



Araştırma makalesi

**Investigation of Fur Morphology Characteristics of The Genus *Mus*
Linnaeus 1758 (Mammalia: Rodentia)^a**

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ABSTRACT

In studies with rodents, it is very important to define the fur characteristics, since the first striking feature is their fur as an external morphological character. A total of 562 *Mus* specimens from 40 localities in western Türkiye were evaluated by investigating their fur morphology. It was observed that the dorsal part of the fur varies from dark brown to dark gray, while the ventral part varies from light brown to dark gray in the examined *Mus domesticus* specimens. It was determined that the junctions of the dorsal and ventral parts of the fur are not separated by a clear line. The tail was monochromatic and the ears were covered with dorsal colored hairs. In the examined *Mus macedonicus* specimens, the dorsal fur color ranged from gray to brown tones. The ventral fur color varies from white to light gray and yellowish tones, and the dorsal and ventral fur color is clearly separated from each other. When viewed from the dorsal direction, the tail was dark brown, when viewed from the ventral direction, it was lighter in color according to dorsal fur and it was observed that the ears were covered with hairs.

Anahtar Kelimeler: House mouse, Macedonian mouse, pelage features, Türkiye

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Mus Linnaeus 1758 Cinsinin (Mammalia: Rodentia) Kürk Morfolojisi Özelliklerinin İncelenmesi

ÖZ

Kemirgenlerle yapılan çalışmalarda, göze çarpan ilk özellikleri dış morfolojik karakterleri yani kürkleri olduğundan kürk özelliklerinin tanımlanması oldukça önemlidir. Türkiye'nin batısında 40 lokaliteden toplam 562 *Mus* cinsi örneği kürk morfolojilerine bakılarak değerlendirilmiştir. İncelenen *Mus domesticus* örneklerinde postun dorsal kısmının koyu kahverengiden koyu griye kadar değiştiği, ventral kısmının ise açık kahverengiden koyu griye kadar değiştiği gözlenmiştir. Kürkün dorsal ve ventral kısmının birleşim yerlerinin belirgin bir hatla ayrılmadığı tespit edilmiştir. Kuyruğun tek renkli, kulakların ise sırt rengindeki kıllarla kaplı olduğu belirlenmiştir. İncelenen *Mus macedonicus* örneklerinde ise dorsal kürk renginin griden kahverengi tonlarına kadar çeşitlilik gösterdiği belirlenmiştir. Ventral kürk renginin beyazdan açık griye ve sarımsı tonlara kadar değişmekte olduğu, dorsal ve ventral kürk renginin ise birbirinden belirgin biçimde ayrıldığı tespit edilmiştir. Kuyruğa dorsalden bakıldığında koyu kahverengi, ventralden bakıldığında ise daha açık renkli olduğu görülmüş ve kulakların kıllarla örtülü olduğu gözlenmiştir.

Keywords: Ev faresi, sarı ev faresi, post özellikleri, Türkiye

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Introduction

Rodents are among the most widespread mammalian orders in the world and can live in almost any habitat. Many rodent species suffer from habitat loss, habitat fragmentation, improper agricultural practices and anthropogenic effect. Knowing the distinction of rodent species is of great importance both in protecting populations of endangered species and in combating agricultural pests.

Species of the genus *Mus* have spread to continents and islands except Antarctica with their close relationship with humans (Ellerman and Morrison-Scott 1951; Macholan 1996; Marshall 1998; Balčiauskienė et al. 2015; Li et al. 2021). There are four subgenus of the genus *Mus*, and species of the subgenus *Mus* are widespread in Türkiye. One of the most characteristic features of one of these species, *Mus domesticus* Linnaeus 1758 (house mouse), is its relationship with humans. The worldwide colonization of this species is due to passive transport by humans and is the result of ecological dependence on them (Boursot et al. 1993). The other species is *Mus macedonicus* Petrov and Ruzic 1983 (Macedonian mouse), which lives away from human habitation areas.

Numerous morphological studies have been carried out in the differentiation of *Mus* species (e.g. Cserkészi et al. 2008; Hamid et al. 2017; Csanady and Mosansky 2018; Kishimoto et al. 2021; Yavuz 2022). Apart from these, Schwarz and Schwarz (1943) took into account the external morphology and distribution records of the subgenus *Mus*. Orsini et al. (1983), on the other hand, stated that the species belonging to the *Mus* subgenus share a significant part of the variations in taxonomic characters of intraspecies, since they have common morphological characters. In other words, classical external morphological characters such as fur color, head-body length, tail length, ear length or foot length remain weak in species differentiation. However, in some cases, when two species are found sympatric, some characters, such as tail length, can be distinctive. For example, the tail length criterion is useful for the diagnosis of *Mus musculus domesticus*, one of the longest-tailed mice of all sympatric species (Auffray and Britton-Davidian 2012).

When we look at the coloration of the fur morphology, this feature shows diversity in both *Mus* species. Therefore, it may be difficult at first glance to distinguish between these two species. However, in studies with rodents, it is very important to define the fur characteristics, since the first striking features are their external morphological characters, i.e. their fur. In this context, in this study, it is aimed to examine the fur morphologies of the genus *Mus* species distributing in Türkiye and to contribute to the literature.

Material and Methods

In this study, museum specimens in Ankara University Mammal Research Collection were examined. A total of 562 the genus *Mus* samples from 40 localities in the west of Türkiye were evaluated by looking at fur morphologies (Figure 1).

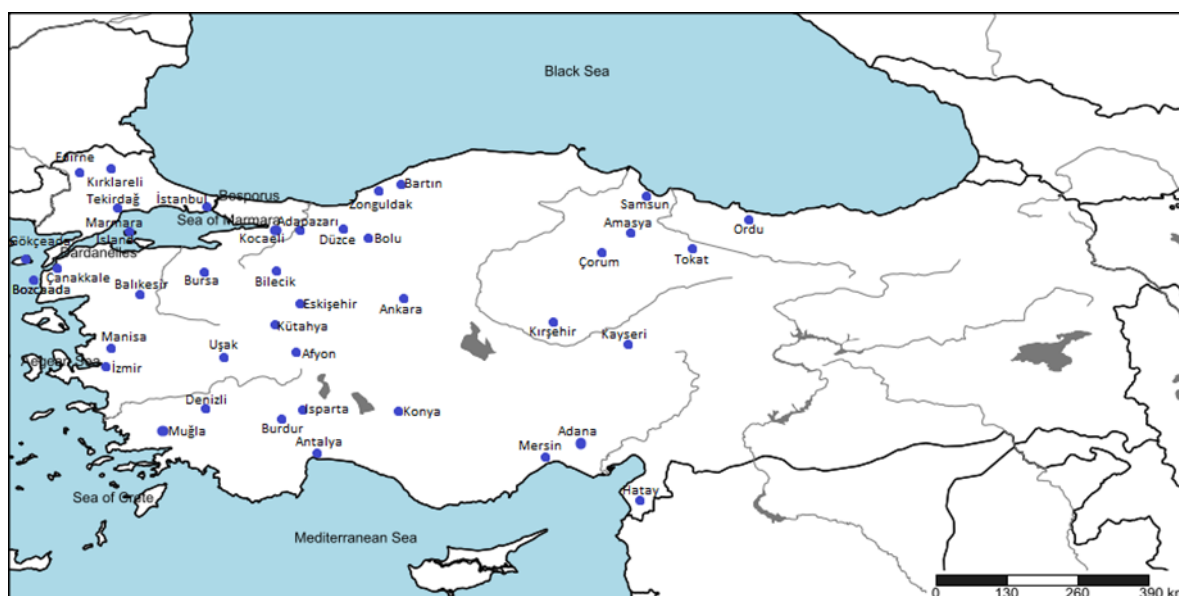


Figure 1. Locations of the samples

The identification of the species was made by first looking at the external morphological features, that is, the H+B/T index (the ratio of head-body length to the length of the tail) and

then calculating the zygomatic index (the ratio of the width of the malar ridge to the width of the antero-lateral part of the zygomatic arch).

Results and Discussion

In the diagnosis made according to the H+B/T index values and zygomatic index values, 154 *Mus domesticus* specimens and 408 *Mus macedonicus* specimens were evaluated (Yavuz 2022). In the 154 *Mus domesticus* specimens examined, the dorsal fur ranged from dark brown to dark gray, while the ventral fur ranged from light brown to dark gray. It was determined that the junctions of the dorsal and ventral parts of the fur are not separated by a clear line. The tail was covered with mono-colored hairs and the ears were covered with back-colored hairs (Figure 2).



Figure 2. Dorsal and ventral fur characteristics of *Mus domesticus*

In 408 specimens of *Mus macedonicus*, it was determined that the dorsal fur color ranged from gray to brown tones. The ventral fur color varies from white to light gray and yellowish tones, and the dorsal and ventral fur color is clearly separated from each other. When viewed from the dorsal, the tail was dark brown, and when viewed from the ventral, it was light colored. Ears were observed to be covered with hairs (Figure 3).



Figure 3. Dorsal and ventral fur characteristics of *Mus macedonicus*

Krystufek and Vohralik (2009) stated that the body shape of *Mus domesticus* is thin, long and does not have distinctive features. They noted that the tail hairs were sparse. According to the same researchers, the soles of the feet are hairless. They stated that the fur has soft and dark colors and the ventral-dorsal junctions are not prominent. Özkurt and Bulut (2020) stated that the dorsal fur color varies between black and brown, the coloration on the sides of the body is lighter and the dorsal-ventral distinction is not clear. It is stated that the abdomen is in gray tones. According to Özkurt and Bulut (2020), the ears are covered with sparse and brown hairs. The soles of the feet are hairless and brown, while the upper parts of the feet are covered with dark hairs. The upper part of the tail is dark, the lower part is light brown. All these fur morphology features stated in the studies of Krystufek and Vohralik (2009) and Özkurt and Bulut (2020) are in harmony with the *M. domesticus* specimens examined in this study.

The tail length being shorter than the head and body length is a characteristic feature for *Mus macedonicus*. Fur coloration is variable, but generally the dorsal fur color is brown, the junction of the dorsal and ventral furs are lighter, and the ventral fur color is whitish, creamy or gray tones. The fur on the feet is cream-colored, and the ears are grayish-brown. The tail is bicolored, the dorsal side is grayish and the ventral side is light gray (Krystufek and Vohralik 2009). Özkurt and Bulut (2020), on the other hand, stated that the dorsal fur color is in brown and

yellowish tones and the fur color is lighter towards the ventral part. Dorsal-ventral distinction is evident, and ventral fur color can be white, cream-colored or yellowish-white. They stated that the ears were covered with white sparse hairs and the feet were covered with white hairs. According to these researchers, the tail is covered with dark brown hairs dorsally and light brown hairs ventrally. The fur characters of *M. macedonicus* specimens examined in this study were found to be similar to those stated by Krystufek and Vohralik (2009) and Özkurt and Bulut (2020).

Conclusion

In this study, the fur characteristics of *Mus domesticus* and *Mus macedonicus* species, which are adaptive species that can live in almost any environment, were investigated. As a result, it has been seen that fur morphology provides important results in the diagnosis of *Mus* genus species, even without measurement-based data such as H+B/T index and zygomatic index.

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Conflict of Interest

No known or potential conflicts of interest exist for any author.

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