LARGE PEBBLES (BOULDERS) IN THE GRAVELS OF THE COTMEANA PIEDMONT

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Abstract. During the field researches, the pebbles of the Cotmeana Piedmont gravels were described using the following terms: boulders, for pebbles with dimensions of 20-50 cm, coarse gravels, with pebbles of 10-20 cm, gravels, with pebbles of 3-10 cm, small gravels, with pebbles of 1-3 cm and fine gravels, with pebbles under 1 cm. Boulders were found in 21 observation points, 8 on the north-eastern edge of the piedmont and 13 on its western edge. By order of frequency, the petrographic types of boulders are quartzo-feldspathic gneisses, quartzites, siliceous rocks, quartz, pegmatites, amphibolites, eclogites, augen-gneisses, red sandstones, rhyolites, granites and granodiorites. Specific for the western zone are the red sandstones, amphibolites and jasper boulders. Boulders of rhyolites and augen-gneisses appear only in the north-eastern zone. The presence of boulders in the north-eastern part of the piedmont is explained by the proximity of this zone to the Subcarpathian and Carpathian source areas, but their presence in the south-western zone is somewhat surprising, this zone being further from these source areas. The boulders along the western edge represent the clastic material input of a torrent river with high transport power (the Olt paleo-River).

Keywords: Cotmeana Piedmont, gravels, boulders.

Rezumat. Galeți mari (bolovani) în pietrișurile Piemontului Cotmeana. În timpul cercetărilor de teren, galeții din pietrișurile Piemontului Cotmeana au fost descriși cu următorii termeni: bolovani - pentru galeții cu dimensiuni de 20-50 cm, pietrișuri grosiere - cu galeți mari de 10-20 cm, pietrișuri - cu galeții de 3-10 cm, pietrișuri mărunte - cu galeții de 1-3 cm și pietrișuri fine - cu galeți sub 1 cm. Bolovanii au fost întâlniți în 21 de puncte de observație, 8 pe marginea nord-estică a piemontului și 13 pe marginea sa vestică. În ordinea frecvenței, tipurile petrografice de bolovani sunt: gnaise cuarțo-feldspatice, cuarțite, roci silicioase, cuarț, pegmatite, amfibolite, eclogite, gnaise oculare, gresii roșii, riolite, granite și granodiorite. Specifici pentru zona vestică sunt bolovanii de gresii roșii, amfibolite și jaspuri. Bolovanii de riolite și gnaise oculare apar doar în zona nordică. Prezența bolovanilor în zona nord-estică piemontului se explică prin proximitatea acestei zone față de ariile sursă carpatică și subcarpatică, dar prezența lor în zona sud-vestică este oarecum surprinzătoare, aceasta fiind departe de ariile sursă. Bolovanii din lungul marginii vestice reprezintă aportul de material clastic adus de un râu cu putere mare de transport (paleo-Râul Olt).

Cuvinte cheie: Piemontul Cotmeana, pietrișuri, bolovani.

INTRODUCTION

The Cotmeana Piedmont is the subunit of the Getic Piedmont delimited by the Argeș River, to the east, the Topolog River, to the northeast, and the Olt River, to the west. To the east it borders with the Cândești Piedmont and to the west with the Olteț Piedmont. The Cotmeana Piedmont consists of torrential deposits of gravels, Lower Pleistocene in age, known in the geological literature under the lithological term of Cândești Gravels (PARASCHIV, 1965) and the stratigraphic term Cândești Beds (GHENEA et al., 1971). The gravels are poorly sorted, so that gravels of various sizes, boulders and sands can be frequently found in the same outcrop (Fig. 1).

Simplifying for practical reasons the Wentworth size scale, the gravels of the Cotmeana Piedmont were described in the field with the following terms: boulders, for the pebbles with dimensions of 20-50 cm, coarse gravel, with pebbles of 10-20 cm, gravels, with pebbles of 3-10 cm, small gravels, with pebbles of 1-3 cm, and fine gravel, with pebbles under 1 cm. Boulders also appear in the Cândești Piedmont (PARASCHIV, 1965; GHENCIU & STELEA, 2016). The first quoted author considers that the boulders in this piedmont represent a marker level, with stratigraphic connotation, which is not confirmed by the other two quoted authors. The Olteț Piedmont consists of deposits of only sands and fine gravels, which can be explained by a preferential deposition of the clastic material carried by the torrent corresponding to the present Olt River.

BOULDERS IN THE GRAVELS OF THE COTMEANA PIEDMONT

The boulders in the gravels of the Cotmeana Piedmont were found in 21 observation points, 8 points on valleys on the north-eastern margin of the piedmont and 13 points on valleys on its western margin, west of the present water divide in the piedmont (Fig. 1). In each observation point, the petrographic types of boulders were registered in the order of the occurrence frequency. The siliceous rocks (a term synonymous with that of silicolites) of red colour were registered as jaspers and those of other colours, usually yellow-brown, were registered as yellow-brown silicolites. On the valleys with frequent observation points, the case of the Mare Valley in the western part of the piedmont (Fig. 1), the petrographic types of boulders were not registered in all the observation points.

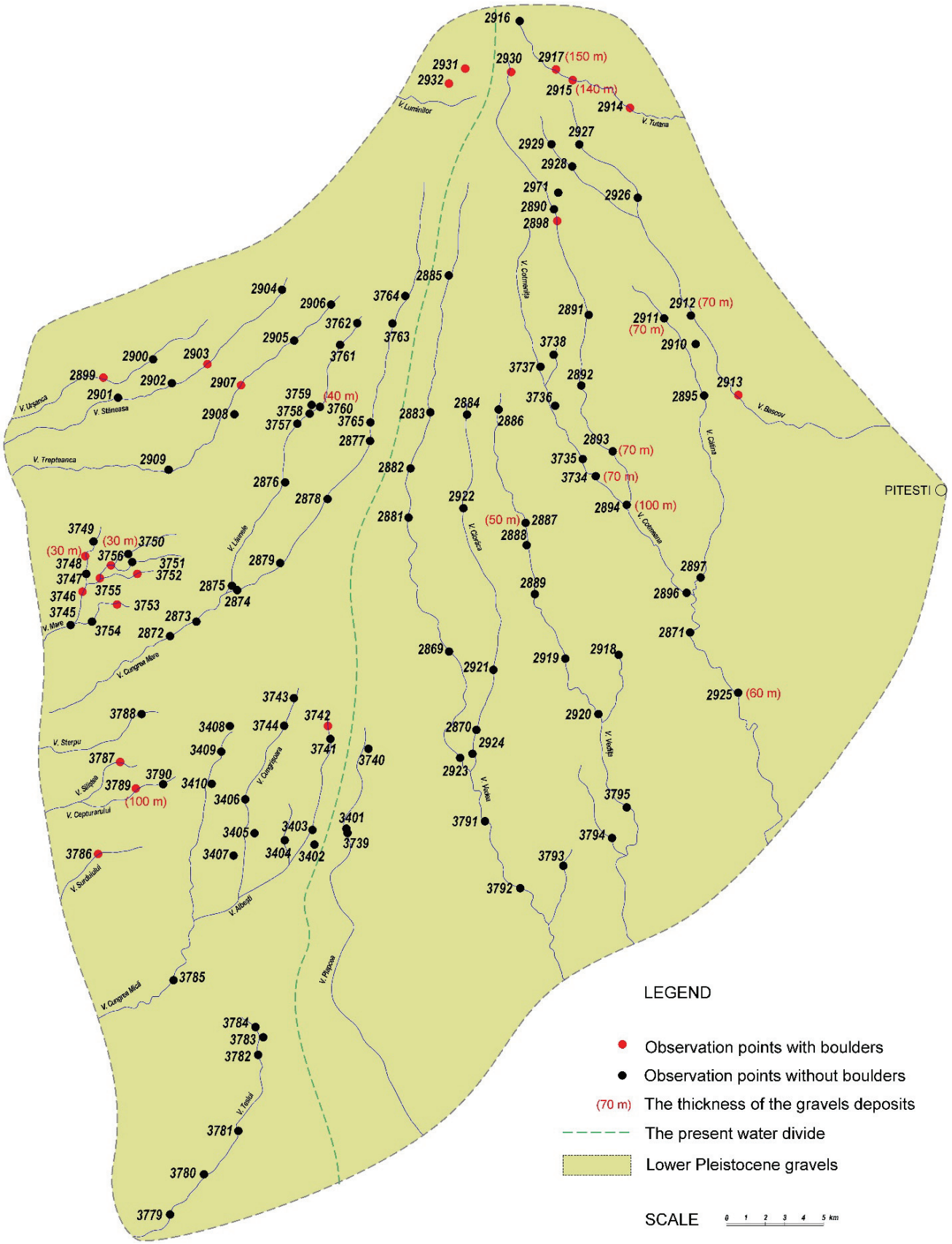

Figure 1. Spatial distribution of the observation points in the Cotmeana Piedmont (123 points with gravels, of which 21 points with gravels and boulders).

Figure 2. Torrential deposits of gravels of various sizes, sands and boulders of quartzites (ct) and quartzo-feldspathic gneisses (gn). Mare Valley (point 3755).

Boulders on the valleys in the north-eastern part of the piedmont

Tutana Valley (3 observation points)
- point 2914: boulders of quartzites, augen-gneisses, pegmatites and yellow-brown silicolites;
- point 2915: boulders of quartzites, augen-gneisses, pegmatites and yellow-brown silicolites;
- point 2917: boulders of quartzo-feldspathic gneisses, quartzites and augen-gneisses.

Luminilor Valley (2 points)
- point 2931: boulders of quartzites, quartz, yellow-brown silicolites, quartzo-feldspathic gneisses and rhyolitic ignimbrites;
- point 2932: boulders of quartzites, quartzo-feldspathic gneisses, quartz and yellow-brown silicolites.

Bascov Valley (1 point)
- point 2913: boulders of granodiorite, augen-gneisses and tourmaline-bearing quartz.

Cotmeana Valley, upper course (2 points)
- point 2898: quartzo-feldspathic gneisses, augen-gneisses, eclogites, quartzites and pegmatites;
- point 2930: boulders of quartzite, quartzo-feldspathic gneisses, augen-gneisses, yellow-brown silicolites and rhyolites.

Boulders on the valleys in the western part of the piedmont

Urşanca Valley (1 point)
- point 2899: boulders of quartz, quartzites, quartzo-feldspathic gneisses, yellow-brown silicolites, pegmatites, granodiorites, amphibolites and quartzous red sandstones.

Stăneasa Valley (1 point)
- point 2903: boulders of quartzo-feldspathic gneisses, quartz, quartzites, yellow-brown silicolites and pegmatites.

Trepteanca Valley (1 point)
- point 2907: boulders of quartz, quartzo-feldspathic gneisses and yellow-brown silicolites.

Mare Valley (6 points)
- point 3746: boulders of quartzites and quartzo-feldspathic gneisses;
- point 3747: (the petrographic types of boulders were not registered);
- point 3748: boulders of quartzo-feldspathic gneisses and quartzites;
- point 3752: boulders of quartzo-feldspathic gneisses, quartzites and quartz;
- point 3753: boulders of quartzo-feldspathic gneisses and yellow-brown silicolites;
- point 3755: boulders of quartzo-feldspathic gneisses, amphibolites and quartzites (Fig. 2);

Siliştea Valley (1 point)
- point 3787: boulders of amphibolites, quartzo-feldspathic gneisses, quartz, quartzites and yellow-brown silicolites.

Cepturaru Valley (1 point)
- point 3789: boulders of yellow-brown silicolite, quartzo-feldspathic gneisses, amphibolic gneisses, quartzites, quartzous red sandstones, pegmatites and eclogites.

Surduiu Valley (1 point)
- point 3786: boulders of quartzites, yellow-brown silicolites, quartzo-feldspathic gneisses, eclogites and amphibolic gneisses.

Albeşti Valley (1 point)
- point 3742: jasper boulders.

DISCUSSIONS AND CONCLUSIONS

In order of occurrence frequency, the petrographic types of boulders in the Cotmeana Piedmont are the following: quartzo-feldspathic gneisses (16 observation points), quartzites (15 points), yellow-brown silicolites (11 points), quartz (7 points), augen-gneisses (6 points), pegmatites (6 points), amphibolic rocks (5 points), eclogites (2 points), red sandstones (2 points), granodiorites (2 points), rhyolitic eruptive rocks (2 points), jaspers (1 point). If the presence of boulders in the north-eastern zone was predictable given its proximity to the Carpathian and Subcarpathian source areas, the presence of boulders in the western zone is somewhat surprising, especially in the case of the boulders in the south-western zone, this one being far from these source areas. The boulders in this zone represent the clastic material input from three source areas, Carpathian, Subcarpathian and Intracarpathian (south-eastern Transylvanian Basin).

Most petrographic types of boulders occur on both margins of the piedmont, with some exceptions. The boulders of jasper, red sandstones and amphibolites appear only on the western margin of the piedmont. The clastic material from this zone was brought by a torrent corresponding to the present Olt River whose hydrographic basin drains three source areas, Subcarpathian (Getic Subcarpathians), Carpathian (the mountains Cindrel, Lotru, Latoriţa, Căpăţâna, western and northern Făgăraş) and Intracarpathian (south-eastern Transylvanian Basin). The jaspers appear in the Mesozoic carbonate formations in the Căpăţâna Mountains (LUPU et al., 1978), the north-eastern Făgăraş Mountains (ex. SĂNDULESCU et al., 1972) and the Perşani Mountains (POPESCU, 1970). Red sandstones could be removed from the Lower Eocene and Oligocene-Miocene sandstone formations in the Subcarpathian area (MURGEANU et al., 1967).

The augen-gneisses and rhyolites boulders appear only on the north-eastern edge of the piedmont. The clastic material in this zone could be brought in the piedmont only by the torrents from the Carpathian source area (southern Făgăraş Mountains), the correspondents of the present rivers Argeş (mainly) and Topolog (the present left tributary of the Olt River). The augen-gneisses outcrop on large areas on the southern slope of the Făgăraş Mountains (e.g. DIMITRESCU et al., 1985). Rare dykes of eruptive rocks also occur.

It is obvious, and surprising at the same time, the large difference in frequency within the siliceous rocks, yellow-brown silicolites and jaspers, hard rocks with high resistance to transport and alteration. The yellow-brown silicolites appear in 11 observation points, most in the western zone (7 points), while the jaspers appear in only one point, also in the western zone. The explanation for this difference in frequency could be a longer transport distance for jasper, from the Intracarpathian source area, as well as the breccia texture of the jaspers and their high content of hematite, a mineral that easily alters in aquatic environment, leading to the disintegration of the host rock.

Given the torrential nature of the gravel deposits in the Cotmeana Piedmont, as in the whole of the Getic Piedmont, the boulders cannot constitute a stratigraphic level. The boulders along the western edge of the Cotmeana Piedmont represent the input of coarse clastic material, Subcarpathian, Carpathian and Intracarpathian, of a torrent with high transport power (the paleo-Olt River). This material arrived in the piedmont after the opening of the Olt River transversal valley at the beginning of the Quaternary (DE MARTONNE, 1907 & POPESCU-VOITEŞTI, 1918).

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