

## MAIN GEOLOGICAL FEATURES AND FOSSIL VERTEBRATE FAUNA OF STOLNICENI FORMATION IN THE CENTRAL AREA OF CODRU RAND

NICOARĂ IGOR, LUNGU ALEXANDRU

**Abstract.** This paper gives a general view on the Stolniceni Formation exposed mainly in the central area of Codru height. It reflects a short historical study of these deposits. It mentions the lithology and mineralogical differences of these deposits in comparison with the ones belonging to Balta Formation, with mention to the presence of jasper and other Carpathian originating rocks, whose presence it is for the first time mentioned on the Basarabia territory. The mineralogical structure is almost identical to the one from all terraces of Dniester and Prut rivers. As the initial type-section of Stolniceni Formation disappeared as consequence of rocks mining, we are proposing as lectostratotype the section located in vicinity of the village Leordoia. About the geological age of these deposits there are several opinions. In our opinion, the fossil vertebrate fauna already studied probably belongs to the Late Turolian? (zone MN 13?)

**Keywords:** Stolniceni Formation, lithology, fauna, Late Miocene, Republic of Moldova.

**Rezumat. Caracteristici generale ale depozitelor și faunei de vertebrate fosile a formațiunii de Stolniceni din partea centrală a Podișului Codrilor.** Această lucrare prezintă o caracterizare generală a depozitelor Formațiunii de Stolniceni din partea centrală a Podișului Codrilor. Se menționează particularitățile litologice și mineralogice ale Formațiunii de Stolniceni și deosebirea care le separă de cele ale Formațiunii de Balta, ce constau în prezența jaspului și a materialului litic provenit din arii-surse carpatice. Compoziția mineralogică a Formațiunii de Stolniceni este de altfel comună cu cele din toate terasele râurilor Nistru și Prut. Deoarece stratotipul inițial al Formațiunii de Stolniceni a dispărut în timp ca urmare a exploatării rocilor din cariera în care a fost descris, propunem ca lectostratotip secțiunea din vecinătatea satului Leordoia. Despre vârsta geologică a acestor depozite generate de un sistem fluvial există mai multe păreri. În baza studiului faunei de vertebrate fosile colectate din aceste strate putem stabili vârsta lor ca revenind probabil Turolianului tardiv? (zona MN13?).

**Cuvinte cheie:** Formațiunea de Stolniceni, litologie, fauna, Miocenul tardiv, Republica Moldova.

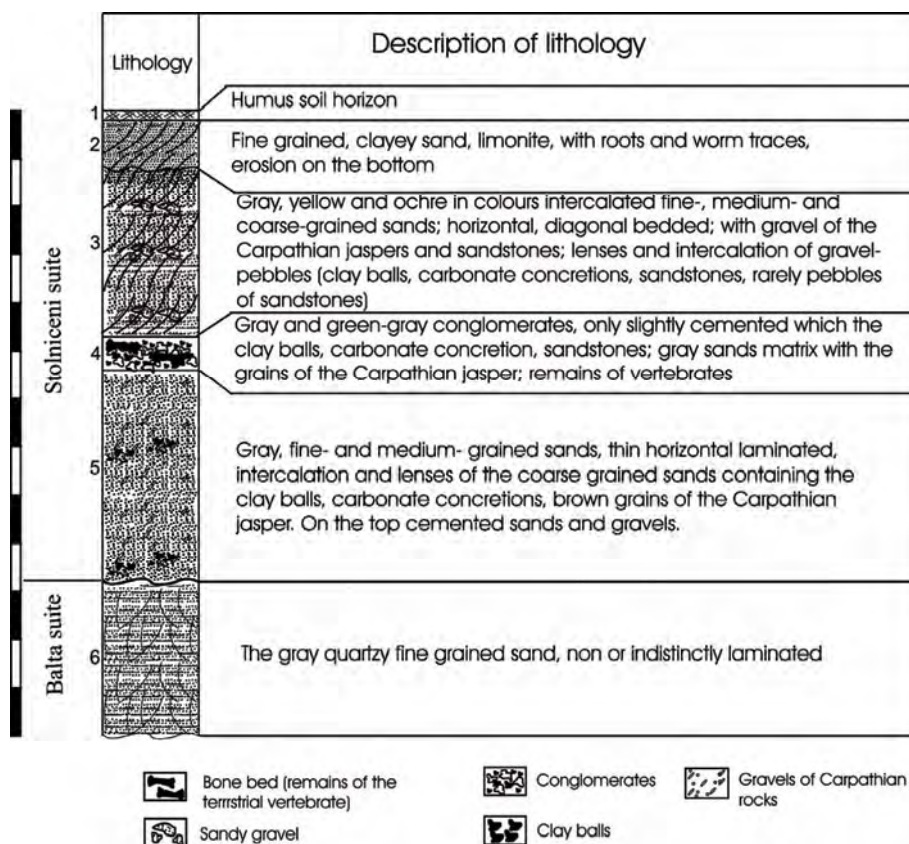


Fig. 1. Lithostratigraphic log of the locality Leordoia.

Fig. 1. Coloana litostratigrafică în vecinătatea localității Leordoia.

For the first time the Stolniceni Formation has been outlined by Bukatchuk (BUKATCHUK et al., 1968). The deposits have been described in the quarry located in the vicinity of Stolniceni village, in Hâncești district whence have received the name. Later, this type-section has been lost in connection with the quarry mining. The adjournment composing of Stolniceni Formation, represent the alluvium thickness, a height known on the highest watershed of Codru Rand. They are submitted by two or three alluvium cycles, bedding with washout on lake-alluvium deposits of Balta Formation, sharply differing from this deposit on the mineralogical and granulation basis from those of Balta Formation.

One of the lithological features of these deposits is the presence of Carpathian jasper pebble and the prevalence siliceous in it material, and also

coarse-grained structure of rocks, intercalate beds, that testifies the river genesis of these padding. According to the mineralogical structure of the padding Stolniceni Formation, is identical to the deposits composing terraces of Dniester and Prut stratigraphically lying below the modern deposit of these waterways.

The presence of these deposits of pebble of Carpathian rocks and additional siliceous material, as well as their bad degree of balling testifies the change of structural and the facial plans and the involving in sphere of erosion of more ancient rocks. Stolniceni alluvium spreads from northwest to southeast, reflecting in relief the general southeast direction of the Carpathian rivers. Except for it the absolute mark of a sole of these padding also changes in the same direction from 390 m in the vicinity of village Veverița, 380 m in the vicinity of village Leordoia and going down in a southeast direction up to 150 m in the southern part of Codru height (BUKATCHUK, 1985, POKATILOV et al., 1990). The alluvium padding composing of Stolniceni suite are known as small residual patches on watershed of the Bâc, the Ichel and the Cula, submitted for the alluvial fields extended in a southeast direction.

After the disappearance of the type-section of Stolniceni Formation, as lectostratotype of the above mentioned retinue it has been offered a geological section in vicinity of village Leordoia of Călărași district (Fig. 1) where on watershed of the rivers Byk and Ikel, on an absolute mark of 380 m on padding of Balta suite lies the adjournment of Stolniceni Formation (NICOARĂ, 2008).

For padding of Stolniceni suite, the cyclic structure is characteristic. Each accumulative cycle begins by lenses of gravel and conglomerate, involving clasts of sandstone, quartz and other various siliceous rocks with main dominance of Carpathian jaspers, passing upwards on a section in middle-fine-grained sand. Loams and fine-grained sand submit the top part of a cycle. On mineralogical association of padding of Stolniceni Formation were formed as a result of erosion of flish zones adjacent Carpathian zone and more ancient Miocene padding of the north of Moldova (HUBKA, 1981).

BILINKIS (1992) marks, that padding of Stolniceni Formation were formed in conditions of alluvium plain which reached from Siret in the West and up to Southern Bug in the east. It proves to be true presence of alluvium padding on the maximal hypsometric marks of watershed of the following rivers: Siret - Prut, Prut - Dniester and Dniester - South Bug. For acknowledgement of a foresaid works on research watershed Dniester - South Bug were carried out. As a result of these works it was found out, that in vicinity of the city Ananjev (Odessa region, Ukraine) on the maximal watershed marks, above deposits of Balta Formation, as well as in Codru Rand lies alluvial deposits, which have been allocated in Ananjev Formation. Alluvium of the named Formation on mineralogical structure and character of bedding are similar to deposits of Stolniceni.

From the faunistic point of view of deposits Stolniceni and Ananjev Formations are poorly characterized. In this connection there is no consensus of opinions on geological age and stratigraphy of these deposits.

From sites known in the central part of Codru heights neighboring villages Milești, Lozova, Leordoia, Veverița have been found out fossils of the following forms of fossil large mammals: *Deinotherium giganteum* KAUP, *Zygodon turicensis* SCHINZ, *Choerolophodon* sp. and *Hipparion* sp., as well as microvertebrates: *Crusafontina kormosi* (BAHMAYR and WILSON, 1970), *Prolagus crusafonti* LOPEZ-MARTINEZ, 1976, *Criopterus* sp, *Keramidomys* aff. *carpaticus* (SCHAUB & ZAPFE, 1953), *Lophocricetus* sp., *Ishimomys* sp. which can be related to a late phase of development of Hipparion faunae of Turolian type, zone MN 13?. (LUNGU, 1998).

In the southern part of Codru Rand in a lot of localities of Cimișlia district (Mihailovca, Sagaidac, Porumbrei), in the deposits of Stolniceni Formation, there are known the following fossil vertebrates: *Protestudo* sp., *Melanochelys pidoplickai*, *Pliocervus* sp., etc., that testify a younger age of Stolniceni retinues in comparison with the deposits of the central part of Codru Rand.

Presence of the fresh-water mollusc *Plicatibaphia flabellate rossica* from adjournment of Ananjev Formation, characteristic for the top of Meotian is interesting. In deposits of Ananjev Formation are known also the fragmentary remains of mammals: *Indarctos* sp., *Mammot* sp., *Dihoplus schleiermayeri* (KAUP, 1832), *Samotherium* sp., *Neomegaloceros gracilis* KOROTKEVICH (HUBKA, 1981). On the basis of mentioned above the assumption about upper Miocene age of this padding (IATZKO, 1959) has been stated.

Studies on the fossil fauna of Stolniceni Formation in Leordoia, Veverița-2 and Bălănești localities had been carried out by LUNGU (1998). As a whole these localities may be characterized by a large variety of species, but few in number. As a whole, the faunal assemblages from the above mentioned localities can be characterized as cricetids hamster. During the field works carried out in 2007 it was possible to collect a new material, which allowed establishing the age of these padding more precisely. As a result of preliminary definitions of the fossilized remains it is possible to conclude that fauna of Stolniceni suite is older in comparison with known fauna from average Pliocene, and apparently it is early Pontian age, for example Middle Pliocene, Lower Pliocene and Upper Miocene. Detailed definition of the age of these deposits is complicated from the point of view that in Eastern Parathetys the fauna of early Pontian is poorly investigated.

Below, the preliminary list of vertebrate fauna of several Stolniceni Formation localities of the central areas of Codru heights (Table 1) is given.

Table 1. Preliminary list of fossil vertebrate fauna from stolniceni formation.  
Tabel 1. Lista preliminară a vertebratelor fosile determinate din formațiunea de stolniceni.

Taxa	Leordoia	Veverița-2	Bălănești
<b>Reptilia:</b>			
<i>Lacerta</i> sp.	*		*
<i>Ophisaurus</i> sp.	*	*	*
<i>Protestudo</i> sp.	*		*
<b>Mamalia. Insectivora:</b>			
<i>Erinaceus</i> sp.	*		
<i>Crusafontina kormosi</i> (BAHMAYER and WILSON, 1970)			*
<i>Mygalinia</i> sp.	*		
<b>Primates</b> gen. et sp. indet	*		
<b>Lagomorpha:</b>			
<i>Alilepus</i> sp.			*
<i>Proochotona eximia</i> HOMENKO, 1914	*	*	*
<i>Prolagus cf. michauxi</i> LOPEZ-MARTINEZ, 1976	*		*
<b>Rodentia:</b>			
<i>Spermophilinus cf. turolensis</i> , BRUIJIN & MEIN, 1968	*		
<i>Cryptopterus</i> sp.	*		
<i>Blasckia</i> sp.			*
<i>Trogotherium (Euroxenomys) minutum rhenanum</i> FRANZEN & STORH, 1975	*	*	*
<i>Castor cf. neglectus</i> SCHLOSSER, 1902	*		
<i>Keramidomys aff. carpaticus</i> (SCHAUB & ZAPFE, 1953)			*
<i>Parapodemus</i> sp.			*
<i>Occitanomys cf. sondari</i> WEERD, 1976			
<i>Anomalospalax cf. tordosi</i> KORDOS, 1989	*	*	
<i>Lophocricetus</i> sp.		*	
<i>Neocricetodon cf. schaubi</i> KRETZOI, 1951	*	*	*
<i>Ichimomys</i> sp.	*		
<b>Carnivora:</b>			
<i>Metailurus</i> sp.		*	
<b>Proboscidea:</b>			
<i>Zygodon turicensis</i> (SCHINZ, 1824)	*		
<b>Perissodactyla:</b>			
<i>Hipparion</i> sp.	*	*	*
<i>Rhinocerotidae</i> , gen et sp. ind.	*	*	*
<b>Artiodactyla:</b>			
<i>Microstonyx cf. major</i> (GERVAIS, 1848).		*	
<i>Cervavitus</i> sp.		*	
<i>Procapreolus</i> sp.	*	*	*
<i>Gazella</i> sp.	*	*	

## CONCLUSIONS

As a result of the study of continental padding of water-separate spaces of Codru heights can be noted, that the padding composing alluvium of Stolniceni Formation have started to be formed in early Pontian and proceeded apparently down to average Pliocene.

On an extent Pliocene-Quaternary time these padding were intensively eroded and were kept only on the maximal watershed as separate patches. That fact is interesting, that from Stolniceni suite have been determined the remains of faunal associations of various geological ages. From the central areas of Codru heights were found certain faunal remains characteristic for late Turolian (zone MN13?), what testifies the presence of such forms as *Deinotherium giganteum* KAUP., *Zygodon turicensis* SCHINZ, and *Hipparion* sp., *Crusafontina kormosi* (BAHMAYER and WILSON, 1970), *Prolagus cf. michauxi* LOPEZ-MARTINEZ, 1976, *Cryptopterus* sp., *Keramidomys* sp., *Lophocricetus*, *Ichimomys*.

In faunistic association in the padding of Stolniceni Formation of the central part of Codru Rand there are representatives of various paleoecosystem: marshlands, flood-plain forests, forest steppes, what we can explain in specific taphonomy of these sites. Presence of primates indicates the existence of a warm climate of subtropical type about what testifies and the paleobotanical data (MEDEANIK, 2007).

## REFERENCES

- BILINKIS G. 1992. *Gheodinamika krainego Yugo-zapada Vostochnoevropeiskoi platformy v epohu morfogeneza Kishinev, Shtiintsa*: 179 pp.

- BUCATCHUK P., BURDENKO B., VOLOSHYN E. 1968. *Novye dannie o nalichii drevnealluvialnykh otlojenii na territorii mejdurechia Dnestr-Prut*. DAN SSSR. **178**(6).
- BUCATCHUK P. 1985. *Srednipliotsenovye alluvialnyye otlojenia Paleo-Pruta i Paleo-Dnestra. Tektonika i Stratigraphia*, Kiev: Naukova Dumka. **26**: 81-87.
- IATZKO I. 1959. *Kontinentalnyye fatsii v verhnem neogene yuga USSR i ih unionidy*. Tr. Odesskogo gosuniversitetaim. „I. I. Mechnikova”. Serii. geol. i Geogr. nauk. **149**(6): Odessa: 150 pp.
- KHUBKA A. 1981. *Stratigraphicheskoe polozenie Stolnichensko – Ananjevskih sloev*. Biostratigraphia Antropogena i Neogena yugo-zapada SSSR, Kishinev. Shtiintsa: 48-59.
- LUNGU A. 1998. *Fauna și poziția stratigrafică a „Stratelor de Stolniceni”*. 60 de ani ai Facultății de Geografie. Chișinău: 27-29.
- MEDEANIK S. 2007. *Palonologicheskaya kharakteristika ponticheskikh otlojeniy v Moldove: stratigaphiya, rekonstruktzii rastitelinosti i klimata*. Buletinul Institutului de Geologie și Seismologie al ASM Chisinau. 1: 40-51.
- NICOARA I. 2008. *Noul stratotip al suietei de Stolniceni*. Chisinau. (in press).
- POKATILOV V., BLIUC I., BUCATCHUK P. 1990. *Otchet po teme "Izuchenie stratigraphii i litologhii alluvialnykh pokrovnykh Pliocene – Chetvertichnykh otlojenii Moldavskoi SSR."* Kishinev. MTGF.

**Nicoară Igor**

Institute of Geology and Seismology of ASM  
Republic of Moldova, Chisinau, str. Academiei 3  
nicoaraigor@gmail.com

**Lungu Alexandru**

Tiraspol State University, Chisinau  
Republic of Moldova, Chisinau, str. Gh. Iablocichin 5