Zonal subdivision of continental deposits of Middle-Late Pliocene of East Europe (based on small mammals)

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Regional biostratigraphic zones, based on small mammal assemblages, were recently proposed for the Quaternary of south Eastern Europe (PEVZNER et al. 2001). As an expansion of this work, a detailed biostratigraphic zonation scheme has been devised for the Middle and Late Pliocene continental deposits from this region (Figs. 1, 2). *mys hintoni-pusillus* and *Pitymimomys inceptor-pitymyoides*). The evolutionary stages within each lineage were defined mainly on a progressive increase in hypsodonty.

Boundary criteria and estimates of their age, faunal content and type and reference localities are presented for each zone. Boundary ages were inferred using palaeomagnetic

MNR1	concurrent range zone (CRZ) of <i>Borsodia</i> ex gr. <i>newtoni-arankoides</i> and <i>Mimomys pliocaenicus</i>	Type locality (TL): Psekups Other relevant Eastern European localities include Liventsovka 1-4
MNR2	CRZ of Borsodia praehungarica cotlovinensis and Mimomys praepliocaenicus	TL: Kryzhanovka 3 Other relevant localities include Etulya 3
MNR3	CRZ of Borsodia praehungarica praehungarica and Mimomys hintoni livenzovicus	TL: Veselovka Other relevant localities include Kryzhanovka 2
MNR4	CRZ of <i>Mimomys polonicus</i> and <i>Borsodia</i> novoasovica.	TL: Simbugino Other relevant localities include Kushkuna, Akkulaevo 1, Apastovo
MNR5	CRZ of Mimomys hajnackensis and Borsodia novoasovica	TL: Shirokino Other relevant localities include Volna
MNR6	CRZ of Mimomys hajnackensis and Pitymimomys inceptor	TL: Ripa Skortselskaya Other relevant localities include Dolinskoe, Uryv 2, Korotoyak 2

Fig. 1 Definition of MNR Zones.

The analysis of geology and taxonomic composition of vole assemblages from the northern Black Sea region, the Sea of Azov region, the Northern Caucasus, the Volga Region and the south Urals, has led to the recognition of six (MNR1-6) (MNR = Mammal-Neogene-Russian Plain) concurrent range zones (CRZ) in arvicolines from four evolutionary lineages (namely, *Borsodia-Prolagurus; Mimomys hajnackensis-pliocaenicus; Mimo*

data, as well as on the basis of mollusc faunas from localities with intercalated marine deposits.

All the defined units are correlated to reference localities in Central Europe and to some sites in North-western Europe. These correlations show that many of the above zones are traceable to the western limits of Central Europe, at least.

millions of years Magnetic polarity time scale (Cande & Kent, 1995)	N/Q SERIES	Stages of Eastern Parathetys	MN / MQ zones (Mein, 1975; Fejfar et al., 1998)	Evolutionary lineages of Arvicolids	Regional mammal zones	Reference forms
	Plst	Gurian	MQ1	meus mi Prolagurus neles Lagurodon Allophaiomys deuceiton	MQR10	Prolagurus ternopolitanus - Allophaiomys deucalion
2.0-			Σ	Us phoneannus a ferencia annual ferenc	MQR11	
		nik	MN17	praep/locaenicus proceentrus praehungarica freedom F ungenica cutoviensa argunouse oni reidi rzovcus <u>Allo</u>	MNR1	Borsodia ex gr. newtoni-arankoides - Mimomys pliocaenicus Borsodia praehungarica cotlovinensis - Mimomys praepliocaenicus
2.5				praepliocaenicu praehungarica praehungarica cotovien praehungarica praehungarica itvenzovicus dorfensis stenokoys phym	MNR3	Borsodia praehungarica praehungarica - Mimomys hintoni livenzovicus
- - 3.0	Pliocene	Kujalnik	16	olonicus ica mimus) f	MNR4	Mimomys polonicus - Borsodia novoasovica
	Π		MN16	Mirnomys (Mirnomys) hajnackensis p Borsodia novoasov Mirnomys (Pusillo hintoni Pitymirnomys	MNR5	Borsodia novoasovica - Mimomys hajnackensis
3.5		z		Mimo haji Bo Bo Bo Pityn	MNR6	Mimomys hajnackensis - Pitymimomys inceptor
4.0-		KIMMERIAN	MN15			

Fig. 2

Regional biostratigraphic zones based on arvicoline assemblages for the Middle to Late Pliocene of Eastern Europe.

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