Middle Miocene rodents from Paşalar, Anatolia, Turkey

PABLO PELÁEZ-CAMPOMANES and REMMERT DAAMS


Despite the importance of the Paşalar fauna for the evolution and biogeography of Miocene mammals, few studies on its rodents have been published. In this paper a taxonomic analysis of the Paşalar rodents and the possible correlation that can be based on them are presented. Several rodent taxa, previously unknown from Paşalar are described. These include the cricetids *Megacricetodon andrewsi* sp. nov. and *Democricetodon brevis* (Schaub, 1925), the sciurids *Spermophilinus bredai* (Meyer, 1848) and Sciurinae indet., and the glirid *Peridyromys lavocati* sp. nov. The taxa previously described from Paşalar are: the ctenodactylid *Sayimys cf. intermedius* (Sen and Thomas, 1979), the cricetid *Cricetodon pasalaensis* (Tobien, 1978), the spalacid *Pliospalax marmarensis* Ünay, 1990 and the castorid cf. *Chalicomys jaegeri* Kaup, 1832. These determinations represent a reduction of the number of taxa recorded from the locality, as previous papers listed up to five sciurids. Only two sciurids and two glirids are recognized in this study. Mainly on the basis of the new cricetid records, it is possible to correlate the Paşalar fauna to late MN6.

Key words: Rodentia, *Democricetodon*, *Megacricetodon*, *Spermophilinus*, *Peridyromys*, biochronology, Miocene, Anatolia.

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**Introduction**

Details on the site and fauna of Paşalar were reported in the monograph by Andrews and Jungers (1990), and are not repeated herein. Hitherto, the rodents were studied only in part. Ünay (1990a, b) described *Cricetodon pasalaensis* (Cricetidae) and *Pliospalax marmarensis* (Spalacidae) respectively, and Flynn and Jacobs (1990) gave a preliminary analysis of the small mammal fauna. Most of the faunal correlations among Neogene localities in the Old World are based primarily on comparison of their rodent assemblages. The study of the rodent assemblage from Paşalar is therefore important to provide a precise biochronological position for the fauna.

Dental nomenclature for Sciuridae is after Cuenca Bescós (1988), for Cricetidae follows Daams and Freudenthal (1988), and for Gliridae follows Daams (1981). Measurements of the teeth are in millimeters.

The specimens described here are stored in the collections of the University of Ankara, Faculty of Language, History and Geology, Department of Paleoanthropology, abbreviated as UA. The PSL abbreviation denotes the collection from Paşalar. Upper cheek teeth are denoted with capital letters, lower teeth with lower case letters: P/p, premolar; M/m molar. In case of deciduous teeth we use D/d as prefixes. In Tables: N, denotes number of specimens; s.d., standard deviation.

**Systematics**

Cricetidae Rochebrune, 1883

*Democricetodon brevis* (Schaub, 1925)

Fig. 1A–J, Table 1.

Table 1. Length and width of the cheek teeth of *Democricetodon brevis* (Schaub, 1925) from Paşalar.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>min</th>
<th>mean</th>
<th>max</th>
<th>s.d.</th>
<th></th>
<th>N</th>
<th>min</th>
<th>mean</th>
<th>max</th>
<th>s.d.</th>
</tr>
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<tbody>
<tr>
<td>M1</td>
<td>5</td>
<td>1.75</td>
<td>1.84</td>
<td>1.98</td>
<td>0.090</td>
<td>7</td>
<td>1.06</td>
<td>1.19</td>
<td>1.31</td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>7</td>
<td>1.29</td>
<td>1.37</td>
<td>1.47</td>
<td>0.060</td>
<td>9</td>
<td>1.20</td>
<td>1.24</td>
<td>1.31</td>
<td>0.044</td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>9</td>
<td>0.96</td>
<td>1.05</td>
<td>1.12</td>
<td>0.059</td>
<td>9</td>
<td>0.93</td>
<td>1.08</td>
<td>1.17</td>
<td>0.077</td>
<td></td>
</tr>
<tr>
<td>m1</td>
<td>3</td>
<td>1.53</td>
<td>1.61</td>
<td>1.70</td>
<td>0.113</td>
<td>3</td>
<td>1.13</td>
<td>1.15</td>
<td>1.17</td>
<td>0.077</td>
<td></td>
</tr>
<tr>
<td>m2</td>
<td>9</td>
<td>1.31</td>
<td>1.40</td>
<td>1.50</td>
<td>0.063</td>
<td>8</td>
<td>1.07</td>
<td>1.14</td>
<td>1.23</td>
<td>0.062</td>
<td></td>
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<tr>
<td>m3</td>
<td>4</td>
<td>1.26</td>
<td>1.32</td>
<td>1.41</td>
<td>0.057</td>
<td>5</td>
<td>0.98</td>
<td>1.06</td>
<td>1.13</td>
<td>0.057</td>
<td></td>
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</tbody>
</table>

Description.—M1: The anterocone is simple and kidney-shaped. The lingual and labial cingula of the anterocone descend to join the base of the protocone and paracone, respectively. A labial spur branches off the anteroophlole in six out
of eight specimens. In three specimens this spur is transverse and relatively long, but does not reach the labial border. In the other three specimens the spur is short, and in one of these specimens it is oblique and apparently constitutes the anterior arm of the double protolophule. The posterior protolophule points obliquely backwards. In all eight specimens the mesoloph is relatively long, but it ends just before reaching the labial tooth border. The metalophule is absent in two cases, and it points obliquely backward in the other six. The posterosinus is narrow and labially closed.

M2: The lingual anteroloph descends from the middle of the anterior border to the anterior base of the protocone. The labial anteroloph encloses the anterisinus. In two specimens the paracone has an ectoloph spur which descends towards the base of the metacone without reaching it. The protolophule is symmetrically double in five specimens, and in the remaining three the anterior arm is better developed. The mesoloph is of medium length in all eight cases. The metalophule points obliquely forward in seven specimens and it is absent in one. The posteroloph encloses the wide posterisinus.

M3: The lingual anteroloph descends from the middle of the anterior tooth border to the anterior base of the protocone. The labial anteroloph encloses the anterisinus. The protocone and paracone are distinct cusps, and the posterior part of the tooth forms a reticulate ridge pattern of moderate complexity.

m1: The anterconi is a simple and kidney-shaped cusp. Cingular ridges descend from the cusp top towards the lingual and labial border respectively, but without enclosing the anterisinusid. The metalophulid and hypolophulid point obliquely forward. The mesolophid is relatively long, but it ends just before reaching the lingual tooth border. The posterosinusid is lingually open in two specimens; closed by the posterolophid in a third.

m2: The well-developed labial anterolophid reaches the base of the protoconid. The lingual anterolophid is absent in six and short in three cases. However, these short ridges dis-
appear with progressive wear. The metalophulid and hypolophulid point obliquely forward. Of ten m2s, the mesolophid is long in four, of medium length in four, short in one, and absent in one. The posterolophid reaches the base of the entoconid in all specimens.

m3: A low labial anterolophid is present. The lingual anterolophid is either short or absent and disappears with little wear. A mesolophid is present in two of four specimens.

Comments.—*Democricetodon brevis* from Paşalar is of similar size to the type material of *D. brevis* from La Grive (Freudenthal 1963) and the scarce material from Marktl (Fahlbusch 1964), while it is somewhat larger than *D. brevis* from MN7/8 of Giggenhausen (Fahlbusch 1964), Anwil, Ergeten 990m, and Grat 930m (Bolliger 1992). The specimens of *Democricetodon brevis* from these assemblages have a remarkably similar dental pattern, which is evident from the comparable length of the mesolophid(s), the labial spur of the anterolophule, the double protolophule of M2, and the length of the lingual anterolophid of m2. The only difference is the connection of the metalophule from an anterior to a posterior position. This would imply that the Paşalar *Democricetodon* population is somewhat more primitive than the one from Giggenhausen and Anwil, and probably also slightly more primitive than the one from Grat 930m.

**Megacricetodon andrewsi** sp. nov.

Fig. 2A–J, Table 2.

Holotype: right M1, UAPSL217, Fig. 2A.

Etymology: *andrewsi*—in honour of Peter Andrews (Natural History Museum, London).

Type locality: Paşalar, Turkey.

Table 2. Length and width of the cheek teeth of *Megacricetodon andrewsi* sp. nov. from Paşalar.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>N</th>
<th>Length</th>
<th>Width</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>min mean max s.d.</td>
<td>N</td>
</tr>
<tr>
<td>m1</td>
<td>29</td>
<td>1.45 1.56 1.66 0.090</td>
<td>33</td>
</tr>
<tr>
<td>M1</td>
<td>34</td>
<td>1.02 1.13 1.22 0.044</td>
<td>36</td>
</tr>
<tr>
<td>M2</td>
<td>15</td>
<td>0.72 0.81 0.93 0.055</td>
<td>14</td>
</tr>
<tr>
<td>m2</td>
<td>31</td>
<td>1.34 1.42 1.52 0.040</td>
<td>38</td>
</tr>
<tr>
<td>M3</td>
<td>35</td>
<td>1.08 1.16 1.24 0.043</td>
<td>34</td>
</tr>
<tr>
<td>m3</td>
<td>22</td>
<td>0.90 1.00 1.05 0.045</td>
<td>23</td>
</tr>
</tbody>
</table>

**Diagnosis.**—A *Megacricetodon* species of medium size with incompletely bilobed anterocone of M1, medium-sized to long mesolophids in M1–2 and short mesolophids in m1–2. The upper molars of *Megacricetodon* sp. nov. from Paşalar are slightly smaller than those of *M. similis* Fahlbusch, 1964 from the Upper Aragonian of Giggenhausen (south Germany), but the lower molars are of the same size and morphology. More outstanding differences between these two assemblages are: M1 of *M. andrewsi* sp. nov. never has a labial spur of the antero-

lophule, whereas this feature is frequent in *M. similis* from Giggenhausen, and the presence of a well-developed posterior spur of the paracone is rare in M1–2 of *M. andrewsi* sp. nov., while it is present in most of the specimens from Giggenhausen. *Megacricetodon andrewsi* sp. nov. differs from *M. rafaeli* Daams and Freudenthal, 1988 from the Spanish MN6 sites Armantes 7, Valalto 2B and Valalto 2C by its significantly larger size and its shorter mesolophids in m1–2.

**Description.**—M1: The anteroconid is asymmetrically split into a larger labial and a smaller lingual cusp. The furrow that separates these cusps is shallow and does not reach the anterior tooth border in most of the specimens. A cingularum descends from the labial anterocone cusp to the base of the paracone to enclose a labial anterolophid. Another cingularum descends from the lingual anterocone cusp towards the base of the protocone, but does not reach it. In three out of 34 specimens the protolophule is double, although the anterior arm is incomplete. The paracone may have a small, posterior spur but disappears after slight wear. The mesolophid is short in three specimens, of medium length in 20 and long in 10 specimens. The metalophid joins the posterolophid just behind the hypocone. The posterosinus is enclosed by the posterolophid.

M2: A thin lingual anterolophid descends to the base of the protocone. The labial anterolophid joins the base of the paracone, thus enclosing the anterolophid. The protolophid is simple and anterior in nine specimens, simple and more or less transverse in 23 specimens, simple and posterior in one, double with the anterior arm better developed than the posterior one in two, and symmetrically double in two. The mesolophid is short in three specimens, of medium length in 11, and long in 21. In 10 of 36 specimens the paracone has a thin posterior spur that joins the labial end of the mesolophid. The simple metalophid is either anterior or transverse. The posterosinus is wide and enclosed by a posterolophid.

M3: A faint lingual anterolophid is visible in only three of 15 specimens. From the high paracone, the protolophid descends to join the anterior wall of M3. The protocone and hypocone fuse, thus closing the sinus. The irregular posterior part of M3 generally has a more-or-less transverse ridge, but this ridge may bifurcate. A continuous cingularum surrounds the posterior part of M3.

m1: The anteroconid is a simple, rounded cusp in 25 specimens and is slightly constricted antero-posteriorly in seven. The labial anterolophid may or may not be bordered by a cingularum. The lingual anterolophid is generally open. The short anterolophid is longitudinal and reaches the labial cusp of the anteroconid when the latter structure is double. A labial spur of the anterolophid is present in nine of 33 specimens. The metalophid and hypolophid point slightly forward. The mesolophid is absent in 20, short in 17, and of medium length in three specimens. The posterolophid joins the base of the entoconid, thus closing the posterosinus.

m2: The labial anterolophid is well developed and joins the base of the protocone. Understanding the morphology of the lingual anterolophid depends on wear, so extremely worn
specimens are not included in the following count. This ridge is absent in 13 cases, short in 14, and of medium length in five. The metaophulid and hypophulid point slightly obliquely forward. The mesophulid is absent in 20 specimens, short in 12, and of medium length in three. The posterophulid joins the base of the entoconid, thus closing the posterosinusid.

m3: The labial anterolophid descends to join the base of the protoconid. The lingual anterolophid is absent in eight specimens and short in 14. The metalophulid points obliquely forward. The low entoconid is obliquely connected with the main cusps and short in 14. The metalophulid points obliquely forward. The lingual anterolophid is absent in eight specimens and short in 14. The metalophulid points obliquely forward.

Comments.—The genus Megacricetodon contains a large number of species, which can be divided into three size groups:

(1) A small-sized group that includes M. minor (Lartet, 1851), M. debruijni Freudenthal, 1968, M. pusillus Qiu, 1996, M. sinensis Qiu et al., 1981, M. primitivus (Freudenthal, 1963), and M. collongensis (Mein, 1958). Most of these species share the presence of a deeply bilobed anteroconid of M1 and generally long mesolophs on M1 and M2. More modern representatives demonstrate an anteroconid that is not completely split, such as M. debruijni from the Spanish Vallesian (Daams and Freudenthal 1988).


(3) A large-sized group which includes M. gersii Aguilar, 1980, M. crusatoni (Freudenthal, 1963), M. ibericus (Schaub, 1944), M. gregarius (Schaub, 1925), M. bavaricus Fahlbusch, 1964, M. germanicus Aguilar, 1980, M. fournasi Aguilar, 1995, M. lemartineli Aguilar, 1995, M. rousillonensis Aguilar et al., 1986, M. lappi (Mein, 1958) and M. mythikos Lindsay, 1988. The anteroconid of M1 is clearly bilobed and anteroconid of m1 tend to be bilobed. The size of the Megacricetodon material from Paşalar corresponds to that of the medium-sized group, and consequently we will compare it only with these species.

The Asian species described by Lindsay (1988) from Sivalik have lower crowned teeth than M. andrewsi. The size of the latter species is similar to M. daamsi and slightly smaller than M. aguilari and M. sivalensis. Nevertheless, these measurement differences must be considered tentative, as the measurements published by Lindsay (1988) included a mixture of samples from different stratigraphic levels covering an extensive time period. Morphologically, M. andrewsi differs from M. aguilari by its more lophodont upper molars and the connection of the anterophulid to the lingual cusp of the anteroconid. The anterophulid connects to the labial cusp of the anteroconid in M. aguilari. Megacricetodon sivalensis has a set of characters that differentiates it clearly from M. andrewsi, such as the reduced posterophulid in the upper molars, the presence of a styal self in front of the anteroconid in 50% of the M1s, and the anteroconid of m1 located in a more lingual position than in the Turkish material. M. daamsi has a narrower anteroconid on M1 that is additionally located more buccally than in M. andrewsi. In general, the molars of M. daamsi are more bunodont with shorter connections between main cusps than in M. andrewsi.

Megacricetodon lopezae, from the Spanish locality of Simancas 2 (Álvarez-Sierra and García Moreno 1986), differs from M. andrewsi by the higher frequency of bilobed anterocones and anteroconids in M1 and m1, and the presence of a stylar self in front of the anterocone.

Among the species included in the medium-sized Megacricetodon group, only M. similis and M. rafaeli show close similarities with the Turkish material, especially the slightly bilobed anteroconid, the presence of long posterolophs, and the shape and position of the anterocone. This general pattern, similar in the three species, suggests that M. andrewsi should be included in the M. rafaeli–M. similis group defined by Daams and Freudenthal (1988). The size of M. andrewsi is intermediate between M. rafaeli and M. similis. Morphologically, M. andrewsi shows features that could be considered as intermediate between these two species, such as the progressive increase in bilobed anterocones on m1 (< 5% in M. rafaeli, 20% in M. andrewsi, and > 25% in M. similis).

Gliiridae Thomas, 1897

Peridyromys lavocati sp. nov.

Fig. 2K, Table 3.

Holotype: Left M1 or M2 UAPSL394, Fig. 2K.

Derivation of the name: In honour of Prof. Dr. René Lavocat, Montpellier.

Type locality: Paşalar, Turkey.

Table 3. Length and width of the check teeth of Peridyromys lavocati sp. nov. from Paşalar.

<table>
<thead>
<tr>
<th></th>
<th>Length</th>
<th>Width</th>
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<td>N</td>
<td>min</td>
<td>mean</td>
</tr>
<tr>
<td>P4</td>
<td>8</td>
<td>0.67</td>
</tr>
<tr>
<td>m2</td>
<td>10</td>
<td>0.93</td>
</tr>
<tr>
<td>M3</td>
<td>5</td>
<td>0.78</td>
</tr>
<tr>
<td>P3</td>
<td>8</td>
<td>0.65</td>
</tr>
<tr>
<td>m1</td>
<td>10</td>
<td>1.03</td>
</tr>
<tr>
<td>M2</td>
<td>8</td>
<td>0.88</td>
</tr>
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</table>

Diagnosis.—A Peridyromys species of relatively small size with two-rooted lower molars, a posterior extra ridge in m1 and m2 and two centrolophs in M1 and M2. Peridyromys lavocati differs from P. marinus (Pomel, 1853) from the Lower Miocene of Western Europe by its larger size and more complicated dental pattern. It differs from P. aquatilis (Brujin and Moltzer, 1974) from the Lower Miocene of Spain by its larger size and more simple dental morphology. Peridyromys lavocati differs from P. columnbarii Daams, 1989 from the Upper Oligocene of Spain, from P. turbatus Daams and Visser, de, 1990 (in Álvarez et al., 1990) from the Lower Miocene of Spain, and from P. jaegeri Aguilar, 1974 from the Lower Miocene of France by its less complicated dental pattern. From Myomimus dehmi (Brujin, de, 1966) from the Lower Vallesian of Spain it differs by having two roots in the lower molars in-
stead of three, slightly larger size, and slightly lower number of lophs in M1 and M2.

**Description.**—P4: The anteroloph varies from short to long, and is an isolated ridge. The protofolph and metaloph join at the lingual tooth border in most specimens, although in one case these two ridges form a Y-shaped composite structure. The centrolophe tends to be the posterior one and may be either connected to the metacone or isolated from this cusp. The posteroloph joins the protocone lingually.

M1 and M2: The anteroloph is an isolated ridge, although the furrow between the labial end and the paracone may be shallow and narrow. The trigon is asymmetrical since the protoloph and metaloph join the protocone near the posteroloph lingual corner of the tooth. Most specimens have two centrolophs; the anterior one is the longest in eight specimens, the posterior one is longer in one, and in three cases these ridges meet in the centre of the tooth, thus forming a Y-shaped, composite ridge. In two of 14 specimens the posterior centroloph is lacking. One specimen has an extra ridge between the protoloph and the anterior centroloph.

M3: The tooth has a subtrapezoidal outline. The anteroloph is either connected to or separated from the protocone. Two centrolophs are present, of which the posterior one is the longest in four specimens, and the anterior one is the longest in one case. One specimen has an accessory ridge between the posterior centroloph and the metaloph. The posteroloph joins the metacone.

p4: The p4 is a subtriangular tooth, of which the anterior part consists of a short anterolophid connected to a longitudinal metalophid, thus forming a tilted T-shaped ridge. The posterior part is a U-shaped structure, formed by mesolophid and posterolophid.

m1 and m2: The anterolophid is either isolated from, or connected to, the protoconid. The metalophid does not meet the metaconid. The centrolophid is longer than half of the tooth width, but it never reaches the labial border. The mesolophid and posterolophid join each other at the entoconid. A well-developed extra ridge is present in the posterior valley. Two roots are present.
m3: Basically this tooth has the same dental pattern and number of roots as m1 and m2, but the centrolophids are shorter and the posterior extra ridge is lacking in four out of nine specimens.

Comments.—The dental pattern of P. lavocati corresponds to the general pattern of various dormouse species such as Miodromys biradiculus Mayr, 1979, Myomimus dehmi Bruijn, 1966, and Peridromys marinus (Pomel, 1853). The differences are not great and our species is closest to species in the genus Peridromys. P. lavocati differs from M. biradiculus from MN3/MN4 of south Germany by its somewhat smaller size, and by some M1s and M2s with fused centralops. In Miodromys centralops never fuse in M1 and M2 (Mayr, 1979). Our new species differs from Myomimus dehmi from MN9 of Pedregueras 2C (Spain) by its slightly larger size, and the somewhat more complex lower molars. Moreover, all Myomimus-species have two-rooted lower molars. P. lavocati differs from P. marinus from the Upper Oligocene of St. Victor (France) by its larger size and its less complex dental pattern.

Dryomyinae indet.

Material and measurements.—One m2 (1.15 × 1.10) and one m3.

Comments.—The m2 attributed to cf. Microdyromys koenigswaldi by Flynn and Jacobs (1990) may belong to an undefined Dryomyinae. The d4 designated as Gliridae indet. by Flynn and Jacobs (1990: fig. 2N) as cf. Tamias sp. has a large metaconule and is consequently assigned to Tamias by these authors. However, Spermophilinus assemblages (e.g., S. bredai from the Upper Miocene of Düzyayla, Turkey, our observations; S. besana from the Lower Miocene of Rembach, Germany, see Ziegler and Fahlbusch 1986) have a metaconule of variable size. Therefore, this character cannot be used as distinctive forgeneric separation, and all material recognized by the above mentioned authors as Tamias is assigned by us to Spermophilinus bredai.

Flynn and Jacobs (1990) assigned several large sized specimens to Palaeosciurus, of which two are figured here (Fig. 2L; right m3 and Fig. 2M; right m3 and not m2 such as mentioned by the authors). Typical for Spermophilinus, however, is the size increase from p4 to m3 and therefore the m3 appears to be disproportionately large compared to the preceding elements. Therefore we consider these specimens to form part of the homogeneous S. bredai assemblage.

### Biochronological comments

The age assignment of the Paşalar fauna has been controversial. Sickenberg et al. (1975) considered Paşalar to be slightly older than Sansan (reference fauna for MN6) and Savage and Russell (1983) correlated Paşalar to MN5, partly based on large mammals. Flynn and Jacobs (1990) were not able to date
Paşalar more precisely and correlated it to a range of time during the MN4–MN8 interval. Bernor and Tobien (1990) correlated Paşalar to the late Langhian and early MN6, ca. 15 Ma. However, we prefer to avoid the usage of marine stratigraphic terminology since the correlation of Paşalar to late Langhian is doubtful because of the absence of correlative criteria. Other authors have correlated the Paşalar fauna to MN6 without determining its biochronological position relative to other MN6 European faunas, with the exception of Çandır and Belometchetskaya (Brujin et al. 1992; Bernor et al. 1996; Pickford et al. 2000). On the basis of the new rodent determinations presented here, the Paşalar fauna can be more precisely sequenced within the MN scale.

After our revision, the new rodent faunal list of Paşalar is as follows: The sciurids Spermophilinus bredai (Meyer, 1848) (15%) and Sciruria indet. (0.2%), the dactylid Peridromys lavocati (9%) and Dryomyinae indet. (0.4%), the ctenodactylid Sayimys cf. intermedius (0.2%), the cricetids Cricetodon pasalarensis (Tobien, 1978) (31%), Megacricetodon andrewsi (30%), and Democricetodon brevis Fahlschuch, 1964 (6.5%), the spalacid Pliosupalax marmarensis Ünay, 1990 (7.4%), and the castorid cf. Chalicomys jaegeri (0.2%). The percentages shown after each taxon represent the proportion of lower and upper M1s and M2s for each species in respect to the total number of rodents M1s and M2s.

The various hamster taxa serve well to correlate the Paşalar fauna to the MN scale (Brujin et al. 1992). Democricetodon brevis is a European taxon, for which the oldest record until now was MN 7/8 (Bolliger 1992), and consequently indicates that Paşalar could not be older than MN7/8. However, the material from Paşalar may represent a slightly more primitive evolutionary stage than the assemblages of the same species from the MN7/8 faunas of Grat 930m, Anwil (Bolliger 1992), La Grive (Freudenthal 1963), and Giggenhausen (Fahlschuch 1964), therefore Paşalar likely correlates with either the late MN6 or early MN7/8 intervals. Megacricetodon andrewsi, as discussed above, is morphologically close to the M. rafaeli–M. similis group as defined by Daams and Freudenthal (1988). It is more similar to M. similis from MN7/8 localities than to M. rafaeli from the early MN6 of Spain, and therefore we suggest that the correlation of Paşalar should be with late MN 6 localities. According to the correlation of the Aragonian with the late MN6, therefore there may be an age gap between Paşalar and the MN6, which is similar to that of Spermophilus and S. giganteus from Düzyayla (MN11; see Brijou 1995) is of the same size as these MN6 assemblages.

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Some biochronological information can also be obtained from the sciuroids. In Western and Central Europe there appears to be a trend from small to large size in the lineage of Spermophilus besana Cuenca Bescós, 1988 to S. giganteus Brijou et al., 1970 (Brijou 1995). The size of Spermophilinus bredai from Paşalar is similar to that of Spermophilus from MN6 assemblages from West and Central Europe (Brijou 1995). Nevertheless, in Turkey this size trend may not be present since S. bredai from Düzyayla (MN11; see Brijou 1995) is of the same size as these MN6 assemblages. The record in Paşalar of a sciurid M with morphology and size close to Atlantoxerus could confirm the correlation of this locality to MN6, since this genus has been recorded only in Turkish localities not older than MN7/8 (Brijou and Mein 1996). In conclusion, and based exclusively on the rodent assemblage, we propose a correlation of the Paşalar fauna to late MN6.

References
