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A BOULDER OF ORBICULAR ROCK FROM REPLOT (RAIPPALUOTO), WESTERN FINLAND

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A boulder of orbicular rock in Panike, Replot (Raippaluoto, see map sheet 1332 02, x = 7023,82, y = 507,96) was found by Dr. Alf Björklund in connection with exploration undertaken by Outokumpu Oy. The whole boulder, which measured some $90 \times 70 \times 40$ cm, was later transported to the outdoor museum of the Geological Survey of Finland. Study of the vicinity of the boulder did not reveal any other orbicular rocks. This was not surprising, because the well rounded shape of the boulder indicated fairly long glacial transport, the source area thus being on the sea bottom or in the archipelago NW of Replot.

The bulk composition of the rock is quartz dioritic. The chemical composition of the rock is given in Table 1. In the computation of the CIPW norms, the total iron (as Fe_2O_3) was divided according to the equation given by Le-Maitre (1976) for plutonic rocks.

The orbicules of the rock are some seven cm in diameter and densely packed (Fig. 1). Point counting on some photographs shows that the proportion of matrix is 27 % and that of orbicules 73 %. Mechanical deformation following the development of the orbicular structure has not been observed.

The rather coarse-grained matrix consists of plagioclase (An 30) with some scattered grains

of biotite and quartz. It also includes finegrained biotite-rich fragments that are very similar to the outer shells of the orbicules.

The orbicules vary somewhat in shape. The most complete ones have a core consisting almost entirely of plagioclase and about six concentric shells. Figure 2 shows a typical orbicule with a few contrasting shells. The diameters of the cores vary from 10 to 40 mm. Some orbicules have a small biotite-rich xenolith in the centre of the core. The innermost shell is usually 15 to 20 mm thick and fairly homogenous. Its main minerals are plagioclase biotite and

Table 1. The chemical and normative composition of the orbicular rock from Replot (Raippaluoto). 1. XRF analyses (wt %) by V. Hoffrén, 2. CIPW weight norms computed from the analytical data.

1.		2.	
SiO ₂	62.14	Q	12.89
Al_2O_3	19.31	C	1.20
Fe_2O_3 tot.	4.50	or	8.69
MgO	0.98	ab	48.32
CaO	4.08	an	20.20
Na ₂ O	5.63	hy	4.86
K ₂ O	1.45	mt	2.28
MnO	0.00	il	1.44
TiO ₂	0.75	ap	0.12
P_2O_5	0.50		
	98.89		



Fig. 1. The boulder of orbicular rock from Replot (Raippaluoto) 1 : 8 of nat. size. Photo Erkki Halme.

Fig. 2. A typical orbicule of the Replot (Raippaluoto) orbicular rock. 1 : 1 of nat. size. Photo Erkki Halme.

quartz. The outer shells, five or fewer in number, are altogether seven to 10 mm thick; two or three of them are fine grained and rich in biotite. Between them there are very thin shells consisting almost entirely of plagioclase. The anorthite content of the plagioclase in the cores, shells and matrix is about 30 % and does not show any systematic variation. The biotite grains in the shells do not display radial or concentric orientation. Accessory minerals of the rock are apatite, zircon, sphene, potassium feldspar, chlorite and opaques. The authors favour a magmatic origin for the rock concerned. Plagioclase forms a nucleus in the orbicules and was the first mineral to crystallize in the melt. The next were biotite and light constituents, which crystallized under specific conditions. Owing to the paucity of material and geological observations, however, the origin of the orbicular structure has not been established.

At present about 50 occurrences of orbicular rocks are known in Finland. The Replot rock resembles most closely the orbicular rocks of Hankasalmi (Sederholm 1928). Finnish orbicular rocks vary substantially in composition, shape and structure, as can be seen in the mineralogical museum of the Geological Survey of Finland, where samples of nearly all of these rocks are housed.

References

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