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VIEWPOINTS ON RELIEF EVOLUTION AND THE HYDROGRAPHICAL SYSTEM OF THE SOUTHERN IEZER MOUNTAINS BETWEEN VALEA MARE-PRAVĂȚ AND STOENEȘTI-CETĂȚENI

CONSIDERAȚII PRIVIND EVOLUȚIA RELIEFULUI ȘI A REȚELEI HIDROGRAFICE DIN SUDUL MUNȚILOR IEZER ÎNTRE VALEA MARE-PRAVĂȚ ȘI STOENEȘTI-CETĂȚENI

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Abstract: In the development of the hydrographical network from the south of the Iezer Mountains between Valea Mare-Pravăţ and Stoeneşti-Cetăţeni one can distinguish three periods: inferior-Miocene, in which there is visible a wide valley with psefit-peltic accumulations in the surrounding sea basin; medium Miocene - Pliocene with clearly-cut valleys in the mountains, with the presence of some debris from a field close by to the mountains, on which valley chutes have transversely extended; intermittent tectonic movements have been detected in this period, which have triggered both slight elevations and mild dips that have led during the Pliocene towards a sedimentary environment. In the Romanian upper-Pliocene in which the mountain elevations are finally settled down, there are breaks into the non-proclivity crests from the sub-Carpathians, which determine an asymmetrical proclivity-inclined couloir towards the mountain. New generations of torrential valleys come up, which are transversely oriented on the previous ones (springing from the mountains.

Key-words: *paleogeographical evolution, hydrographical network, tectonic movements, morphostructural units*
Cuvinte cheie: *evoluţia paleogeografică, reţea hidrografică, mişcări tectonice, unităţi morfostructurale*

I. INTRODUCTION

Eastwards of the Râul Doamnei, the Getic Sub-Carpathians come in contact with the Iezer Mountains (N), the Leaota Mountains (NE), the Bend Sub-Carpathians (E) and the Cândești Tableland (S), all these representing distinct structural units, with extremely complex morphology and evolution, created during the Neozoic, at the contact between the Carpathians and the north-eastern sector of the Getic Depression. Here, in the hilly space, the fundament is represented by a pre-Paleogene risen sector that resembles a threshold and is located at the transition from the Getic Depression to the Foreland basin. It had an essential part in the

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structural configuration of the local Sub-Carpathian space, as well as in the imposition of a distinct limit towards the mountains.

The Sub-Carpathians are made up of two subunits with distinct characteristics, i.e. a depression located at the contact with the mountains and a range of hills situated on an anticline structure, at the exterior of the former subunit, their southern border being represented the Cândeşti piedmont tableland.

The Câmpulung structural depression, characterised by a floor altitude of 650 - 700 meters and by east - west general development, is divided into multiple sectors by the Argeşel, the Râul Târgului, the Bughea, the Bratia, which are rivers originating in the Iezer Mountains and following a general north-south course. Each sector represents a distinct unit from the viewpoint of the morphological structure (floodplain, 1-3 terraces with variable extensions framed by interfluve sectors resulted from the fragmentation of the depression floor).

The first common element is represented by the contact with the mountain, which, despite some local discrepancies, displays certain defining features. Firstly, there is a clear oro-structural limit developed along some fault lines marked by sudden altitude differences between the two units (the mountains and the depression); these units have an obvious geological structure (on the one hand, the mountains made up of metamorphic rocks, such as the chlorite crystalline schists, which bear on top sedimentary formations made up of tithonic limestone and thick strata of conglomerate and sandstone of upper Cretaceous age, which are folded and faulted; on the other hand, the sedimentary layer of the depression, which bears alternations of sandstone, Miocene clay or sand, Pliocene or Quaternary gravel strata at the surface). From the morphologic viewpoint, there are to be noticed tops that reach 850 - 1200 meters and steep slopes, while the depression displays smooth and slightly sloping interfluvial surfaces at 700 - 750 meters (i.e. a hypsometric difference of 150 - 300 meters). It is to be added a relatively sudden change of landscape (broadleaved and coniferous forests in the north, as compared with the highly human-changed surfaces characterised by various land use and the presence of settlements, in the south).

The interfluves within the depression are low, slightly rising and they have structural character, representing the edges of the Sub-Carpathian hills anticline located in the south; they consist of sedimentary rocks dating to the first part of the Miocene (clay, sand, sandstone) or to the upper Cretaceous - Paleogene (alternations of clay, marl, sandstone strata). They represent fragments of the initial depression bottom that resulted after the water withdrawal and was divided by the rivers that extended their courses from the Carpathians (e.g. the Râul Târgului, the Argeşel). They created secondary catchments with 1 - 3 terraces, framed by slopes covered with thick deluvial deposits or pediments.

The Sub-Carpathian hills represent an obvious structural unit located along a major anticline, which has an almost continuous development between the Dâmboviţa and the Râul Doamnei valleys. The hills are between 800 and 1,100 meters high and they are separated by the couloirs of the Carpathian valleys, which display the features of short defiles in the area. The high altitudes are generated

both by the structurally-induced vaulting, as well as by the petrographic composition, represented by thick strata of sandstone and Miocene and Paleogene conglomerate. The hypsometrical differences among the sectors are a result of the petrographic composition. The litho-structural composition and the faulting led to an active, but locally-differentiated slope dynamics, this situation imposing the alternation of very steep slope areas (even significant escarpments) and sectors with extended landslides situated on torrential basins (especially where they deepen in sedimentary formations characterised by the presence of thin strata with variable composition – with higher frequency of the clay and clayey-marly ones).

Towards south, the transition from the Sub-Carpathian hills alignment to the Cândeşti Tableland is highlighted at the level of the interfluves by an east-west alignment of large saddles at ± 700 meters.

They delineate an altitude couloir which separates the two types of units and was created by differential erosion between the Miocene, Paleogene formations located in the north, on the southern edge of the anticline and the Romanian - Pleistocene formations (the Cândeşti Gravels), situated in the south (the monocline of the tableland). The couloir developed on Pliocene (Dacian - Romanian), mostly sandy-clayey deposits is dominated by the cuesta front located on the northern flank of the piedmont tableland.

II. RESULTS AND DISCUSSIONS

2.1. Paleogeographical evolution and constitution of the morphostructural units

Structurally, three types of units with different evolution and composition are to be found in sequence from north to south (Fig. 1).

The Carpathian orogenic unit represents the area of origin for the main river valleys within the Argeş catchment (the Dâmboviţa, the Râul Târgului, the Argeşel, the Bughea, the Bratia, the Râul Doamnei). It resulted through the succession of a number of tectonic movement phases, which affected an extended sedimentation basin. The formations were metamorphosed and folded during a number of orogenic phases and they were firstly included into submerged ridge complexes and, finally (upper Cretaceous), into an emerged mountain system. Subsequently, the mountains undergone fragmentations (there resulted tectonic depressions in the upper Dâmboviţa catchment), but also very intense rising processes, during a number of phases, when the tectonic movements were active and led to the fracturing, rising and intermingle of the planation cycles that generated a number of erosion levels and surfaces, which were identified and analysed in PhD theses and synthetic articles.

The Getic Depression, developed in the northern part of the Moesian Platform, at the contact with the Southern Carpathians, had here a more elevated sector (crystalline-Mezozoic), which would represent a structural threshold towards the foreland basin located eastwards; it would have an important part in the paleogeographical evolution of the region.

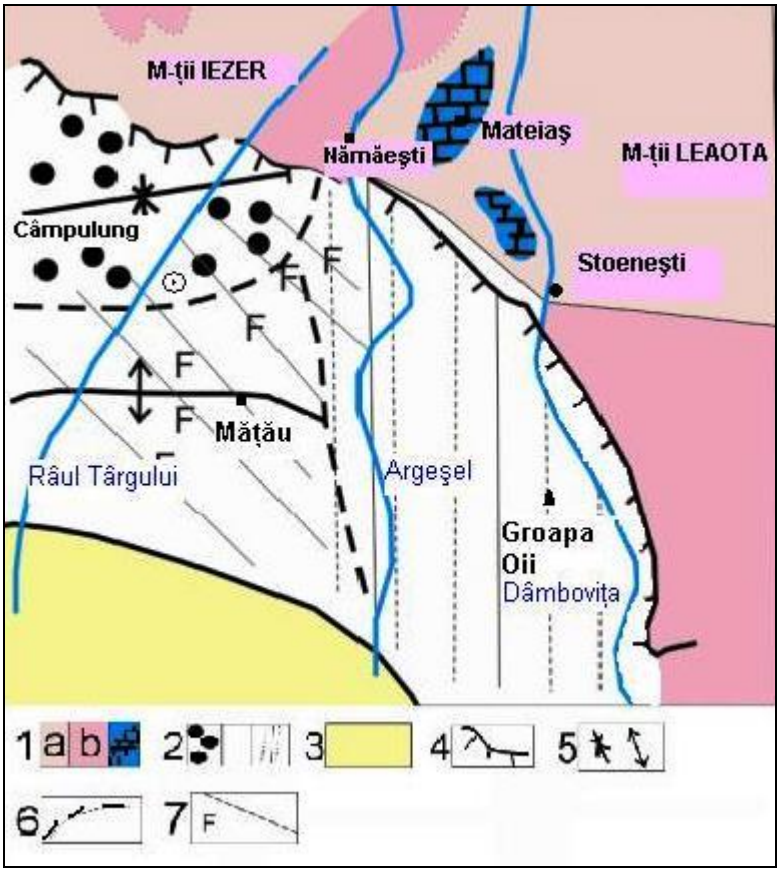

Fig. 1. Sketch of the morphostructural units

1. Mountains (a. crystalline, b. Cretaceous sedimentary, c. limestone); 2. Sub-Carpathians (a. The Câmpulung Depression with Miocene – Quaternary deposits, b. Hills on anticlines – Miocene formations, c. Hills that mark the transition between mountains and Sub-Carpathians – Cretaceous - Paleogene formations); 3. Piedmont Tableland (Romanian – Pleistocene 1); 4. Tectonic-structural contact between mountains and Sub-Carpathians; 5. Axis of: a. syncline, b. anticline; 6. Limit between Sub-Carpathian units; 7. Fault

The much more active tectonics that characterised the contact stripe imposed two situations: firstly, the gradual boosting of the net structural contact between the mountain and the threshold and secondly, the fragmentation of the latter one into a number of blocks that are relatively parallel to the mountain and are framed by fault alignments (the main ones had NW-SE, but also E-V orientation). The blocks have different vertical positions: those located at the contact with the mountain gradually deepen between the sector stretching eastwards of the Argeşel and that stretching westwards of the Bughea, while the blocks situated in the southern hilly space (the Ciocanu - Măţău alignment, after Mândruţ, 2003) are near the level of the riverbeds (they appear in the thalweg of the Râul Târgului, south of Câmpulung).

The paleogeography has several significant phases.

At the beginning of the Paleogene, the Carpathian orogene enters in contact with the marine basin from the depression on the Nămăeşti- Cetăţeni direction (west of Dâmboviţa valley). From the land the rivers carried sandy-clayey materials (reflecting the limited transportation force due to the reduced heights and the limited extension of the hydrographic basins) which shall generate layers of Eocene sand stones and Oligocene dysodilic shales, marls and clays included in the slopes and peaks eastward of the Nămăeşti- Mioarele- Boteni line, but also in depth (south and west of this line). They have a transgressive character upon the Cretaceous formations and a structural deployment imposed by the movements in Mio-Pliocene that shall generate a large and slightly arched line (Ciocanu-Mățău-Groapa Oii), which was framed by a lowland area which continued to the north up to the slopes of the mountains (Fig. 2).

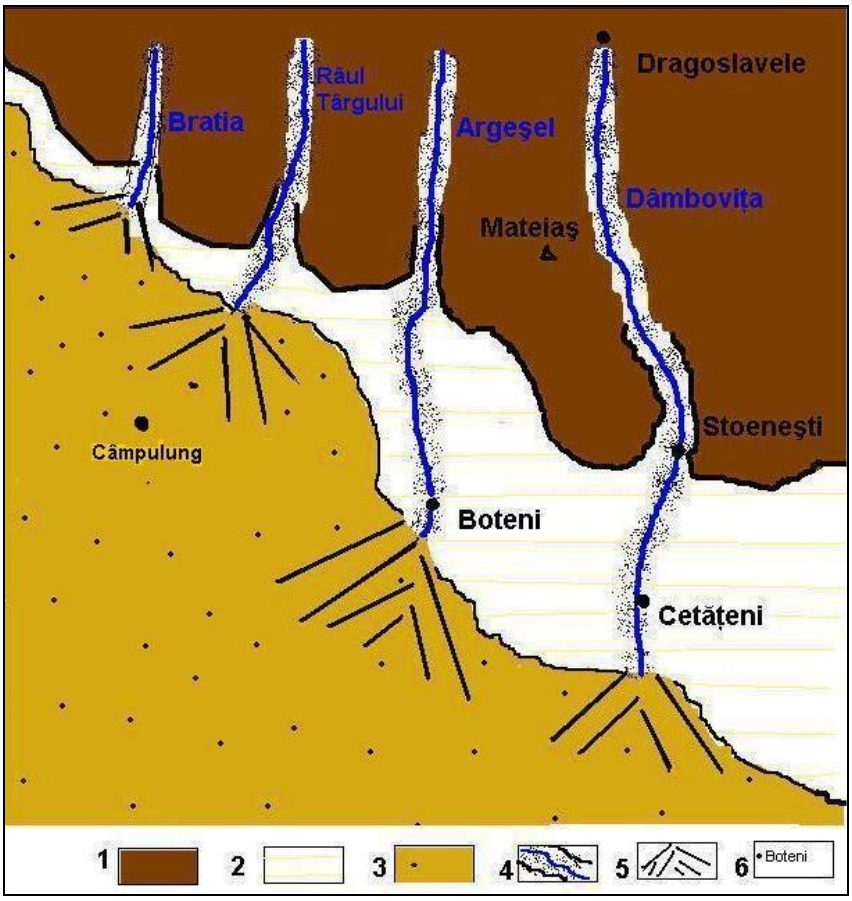

Fig. 2. Final Paleogene-inferior Miocene

1. Highland made up of metamorphic rocks and tithonic limestone, intensely fractured; 2. Low mainland with sedimentary strata from Superior Cretaceous-Paleogene, with faulting; 3. Marine basin; 4. Valley corridor; 5. Alluvial cone; 6. Settlements.

At the end of the Paleogene and at the beginning of the Miocene, the tectonic movements shall determine the different uprising of the mountainous region, including the southern adjacent area which becomes a littoral plain, subsequently the erosion processes increase in the hydrographic basins located on the slopes of the Carpathians (they shall have a dominant torrential character given by the subtropical climate); the displaced materials (sands, gravel in Burdigalian-Helvetian) are accumulated in the southern littoral basin, where they shall create morphostructres like piedmonts between Argeşel and Argeş (they can be reconstructed by correlating the discontinuous stripes of conglomerate located between the mountains and the Boteni- Poienari- Muşeteşti- Albeşti line).

Subsequently, the monoclinal feature of these deposits can only be found west of Bratia, while in the east the structure is changed (it unfolds on a slightly plicate structure).

From Badenian-Sarmatian age, the transgression shall finalize the levelling stage in the mountains, while the elevations occurred in the Upper Sarmatian (the Meotian stage) the beginning of another one finalized in Romanian. It is a stage when the individualization process of the two morphostructural units (Câmpulung Depression and the Subcarpathian hills), process eased by tectonic factors. On one hand, the tectonic movements raised the mountains and, on the other hand, impelled the elevation of the rigid blocks from the base of the threshold covered by a sedimentary layer (Paleogene-Miocene) differentiated in thickness. Those located on the Ciocanu-Măţău-Groapa Oii anticline shall raise determining the formation of an anticline (edges directed north and south, with an average slope of the layers is 10º-30º, which morphogenetically correspond to hills). The area between the anticlines and the mountains shall be little elevated (east of Argeşel shall result a littoral plain), or it shall be affected by a slightly lowering process (in the western part). Generally, the Miocene sediment layers north of the anticline, shall be included in an synclinal depression located at the contact with the mountain (its axis is very well outlined west of Râul Târgului, but it gets close to the mountain east of the Valea Mare- Pravăţ). Subsequently, in the eastern part, the northern extremity of the anticline edge reaches the mountain, case when it confers the feature of a surface land anticline with a clear structural feature, with a continuous deployment from south up to the saddleback in Valea Mare-Pravăţ.

The transgression from the Upper Pliocene, covers with sediments most of the structural depression from Câmpulung (here accumulates marls and sandy-clayey deposits), its connexion to the exterior of the hills (turned into islands) shall be done through wider or narrower spaces.

The tectonic movements began in the Upper Romanian and continued during the Quaternary had several important effects: - the gradual elevation of the mountains up to the present heights (especially during the Villafranchian and Pleistocene); the elevation of the Subcarpathians which shall acquire special heights depending on the petrography (the highest ones where the layers of sandstones and conglomerates are thicker), the lower areas between a plain, where the carpathian rivers shall establish the flows following the couloirs between the

hills, were definitively built-out; the formation of several generation of sands and stones debris cons, south of the Boteni-Poienari-Muşeteşti line, that will create a piedmontan plain, which affected by elevation and fragmentation will become subunits of the Getic Piedmont, where the monocline structure is the main feature.

During the Upper Pleistocene-Holocene, general abruptly elevations would occur and contribute to the deepening of the river beds and creation of terraces in the Câmpulung Depression, and then create short, but obvious, couloirs when cutting the hills along the Subcarpathian anticline, the development of glacises and a differentiate dynamics of present processes as type and intensity depending on the slopes, petrography and human activity.

2.2. The features of the relief (aspect, morphometric elements, levelling steps, the role of the structure and lithology for the relief)

Between the Râul Târgului and Dâmboviţa interpenetrate units from the Carpathians (Leaota, Iezer Mountains) with the Subcarpathians. Although, at the first glance they seem well distinguished, in reality, because of the interpenetration of the elements having a lithology and structure specific to the two types of units, progressively it was imposed the feature of a transitional area (observed by Mihăilescu and analysed by Mândruţ, 2003), that is reflected both by the individualization and development of the units and by the morphostructural landscapes indrawn.

The Carpathian area consists of Iezer Mountains (with a south-eats prolongation to Stoeneşti) and Leaota Mountains which heads much to south left of the Dâmboviţa river. Toward the Subcarpathians are slopes which lower from 1,350-1,500 meters up to 850-1,000 meters, they are dominantly made of crystalline schists which confers massiveness, resistance to the activity of external agents and the conservation of several levelling steps. Calcareous edges and peaks are added (especially Iezer Mountains) or conglomerate and sandstone facieses (especially in the south-west of Leaota) which confer important heights and preserve the peripheral erosion levels. There is a network of deep valleys (fisrt generation is directed N-S), with a different aspect depending on the lithology. Progressively, lower basins resulted with alluvial plains and 1-2 terraces, (proluvio-deluvial) glacises separated by narrowing points (in hard rocks) having numerous thesholds in the river beds.

On the Argeşel river there is a relatively symmetry in the deployment of the secondary valleys within the basins with 2 terraces.

On the Dâmboviţa river asymmetry is noticed (the tributaries on the left are well developed), a higher slope, a narrowing sector and the suspended aspect in its lower course (it finishes in the Dâmboviţa river bed with alluvial cons, their ends advancing regressively).

On the upper course of the Dâmboviţa, there are large tectonic depressions - Podul Dâmboviţei and Rucăr, while in the lower course, the lower basins at Dragoslavele, Slobozia, Stoeneşti, etc., which form a geosyncline up to the Cetăţeni narrowing section located at 65 m (N) and 55 m (S), with a difference

level ranging between 150-300 m compared to the edge in the west and 300-400 m compared to the one in the east.

There are several levelled surfaces in the mountain area on the high peaks. The plateaus at the springhead of Argeșel located at ± 2000 m height belong to Borăscu surface (Carpathian Pediplena). The surfaces located at 1350 m and 1600-1700 m have a large extension in The Meridional Carpathians (they belong to Râu-Șes levelled surface or to Median Carpathian Surface from Miocene). At the contact with the Subcarpathian basin and upstream, in the riverbeds, there are areas at 1000 -2000 m (continuous surface) and at ± 850 m (marginally level which in the main valleys indicates clearly the first obvious river corridor) which date from the Pliocene.

In Subcarpathians, at the contact with the mountains, there is on one side a depression corridor on Argeșel between Boteni (south), Suslănești, Nămăești (north) localities, and on the other side there are two interfluves (in the west towards Râul Târgului river and in the east towards Dâmboviţa), having each of them a distinct evolutionary aspect and connotation.

The Argeșel Micro-Basin has a relatively symmetrical development and it was carved in layered formations of sandstone, marls, sandy clays from Paleogene, poorly consolidated (the largest expansion was that of the Oligocene ones) and with a fall from the north-east and east (which reflects the tectonic impulse from the mountains produced by their lifting stages at the end of Paleogene and early Miocene). These are deposits correlated with the first cycle of Carpathian levelling and whose evidence is in the high region of the surrounding massifs.

In the Argeșel riverbed, the altitudes decrease from 700 m (north) to 600 m (south), the level differences in the central sector in relation to the neighbouring interfluves being of 80-150 m in the west and 60-100 m in the east. In the depression there are areas from two terraces, a narrow riverbed framed by a meadow of 50-100 m wide and slopes covered almost entirely by landslides (with thick delluvium formations). The anthropogenic pressure led to several changes in the relief and landscape.

The western interfluve which expands from Mățau Peak to Nămăești has two sectors. Firstly in the north, between Valea Mare-Pravăţ-Bâlcești and Argeșel alignment, there is an interfluve that ascends slightly from 720 m to 800 m both in the north (at the contact with the mountain) and in the south and it is formed since Miocene. In the south, the interfluve raises quickly on the northern flank of the Mățău anticline. It has steps of erosion oriented towards Argeșel axis (they have an altitude ranging from 720 to 780 m with a slight increase and then a descent in relation to the axis of the Mățău anticline). These forms are individualized on Paleogene formations, which are slightly deformed. There are slopes below them with thick delluvial-prolluvial deposits.

The Mățău Subcarpathic Hill, located in the south of this interfluve, has a ridge that decrease in height to north-east from 1017 m to about 800 m (in the north of Hodor Peak). It consists of Miocene formations (with clay and marl at the base and sandstone with conglomerates which belong to the former Burdigalian-

Helvetian piedmont at the top) which form in the north a large part of the anticline; the petrographic and structural differences are evident in the general configuration (steeps on the hard rocks strata and variable slopes with landslides delluviums on the ones that are dominant pelitic).

The interfluve between the Argeșel and Dâmboviţa valleys has two visible areas in relation to the Stoenești saddle. The northern interfluve is shorter and consists of Paleogene and partially Miocene rocks (it is a secondary peak of the extension of the Mateiaş-Piatra Mountain); it is cut by the Stoeneşti valley (a tributary stream of Dâmboviţa). It is composed of rocks with low resistance prone to landslides whose physiognomy and development were heavily influenced by the anthropogenic actions (limestone exploitation, grazing, fruit growing, etc).

The southern sector is longer and has a height ranging from about 740 m to 950 m (Groapa Oii Peak); it has Cretaceous deposits at the base and Paleocene ones at the top.

The saddle that separates the two sectors is on the lito-structural contact line which facilitated the advance of Stoeneşti stream westward creating catchments and a position difference between the line of the high peaks and watershed.

2.3. Formation and evolution of the river network between Valea Mare Pravăț and Stoeneşti.

The differential evolution of the morphostructural units in this subcarpathic sector led to the genesis of several morphohydrographic elements that have constituted marks for the creation of the river system between Dâmboviţa and Râul Doamnei. The most frequently mentioned were the saddles on the interfluves between the mountains and Subcarpathic hills, on the north-south, north-east, south-west direction of the hydrographical axes, the gorges sectioned in the hills from the anticline axis, the terraces and levels of erosion analysis, some paleogeographic interpretations.

Opinions are found in various papers, but the detailed analyses were done by Brătescu (1910) and Muică (1971).

For the Argeșel sector, the corroboration of the lito-structural data on which the paleogeographic evolution was reconstructed and the survey on the levels of erosion and terraces on the two valleys (Dâmboviţa Argeșel) lead to a different genetic-evolutionary interpretation of the system of valleys in this contact sector compared with other opinions. In this respect there are mentioned and considered significant some ideas of the paleogeographic evolution.

- the tectonic contact evidenced by the steep slopes oriented north-west and south-east and the mountain extends to the south-east through the Mateiaş- Piatra spre Cireșu-Cetățeni unit.

- the existence in the base, in the south, of a submerged "threshold" formed of several crystalline-Mesozoic blocks which moved differently as intensity and direction under the uplifting tectonic movements that affected mainly the mountains.

- there were accumulated several series of formations with variable thickness (from conglomerate to clays) separated by stratigraphic gaps (corresponding to a

time when the space near the mountain was lifted being subject to erosion) in the sea basin, in the south of the mountains, in Neozoic. The sediments (psamit-psefitic) date from Eocene-Middle of Oligocene, Middle of Burdigalian-Helvetian, Middle of Pliocene-Romanian and the kakunes date from the middle-upper Oligocen, Romanian, Pleistocene.

- the tectonic movements had the following effects: the abrupt uplift of the mountain area, and in the upper Pleistocene the lift of the entire region; the fault system reactivation (the most important are oriented north-west – south-east and east-west) and the slightly involvement of the blocks from the " crystalline Mesozoic threshold " on the Schitu Goleşti-Boteni-Cetăţeni alignment in Sarmatian and more intense in Pleistocene which resulted in a complex structure (an anticline corresponding to the Subcarpathian hills, in the north of which there was shaped the synclinal of the Câmpulung depression), then the formation of a piedmont plain at the south of the hills, in Romanian-Pleistocene;

- the morphological elements reveal several morpho-genetical phases which created the corresponding levelling surfaces in the mountains, made up in Paleogene, Miocene and Pliocene. Between them, there are others at ± 2000 m, 1600-1700 m, ± 1350 m, ±1250 m, 950-850 m, the former having a clear delineation on the main tops, while the latter are rather developed at the bottom of the mountain and within the Dâmboviţa, Argeşel, Râul Târgului valleys (these are also emphasizing the existence of a N-S orientation of the hydrographical network). The level of 750-780 m and two or three obvious terraces are added (± 50 m, ± 15 m, ± 5 m), which are present both in the mountains and in the sub-Carpathian area, but also the reconstitution of a piedmont dating from middle Miocene, which had been subsequently elevated, fragmented and then suffered an altimetric distortion (it remained in patches on some hills), the post-Romanian hills system and the Pleistocene ones which resulted from the fragmentation of the Getic Piedmont.

2.4. The genetics and evolution of the hydrographical network can be established by corroborating these data.

- the Miocene-inferior Pliocene phase, which was characterised by a hydrographical network exclusively in the mountains' area (the Argeşel, the Dâmboviţa, the Râul Târgului rivers) and flew in the getic marine basin (the Dâmboviţa reached Stoeneşti in the South, fragmenting the border of the mountains and the Argeşel quenched southwards of Nămăeşti). Laps appearing on Măgura-Mateiaş-Piatra peak (alleged by Constantinescu) are not evidences of old courses of the Dâmboviţa river to south-west (in the mountains), towards Câmpulung sector, but rather resulted through differential erosion between the limestone, crystalline and sandstone, especially in the intensely faulted sectors. The direction of the Dâmboviţa river towards Stoeneşti-Cetăţeni is sustained by the omnipresent erosion levels at ± 1250 m and ± 950 m, defining an obvious corridor.

Three phases of this period can be distinguished:

- pre-Helvetian: with large, incipient valleys in the mountain area and psefito-pelitic accretion in the contiguous marine basin (Fig. 3).

• medial Miocene-Pliocene: with well-evidenced valleys in the mountains (the levelling steps at ±1250 m and ± 950 m) and a different evolution southwards. Tectonic movements by stages determined repetitive elevations in Burdigalian-superior Sarmatian, but very different in what concerns their direction and magnitude in the mountains as compared to the southern area (where the bedding blocks functioned and influenced movements differently). On the one hand, they facilitated the customization of a piedmont plain which imposed a southward course of the Argeșel river and on the other hand, the development of a higher peak in the East, in which the Dâmbovița river deepened. Westwards from Câmpulung, slight descending was registered and they maintained a favourable sedimentation environment during the Pliocene, but also closed by several islets which developed as Mățău hummock individualized (Fig. 4).

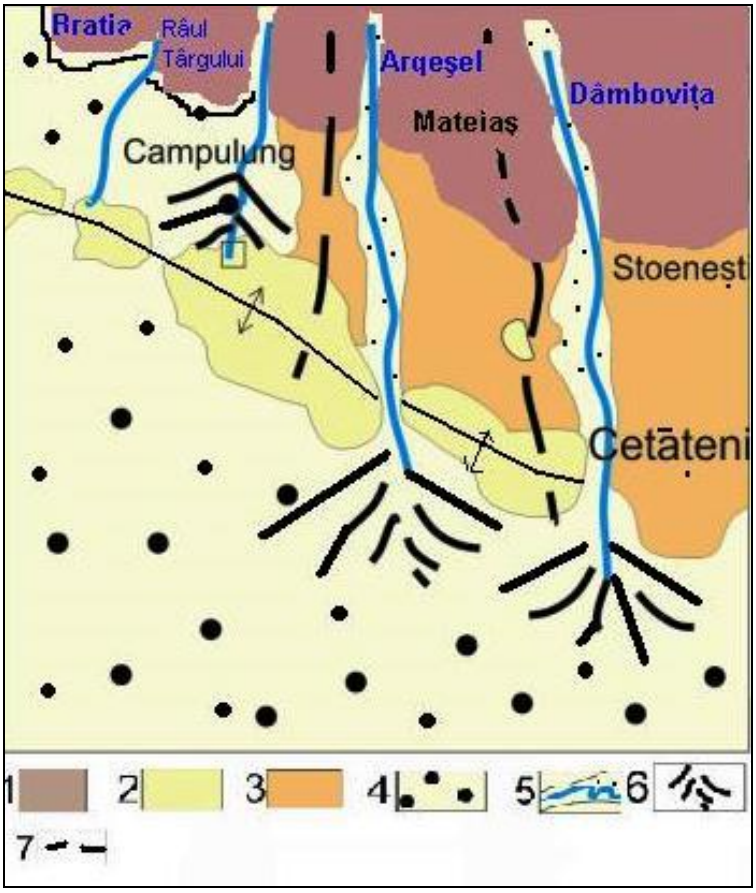

Fig. 3. Superior Miocene-medial Pliocene

1. Highland made up of crystalline metamorphic rocks; 2. Islands on anticline structure in the process of formation and elevation; 3. Hilly lands made up of Crataceous-Paleogene and Pontian-Miocene strata 1-2; 4. Marine basin; 5. Valley corridors; 6. Alluvial cones; 7. Watershed parting.

• superior Romanian-Pleistocene: in which tectonic movements imposed the elevation of the mountains, but also the peaks representing the anticline structure of the Sub-carpathians (Mățău, Groapa Oii, Ciocanu). This process would determine the formation of a depression with an asymmetrical synclinal structure, which eventually transformed into land. The Râul Târgului river would prolong its mountain pathway, through the latter and the area comprised between Mățău and Ciocanu hills. During the inferior Pleistocene, the accretion of sand, gravel interchangeable with clays in the south of the Sub-Carpathian hills generated a piedmont plain, in which rivers prolonged their course. During the superior Pleistocene, it was elevated and transformed into plateau and hilly relief units. Levels of erosion were evidenced at ± 750 m in the Romanian-Pleistocene corridors (bordering the mountains and the gorges of Boteni-Argeșel river, Cetățeni-Dâmbovița river), but also on the Quaternary terraces much more developed southwards.

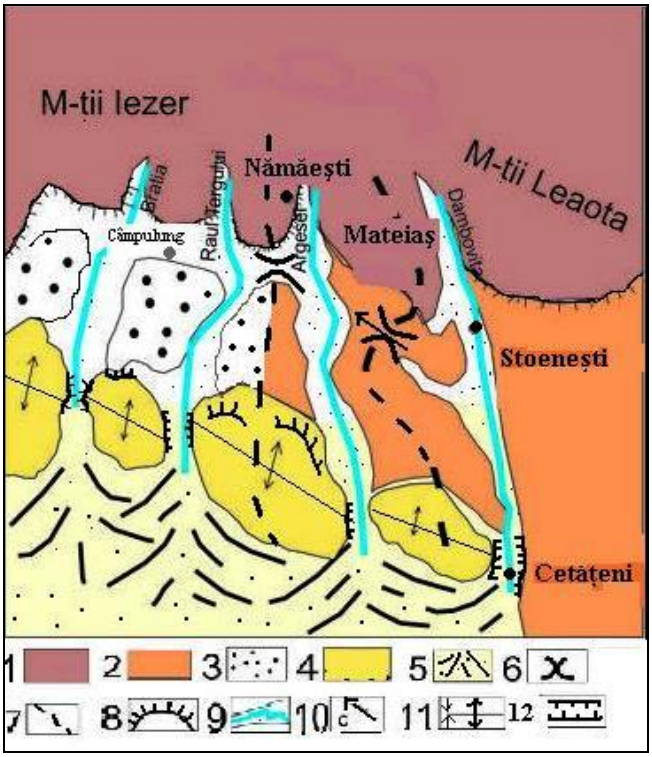

Fig. 4. Genetics and dynamics of valleys in Câmpulung-Cetățeni area

1. Mountains made up of crystalline metamorphic rocks; 2. Heights from Cretaceous-Paleogene; 3. Pliocene Lowland, in which rivers created terraces in Pleistocene (Câmpulung Depression); 4. Sub-Carpathian hills through anticline structure affirmation; 5. Piedmont accumulation (Romanian-inferior Pleistocene); 6. Saddle; 7. Watershed parting; 8. Tectonic-structural escarpment; 9. Valley corridor; 10. Catchment; 11. Anticline and syncline; 12. Antecedent gorge.

Also, minor catchments were produced by the advancement of a rivulet from Stoenești towards the eastern area of Argeșel basin, following an alignment made up of easily eroded strata (lithological friability and many faults oriented NV-SE). Several torrents oriented NE-SV were captured under Mateiaș-Piatra peak; the hydrographical borderline was pushed westwards, off the Stoenești top, being found at 720-730 m (an altimetric difference of about 60 m as compared to the Argeșel and 160-170 m as compared to the Dâmbovița) and hundred of metres far from the Argeșel river. Tough imminent, superior Argeșel catchment is slowed down by the landslides in the superior basin of Stoenești spring, the reduced flow and man-made interventions.

III. CONCLUSIONS

● In terms of structure, evolution and relief features, the two interfluves do not belong directly to Câmpulung depression but to a transit area between the mountains (they have a similar composition and evolution) and Subcarpathians (they are similar to those by the low altitudes and the slopes intensely affected by landslides and runoff).

● The Mățău (in the west) and Groapa Oii (in the east) Subcarpathian hills close the depression corridor of Argeșel having an altitude higher than that of the corridor with 250-300 m and morphologically it has peaks above 900 m forming the axis of the faulted anticline (Upper Miocene - Pliocene).

● Both Argeșel (between Mățău Peak and Groapa Oii Peak) and Râul Târgului River cross the anticline forming valley sectors as a gorge. Through these, the erosion steps from the north (± 800 m and 650 m) pass to the south, creating a connection with the Pliocene and Lower Quaternary formations.

● The height of the hills was due to Post-Romanian tectonic uplifts which are more active along the axis of the anticline (probably caused by the impulse sent from the Carpathian block, from the crystalline "threshold" of the foundation).

● Between the hills on the anticline and faulted steep slopes of the mountain, the below space form a synclinal asymmetric fold whose axis cross the system of faults in the east of Valea Mare- Pravăţ.

● The differentiated erosion exercised between the Paleogene sedimentary formations and the crystalline and limestone of the mountain led in terms of tectonics (a lift in the north and south) to the extension of some features of the western Subcarpathic corridor, in the east of Valea Mare-Pravăţ, especially the structural character of thereof.

● The elevations in Quaternary exercised on the anticline axis imposed the monocline of the Pliocene sediments from the south (Getic Piedmont) which have on the upper part the Cândeşti gravel and in the depths they have layers of sand, clay (some with coal horizons) from the Pontian-Lower Romanian.

REFERENCES

BRĂTESCU C. (1910), *Forme de relief în Muscel*, Analele de geografie şi antropogeografie, Bucureşti

IELENICZ M., PĂTRU ILEANA, GHINCEA MIOARA (2003), *Subcarpaţii României*, Edit. Universitară, Bucureşti

MÂNDRUŢ O. (2003), *Relieful Subcarpaţilor dintre Argeş şi Argeşel (Studiu geomorfologic)*, Edit. Universităţii din Bucureşti, Bucureşti

MUICĂ N. (1971), *Schimbări ale reţelei hidrografice în regiunea de sub munte între Dâmboviţa şi Râul Doamnei*, Studii şi cercetări geografice, vol. XVII, nr. 1, Bucureşti

POSEA GR. (1993), *Subcarpaţii Măţăului*, Studii şi cercetări geografice, T. XXIX, Edit. Academiei, Bucureşti

POPESCU-ARGEŞEL I. (1965), *Observaţii geomorfologice în valea Argeşelului*, S.S.N.G., din R.P.R-Comunicări de geografie, Vol. III, Bucureşti