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THE STRATIGRAPHY OF THE VALAH BASIN (PLEISTOCENE) WITH BIOSTRATIGRAPHIC ARGUMENTS (ROMANIA)

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ABSTRACT. In this article the stratigraphy of the Quaternary deposits from Romanian Plain and the Sub-Carpathian Piedmonts (between Adjud and Drobeta Turnu Severin) was restructured; it was outlined a new paleogeographic unit (the Valah Basin, Pleistocene); it was outlined a tectonic structure (Valah Nappe) localized to Pliocene-Pleistocene boundary (at ~ 2.58 My); was proposed a new stratigraphic scale of the Quaternary from the Valah Basin (valid for the entire Paratethis Domain); was demonstrated presence anew geologic unit (Danubian) from the Eastern Carpathians Orogene, under the Laramic Getic Megastructure (Nappe) and over Teleajen-Macla-Audia Unit; it was found that within lithostratigraphic unit of the Cândeşti Beds included several lithostratigraphic units of different ages, delimited through discordances; there were stated two tectogenetice phases (Vrancea Valah Tectogenetic Phase camped to ~ 2.58 My and Pasaden Focşani Tectogenetic Phase camped to 1.0 My) marked by very obvious discordances of the deposits and through discontinuities by deformation. In the framework of the Valah Basin new lithostratigraphic units were defined; there were redefined some older lithostratigraphic units; there were outlined two depositional units (central depositional unit and marginal depositional unit with two subunits: northern marginal depositional subunit and southern marginal depositional subunit); have been made he ambient nature clarifications and regional correlations were made.

Key words: Valah Basin, Pleistocene, Buridavian, Ordessensian, lithostratigraphy, biostratigraphy.

REZUMAT. Stratigrafia Bazinului Valah (Pleistocen) cu argumente biostratigrafice (România). În acest articol s-a restructurat stratigrafia depozitelor cuaternare din Câmpia Română şi din Piemonturile Subcarpatice (între Adjud şi Drobeta Turnu Severin); s-a conturat o nouă unitate paleogeografică (Bazinul Valah, Pleistocen); s-a conturat o structură tectonică (Pânza Valahă) precizată la limita Pliocen-Pleistocen (la ~ 2,58 milioane ani); s-a propus o nouă scară stratigrafică a Cuaternarului din Bazinul Valah (valabilă pentru întregul Domeniu Paratethis); s-a demonstrat prezența unei noi unități geologice (Danubianul) în Orogenul Carpaților Orientali, sub Megastructura (Pânza) Getică Laramică şi peste ?Unitatea Teleajen-Macla-Audia; s-a constatat că în cadrul unității litostratigrafice a Stratelor de Cândeşti au fost incluse mai multe unități litostratigrafice de vârste diferite, delimitate prin discordanțe; s-au precizat două faze tectogenetice (Faza Tectogenetică Valahă Vrânceană cantonată la ~ 2,58 milioane ani şi Faza Tectogenetică Pasadenă Focşani cantonată la 1,0 milioane ani) marcate prin discordanțe foarte evidente ale depozitelor şi prin discontinuități deformaționale. În cadrul Bazinului Valah s-au definit noi unități litostratigrafice; s-au redefinit unele unități litostratigrafice mai vechi; s-au conturat două unități depoziționale (unitatea depozițională centrală şi unitatea depozițională marginală cu două subunități: subunitatea depozițională marginală

nordică şi subunitatea depoziţională marginală sudică); s-au făcut precizări de natură ambientală şi s-au făcut corelări regionale.

Cuvinte cheie: Bazinul Valah, Pleistocen, Buridavian, Ordessensian, litostratigrafie, biostratigrafie.

INTRODUCTION

In this article we used the terminology employed by Grasu (Grasu et al., 1999; 2002), etc. on foreland basin (Dickinson, 1964) with flysch and molasse stages (Sinclair, 1997), with molasse and premolasse phases (Ensele, 1992) and with morphostructural and depositional aspects (DeCelles & Giles, 1966) as: orogenic prism, flexural dome, wedge-top depositional area, foredeep depositional area, forebulge depositional area etc. It appears that this terminology, which is a breakdown of the terminology used by Ion Dumitrescu (Dumitrescu et al., 1962) is easily applicable to the Carpathian Foredeep's study: the orogenic prism represents the overthrust's head, sometimes blind and „inter layered" in foredeep basin's deposits; wedge-top depositional area (superimposed to the orogenic prism) corresponds to the internal, epiorogenic sidewall of the foredeep (Dumitrescu et al., 1962), or to the internal area of the foredeep (Dumitrescu et al., 1968; 1970); Foredeep depositional area and forebulge depositional area corresponds to the external, epiplatformic, epicratonic flank of the, foredeep (Dumitrescu et al., 1962) and to the Sarmato-Pliocene external area (Dumitrescu et al., 1968; 1978).

Săndulescu (Săndulescu, 1984) integrated the molasse from the Carpathian Nappe to Moldavides, the latest remaining molasse deposits being assigned to the Foredeep sensu stricto (s. str).

From a morphological perspective, in the concavity of the Mehedinţi Bend (Stănoiu, 2005) from the Carpatho-Balkan Orogen, between the South Carpathians and the Balkans, looms the Valah Depression (Liteanu, 1961). The depression of this great morphological unit is represented by the Romanian Plain. Between the Carpathian Mountains and the Romanian Plain are distinguished two major morphological units stacked over the Carpathian Foredeep: 1. Sub-Carpathians, situated outside the Carpathians; 2. Sub-Carpathian Piedmonts, located between the Sub-Carpathians and Romanian Plain. South of the Danube, Sub-Carpathians and Sub-Carpathian Piedmonts are missing, here, between the Balkans and the Romanian Plain Pre-Balkans interposes.

The progressive decreasing from east to west, of the Cenozoic deformation's intensity-transpresional, with shortening for the external part of the South Carpathians Orogen (Dumitrescu & Săndulescu, 1968; Dumitrescu et al., 1962; Săndulescu, 1984; Krézsek, 2012; etc.), and the virtual absence of these tectogenese outside the Balkan Orogene (Săndulescu, 1984; Bergerat et al., 2010; Ivanov, 1998), had several consequences: 1. The synchronous transition from flysch facies of the Premolasic Moldavides from Eastern Carpathians to molasse facies (Dumitrescu & Săndulescu, 1968; Săndulescu, 1984) of the Getic Foredeep form the South Carpathians, characterized by abundant conglomerates and the

presence of evaporites; 2. The gradual transition from Vrancea Bend region where Foredeep deposits are intensely deformed by major Miocene-Quaternary tectonic structures, thrusted with shortening (Băncilă, 1958; Dumitrescu et al., 1962; Săndulescu, 1984; Stănoiu, 2012-2013), to the Mehedinți Bend region, where Foredeep deposits occur almost undistorted as homocline with rare discordances (Marinescu, 1978), imposed by oblique convergence and important dextral rotation (Krautner et Krstic, 2002; Krézsek et al., 2012) associated especially with large-scale strike-slip type deformations, accompanied predominantly by openings; 3. The reduction to extinction from east to west (Mehedinți Bend region), in the same sense, of the Moldavides, the Carpathian Foredeep, the Subcarpathians and of the Sub-Carpathian Piedmonts; 4. The absence of the Foredeep, the Subcarpathians and of the Subcarpathian Piedmonts north of the Balkans; 5. The large scale of the Valah Basin, the Moldav Basin (Dacic Basin, Saulea et al., 1969), the Carpathian Foredeep, the Subcarpathians and Sub-Carpathian Piedmonts in the northern part of Valah Depression, adjacent to the Carpathians; 6. An intense deformation of the northern flank's deposits (adjacent Carpathians) from the Moldav Basin to the southern flank's deposits (Stănoiu, 2012-2013); 7. A greater thickness of the northern flank's deposits (defined by a piedmont accumulation) from the Moldav and Valah Basins versus lower thickness of the southern flank's deposits (Saulea et al., 1969; Jipa & Olariu, 2009; Stănoiu, 2012-2013); 8. A coarse appearance and greater frequency of detrital deposits of the northern flank of the Moldav and Valah Basins compared with deposits from the southern flank (Saulea et al., 1969; Jipa & Olariu, 2009; Andreescu et al., 2011; Stănoiu, 2012-2013); 9. A higher sediment filling rate of the two largest basins in the southern flank than in the northern one (Olariu & Jipa, 2009; Stănoiu, 2012-2013).

The transtensional opening, along the direction of the Timok-Țicleni-Scoarța and Vârciorova-Baia de Aramă-Săcel-Govora faults (with significant strike-slip type deformations) prevalent in Paleogene-Lower Miocene from the Mehedinți Bend region (Western part of the Valah Depression) was replaced progressively to the east by transpresional shortenings, especially subsequent to the inversion of Middle Miocene prevalent in the Eastern Carpathians (especially in the Vrancea Bend region), as shown in most of the existing information, in particular (Krautner & Krstic, 2002; Stănoiu, 2004; Krézsek et al., 2012).

A synthesis of existing information shows that in the region of the Carpathian Orogene Foreland Basin (especially in the Eastern Carpathians) important tectonic structures can be distinguished in the overthrust bloc: 1. The Laramic Nappe (Megastructure) emerged in the Laramic Tectonogenetic Phase, belonging to the Dacides; 2. Cenozoic tectonic structures characteristic of the Moldovides represented by the Old Styric Nappe (Megastructure) with three major digitations (the Curbicortical, Macla and Audia), by the New Styric Nappe (Megastructure) with two digitations (Tarcău and the Marginal Folds), represented by the Moldav Nappe (Megastructure) with two major digitations (Pietricica and Mărgineşti - Perchiu, Săndulescu, 1984) and by the Valah Nappe (Megastructure) with two major digitations (a lower one, Scoarța and an upper one, Chiliile)

(Fig. 1, 2). Following the conclusion of the above, mentioned Cenozoic tectonic megastructures that correspond to some compression episodes, four well-individualises, well-outlined subunits (the Old Styric Basin, the New Styric Basin, the Moldav Basin and the Valah Basin; well definite paleogeographic, tectonic, lithostratigraphic, morphologic etc.), synchronous with some tension, free intervals were formed. Four main tectonic-stratigraphic cycles correspond to the four basins: 1. The Old Styric Cycle (Burdigalian-Badennian: Langhian); 2. The New Styric Cycle (Badennian: Cossovian-Lower Sarmatian); 3. The Moldav Cycle (Upper Sarmatian: Bessarabian-Pliocene: Romanian); 4. The Valah Cycle (Pleistocene: Buridavian-Ordessensian: ~ 2.58-0.01 My).

Between the Outer Dacides (which in this case appear in front of the Laramic Megastructure) and the Moldavides (represented by the Curbicortical Flysch Unit) lies the Danubian (the Perimoldavian Cordillera: Săndulescu, 1984), overlapped in the Eastern Carpathians by the Outer Dacides (Fig. 2). The existence of Danubian under the Laramic Plan, under the Laramic Getic Megastructure (Nappe), form the Eastern Carpathians Orogene is justified by the presence of the following rocks (reported by Bancila, 1958; Marinescu, 1962) along the Lutu Rosu Line: greenish-purple marly-limestone with *Aptychus*, marly-limestone with *Calpionella alpina* and lumachele breccia with *Aptychus*; white limestone with *Lithoceras* sp., limestone breccias with silicolite and crystalline schists; white and gray limestone etc.

The Vrancea Valah Tectonogenetic Phase is the last major converging event, with crust shortening (materialized in the Valah Nappe of the Vrancea Bend area) of the Carpathian Orogene, of the Moldavides (the Eastern Carpathian Foreland Basin), and of the Carpathian Foredeep (the Foreland Basin molasse phase).

The Valah Nappe is very well individualized (Stănoiu, 2012-2013) in the Vrancea Bend area (where major tectonogenesis has been going on up to the Present: the Vrancea Earthqakes) along a distance of over 100 km between the Trotuş and the Teleajen Valleys. This tectonic structure is argued by the severely warped deposits (folded and faulted) of the Miocene-Pliocene (inclusive of the gravels of the Motru-Vâlsan Member situated in the upper part of the Romanian) belonging to the Soveja Unit, thrust over synchronous deposits (warped only below the Valah Plane) of the Moldav Basin, Milcov Unit. The Valah Plane (with some 45^0 surface dip towards the Orogene inside) is very well outlined by the Casin-Jitia-Berca-Urlați Linement sealed (unconformably covered) by Valah Basin deposits beginning with the gravels of the Odobeşti Formation (Pleistocene, Buridavian: ~ 2.58 - 1.0 My). All these argue that the Valah Nappe emerged in the Vrancea Valah Tectonogenetic Phase (~ 2.58 My) at the Romanian-Burdigalian boundary, at the limit between the Pliocene and the Quaternary (set according to the latest proposals) (Fig. 1, 2).

The Valah Basin, the Moldav Basin, the Eastern Carpathian Foreland Basin, the Carpathian Foredeep Basin, etc. fall into the episutured, post-collisional peripheral basins situated mostly on the subducted continental lithosphere (the

epiplatform external flank: the foredeep and forebulge depozones) and over the orogene wedges of the last overthrust tectonic structures of the Carpathian Orogene (the inner epirogenic flank: the wedge-top depozone).

The Valah Basin, corresponding to the Valah Cycle (Pleistocene, Buridavian-Ordessensian, ~ 2.58-0.01 My), was formed in the Vrancea Valah Tectonogenetic Phase, set (Stănoiu, 2012-2013) at the boundary between the Pliocene and the Pleistocene (~ 2.58 My according to the latest proposals), between the Romanian and the Buridavian, between the Motru Valley Formation (Romanian, warped as effect of the Vrancea Valah Tectonogenetic Phase) and the Odobeşti Formation (Buridavian, unconformable, unwarped) inside the Cândeşti Beds (Stănoiu, 2012-2013).

What has been a said (Stănoiu, 2012-2013) show that initially, Mrazec and Tesseyre (Mrazec & Tesseyre, 1901), had included two lithostratigraphic units (the gravels of the Motru-Vâlsan Member and the gravels of the Odobeşti Formation) into the Cândeşti Beds (Cândeşti Gravels). Those two units are of different age (Romanian and Pleistocene), warped at very different intensities and separated by a major unconformity with sedimentation gap (controlled by the Vrancea Valah Tectonogenetic Phase). The units in question belong to two distinct tectonic-stratigraphic units (the Valah Nappe and the post-tectonic cover of units subject to the Valah Tectonogenesis represented by rocks of the Valah Basin northern marginal depositional subunit) (Fig. 6).

The unwarped Valah Basin, subsequent to the formation of the Valah Nappe, corresponding with the Valah Cycle (Pleistocene, Buridavian-Ordessensian, ~ 2.58-0.01 My), emerged in the Vrancea Valah Tectonogenetic Phase relating to the strike-slip sinister episode (Dinu, 2006), which is the last major episode connected with sinister transcurrent warpings along the NNE-SSW direction. The Valah Basin wedge-top depozone is represented by the northern marginal depositional subunit of the basin, unconformably overlapping the front edge of the blind Moldav Nappe of the Soveja Unit (severely warped as effect of the Vrancea Valah Tectonogenetic Phase) where it forms the post-tectonic cover of the Valah Tectonogenetic units. The Valah Basin forebulge depozone is represented by the southern marginal depositional subunit, approximately marked by flexion (Săndulescu, 1984) suggestive of the flexural dome. The Valah Basin Foredeep depozone is represented by the central depositional subunit overlapping the depocentral unit (intensely subsiding) of the Slatina-Titu-Măicăneşti-Focşani Perimeter (and of the Bucharest Perimeter, in the Ordessensian) situated largely at the forefront of the blind Moldav Nappe, Milcov Unit.

The formation of the Moldav Nappe (Subcarpathian Nappe: Săndulescu, 1984) was followed by the emergence of the Moldav Basin (Dacic Basin: Saulea, 1969) corresponding with the Moldav Cycle (Upper Sarmatian-Pliocene), the outcome of the Moldav Tectonogenetic Phase (Săndulescu & Visarion, 2000), corresponding with the dextral transtensional episode in the upper Miocene, intra-Sarmatian (Dinu, 2006). The wedge-top depozone (northern marginal depositional subunit) of the Moldav Basin (warped as effect of the Valah Tectonogenesis)

represents the post-tectonic cover of units subject to the Moldav Tectonogenesis (Moldav Cycle deposits in the Comăneşti area, Pătârlagele, etc.), unconformably overlaying all Moldavide units (part of the Valah Nappe) as far as the Dacide Unit, proves the importance of the Vrancea Valah Tectonogenetic Phase and the wide expansion of the Moldav Basin. The forebulge depozone of this basin (less outlined, unwarped) is represented by the southern marginal depositional subunit of the Moldav Basin (with frequent detritic deposits: Saulea et al., 1969; Jipa & Olariu, 2009), approximately overlapped by the southern marginal depositional subunit of the Valah Basin. The Moldav Basin Foredeep depozone, warped only in the forefront of the Valah Nappe (where it lies under the Valah Plane), is represented by the central depositional unit of the Moldav Basin, featuring a wealth of clayey-sand deposits (Saulea et al., 1969; Jipa & Olariu, 2006).

RESULTS AND DISCUSSIONS

1. The Valah Basin (Fig. 1-3, 7, 9).

The Valah Basin, which mostly overlapped the Moldav Basin (outlined by Saulea et al., 1969; Jipa & Olariu, 2009), highlights a lesser extension and movement outwards towards the latter, controlled by the movement of the depositional units and the depo-centres and by the reduce intensity of the Moldav and Valah tectogenesis in the same direction.

1.1. Main environments.

Was approximated (Stănoiu, 2006; 2007; 2008; 2012-2013) that in the Valah Basin's evolution some main environments (areas) occur: 1. Dacic Ambiance looks mostly the kind of low alluvial plains characterized by unconsolidated terrain, very paludal (excessive lake type paludal sequences), drained by Dacic River Network represented by braided-anastomosed-meandering valleys without terraces; 2. Odobeşti Ambiance is characterized by a moderate paludal field, poorly consolidated, represented predominantly by alluvial fans, composed mainly of gravel from Carpathian sequences, with clayey-sandy sequences, drained by Odobeşti River Network, predominantly torrential, without terraces; 3. Frăteşti Ambiance is characterized by poorly consolidated, moderate paludal, more marshy than the Odobeşti Ambience terrain characterized by abundant gravel of Balkan, Pre-Balkan and Dobrogean origin, drained by Frăteşti River Network consisting predominantly of braided-anastomosed-meandering valleys, associated with torrential valleys without terraces; 4. Valah Ambiance is defined as a consolidated (firmly) and dry terrain drained by Valah River Network made up of straight terraced valleys.

1.2. Depositional ensemble (Fig. 3, 7, 9).

Existing information highlights (Stănoiu, 2006; 2007; 2008; 2012-2013) spatio-temporal sharing of the Pleistocene facies and ambiances (2.58 to 0.01 My) from the Valah Basin paleogeographic unit (suggested by Liteanu, 1961; Jipa, 1999), synthesized in a depositional assembly controlled tectonically, morphologically, environmentaly and climaticaly, with two main units: 1. A central

depositional unit, distal relative to the Carpathians and the Balkans (including Sub-Carpathians, Pre-Balkans, Dobrogea and Moldav Tableland), which represent the source area; 2. A marginal depositional unit, proximal compared with the morphological entities listed above, representing the source area. In the marginal depositional unit it outlines two subunits: 1. Northern marginal depositional subunit (Carpathian), proximal relative to the Carpathian regions (including the Sub-Carpathians) that constitute the source area; 2. Southern marginal depositional subunit (Balkan), proximal in relation to Balkan regions (including Pre-Balkans and Dobrogea Tableland) which were the source area. The connection between the northern marginal and southern marginal depositional subunits is achieved in the western part of the Valah Basin, in the concave region of Mehedinți Bend, in Bălăciței Piedmont.

Central depositional depressional unit overlaps the northern and north-eastern part of the Romanian Plain (including Siret Plain) which coincides with the Slatina-Titu-Măicăneşti-Focşani Perimeter of an intense subsidence, progressively amplified from west to east. Central depositional unit, especially Slatina-Titu-Măicăneşti-Focşani Perimeter represents a deposition region of the Valah Basin with Focşani Depression depositional centre where the rate of Pliocene-Quaternary subsidence is 0.86 km/My and the thickness of Badenian-Quaternary deposits exceeds 9000 m (Tărăpoancă, 2004; Tărăpoancă et al., 2003) and where Vrancea Valah Phase tectogenesis highlights highest intensity accompanied by thrusted tectonic structures (Valah Nappe). Northern marginal depositional subunit overlaps the Sub-Carpathian Piedmonts characterized (Zugrăvescu et al., 1998; 1999; 2000) by present up-lifting processes. Southern marginal depositional subunit overlaps the southern and north-eastern part of the Romanian Plain, adjacent to Pre-Balkans and Dobrogea Tableland.

Slatina-Titu-Măicăneşti-Focşani Perimeter was partially emphasized by Vâlsan (Vâlsan, 1916) as the divagation area, by Mihailescu (Mihailescu, 1937; 1947) as the area of subsidence, by Posea (Posea, 2002) as the Titu Subsidence Stripe etc.

General geological context reveals that in Ordessensian (~ 1.0 to 0.01 My) the Pleistocene depositional ensemble from the Valah Basin changed by the advance of the Dacic Ambience from the central depositional unit over Bucharest Perimeter (described by E. Liteanu, in 1952, under the name of Bucharest City Area) which in Buridavian time belonged to the southern marginal depositional subunit; this phenomenon fits in to the outward shift of the depositional units. Bucharest Perimeter, which in Buridavian time belonged to the central depositional unit (controlled by Dacic Ambience), can be interpreted as a subunit of the central depositional unit which in Ordessensian make the transition between typical southern marginal depositional subunit and the typical central depositional unit from Slatina-Titu-Măicăneşti-Focşani Perimeter.

The above-mentioned depositional assembly is shown also for Dacic (Moldav) Basin's Pliocene (Romanian) by: 1. The Motru-Vâlsan Member (Gravels) (argued by the information provided by: Liteanu & Feru, 1964; Saulea et

al., 1969; Mihăilă, 1971; Enache, 1976; Pană et al., 1981; Jipa & Olariu, 2009; Andreescu et al., 2011) that corresponds to the northern marginal depositional subunit; 2. Izvoarele Formation (Lubenescu et al., 1987), characterized by the abundance of sands and clays, which corresponds to the central depositional unit; 3. Traikovo Formation (Andreescu et al., in press, from Andreescu et al., 2011) defined by the abundance of gravels, which corresponds to the southern marginal depositional subunit.

Existing information (Saulea et al., 1969; Papaianopol et al., 1987; Jipa & Olariu, 2009) argues that the depositional ensemble of the Valah Basin characterize also the Moldav (Dacic) Basin. The central depositional unit of the Moldav Basin overlaps approximately the central depositional unit of the Valah Basin which has a smaller area. Southern marginal depositional subunit of the Moldav Basin is poorly highlighted. Northern marginal depositional subunit of the Moldav Basin is very extensive in all the tectono-stratigraphic units integrated in the Valah Nappe (up to Dacides Unit), and is represented by post-tectogenetic cover of the units with Moldav Tectogenesis, deformed as a result of Vrancea Valah Tectogenetic Phase. Regarding the equivalence of structural, morphological and depositional elements of Moldav Basin and structural, morphological and depositional elements of the foreland basin, might be appreciate that the northern marginal depositional subunit of the Moldav Basin corresponds to the wedge-top depositional area partially superimposing the orogenic prism of Moldav Nappe, the central depositional unit corresponds to the Foredeep depositional area placed to the Moldav Thrust's front and the southern marginal depositional subunit corresponds approximately to the forebluge depositional area marked by the flexure depicted by Săndulescu (Săndulescu, 1984).

1.3. Discontinuity moments (Fig. 3, 7, 9).

The evolution of Valah Basin during the Pleistocene highlight the existence of some tectonical, lithostratigraphical, environmental, climatic etc. discontinuity moments (Stănoiu, 2012-2013) correlated at global and regional scale, controlled predominantly by terrestrial and cosmic causes, which have contributed to the stratigraphic scale subdivisions proposed in this article: 1. Vrancea Valah Moment (Stănoiu et al., 2010a; 2010b) stated (Stănoiu, 2011-2012) at ~ 2.58 My at the boundary between the Pliocene (Romanian) and Pleistocene (Buridavian); 2. Focşani Pasaden Moment (Stănoiu et al., 2010a; 2010b) stated (Stănoiu, 2011-2012) at ~ 1.0 My at the boundary between Buridavian and Ordessensian; 3. Getic Pasaden Moment appreciated ~ 0.78 My in age, at the boundary between Vranceanian (~ 1.0 to 0.78 My) and Focşanian (~ 0.78 to 0.01 My); 4. Hierasus Moment (name suggested by the name of Siret Valley during Burebista and Decebal kings) said to ~ 0.01 My age at the boundary between the Pleistocene (Focşanian) and Holocene. It is noted the large scale of the lithostratigraphic, tectonic, climatic and environmental discontinuities corresponding to Focşani Pasaden Moment, especially of tectonic and climatic discontinuities corresponding to Vrancea Valah Moment, both very evident throughout the Paratethys region.

1.4. Litostratigraphy.

The lithostratigraphic assembly of Pleistocene (Buridavian-Ordessensian, ~ 2.58 to 0.01 My) from the Valah Basin described by Stănoiu (2012-2013) in an article published on 30.11.2012, overlap the above-mentioned depositional assembly, demonstrating that both have undergone a common tectonic, environmental, climatic and morphological control.

1.4.1. Central depositional unit (Fig. 3, 7, 8, 9).

Central depositional unit of the Valah Basin, characterized by a uniform lithology, clayey and sandy, without discordances, is located in two areas: 1. Slatina-Titu-Măicăneşti-Focşani Perimeter, characterized by the presence of a clayey-sandy lithology throughout Pleistocene (defined as Slatina-Titu-Măicăneşti Formation) and the highest subsidence in Romania strongly amplified from west to east; 2. Bucharest Perimeter, located in the surroundings of Bucharest City (Liteanu, 1952) is characterized by abundant clayey and sandy lithology (in Coconi-Mostiştea Group: Coconi and Mostiştea Formations) and the emergence of a typical conditions for central depositional unit (both Dacic Ambiance drained by Dacic River Network) since Ordessensian.

1.4.1.1. Slatina-Titu-Măicăneşti-Focşani Perimeter.

1.4.1.1.1. Slatina-Titu-Măicăneşti Formation (Stănoiu, 2006; 2007; 2012-2013) is represented by the clayey-sandy lithological sequence from Slatina-Titu-Măicăneşti-Focşani Perimeter, Pleistocene in age (Buridavian-Ordessensian, ~ 2.58 to 0.01 My, between the Vrancea Valah and Hierasus Moments), has an average thickness of about 300 m (increasing from west to east especially do to subsidence amplification in the same direction) and is situated by gradual lithological transition over Izvoarele Formation rocks (Romanian: Lubenescu et al., 1987) and under the alluvial rocks of the valleys belonging to the Valah Fluvial Network of Holocene age. The decrease from east to west of the Vrancea Valah Tectogenesis' intensity from the Carpathians Foredeep and the subsidence amplification from west to east for Slatina-Titu-Măicăneşti-Focşani Perimeter had some impact on Slatina-Titu-Măicăneşti Formation: 1. Thickness increase from west to east; 2. Occurrence in the western part of gravel intercalations; 3. Outlining of two juxtaposed lithostratigraphic subunits (Titu-Măicăneşti Member and Slatina-Titu Member).

1.4.1.1.1.1. Titu-Măicăneşti Member has an average thickness of about 300 m, consists of clays and sands, occurs in the eastern part (subsided) of the Slatina-Titu-Măicăneşti-Focşani Perimeter and it is placed, through gradual lithological transition, over Ialomiţa-Buzău Member's rocks (Izvoarele Formation) with similar lithology and under the rocks of the alluvial plain of Valah River Network' valleys.

1.4.1.1.1.2. Slatina-Titu Member occurs in the western part of Slatina-Titu-Măicăneşti-Focşani Perimeter. It is place (through gradual lithological transition) over Jiu-Argeş Member's rocks (Izvoarele Formation, Romanian in age) with a relatively similar lithology, has an average thickness of 100 m and show a

clayey-sandy lithology with gravels intercalations and with fossils of molluscs and mammals indicating (Andreescu et al., 2011) QM_1-QM_3 and MN16b-MN17 areas.

1.4.1.1.1.2.1. Lower Morunglav Beds are represented by the lower part of Slatina-Titu Member (highlighted in 63104-Dobreţu well and especially in 60160-Morunglav well) characterized by the abundance of gravels, poorly argued by Andreescu (Andreescu et al., 2011) as belonging to Frăteşti and Tetoiu Formations.

1.4.1.1.1.2.2. Upper Morunglav Beds are represented by the upper part of Slatina-Titu Member highlighted in the two wells mentioned above and characterized by a reduced percentage of gravels.

1.4.1.2. Bucharest Perimeter.

Bucharest Perimeter arose as a consequence of an enlargement to the south of the Dacic Ambience from Slatina-Titu-Măicăneşti-Focşani Perimeter over the distal edge of southern marginal depositional subunit at the beginning of Ordessensian as a result of Focşani Pasaden Tectogenetic Phase. The consequence of this phenomenon was the emergence of Coconi and Mostiştea Formations (Coconi-Mostiştea Group) controlled by the Dacic Ambience (characteristic for the central depositional unit) over the Frăţeşti Formation controlled by Frăţeşti Ambience (characteristic to the southern marginal depositional subunit).

1.4.1.2.1. Coconi-Mostiştea Group.

Coconi-Mostiştea Group, clayey and sandy, is represented by the Coconi and Mostiştea Formations.

1.4.1.2.1.1. Coconi Formation was defined by Liteanu (Liteanu, 1955) as the marly complex and was named Coconi Beds by Alexeeva (Alexeeva et al., 1983) and the Coconi Formation by Andreescu (Andreescu et al., 2011). Coconi Formation belongs to Vranceanian age (at least the lower part), is consecutive to Focşani Pasaden Moment (~ 0.1 My), it has a pelitic lithology, shows an average thickness of about 100 m (gradually increasing toward north to Slatina-Titu-Măicăneşti-Focşani Perimeter), it is placed (through gradual lithological transition) over Frăteşti Formation and under Mostiştea Formation, it is synchronous (at least the lower part) with Drincea-Olt Formation (specified at ~ 0.96 My, synchronous with QM_6), it contains molluscan fossils characteristic to QM_6 zone, distributed by no arguments to Copăceni Beds by Andreescu (Andreescu et al., 2011) and mammalian fossils (Rădulescu et al., 1907) which indicate the range from 1.1 to 1.0 My (Andreescu et al., 2011) for its age (Fig. 5).

1.4.1.2.1.2. Mostiştea Formation was defined by Liteanu (Liteanu, 1953). as the Mostiştea Sands, it was called Mostiştea Formation by Andreescu (Andreescu et al., 2011), it belongs, at least partially, to Focşanian age, it shows a sandy lithology, it has a thickness of about 50 m, it is located (by gradual lithological transition) over Coconi Formation, it contains a faunal association (Macarovici & Kennel, 1962; Munteanu, 2006) equivalent to QM_8 biozone situated beneath 0.13 My time-line (Andreescu et al., 2011). Frăteşti Formation (including Copăceni Beds), Coconi and Mostiştea Formations represent overlapping lithostratigraphic unit's characteristic to Bucharest Region located south of Chitila-Slobozia Linement, as was defined by Liteanu (Liteanu, 1952; 1953; 1955).

Shaping (Andreescu et al., 2011; Fig. 2) these lithostratigraphic units north of the mentioned linement inside the monotonous clayey-sandy Slatina-Titu-Măicăneşti Formation from Slatina-Titu-Măicăneşti-Focşani Perimeter it is arbitrary and confusing.

1.4.2. Marginal depositional unit.

Marginal depositional unit's stratigraphic sequence shows a more heterogeneous lithology to stratigraphic sequence from the central depositional unit, with abundant gravels in Buridavian and two discordances controlled by Valah Vrancea Tectogenetic Phase and Focşani Pasaden Tectogenetic Phase. The Buridavian from the marginal depositional unit corresponds to Odobeşti-Frăteşti Group, characterized by the abundance of gravel and the Ordessensian corresponds to Drincea-Galați Group with dominant pelitic rocks represented by loess-paleosoil alternation (Craiova-Galați Formation: Focşanian) and red clay (Drincea-Olt Formation: Vrânceanian).

In the southern marginal depositional subunit to Odobeşti-Frăteşti Group corresponds Frăteşti Formation which is controlled environmentlly by Frăteşti ambiance and is drained by Frăteşti River Network, and in the northern marginal depositional subunit to the above-mentioned group corresponds Odobeşti Formation controlled by Odobeşti Ambiance and drained by Odobeşti River Network. In Ordessensian, litofacial differences between southern and northern marginal depositional subunits diminish.

1.4.2.1. Southern marginal depositional subunit (Fig. 3, 7, 9).

In Buridavian, lithostratigraphic assembly of the southern marginal depositional subunit is defined by Frăteşti Ambiance drained by the Frăteşti River Network that controlled the formation of Frăteşti Formation deposits (which belongs to Odobeşti- Frăteşti Group) characterized by the abundance of gravels. In Ordessensian, lithostratigraphic assembly of the southern marginal depositional subunit is defined by Valah Ambience drained by the Valah River Network that control the formation of Drincea-Galați Group's deposit (Drincea-Olt and Craiova-Galați Formations) characterized by the red clay and by the alternation of loess-paleosoil. Description for almost all lithostratigraphic units from the southern marginal depositional subunit was included in the articles writened by E. Liteanu (Liteanu, 1952; 1953).

It should be noted that the Bucharest Perimeter area (characterized by Coconi-Mostiştea Group) which in Buridavian belonged to southern marginal depositional subunit, has been integrated into the central depositional unit starting from Ordessensian by the invasion of Dacic Ambiance.

1.4.2.1.1. Odobeşti-Frăteşti Group.

In the southern marginal depositional subunit the Odobeşti-Frăteşti Group is represented by Frăteşti Formation.

1.4.2.1.1.1. Frăteşti Formation (including Vlădeni and Copăceni „Formations").

Frăteşti Formation defined by Liteanu (Liteanu, 1952) as the Frăteşti Gravels was called Frăteşti Formation by Alexeeva (Alexeeva et al., 1983), shows

an average thickness of 150 m, it is controlled by Frăteşti Ambiance drained by Frăteşti River Network, it is represented predominantly by gravels of balkan, prebalkan and dobrogean origin, associated with sands and clays, which defines the Buridavian age (~ 2.58 to 1.0 My) in the southern marginal depositional subunit (balkan and subordinate prebalkan and dobrogean), is placed discordantly (as a result of Vrancea Valah Tectogenetic Phase) over rocks of different ages (including the Late Romanian) and supports discordantly Drincea-Olt Formation, specified at 0.96 My and concordantly Cococni Formation, located within Bucharest Perimeter.

1.4.2.1.1.1.1. Vlădeni Member (Fig. 4).

Andreescu (Andreescu et al., 2011) separated Vlădeni Formation that highlights almost identical characteristics as Frăteşti Formation chrono-stratigraphically specified from ~ 2.58 My to 1.0 My (Stănoiu, 2012-2013). Vlădeni „Formation" it is located in the classic area of southern marginal depositional subunit (characterized by the Frăteşti Formation) between the Dobrogean Tableland in the east and the central depositional unit to north-west. Vlădeni „Formation" the same as Frăteşti Formation sits discordantly over rocks aged between Lower Aptian and Romanian. Northwest (toward the central depositional unit) thickness increases and clasts become finer, realizing the transition to rocks typically for the bottom of Copăceni-Coconi sequence (Andreescu et al., 2011), which actually belong to Titu-Măicăneşti Member of Slatina-Titu-Măicăneşti Formation. Vlădeni „Formation" supports discordant the red clay (Drincea-Olt Formation) of 0.96 My in age which in turn supports the alternation of loess-paleosoil (Craiova-Galați Formation) that develops between 0.92 to 0.01 My. Vlădeni „Formation" integrates completely in the lithostratigraphical sequence of southern marginal depositional subunit, occupiyng the typical place of Frăteşti Formation. Only the absence of conglomerates, replaced by coarse sandstones makes the only difference from Frăteşti Formation, what could possibly justify the use of the name of Vlădeni Member for the Frăteşti Formation.

1.4.2.1.1.1.2. Copăceni Beds (Andreescu et al., 2011**) and Uzun Beds** (Alexeeva et al., 1983) represents lens-like sequences predominantly pelitic, present at the top of Frăteşti Formation characterized by the abundance of gravels (Fig. 5). Andreescu (Andreescu et al., 2011) admitted that Copăceni Beds may represent a new formation or a member of the Coconi Formation. Uncertainties on Copăceni Beds are determined by the gravel sequence F_4, located at the end of Frăteşti Formation (Andreescu et al., 2011), which gradually dissapear north of central depositional unit (clayey-sandy) from Slatina-Titu-Măicăneşti-Focşani Perimeter. This situation made the pelitic rocks of the Coconi Formation to sit (by gradual lithological transition) over the pelitic rocks of Copăceni Beds. This finding allowed (Andreescu et al., 2011) as a specific molluscan fossils biozone QM_6, stationed in Coconi Formation, to be regarded as localized in Copăceni Beds which represents a pelitic seam on top of the Frăteşti Formation specified within ~ 2.58 to 1.0 My age interval. Consequently (Andreescu et al., 2011) it was possible to raise the age of Frăteşti Formation up to 0.8 My, above QM_6 biozone

without convincing arguments. General geological situation highlights (Stănoiu, 2012-2013) that the upper limit of the Frăteşti Formation is located at ~ 1.0 My because this formation supports discordantly Drincea-Olt Formation, specified at 0.96 My, synchronous to Leerdam Interglacial. In the region where the Coconi Formation is placed directly on Copăceni Beds (as a result of northern gradual dissaparence of F_4 sequence of gravels), the upper limit of the Frăteşti Formation (defined by the presence and abundance of gravels) should stratigraphically scale down under 1.0 My and not to be younger than 0.8 My, as admitted by Andreescu (Andreescu et al., 2011).

1.4.2.1.2. Drincea-Galaţi Group (Fig. 3, 7, 8, 9).

There are arguments which justify the inclusion of Drincea-Olt and Craiova-Galaţi Formations in the great lithostratigraphical unity of Drincea-Galaţi Group: a. Drincea-Olt and Craiova-Galaţi Formations are controlled by Valah Ambiance; b. Drincea-Olt and Craiova-Galaţi Formations are represented by a relatively uniform lithology defined by the presence of clays and loess-paleosoil alternation; c. The gradual lithological transition between Drincea-Olt Formation and Craiova-Galaţi Formation highlighted only when the Craiova-Galaţi Formation starts at 0.92 My with Dorst Glacier; d. The equivalence of Drincea-Olt Formation with the oldest paleosoil sequence of Craiova-Galaţi Formation; e. The location of Drincea-Olt and Craiova-Galaţi Formations in Ordessensian, from ~ 1.0 to 0.01 My, consecutively after Focşani Pasaden Moment which marks a significant discontinuity. This discontinuity has multiple significance: 1. Tectonical, explained by the discordance, with a sedimentation gap between Drincea-Olt Formation and older rocks, including Odobeşti-Frăteşti Group; 2. Ambiental, evidenced by the shift from Odobeşti-Frăteşti Ambiance defining Odobeşti-Frăteşti Group to Valah Ambiance, defining Drincea-Olt and Craiova-Galaţi Formations; 3. Litho-stratigraphical, revealed by the sudden shift from Odobeşti-Frăteşti Group defined by abundant gravels to Drincea-Olt and Craiova-Galaţi Formations characterized by clayey rocks and loess-paleosoil alternation; 4. Sequential, driven by the frequency shift from 0.041 My periodicity to 0.1 My periodicity evidenced by Müller and MacDonald in 2000 (Müller & MacDonald, 2000) (Fig. 6); 5. Climatic, marked by the beginning of a new general cooling of the climate argued by the presence of loess, by the curve of climatic evolution in the last three million years recorded by Müller and MacDonald (Müller & MacDonald, 2000, in figure 16), by the oxygen isotope scale presented by Husen and Reiner in 2011 (Husen & Reiner, 2011) for alpine glacier events, etc.

1.4.2.1.2.1. Drincea-Olt Formation (Stănoiu, 2007; 2008; 2012-2013). In the southern marginal depositional subunit, Drincea-Olt Formation (Ordessensian in age, controlled by the Valah Ambiance from the marginal depositional unit) does not appear starting from Ordessensian in the Bucharest Perimeter region which belongs to the central depositional unit (controlled by Dacic Ambiance).

Drincea-Olt Formation coresponds to the Basal Ordessensian, it has its onset around 1.0 My, it is consecutive to Focşani Pasaden Moment controlled by Focşani Pasaden Tectogenetic Phase specified at ~ 1.0 My (at the top of the

Jaramillo Event), it is represented predominantly by a red clay with ferro-manganese concretions, it has an average thickness of about 10 m, it is specified at 0.96 My (Shelkoplias, 1983), it has an age older than 0.92 My, onset of Craiova-Galați Formation mentioned above (Shelkoplias, 1983), it is synchronous with Leerdam Interglacial and MIS_{25}, it is controlled by Dacic Ambiance and by Focșani Pasaden Climatic Moment, which is one of the most important periods of relatively warm and humid climate of the Pleistocene, subsequent to Focșani Pasaden Tectogenetic Phase specified at ~ 1.0 My (Stănoiu, 2012-2013), it sits discordantly over rocks of various ages, including over Frăteşti-Odobeşti Group (Odobeşti and Frăteşti Formations) aged between ~ 2.58 to 1.0 My (Stănoiu, 2012-2013) .

It appears that the formation of Drincea-Olt Formation's deposits was controlled by timing between Focșani Pasaden Climatic Moment and Valah Ambiance emerged only a moment after Focșani Pasaden Tectogenetic Moment (~ 1.0 My) and prior to 0.92 My (onset of Craiova-Galați Formation) in Leerdam Interglacial, between Linge Glacial, corresponding to the upper sequence of Odobeşti-Frăteşti Group and Dorst Glacial, corresponding to the lower sequence of Craiova-Galați Formation, MIS_{22} synchronous (Fig. 8, 9).

Drincea-Olt Formation, who never sits over rocks newer than Buridavian, is an excellent lithostratigraphic reference for the entire Paratethys region from Hungary to Ukraine.

Red clay with ferro-manganese concretions of Drincea-Olt Formation („The Red Clay", name used by the peasants of Oltenia) can be confused with the red clay associated with paleosoil sequences from Craiova-Galați Formation and can be easily reworked in newer deposits, more particularly in the river terraces of the valleys belonging to Valah River Network.

1.4.2.1.2.2. Craiova-Galați Formation (Stănoiu, 2007; 2008; 2012-2013). Craiova-Galați Formation's debut said to be Dorst Glacier Event at 0.92 My (Shelkoplians, 1983), having the upper limit located at Hyerasus Moment (~ 0.01 My, at the beginning of the Holocene, when global warming has not been favorable to the formation of loess), it is controlled by a Valah Ambiance and by the onset (after the Focșani Pasaden Moment) of a period of colder climate (as in figure 16 in Müller and MacDonald, 2000), it is represented by an alternation of loess-paleosoil with subaerial and marsh gastropods (Sevastos, 1910; Liteanu, 1961; Enciu, 2007), it has a thickness of 70 m, with a heterochrone lower limit (Enciu, 2007), it is located over the rocks of various ages, including the red clay from Drincea-Olt Formation with which appear to merge into a single senior lithostratigraphical unit: Drincea-Galați Group, Ordessensian in age (~ 1.0-0.01 My), (Fig. 3, 7, 8, 9).

Gradual lithological transition (loess-paleosoil alternation at the beging of Dorst Glacier) between Drincea-Olt and Craiova-Galați Formations (which implies the existence of loess interlayeres at least in the upper part of Drincea-Olt Formation), and the confusion that can be made between the red clay of Drincea-Olt Formation and the red clays associated with paleosoil sequences of Craiova-Galați Formation could explain the age of 1.0 My attributed sometimes to the onset of Craiova-Galați Formation.

1.4.2.1.2.2.1. Panciu and Zăbrăuț litostratigraphic subunits. In Craiova-Galați Formation there are (Stănoiu et al., 2010) two lithostratigraphic subunits with a very arbitrary boundary between them: 1. Panciu Subunit (Vranceanian), at the bottom; 2. Zăbrăuț Subunit (Focşanian) at the top (with frequent fluvial structures and sequences). Zăbrăuț Subunit is connected with river terraces belonging to present Valah River Network (including the Danube), which started at about the limit between Panciu Subunit and Zăbrăuț Subunit (Stănoiu et al., 2010), at ~ 0.78 My (Fedorov, 1978; Shapoval et al., 1994; Shapoval, 1996; Muşinschi, 1999; Andreescu et al., 2011), synchronous with the maturation of the Valah River Network's valleys (with terraces), consecutively after Danube capture in the Gorge which has resulted in an emergence of present Pannonian-Dacic Danube (Stănoiu, 2008). Zăbrăuț Subunit is synchronous with some important alpine glaciations, outlined by Husen and Reitner in 2011 (Gunz at MIS_{16}, Mindel at MIS_{12}, Riss at MIS_{6}, Wurm at MIS_{2-4}), which seems to confirm the relationship of determination between mountain ice ages and the main terraces of the valleys belonging to present Valah Fluvial Network.

Consequently to the Focşani Pasaden Tectogenetic Moment, Dacic Ambiance from Slatina-Titu-Măicăneşti-Focşani Perimeter invaded Bucharest Perimeter region. In Ordessensian Dacic Ambiance from Bucharest Perimeter began to gradually withdraw to the north into Slatina-Titu-Măicăneşti-Focşani Perimeter in a Prebalkan related region and to the west in Dobrogean related region. Simultaneously advance occurred in the same sense for the Valah Ambiance which controlled Drincea-Galați Group's deposit formation from southern marginal depositional subunit related to Prebalkans and Dobrogea. Thus, Valah Ambiance who controlled the formation of Drincea-Galați Group's deposits, reached the Slatina-Titu-Măicăneşti-Focşani Perimeter barely at the beginning of the Holocene when climatic warming and persistence until the end of the Pleistocene of intense palud Dacic Ambiance (unfavorable for loess formation) does not has allowed the formation of loess. This statement has several consequences: 1. The lack of loess in most of the Slatina-Titu-Măicăneşti-Focşani Perimeter; 2. Diachronic aspect of the lower limit of Craiova-Galați Formation (oldest on the proximal marginal depositional unit and newest in the distal edge); 3. Craiova-Galați Formation debut at different times; 4. Drincea-Olt Formation (discordant) often occurs as lenses placed over the basement of different ages and under Craiova-Galați Formation that starts at different times.

1.4.2.2. Northern marginal depositional subunit (Fig. 1, 2, 3, 7, 9).

The almost complete sequence of the lithostratigraphic entities belonging to northern marginal depositional subunit was excellent described by Mateescu (Mateescu, 1927) in the region situated between Putna and Râmnicul Sărat Valleys with the two, bottom and top, discordances bordering the Cândeşti Gravels (assigned to Levantine assigned then to Pliocene).

1.4.2.2.1. Odobeşti-Frăteşti Group.

In the northern marginal depositional subunit the Valah Basin starts with Odobeşti-Frăteşti Group (Buridavian) characterized by the abundance of gravels and is represented by Odobeşti Formation.

1.4.2.2.1.1. Odobeşti Formation (Stănoiu, 2012-2013). Odobeşti Formation represents the upper, discordant lithostratigraphical unit which was embedded in Cândeşti Beds (Mrazec & Tesseyre, 1901), it is characterized by the abundance of gravels with sands and clays sequences, it is controlled by Odobeşti Ambiance drained by Odobeşti River Network, has a thickness up to ~ 500 m (to the east), occurs predominantly in Sub-Carpathian Piedmonts between Trotuş and Danube Valleys and has the stratotype in Măgura Odobeşti Hill from the convexity of Vrancea Bend of the Carpathian Orogen.

Odobeşti Formation Lithon, which mostly represents the wedge-top depositional area of the Valah Basin (corresponding to the post-tectonic cover of the units with Valah Tectogenesis), develops in the external part of Sub-Carpathian in Sub-Carpathian Piedmonts as a quasi horizontal plate, slightly inclined to the external undeformed orogene, which sits more discordant over some tectonic structures and tectonostratigraphical units: 1. Over the overthrust plane of Valah Nappe from Soveja Unit; 2. Over the front of the Valah Nappe from Soveja Unit; 3. Over the deposits of Moldav Basin from Milcov Unit. Progressive decrease from east to west of the intensity of Valah tectogenesis from Western Carpathians Foredeep had several consequences over Odobeşti Formation it controlled: 1. Reducing the percentage of gravels in the same direction; 2. Reduction in thickness in the same direction; 3. Decrease in the same sense of Sub-Carpathian Piedmonts scale as well as the absence of this morphological units north of the Balkans; 4. Individualization of several lithostratigraphic subunits within Odobeşti Formation (Măgura Odobeşti Member, Perşunari Member, Tetoiu Member).

1.4.2.2.1.1.1. Măgura Odobeşti Member (Stănoiu, 2012-2013). Măgura Odobeşti Member has a very obvious discordant position (Fig. 3, 6, 7, 9; Photo. 1), it is representative for Odobeşti Formation, it occurs in the region of Buzău Valley and Trotuş Valley, it has the stratotype in Măgura Odobeşti Hill, it consists predominantly of sands and gravels associated with clays and shows a thickness of up about 500 m. Măgura Odobeşti Member's Lithon (and Odobeşti Formation's Lithon) has the form of a quasi horizontal plate, slightly inclined toward external part of the orogene, undistorted, which sits discordantly (Photo. 1) over different lithostratigraphic entities: 1. Over Motru Valley Formation's rocks consisting of Râmna Member (Râmna Formation) (Andreescu & Țicleanu, 1977) corresponding to the lower part of Romanian and of Motru-Vâlsan Member (including Pralea Gravels with coal and mammals remnants) corresponding to the Upper Romanian (including Valahian) (Andreescu et al., 2011); 2. Over Pleşcoi Beds rocks (Pană et al., 1968), referred to ~ 3.2 My, approximately at the Pelendavian-Valahian limit (Andreescu et al., 2011); 3. Over Pliocene rocks from the Milcov Unit (including gravels from Pralea equivalent with Motru-Vâlsan Member and clayey-sandy rocks

of Meotian) that in front and below the overthrust plane of the Valah Nappe (Caşin-Jitia-Berca-Urlaţi Linement) are redressed to vertical and even reversed.

High frequency of conchoidal oblique lamination (Stănoiu et al., 2010) (Photo. 6, in Stănoiu et al., 2010), which argues large scale sediment gravity slides in plastic state (Photo. 2), resulted in an overstatement of the value of the Măgura Odobeşti Member's thickness and probably caused appreciation as which Cândeşti Gravels (assigned to Lower Pleistocene) underwent deformation controlled by Valah Tectogenesis arguing the lower postpleistocen age attributed for this tectogenesis.

1.4.2.2.1.1.2. Perşunari Member (Stănoiu & Istrate, in press). Perşunari Member has a thickness of about 50 m, it is represented by undeformed rocks (gravels, sands and clays with interlayered sands) and sits discordant over rocks intensely deformed (Old Styric, New Styric and Moldav Cycles) on the front of the Valah Nappe (located in Soveja Unit), which includes Moldav Nappe rocks (Old Styric and New Styric Cycles) and rocks from the postectonic cover from units with Moldav Tectogenesis (Moldav Cycle). To Perşunari Member may belong too the alternation of sands, gravels and clays signalled by Liteanu (Liteanu et al., 1967) under the red pelitic complex of Teleajen and Prahova Valleys. Perşunari Member's Stratotype is located in the Perşunari village region (located in Tohăneanca Valley, a tributary on the left side of the Budureasca Valley) where sits discordant over intensely deformed (folded and faulted) Valah Nappe rocks from Soveja Unit, reaching over Istra Limestone (Kersonian) (Micu, 1976; 1978) reworking them.

1.4.2.2.1.1.3. Tetoiu Member. Tetoiu Member has been named by Andreescu (Andreescu et al., 2011) as the Tetoiu Formation, develops in the western part of the northern marginal depositional subunit (between Motru and Dâmboviţa Valleys), it is composed predominantly of sands and gravels, has an average thickness of 30-50 m, discordantly overlap the Motru Valley Formation rocks (Râmna Member, clayey at the bottom and Motru-Vâlsan Member characterized by the abundance of gravels at the top) and is attributed to Romanian age, mostly described by Liteanu (Liteanu et al., 1976) and Mihăilă (Mihăilă, 1971).

1.4.2.2.1.1.4. Bălăciţa Member (Beds). The Bălăciţa Member (Beds) makes the transition between Odobeşti Formation characteristic for the Buridavian from the northern marginal depositional subunit and synchronous Frăteşti Formation belonging to the southern marginal depositional subunit. Bălăciţa Member (Beds) develop in the western end of the Valah Basin (in Bălăciţa Piedmont, in the concavity of Mehedinţi Bend), has an average thickness of about 30 m, sits discordant over ancient rocks and also supports the red clay of the Drincea-Olt Formation (Boengiu, 2008; Liteanu, 1978).

Evidence suggests that some of the old terraces of the main tributaries of the Danube valley from Valah Depression would represent remnants saved from erosion of Odobeşti Formation (Gravels) which extended toward internal part of Carpathian Orogene over Carpathian Foredeep's tectono-stratigraphic units prior of

the Vrancea Valah Tectogenetic Phase. Among these may be mentioned: 1. Terrace VI of Teleajen Valley called „Fântâna Rece Alluvial Level" (Niculescu, 1963), which supports red clay; 2. Gravels plated with lateritic red clays from southeast Vulcăneşti (Hanganu, 1966); 3. Discordant gravels flaps atop the Caşin Valley slopes, shown on the Geological Map of Romania, scale 1:50,000, sheet Caşin Monastery; 4. Discordant patch of gravels featured on Geological Map of Romania, scale 1:50,000, sheet Pucioasa south-east of the Glodeni town; 5. At least some gravel from Bran Hill (Posea, 2002); 6. The high terrace, plated with red clay, located on top of the left side of the Jiu Valley, upstream of Târgu Jiu town (I. Huică, verbal information), etc. In this regard there are several precedents: 1. Ionescu-Argetoaia (Ionescu-Argetoaia, 1918) acknowledged that discordant gravels representing the Odobeşti Formation belong to Danube alluvia; 2. Liteanu and Ghenea (Liteanu & Ghenea, 1953) attributed Odobeşti Formation's gravels to the Danube terraces; 3. Enciu (Enciu, 2007) acknowledged that the gravels that are now assigned to Odobeşti Formation belongs to the Lower Danube Formation; 4. Pécsi (Pécsi, 1982; Pécsi et al., 1984; Pécsi et al., 1988, in Gabris et Nádor, 2005) found that old terraces deposits of the Danube (t. VII and t. VIII) from Visegrad Gorge belong to a pediment or to a lacustrine and coastal-deltaic Pannonian, etc.

1.4.2.2.2. Drincea-Galaţi Group.

The Vranceanian from the northern marginal depositional subunit is represented by Drincea-Galaţi Group (Drincea-Olt and Craiova-Galaţi Formations) composed predominantly of red clay and loess-paleosoil alternation.

1.4.2.2.2.1. Drincea-Olt Formation (Stănoiu, 2007; 2008). Drincea-Olt Formation was discussed in chapter **1.4.2.1.2.1.** Red clay, the name under which it is known Drincea-Olt Formation, has been mentioned in the northern marginal depositional subunit region. Mateescu (Mateescu, 1927) mentions red clay (Lower Pleistocene) discordant over Cândeşti Beds (assigned in that time to Upper Levantine) from Putna and Râmnicul Sărat Valleys region. Liteanu (Liteanu et al., 1971) describes the red clay (Middle Pleistocene) in Nişcov Valley and north of Râmnicul Sărat Valley over Cândeşti Gravels and under loess deposits. Red deposits located over Tetoiu Member's rocks and under loess sequence are mentioned in the Getic Piedmont by Liteanu (Liteanu et al., 1976), Mihăilă (Mihăilă, 1971) and Parichi (Parichi, 2001). Red clay with ferro-manganese concretions appears well developed in Bălăciţa Piedmont, over Bălăciţa Member (Beds)'s rocks and under Craiova-Galaţi Formation's rocks described by Liteanu (Liteanu et al., 1973), Boengiu (Boengiu, 2008), etc.

1.4.2.2.1.1. Năianca Member (Stănoiu & Istrate, in press). Năianca Member consists of undeformed rocks represented by clays and sandy-clays with gravels (reddish in colour), it has a thickness of about 30 m and has the stratotype on Năianca Valley where sits discordant over the undistorted gravels of Perşunari Member, over the non-deformed rocks of Pietroasele Formation and over Istriţa Limestone, heavily distorted, belonging to the Soveja Unit (Valah Nappe), part of the wedge-top depositional area (overlapping orogenic prism of the blind Moldav

Nappe) from Moldav Basin (Dacic). Geological Map of Romania, scale 1:50,000, sheet Călugăreni, shows Năianca Member's rocks assign to the Upper Pleistocene (Riss-Würm). Also, Năianca Member probably should include the red pelitic complex rocks described by Liteanu (Liteanu et al., 1967) in Teleajen and Prahova Valleys region.

1.4.2.2.2.2. Craiova-Galați Formation. Craiova-Galați Formation was described in the southern marginal depositional subunit, in chapter 1.4.2.1.2.2.

1.4.2.2.2.2.1. Panciu Member and Zăbrăuț Member. In the eastern extremity of the northern marginal depositional subunit, in Focşani Depression (Stănoiu et al., 2010a), the two subdivisions of Craiova-Galați Formation (Panciu Member, Vranceanian in age and Zăbrăuț Member, Focşanian in age) appear well substantiated. Here it is a very obvious connection between the present Valah River Network valleys' terraces (Siret, Zăbrăuț, Şuşița, Putna, Milcov) and the upper part of Craiova-Galați Formation (Zăbrăuț Member) as shown in Ghenea (Ghenea et al., 1971), Grumăzescu (Grumăzescu, 1973), Folea (Folea, 2006), Necea (Necea, 2010), etc.

1.4.2.2.2.2.2. Budureasca Member. In the eastern part of the northern marginal depositional subunit over Năianca Member's rocks (Drincea-Olt Formation) is emerging Budureasca Member (Stănoiu & Istrate, in press) of Craiova-Galați Formation, represented by a sequence of sands and clayey-sands with loess-like aspect, which allowed intercalations, sometimes lenticulary, of clays and sandy-clays, gray-blackish, rarely reddish in colour. Budureasca Member, with a thickness of about 40-50 m, shows the presence of fluvial erosion channels represented by gravels. Budureasca Member would represent the transition between typical Craiova-Galați Formation controlled by Valah Ambiance (firm and dried ground) from northern marginal depositional subunit and Slatina-Titu-Măicăneşti Formation from central depositional unit.

1.4.2.2.2.3. Pietroasele Formation (Stănoiu & Istrate, in press). Pietroasele Formation is represented by colluvial deposits consisting of often reddish clays with Istrița limestone blocks (Kosovian), located over the limestone rocks mentioned and under Năianca Member rocks. Pietroasele Formation rocks, synchronous with Focşani Pasaden Tectogenetic Phase (~ 1.0 My), are shown on the Geological Map of Romania, scale 1:50,000, Istrița sheet, at the boundary between the Lower Pleistocene and Pliocene. The presence of reddish clays and Năianca Member rocks above suggests an age immediately after Focşani Pasaden Tectogenetic Phase specified at ~ 1.0 My.

1.5. Stratigraphic scale (Fig. 3, 7, 9).

Existing stratigraphic scales are very hard to use fot the Valah Basin do to its scarcity of fossils (most often by their lack of) and the scarcity of information regarding the age of the Quaternary deposits. This finding has imposed the need for stratigraphic scales based on lithostratigraphic criteria as suggested by Ghenea (Ghenea, 1980).

After achieving a satisfactory overall spatial-temporal ordering of the lithostratigraphic units from the Valah Basin, a local stratigraphic scale of

Quaternary (Pleistocene, ~ 2.58-0.01 My) occur. The scale it is operable throughout the Paratethys region which shows a lithostratigraphical sequence almost identical to the Valah Basin. This stratigraphical scale is based on lithostratigraphic criteria completed with existing cronostratigraphic information and it is easy to use.

According to the stratigraphic scale seted (Stănoiu, 2012-2013), during the Pleistocene (~ 2.58-0.01 My) are outlined two subdivisions (Buridavian, ~ 2.58 My to 0.01 My and Ordessensian ~ 1.0-0.01 My) pegged to the three major discontinuity moments (Vrancea Valah Moment, Focşani Pasaden Moment and Hyerasus Moment). The boundary between the Pliocene (Romanian) and Pleistocene (Buridavian) is pegged to the Vrancea Valah Moment (~ 2.58 My), triggered by the Vrancea Valah Tectogenetic Phase marked by a lithological discontinuity between Odobeşti-Frăteşti Group and the lithostratigraphic units of Romanian from below and the discordance (angular stratigraphic deformation with sedimentation gaps) of Odobeşti-Frăteşti Group from the base (specified in the age range ~ 2.58-0.01 My), etc. The limit of Buridavian and Ordessensian is pegged by Focşani Pasaden Moment (~ 1.0 My), triggered by the Focşani Pasaden Tectogenetic Phase marked by the discordance (with sedimentation gap) from the base of Drincea-Olt Formation (red clay) and the lithological discontinuity between Drincea-Olt Formation (specified at 0.96 My) and Odobeşti-Frăteşti Group (specified in the age range ~ 2.58-1.0 My) from below. The limit between Pleistocene (Ordessensian, aged from ~ 1.0 to 0.01 My) and Holocene is punctuated by Hyerasus Moment (the name was suggested by the name of the Siret Valley during Burebista and Decebal kings time) marked by the cessation of loess formation (triggered by climate warming) and by the lithological discontinuity of Craiova-Galați Formation (consisting mainly of loess-paleosoil alternation) and alluvial plain rocks of present Valah River Network. The ~ 1.0 My isochrone, which corresponds to the Focşani Pasaden Moment, was considered by Steininger and Rögl (Steininger & Rögl, 1984) the limit of the Lower Pleistocene and Middle-Upper Pleistocene from the Mediterranean Area.

The Buridavian (name suggested by the Buridavensis province of Dacia under Burebista and Decebal kings) corresponds to Odobeşti-Frăteşti Group (Odobeşti and Frăteşti Formations). Ordessensian (name suggested by the Ordessensis province of Dacia under Burebista and Decebal kings, Ordessus beeing the name of Argeş River) corresponds to Drincea-Galați Group (Drincea-Olt and Craiova-Galați Formations, very obvious in Paratethys region) and Coconi-Mostiştea Group (Coconi and Mostiştea Formations) of Bucharest Perimeter.

The Ordessensian is likely to be divided into two subdivisions, bounded by Getic Pasaden Moment at ~ 0.78 My: 1. Vranceanian (name suggested by the Vrancea region); 2. Focşanian (name suggested by the city of Focşani). Vranceanian (~ 1.0 to 0.78 My) is pegged at the bottom of Focşani Pasaden Moment (~ 1.0 My) and the upper part is framed by Getic Pasaden Moment. Getic Pasaden Moment from ~ 0.78 My is marked by the appearance of terraces for the valleys from the Valah River Network and by the final capture of Danube at the

Gorge which resulted in the appearance of the present Pannonian-Dacic Danube. Focşanian is pegged to Getic Pasaden Moment (~ 0.78 My) at the bottom and Hyerasus Moment (0.01 My) at the top. In the marginal depositional unit the Vranceanian is represented by Drincea-Olt Formation and (at least partially) by the Panciu Member (Craiova-Galaţi Formation). In the central depositional unit the Vranceanian is represented by the median part of Slatina-Titu-Măicăneşti Formation (in Slatina-Titu-Măicăneşti-Focşani Perimeter) and (at least partially) by the Coconi Formation (Coconi-Mostiştea Group) of Bucharest Perimeter. In the marginal depositional unit the Focşanian is represented (at least partially) by the Zăbrăuţ Member (Craiova-Galaţi Formation). In the central depositional unit the Focşanian is represented by the upper part of Slatina-Titu-Măicăneşti Formation (form the Slatina-Titu-Măicăneşti-Focşani Perimeter) and (at least partially) by the Mostiştea Formation (Coconi-Mostiştea Group) of Bucharest Perimeter.

Slatina-Titu-Măicăneşti Formation from the central depositional unit (Slatina-Titu-Măicăneşti-Focşani Perimeter) belongs to the Pleistocene (~ 2.58 to 0.01 My, Buridavian-Ordessensian).

Regarding the parallelization of molluscs-based biozone performed by Andreescu (Andreescu et al., 2011), the Buridavian corresponds to QM_1-QM_5 biozones; the Ordessensian corresponds to QM_6-QM_9 biozones, up to 0.01 My; the Vranceanian corresponds to QM_6 biozone; the Focşanian corresponds to QM_7-QM_9 biozones, up to 0.01 My, (Fig. 3, 7, 8, 9).

It is found that the stratigraphic scale proposed by Andreescu (Andreescu et al., 2011), based on molluscan biozones, does not work in the Dacic Basin (characterized by scarcity of fossils and often by their absence) because the boundaries between the chronostratigraphic subdivisions do not coincide with the boundaries between the lithostratigraphic units outlined.

Stratigraphic scale proposed in this article, based on lithostratigraphic criteria (supplemented by chronostratigraphic, tectonic, climatic and biostratigraphic information) is operational in most of the Paratethys region, from Hungary to Ukraine, been characterized by lithostratigraphic units almost identical to the Valah Basin and framed by the three very obvious discontinuity moments.

The Valah Moment (~ 2.58 My) finds its counterpart in the lower part of the Beds with Paludine and the Lower Complex of Danube Series from the Pannonian Basin, which shows in the marginal depositional units a discordant position and a coarse detrital lithology (Krstic et al., in Papaianopol et al., 2003; Buday, 1962; Holouzka & Minarikova, 1977) similar to Odobeşti-Frăteşti Group, Buridavian in age. Drincea-Galaţi Group (Drincea-Olt and Craiova-Galaţi Formations), Ordessensian in age, shows an identical lithology and a very large spread in almost all Paratethys region, from Hungary to Ukraine. Odobeşti-Frăteşti Group from the Valah Basin, which defines the Buridavian, has an equivalent in the Upper Beds with Paludine, rich in psephitic sequences attributed to Eo-Pleistocene (Krstic et al., in Papaianopol et al., 2003) and the Lower Complex of the Danube Series assigned to the Lower Pleistocene (Buday, 1962; Holouzka & Minarikova, 1977). Drincea-Galaţi Complex (Drincea-Olt Formation represented

by red clay and Craiova-Galaţi Formation represented by loess-paleosoil alternation) defining Ordessensian and also Focşani and Hyerasus Pasaden Moments are very evident throughout the Paratethys region. The Upper Complex of the Danube Series (Holouzka & Minarikova, 1977) correlates: with Drincea-Galaţi Complex, with Coconi-Mostiştea Complex, with the upper part of Slatina-Titu-Măicăneşti Formation, partially (upper equivalent part of Zăbrăuţ Member) with the terraces of the valleys belonging to the present Valah River Network (including the present Pannonian-Dacic Danube: Stănoiu, 2008; 2012-2013; Stănoiu et al., 2010a; 2010b) from the Valah Basin, with the terraces of the valleys from the (present) „Valah" River Network of the Pannonian area and with the upper clayey-sandy part, without discordances, of Pannonian-Pleistocene age, from the central depositional units (depressions) from the Pannonian Basin.

1.6. The evolution of the Valah Basin.

In the median part of the Dacian occurred the fluvial continentalization of the Moldav Basin (Olariu & Jipa, 2009) dominated by Dacic Ambiance, drained by Dacic River Network, which resulted in the formation of the very palud Dacian-Romanian Plain on the territory of Sub-Carpathian, Carpathian Piedmonts and Romanian Plain. The consequence of this ambient was the emergence of Jiu-Motru Group (Jiu-Motru Formation: Andreescu & Ţicleanu, in Andreescu et al., 1984), Parscovian-Romanian in age, predominantly clayey-sandy with coal and a heterogeneous lithology. In the central, intensely subsiding, depositional unit (Foredeep depositional area) the Dacic Ambiance continued until the early Holocene, favoring shaping of the Slatina-Titu-Măicăneşti Formation, tipical for the Pleistocene from the Valah Basin, located over Izvoarele Formation (Romanian) and under the alluvial plain (Holocene) of Valah River Network's valleys (recent).

Amplification of tectonic processes, controlled by Vrancea Valah Tectogenetic Phase (specified at ~ 2.58 My), had several consequences: 1. Formation of Valah Nappe; 2. Triggering Valah Basin's formation; 3. Sub-Carpathians and Carpathian territories up-lifting synchronous with the subsidence of central depositional unit; 4. The abundance of gravels in the Odobeşti-Frăteşti Group (obviously discordant) which marks the onset of Valah Basin; 5. The obvious deformation, as a result of Vrancea Valah Tectogenetic Phase, of the Miocene-Pliocene deposits from the Valah Nappe which include Moldav Nappe deposits assigned to Old Styric and New Styric cycles and also the posttectogenetic covering deposits from the units with Moldav Tectogenesis assigned to Moldav Cycle.

Sub-Carpathian Piedmonts appearance (in accelerated expanding outwards) and the Frăteşti Ambiance imposed as between Sub-Carpathian Piedmonts and Pre-Balkans to emerge the Buridavian in age Romanian Plain with two subdivisions: 1. Dacic Buridavian Romanian Plain (controlled by Dacic Ambiance) superimposed to the central depositional unit, which is a very paludal low alluvial meadow; 2. Frăteşti Buridavian Romanian Plain (controlled by Frăteşti Ambiance)

superimposed to southern marginal subunit which represents a moderate paludal, relatively high alluvial plain.

Buridavian Romanian Plain areal reduction as a result of Sub-Carpathians Piedmonts extending outward (partially completed), determined as beginning with Ordessensian, synchronous to Focşani Pasaden Tectogenetic Phase (referred to ~ 1.0 My), to outline the Ordessensian Romanian Plain (superimposed about present Romanian Plain) with two subunits: 1. Dacic Subunit controlled by Dacic Ambiance superimposed to central depositional unit (Slatina-Titu-Măicăneşti-Focşani and Bucharest Perimeters); 2. Valah Subunit controlled by Valah Ambiance superimposed to southern marginal depositional unit. The Valah Subunit of the Ordessensian Romanian Plain shows a continuous extension to the north and west to central depositional unit imposed by the extension in the same sense of the Valah Ambience, with the simultaneous gradually reduction of the Dacic Subunit's areal controlled by the retreat in the same sense of the Dacic Ambience. Thus, it was in the early Holocene to complete the Valah Romanian Plain (present) controlled entirely by the Valah Ambiance and drained by Valah River Network (present).

The importance of the Focşani Pasaden Tectogenetic Phase specified at ~ 1.0 My, at the boundary between Buridavian and Ordessensian ages, well highlighted in the Valah Basin and throughout the Paratethys region (by the discordant position of the Drincea-Olt Formation over rocks of various ages, including the Romanian) imposed shaping the Valah Cycle (corresponding to Valah Moment (~ 2.58 My) and Focşani Pasaden Moment (~ 1.0 My); 2. Ordessensian Subcycle placed between Focşani Pasaden Moment (~ 1.0 My) and Hyerasus Moment (~ 0.01 My) at the boundary between the Pleistocene and Holocene.

Consequently, in the Sub-Carpathian Piedmonts development, during Valah Cycle (corresponding to the Valah Basin), are also outlined two subcycles: 1. Buridavian Subcycle (~ 2.58 to 1.0 My), triggered by the Vrancea Valah Tectogenetic Phase, characterized by a rapid piedmont accumulation net represented predominantly by Odobeşti Formation gravels; 2. Ordessensian Subcycle (~ 1.0 to 0.01 My), triggered by the Focşani Pasaden Tectogenetic Phase and controlled by a predominant glacis-type accumulation, represented predominantly by clays, sands and loess-paleosoil alternation characteristic to Drincea- Galați Group (Drincea-Olt and Craiova-Galați Formations).

CONCLUSIONS

Stratigraphy of the Valah Basin (Pleistocene) with biostratigraphic arguments.

The Valah Nappe formed by the Vrancea Valah Tectonogenetic Phase (~ 2.58 My), is very obvious (Stănoiu, 2012-2013) in the Vrancea Bend area along a distance of over 100 km between the Trotuş and the Teleajen valleys. This tectonic structure, which favoured the formation of some hydrocarbon deposits, is

argued by the (severely warped) Miocene-Pliocene overthrust deposits of the Soveja Unit (inclusive of the gravels of the Motru-Vâlsan Member situated in the upper part of the Romanian) overlapping the synchronous deposits (warped only under the Valah Plane (~ 45^{o} surface dip towards the orogene inside) is very well outlined by the Caşin-Jitia-Berca-Urlaţi Linement sealed (unconformably covered) by Valah Basin deposits that begin with the Odobeşti Formation gravels (Pleistocene, Buridavian, ~ 2.58-1.0 My).

The Valah Basin (Pleistocene: Buridavian-Ordessensian, ~ 2.58-0.01 My), subsequent to the Valah Nappe, was formed by the Vrancea Valah Tectonogenetic Phase.

The Moldav Basin (Dacic Basin: Saulea et al., 1969), Upper Sarmatian-Pliocene, subsequent to the Moldav Nappe (Sub-Carpathian Nappe: Săndulescu, 1984), is the outcome of the Moldav Tectonogenetic Phase.

It was estimated that the deposits of the Pleistocene from the Dacic Basin emphasizes four more important environments: 1. Dacic Environment represented by a very paludal, unconsolidated field, of a low fluvial plain type, drained by woven-anastomosed-meandered valleys, without terraces, of the Dacic Fluvial Network; 2. Valah Environment represented by a consolidated, dry field, drained by the straight valleys, with terraces of the Valah Fluvial Network; 3. Odobeşti Environment represented by a moderate consolidated field, moderately paludal, drained by predominantly torrential valleys of the Odobeşti Environment; 4. Frăteşti Environment represented by a moderate consolidated field (less consolidated compared to the one of Odobeşti Environment), moderately paludal (more paludal compared to the one of Odobeşti Environment), of a high fluvial plain type, drained by woven-anastomosed-meandered predominantly valleys and by subordinated torrential valleys, without terraces of the Frăteşti Fluvial Network.

Spatial and temporal distribution of environments and facies, controlled morphologically, tectonic and climatic, is classified in a depositional system with two important units: 1. Marginal depositional unit, proximal to the Carpatho-Balkan Chain; 2. Central depositional unit, distal to the Carpatho-Balkan chain. Within the marginal depositional unit two more important subunits are defined: a) northern marginal depositional subunit (Carpathian), proximal to the Carpathians; b) southern marginal depositional subunit (Balkan and Dobrudjan subordinated), proximal to the Balkans (subordinated to Pre-Balcan and Dobrudja). Within the Ordessensian two more important units are defined: Ordessensian Marginal Unit and Ordessensian Central Unit (Slatina-Titu-Măicăneşti-Focşani Perimeter and Bucharest Perimeter).

The evolution of Dacic Basin during the Pleistocene emphasizes four important moments of tectonic, climatic, environmental lithostratigraphic, biostratigraphic discontinuity (the Vrancea Valah Moment, specified at ~ 2.58 My; Focşani Pasaden Moment, specified at ~ 1.0 My; Getic Pasaden Moment, specified at ~ 0.78 My; Hierasus Moment, specified at ~ 0.01 My), which can be correlated at regional and global scale.

A stratigraphic scale drawn up on lithostratigraphic criteria, filled with the other information was proposed. This is because existent stratigraphic scales are inoperable given the insufficiency of chronostratigraphic information and continental environments characterised by rarity and most of the times, by lack of fossils.

The Buridavian is situated between the Vrancea Valah Moment and the Focşani Pasaden Moment and the Ordessensian is situatad between the Focşani Pasaden Moment and the Hierarus Moment. 1. The Ordessensian is divided in two stages: Vranceanian, between the Focşani Pasaden Moment and the Getic Pasaden Moment; 2. The Focşanian, between the Getic Pasaden Moment and the Hierasus Moment.

The marginal depositional unit is characterised by a very heterogenous lithostratigraphy and by two important discordances controlled by the Vrancea Valah Tectogenetic Phase and the Focşani Pasaden Tectogenetic Phase. Here, the Buridavian is represented by Odobeşti-Frăteşti Group (~ 2.58-1.0 My), discordant is defined by the predominance of gravel, it discordantly supports Drincea-Olt Formation (red clay, specified at 0.96 My) and is represented by two more important lithostratigraphic units: 1. Odobeşti Formation is characteristic to northern marginal depositional subunit and is controlled by Odobeşti Environment; 2. Frăteşti Formation is characteristic to the southern marginal depositional subunit and is controlled by Frăteşti Environment. In the northern marginal depositional subunit and on the distal margin of the southern marginal depositional unit, Ordessensian is represented by Drincea-Galați Group, spread in the entire region of Paratethys, controlled by the Valah Environment and is composed of two lithostratigraphic units: 1. Drincea-Olt Formation (red clay with ferruginous and manganese concretions), situated discordantly on rocks of different ages (including over Buridavaian Terminal), specified at 0.96 My, corresponding to Leerdam Interglacial, placed approximately in the 1.0-0.93 My interval, controlled by the Valah Environment and the Focşani Pasaden Climatic Moment (warm and relatively wet climate, immediately subsequent to the Focşani Pasaden Tectogenetic Moment); 2. Craiova-Galați Formation is composed of the loess-paleosol alternation, it emphasizes the inferior heterochronic limit, has the beginning specified at 0.92 My, is situated approximately in the 0.92-0.01 My interval and is likely to be divided in two lithostratigraphic units: a) the Panciu Member, corresponding to Vranceanian, approximated in the 0.1-0.78 My interval; b) Zăbrăuț Member, corresponding to the Focşanian (~ 0.78-0.01 My), synchronous to the four important alpine glaciations (Günz, Mindel, Riss, Würm), synchronous to the terraces of the Valah Fluvial Network valleys that began at ~ 0.8 My, together with the finalisation capture of the Danube from the Gorge and with the formation of Panono-Dacic Danube (present).

In the central depositional unit, overlapping the Slatina-Titu-Măicăneşti-Focşani Perimeter (intensly subsiding), Buridavian-Ordessensian is represented by a single major lithostratigraphic unit (Slatina-Titu-Măicăneşti Formation, which highlights transitions at all lithostratigraphic entities from the marginal depositional unit), characterized by a uniform lithology (predominantly clayey and sandy),

without discordances, controlled by a Dacic Environment, divided into two lithostratigraphic entities: 1. Clayey and sandy Slatina Member with gravel intercalations, located in the Western side of the Romanian Plain; 2. Titu-Măicăneşti Member, net predominantly clayey and sandy, with larger thicknesses located in the more subsiding Eastern side of the Romanian Plain. In the central depositional unit, on the Bucharest Perimeter overlapping the distal margin of the southern marginal subunit, Ordessensian is represented by two more important lithostratigraphic units controlled by the Dacic Environment: 1. Pelitic Coconi Formation, situated over Frăteşti Formation, argued from a paleontological point of view for the ~ 1.0-0.8 My interval, probably equivalent to the Vranceanian; 2. Sandy Mostiştea Formation, situated over the Coconi Formation, argued from a paleontological point of view for the superior part of the Ordessensian, probably equivalent to Focşanian.

During the Ordessensian, a progress of the Valah Environment (together with the Craiova-Galați formation controlled by it was noticed from the distal margin of the Southern marginal subunit, towards the central depositional unit, concomitant with the withdrawal, in the same direction, of Dacic Environment, resulting in diachronism of the inferior limit of the Craiova-Galați Formation and the absence of the loess in most of the central depositional unit.

The existence of two important tectogenetic moments emphasized though corresponds to several lithostratigraphical units set out by well-defined discontinuity moments in the entire Paratethys habitat.

The existence of two important tectogenetic moments emphasized though differences has been noticed, in the entire marginal depositional unit: 1. The Vrancea Valah Tectogenetic Moment is specified at ~ 2.58 My, at the limit of Pleistocene (Buridavian) and Pliocene (Romanian) and it is very well emphasized at the contact between the Sub-Carpathian Piemonts and the Sub-Carpatians where it's marked through a very clear difference, materialized though a very important deformational discontinuity: the rocks of the Odobeşti Formation, which appear as a quasi-horizontal plate, are laying discordantly over the Miocene and Pliocene rocks, highly deformed (wrinkled, fissured, often reaching a vertical position); 2. The Pasaden Focşani Tectogenetic Moment is specified at ~ 1.0 My, at the limit between Buridavian and Ordessensian and it is very well marked through the discrepancy between the rocks of Drincea-Olt Formation and the rocks of older lithostratigraphical units.

It has been considered (against international recommendations) that the name, „Cândeşti Beds (Gravels)" (sensu Mrazec & Tesseyre, 1901) could eventually be preserved as the Lithogroup (Gravels) Cândeşti with the meaning of comprehensive lithostratigraphical supra-unity in which two lithostratigraphical overlaid units are included, very different from each other: 1. The Odobeşti Formation (Gravels) belongs to the Buridavian, it is divided into several lithostratigrafical sub-units (Odobeşti Măgura Member, Perşunari Member, Tetoiu Member), covered discordantly by the Drincea-Olt Formation, specified at 0.96 My and appears in the Sub-Carpathian Piedmonts between Siret and Danube as a

continuous plate, very little deformed (slightly wavy and fissured), very clearly different over the Miocene and Pliocene deposits (including the Motru-Vâlsan Rocks), from the Sub-Carpathian, more heavily deformed; 2. The Motru-Vâlsan Member (Gravels) which belongs to the superior side of the Romanian heavily deformed in the Sub-Carpathians. The Motru-Vâlsan Member lays (through progressive lithologic transition) over the Râmna Member (Râmna Formation: Andreescu & Ţicleanu, 1977; including the Pleşcoi Beds, specified at 3.2 My), predominantly sandy-clayey and fossiliferous. Both (the Motru-Vâlsan and Râmna Members) belong to the Motru Valley Formation (Romanian). It must be mentioned that Andreescu (Andreescu et al., 2011) defined the Cândeşti Formation by correlating the Motru-Vâlsan Member (Gravels, Romanian Terminal), from the West side of the northern marginal depositional sub-unit with the Odobeşti Formation (Gravels; Pleistocen, Buridavian) from the east side of the northern marginal depositional sub-unit.

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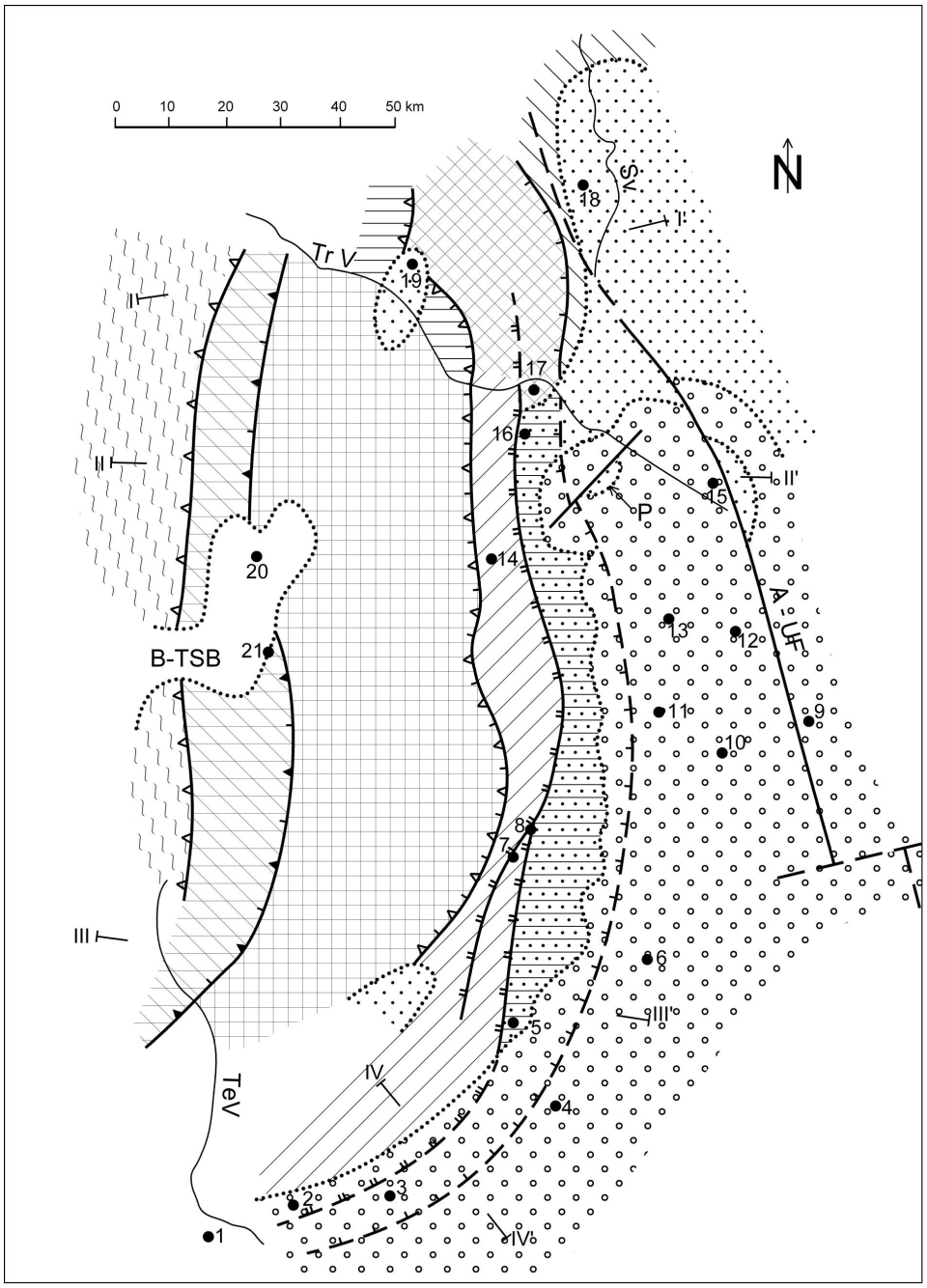


Figure 1 - Geologic sketch of the Vrancea Bend region (Legend in the figure 2).

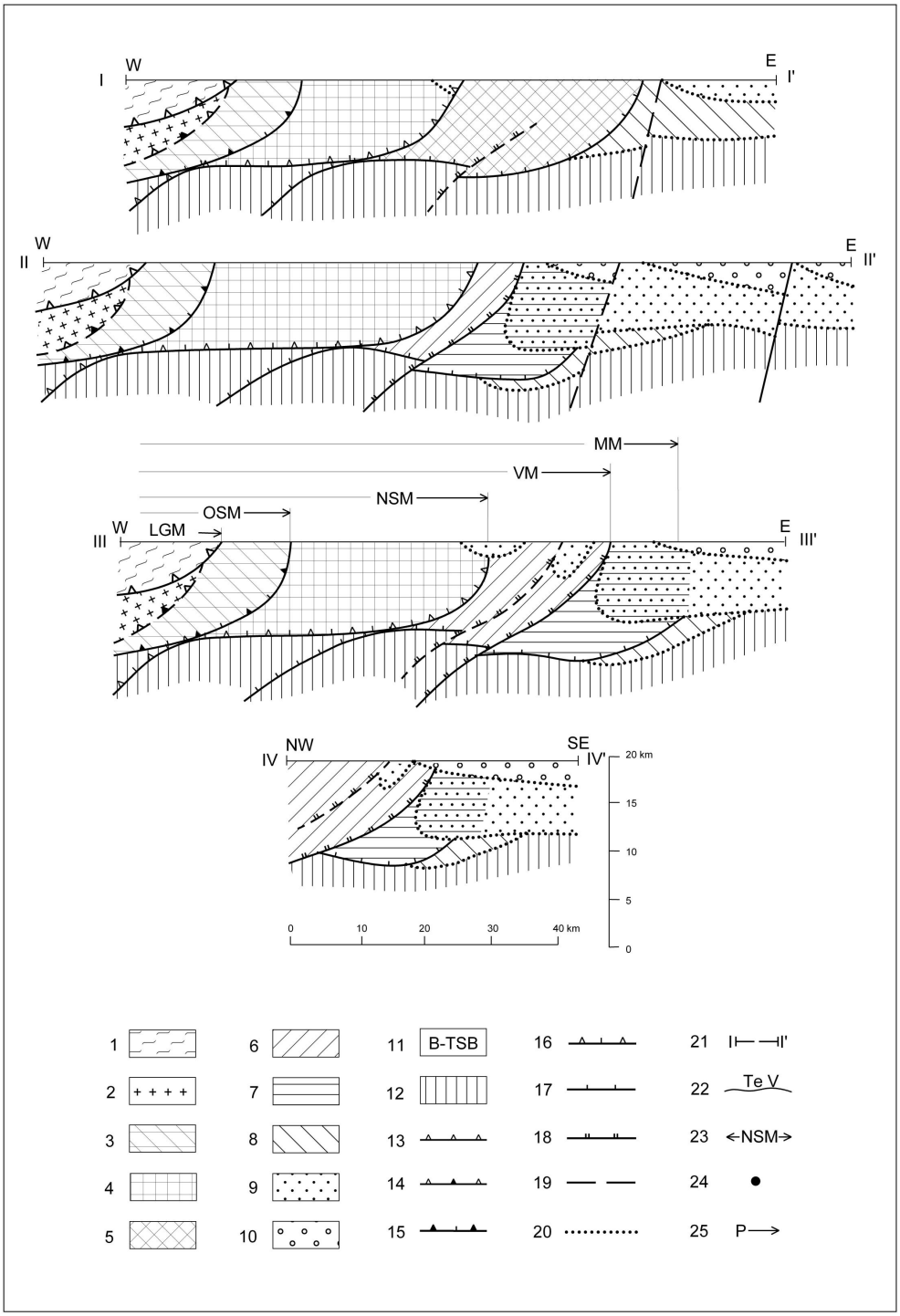


Figure 2 - Geologic cross-sections in the Vrancea Bend region.

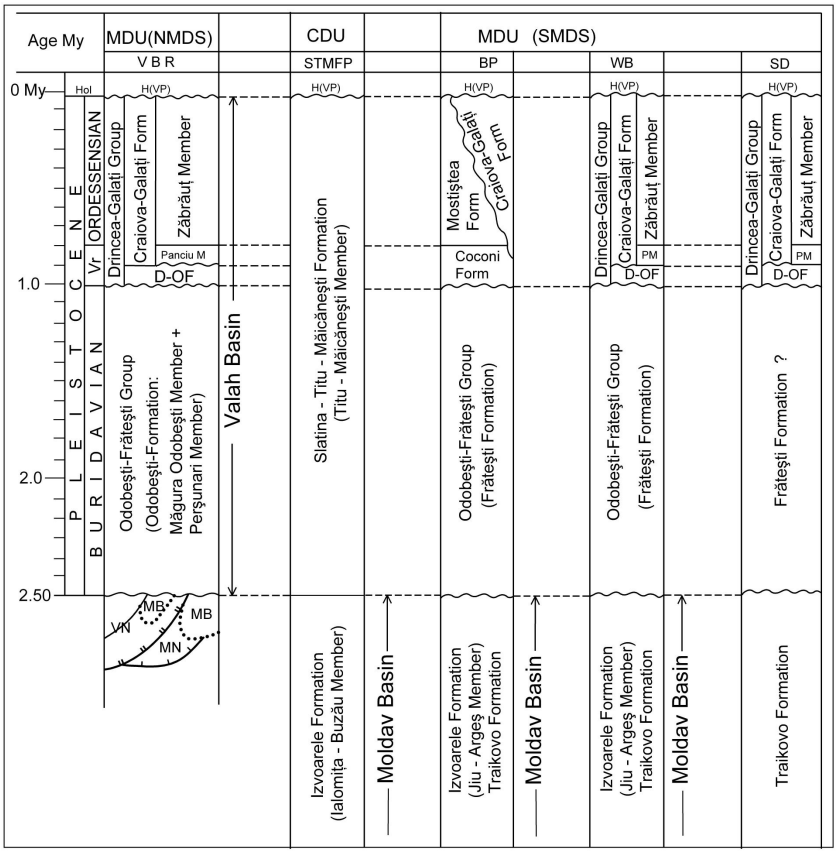


Figure 3 - Transversal correlations in the Valah Basin (Vrancea Bend-Danube Region).

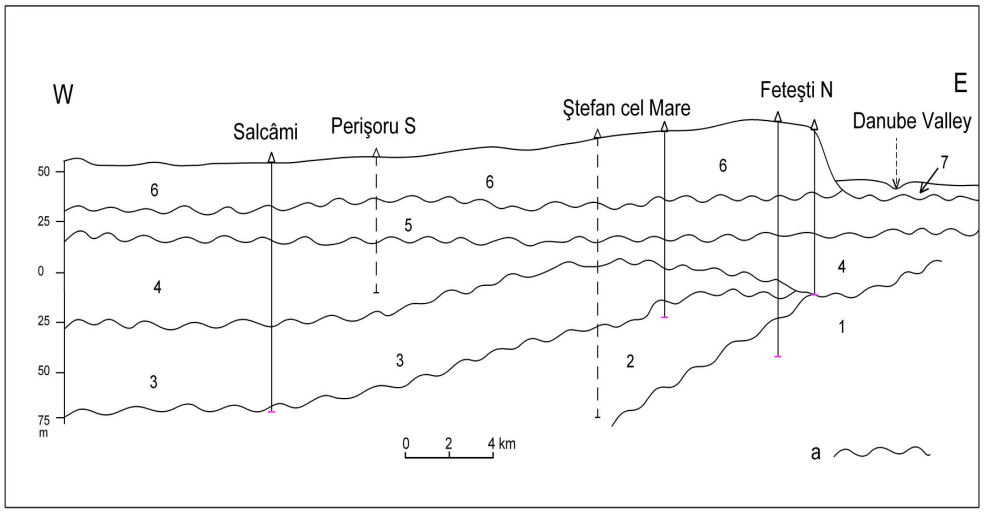


Figure 4 - Geologic cross-section on the Feteşti-Salcâmi region (in Stănoiu, 2012-2013).

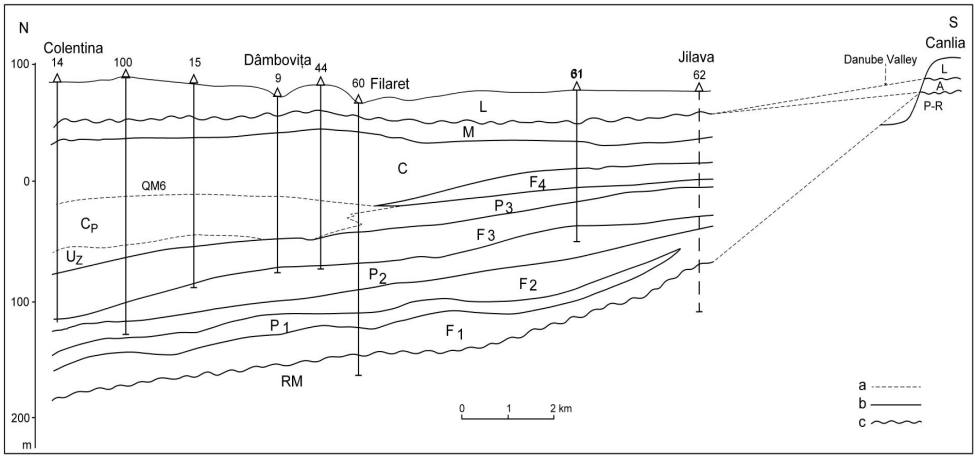


Figure 5 - Geologic cross-section on the Bucharest Perimeter (in Stănoiu, 2012-2013).

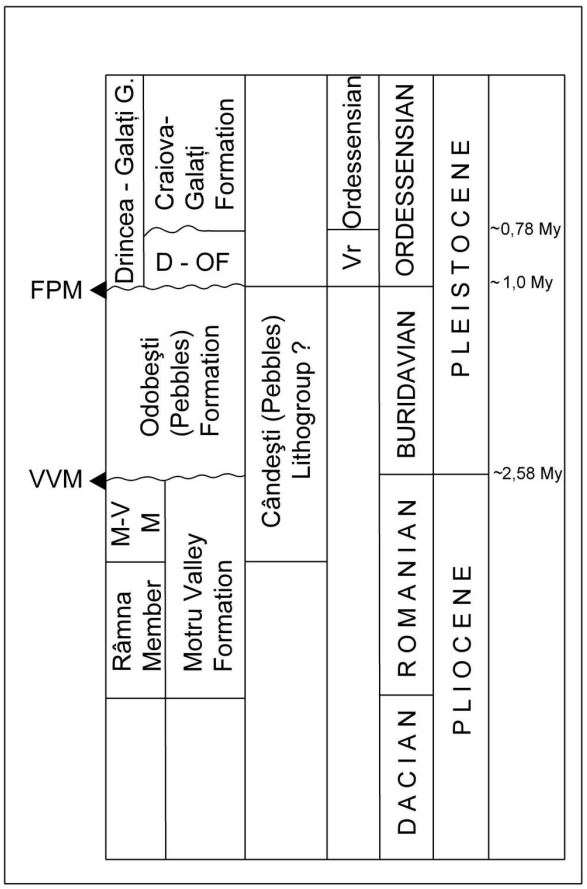


Figure 6 - Lithostratigraphic Units of the Cândeşti Beds (in Stănoiu, 2012-2013).

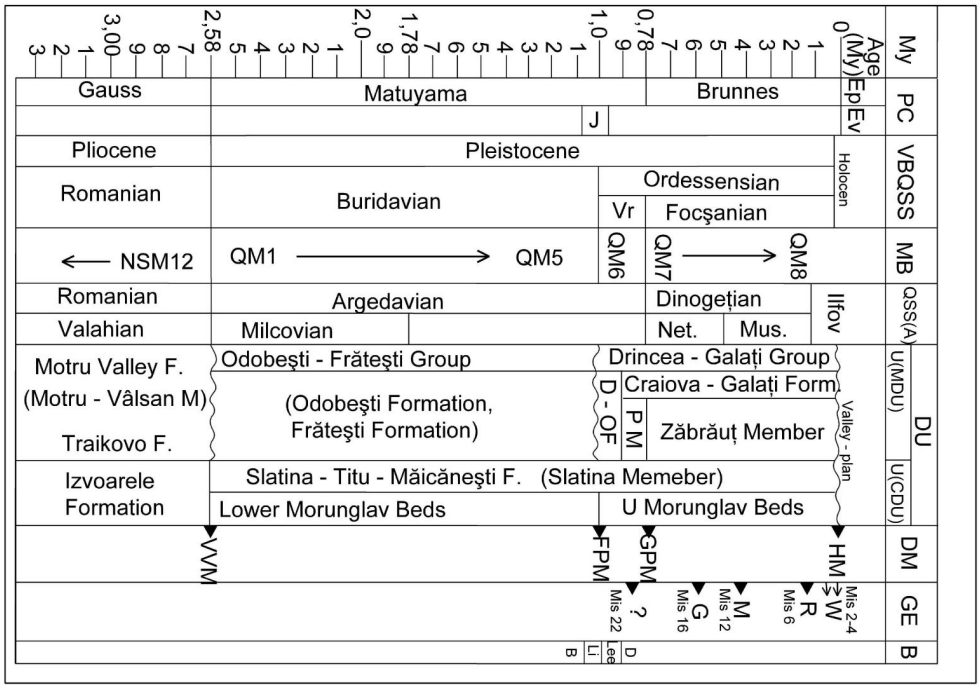


Figure 7 - Correlations in the Valah Basin (in Stănoiu, 2012-2013).

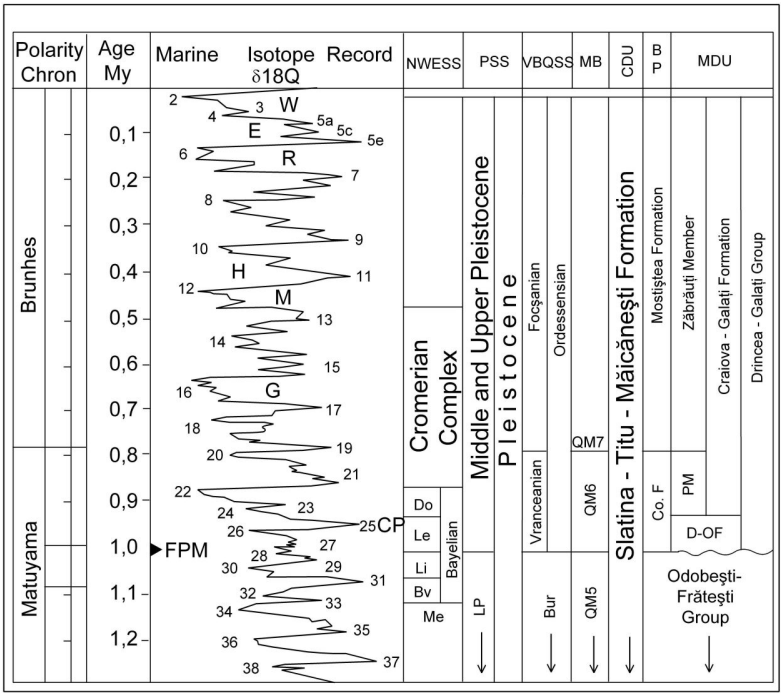


Figure 8 - Correlations in the Valah Basin.

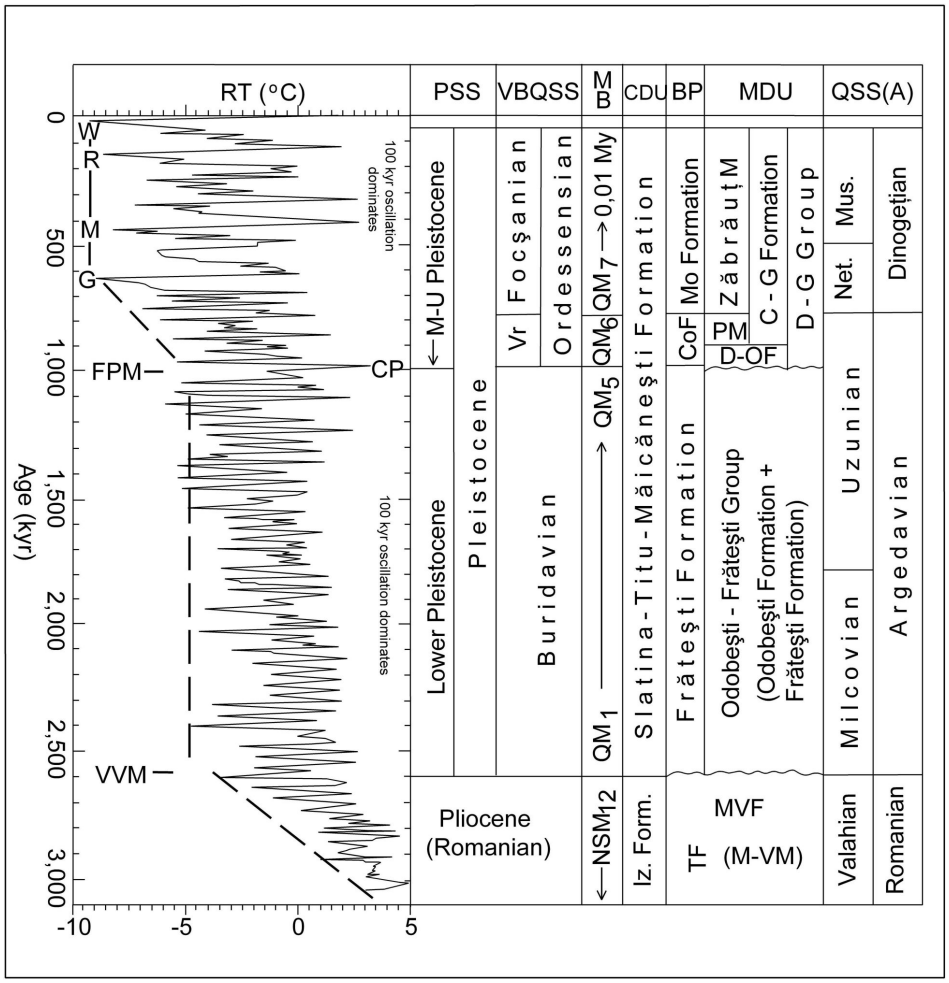


Figure 9 - Correlations in the Valah Basin.

Explications of the figures.

Figure 1 - Geologic sketch of the Vrancea Bend region;
Figure 2 - Geologic cross-sections in the Vrancea Bend region.

1-Laramic Getic Megastructure (Nappe) Unit. **2**-Danubian Unit (Perimoldavic Cordiliere). **3**-Teleajen-Audia Unit. **4**-Tarcău-Vrancea Unit. **5**-Cracău Unit. **6**-Soveja Unit. **7**-Milcov Unit. **8**-Râşca Unit. **9**-Moldav Basin. **10**-Valah Basin. **11**-Braşov-Târgu Secuiesc Basin. **12**-Vorland. **13**-Laramic Plane. **14**-Laramic and/or Austric Plane. **15**-Old Styric Plane. **16**-New Styric Plane. **17**-Moldav Plane. **18**-Valah Plane. **19**-Fault: **A-UF**-Adjud-Umbrăreşti Fault (Pecineaga-Camena Lineament = Solka Lineament: Photo. 3). **20**-Discordance boundary. **21**-Cross-section. **22**-Valley (**TeV**-Teleajen Valley; **TrV**-Trotuş Valley; **SV**-Siret Valley). **23**-Megastructures (Nappes): **LGM**-Laramic Getic Megastructure (Nappe); **OSM**-Old Styric Megastructure (Nappe); **NSM**-New Styric Megastructure (Nappe); **MM**-Moldav Megastructure (Nappe); **VM**-Valah Megastructure

(Nappe). **24**-Locality (**1**-Ploieşti; **2**-Urlați; **3**-Mizil; **4**-Buzău; **5**-Berca; **6**-Râmnicu Sărat; **7**- Bisoca; **8**-Jitia; **9**-Umbrăreşti; **10**-Focşani; **11**-Odobeşti; **12**-Mărăşeşti; **13**-Panciu; **14**-Soveja; **15**-Adjud; **16**-Caşin; **17**-Oneşti; **18**-Bacău; **19**-Comăneşti; **20**-Târgu Secuiesc; **21**-Covasna. **P**-Pralea.

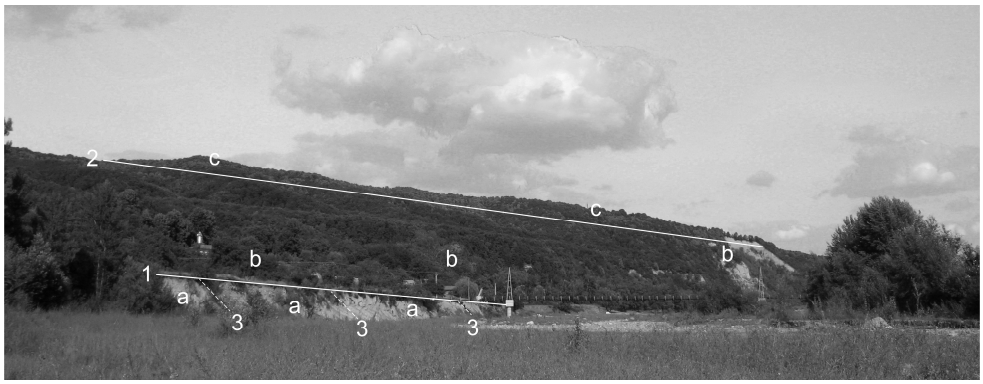
Figure 4 - Geologic cross-section on the Feteşti-Salcâmi region: 1-Aptian; **2**-Sarmațian; **3**-Ponțian-Romanian; **4**-Frăteşti Formation (Vlădeni Member); **5**-Drincea-Olt Formation; **6**-Craiova-Galați Formation; **7**-Valley plan; **a**-discordance boundary.

Figure 5 - Geologic cross-section on the Bucharest Perimeter: P-R-Ponțian-Romanian; **F 1-4** -Frăteşti 1-4 (pebble); **P 1-3**-Clay; **Uz**-Uzun Beds; **Cp**-Copăceni Beds; **C**-Coconi Formation; **M**-Mostiştea Formation; **A**-Drincea-Olt Formation; **L**-Craiova-Galați Formation; **a**-Biur lithological boundary; **b**-Lithological boundary; **c**-Discordance boundary.

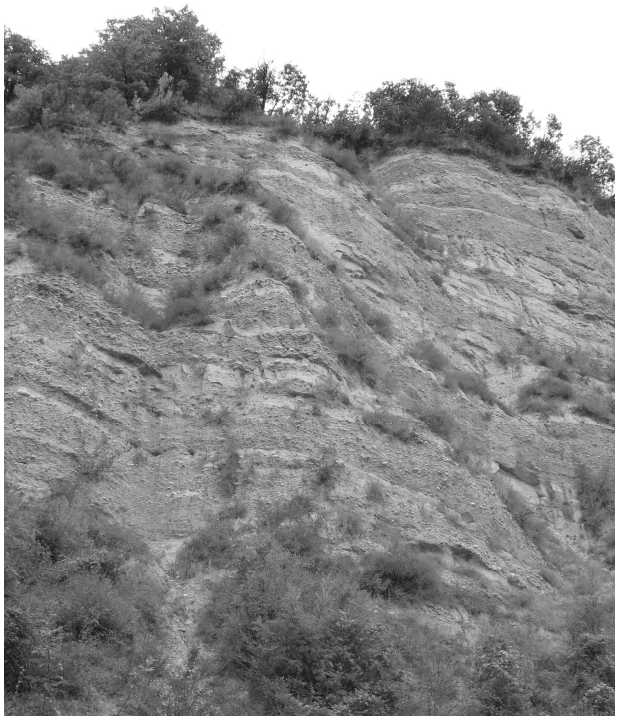
Figure 6 - Lithostratigraphic units of the Cândeşti Beds: Vr-Vranceanian; **D-OF**-Drincea-Olt Formation; **M-VM**-Motru-Vâlsan Member; **VVM**-Valah Vrâncean Moment; **FPM**- Focşani Pasaden Moment.

Figure 3 - Transversal correlations in the Valah Basin.

Figure 7, 8, 9 - Correlations in the Valah Basin: VBQSS-Valah Basin Quaternary Stratigraphic Scale; **DV**-Depositional Units; **MDU**-Marginal Depositional Unit; **NMDS**-North Marginal Depositional Subunit; **SMDS**-South Marginal Depositional Subunit; **CDU**-Central Depositional Unit; **VBR**-Vrancea Bend Region; **STMTP**-Slatina-Titu-Focşani Perimeter; **BP**-Bucharest perimeter; **WB**-West Bucharest; **SD**-South Danube; **QSS(A)-**Quaternary Stratigraphic Scale (Andreescu et al., 2011); **MB**-Molusc Biozones (Andreescu et al., 2011); **B**-Bayellian Stages (**D**-Dorst; **Lee**-Leerdam; **Li**-Linge; **B**-Bavel; **Me**-Menopian: after Kolsoten et Gibard, 1996; Gradstein et al., 2004; **NWESS**-North-West European Stratigraphic Stages (after Kolsoten et Gibard, 1996; Gradstein et al., 2004); **PSS**-Pleistocene Stratigraphic Scale (after Steininger & Rőgl, 1984); **DM**-Discontinuity Moments (**VVM**-Vrancea Valah Moment; **FPM**-Focşani Pasaden Moment; **GPM**-Getic Pasaden Moment; **HM**-Hierasus Moment; **CP**-Climatic Pasaden Moment); **GE**-Glaciar and Interglaciar Events (**G**-Gűnz; **M**-Mindel; **H**-Holsteinian; **R**-Riss; **E**-Eemian; **W**-Wűrm: after Husen & Jurgen, 2011); **PC**-Polarity Chron; **RT(^{0}C)-**Relative temperature (after Műller & MacDonald, 2008); **LP**-Lower Pleistocene; **Bur**-Buridavian; **H(VP)-**Holocen (Valley Plan); **M-U Pleistocene**-Middle Upper Pleistocene; **Vr**-Vranceanian; **Net**-Netindavian; **Mus**-Musaisian; **Ilfov**-Ilfovian; **F**-Foreland; **VN**-Valah Nappe; **MN**-Moldav Nappe; **MB**-Moldav Basin; **Mo Formation**-Mostiştea Formation; **CoF**-Coconi Formation; **D-G Group**-Drincea-Galați Group; **C-G Formation**-Craiova-Galați Formation; **D-OF**-Drincea-Olt Formation; **PM**-Panciu member; **MVF**-Motru Valley Formation; **M-VM**-Motru-Vâlsan Member; **Iz. Form**-Izvoarele Formation; **TF**-Traikovo Formation.



Photography 1 - Milcov Valley, Pitulişa locality. Visible discordance between the Râmna Member (Romanian of the Moldav Basin) and the Măgura-Odobeşti Member (Buridavian: lower Pleistocene of the Valah Basin). **a**-Râmna Member (clays); **b**-Măgura Odobeşti Member (predominant pebbles); **c**-Craiova-Galați Formation (loess-paleosol alternance), Ordessensian; **1**-discordance boundary between of the Romanian and Buridavian; **2**- discordance boundary between of the Măgura-Odobeşti Member and Craiova-Galați Formation; **3**-Romanian clays stratification (Stănoiu et al., 2010).



Photography 2 - Milcov Valley, between the Odobeşti locality and the Pitulişa locality. Măgura-Odobeşti Member Pebbles with gravity slides in the plastic state (Stănoiu et. al., 2010).

Photography 3 - Adjud-Umbrăreşti Fault (**F**), North of the Umbrăreşti locality, between the Quaternary and Pliocene roks.