Acta zoologica cracoviensia, **56**(2): 13-28, Kraków, 30 December, 2013

doi:10.3409/azc.56_2.13

New dormice records (Rodentia: Gliridae) from the Late Miocene of the Republic of Moldova

Andrian DELINSCHI

Received: 5 May 2013. Accepted: 16 December 2013.

DELINSCHI A. 2013. New dormice records (Rodentia: Gliridae) from the Late Miocene of the Republic of Moldova. *Acta zool. cracov*., **56**(2): 13-28.

Abstract. The Gliridae from three Late Miocene localities of the Republic of Moldova – Chimishliya (age MN12), Gura Galbene (MN12), and Gradishte (MN11/12) are described and their taxonomic position discussed: two are assigned to *Myomimus*, one each to *Vasseuromys, Muscardinus* and Gliridae gen. and sp. indet. The most abundant fossil remains were found in Chimishliya (nine teeth) and the most taxonomic diversity was observed in Gura Galbene (*Myomimus dehmi/maritsensis*, *Myomimus* sp., *Muscardinus* and Gliridae gen. and sp. indet). Discovery of the specimen of *Muscardinus* from Moldova fills the stratigraphic gap of genus occurrence between MN11 and MN14 in Europe. Scarcity of fossil remains does not allow for reconstruction of the transformations of the dormice fauna, though presence of particular genera is indicative of specific palaeoenvironment conditions in the Late Miocene of Moldova.

Key words: Gliridae, *Myomimus*, *Vasseuromys*, *Muscardinus*, Turolian, Republic of Moldova.

✉ Andrian DELINSCHI, Department of Natural Sciences, National Museum of Ethnography and Natural History of Moldova, M. Kogalniceanu str. 82, 2009, Chişinău, Republic of Moldova.
E-mail: andriandelinschi@yahoo.com

I. INTRODUCTION

Late Miocene vertebrate faunas represent a dominant part of the Neogene fossil record from the Republic of Moldova. Some of these yielded both large and small mammals (Kalfa, Chimishliya, Chiobruchiu), while Tudora exclusively contains large mammals. Localities that yield small mammals associated with amphibians and reptiles are rare (e.g. Gradishte). Although these faunas captured the attention of paleontologists for a long time (GORNOVICH 1906, KHOMENKO 1912), detailed descriptions of the small mammal fossil material are not numerous (e.g., LUNGU 1981, NICOARA 2011). As a consequence, detailed data on Late Miocene dormice from the Republic of Moldova are still insufficient.

The first report of glirid rodents was provided by LUNGU (1981) from the locality of Buzhor (age: MN9), e.g. *Miodyromys* aff. *multicrestatus* (*Ramys multicrestaus* in LUNGU & RZEBIK-KOWALSKA 2011). Thereafter LUNGU & CEMARTAN (1989) recognized the genera *Myomimus* and *Ramys* in Keinar (MN10), and LUNGU (1990) added *Vasseuromys* to the Moldovan fossil record (Chiobruchiu, MN11).

A rich small vertebrate fauna including the dormice *Myomimus* and *Vasseuromys* was discovered in Chimishliya in 2000-2008 as result of several field excavations (DELINSCHI 2009). Further prospective fieldwork carried out by paleontologists from the National Museum of Ethnography and Natural History of Moldova (NMENHM) yielded three new Late Miocene localities. Two of them – Gura Galbene and Gradishte – contain glirid remains, which are described and discussed in their biostratigraphic context in this paper.

Dormice are generally rare in the Late Miocene paleontological localities of the Republic of Moldova but they have been found in most localities with small mammal fauna: *Muscardinus hispanicus* DE BRUIJN, 1966 – Girovo, MN9; *Miodyromys* aff. *hamardas* (MAJOR, 1899), *Ramys multicrestatus* (DE BRUIJN, 1966) – Buzhor I, MN9; *Muscardinus* sp. – Veveritsa I, MN9; *Ramys multicrestatus*, *Myomimus dehmi* (DE BRUIJN, 1966) – Keinar, MN10; *Myomimus dehmi, Vasseuromys* cf. *pannonicus* (KRETZOI, 1978) – Chiobruchiu, MN11; *Myomimus maritsensis* DE BRUIJN, DAWSON & MEIN, 1970, *Glis* cf. *minor* KOWALSKI, 1956 – Leordoaya, MN13 (LUNGU & RZEBIK-KOWALSKA 2011).

Outside the Republic of Moldova, in Northern Black Sea Area, records of Late Miocene dormice were mentioned from Ukraine. NESIN in recent paper (2013) presented detailed overview of Mammalian Neogene localities in Ukraine where dormice are mentioned: *Glis valesiensis* AGUSTÍ, 1981 – Gritsiv, MN9; *Myoglis ucrainicus* NESIN & KOWALSKI, 1997 – Gritsiv, MN9; *Muscardinus topachevskii* NESIN & KOWALSKI, 1997 – Gritsiv, MN9; *Paraglirulus* cf. *werenfelsi* ENGESSER, 1972 – Gritsiv, MN9; *Ramys gipanensis* NESIN, 2004 – Mikhailovka 1, MN10; *Ramys multicrestatus* – Mikhailovka 1, MN10; *Myomimus* sp. – Novoelizavetovka 2,3 MN11/12, 16th Station of Bolschoy Fontan, Odessa, MN13; *Muscardinus* sp. – Novoelizavetovka 2,3 MN11/12, Cherevichnoe 3, MN12, 16th Station of Bolschoy Fontan, Odessa, MN13; *Glirulus* sp. – Cherevichnoe 3, MN12; *Myomimus maritsensis* – Vinogradovka 1, MN13; *Glis* sp. – Vinogradovka 1, MN13. There are also records of dormice from Ukraine related by SINITSA (2011): *Vaseuromys pannonicus* – Palievo, MN11, and *Vaseuromys* aff. *pannonicus* – Belka, Kubanka 2, MN11.

II. LOCALITIES

Chimishliya (46° 32′ 46.8486" N, 28° 45′ 24.552" E) is located in a clay/sand quarry at 3 km NW of center of Chimishliya city, and about 70 km SW to Kishinev (Fig. 1). This locality is considered by several authors (VANGENGEIM & TESAKOV 2008, DELINSCHI 2009, LUNGU & RZEBIK-KOWALSKA 2011) to be of Middle Turolian age (MN12). Last of all, the faunal list from Chimishliya was mentioned in LUNGU and RZEBIK-KOWALSKA (2011), however there is some doubt to the identification of some taxa (e.g. *Proochotona* sp., *Myomimus maritsensis*, *Neocricetodon* (*Kowalskia*) *browni* DAXNER-HÖCK, 1992, *Pseudocricetus orienteuropaeus* TOPACHEVSKII & SKORIK, 1992).

Gura Galbene (46° 42′ 38.4912" N, 28° 41′ 40.2612" E) is located in a small sand quarry in the northern part of village Gura Galbene (Chimishliya District), at a distance of 23 km from Chimishliya and 48 km from Kishinev (Fig. 1). The locality with a small vertebrate fauna was discovered in summer 2011 and the faunal assemblage has some similarities with Chimishliya (Table I). LUNGU and RZEBIK-KOWALSKA (2011) assign Gura Galbene to MN12. A preliminary list from this locality was mentioned by DELINSCHI

(2012), but requires the following comments. The place where the large mammalian fauna collection from this site is stored is unknown (Bucharest?, Moscow?), and the faunal list is known from bibliography only (SUKHOV 1945). Remains of the genus *Lophocricetus* probably represent a new species, and the taxonomic affinity of the murids (*Apodemus*, *Hansdebruijnia*) requires verification.

Gradishte (46° 37′ 2.9706" N, 28° 45′ 51.4728" E) is located in a sand quarry in the northern part of the village Gradishte (Chimishliya District), at a distance of 13 km to Chimishliya and 55 km to Kishinev (Fig. 1). This locality was discovered in summer 2012 and currently the faunal assemblage is under study. It is too early to confirm the age of this locality, but it has some similarities with Chimishliya and Gura Galbene (Table I) and has been preliminary assigned to MN12.

Table I

Preliminary list of fossil small vertebrate fauna from the studied fossil localities

	Chimishliya	Gura Galbene	Gradishte
Insectivora			
Parasorex socialis (VON MEYER, 1865)	+	–	–
?*Erinaceus* sp.	+	–	–
Ruemkelia sp	+	+	+
Lagomorpha			
"Proochotona" cf. *eximia* KHOMENKO, 1914	–	–	+
Alilepus laskarewi (KHOMENKO, 1914)	+	–	–
Alilepus sp.	–	+	+
Rodentia			
Euroxenomys minutum rhenanum (FRANZEN & STORCH, 1975)	+	–	–
Tamias aff. *atsali* DE BRUIJN, 1995	+	–	–
Tamias sp.	–	+	+
Spermophilinus sp.	+	+	+
Myomimus dehmi/maritsensis group	+	+	+
Myomimus sp.	–	+	–
Vasseuromys cf. *pannonicus* (KRETZOI, 1978)	+	–	+
Muscardinus cf. *pliocaenicus austriacus* BACHMAYER & WILSON, 1970	–	–	+
Lophocricetus sp.	+	+	+
Kowalskia progressa TOPACHEVSKII & SKORIK, 1992	+	+	+
Hansdebruijnia aff. *neutrum* (DE BRUIJN, 1976)	+	–	–
Hansdebruijnia sp.	–	+	+
Apodemus aff. *barbarae* (VAN DE WEERD, 1976)	+	–	–
Apodemus sp.	–	+	+

Fig. 1. Map of the Republic of Moldova, showing the location of the studied fossil localities.

III. METHODS

During excavations carried out between 2000 and 2012 at all three localities the same methods of small mammal fossils isolation were used. In the field sediment samples had been first dry-screened (2.5 mm mesh) and the residues water-screened (0.5 mm mesh). The refuse was dried, and bones and teeth of small vertebrates were picked out under light microscopes (МБС 9, XTL 6445B-J4).

The nomenclature of the dental elements (Fig. 2) follows DAAMS & DE BRUIJN (1995) and DAXNER-HÖCK & HÖCK (2009). Measurements of teeth were taken according to the methods applied by DAAMS & DE BRUIJN (1995). All measurements were taken with a digital microscope LEICA DVM 5000 to the nearest 0.01 mm. Photographs were taken in Eberhard Karls University Tuebingen, Institute for Geoscience, Palaeontological Museum and Collection.

The material studied is housed in the collections of the National Museum of Ethnography and Natural History of Moldova (NMENHM), Kishinev.

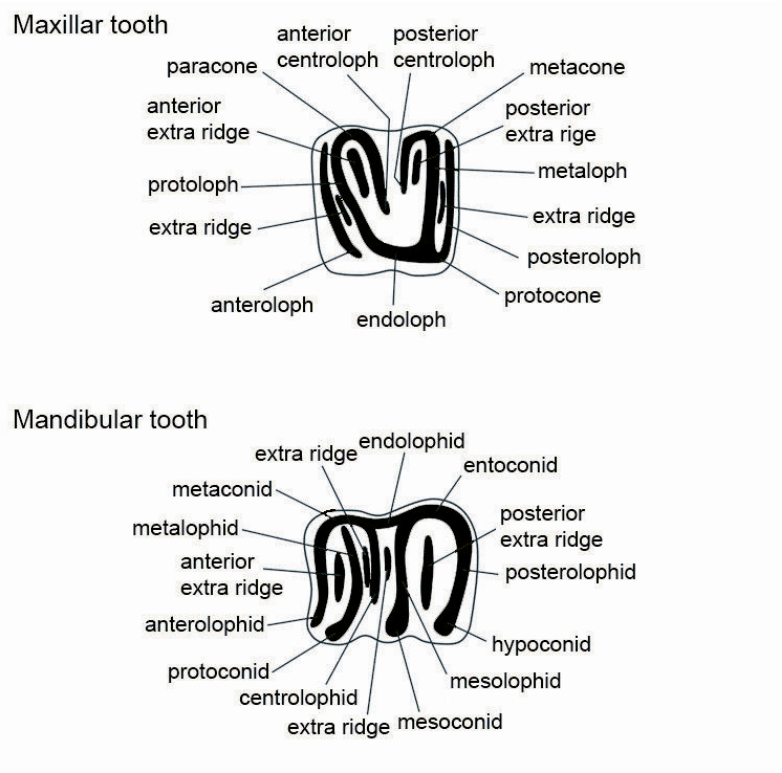

Fig. 2. Dental morphology of Gliridae after DAXNER-HÖCK and HÖCK (2009).

IV. SYSTEMATIC PALAEONTOLOGY

Family: **Gliridae** THOMAS, 1897

Subfamily: **Myomiminae** DAAMS, 1981

Genus: ***Myomimus*** OGNEEV, 1924

Myomimus dehmi (DE BRUIJN, 1966) ***/maritsensis*** DE BRUIJN, DAWSON & MEIN, 1970 – group of species

2008 *Miomimus maritsensis* DE BRUIJN, DAWSON & MEIN, 1970. – DELINSCHI: 115-119, pl. XXIII, figs. 1-4.

M a t e r i a l. Chimishliya: 4 M1/2; 1 m1; 2 m2. Gura Galbene 2 M1/2; 2 m1. Gradishte: 2 M1/2; 2 m1.

D e s c r i p t i o n. Maxillary teeth: M1 and M2 are relatively small with a concave labial margin. *Myomimus* M1 and M2 are very similar and it is thus very difficult to separate

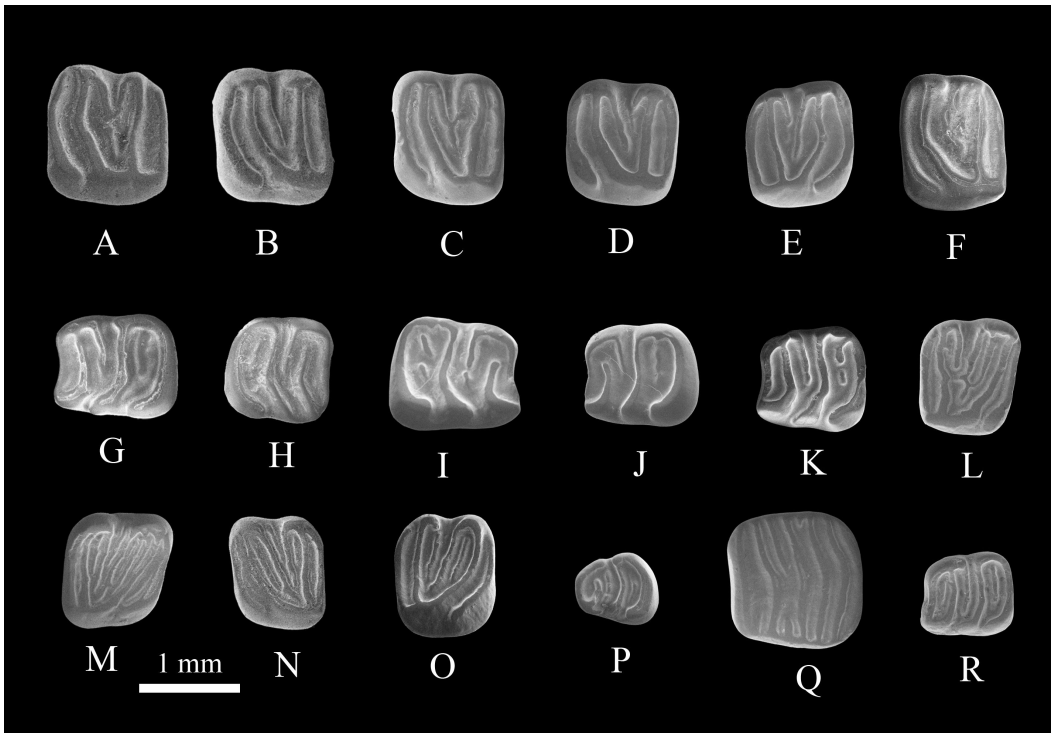

Fig. 3. Late Miocene glirids from Republic of Moldova. *Myomimus dehmi/maritsensis* group from Chimishliya A-B: left M1/M2, G: left m1, H: right m2; from Gura Galbene C-D: left M1/M2, I: right m1, J: left m1; from Gradishte E: right M1/M2, F: left M1/M2, K: left m1. *Myomimus* sp. from Gura Galbene L: right M1/M2; *Vasseuromys* cf. *pannonicus* from Chimishliya M: right M1/M2, N: left M1/M2; from Gradishte O: right M1/M2, P: left p4. *Muscardinus* cf. *pliocaenicus austriacus* from Gura Galbene Q: left M2. Gliridae gen. et sp. indet. from Gura Galbene R: left m1. Scale bar: 1 mm.

them when dealing with isolated teeth. They are herein not identified and considered as M1/2. The dental morphology is simplified and extra ridges are lacking. The main ridges (anteroloph, protoloph, metaloph and posteroloph) are well developed, weakly curved, and separated by wide and deep valleys. The anteroloph does not connect to the protocone. In three out of eight molars the anteroloph connects to the paracone (Fig. 3F), and in two teeth it is completely isolated. In two specimens centrolophs are running parallel and are slightly directed backwards, while in other teeth both join in a Y-shaped connection (Figs. 3A; 3C). The protoloph and metaloph are connected to protocone, forming a U-like structure. The protoloph connects to the paracone and to the anterior centroloph. The metaloph connects to the metacone and to the posterior centroloph. This centroloph is less developed than the anterior one (not exceeding ¼ of the width of the M1/2). The metaloph and posteroloph reach the protocone, and are in all specimens but two in connection with the metacone. The M1/2 have three roots, a large lingual root and two smaller labial ones.

Mandibular teeth: m1 and m2 have a rectangular shape. The dental morphology is simplified, only the posterior extra ridge being present. This crest is variable in its degree of development. It is relatively short in one m2 (Fig. 3H), but long in the other (Fig. 3G).

In two m1 this crest is divided into two smaller ridges (Figs. 3I; 3K). In another tooth it connects to the entoconid (Fig. 3J). The main ridges are slightly curved. There is no endolophid. In the specimens from Chimishliya and Gura Galbene, the metalophid is separated from the metaconid, and in one tooth the crest is connected to the anterolophid. In the specimens from Gradishte, metalophid is connected to the metaconid (Fig. 3K). The centrolophid reaches or exceeds ½ of the width of the lower molars. In one tooth, the centrolophid is not continuous (Fig. 3I). The mesolophid connects to the posterolophid through the entoconid. The m1 and m2 have three roots, two in anterior and one in the posterior part.

T a x o n o m i c a l p o s i t i o n: The teeth from Chimishliya, Gura Galbene and Gradishte are morphologically similar to *Myomimus* (Tab. II). The molars from Moldova differ from *M. sinensis* WU, 1985 from Bilike (China, MN14 equivalent) (QIU & STORCH 2000) in being larger and in the lack of extra ridges in the maxillary teeth, as well as in both the absence of cingulum on the lingual border of the upper molars and tubercles in the lower molars. They differ from *M. complicitidentatus* POPOV, 2004 from Muselievo (Bulgaria, Ruscinian) in their clearly smaller size. From *M. roachi* BATE, 1937 and *M. qafzensis* HAAS, 1973 from the Pleistocene and Holocene of Israel (DAAMS 1981) they differ by smaller size and in the development of the centrolophs (*M. roachi* and *M. qafzensis* show weakly developed centrolophs).

Metrically, all specimens from the Republic of Moldova can be included in the variability range of *M. dehmi* from Kohfidisch and Eichkogel (Austria, MN11, DAXNER-HÖCK & HÖCK 2009) and *M. maritsensis* from Maramena (Greece, MN13, DAXNER-HÖCK 1995) (Figs 4, 5). Similarly, the dental morphology of the specimens fits what is observed in these species (DAAMS 1981). However, the lack of sufficient material does not allow a deeper taxonomic analysis, and the specimens cannot be precisely assigned to one or to the other *Myomimus* species. Criterion proposed by DAXNER-HÖCK (1995) of separation between *M. dehmi* and *M. maritsensis* by P4/p4 was impossible to use in this case.

S t r a t i g r a p h i c r e m a r k s. The stratigraphic range of *M. dehmi* is Late Miocene (MN9-12). It is known from the Republic of Moldova (Keinar MN10, Chiobruchiu MN11; LUNGU & RZEBIK-KOWALSKA 2011), and also known from: Spain (Nombrevilla, Pedregueras II C, Pedregueras 1A, Pedregueras 2A, Peralejos 4, Peralejos D, DE BRUIJN 1966, DAAMS 1981, MN9; El Arquillo, AZANZA et al. 1989, MN13), Greece (Lefkon, DAXNER-HÖCK 1995, MN10; Pikermi-Chomateri, DE BRUIJN 1976, MN11-12), and Austria (Eichkogel, Kohfidisch, DAXNER-HÖCK & HÖCK 2009, MN11). *M. maritsensis* is known from Greece (Maritsa, Monaseri, Maramena, DE BRUIJN et al. 1970, DAXNER-HÖCK 1995, MN13/14) and Ukraine (Vinogradovka 1, NESIN 2013, MN13). Therefore biostratigraphic ranges of these species are very close and I found it impossible to separate between them on the basis of this criterion. This would be possible only in case of abundant presence of fossil records.

In their latest overview of the Miocene fauna from the Republic of Moldova, LUNGU and RZEBIK-KOWALSKA (2011) consider that the specimens from Chimishliya belong to *M. maritsensis*, a statement with which I disagree (see above). The presence of *M. maritsensis* in Leordoaya is also doubtful (one m1/2, MN13, NICOARA 2013). Certainly this species can be found in Late Turolian of Moldova, but this requires more fossils for analysis.

Table II

Measurements (in mm) of teeth of *Myomimus* from the three recently studied localities in Republic of Moldova and localities in other countries

	M. dehmi/ maritsensis Chimishliya (MN12)	*M. dehmi/ maritsensis* Gradishte (MN12?)	*M. dehmi/ maritsensis* Gura Galbene (MN12)	*M. dehmi* (DE BRUIJN, 1966) Kohfidisch, Austria (MN11) DAXNER-HÖCK & HÖCK, 2009	*M. maritsensis* DE BRUIJN, DAWSON & MEIN 1970, Maramena, Greece (MN 13/14) DAXNER-HÖCK, 1995	*M. complici-dentatus* POPOV, 2004 Muselievo Bulgaria (MN15b) POPOV 2004	*M. sinensis* WU, 1985, Bilike, China (MN14) QIU & STORCH, 2000	*M. roachi* (BATE, 1937) Hayonim Israel Pleistocene DAAMS, 1981	*M. qafzensis* (HAAS, 1973) Qafzeh Israel Holocene DAAMS, 1981
Length P4	–	–	–	0.55-0.70 n=30	0.63-0.90 n=22	–	0.64-0-76 n=15	1.0.65=0.70 n=3	0.60-0.75 n=10
Width	–	–	–	0.60-0.90	0.79-1.08	–	0/84-1.00	0.79-0.92	0.79-0.92
Length M1/M2	1.05-1.11 n=4	0.99-1.05 n=2	1.04-1.06 n=2	0.85-1.10 n=116	0.90-1.12 n=94	1.27-1.32 n=3	0.92-1.20 n=41	1.25-1.35 n=3	1.17-1.35 n=54
Width	1.05-1.09	0.91-0.99	0.98-1.08	0.90-1.25	1.15-1.40	1.60-1.74	1.16-1.40	1.27-1.43	1.11-1.44
Length M3	–	–	–	0.70-0.88 n=28	0.76-0.97 n=18	1.05 n=1	0.92-1.00 n=15	1.08 n=1	1.08-1.22 n=32
Width	–	–	–	0.85-1.05	0.97-1.22	1.37	1.12-1.28	1.27	1.13-1.29
Length p4	–	–	–	0.60-0.75 n=12	0.65-0.72 n=5	–	0.68-0.76 n=3	0.60-0.63 n=3	0.54-0.70 n=13
Width	–	–	–	0.60-0.70	0.72-0.79	–	0.64-0.72	0.60-0.65	0.56-0.78
Length m1	1.05 n=1	0.94-1.11 n=2	0.99-1.01 n=2	0.90-1.10 n=64	0.97-1.19 n=28	1.57-1.64 n=2	1.00-1.20 n=22	1.19-1.46 n=19	1.19-1.43 n=26
Width	0.94	0.89-0.91	0.90-0.92	0.85-1.05	0.90-1.12	1.30-1.45	1.00-1.24	1.05-1.33	1.08-1.25
Length m2	1.05-1.08 n=2	–	–	0.90-1.10 n=56	0.94-1.22 n=37	1.38-150 n=4	1.04-1.24 n=	1.29-1.46 n=12	1.24-140 n=26
Width	0.97-1.05	–	–	0.90-1.10	0.94-1.22	1.38-1.48	1.08-1.24	1.08-1.43	1.11-1.27
Length m3	–	–	–	0.80-0.95 n=13	0.88-1.04 n=23	–	0.92-1.08 n=15	1.13-1.19 n=2	1.06-1.24 n=30
Width	–	–	–	0.75-1.00	0.83-1.03	–	0.98-1.12	1.06-1.14	0.94-1.14

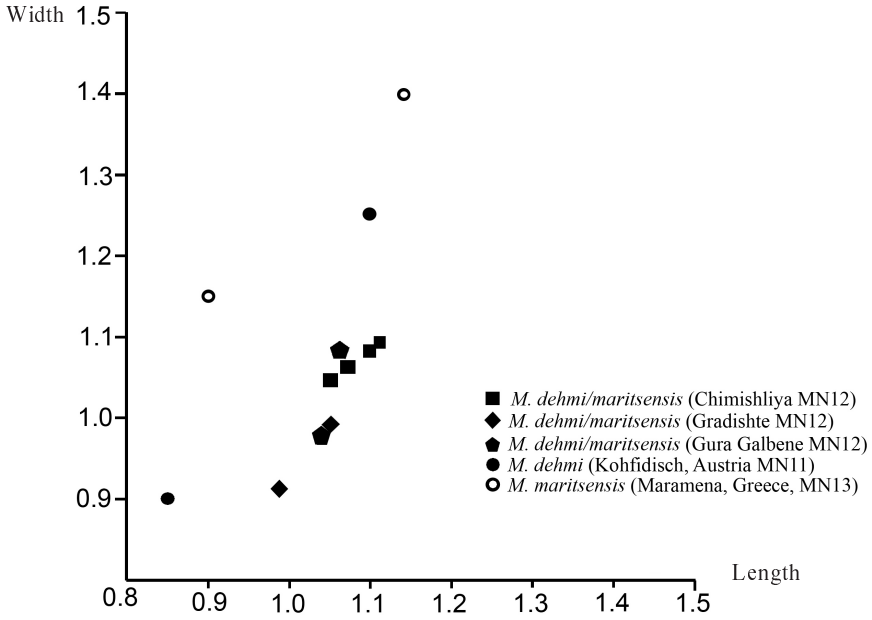

Fig. 4. Scatter-diagrams of the maxillary teeth sizes (mm) of *Myomimus dehmi/maritsensis* group from Republic of Moldova in comparison with *M. dehmi* from Kohfidisch (Austria) and *M. maritsensis* from Maramena (Greece).

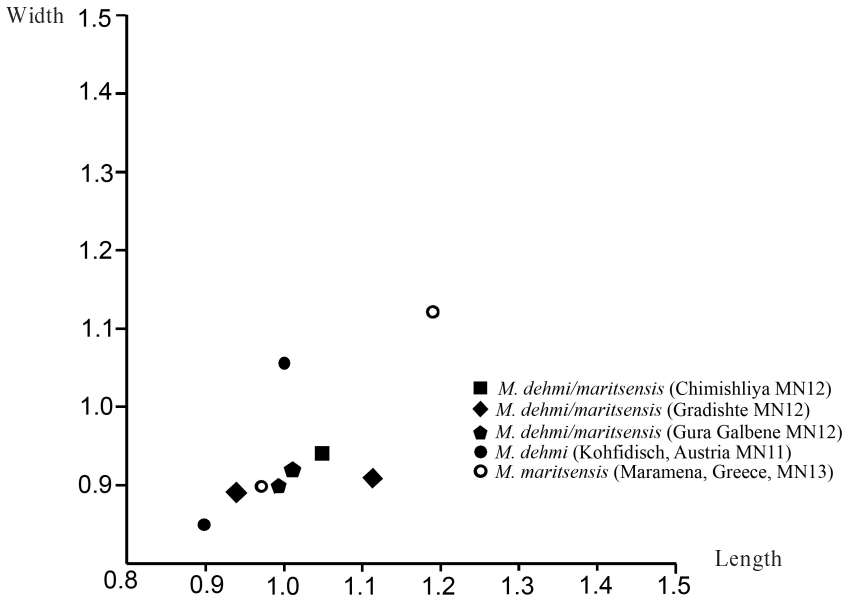

Fig. 5. Scatter-diagrams of the mandibular teeth sizes (mm) of *Myomimus dehmi/maritsensis* group from Republic of Moldova in comparison with *M. dehmi* from Kohfidisch (Austria) and *M. maritsensis* from Maramena (Greece).

Myomimus sp.

Fig. 3L

M a t e r i a l. Gura Galbene 1 M1/2.

M e a s u r e m e n t s (mm): length 0.82; width 0.92.

D e s c r i p t i o n. Concave occlusal surface. The tooth has a relatively complicated morphology: all the main ridges but the anteroloph connect to endoloph. The anterior centroloph is long and not connected to the centroloph. The anterior centroloph is connected to the anterior extra ridge (between protoloph and anterior centroloph), by small crests. The anterior extra ridge is well developed, while the posterior one (between metaloph and posterior centroloph) is very small. The posteroloph reaches the protocone but ends labialy free. M1/2 has three roots, a larger lingual and two smaller labial ones.

T a x o n o m i c a l p o s i t i o n. This tooth differs from *Myomimus* from Chimishliya, Gura Galbene and Gradishte by presence of anterior and posterior extra ridges. For this reason the molar cannot be assigned with confidence to *M. dehmi* or *M. maritsensis.* The tooth has some similarities with *Vasseuromys* but differs by lack of extra ridges in the anterior or posterior valley.

Genus: ***Vasseuromys*** BAUDELOT & DE BONIS, 1966

Vasseuromys cf. ***pannonicus*** (KRETZOI, 1978).

Fig. 3 M-P

2008 *Vaseuromys* sp. – DELINSCHI: 119, pl XXIII fig. 5

M a t e r i a l. Chimishliya: 2 M1/2. Gradishte: 1 M1/2; 1 p4, 1 m2.

D e s c r i p t i o n. Maxillary teeth – Chimishliya: M1/2 with concave occlusal surface and of relative small size (Tab. III). The dental morphology is complicated, with 10-11 ridges.

Table III

Measurements (in mm) of teeth of *Vasseuromys* cf. *pannonicus* from two recently studied localities in Republic of Moldova

	Chimishliya	Gradishte
Length M1/M2 Width	0.94-1.09 n=2 1.02-1.03	0.99 n=1 0.97
Length p4 Width	–	0.79 n=1 0.75
Length m2 Width	–	0.99 n=1 0.89

Main ridges but anteroloph are connected to endoloph. In one tooth the anteroloph is connected only to the paracone, in the other tooth the anteroloph is free. The anterior centroloph is long but not connected to endoloph. The anterior extra ridge is longer than the posterior one; centrolophs and extra ridges are of irregular shape. The posteroloph connects to the protocone and the metacone. M1/2 have three roots, a larger lingual and two smaller labial ones.

Maxillary teeth – Gradishte: The tooth has a rectangular outline. The anterior part of the M1/2 is narrower than the posterior part. The anteroloph, protoloph, metaloph and posteroloph are well developed. The centrolophs are also well developed and anterior centroloph is longer than the posterior one. Two extra ridges are present between anterior centroloph and protoloph (anterior extra ridge), and between centrolophs. The anteroloph reaches the paracone but is not connected with the protocone. The endoloph is lacking. The posteroloph is connected to the metacone and the protocone.

Mandibular teeth: Premolar p4 has triangular-rounded outline. Posterolophid and mesolophid are well developed. Posterior extra ridge is also well developed. Anterolophid, metalophid and centrolophid connected to protoconid. Anterolophid and centrolophid are not connected. Molar m2 has rectangular shape, anterolophid, metalophid, mesolophid and posterolophid are well developed. Anterolophid and metalophid fuse at the labial part. The anterolophid connects to the metaconid and centrolophid. The centrolophid exceeds ½ of the width of the teeth. Posterior extraridge is well developed. Outside the last ridge, small anterior extra ridges are present, and the two small extra ridges, one between centrolophid and mesolophid and another one between centrolophid and metalophid occur.

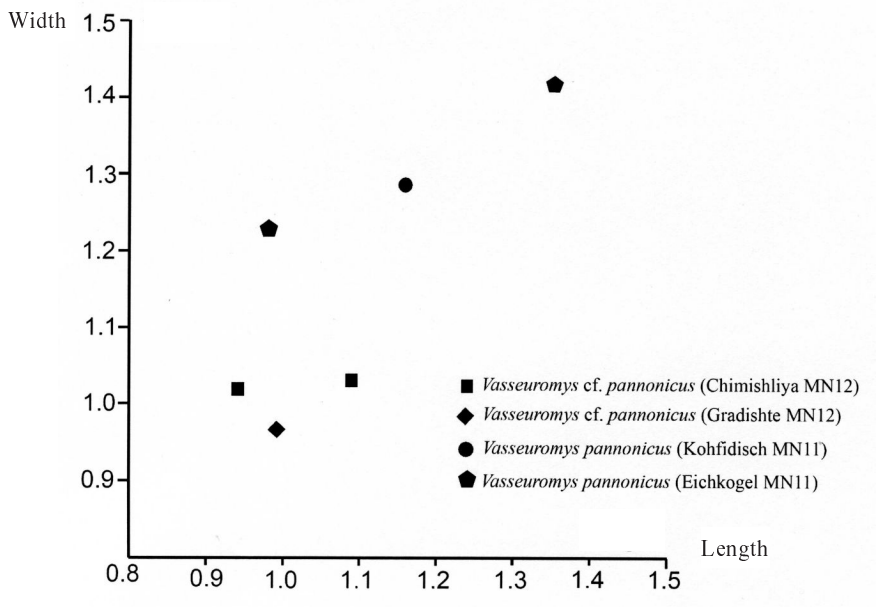

Fig. 6. Scatter-diagrams of the maxillary teeth sizes (mm) of *Vasseuromys* cf. *pannonicus* from Republic of Moldova in comparison with *Vaseuromys pannonicus* from Kohfidisch and Eichkogel (Austria).

The mesolophid and posterolophid are united with entoconid. This tooth has three roots, two in anterior and one in posterior part.

T a x o n o m i c a l p o s i t i o n. This dormouse differs from *Myomimus* in the complicated dental morphology and the well-developed anterolophs. The genus *Ramys* differs by less developed extra ridges.

The teeth fit well within representatives of the genus *Vasseuromys*, especially *Vasseuromys pannonicus* from Eichkogel (Austria, MN11, DAXNER-HÖCK & DE BRUIJN 1981; DAXNER-HÖCK & HÖCK 2009), but are slightly smaller (Fig. 6). The insufficient material does not allow for certain assignment.

Subfamily **Glirinae** THOMAS, 1897

Genus ***Muscardinus*** KAUP, 1829

Muscardinus cf. ***pliocaenicus austriacus*** BACHMAYER & WILSON, 1970

Fig. 3Q

M a t e r i a l. Gura Galbene: 1 M2.

M e a s u r e m e n t s (mm): length 1.22; width 1.25.

D e s c r i p t i o n. Square outline, nine ridges: 1st, 3rd, 5th, 7th, 9th and 10th ridges are long; 2nd ridge is short and positioned in the lingual part of tooth; 4th ridge is interrupted with a longer labial part; 6th ridge is very short. All ridges in lingual part are connected and form the endoloph.

T a x o n o m i c a l p o s i t i o n. The dental morphology of M2 falls within the variability range of *Muscardinus pliocaenicus austriacus* BACHMAYER & WILSON, 1970 from Late Miocene of Austria (DAXNER-HÖCK & HÖCK 2009). However, insufficient material does not allow for precise assignment to the species.

Gliridae gen. et sp. indet.

Fig. 3R

M a t e r i a l. Gura Galbene: 1 m1.

M e a s u r e m e n t s (mm): length 0.83; width 0.78.

D e s c r i p t i o n. Rectangular shape. The anterolophid, metalophid, mesolophid and posterolophid are present. The posterior extra ridge is well developed, while the anterior extra ridge is a bit smaller. The metalophid connects to the metaconid and protoconid. The centrolophid is long and exceeds ¾ of the width of the tooth. An endolophid is incomplete.

T a x o n o m i c a l p o s i t i o n. This tooth differs from other glirids from studied fossil localities in its smaller size and the presence of anterior extra ridge. In measurements and tooth structure it has some similarities with *Glirulus lissiensis* HUGUENEY & MEIN, 1965 from Eichkogel (Austria) (DAXNER-HÖCK & DE BRUIJN 1981), like presence of anterior extraridge and long centroloph. But at the same time, the specimen from Gura Galbene is different from description of *Glirulus lissiensis* from DAXNER-HÖCK & HÖCK (2009): “increasing number and length of extra ridges; increasing tendency towards com-

plete endolophid (from Vallesian towards Turolian occurrences)". Unfortunately, the presence of only one m1 does not allow a deeper taxonomic analysis, and the specimen cannot be assigned to any *Gliridae* genera.

V. DISCUSSION

Three Gliridae genera from three Late Miocene localities were described in this work.

Myomimus – the genus is a common element of the Vallesian and Late Turolian fauna from Spain (MN13, DE BRUIJN 1966; DAAMS 1981, MN9; AZANZA et al. 1989), of the Vallesian/Turolian from Greece (MN10-12; DE BRUIJN 1976, DAXNER-HÖCK 1995), for the Turolian of Austria (MN11; DAXNER-HÖCK & HÖCK 2009) and for the Late Turolian of Ukraine (MN13, NESIN 2013). *Myomimus dehmi/maritsensis* – recorded in the Turolian faunas Chimishliya, Gura Galbene and Gradishte, is related to the forms reported from Keinar and Chiobruchiu (*M. dehmi*), and Leordoaya (*M. maritsensis*) by LUNGU and RZEBIK-KOWALSKA (2011) and NICOARA (2013).

Vasseuromys – in Central Europe, the genus is known only from the Early Turolian (MN11) of Austria and Hungary (DAXNER-HÖCK & HÖCK 2009), in Eastern Europe, *Vasseuromys* is well represented in Early Turolian of Ukraine (SINITSA 2011).

Muscardinus – this widespread genus is known from Miocene localities of all Europe. The species: *M. vallesiensis* HARTENBERGER, 1966, *M. hispanicus* and *M. pliocaenicus austriacus* range from the Astaracian to Turolian (MN7-11) of Spain, Austria, Germany, Hungary, Romania, Poland and Ukraine (HARTENBERGER 1966, AGUILAR et al. 1979, NESIN & KOWALSKI 1997, DAXNER-HÖCK & HÖCK 2009). The Moldovan specimen is very interesting because in Europe remains of *Muscardinus* between *M. pliocenicus austriacus* from Kohfidisch, Eichkogel (MN11, DAXNER-HÖCK & HÖCK 2009) and *M. pliocaenicus pliocaenicus* from Podlesice (MN14, KOWALSKI 1963) are not known. Thus it fills the stratigraphic gap of occurrence between MN11 and MN14.

Gliridae gen. et sp. indet. – This very small specimen is new in the fossil record from the Republic of Moldova. However the material is very scarce (just one tooth) and determination of its relationship with other Late Miocene forms requires further research.

While the lack of material does not allow us to clarify the paleobiogeographic relationships of the herein studied fauna, the remains give some indication on the palaeoenvironment conditions in the Late Miocene of the Republic of Moldova. For instance *Myomimus and Vasseuromys* species are ground-dwellers preferring open country. This confirms the statements of LUNGU and DELINSCHI (2008) about the predominance of open country, of savannah-like type in Turolian.

C o n c l u s i o n s. This study provides one of the rare detailed descriptions of Late Miocene Gliridae remains from the Republic of Moldova. Although lack of sufficient material does not allow for any definitive taxonomical statement, the results show the good potential of the rodent family for biostratigraphic purposes. The dormice had a long evolution in Late Miocene of Moldavian Plate and forms from Middle Turolian probably had local descendants.

A c k n o w l e d g e m e n t s. Many thanks to colleagues from the Paleontological Collection and Museum, University of Tübingen, Germany Madelaine BÖHME, Jérôme PRIETO and Davit VASILYAN for their help during providing references, as well as valuable comments and critical remarks. Also I am grateful to Maxim SINITSA for his continuous encouragement.

REFERENCES

AGUILAR J. P., AGUSTÍ J., GIBERT J. 1979. Rongeurs Miocènes dans le Vallés-Penedés. 2 – Les rongeurs de Castell de Barbera. *Palaeovertebrata*, **9**(1): 17-31.

AGUSTÍ J. 1981. *Glis vallesiensis* n. sp., nouveau Gliride (Rodentia, Mammalia) du Neogene de Seu d'Urgell (Catalogne, Espagne). *Geobios*, **14**(4): 543-547.

AZANZA B., MENÉNDEZ E., ALCALÁ L. 1989. The Middle-Upper Turolian and Ruscinian Cervidae in Spain. *Bolletino della Società Paleontologica Italiana*, **28**(2-3): 171-182.

BACHMAYER F., WILSON R. W. 1970. Die Fauna der altpliozänen Höhlen- und Spaltenfüllungen bei Kohfidisch, Burgenland (Österreich). *Annalen des Naturhistorischen Museums in Wien*, **74**: 533-587.

BATE D. M. A. 1937. New Pleistocene Mammals from Palestine. *Annals and Magazine of Natural History*, **20**: 397-400.

DAAMS R. 1981. The dental pattern of the dormice *Dryomys*, *Myomimus*, *Microdyromys* and *Peridyromys*. *Utrecht Micropaleontological Bulletins, Special Publications*, **3**: 1-115.

DAAMS R., DE BRUIJN H. 1995. A classification of Gliridae (Rodentia) on the basis of dental morphology. *Hystrix*, **6**(1-2): 3-50.

DAXNER-HÖCK G. 1992. Die Cricetinae aus dem Obermiozän von Maramena (Mazedonien, Nordgriechenland). *Paläontologische Zeitschrift*, **66**(3-4): 331-367.

DAXNER-HÖCK G. 1995. Some Glirids and Cricetids from Maramena and other late Miocene localities in Northern Greece. [In:] SCHMIDT-KITTLER N. (ed.). The vertebrate Locality Maramena (Macedonia, Greece) at the Turolian-Ruscinian Boundary (Neogene). *Münchner Geowissenschaftliche Abhandlungen, Serie A*, **28**: 103-120.

DAXNER-HÖCK G., DE BRUIJN H. 1981. Gliridae (Rodentia, Mammalia) des Eichkogels bei Mödling (Niederösterreich). *Paläontologische Zeitschrift*, **55**(2): 157-172.

DAXNER-HÖCK G., HÖCK E. 2009. New data on Eomyidae and Gliridae (Rodentia, Mammalia) from the Late Miocene of Austria. *Annalen des Naturhistorischen Museums in Wien*, *Serie A*, **111**: 375-444.

DE BRUIJN H. 1966. Some new Miocene Gliridae from the Calatayud Area (Prov. Zaragoza, Spain). *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen, Serie B*, **69**(1): 58-71.

DE BRUIJN H. 1976. Vallesian and Turolian Rodents from Biota; Attica and Rhodes (Greece). I. *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen, Serie B*, **79**(5): 1-21.

DE BRUIJN H. 1995. Sciuridae, Petauristidae and Eomyidae (Rodentia, Mammalia). [In:] SCHMIDT-KITTLER N. (ed.). The Vertebrate Locality Maramena (Macedonia, Greece) at the Turolian-Ruscinian Boundary (Neogene). *Münchner Geowissenschaftliche Abhandlungen*, **28**/A: 87-102.

DE BRUIJN H., DAWSON M., MEIN P. 1970. Upper Pliocene Rodentia, Lagomorpha and Insectivora (Mammalia) from the Isle of Rhodes (Greece). I, II and III. *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen, Serie B*, **73**(5): 535-584.

DELINSCHI A. 2008. Studiul faunei de microvertebrate meoþiene din Sudul Republicii Moldova [Study of the Meotian micro-vertebrate fauna from the Southern part of Republic of Moldova]. PhD thesis. Manuscript. Alexandru Ioan Cuza, University of Iasi, Romania: 222 pp.

DELINSCHI A. 2009. Contribution to the study of maeotian *Hipparion* faunas from the Republic of Moldova. *Oltenia Journal for Studies in Natural Sciences*, Craiova, **25**: 391-395.

DELINSCHI A. 2012. Some dates about paleontological sites in the vicinity of village Gura Galbenei. *Buletinul Ştiinţific al Muzeului Naţional de Etnografie şi Istorie Naturală a Moldovei*, **16**(29): 88-92. [In Romanian with English summary].

ENGESSER B. 1972. Die obermiozäne Säugetierfauna von Anwil (Baselland). Inauguraldissertation. *Tätigkeitsberichte der Naturforschenden Gesellschaft Baselland*, Basel, **28**: 37-363.

FRANZEN J. L., STORCH G. 1975. Die Unterpliocene (Turolische) Wirbeltier Fauna von Dorn-Durkheim, Rheinhessen (SW Deutschland). 1-Entdeckung, Geologie, Mammalia: Carnivora, Proboscidea, Rodentia. Fouilles 1972-1973. *Senkenbergiana Lethaea*, **56**(4-5): 233-303.

GORNOVICH N. 1906. Ostatki ghiparionov (*Hipparion mediteranieum*), sobranie v sele Taraklia Besarabskogo Uezda [Remains of hipparions (*Hipparion mediteranieum*), collected in Taraklia village, District of Bender]. *Trudy Besarabskogo Obshchestva Estestvoispytatelei*, **1**(1): 1-55. [In Russian].

HAAS G. 1973. The Pleistocene Glirids of Israel. *Verhandlungender Naturforschhenden Gesellschaft*, Basel, **83**: 76-1 10.

HARTENBERGER J. L. 1966. Les rongeurs de Vallésien (Miocène supérieur) de Can Llobateres (Sabadell, Espagne): Gliridae et Eomyidae. *Bulletin de la Société géologique de France*, **8(**7): 596-604.

HUGUENEY M., MEIN P. 1965. Lagomorphes et rongeurs du Néogène de Lissieu (Rhone). *Travaux du Laboratoire de Géologie de la Faculté des Sciences de Lyon – Nouvelle Série*, **12**: 109-123.

KHOMENKO I. 1912. Meoticheskaja fauna sela Taraklii, Benderskogo uezda. *Castor fiber* LIN. [Maeotian fauna of the Taraclia vilage , Bendery district. *Castor fiber* LIN.]. *Trudy Besarabskogo Obshchestva Estestvoispytatelei*. **2**(2): 136-149. [In Russian].

KHOMENKO I. 1914. La faune méotique du village Taraklia du district de Bendery. *Travaux de la Société des Naturalistes et des Amateurs des Sciences Naturelles de Bessarabie*, **5**: 1-55. [In Russian with French summary].

KOWALSKI K. 1956. Insectivores, bats and rodents from the Early Pleistocene bone breccia of Podlesice near Kroczyce (Poland). *Acta Palaeontologica Polonica*, **1**: 33 1-394.

KOWALSKI K. 1963. The Pliocene and Pleistocene Gliridae (Mammalia, Rodentia) from Poland. *Acta Zoologica Cracoviensia*, **8**(14): 533-567.

KRETZOI M. 1978. Wichtigere Streufunde in der wirbeltierpaläontologischen Sammlung der Ungarischen Geologischen Anstalt.1. Wirbeltierfauna des pliozänen Süßwasserkalkes am Széchenyi-Berg in den Budaer Bergen. *Magyar Allami Földtami Intézet Évi Jelentése*, **1978**: 347-358. Budapest.

LUNGU A. 1981. Gipparionovaja fauna srednego sarmata Moldavii (nasekomojadnye, zajceobraznye i gryzuny). [The Hipparion fauna of the Middle Sarmatian from Moldavia (Insectivora, Lagomorpha, Rodentia)]. Izdatelstvo Štiintsa: 118 pp. [In Russian].

LUNGU A. 1990. Rannie etapy razvitija gipparionovoj fauny kontinentalnogo obramlenija Paratetisa [Early evolution stages of the Hipparion fauna in the continental frame of Paratethys]. Author's review of the dissertation, Geologiceskij Institut Akademii Nauk Gruzinskoj SSR, Tbilisi: 1-36. [In Russian].

LUNGU A., CEMARTAN G. 1989. K istorii razvitija gipparionovoj fauny pozdnego sarmata severnykh oblastej kontinentalnogo obramlenija Vostochnogo Paratetisa [Evolutionary history of the Late Sarmatian Hipparion Fauna in the north part of the continental frame of the Eastern Paratethis]. *Trudy Gosudarstvennogo Kraevedèeskogo muzeja Moldavskoj SSR*, Kishinev, **3**: 48-66. [In Russian]

LUNGU A., DELINSCHI A. 2008. Les particularites des orictocénoses de la faune de *Hipparion* du site Cimişlia. *Acta Palaeontologica Romaniae*, Iasi, **5**: 187-193.

LUNGU A., RZEBIK-KOWALSKA B. 2011. Faunal assemblages, stratigraphy and taphonomy of the Late Miocene localities in the Republic of Moldova. Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków, 62 pp.

MAJOR C. I. F. 1899. On fossil dormice. *Geological Magazine London* (Decade 4), **6**: 492-501.

NESIN V. 2004. Sony roda *Ramys* (Rodentia, Gliridae) pozdnego valezia Ukrainy [Dormice of the genus *Ramys* (Rodentia Gliridae) from the Late Vallesian of Ukraine]. *Vestnik zoologii*, **38**(4): 87-90. [In Russian].

NESIN V. 2013. Neogenovye Murinae (Rodentia, Muridae) Ukrainy [Neogene Murinae (Rodentia, Muridae) of Ukraine]. Monograph. Sumi, Universitetskaja Kniga: 174 pp. [In Russian].

NESIN V., KOWALSKI K. 1997. Late Miocene Gliridae (Mammalia, Rodentia) from Grytsiv (Ukraine). *Acta Zoologica Cracoviensia*, **40(**2): 209-222.

NICOARA I. 2011. Upper Turolian Sciuroidea (Rodentia, Mammalia) from the Republic of Moldova. *Acta Palaeontologica Romaniae*, **7**: 257-265.

NICOARA I. 2013. Stratigraphic position and fossil fauna of the final Miocene continental formation from Moldavian Plateau. PhD thesis. Manuscript. Institute of Geology and Seismology of Academy of Sciences of Moldova, Kishinev, 176 pp. [In Russian with English summary].

POPOV V. 2004. Pliocene small mammals (Mammalia, Lipotyphla, Chiroptera, Lagomorpha, Rodentia) from Muselievo (North Bulgaria). *Geodiversitas*, **26**(3): 403-491.

QIU Z., STORCH G. 2000. The early Pliocene Micromammalian fauna of Bilike, Inner Mongolia,China (Mammalia: Lipotyphla, Chiroptera, Rodentia, Lagomorpha). *Senckenbergiana lethaea*, **80**(1): 173-229.

SINITSA M. 2011. Sony roda *Vasseuromys* (Rodentia, Gliridae) Pozdnego Miotena Ukrainy [Dormice of genus *Vasseuromys* (Rodentia, Gliridae) from the Late Miocene of Ukraine]. National Academy of Science of Ukraine, I.I. Schmalhausen Institute of Zoology *Abstracts of the Conference of Young Researchers zoologists*, Kiev 2011. Pp: 15. [In Russian].

SUKHOV I. 1945. Ostatki iskopaemykh pozvonochnykh v Bessarabii [Remains of fossil vertebrata in Bessarabia]. Manuscript, Kishinevskii Kraevedcheskii Muzei, Kishinev, 64 pp. [In Russian].

TOPACHEVSKII V., SKORIK A. 1992. Neoghenovye i Pleistotsenovye homiakoobraznye Iuga Vostochnoi Evropy [Neogene and Pleistocene Cricetidae of early evolutionary stage of South Eastern Europe]. Naukova Dumka, Kiev, 244 pp. [In Russian].

VAN DE WEERD A. 1976. Early Ruscinian rodents and lagomorphs (Mammalia) from the lignites near Ptolemais (Macedonia, Greece). *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen, Serie B*, **82**: 127-170.

VANGENGEIM E. A., TESAKOV A. S. 2008. Meotian Mammalian Localities of Eastern Paratethys: Magnetochronology and Position in European Continental Scales. *Stratigraphy and Geological Correlation*, **16**(4): 437-450.

VON MEYER H. 1865. Mittheilungen an Professor Bronn. *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie*, **1865**: 215-221.

WU W. 1985. The Neogene mammalian faunas of Ertemte and Harr Obo in Inner Mongolia (Nei Mongol), China – 4. Dormice – Rodentia: Gliridae. *Senckenbergiana lethaea*, **66** (1-2): 69-88.

APPENDIX

Romanian, Russian and English names of localities listed in the text

Transcription in English	Romanian	Russian
Buzhor I	Bujor	Бужор
Chimishliya	Cimişlia	Чимишлия
Chiobruchiu	Ciobruciu	Чиобручиу
Gura Galbene	Gura Galbenei	Гура Галбеней
Gradishte	Gradişte	Градиште
Girovo	Hirova	Гирово
Kalfa	Calfa	Калфа
Keinar	Căinari	Кэинарь
Kishinev	Chişinău	Кишинев
Leordoaya	Leordoaia	Леордоая
Razeni	Răzeni	Рэзень
Tudora	Tudora	Тудора
Veveritsa I	Veveriţa I	Веверица