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Systematic Palaeontology (Vertebrate Palaeontology)

Blarinoides aliciae sp. nov., a new Soricidae (Mammalia, Lipotyphla) from the Pliocene of Spain

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Abstract

A new species of *Blarinoides* (Soricidae, Mammalia), *Blarinoides aliciae*, is described from the Pliocene of Tollo de Chiclana (Guadix Basin, southeastern Spain). It is notably smaller than the single species of this genus known until now, *B. mariae*. *B. aliciae* is recorded from several other Spanish localities, but the sample from Tollo de Chiclana-3 is the most numerous. *B. aliciae* proves the simultaneous existence of two different species of *Blarinoides* in Europe during the Pliocene: one of large size in central and eastern Europe, and another one of small size in Iberia. ***To cite this article: R. Minwer-Barakat et al., C. R. Palevol 6 (2007).***

Résumé

Blarinoides aliciae* sp. nov., un nouveau Soricidae (Mammalia, Lipotyphla) du Pliocène d'Espagne.** Une nouvelle espèce de *Blarinoides* (Soricidae, Mammalia), *Blarinoides aliciae*, est décrite du Pliocène de Tollo de Chiclana (dépression de Guadix, Espagne sud-orientale). Elle est notablement plus petite que la seule espèce du genre connue jusqu'à maintenant, *B. mariae*. *B. aliciae* est documentée dans plusieurs autres gisements espagnols, mais l'échantillon de Tollo de Chiclana-3 est le plus abondant. *B. aliciae* démontre l'existence simultanée de deux espèces de *Blarinoides* en Europe au Pliocène : une première, de grande taille, en Europe centrale et orientale, et une seconde, plus petite, dans la péninsule Ibérique. ***Pour citer cet article : R. Minwer-Barakat et al., C. R. Palevol 6 (2007).

Keywords: *Blarinoides*; Soricidae; Lipotyphla; Pliocene; Spain

Mots clés : *Blarinoides* ; Soricidae ; Lipotyphla ; Pliocène ; Espagne

Version française abrégée

Introduction

Le genre *Blarinoides* était jusqu'à aujourd'hui monospécifique, et connu uniquement par son espèce-type, *Blarinoides mariae*. Sa distribution géographique

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était pratiquement limitée à l'Europe centrale et orientale : Hongrie, Pologne, Bulgarie, Roumanie, Slovaquie et Allemagne [18]. Nous y ajoutons une deuxième espèce, *Blarinoides aliciae*, provenant du Villafranchien ancien de Tollo de Chiclana-3 (TCH-3), gisement situé dans la dépression de Guadix (Espagne sud-orientale).

Paléontologie systématique

Ordre : Lipotyphla Haeckel, 1866
Famille : Soricidae Fischer von Waldheim, 1817
Sous-famille : Soricinae Fischer von Waldheim, 1817
Tribu : Blarinini Kretzoi, 1965
Genre : *Blarinoides* Sulimski, 1959
Blarinoides aliciae sp. nov. (Fig. 1)

Derivatio nominis : cette espèce est dédiée à Alicia Serna Barquero, amie et collègue du Departamento de Estratigrafía y Paleontología (université de Grenade), en témoignage de reconnaissance pour son aide.

Holotype : M^1 droite, TCH-3 278, conservée au Departamento de Estratigrafía y Paleontología de l'université de Grenade.

Hypodigme : 6 I inf., 8 M_1, 9 M_2, 5 M_3, 4 I sup., 8 P^4, 10 M^1, 7 M^2.

Localité-type : Tollo de Chiclana-3 (TCH-3), Villafranchian ancien, dépression de Guadix, Espagne. Coordonnées UTM 30SVG957549 [11].

Diagnose : Blarinoides, avec des dents morphologiquement similaires à celles de *B. mariae*, mais notablement plus petites. I inf. tricuspidée. M_1 et M_2 avec l'entoconide bien développé, et sans entocristide. M_3 à hypoconide et entoconide distincts. I sup. non bifide. P^4 à protocône et hypocône distincts. M^1 et M^2 avec une émargination postérieure faible, à métalophe long, reliant le protocône au métacône.

Diagnose différentielle : B. aliciae diffère de *B. mariae* principalement par sa taille inférieure. En plus, la P^4 de *B. aliciae* présente une émargination postérieure plus forte que *B. mariae*. *B. aliciae* se distingue des espèces du genre *Mafia* Reumer, 1984 par sa plus grande taille, et par la présence d'un hypocône et d'un métalophe distincts sur les M^1 et M^2. La nouvelle espèce diffère de *Sulimskia* Reumer, 1984 par sa taille beaucoup plus conséquente, et par le cingulum labial de la I inf., moins développé.

La I sup. non bifide et la I inf. tricuspidée permettent de distinguer *B. aliciae* de toutes les espèces de Anourosoricini, Beremendiini et Neomyini. La nouvelle espèce diffère des tribus Blarinellini et Soricini par l'absence d'une entocristide en M_1 et M_2.

Mesures : voir Tableaux 1 et 2.

Discussion et conclusions

B. mariae présente une distribution temporelle longue, du Pliocène ancien jusqu'au Pléistocène ancien, plus ancien et plus récent que TCH-3, sans présenter de variations morphologiques ou biométriques [15,17]. *B. aliciae* se distingue de *B. mariae* par plusieurs caractères morphologiques de la dentition, et surtout par une taille notablement plus petite (Figs. 2 et 3).

Jammot [9] a décrit une espèce, *B. chalinei*, qui doit être considérée comme un *nomen nudum*, puisque ce travail n'est pas publié.

Dans la péninsule Ibérique, *Blarinoides* a été cité du gisement d'Escorihuela (Villafranchien ancien) et Escorihuela B (Ruscinien tardif) [10] où le matériel est trop pauvre pour permettre une détermination. Le genre est aussi documenté par du matériel non publié de Concud Village 3 et Concud Estación 2. Au vu de la petite taille de ces matériaux, ils peuvent être attribués à *B. aliciae*.

1. Introduction

The genus *Blarinoides* was until now a monospecific genus, represented solely by the type species, *Blarinoides mariae* Sulimski, 1959. *Blarinoides* is one of the most common elements in the European Pliocene soricid faunas. It is quite abundant in localities from Hungary, Poland, Bulgaria, Romania, Slovakia, and Germany, ranging in age from Early Ruscinian to Early Pleistocene [18]. On the contrary, remains ascribed to *Blarinoides* are extremely scarce in the Iberian Peninsula, maybe due, in part, to the lack of detailed studies.

In this paper, the population of *Blarinoides* from the locality of Tollo de Chiclana-3 is described; this is the most numerous sample found in the Iberian Peninsula until now. The material described here shows distinctive features that allow the definition of a new species, *Blarinoides aliciae* sp. nov.

The section of Tollo de Chiclana is situated in the central part of the Guadix Basin (southeastern Spain), an intramontane basin established in the Late Miocene. The oldest sediments are marine Tortonian. Continental sedimentation begins in the Latest Tortonian and lasts until Late Pleistocene [5,21]. In the section of Tollo de Chiclana, six fossiliferous localities were described in previous publications [12,13]. These fossiliferous levels, ranging in age between Late Ruscinian and Middle Villafranchian, are found in swamp deposits. The faunal list of the locality of Tollo de Chiclana-3 (TCH-3) includes the following species: *Stephanomys thaleri*, *S. minor*, *Castillomys crusafonti*, *Apodemus*

atavus, *Mimomys stehlini*, *Kislangia ischus*, *Eliomys intermedius*, *Asoriculus gibberodon*, *Paenelimnoecus pannonicus*, *B. aliciae* nov. sp., '*Myosorex meini*', *Archaeodesmana* sp., and Talpinae indet. [11]. This association allows us to assign the locality of TCH-3 to the Early Villafranchian.

The nomenclature used in the descriptions of the teeth is that of Reumer [15]. Lengths and widths have been measured as defined by Reumer [15]. Specimens are kept in the 'Departamento de Estratigrafía y Paleontología' of the University of Granada, Spain.

2. Systematic Palaeontology

Order Lipotyphla Haeckel, 1866
Family Soricidae Fischer von Waldheim, 1817
Subfamily Soricinae Fischer von Waldheim, 1817
Tribe Blarinini Kretzoi, 1965
Genus *Blarinoides* Sulimski, 1959
Blarinoides aliciae sp. nov. (Fig. 1)

Derivatio nominis: this species is devoted to Alicia Serna Barquero, friend and colleague of the 'Departamento de Estratigrafía y Paleontología' (University of Granada), in appreciation of her help in this work.

Holotype: right M^1, TCH-3 278, kept in the 'Departamento de Estratigrafía y Paleontología' (University of Granada).

Referred material: 6 I inf., 8 M_1, 9 M_2, 5 M_3, 4 I sup., 8 P^4, 10 M^1, 7 M^2.

Type locality: Tollo de Chiclana-3 (TCH-3), Early Villafranchian, Guadix Basin, Spain. Coordinates UTM 30SVG957549 [11].

Diagnosis: Blarinoides with dental elements morphologically similar to those of *B. mariae*, but notably smaller. I inf. tricuspulate. M_1 and M_2 with well-developed entoconid, and without entoconid crest. M_3 with distinct hypoconid and entoconid. I sup. not fissident. P^4 with distinct protocone and hypocone. M^1 and M^2 with a weak posterior emargination, and with a long metaloph connecting the protocone to the metacone.

Differential diagnosis: B. aliciae differs from *B. mariae* mainly by its smaller size. Besides, the P^4 of *B. aliciae* has a stronger posterior emargination than *B. mariae*. *B. aliciae* can be distinguished from the species of the genus *Mafia* Reumer, 1984 by its larger size, and by the presence of a distinct hypocone and metaloph in M^1 and M^2. The new species differs from *Sulimskia* Reumer, 1984 by its much larger size, and by the less developed labial cingulum in the I inf.

The non-fissident I sup. and the tricuspulate I inf. allow us to distinguish *B. aliciae* from all the species of Anourosoricini, Beremendiini, and Neomyini. The new species differs from the tribes Blarinellini and Soricini in the lack of an entoconid crest in M_1 and M_2.

Measurements: see Tables 1 and 2.

3. Description

I inf.: tricuspulate incisors. In unworn specimens, one may observe that the posterior cuspule is weak. The apex is notably upturned. The specimens preserving the posterior part show a weakly developed cingulum along the dorsal part of the posterolabial edge.

M_1 and M_2: large molars, with sharp cuspids and high crests. In the M_1, the trigonid is somewhat longer and notably narrower than the talonid; in the M_2, trigonid and talonid have similar dimensions. The entoconid is high, and well separated from the metaconid. There is no entoconid crest. The entoconid is close to the hypolophid, separated from it by a narrow, deep valley. The labial cingulum is not very prominent, but well defined. It is low between the paraconid and the protoconid, and between the hypoconid and the entostylid; this cingulum shows an elevation at the level of the re-entrant valley. On the contrary, the lingual cingulum has a constant height. The re-entrant valley opens high on the labial cingulum. There are two roots, strongly inclined backwards.

The mental foramen is placed below the talonid of the M_1.

M_3: the lingual border is straight. The paraconid, protoconid and metaconid, and the crests connecting these cuspids are high. In the least-worn specimens, the entoconid and the hypoconid can be observed. The oblique crest and the hypolophid are curved, so the talonid basin is rounded. The labial cingulum is very well developed; it is more prominent in its anterior part, and it rises at the level of the re-entrant valley. The labial cingulum disappears below the hypoconid. The lingual cingulum is less prominent than the labial one, but it is similar in height and well marked. The re-entrant valley opens near the labial cingulum. There are two long and inclined roots.

I sup.: large, non-fissident incisors. The labial cingulum is slightly marked; it extends along two thirds of the posterolabial margin. The talon is weakly developed.

P^4: long teeth, with trapezoidal outline. The paracone is high and sharp. The parastyle protrudes notably over the anterior border of the tooth; it is higher than the protocone and hypocone. The parastyle is connected to the paracone by a parastylar crest, and to the protocone by another crest. The protocone is large and distinct. It is connected to the hypocone by a posterolingual crest. The hypocone is well individualized, somewhat lower than the protocone. In the least-worn specimens, an extra

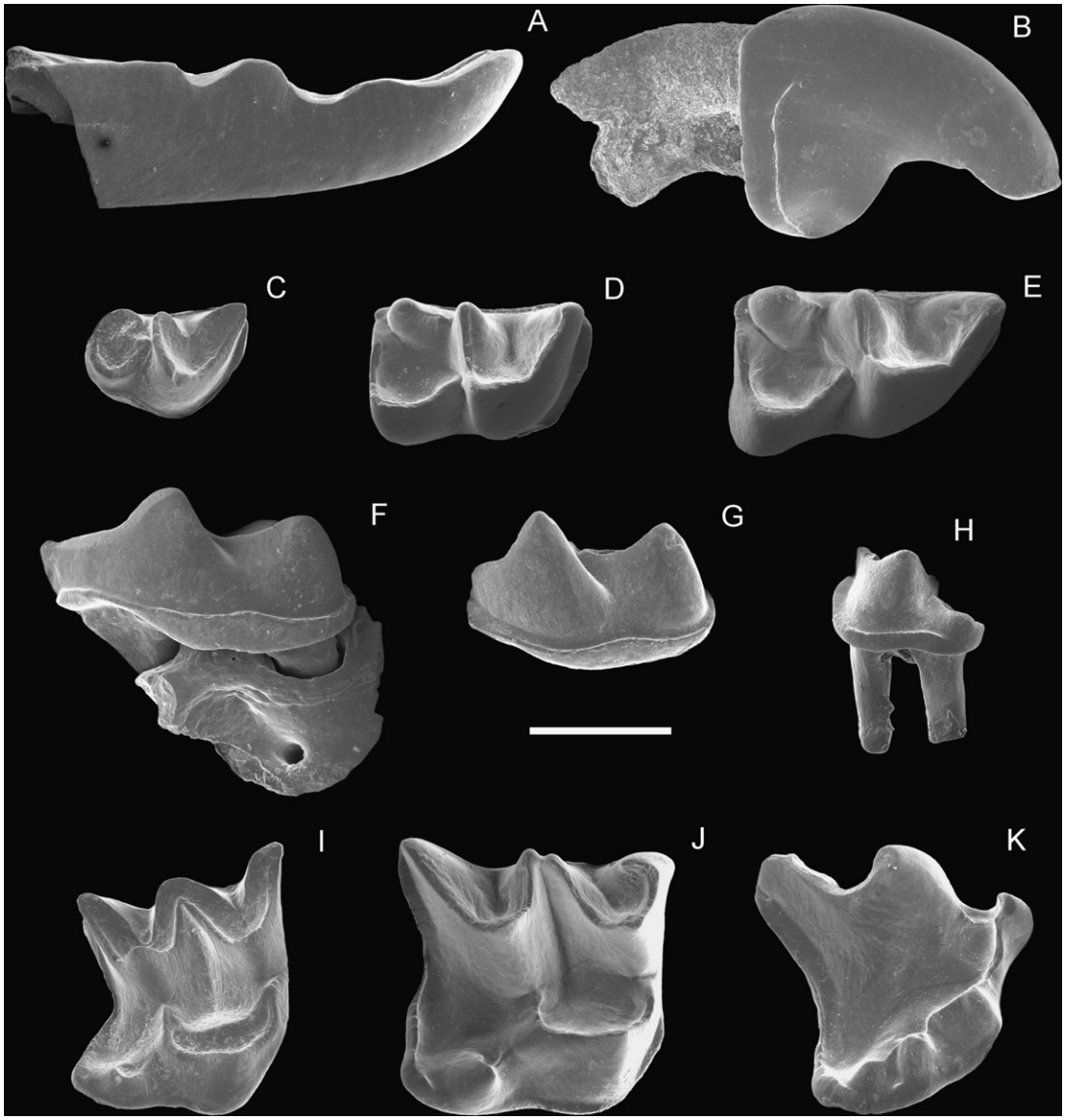

Fig. 1. *Blarinoides aliciae* sp. nov. from TCH-3, Guadix Basin. **A**, Right I inf., TCH-3 289; **B**, right I sup., TCH-3 262; **C**, right M_3, TCH-3 259; **D**, right M_2, TCH-3 253; **E**, right M_1, TCH-3 243; **F**, left M_1, TCH-3 241, labial view; **G**, left M_2, TCH-3 247, labial view; **H**, left M_3, TCH-3 256, labial view; **I**, right M^2, TCH-3 285; **J**, right M^1, TCH-3 278 (holotype); **K**, right P^4, TCH-3 269. Scale = 1 mm.

Fig. 1. *Blarinoides aliciae* sp. nov. de TCH-3, bassin de Guadix. **A**, I inf. droite, TCH-3 289 ; **B**, I sup. droite; TCH-3 262; **C**, M_3 droite ; TCH-3 259 ; **D**, M_2 droite, TCH-3 253 ; **E**, M_1 droite, TCH-3 243 ; **F**, M_1 gauche, TCH-3 241, vue labiale ; **G**, M_2 gauche, TCH-3 247, vue labiale ; **H**, M_3 gauche, TCH-3 256, vue labiale ; **I**, M^2 droite, TCH-3 285 ; **J**, M^1 droite, TCH-3 278 (holotype) ; **K**, P^4 droite, TCH-3 269. Échelle = 1 mm.

cingular cusp can be observed behind the hypoconid. Behind this cusp, there is a short and thick posteroloph. The hypoconal flange does not protrude far backwards, and the posterior emargination is weak. Along the posterior side of the tooth, there is a narrow, but well-marked, cingulum. There are two roots with round section in anterolabial and posterolabial position, and a third one with an elongated section on the lingual side of the tooth.

M^1 and M^2: the outline is practically quadratic in M^1. The M^2 is trapezoidal in occlusal view: the posterior border is shorter than the anterior one, and the labial and lingual borders converge backwards. The metacone is slightly higher than the paracone. The posterior arm of the metacone is somewhat longer than the anterior one, and the metastyle protrudes over the labial border, especially in the M^1. The mesostyle is split. The protocone

Table 1
Measurements (mm) of the lower teeth of *Blarinoides aliciae* sp. nov. from Tollo de Chiclana-3
Tableau 1
Mesures (en mm) des dents inférieures de *Blarinoides aliciae* sp. nov. de Tollo de Chiclana-3

Element	Parameter	*n*	min.	mean	max.
I inf.	*L*	2	5.12	5.175	5.23
M_1	*L*	6	2.07	2.14	2.21
	TRW	7	1.11	1.15	1.16
	TAW	8	1.23	1.27	1.29
M_2	*L*	7	1.72	1.79	1.87
	TRW	7	1.03	1.07	1.11
	TAW	7	1.08	1.12	1.17
M_3	*L*	4	1.25	1.30	1.33
	W	4	0.82	0.84	0.85

L: Length. *TRW*: Trigonid width. *TAW*: Talonid width. *W*: Width.
L : Longueur. *TRW* : largeur du trigonide. *TAW* : Largeur du talonide. *W* : Largeur.

Table 2
Measurements (mm) of the upper teeth of *Blarinoides aliciae* sp. nov. from Tollo de Chiclana-3
Tableau 2
Mesures (mm) des dents supérieures de *Blarinoides aliciae* sp. nov. de Tollo de Chiclana-3

Element	Parameter	*n*	min.	mean	max.
I sup.	*L*	2	2.56	2.575	2.59
	H	3	1.71	1.74	1.77
	LT	1		1.18	
P^4	*PE*	5	1.43	1.61	1.69
	LL	5	1.50	1.58	1.67
	BL	6	2.17	2.195	2.26
	W	5	1.98	2.02	2.08
M^1	*PE*	10	1.73	1.78	1.85
	LL	10	1.88	1.98	2.06
	BL	9	1.91	1.94	1.98
	AW	10	2.01	2.07	2.17
	PW	9	2.06	2.13	2.25
M^2	*PE*	7	1.40	1.43	1.44
	LL	6	1.58	1.625	1.67
	BL	5	1.58	1.63	1.67
	AW	3	2.07	2.09	2.12
	PW	4	1.67	1.70	1.74

L: Length. *H*: Height. *LT*: Length of the talon. *PE*: Length to the posterior emargination. *LL*: Lingual length. *BL*: Buccal length. *W*: Width. *AW*: Anterior width. *PW*: Posterior width.
L : Longueur. *H* : Hauteur. *LT* : Longueur du talon. *PE* : Longueur jusqu'à l'émargination postérieure. *LL* : Longueur linguale. *BL* : Longueur buccale. *W* : Largeur. *AW* : Largeur antérieure. *PW* : Largeur postérieure.

is lower than the paracone. There is a minuscule protoconule near the base of the paracone, separated from it by a narrow valley, and connected to the protocone by a crest. Behind the protocone, there is a long metaloph that reaches the base of the metacone, closing the trigon basin. Eight out of ten M^1 have a narrow cingulum at the base of the protocone. In four specimens, the cingulum is well defined, and it extends along the anterolingual border of the molar. In the other four specimens, the cingulum is weak and short, limited to the base of the anterior side of the protocone. This cingulum only occurs in one out of seven M^2. The hypocone is low and rounded, connected to the metaloph by a low anterior crest. The posteroloph is thick. There is a well-developed cingulum along the posterior border. The hypoconal flange is small; the posterior emargination is not much pronounced in the M^2 and even weaker in the M^1. There are four small roots with round section in anterolingual, anterolabial, posterolingual, and posterolabial positions.

No M^3 is preserved in the material from TCH-3.

4. Discussion

Blarinoides was a monospecific genus until now. The diagnosis of the genus and species is based on dental and cranial features. Unfortunately, in TCH-3, no complete skull or mandible has been preserved. Dental elements are isolated (exceptionally two teeth are preserved in a mandible fragment), so only dental features can be observed in this population.

The dental characters of the genus *Blarinoides* described by Sulimski [20], which can be considered diagnostic, are: lower incisor tricuspulate, M_3 with distinct hypoconid and entoconid, upper molars with a weak posterior emargination. Rzebik-Kowalska [17] gave more details on the dental morphology of *B. mariae*, based on several Polish localities (Wéze I, Zamskowa Dolna, and Rebielice Królewskie I and II): the upper incisor is 'not bifid' (not fissident, after Reumer [15]); the P^4 has a large parastyle, a well-developed protocone and hypocone, and an accessory cusp behind the hypocone; the upper molars have a metaloph; the occlusal outline of the M^2 is trapezoidal; the lower molars have a large entoconid, but lack an entoconid crest. All these features are found in other populations of *B. mariae*, described in the literature (like Csarnóta 2, Osztramos 7 and 9 [15]), and can also be observed in the population from TCH-3.

We have compared the material from TCH-3 with that from the type locality of *B. mariae*, Wéze, stored at the University of Lyon-1 (France). The most important morphological differences are: in the M_1 of *B. mariae*

from Wéze, the difference in width between the trigonid and the talonid is subtle, and the labial border is almost straight and parallel to the lingual one. On the contrary, in the specimens of *B. aliciae* from TCH-3, the trigonid is markedly narrower than the talonid; besides, on the occlusal outline, there is a concavity at the level of the re-entrant valley, which does not exist in the specimens from Wéze. The labial cingulum is somewhat higher in the $M_{1–3}$ of *B. mariae* than in those of *B. aliciae*. The P^4 from Wéze have a notably weaker posterior emargination than those from TCH-3; this character can be also observed in the specimens from other populations of *B. mariae* (Osztramos 7, Csarnóta 2), figured by Reumer [15].

Biometrical differences between all the material assigned to *B. mariae* and the population from TCH-3 are much more evident. Sulimski [20] gives no measurements of isolated teeth. Rzebik-Kowalska [17] published measurements of the upper dentition only, which are based on a measurement method [16] different from ours. Nevertheless, it is clear that the size of *B. mariae* from the localities of Wéze I, Zamskowa Dolna, and Rebielice Królewskie I and II is notably larger than that of *B. aliciae* from TCH-3. Direct comparison of the material from TCH-3 with that from Wéze has allowed us to observe a notable difference in size for all dental elements, especially for the incisors, which are much larger in *B. mariae* from Wéze.

The size of the specimens from Csarnóta 2, Osztramos 7 and 9 [15] is also clearly larger than that of *B. aliciae* from TCH-3, for all the measured parameters. The maximum values in TCH-3 are usually smaller than the minimum values in these Hungarian populations. For some dental elements, especially the M_3 and the M^2, certain overlap of the size ranges exists between the population of TCH-3 and those of Csarnóta and Osztramos. Anyway, the mean values are clearly smaller in the population from TCH-3 for all the considered parameters. The size of *B. aliciae* from TCH-3 is also smaller than that of the few specimens of *B. mariae* found in Betfia-XIII (Romania, [19]), Muselievo (Bulgaria, [14]), and Vue-des-Alpes (Switzerland, [2]). Figs. 2 and 3 represent the ranges of variation of several parameters of the dentition of *B. aliciae* from TCH-3 and *B. mariae* from various European localities.

It is important to emphasize that we have compared TCH-3 with populations of *B. mariae* both older (Osztramos 9, Csarnóta 2, Muselievo, Vue-des-Alpes), and younger (Osztramos 7, Betfia-XIII) than it; the sizes of all of them are notably larger than that of *B. aliciae*. *B. mariae* has a long temporal distribution (from Early Pliocene to Early Pleistocene); during this time interval, no morphological or biometrical changes can be observed, as Rzebik-Kowalska [17] and Reumer [15] pointed out.

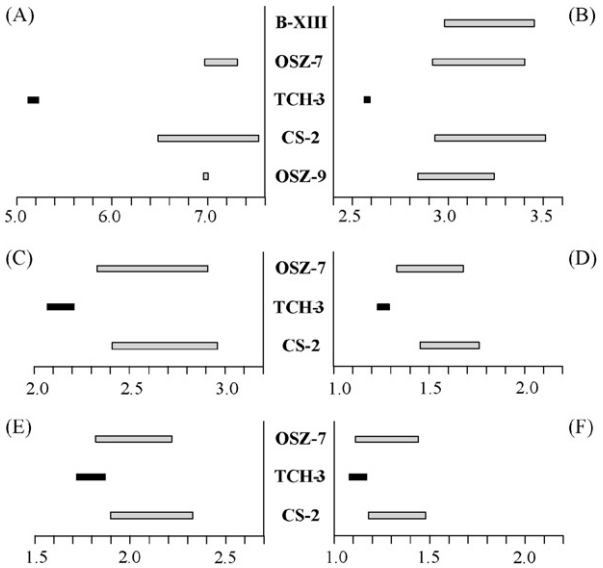

Fig. 2. Ranges of variation of several parameters of the dentition of *Blarinoides mariae* from Osztramos 7 and 9, Csarnóta 2 [15], and Betfia XIII [19], and of *Blarinoides aliciae* from TCH-3. **A**, length of the I inf.; **B**, length of the I sup.; **C**, length of the M_1; **D**, talonid width of the M_1; **E**, length of the M_2; **F**, talonid width of the M_2.

Fig. 2. Variation de quelques paramètres de la dentition de *Blarinoides mariae* de Osztramos 7 et 9, Csarnóta 2 [15] et Betfia XIII [19], et de *Blarinoides aliciae* de TCH-3. **A**, longueur de I inf. ; **B**, longueur de I sup. ; **C**, longueur de M_1 ; **D**, largeur du talonide de M_1 ; **E**, longueur de M_2 ; **F**, largeur du talonide de M_2.

In the Iberian Peninsula, *B. mariae* has been cited from the locality of Escorihuela (Lower Villafranchian) and *Blarinoides* sp. from Escorihuela B (Upper Ruscinian) [10]. The material from TCH-3 has been compared with that from these localities, and also with unpublished material from Concud Village 3 and Concud Estación 2, stored at the University of Lyon-1. The material from Escorihuela and Escorihuela B is very scarce (a single M_1 in the former locality, one M_1 and one M_2 in the latter). These specimens are slightly larger than those of *B. aliciae* from TCH-3. Nevertheless, the scarcity of the material does not allow us to do a specific determination, so we refer to it as *Blarinoides* sp. The material from Concud Village 3 and Concud Estación 2 is more abundant. The specimens from these localities are similar in size to those from TCH-3, and notably smaller than those of *B. mariae* from Wéze, and can be assigned to the new species *B. aliciae*. Therefore, the geographical distribution of this species included the greater part of the Iberian Peninsula.

Crochet [4] cited for the first time the possible existence of two different lineages of the genus *Blarinoides*

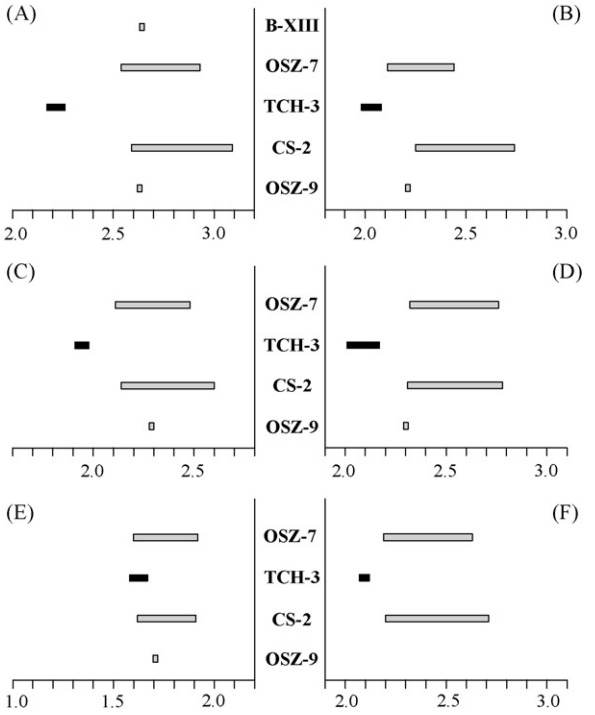

Fig. 3. Ranges of variation of several parameters of the dentition of *Blarinoides mariae* from Osztramos 7 and 9, Csarnóta 2 [15], and Betfia XIII [19], and of *Blarinoides aliciae* from TCH-3. **A**, buccal length of the P^4; **B**, width of the P^4; **C**, buccal length of the M^1; **D**, anterior width of the M^1; **E**, buccal length of the M^2; **F**, anterior width of the M^2.

Fig. 3. Variation de quelques paramètres de la dentition de *Blarinoides mariae* de Osztramos 7 et 9, Csarnóta 2 [15], et Betfia XIII [19], et de *Blarinoides aliciae* de TCH-3. **A**, longueur buccale de P^4 ; **B**, largeur de P^4 ; **C**, longueur buccale de M^1 ; **D**, largeur antérieure de M^1 ; **E**, longueur buccale de M^2 ; **F**, largeur antérieure de M^2.

in Europe. He assigned a single M^2 from Terrats (Roussillon), morphologically similar to *B. mariae*, but notably smaller, to *Blarinoides* sp. This specimen is clearly smaller than those from TCH-3, and it is morphologically similar to the specimens of *B. aliciae*, but its hypocone is less developed. The locality of Terrats (Early Pliocene, MN14) is much older than TCH-3, Concud Village 3, and Concud Estación 2. If the generic determination of the single molar from Terrats were correct, this would indicate the presence of a small-sized lineage of *Blarinoides* in western Europe since the beginning of the Pliocene. However, its adscription to this genus is uncertain, because of the scarcity of material and of the pronounced difference in size with all known populations of *Blarinoides*. More numerous samples from this locality would be necessary to determine this specimen beyond doubt and clarify its possible relation with *B. aliciae*. For the moment, the single tooth from Terrats cannot be determined at a specific level; therefore, we keep the denomination of *Blarinoides* sp.

Jammot [9] described a new species of this genus, *Blarinoides chalinei*, from the locality of Seynes. This paper is unpublished, and hence this species is considered a nomen nudum. However, we have revised the manuscript of Jammot, in order to check the possible resemblance between the populations from TCH-3 and Seynes. The diagnosis of Jammot is based mainly on cranial features. The description of the teeth is brief and not detailed: the diagnosis only specifies that the lower molars have a well-developed labial cingulum, there is no reference to the morphology of the upper molars, and there are no tooth measurements. Jammot does not mention the difference in size between '*B. chalinei*' and *B. mariae*, and indicates that the difference between these two species is based on the shape of the mandible. Therefore, it seems very unlikely that the population from Seynes would correspond to *B. aliciae*, which differs notably in size from *B. mariae*.

The presence of *Blarinoides* has been mentioned in other few western European localities: *B. mariae* from Hautimagne (France) [6] and from Arondelli (Italy) [1], and *Blarinoides* sp. from Arcille (Italy) [8]. It would be very interesting to analyze the size and the morphology of these populations to ensure their specific ascription and to clarify their relationships with the species *B. mariae* and *B. aliciae*. Nevertheless, the material from these localities is very scarce and there are no published descriptions, measurements or figures of the specimens; therefore, it is impossible to interpret their relationships with other European populations. Table 3 compiles the current available data of the presence of *Blarinoides* in Europe.

B. aliciae from TCH-3 differs clearly from the rest of the Soricidae found in the Pliocene of Europe. It is larger than *Crocidura*, and very different morphologically: the upper molars of *B. aliciae* are longer, with a weaker posterior emargination, and the lower molars have a less compressed talonid and a deeper re-entrant valley. The new species differs from *Paenelimnoecus* in its much larger size, and in the presence of an entoconid in the lower molars. With regard to the Soricinae, *B. aliciae* can be distinguished from all the Soricini, Neomyini, Blarinellini, and Beremendiini in two characters: non-fissident upper incisor and lack of an entoconid crest in the lower molars. *B. aliciae* differs from the Anourosoricini in the tricuspulate lower incisor and in the well-developed talonid basin in the M_3. Furthermore, *B. aliciae* is much larger than most of the fossil Soricidae. Its size is only comparable to that of *Beremendia*, but this genus differs obviously from *Blarinoides* in the

Table 3
Citations of the genus *Blarinoides* in Europe
Tableau 3
Citations du genre *Blarinoides* en Europe

Age	Species	Locality	Country
Early Pleistocene	*B. mariae*	Betfia-XIII	Romania
Early Pleistocene	*B. mariae*	Kamyk	Poland
Early Pleistocene	*B. mariae*	Kadzielnia 1	Poland
Middle Villafranchian (MN17)	*B. mariae*	Zamkowa Dolna Cave A	Poland
Middle Villafranchian (MN17)	*B. mariae*	Stranzendorf D	Austria
Villafranchian (MN16/17)	*B. mariae*	Gundersheim fissure fillings	Germany
Early Villafranchian (MN16)	*B. aliciae*	Concud Village 3	Spain
Early Villafranchian (MN16)	*B. aliciae*	Concud Estación 2	Spain
Early Villafranchian (MN16)	*B. aliciae*	Tollo de Chiclana 3	Spain
Early Villafranchian (MN16)	*Blarinoides* sp.	Seynes	France
Early Villafranchian (MN16)	*Blarinoides* sp.	Escorihuela	Spain
Early Villafranchian (MN16)	*B.* cf. *mariae*	Uryv 2	Russia
Early Villafranchian (MN16)	*B. mariae*	Hambach 11	Germany
Early Villafranchian (MN16)	*B. mariae*	Frenchen	Germany
Early Villafranchian (MN16)	*B. mariae*	Hajnacka	Slovakia
Early Villafranchian (MN16)	*B. mariae*	Podari	Romania
Early Villafranchian (MN16)	*B. mariae*	Debren 1	Romania
Early Villafranchian (MN16)	*B. mariae*	Rebielice Królewskie 2	Poland
Early Villafranchian (MN16)	*B. mariae*	Rebielice Królewskie1A	Poland
Early Villafranchian (MN16)	*B. mariae*	Arondelli	Italy
Early Villafranchian (MN16)	*B. mariae*	Osztramos 7	Hungary
Late Ruscinian (MN15)	*Blarinoides* sp.	Obuchovka 1	Ukraine
Late Ruscinian (MN15)	*Blarinoides* sp.	Dranic 1	Romania
Late Ruscinian (MN15)	*Blarinoides* sp.	Escorihuela B	Spain
Late Ruscinian (MN15)	*B.* cf. *mariae*	Měňany 3	Czech Republic
Late Ruscinian (MN15)	*B.* cf. *mariae*	Gundersheim-Findling	Germany
Late Ruscinian (MN15)	*B. mariae*	Wéze 2	Poland
Late Ruscinian (MN15)	*B. mariae*	Wéze 1	Poland
Late Ruscinian (MN15)	*B. mariae*	Ewy Cave 1	Poland
Late Ruscinian (MN15)	*B. mariae*	Deutsch-Altenburg 9	Austria
Late Ruscinian (MN15)	*B. mariae*	Vue-des Alpes	Switzerland
Late Ruscinian (MN15)	*B. mariae*	Ivanovce	Slovakia
Late Ruscinian (MN15)	*B. mariae*	Dranic 3	Romania
Late Ruscinian (MN15)	*B. mariae*	Dranic 0	Romania
Late Ruscinian (MN15)	*B. mariae*	Csarnóta 2	Hungary
Late Ruscinian (MN15)	*B. mariae*	Wölfersheim 4	Germany
Late Ruscinian (MN15)	*B. mariae*	Muselievo	Bulgaria
Ruscinian (MN14/15)	*B. mariae*	Ewy Cave 3	Poland
Early Ruscinian (MN14)	*Blarinoides* sp.	Panska Góra	Poland
Early Ruscinian (MN14)	*Blarinoides* sp.	Arcille	Italy
Early Ruscinian (MN14)	*Blarinoides* sp.	Terrats	France
Early Ruscinian (MN14)	*B. mariae*	Zamkowa Dolna Cave B	Poland
Early Ruscinian (MN14)	*B. mariae*	Podlesice	Poland
Early Ruscinian (MN14)	*B. mariae*	Osztramos 9	Hungary
Early Ruscinian (MN14)	*B. mariae*	Hautimagne	France

Data from Rzebik-Kowalska [18,19], Hoek Ostende et al. [7], and Čermák et al. [3].
Données reprises de Rzebik-Kowalska [18,19], Hoek Ostende et al. [7] et Čermák et al. [3].

fissident upper incisor, the acuspulate lower incisor, the presence of entoconid crests in the lower molars, and the stronger posterior emargination in the upper molars.

B. aliciae can be distinguished from the other genera of the tribe Blarinini found in the Pliocene of Europe, *Sulimskia* and *Mafia*, mainly by its larger size. Besides, the new species has some distinctive morphological features, like the labial cingulum of the lower incisor, which is weaker than in *Sulimskia*, and the hypocone in the upper molars, more developed than in *Mafia*.

5. Conclusion

The population of *B. aliciae* sp. nov. from the locality of TCH-3 is the most numerous population of *Blarinoides* found in the Iberian Peninsula until now, and represents the first citation of the genus in southern Spain. This new species is morphologically very similar to *B. mariae*, but markedly smaller. Apart from the type population, the material from Concud Village 3 and Concud Estación 2 is assigned to this species.

Blarinoides now comprises two contemporaneous species: *B. mariae*, from central and eastern Europe, and *B. aliciae*, from the Iberian Peninsula.

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