Microtus (Sumeriomys) bifrons nov. sp. (Rodentia, Mammalia), a new vole in the French Upper Pleistocene identified at the Petits Guinards site (Creuzier-le-Vieux, Allier, France)

Microtus (Sumeriomys) bifrons nov. sp. (Rodentia, Mammalia), un nouveau campagnol pour le Pléistocène supérieur français, reconnu aux Petits Guinards (Creuzier-le-Vieux, Allier, France)

Marcel Jeannet and Laure Fontana

Electronic version

URL: <http://journals.openedition.org/paleo/3026>

DOI: 10.4000/paleo.3026

ISSN: 2101-0420

Publisher

SAMRA

Printed version

Date of publication: 1 December 2015

Number of pages: 59-77

ISSN: 1145-3370

Electronic reference

Marcel Jeannet and Laure Fontana, « Microtus (Sumeriomys) bifrons nov. sp. (Rodentia, Mammalia), a new vole in the French Upper Pleistocene identified at the Petits Guinards site (Creuzier-le-Vieux, Allier, France) », *PALEO* [Online], 26 | 2015, Online since 26 April 2016, connection on 07 July 2020. URL : <http://journals.openedition.org/paleo/3026> ; DOI : <https://doi.org/10.4000/paleo.3026>

This text was automatically generated on 7 July 2020.

PALEO est mis à disposition selon les termes de la licence Creative Commons Attribution - Pas d'Utilisation Commerciale - Pas de Modification 4.0 International.

Microtus (Sumeriomys) bifrons nov. sp. (Rodentia, Mammalia), a new vole in the French Upper Pleistocene identified at the Petits Guinards site (Creuzier-le-Vieux, Allier, France)

Microtus (Sumeriomys) bifrons nov. sp. (Rodentia, Mammalia), un nouveau campagnol pour le Pléistocène supérieur français, reconnu aux Petits Guinards (Creuzier-le-Vieux, Allier, France)

Marcel Jeannet and Laure Fontana

We are very grateful to Ms Margarita A. Erbajeva for her competent advice which enabled us to reduce our prospection field and save a lot of precious time. We also thank Christophe Petit for his help with the figures and the reviewers of this article for their helpful advice.

Introduction

- 1 The Petits Guinards site (Creuzier-le-Vieux, Allier, France) was discovered in 1981 during reconstruction work on the road embankment bordering the right bank of the Allier (fig. 1) and was excavated in 2003 (Fontana et al. 2003a, 2003b). The geomorphological and archaeological study demonstrated the secondary position of the remains discovered inside a bulge deposit at the bottom of the slope. It attests to Palaeolithic occupations at the base of a limestone scarp, originally located at the top of a slope and dismantled at the beginning of the Holocene. The study also showed that the conserved part of the site was significantly displaced to 100 m lower down, and that the internal organization of the site stratigraphy did not undergo any major

sedimentary reworking. Nonetheless, it was not possible to differentiate between any potential layers in the archaeological level, which reaches a thickness of 60 to 120 cm, due to the type of deposit (heterometric blocks in a silty matrix). The thirteen radiocarbon dates on bone and dental remains (food waste and objects in reindeer antler) place the occupations in a long time period ranging from 19 600 to 10 300 uncal BP. Several flints provide clear presence of a Solutrean occupation (Fontana et al. 2013), but most of the lithic industry is Magdalenian, as is the industry in hard animal matter (Fontana et al. 2003a, 2003b). The abundance of the latter (Fontana & Chauvière 2009; Chauvière et al. 2006) and the presence of the Solutrean are two original features of this Upper Palaeolithic site located in the Massif Central. The abundance and the excellent conservation of the bone remains are also remarkable. The 100 000 rodent remains include numerous temperate and boreal species, providing evidence of a continental climate: the mole (*Talpa europaea*), the common shrew (*Sorex araneus*), the greater white-toothed shrew (*Crocidura russula*), the field vole (*Microtus agrestis*) and emblematic species such as the Arctic lemming (*Dicrostonyx torquatus*), the Tundra vole (*Microtus oeconomus*), the Narrow-headed vole (*Microtus gregalis*), the Northern birch mouse (*Sicista betulina*) and the very abundant Russet ground squirrel (*Spermophilus major*) (fig. 2). Most of the rodent remains belong to six species of voles (including five *Microtus*), but some vole molars present differences, raising questions as to their affiliation to one of the six determined microtine species. The aim of this study is thus to identify the species represented by these dental remains.

Figure 1 - Les Petits Guinards, Creuzier- le-Vieux. Map of site location.

Figure 2 - Microvertebrate species from Les Petits Guinards.

RONGEURS	Noms vernaculaires	NMI
<i>Microtus arvalis</i>	Campagnol des champs	687
<i>Microtus agrestis</i>	Campagnol agreste	79
<i>Microtus gregalis</i>	Campagnol des hauteurs	919
<i>Microtus oeconomus</i>	Campagnol nordique	87
<i>Microtus nivalis</i>	Campagnol des neiges	4
<i>Dicrostonyx torquatus</i>	Lemming à collier	43
<i>Arvicola terrestris</i>	Rat taupier	276
<i>Clethrionomys glareolus</i>	Campagnol roussâtre	5
<i>Apodemus sylvaticus</i>	Mulot gris	9
<i>Spermophilus major</i>	Ecureuil terrestre	82
<i>Cricetus cricetus</i>	Grand hamster	1
<i>Sicista betulina</i>	Sminthe errant	1
ESPÈCES DIVERSES	Noms vernaculaires	NR
<i>Talpa europaea</i>	Taupe commune	16
<i>Sorex araneus</i>	Musaraigne carrelet	17
<i>Sorex minutus</i>	Musaraigne pygmée	5
<i>Sorex minutissimus</i>	Musaraigne naine	1
<i>Crocidura russula</i>	Musaraigne musette	1
<i>Crocidura leucodon</i>	Musaraigne bicolore	1
<i>Neomys fodiens</i>	Musaraigne aquatique	4
<i>Lagomorpha</i>	Lagomorphes	27
<i>Salamandra salamandra</i>	Salamandre tachetée	1
<i>Bufo bufo</i>	Crapaud commun	2
<i>Rana temporaria</i>	Grenouille rousse	46
<i>Rana dalmatina</i>	Grenouille agile	2
<i>Rana arvalis</i>	Grenouille des champs	7
<i>Natrix natrix</i>	Couleuvre à collier	3
<i>Elaphe longissima</i>	Couleuvre d'Esculape	3
<i>Coronella austriaca</i>	Coronelle lisse	1
<i>Mustela nivalis</i>	Belette	26
<i>Mustela erminea</i>	Ermine	8
<i>Mustela putorius</i>	Putois	1

1 – Dental morphology and morphometric analysis

1.1 – Dental morphology

- 2 The dental remains of small voles from the Petits Guinards deposits represent a minimum number of 430 individuals. The terminology of the occlusal surface elements of the molars is presented in figure 3. Sixteen m/1 and one M3/ present significant differences, and are at the limitations of the initial characteristics of the *Microtus* genus¹. The general aspect of these molars is similar to the *Microtus* genus, but several characteristics sporadically observed in diverse species are combined here on members of this group with remarkable constancy and intensity: in particular the acuity of the projecting angles, the hermetic closing of the triangles and their very marked bucco-jugal symmetry. But, above all, although eight m1 present five triangles and two present six (fig. 4), surprisingly, the six other m1 bear seven closed triangles (sometimes converging to form a deformed rhombus tending to split), which only occurs in exceptional cases in other microtines. In addition, among the eight m1 with five triangles, each group of five triangles is preceded by a rhombus deformed by the penetration of the internal angle a7, which tends to create two new closed triangles: these m1 are thus part of the group of molars with seven closed triangles. Forms 7 and 17 (cf. fig. 4), with a very open rhombus, are separate from the other types. Lastly, a tight constriction isolates the anterior loop, which is extended by a characteristic spur on the external surface (t8), which never occurs elsewhere (cf. fig. 4, n. 13, 14).
- 3 What species do these M1 belong to? They could be attributed to two of the five microtine species identified at Petits Guinards (cf. fig. 2); *Microtus arvalis* and *Microtus*

agrestis, which are morphologically similar to this new arrival. *M. arvalis* differs by its smaller size, less acute bulging angles, practically no dissymmetry, a less developed and more rounded t8 (fig. 5). As for *M. agrestis*, the relatively frequent presence of six closed and angular triangles is similar to indeterminate *Microtus* (cf. fig. 5c), as it never presents seven closed triangles or such a bulging t8. Figure 6 presents the anterior loop of present-day voles from Finistère (where *Microtus arvalis* is naturally absent) and provides evidence of this; it associates a wide variety of chosen forms, from the most simple to the most complex, in order to avoid all confusion with the common vole (*M. arvalis*), its closest relative, naturally absent from Brittany.

- 4 This indeterminate vole differs from local microtines, but may perhaps be compared to boreal species issued from migratory populations, as such species are present in Petits Guinards? The comparison with *Microtus hyperboreus* Vinogradov 1933, the North Siberian vole, issued from the Lena Delta with a territory extending from the north of the Ural to the Jamal Peninsula appears to be an obvious point of comparison as it is the only Boreal microtine to be naturally associated with *Dicrostonyx torquatus*. Its m/1 bears five to six closed angular and dissymmetrical triangles (occasionally seven), which relate it to indeterminate *Microtus*. However, the t8 has no jugal spur and no constriction of the anterior loop is visible. In addition, the *M. hyperboreus* M3 bears an additional internal protruding angle. These differences appear to be sufficiently significant to rule out an attribution of the indeterminate microtine from Petits Guinards to this subarctic species.
- 5 It thus seems impossible to consider the indeterminate microtine from Petits Guinards as a subspecies of one of the presented microtines as the morphological differences are too marked and are beyond the variability of the *Microtus* genus. If we did not take account of these differences, we would have to redefine the whole systematics of the genus. The best example of this is the similarity between *M. arvalis* and *M. agrestis*, leading many authors to regroup them under the double label *M. arvalis-agrestis* (Chaline 1972; Desclaux et Defleur 1997; Sese 2005; Cuenca-Bescos et al. 2010). Yet, the criteria presented here for describing this new *Microtus* are much clearer than those likely to separate the two afromentioned species. This observation is all the more pertinent for the other analysed microtines. Do the morphometric data confirm this conclusion?

Figure 3 - Ondatra zibethicus. Terminology example of the occlusal surface of vole molars (from Hibbard, 1950, fig.16). a/ m1-m3 G; b/ M1-M3 G. AC: anterior cap; ACC: anteroconid complex; AL: anterior loop; BRA: buccal re-entrant angle; BSA: buccal salient angle; LRA: lingual re-entrant angle; LSA: lingual salient; PC: Posterior cap; PL: Posterior loop. TTC: trigonid-talonid complex.

Figure 4 - Microtus bifrons - Les Petits Guinards, Creuzier-le-Vieux. Scale: 1 mm.

Figure 5 - a/ *Microtus arvalis*: m1, m2, m3 G; b/ *Microtus arvalis*: M1, M2, M3 G. ; c/ *Microtus agrestis*: m1, m2, m3 G; d/ *Microtus agrestis*: M1, M2, M3 G. Grotte des Romain, (Virignin, Ain) – Magdalenian (Excavations by R. Desbrosse).

Figure 6 – Present-day *Microtus agrestis* from Finistère. Anterior complex from m1. Varied types are classified from 1 to 14 following the evolution of the closing of t6 and progressive development of t8 on the anterior loop (N.B.: *Microtus arvalis* is currently absent from Finistère, Côtes-d'Armor and Morbihan).

Figure 7 – Position of biometric points taken on *Microtus* M/1 (adapted from Van der Meulen 1973).

Figure 8 - Comparison of morphometric values for the unidentified microtine from Petits Guinards and four other Microtines.

Figure 9 - Comparison of *Microtus* biometric data from Les Petits Guinards and four other microtines (*M. arvalis*, *M. agrestis*, *M. agrestis* Leb., *M. hyperboreus*), using the Mann-Whitney test. In grey: non-significant differences ($p > 0.01$)

Longueur de la m1				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	125,5	184,5	44,5	3
z	-4,6	-1,64	-5,16	-3,46
p	4,20E-06	0,1007	2,39E-07	0,0005

b2/C2				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	180	90	84	13
z	-3,3262	-3,1042	-3,8799	-2,2375
p	0,0009	0,0019	0,0001	0,0253

b2/W2				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	46,5	30	20	5,5
z	-5,4702	-4,9176	-5,5426	-3,047
p	4,49E-08	8,58E-07	2,98E-08	0,002311

C2/W2				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	135	84,5	143,5	27,5
z	-3,9219	-3,2383	-2,773	-0,096731
p	8,78E-05	0,0012	0,0056	0,33339

ACC				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	185	208,5	229,5	19
z	-3,811	-1,136	-2,3394	-1,9891
p	0,0014	0,2560	0,0193	0,046696

Asym				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	441	258,5	31	43,5
z	-0,73238	-0,074221	-5,3793	-0,78129
p	0,4639	0,9408	7,48E-08	0,93773

Wn/Wr				
	MPG/arval	MPG/agres	MPG/agre L	MPG/hyper
U	445	262,5	28	36
z	-0,68429	0,010596	-5,4212	-0,087419
p	0,4900	0,9916	5,92E-08	0,93034

1.2 - Morphometry

- 6 The m/1 metric data from the five analysed morphotypes (from Petits Guinards: *M. arvalis*, *M. agrestis* and *M. indet.*; from the current collections: *M. hyperboreus* and *M. agrestis* Leb.) are grouped together in the annexed tables (annexes 1 to 5). We analysed seven variables for these five morphotypes (fig. 7): the length of the M/1, the ratio between the constriction of the anterior loop (b2) and the internal width of its base (W2) (following the Van der Meulen standards, 1973), the reduction ratio (b2/c2) for the two isthmuses of the anterior loop, the c2/W2 ratio, the asymmetry of the anterior loop (asym), the asymmetry/anterior complex ratio (ACC), the asymmetry of the trigonid (Wn/Wr). As the aim of this is to compare the indeterminate *Microtus* from Petits Guinards (called MPG) to the other described microtines, we tested the differences between *Microtus indet.* and each morphotype for each variable, using the Mann-Withney test. The results are presented in figures 8 and 9.
- 7 The length of the M/1 from MPG is significantly greater than that of three of the four microtines, with the exception of *M. agrestis*, like for the asymmetry/anterior complex ratio (ACC). The reduction ratio (b2/c2) is also significantly different between MPG and three microtines, with the exception of *M. hyperboreus*, like for the c2/W2 ratio. For c2/W2, the closing of t6 depends on the c2 value and can sometimes be considered as an evolutionary character of the molar which tends to get longer through the acquisition of an additional closed triangle. This is naturally the case for MPG which generally has seven closed triangles, as shown in the figure. The figure also shows the discrepancy of the c2/w2 index towards the lowest MPG values. According to the Mann-Withney test (cf. fig. 9), it is distinct from the two *M. agrestis* and *M. arvalis* types. The ratio between the constriction of the anterior loop and the internal width of the base (b2/W2) is significantly different between MPG and the four microtines. As for the asymmetry of the trigonid (Wn/Wr) and the asymmetry of the anterior loop (Asym), only the difference between MPG and *M. agrestis* Leb. is significant. In spite of a visual dissymmetric appearance of the anterior loop, the recorded values are uniformly incorporated in the mass of the other taxa, which is rather unexpected. We can consider this as confirmation of the attribution of MPG to the *Microtus* genus. The asymmetry of the (Wn/Wr) trigonid is only evident for the Breton *Microtus agrestis* (C). The visual aspect of this parameter thus appears to be illusory in a multi-specific association.
- 8 All of these differences illustrate three main facts. First of all, the microtine from Petits Guinards can be statistically differentiated on the basis of one parameter (the b2/W2 ratio). For four of the six other variables (length, b2/c2, c2/w2, ACC), the difference between MPG and the four other microtines is significant for three of them, which signifies that for each of these four variables, MPG is only similar to one of the four microtines, that is *M. hyperboreus* in two cases and *M. agrestis* in two cases. The two other variables (the two asymmetries) are only significantly different in one case, which is *M. agrestis* Leb. Furthermore, a single morphotype systematically presents significant differences with MPG (for the seven variables, cf. fig. 9); that is *M. agrestis* Leb.
- 9 Consequently, none of the four morphotypes is significantly similar to MPG, according to the measured parameters, which confirms that this microtine is a different species

to the local microtine species and the tested boreal species. The two dominant criteria are the presence of seven closed triangles on the M/1 (rarely six or eight), and the large size. The constriction of the anterior loop and the spurred t8 are also characteristic. On the other hand, the visually evident asymmetry does not resist to the biometric test. What species do these M/1 thus belong to?

2 – A Near Eastern vole in the Upper French Pleistocene?

2.1 - *Microtus socialis* and *Microtus guentheri*

- 10 The indeterminate *Microtus* from Petits Guinards does not thus appear to be a local type vole or a Siberian migrant, which incites us to seek its origin in lower latitudes and more rigorous climates. The latitudinal and climatic convergence could be compared to the gopher, which is very abundant at Petit Guinards and which extends to the semi-arid and steppe-like regions of south-western Asia. At this stage, only the literature provides information on this, without taking regional faunal associations into consideration. S. I. Ognev (1950) regrouped all the sub-generic mid-oriental forms of *Chilotus* Baird 1857 (North American microtine sub-genus) under the single specific name of *Microtus socialis*, the social vole, thereby demoting them to sub-specific status. According to that author, the domain of *M. socialis* extends from the north of the Black Sea to inland Mongolia and it also lives in low altitude semi-desert zones (fig. 10), like the gopher. The application of mitochondrial research (Yigit & Çolak 2002; Golenischchev et al. 2002a, 2000b; Jaarola et al. 2004; Yigit et al. 2012) modified this model by placing the the so-called subspecies into two main groups of species2: *Microtus guentheri* and *M. socialis*. These works also revised the distribution of *M. socialis* (by S.I. Ognev 1950), which extended over the geographic zone in the north Caucasus region and a large strip of the Black Sea to Kazakhstan (Corbet 1978; Gromov & Erbajeva 1995; Yigit et al. 2003; Yigit et al. 2012) (cf. fig. 10). This species was sporadically recorded in several Near Eastern sites (Kowalski 1958). As for *M. guentheri*, it extends to the Black Sea in the south, to Kirghizistan in the east (Lac Ala Kul), to the south (Lebanon, Syria, Israel and isolated occurrences in Cyrenaica) and to the west (Thrace and Bulgaria). For some researchers, its domain extends to the Balkans.
- 11 The two species differ by their dental morphology and size.
- 12 Most of the m/1 from these two species are made up of five closed triangles, rarely six, but those of *Microtus socialis*³ are the only ones with seven closed triangles and sometimes six; they are also the only ones with a protruding t8 (Ognev 1950, fig. 11). In addition, we observe the frequent presence on the posterior end of a protuberance that can attain the shape of a loop on the M/2, which is well established for *M. agrestis* (cf. fig. 5d). On the M/1, this shape is never so developed and is limited to a more or less voluminous angle (cf. fig. 11). The M/3 displays four bulging lingual and three external angles, but these criteria do not seem to be retained for determinations, probably on account of their instability.
- 13 *M. guentheri* (Danford & Alston, 1880) (fig. 12, 13, 14) differs from *M. socialis* by a larger molar size (*M. socialis* is the smallest species of the *Sumeriomys* sub-genus), orange-coloured incisors (Yigit & Çolak 2002) and the fact that the two upper molars do not have posterior agrestoid formations (Baydemir & Duman 2009).

- 14 *M. guentheri* can be separated from *M. socialis* on the basis of its large size. G. Storch (1988) indicates, for the M/ of *M. guentheri*, an average length of 330 (300-360), which is higher than that of MPG (306; 280-345), but no M/1 dimensions figure in the published studies.

Figure 10 - Distribution map of *Microtus socialis* and *Microtus guentheri*.

2.2 - The microtine from Petits Guinards: *Microtus bifronds* nov. sp.

- 15 It thus seems that the dental morphology of the microtine from Petits Guinards assimilates it to *Microtus socialis*, as described by Ognev (1950) if we exclude the adventive formations extending the posterior end of the first two upper molars. These protuberances, with instable size and presence, frequently characterize this taxon. For this point, we follow the denomination defined by Ognev for this very characteristic morphology, which is not found anywhere else. The seven closed reference triangles are present on the microtine from Petits Guinards and *M. socialis*, but the latter is too small for MPG to be a sub-species. The larger size and morphology of MPG relate it to the sub-genus *Sumeriomys* (fig. 15), but differentiate it from the two morphotypes; one on account of its shape (*M. guentheri*), and the other its size (*M. socialis*), although it conserves a double facies. It is thus difficult to name the vole from Petits Guinards.
- 16 The excessive size could be an evolutionary sign of the species in a more favourable environment than the semi-desert type conditions of its initial biotope. The “*socialis*” form described by Ognev (1950) changed little but its size increased considerably to reach the size of *M. guentheri* (while losing the agrestic formations of the first two upper molars). In this way, this new vole bears the marks of two major Mid-Eastern *Sumeriomys* taxa. This is why we employ the adjective “*bifronds*”, denoting the double facies of the first lower molar. The characteristics are the following:
- 17 **MICROTUS BIFRONS** nov. sp.
 FAMILY: Cricetides
 SUB-FAMILY: Microtines
 GENUS: *Microtus* SCHRANK, 1798
 SUB-GENUS: *Sumeriomys* ARGYROPULO, 1933

HOLOTYPE: m1G n° CVPG 57-1248a (fig. 16)

LOCALITY-TYPE: Creuzier-le-Vieux (Allier); locality Les Petits Guinards

TYPE-LEVEL : The whole of the Upper Pleniglacial with Solutrean and Magdalenian industries.

PROBABLE AGE: 20 000 – 11 000 uncal BP

ORIGIN OF THE NAME: from the Latin *bifrons*: Latin term signifying double face; used on account of the double facies of the m1: *Microtus socialis* for its polymorphic dental pattern (six to seven closed triangles, rarely five), and *Microtus guentheri* for its large size and the absence of agrestis type upper molars.

DIAGNOSIS: Large-sized vole with six to seven highly dissymmetrical and acute angled closed triangles on the m1. Highly dissymmetrical anterior loop and voluminous spur-shaped t8.

PARATYPES: M3D with 3 closed triangles, five external protruding angles and four internal protruding angles (cf. fig. 16).

- 18 We now have better knowledge of the current distribution of *M. socialis* and *guentheri* (see above), but can data relating to their former geographic distribution contribute to our understanding of the presence of a vole such as *M. bifrons* in the Massif Central between 20 000 and 11 000 uncal BP (MIS 2 and the Tardiglacial) and probably derived from Eastern species? Unfortunately, such mentions are rare and are dispersed in space and time (Kowalski 1958; Tchernov 1968; Storch 1988; Gromov & Erbajeva 1995; Helmer et al. 1998; Santel & von Koenigswald 1998; Khenzykhenova et al. 2011; Markova 2011; Maul et al. 2011; Popova 2004). These two *Microtus* are indicated from the Middle Pleistocene onwards in sites in the Near East, Anatolia, in the north of the Caucasus and in Thrace. The hypothesis of the migration of one or two of these species from Turkey by successive waves since the Middle Pleistocene during the drying of the Bosphorus Strait is thus currently preferred.

Figure 11 - *Microtus socialis* after S.I. Ognev, 1950 - a/ 1- 3: m1D; 1 – Northern Caucasus; *M. s. parvus*; 2/ Ala Kul Lake (Khirgызistan): *M. s. gravesi*; 3/ Kaine-Kassyr (Turkmenistan, near the Iranian border: *M. s. paradoxus* (Ognev 1950, fig. 163). b/ Structure variations in *Microtus socialis* molars. 1-3: Salk region; 4: Bakou region; 5-6 Kopet, region Dag. 1,3,4,5,6 : M1-M3D; 2 : m1-m3D. (Ognev 1950, fig. 162). No scale.

Figure 12 - *Microtus guentheri*. a/ 1-11: Lower cheek teeth. Acheulean. Oum Qatafa Cave (Israel). Tchernov 1968. b/ 1-6: Upper cheek teeth. Acheulean. Oum Qatafa Cave (Israel). Tchernov 1968. c/ 1: Upper cheek teeth (M1-M3D). Upper Levallloiso-Mousterian. Kebara Cave (Israel). c1-5: Upper cheek teeth G. recent (Tchernov 1968). No scale.

Figure 13 - *Microtus guentheri*. a & b/ M3D; c & d/ m1-m3D. Kirikkale Province (Turkey). Baydemir & Duman (2009). No scale.

Figure 14 - *Microtus guentheri*. 10-12: m1G; 13-15: M3G. *Microtus arvalis*. 13-15: m1; 19-20: M3D. Karain B. (Turkey). Storch (1988). No scale.

Figure 15 - Sub-genus *Sumeriomys* – m1D (A, C, E, G, J, K, M, O, R, T, V, X, et Z) & m3D (B, D, H, I, L, N, P, S, U, W, Y, Z & ZZ). A & B: *Microtus socialis socialis* (Gur'ev, Kazakhstan); C & D: *M. s. nikolajevi* (Kuyuk-Tuk Island, Ukraine); E & F: *M. s. binominatus* (Tbilissi, Georgia); G & H: *M. s. goriensis* (Tamarasheni, Georgia); I & J: *M. s. goriensis* (Tamarasheni, Géorgia); K & L: *M. schidlovskii* (Nalband, Armenia); M & N: *M. parvus* (Divnoye-Stavropol, Russia); O & P: *M. paradoxus* (Ashkhabad, Turkmenistan); T & U: *M. s. gravesi* (Betpakdala Steppe, Kazakhstan); V & W: *M. guentheri stranjensis* (Sozopol, Bulgaria); X & Y: *M. s. zaitsevi* (Holotype – Bakou, Azerbaijan); Z & ZZ: *M. s. aristovi* (Holotype – Veysalli, Azerbaijan). Golenischchev et al. 2002a. Scale 1mm.

Figure 16 - *Microtus bifrons* (Petits Guinards). a/Holotype: m1 left. b/ Paratype: m1 right. c/ Paratype: M3 right. Scale 1 mm.

Conclusion

- 19 Given the major differences between this new form from Petits Guinards and the described microtine species, it seems logical to attribute a specific status to the vole from Petits Guinards in keeping with the developed criteria. These differences were identified on the m1, the most obvious being the increased number of closed triangles and the marked development of the t8 resulting in increased size. The combined association of the dental morphology of *Microtus socialis* (Pallas, 1773) and the large size of *Microtus guentheri* (Danford et Alston, 1880) resulted in the name *Microtus bifrons* nov. sp., indistinctly associating the double facies of both taxa. Due to the focus on North Siberian continental species, we tend to forget that migrations can also occur from east to west, along the same latitudinal gradient, and the association of micromammals from Petits Guinards is an invaluable reminder of this. The history of this lineage of microtines and the arrival of *Microtus bifrons* in Europe remain to be determined, through the continued study of micromammal remains, which are at times very abundant and very well conserved in the sediments accumulated in caves or rock shelters.

Annex 1 – Metric data from the *Microtus arvalis* m1 from Petits Guinards (Massif Central).

CVPG m1 <i>Microtus arvalis</i>																			
N°	Ref	Sex	N°	LT	a	NE	SE	W1	Wn	Wr	Ht4	L1	LBA	Type	asym	/ACC	/BA	/BA	/BA
1	CVPG1	1	1	291	155	81	81	80	115	50	52	mb	87	98	C	0.93	0.60	0.93	0.60
2	CVPG1	1	2	278	156	87	80	81	100	50	43	mb	84	91	C	0.83	0.53	0.78	0.53
3	CVPG1	1	3	294	164	17	9	85	100	50	49	mb	88	103	C	0.84	0.58	0.78	0.58
4	CVPG1	1	4	281	134	81	81	80	100	50	46	mb	78	89	C	0.92	0.71	0.78	0.71
5	CVPG1	1	5	297	169	10	23	75	115	61	43	mb	83	102	C	0.86	0.69	0.78	0.69
6	CVPG1	1	6	299	171	81	11	78	100	50	45	444	81	99	C	0.90	0.53	0.83	0.53
7	CVPG1	1	7	275	145	19	7	75	115	49	46	mb	80	91	C	0.80	0.69	0.78	0.69
8	CVPG1	2	1	263	155	18	24	84	118	60	47	mb	81	100	C	0.78	0.51	0.78	0.51
9	CVPG1	2	2	278	153	81	17	75	115	49	46	mb	83	101	C	0.75	0.51	0.77	0.51
10	CVPG1	2	3	269	146	81	23	85	100	50	46	mb	78	87	C	0.78	0.58	0.54	0.58
11	CVPG1	2	4	318	151	7	21	95	100	51	47	mb	113	96	C	0.94	0.61	0.75	0.61
12	CVPG1	2	5	279	159	8	26	71	96	47	39	mb	78	84	C	0.71	0.54	0.55	0.54
13	CVPG1	2	6	288	115	80	10	70	100	39	31	mb	77	78	C	0.79	0.69	1.13	0.69
14	CVPG1	2	7	211	147	81	30	85	115	63	46	mb	81	91	C	0.75	0.58	0.83	0.58
15	CVPG1	2	8	245	187	19	13	75	91	50	37	mb	78	82	C	0.86	0.58	0.81	0.58
16	CVPG1	2	9	286	159	14	10	75	110	57	46	mb	84	105	C	0.81	0.51	0.71	0.51
17	CVPG1	2	10	281	151	11	10	76	96	47	44	mb	91	98	C	0.80	0.61	1.18	0.61
18	CVPG1	2	11	270	146	15	13	78	101	43	40	350	80	91	C	0.93	0.64	1.18	0.64
19	CVPG1	2	12	287	135	81	18	70	100	50	41	38	88	C	0.75	0.59	0.93	0.59	
20	CVPG1	2	13	248	151	13	23	71	111	53	45	343	85	92	C	0.86	0.56	0.88	0.56
21	CVPG1	2	14	289	147	87	20	80	113	59	45	360	81	98	C	0.79	0.58	0.81	0.58
22	CVPG1	2	15	306	175	39	20	85	115	63	46	379	88	103	C	0.75	0.62	0.71	0.62
23	CVPG1	2	16	297	153	81	23	81	110	57	45	360	81	98	C	0.79	0.58	0.81	0.58
24	CVPG1	2	17	281	150	80	17	81	108	49	41	333	77	89	C	0.89	0.59	0.85	0.59
25	CVPG1	2	18	293	133	80	14	81	105	53	44	357	87	99	C	0.83	0.68	0.84	0.68
26	CVPG1	2	19	297	135	81	18	70	100	50	41	388	88	98	C	0.75	0.59	0.93	0.59
27	CVPG1	2	20	281	160	18	15	80	108	54	40	338	78	101	C	0.78	0.49	0.77	0.49
28	CVPG1	2	21	275	147	19	11	75	104	58	45	352	80	91	C	0.87	0.59	0.80	0.59
29	CVPG1	2	22	283	144	80	10	77	97	47	41	374	78	97	C	0.86	0.57	0.85	0.57
30	CVPG1	2	23	276	143	80	10	89	117	57	51	389	83	90	C	0.89	0.63	0.90	0.63
31	CVPG1	2	24	283	144	19	10	80	100	40	40	348	85	93	C	0.75	0.58	0.78	0.58
32	CVPG1	2	25	254	137	80	10	71	89	47	34	378	78	92	C	0.78	0.53	0.78	0.53
33	CVPG1	2	26	297	146	11	12	76	93	49	35	355	88	97	C	0.87	0.47	0.80	0.47
34	CVPG1	2	27	258	130	80	13	78	96	44	40	331	85	93	C	0.84	0.61	0.91	0.61
35	CVPG1	2	28	275	145	80	25	77	111	55	45	354	86	90	C	0.86	0.50	0.91	0.50
36	CVPG1	2	29	288	154	10	17	83	91	50	37	353	103	127	C	0.80	0.58	0.85	0.58
37	CVPG1	2	30	290	141	81	23	71	96	47	36	354	89	95	C	0.77	0.54	0.81	0.54
38	CVPG1	2	31	283	155	80	14	74	100	50	46	mb	88	97	C	0.86	0.59	0.95	0.59
39	CVPG1	2	32	283	145	145	10	78	101	53	41	mb	86	96	C	0.75	0.54	0.85	0.54
40	CVPG1	2	33	288	157	81	13	81	111	58	44	mb	81	101	C	0.71	0.45	0.70	0.45
41	CVPG1	2	34	278	145	13	10	77	100	50	38	340	83	93	C	0.71	0.49	0.78	0.49
42	CVPG1	2	35	259	139	81	18	77	100	61	48	337	78	89	C	0.80	0.58	0.90	0.58
43	CVPG1	2	36	297	149	81	20	80	108	54	40	338	88	98	C	0.75	0.59	0.93	0.59
44	CVPG1	2	37	257	137	80	25	78	91	49	30	308	77	87	C	0.81	0.45	0.70	0.45
45	CVPG1	2	38	278	139	11	21	83	110	50	38	348	80	92	C	0.84	0.46	0.78	0.46
46	CVPG1	2	39	287	172	19	84	100	50	50	mb	88	100	C	0.83	0.48	0.75	0.48	
47	CVPG1	2	40	276	149	80	19	83	100	51	49	mb	78	92	C	0.90	0.64	1.04	0.64
48	CVPG1	2	41	285	156	80	11	76	100	49	40	338	88	98	C	0.85	0.59	0.85	0.59
49	CVPG1	2	42	289	163	30	19	80	114	54	46	mb	88	100	C	0.85	0.58	0.80	0.58
50	CVPG1	2	43	249	131	87	20	83	96	48	36	mb	81	79	C	0.75	0.57	0.95	0.57
51	CVPG1	2	44	291	152	17	88	101	50	38	400	80	93	C	0.75	0.47	0.71	0.47	
52	CVPG1	2	45	283	144	16	17	75	91	48	37	350	78	94	C	0.80	0.50	0.80	0.50
53	CVPG1	2	46	285	145	80	10	81	91	30	34	44	74	C	0.57	0.70	0.75	0.70	
54	CVPG1	2	47	298	159	19	17	74	95	47	38	381	83	95	C	0.81	0.57	0.85	0.57
55	CVPG1	2	48	285	166	10	20	79	104	51	40	mb	78	105	C	0.70	0.50	0.75	0.50
56	CVPG1	2	49	285	156	19	10	77	114	55	45	mb	106	105	C	0.86	0.54	0.86	0.54
57	CVPG1	2	50	286	159	19	20	84	113	55	47	mb	78	99	C	0.85	0.54	0.80	0.54
58	CVPG1	2	51	278	153	19	17	83	101	51	39	mb	83	100	C	0.75	0.49	0.75	0.49

Annex 2 – Metric data from *Microtus agrestis* m1 from Petits Guinards (Massif Central).

Annexe 1		CVPG: m1 <i>Microtus agrestis</i>										r/n		(r/n)'		(r/n)'		(r/n)'	
N°	Ref	LT	a	b2	c2	V2	W1	Wn	Wr	Ht4	L1	LBA	Type	asym	/ACC	/BA	/BA	/BA	/BA
1	184-1	314	174	18	20	88	115	54	52	mb	90	114	C	0.98	0.55	0.84	0.20	0.90	0.23
2	184-2	294	163	23	20	80	110	54	41	389	87	105	D	0.76	0.47	0.78	0.29	1.15	0.25
3	184-3	321	187	26	21	87	115	57	48	440	88	128	D	0.84	0.45	0.66	0.30	1.34	0.24
4	184-4	302	164	15	18	83	98	50	40	408	91	106	C	0.80	0.49	0.75	0.18	0.83	0.22
5	184-5	312	172	21	11	87	114	53	41	346	93	114	C	0.77	0.45	0.68	0.24	1.91	0.13
6	184-6	299	146	16	10	81	102	40	31	344	76	85	C	0.78	0.53	0.91	0.20	1.60	0.12
7	283-1	299	170	18	13	76	108	53	44	mb	86	106	C	0.83	0.49	0.78	0.24	1.38	0.17
8	287-1	302	168	22	23	77	109	56	44	371	81	110	C	0.79	0.47	0.71	0.29	0.85	0.34
9	317-1	292	153	11	3	84	108	54	44	mb	84	99	F3	0.81	0.53	0.82	0		
10	317-2	293	157	36	20	89	115	60	51	mb	85	101	D	0.85	0.54	0.84	0.40	1.39	0.31
11	317-4	291	153	26	19	96	131	58	44	365	92	93	E1	0.76	0.50	0.82	0.27	1.37	0.20
12	317-1	256	144	27	19	79	93	45	36	319	73	98	C	0.80	0.56	0.82	0.34	1.48	0.24
14	372-1	296	155	19	18	85	113	57	48	mb	95	97	D	0.84	0.54	0.84	0.27	1.06	0.21
15	372-2	245	137	16	7	84	95	48	42	329	75	93	B	0.88	0.64	0.94	0.19	0.29	0.08
16	372-5	318	177	13	12	80	109	60	41	336	91	113	C	0.68	0.39	0.60	0.16	0.18	0.15
17	372-6	294	156	21	20	85	107	58	45	407	92	100	C	0.78	0.50	0.78	0.25	1.05	0.24
18	400-1	275	146	26	19	84	111	52	49	343	83	93	C	0.94	0.65	1.01	0.31	1.37	0.23
19	400-2	314	169	18	12	82	114	55	44	mb	95	110	E2	0.80	0.47	0.73	0.22	1.50	0.15
20	400-3	318	166	18	16	80	110	56	45	mb	96	110	C	0.80	0.48	0.73	0.23	1.13	0.20
21	400-4	297	159	16	22	74	118	58	47	429	88	99	C	0.81	0.51	0.82	0.22	0.73	0.30
22	400-5	311	169	21	22	73	108	56	41	mb	91	112	C	0.73	0.43	0.65	0.29	0.95	0.30
23	400-6	299	142	21	22	73	108	60	44	mb	85	92	C	0.73	0.52	0.80	0.29	0.95	0.30
24	400-7	287	166	23	17	84	101	52	41	342	81	109	C	0.79	0.47	0.72	0.27	1.35	0.20
25	439-1	294	162	32	24	86	107	57	42	420	85	100	D	0.74	0.45	0.74	0.37	1.33	0.28
27	439-2	276	149	29	25	76	105	48	41	346	80	94	C	0.85	0.57	0.91	0.38	1.16	0.33
28	459-1	322	174	19	33	83	121	64	52	418	95	109	D	0.81	0.47	0.75	0.23	0.58	0.40
29	459-2	273	151	19	14	80	98	53	38	334	84	99	C	0.72	0.47	0.72	0.24	1.36	0.18
30	453-3	306	170	9	21	81	115	62	46	398	86	114	D3	0.74	0.44	0.65	0.11	0.43	0.26
31	453-4	288	159	15	24	76	114	64	45	316	82	109	D	0.70	0.44	0.65	0.20	0.63	0.32
32	453-5	310	174	22	19	89	104	53	41	353	88	113	D3	0.77	0.44	0.68	0.25	1.16	0.21
33	453-6	295	144	17	19	71	97	54	37	328	79	90	D3	0.69	0.48	0.76	0.24	0.89	0.27
34	453-7	309	171	19	27	91	128	64	55	mb	89	113	C	0.86	0.50	0.76	0.21	0.70	0.30
35	453-8	281	150	29	20	77	109	54	47	399	88	95	D	0.87	0.58	0.92	0.38	1.45	0.16
36	453-9	281	154	23	9	88	103	47	39	320	80	98	F2	0.83	0.54	0.85	0.26	0.56	0.10
37	453-10	298	145	5	19	80	98	51	39	295	69	100	A3	0.76	0.53	0.76	0.06	0.26	0.24
n	35	35	35	35	35	35	35	35	35	35	35	35	0	35	35	35	35	35	35
X	20.26	15.9	20.26	18.54	81.97	108.8	54.77	43.57	363.8	85.8	103.5		0	0.80	0.50	1.78	0.25	1.24	0.23
max	32.0	187	36	33	96	131	64	55	440	96	128	0	0	0.96	0.65	1.01	0.40	3.67	0.40
min	24.50	137	5	3	71	93	40	31	295	69	85	0	0	0.68	0.39	0.60	0.06	0.26	0.08
sd	19.62	11.97	6.32	6.24	5.69	8.539	5.353	4.937	40.94	6.566	9.176		0	0.06	0.06	0.09	0.07	0.63	0.04

[illegible]

Annexe 4: CVPG: m1 <i>M. bifrons</i>			: Holotype de <i>Microtus bifrons</i> nov. sp											(r/n)	
N°	Référence	LT	a	b ₁	c ₂	W ₂	W _Δ	W _n	W _r	Ht ₄	L _Δ	LBA	asym		
	Éch	Lot													
1	16 316	318	169	10	24	88	117	59	49	/Mdb	93	111	0,83		
2	18 371	304	167	18	23	80	107	53	43	399	92	108	0,81		
3	47 957	345	198	6	8	93	119	48	43	439	92	135	0,90		
4	48 988	310	177	9	11	101	116	52	48	449	80	118	0,91		
5	51 1065	298	165	10	18	91	112	57	48	355	87	106	0,84		
6	56 1213	295	145	7	4	89	110	57	43	423	90	90	0,74		
7	59 1309	322	174	6	15	81	108	51	41	/Mdb	97	117	0,80		
8	24 517a1	293	163	8	9	88	108	55	42	357	90	108	0,76		
9	24 517a2	292	165	4	3	80	106	49	44	384	82	115	0,90		
10	39 780a	287	135	5	1	84	100	52	36	432	85	105	0,69		
11	53 1118a	317	181	17	2	96	110	55	41	391	89	120	0,75		
12	55 1181a	292	159	1	5	84	118	65	47	375	83	109	0,72		
13	57 1248a	307	169	12	16	84	105	54	39	404	92	111	0,78		
14	57 1248b	345	192	1	4	100	124	64	47	/Mdb	103	125	0,73		
15	60 1346	280	157	5	14	89	101	49	41	/Mdb	83	103	0,84		
	n	15	15	15	15	15	15	15	15	11	15	15	15		
	moy.	307,0	167,7	7,9	10,5	88,5	110,7	54,7	43,5	400,7	89,2	112,1	0,80		
	max	345	198	18	24	101	124	65	49	449	103	135	0,91		
	min	280	135	1	1	80	100	48	36	355	80	90	0,69		
	SD	19,55	16,10	4,98	7,56	6,73	6,87	5,09	3,72	32,13	6,13	10,44	0,05		

Annexe 5 - <i>Microtus hyperboreus</i> actuel de Yakutie													
		LT	a	b ₂	c ₂	w ₂	W _Δ	W _n	W _n	Ht4	L _Δ	LBA	Asym
	n	6	6	6	6	6	6	6	6		6	6	6
	X	275,7	143	20	15	87	105	52	62		85	85	1,19
	max	287	151	29	26	91	110	58	70		90	93	1,2
	min	257	127	10	4	78	101	45	48		78	67	1,07

BIBLIOGRAPHY

- BAYDEMIR A. N., DUMAN L. 2009 – Molars patterns in *Microtus guentheri* (Danford & Alston, 1880) (Mammalia, Rodentia) from Kirikkale Province. *Journal of applied Biological Sciences*, 3 (3), p. 47-53.
- CHALINE J. 1972 – Les rongeurs de l'aven I des Abîmes de La Fage à Noailles (Corrèze). *Nouv. Archives du Muséum d'Histoire Naturelle de Lyon*, Fasc. 10, p. 61-78.
- CHAUVIÈRE F.-X., FONTANA L., LANG L., BONANI G., HADJAS I. 2006 – Une préhampe magdalénienne en bois de renne aux Petits-Guinards (Allier, France). *C.R. Palevol*, 5, p. 725-733.
- CORBET G. B. 1978 – *The Mammals of the Palearctic Region: a taxonomic review*. London: British Museum (Natural History), Cornell University Press, 314 p.
- CUENCA-BESCOS G., STRAUS L.G., GARCIA-PIMIENTA J.C., GONZALES-MORALES M.R., LOPEZ-GARCIA J.M. 2010 – Late Quaternary small mammal turnover in the Cantabrian Region: The extinction of *Pliomys lenli* (Rodentia, Mammalia). *Quaternary International* 212, p. 129-136.
- DESCLAUX E., DEFLEUR A. 1997 – Étude préliminaire des micromammifères de la Baume Moula-Guercy. *Quaternaire*, 8 (2-3), p. 213-223.
- FONTANA L., CHAUVIÈRE F.-X. 2009 – The total exploitation of Reindeer at the site of Les Petits Guinards: What's new about the annual cycle of Magdalenian groups in the French Massif Central? In: L. Fontana, F.-X. Chauvière & A. Bridault (eds): *In search of Total Animal Exploitation. Case Studies from the Upper Palaeolithic and Mesolithic*. Proceedings of the XVth UISPP World Congress, Lisbon, 4-9 September 2006, Session C 61, vol. 42. Oxford, J. & E. Hedges (BAR International series 2040), p. 101-111.
- FONTANA L., LANG L., CHAUVIÈRE F.-X., JEANNET M., MAGOGA L. 2003a – Nouveau sondage sur le site Paléolithique des Petits-Guinards à Creuzier-le-Vieux (Allier, France) : des données inattendues. *Bulletin de la Société préhistorique française*, 100 (3), p. 591-596.
- FONTANA L., LANG L., CHAUVIÈRE F.-X., JEANNET M., MOURER-CHAUVIRÉ C., MAGOGA, L. 2003b – Paléolithique supérieur récent du nord du Massif Central : des données inattendues sur le site paléolithique des Petits Guinards à Creuzier-le-Vieux (Allier, France), *Préhistoire du Sud-Ouest* 10/1, p. 77-93.
- FONTANA L., AUBRY T., ALMEIDA M., CHAUVIÈRE F.-X., DIGAN M., MANGADO J., WALTER B., LANG L. 2013 – Premières traces des Solutréens dans le Massif Central français. In : Th. Aubry & M. Almeida (eds) : *Le Solutréen... 40 ans après Smith 66*. Actes du colloque de Preuilly-sur-Claise (2007), 47è supp. de la RACF, p. 239-246.
- GOLENISCHCHEV F., MALIKO V. G., NAZARD F., VAZIRI A. S., SABLINA O. V., POLYAKOV A. V. 2002a – New species of vole of « guentheri » group (Rodentia, Arvicolinae, *Microtus*) from Iran. *Russian Journal of Theriology*, 1 (2), p. 117-123 (En russe).
- GOLENISCHCHEV F. N., SABLINA O. V., POLJAKOV P. M., GERASIMOV S. 2002b – Taxonomy of the subgenus *Sumeriomys* Argyropulo, 1933. *Russian Journal of Theriology*, 1 (1), p. 43-55 (En russe).
- GROMOV I. M., ERBAJEVA M. A. 1995 – *The Mammals of Russia and adjacent territories*. Saint-Petersburg: Russian Academy of Sciences. Zoological Institut. 521 p. (En russe).
- HELMER D., ROITEL V., SANA SEGUL M., WILLCOX G. 1998 – *Interprétations environnementales des données archéologiques et archéobotaniques en Syrie du Nord, de 16 000 BP à 7 000 BP et les débuts de la*

domestication des plantes et des animaux. In Lyon : Maison de l'Orient et de la Méditerranée Jean Pouilloux : (1-2) : p. 69-33.

HIBBARD C. W. 1950 – Mammals of the Rerxod formation from Fox Canyon, Kansas. *Contributions from the Museum of Paleontology. University of Michigan*, 8, 6, p. 113-192.

JAAROLA M., MARTINKOVA N., GÜNDÜZ I., BRUHOF C., ZIMA J., NADAKOWSKI A., AMORI G., BULATOVA N., CHONDROPOULOS B., FRAGUDZKIS-TSOLIS S., GONZÁLEZ-ESTEBAN J., LOPEZ-FUSTER M. J., KANDAUROV A. S., KEFELIOGU H., MATHIAS M. L., VILLATE I., SEARLE J. B. 2004 – Molecular phylogeny of the species vole genus *Microtus* (Arvicolinae, Rodentia) inferred from mitochondrial DNA sequences. *Molecular phylogenetics and Evolution*, 33, p. 647-663.

KHENZYKHENOVA F., SATO T., LIFNINA E., MENDENEV G., KATO H., KOGAĬ S., MAXIMENKO K., NOVOSEL'ZEVA V. 2011 – Upper palaeolithic mammal faunas, of the Baikal region, east Siberia (new data). *Quaternary International*, 231, p. 50-54.

KOWALSKI K. 1958 – *Microtus socialis* (Pallas) (Rodentia) in the Lebanon mountains. *Acta theriologica*, II (13), p. 269-279.

KRYSTUFEK B., KEFELIOGLU H. 2001 – Re description and species limits of *Microtus irani* Thomas 1921 and description of a new social vole from Turkey (Mammalia, Arvicolinae). *Bonner Zoologische Beiträge* 50 (1-2), p. 1-14.

MARKOVA A. K. 2011 – Small mammals of the Palaeolithic sites of Crimea. *Quaternary International*, 231, p. 22-27.

MAUL L. K. T., SMITH R., BARKAĬ A., BARASH P., KARKANAS P., SHAHAC-GROSS R., GOPHER A. 2011 – Microfaunal remains at Middle Pleistocene Qesem Cave, Israël: Preliminary results of small vertebrates environment and biostratigraphy. *Journal of Human Evolution*, 60, p. 464-480.

OGNEV S. I. 1950 – *Mammals of the USSR and adjacent countries*, Vol VII, Rodents. London: Oldbourne Press, 625 p.

POPOVA L. V. 2004 – The micromammal fauna of the Dnieper modern channel alluvium: Taphonomic and biostratigraphic implications. *Quaternaire*, 15 (1-2), p. 233-242.

SANTEL W., KOENIGSWALD W. von 1998 – Preliminary report on the Middle Pleistocene small mammal fauna from Yarimburgaz Cave in Turkish Thrace. *Eizeitalter und Gegenwart*, 48, p. 162-169.

SESE C. 2005 – Aportation de los micromamíferos al conocimiento paleoambiental del Pleistoceno superior de la Region Cantàbrica : Nuevos datos y síntesis. *Museo de Altamira. Monografías* n° 20, p. 167-200.

STORCH G. 1988 – Eine jungpleistozäne / altholozäne Nager Abfolge von Antalya, S. W. Anatolien (Mammalia, Rodentia). *Zeitschrift für Säugetierkunde*, 53, p. 76-82.

TCHERNOV E. 1968 – *Succession of Rodents fauna during the upper Pleistocene of Israël*. Hambourg & Berlin: Verlag Paul Parey, 152 p.

VAN DER MEULEN A. J. 1973 – Middle Pleistocene Smaller Mammals from the Monte-Peglia, (Orvieto, Italy) with Special Reference to the Phylogeny of *Microtus* (Arvicolidae, Rodentia). *Quaternaria*, XVII, p. 1-144.

YIGIT N., ÇOLAK E. 2002 – On the distribution and taxonomic status of *Microtus guentheri* (Danford & Alston, 1880) and *Microtus lydius* Blackler, 1916 (Mammalia, Rodentia) in Turkey. *Turkish Journal of Zoology*, 26, p. 197-204.

YIGIT N., ÇOLAK E., SÖZEN M., OZKURT S. 2003 – A study on the geographical distribution along with habitat aspect of rodent species in Turkey. *Bonn Zool. Beit.*, 50 (4), p. 355-368.

YIGIT N., MARKOV G., ÇOLAK E., KOÇEVA M., SAYGILI F., YUCE D., GAM P. 2012 – Phenotypic features of the « Guentheri » group vole (Mammalia, Rodentia) in Turkey and South Bulgaria: Evidence for its taxonomic detachment. *Acta zoologica Bulgarica*, 64 (1), p. 23-32.

ABSTRACTS

In a crept deposit, the only preserved part of the Magdalenian and Solutrean site of Les Petits Guinard (Allier, France), many thousands of Rodent bones and teeth have been identified. Among the numerous remains of local and boreal voles, one is unknown in France. It has been compared to the nearest morphological and geographical morphotypus: *Microtus arvalis*, *agrestis*, *agrestis* Leb. (temperate species), *hyperboreus* (boreal species), *socialis* and *guentheri* (eastern species). Biometrical data of these morphotypus (*socialis* excepted) have also been analysed. The whole data analysis clearly demonstrates that this vole of Les Petits Guinards is not one of the mentioned species, neither a sub-species. Never identified in France, living or fossilised, it is considered as a new species, called *Microtus bifrons* nov. sp.

Au sein d'une loupe de glissement constituant la seule partie conservée du site magdalénien et solutréen des Petits Guinards (Allier, France), plusieurs milliers de restes de rongeurs ont été identifiés. Parmi les nombreux restes de campagnols locaux et boréaux, un campagnol inconnu en France a été distingué. Il a été comparé aux types les plus proches morphologiquement et géographiquement : *Microtus arvalis*, *Microtus agrestis*, *Microtus agrestis* Leb. (tempérés), *Microtus hyperboreus* (boréal), *Microtus socialis* et *Microtus guentheri* (orientaux). Les données biométriques ont également été utilisées pour cinq de ces six morphotypes (*socialis* exclu). L'analyse de l'ensemble des données démontre que le microtiné des Petits Guinards n'appartient à aucune de ces espèces et qu'il ne peut en être une sous-espèce. Ce campagnol jamais signalé en France, voire même en Europe à l'état fossile, est donc identifié comme une nouvelle espèce, que nous nommons *Microtus bifrons* nov. sp.

INDEX

Keywords: Les Petits Guinards, Massif central, Vole, Microtinae, *Microtus bifrons* nov. sp., Upper Pleniglacial

Mots-clés: Les Petits Guinards, Massif central, Pléniglaciaire supérieur, Campagnol, Microtinés, *Microtus bifrons* nov. Sp.

AUTHORS

MARCEL JEANNET

UMR 7269 LAMPÉA, BP 647, Maison Méditerranéenne des Sciences de l'Homme, 5 rue du château de l'horloge - BP 647, FR-13094 Aix-en-Provence cedex - m.jeannet.arpa.mf@wanadoo.fr

LAURE FONTANA

(b) CNRS, UMR 7401 ArScAn, Archéologies environnementales. Maison de l'Archéologie et de l'Ethnologie R. Ginouvès, 21 Allée de l'Université, FR-92023 Nanterre cedex -
laure.fontana@mae.u-paris10.fr