley are the same (Table 3.); the amount of Ba, Sr, Zr is higher than their clarke. The Ba and Sr may be hidden in the felspars and volcanic glass, the Zr can be connected to the accessorial zircon.

Based on the chemical analysis (Table 2.) and the results of the other examinations the pyroclastics can be named as dacitic tuff. The well-preserved rock, the low grade of decay, the lack of terrigenous fragments and fossils suggest that the pyroclastics were accumulated on land.

In the area of the outcrops (1) and (2) a special feature of the rock is the tuff envelopment around the pumice-cores (*Fig. 8.*). There is no mention of similar phenomena in the Hungarian references. The so-called tuff-pellets, which are tuff

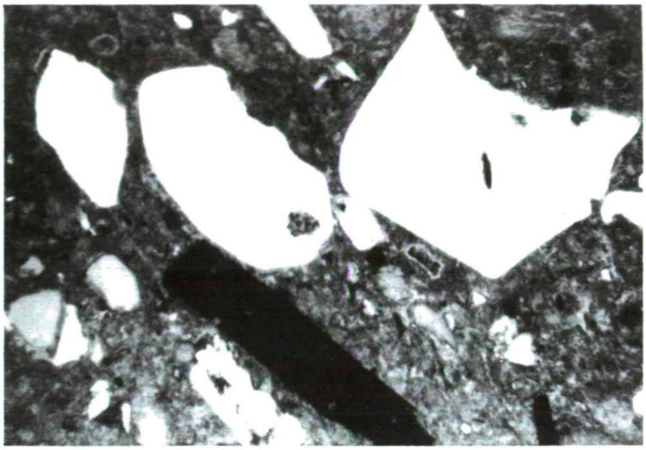

Fig. 4. Oriented plagioclase, biotite and quartz in glassy matrix indicating an ignimbrite character (N+ , 20x)

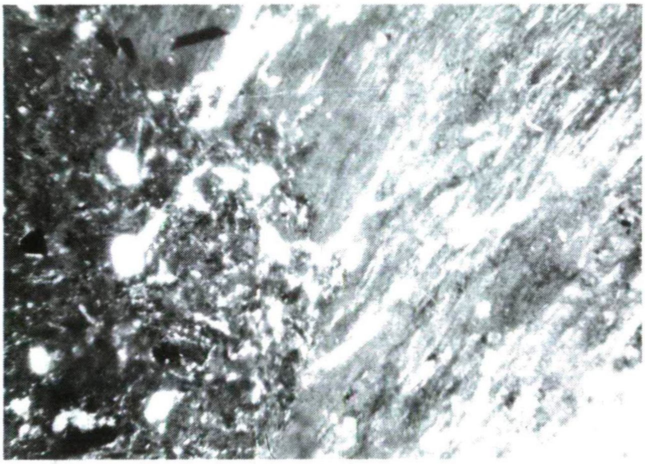

Fig. 5. Pumicite-matrix contact (N+, 20x)

concretions with a decreasing grainsize outwards and a diameter of 3-15 mm are frequent in the Hungarian rhyolitic tuff levels. Their origin is explained as a result of post volcanic activity (KORIM 1951), as rolling of small cores in volcanic dust-cloud (PANTÓ 1962), or accretion of fine volcanic dust and water vapour condensed on bigger grains (RADÓCZ 1976). The above "pellets" are different from the tuff-balls in the examined area. The main differences are the presence of pumice-cores, the bigger size (2—12 cm) and the similar texture of the balls and their surroundings (conversely, the tuff-pellets are fine-grained dust-globules in coarser-grained tuff). The balls are not fixed to definite levels, they are frequent in the outcrops and can be noticed as separated pieces among rock fragments. They are harder and more resistant than the tuff itself (in the wall of the outcrop they stand outer than their surroundings). The piped structure of the pumice-cores was

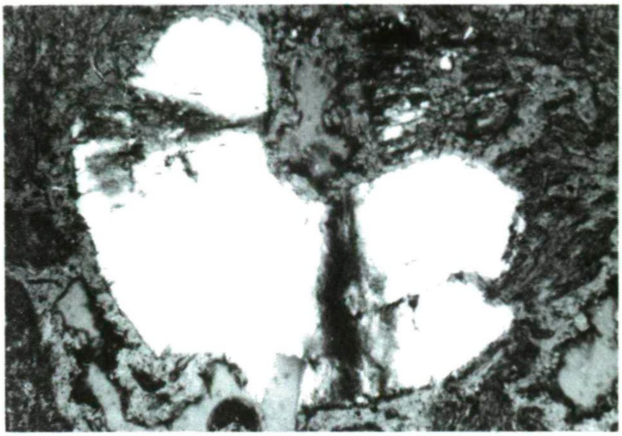

Fig. 6. Radial chalcedony in a matrix with glassy fragments (N+, 30x)

reduced because of the high temperature. The smaller pumices (few mm) have no tuff envelopes. These facts corroborate that the tuff-balls are spheroids formed by the slower cooling around the pumice-cores which have a higher heat-reserve than the fine graind crystal- and glassy fragments.

Similar tuff-balls can be observed NE of Felsőtárkány, in the area of the "Burdigalien" (BALOGH 1964) rhyolite tuff.

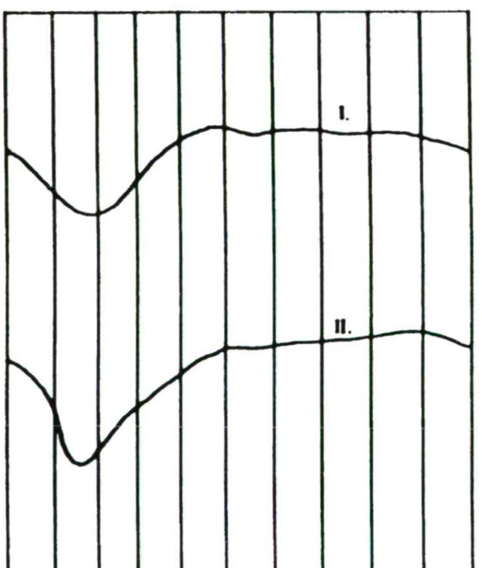

Fig. 7. DTA curves of the samples from the Pazsag-valley (2), (T) and Hosszú-valley (4) (II.)

Data of X-ray diffraction

dA	I/I0		dA	I/I0	
9.983	85	B	10.155	15	B
8.936	60	Cl	9.092	51	Cl
7.907	9	Cl	7.950	10	Cl
6.753	6	Pl, Cl	6.753	8	Pl, Cl
5.136	7	Cl	5.901	4	
5.041	8	B	5.267	10	Cl
4.667	8	Pl, B, Cl	5.136	10	B, Cl
4.271	35	Q	4.667	14	Pl, B, Cl
4.068	20	Kr	4.227	40	Q
3.948	58	Pl, B, Cl	4.064	85	Kr
3.737	3	Pl, Cl	3.969	100	B,C
3.633	1	Pl, B	3.790	16	Pl, Cl
3.559	5	Cl	3.635	4	Pl, B
3.413	15	Pl, B	3.445	23	Pl, B
3.343	100	Q, B, Cl	3.338	42	Q, B, Cl
3.194	22	Pl	3.210	45	Pl
3.131	5	Kr, Pl, B, Cl	3.124	8	Kr, Q, B, Cl
2.976	25	Pl, Cl	2.996	40	Pl, Cl
2.803	10	Kr, Cl	2.847	2	Kr
2.731	5	B, Cl	2.803	10	Cl
2.513	12	Pl, B	2.748	2	B
2.445	5	Q, B, Cl	2.583	8	B
2.136	3	Q, B	2.523	4	Pl
2.013	3	Q, B	2.490	8	Kr
1.932	2	B	2.174	4	B
1.826	1	Q	2.018	3	B
1.658	2	Q, B	1.961	3	Q, B
1.541	30	Q, B	1.801	8	Q
1.451	2	Q	1.542	1	Q, B

(1) Dacite tuff, Pazsag-valley. (2) Dacite tuff, Hosszú-valley. Examinations were made at the Department of Mineralogy, ELTE. Explanation: Q=quartz ASTM 5—490; B=biorite ASTM 3T, ASTM 10—492; Pl=plagioclase ASTM 10—360; Kr=Chrystobalite ASTM 11—695; Cl=clinoptiolite ASTM 22—1236

TABLE 2

Data of chemical analysis

	1.	2.
SiO_2	66.17 %	66.87 %
TiO_2	0.30 %	0.08 %
Al_2O_3	11.22 %	12.88 %
Fe_2O_3	1.03 %	1.31 %
FeO	0.88 %	0.44 %
MnO	—	—
MgO	1.81 %	1.41 %
CaO	3.08 %	2.04 %
Na_2O	1.03 %	0.85 %
K_2O	2.15 %	3.90 %
H_2O^+	6.16 %	6.00 %
H_2O^-	4.49 %	4.04 %
P_2O_5	—	—
SO_3	—	—
CO_2	0.21 %	0.17 %
Sum.	98.53 %	99.99 %

(1) Dacite tuff, Pazsag-valley; (2) Dacite tuff, Hosszú-valley. Analyser: BOBÁLY J. ans SÜTŐ Z., OFKFV, Central Laboratory.

TABLE 3

Trace element's data

	1.	2.
Ag	—	—
As	—	—
B	100	100
Ba	1200	1200
Be	—	—
Bi	—	—
Cd	—	—
Cr	100	100
Co	—	—
Cu	40	40
Ga	10	10
Ge	—	—
In	—	—
La	—	—
Mn	800	800
Mo	—	—
Nb	—	—
Ni	—	—

	1.	2.
Pb	—	—
Sb	—	—
Sc	—	—
Sn	—	—
Sr	1200	1200
Tl	—	—
V	50	50
W	—	—
Zn	—	—
Zr	1200	1200
Y	—	—

(1) Dacite tuff, Pazsag-Valley. (2) Dacite tuff, Hosszú-valley. Analyser: KÁDAS M. OFKFV, Komló, Central Laboratory. PGS-2. Q-spectograph.

Fig. 8. Tuff balls with pumice-cores. Pazsag-valley.

DATING EXAMINATIONS

In order to clearing up the genetical connection between the discussed tuffs and the other acidic pyroclastics in the Bükk Mountains, BALOGH, KADOSA did radioactive measurements to determine the age of the tuffs.

The results are as follows:

Place of occurrence	Examined K cont. fraction (%)	$\frac{^{40}Ar_{rad}}{^{40}Ar_{tot}}$	$\frac{^{40}Ar_{rad}}{(cm^3/g)}$	K-Ar age (Ma.)
Pazsag-valley (2)	biotite 6.29 felspar 0.56	0.39 0.058	$3.979 \cdot 10^{-6}$ $2.205 \cdot 10^{-7}$	16.2±0.8 10.2±2.5
Hosszú-valley (4)	chloritic 5.76 biotite	0.13	$3.638 \cdot 10^{-6}$	16.2±1.8

Based on these data the examined dacitic tuff can be correlated to the so-called "mid-rhyolite tuff".

The dacite tuff of ignimbrite character accumulated on land, proves that the Bükk Mountains were in an emerged position in the middle of the Miocen.

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