ACTA PALAEONTOLOGICA ROMANIAE V. 5 (2005), P. 295-298

CONTRIBUTION TO THE STUDY OF THE DACIAN/ROMANIAN LIMIT IN THE BASIN OF BUZĂU VALLEY BASED ON DRILLING RESULTS

Victoria LUBENESCU[1] and Dana V.LUBENESCU-JANSA[2]

Abstract. In order to clarify some of the problems appeared following the publication of the book ''Romanien''-Chronostratigraphie und Neostratotypen Pliozän Pl 2 (2003), the authors present herein the results they reached after analysing the assemblages of mollusks based on the 19 boreholes made through continuous drilling on the Northern side of Buzău Valley in Cojanu - Vintilă Vodă sector, close to the ''Dacian/Romanian limit''. We have established a longer or shorter ''time of the limit'' during which different fauna was extinct or appeared. We have shown that the waters of the Dacic Basin have sweetened gradually and that the Dacian / Romanian limit has to be drawn once the marine fauna, that is the limnocardiids, disappeared totally. *Viviparus bifarcinatus* (BIELZ) as well as other unionids appeared before the *Upper* Dacian and not in the *Lower* Romanian, as previously thought.

Keywords. Pliocen, Dacian, Romanian, Mollusks, Drilling, Eastern Carpathians.

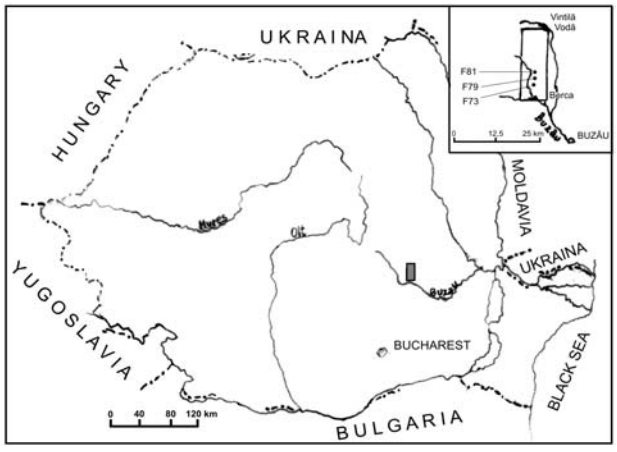
The Dacic Basin is very important for the study of the Upper Neogene because it is located between the Pannonic and Euxinic Basins, therefore between the central and oriental Paratethys. Just like all the stages dating back to Paratethys, Dacian and Romanian, the last stages of the Neogene were identified based on the mollusk fauna, organisms used to define the boundaries and the subdivisions, as well as the biozonation of the stage. ''The limit between the Dacian and Romanian coincides with the significant modifications of the faunas, a consequence of the desalination of the Basin'' (Romanian - Chronostratigraphie und Neostratotypen 2003, p. 11).

Following the basin desalination the saline fauna disappeared altogether (*Pontalmyra*, *Pseudocatillus*, *Plagiodacna*, *Prosodacna*, *Limnodacna, Zamphiridacna, Horiodacna* etc.) and it was replaced by freshwater fauna of unionids and gastropods. The only limnocardiid to reach the Romanian is *Prosodacnomya sturi* (COBALCESCU) (Papaianopol *et al.*, 2003, p. 134).

Unfortunately, just as shown in a previous study (V. Lubenescu, 2004, p. 41-43), it is very hard for one to draw the limit between the Dacian and the Romanian stages if we were to respect the layer-based stereotype in the succession of residues dating back to the Dacian or Romanian stage, which were very well-defined by the tens of samplings undertaken in the Ojasca-Berca sector, south of Buzău river. These do not confirm the sudden disappearance of the marine mollusk macrofauna and its replacement by a freshwater fauna. On the contrary, in the Upper Dacian (Parscovian) beds one can observe at least two or three intercalations with freshwater fauna like *Viviparus bifarcinatus* (BIELZ). Following the analysis of the boreholes taken in Cojanu – Vintilă Vodă sector, north of Buzău Valley, we have reached the same results. We have worked on boreholes taken in 19 continuous drillings performed by IFLGS between 1989-1992. Out of these, only 11 drillings intersected beds dating back to the Upper Dacian, while the rest intersected both the Romanian and the Dacian deposits. The most complete boreholes were 81, 79 and 73 (see Fig. 1).

Borehole 81 identified in its first 192 m a succession of mostly clays and sands, with a rich mollusk fauna of Romanian age: *Synanodonta brandenburgi* (BRUSINA), *Unio sp.*, *Psilunio* (*Psilunio*) *saratae* (TEISSEYRE), *Viviparus bifarcinatus* (BIELZ), *Melanopsis* (*Melanopsis*) *sandbergeri rumana* TOURNOUER, *Theodoxus sp*. etc. At 209 m it contained massive clay layers with *Zamphiridacna orientalis* (STEFANESCU), *Prosodacnomya sturi* (COBALCESCU), *Dacicardium rumanum* (FONTANNES). At 216 m the clay layer also started to show traces of smut, and include a marine fauna similar to the one mentioned above, together with *Synanodonta brandenburgi* (BRUSINA) and *Congeria* ex gr. *Congeria parscoviensis* PAPAIANOPOL. The same fauna can be noticed at 224 m together with *Viviparus bifarcinatus* (BIELZ). Between 248-298 m the hard, black lumaselic clays yielded a freshwater fauna: *Viviparus bifarcinatus* (BIELZ), *Melanopsis (Melanopsis) pterochilla* BRUSINA, *Lithoglyphus sp*., *Bulimus* (*Bulimus*) *croaticus*

Fig. 1. Location of the study area; inset shows the positions of the boreholes F73, F79 and F81.



[1] *Str.Apusului 67, Bloc 50, et. II, apt.32, 77622,Bucharest,Romania. lubenesc@rnc.ro*
[2] *31 Hackeberry Hill Road, Weston, CT 06883, USA. Dana. Lubenescu@mercer.com*

(PILLAR), *Valvata sp*., *Dreissena polymorpha* PALLAS, *Anodonta sp*. It is only at 314 m that the marine fauna appears in the black clays: *Dacicardium rumanum* (FONTANNES), *Pseudocatillus dacianus* EBERZIN, *Pontalmyra* (*Pontalmyra*) *falconensis* PAPAIANOPOL, *Dreissena sp.*, while at 356 m one can notice sandy deposits with species of *Psilodon*, a fauna which is characteristic for the Upper Dacian stage in the lower south - eastern Carpathians: *Prosodacna (Psilodon) haueri haueri* (COBALCESCU), *Prosodacna (Psilodon) haueri damienensis* (COBALCESCU), *Pseudocatillus dacianus* EBERZIN, *Limnocardium sp.* The boundary between the Dacian and Romanian stages was settled, in this case, above the last deposits containing marine fauna, which is at 209 m. Between 224-298 m the freshwater fauna mentioned above dates back to the Late Dacian (see Fig. 2).

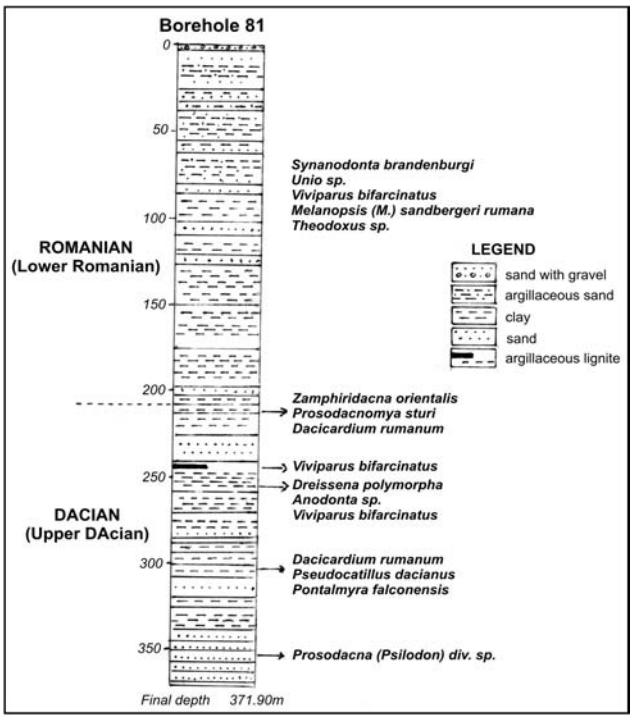


Fig. 2. Lithostratigraphic log and paleontological assemblages identified in borehole F81.

Between 54 to 223.70 m depth of borehole 79 there is a succession of yellow, fine sands, grey clays and marls with a rich fauna of Early Romanian age: *Psilunio (Psilunio) securus* PAPAIANOPOL, *Dreissena polymorpha* (PALLAS), *Pseudohyriopsis problematica* (COBALCESCU), *Unio sp*., *Pisidium sp*., *Theodoxus licherdopoli scriptus* STEFANESCU, *Valvata (Valvata) sulekiana* BRUSINA, *Bulimus (Bulimus) vukotinovici* (BRUSINA), *Melanopsis (Melanopsis) pterochilla pterochilla* (BRUSINA), *Lithoglyphus sp*., *Viviparus bifarcinatus* (BIELZ), fragments of leaves and stems, and ostracodes. Between 289.50-295.20 m, grey clays yielded a marine fauna with *Dacicardium rumanum* (FONTANNES), *Pontalmyra sp*., *Zamphiridacna orientalis* (STEFANESCU), *Prosodacnomya sturi* (COBALCESCU), *Synanodonta brandenburgi* (BRUSINA), *Dreissena sp., Congeria sp., Bulimus sp.*, ostracodes. 3 m below these, in black clays we have identified a mainly freshwater fauna that also included marine taxa: *Viviparus bifarcinatus* (BIELZ), *Psilunio (Psilunio) securus* PAPAIANOPOL, *Dreissena poymorpha* PALLAS, *Prosodacnomya sturi* (COBALCESCU), *Pontalmyra sp*. Starting with 315.50 m, there are grey clays and marls wich contain only marine fauna. The boundary between the Dacian and the Romanian stages, for this borehole, was established above the last deposits of marine fauna, at 289.50 m (Fig. 3)

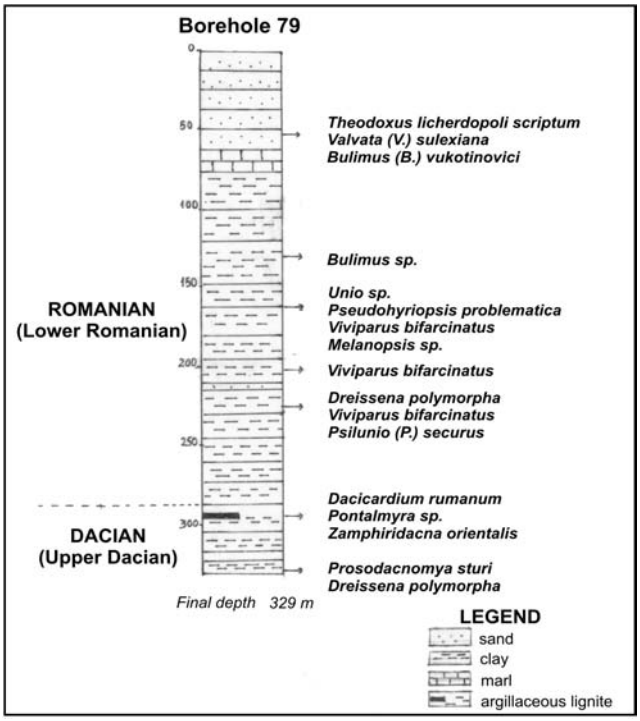


Fig. 3. Lithostratigraphic log and paleontological assemblages identified in borehole F79.

In the last borehole considered, borehole 73, after a succession of sands and marls containing an Early Romanian fauna - *Viviparus bifarcinatus* (BIELZ), *Theodoxus slavonicus* (BRUSINA), *Bulimus sp., Lithoglyphus sp., Melanopsis sp., Pseudohyriopsis sp.* etc. – at 188.00 m we have encountered grey marls with a mixed fauna, containing *Zamphiridacna orientalis* (STEFANESCU) and *Viviparus bifarcinatus* (BIELZ), while at 192.00 m there are grey clays with marine taxa such as: *Prosodacnomya sturi* (COBALCESCU), *Zamphiridacna orientalis* (STEFANESCU) etc. The boundary between the Dacian and the Romanian was established above the deposits with marine fauna, at 188.00 m (Fig. 4).

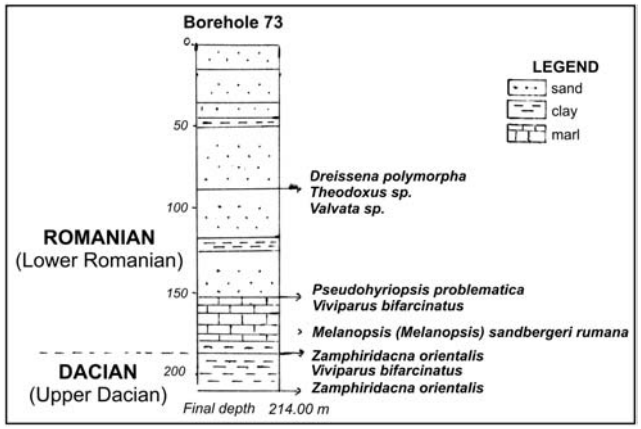


Fig. 4. Lithostratigraphic log and paleontological assemblages identified in borehole F73.

BIOSTRATIGRAPHIC CONSIDERATION

Since the last study on the Upper Neogene from the central Paratethys - the Romanian had appeared one would have though the multiple issues familiar to specialists working on this chronological and chronostratigraphical unit had been settled. Unfortunately, other problems appeared, which are unsolved, had been treated in a hasty manner or which did not have a solid explanation.

Some of these issues have been discussed with the occasion of the Symposium on the Romanian stage organized in Bucharest in June 2004 by the Romanian Academy and the ''Emil Racoviță'' Speleological Institute. Among the topics of discussion were the lower and upper limits of the Romanian stage. Just as Olteanu was saying in this context (R. Olteanu, 2004, p. 21), no biostratigraphic limit can be final. There is always ''a timespan of the limit'', a longer or shorter time of transition characterized by extinctions and appearances.

We might add that in the case of a basin in the process of desalination the situation becomes more complicated and does not compare with the one of the maritime basin. As for the limit between the Dacian and the Romanian stages considered to be the limit between the eurihaline and freshwater periods, sometimes it is not easy to define this limit. It is very well known that starting with the Dacian, the marine-to-freshwater transition process of the Dacic Basin was uneven, more obvious in the western part of the basin, in Oltenia, and less so in the eastern part. The changes in the Dacic Basin history are marked by the changes of the eco-system which differs from one region to another. On the other hand, in the eastern part of the basin, the area around the Carpathians, there was a somewhat restrictive and exclusive fauna, dominated by the *Psilodon* type. Contemporarily, there were genera and species of marine mollusks (*Stylodacna*, *Euxinicardium*, *Dacicardium* etc.), but also freshwater taxa, which are developing especially in the Late Dacian (*Bulimus*, *Viviparus*, *Valvata* etc.).

Maybe one should admit that the boundary between the Dacian and Romanian is heterochronous, older in the western part and younger in the eastern part.

Just as it was mentioned already, based on the boreholes from the eastern part of the Carpathians, over the ''Psilodon beds'' there are usually a series of deposits of pelitic rocks, some 20 to 100 m thick, which alternatively contain marine and freshwater faunas and, rarely, even mixed faunas. This relates to the transition time, to extinctions and appearances taking place during this. We note especially the appearances of *the Viviparus bifarcinatus* (BIELZ) which will develop excessively in the Lower and Middle Romanian.

We would like to mention that there are no doubts insofar as to the correct determination of the gasteropods, as suggested by Papaianopol (1994, p. 96). The fauna is very well preserved and leaves no space for ambiguities. For that matter, even this author mentions the Upper Dacian *Viviparus aff. cerkesi* and *Viviparus* aff. *pannonicus*. The specimens thought to have some relationships to *Viviparus cerkesi* (2nd chart, Figure 16) have many similarities with *Viviparus bifarcinatus*, and the *V. pannonicus* (2nd chart, Figure 17) is considered by Neumayr and Paul (1875, p. 53, 54) as a species related to *V. bifarcinatus*. It is thus evident that the two taxa are related.

It is therefore considered that the limit between the Dacian and the Romanian should be defined above the last deposits with marine fauna [even above the beds of *Prosodacnomya sturi* (COBALCESCU)].

Starting with 1949, Ciocârdel (1949, p. 15) was mentioning above the ''Psilodon beds'' described by Cobalcescu (1883), a fresh water fauna including *Viviparus bifarcinatus*, followed by cemented sands containing *Prosodacnomya sturi*. The author stated that ''I put the limit between the Levantin (=Romanian) and Dacian stages where the *Prosodacna* disappear.'' This is a point of view that we have accepted after we analysed the boreholes from the northern and southern part of the Buzău Valley.

Without pretending to have exhausted the subject, we consider to highlight a serious, yet unsolved, issue. Maybe this is also the reason why a group of researchers among which we mention Enache and Pătruțoiu (2000; Enache, 2004) were suggesting that the boundary between the Dacian and the Romanian may established at the beginning of the middle Romanian as defined in the past. The authors support the proposal put forward by Macarovici (1971) to establish the boundary under the first deposits of sculptured unionids, because it is easy to observe their appearance, which can be better mapped and identified. In our opinion this would mean to attach to the Dacian stage only the beds with freshwater fauna where one can identify the explosion of the well - known mollusks. We would thus contradict

what had been established during the past years of research, that is that the limit between the Dacian and the Romanian stages represents the step to the final fresh-water phase ending the Neogene evolution of this bioprovince.

On the other hand, it is necessary to take into account the validation of the stratigraphy with paleomagnetic events, based on which the Dacian/ Romanian boundary is simultaneous to the Conchiti phase in the Gilbert era and is located at 3.7 - 3.8 MA, and the Lower Romanian/Middle Romanian boundary with the transition between Gilbert / Gauss at 3.3 - 3.4 MA (Andreescu *et al.*, 1981, 1986).

ACKNOWLEDGMENTS

Special thanks to ing. Gh. Pitulea for his invaluable contribution to this project.

REFERENCES

Andreescu, I., Rădulescu C., Samson P., Cepalyga, A., Trubihin, I., 1981, Chronologie (Mollusques, Mammifères, Paléomagnetisme) des formations plio - pléistocènes de la zone de Slatina (Bassin Dacique). *Trav. Inst. Spéol. "E. Racoviță"*, XX, p.127-137, Bucureşti.

Andreescu, I., Rădan, S., Rădan, M., 1986, Magnetostratigraphy of the Dacian-Romanian deposits of the Lupoaia Quarry. *D. S. Inst. Geol. Geophys*,. 70-71/4, p. 219-226, Bucureşti.

Ciocârdel, R., 1949. Regiunea petrolifera Berca-Beciu-Arbănaşi. *Stud. tehn. si economice*, 4, p. 1-32, Bucureşti.

Cobălcescu, Gr., 1883. Studii geologice şi paleontologice asupra unor tărâmuri terțiare din unele părți ale României. *Mem . Geol . Şc. Milit . Iasi*, 161 p., Bucureşti.

Enache, C., 2004, Ingresiunea romanianã în Bazinul Dacic. *Stud. şi comunic. Şt. naturii*, vol. XX, p. 8-10, Craiova.

Enache, C. and Pătruțoiu I., 2000, Considération sur la limite Dacien/Romanien. *Stud. Univ. Babeş-Bolyai*, Geologie, XLV, 2, p.105-108, Cluj.

Lubenescu, V. and Zazuleac, D., 1985, Les Viviparidés du Néogène supérieur du Bassin Dacique. *Mém. Inst. Géol. Géophys*., XXXII, p.77-136, pl. I-XXXIV, Bucuresti .

Lubenescu, V., 2004, Limita Dacian/Romanian, Academia Română and Inst. Speol. ''Emil Racoviță'', Simpozion, Romanian, p.41 – 46, Bucureşti.

Macarovici, N., 1971, Observații stratigrafice pe structura Berca-Arbănaşi (cu privire asupra limitelor Dacianului). *Stud. Cerc. Geol.*, VI, 2, p. 387-403, Bucureşti.

Marinescu, Fl. and Papaianopol, I., 2003, Le Romanien - unité chronostratigraphique. *Chronostr. und Neostratotyp.*, Pl 2, Romanien, Edit. Academiei Române, p.19-20, Bucureşti.

Neumayr, M. and Paul, M., 1875, Die Congerien und Paludinenschichten Slavoniens und deren Faunen. *Ein Beitrag zur Dezzendenz-Theorie- Abb. K. k. geol. Reich*. 7(3) 111 p. X Taf., Wien.

Olteanu, R., 2004, Romanianul şi problemele lui, Academia Română and Institut Speol. ''Emil Racoviță'', Simpozion Romanian, p. 15 – 27, Bucuresti.

Pana, I., Enache, C., Andreescu, I., 1981*, Fauna de moluşte şi depozite cu ligniți din Oltenia*, Craiova.

Papaianopol, I., 1994, Contributions to the study of Pontian, Dacian and Romanian deposits in the Basin of the Buzău Valley based on drilling results. *Rom. Journ. Stratigraphy*, 76, p.91-97, Bucureşti.

Papaianopol, I., Marinescu, Fl., Macaleț, R., 2003, Les coupes représentatives (stratotypes, faciostratotypes, stratotypes de limite), *Chronostratigraphie und Neostratotyp*., Pl 2, B X, Romanian, p.131 –172, Bucureşti.

***, 2003. *Romanian - Chronostratigraphie und Neostratotypen*, Pliozän, Pl 2, Editura Academiei Române, 527 p., Bucureşti.