

## Expansion and distribution of the Egyptian mongoose (*Herpestes ichneumon*) in the Iberian Peninsula

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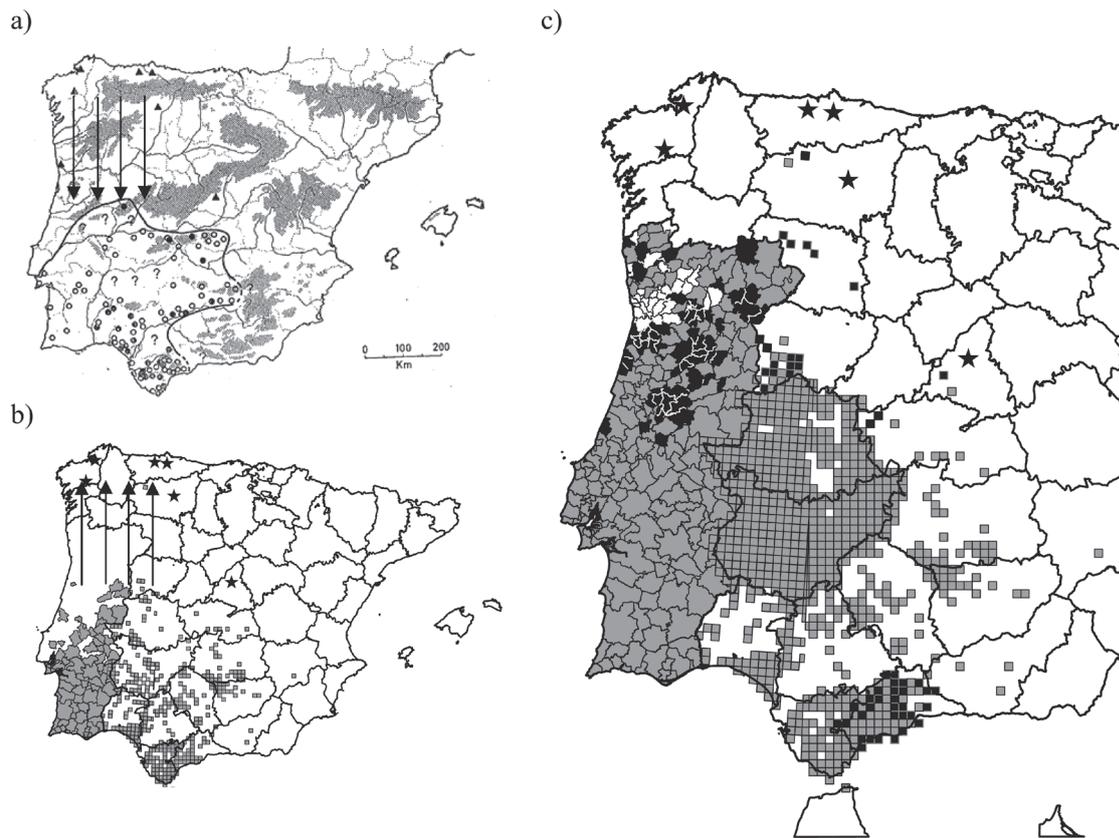
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The Egyptian mongoose *Herpestes ichneumon* (Linnaeus, 1758) has been considered for over a century a species introduced by man in the Iberian Peninsula (Calderón 1882, Delibes 1982, Dobson 1998, Riquelme-Cantal *et al.*, 2008, Barros 2009). The absence of fossils and the wide distribution of the species in Africa seemed to support this. However, new molecular techniques have managed to clarify the biogeographic scenario for the origin of Iberian populations of mongooses (Gaubert *et al.* 2011). Gaubert and colleagues have studied the mitochondrial DNA of different populations of mongooses in North Africa, the Middle East, sub-Saharan Africa and the Iberian Peninsula. The results show the existence of a clear genetic structure, where the Iberian populations of mongooses have their own identity: high genetic variability and differentiation of the North African populations (their populations genetically closer). The different genetic parameters studied suggest some stability in the Iberian population. It is assumed that populations of North Africa colonised the Iberian Peninsula in the Pleistocene, by the way of communication corridors that were open between the two continents in the Strait of Gibraltar, as a result of fluctuations in sea levels between the glacial and interglacial periods. After the last Ice Age, the Iberian mongoose remained isolated from North African populations, and has evolved independently since then (Gaubert *et al.* 2011). These results support the originality of Iberian populations of mongoose as postulated by Cabrera in the early twentieth century (Cabrera 1914).

In this new scenario, the knowledge of the current distribution of the species in the Iberian Peninsula

and the reconstruction of historical changes that occurred in this distribution are particularly relevant. In recent decades, the expansion of the mongoose in Portugal has clearly been shown, where the species has progressively colonised the country from south to north (Barros 2009, Barros & Fonseca 2011). In addition, in Spain, the mongoose has been gradually expanding its range, recently reaching the central plateau in the northern provinces of Salamanca and Zamora (Ramos *et al.* 2009, Talegón & Parody 2009) (Figure 1). In the context of this expansion, the citation of a specimen captured in Sil Valley (León) in November 1982 is of particular interest. The specimen was an adult male caught in Primout (Paramo del Sil), where there had been no evidence of the species since 1869 (Palacios *et al.* 1992). More recently, in May 2007 an adult female was found on the road that runs between Villaseca de Laciana and Villablino (municipality of Villablino), also in Sil Valley, whose body was picked up by the staff of Environmental Council (Junta de Castilla y León date unpublished). The current distribution of the mongoose in Portugal includes several districts north of the Douro River and may be continuous throughout this country (Barros 2009, Barros & Fonseca 2011). This may further explain the appearance of the two records from León, and significantly expands the distribution range contained in the Atlas of Spanish Mammals (Palomares 2007, see Figure 1).

At the beginning of the twentieth century, Cabrera (1914) stated that the mongoose inhabited most of the Iberian Peninsula, but its range was gradually reduced to Andalucía, the province of Badajoz and southern Portugal. Similarly, Delibes (1982) in a



**Figure 1.** Distribution of the Egyptian mongoose in the Iberian Peninsula. A) Distribution in the mid-twentieth century by Delibes (1982). The triangles indicate the locations before 1910 and the arrows signal the contraction range of the species against the distribution in the nineteenth century. B) Distribution in the Iberian Peninsula in the late twentieth century and northward expansion (arrows). Portugal, districts with Egyptian mongoose presence before 1990 (Barros 2009), and Spain, UTM 10x10 km (Palomares 2002). C) Current distribution of the Egyptian mongoose in the Iberian Peninsula. Portugal (Barros 2009), between 1990 and 2000 (grey), and between 2000 and 2009 (black). In Spain, in grey: Palomares 2007 and in black: SECEM database (updated March 2012), Ramos *et al.* (2009) for Salamanca, Talegón & Parody (2009) for Zamora, I. Carbonell for 29TPF82, Junta de Castilla y León for 29TKH25, and Research Group “Vertebrate Biology and Conservation” of Complutense University of Madrid for 30TUK23, 30SUK12 and 29TPF91. In b and c the stars indicate the locations before 1910 (Delibes 1982).

review of all references and specimens collected in various zoological collections, stated that in the late nineteenth century the species was still present in vast areas of the north-western Peninsula, existing in both Galicia and Asturias (Delibes 1982, see Figure 1). Borralho and colleagues (1996) raised the possibility that the distribution of mongoose could have suffered a series of expansions and regressions throughout history, and that current data could be showing the recolonisation of areas that were historically occupied by the species.

The changes in land use, the human abandonment of rural areas and the densification of the bush, have all been exploited by the mongoose which has a large trophic and ecological versatility, have been suggested as determinants of the current species’

expansion (Barros 2009, Talegón & Parody 2009, Recio & Virgós 2010, Palomares 2012). In addition, the expansion could be as a result of the gradual recovery of rabbits in recent years (Recio & Virgós 2010), as this prey includes a large proportion of the biomass ingested by mongooses (Santos *et al.* 2007, see Palomares 2012).

Finally, the accumulation of historical records in the north-western Peninsula, and more recently in 1982 and 2007, in the Sil Valley, cannot completely rule out the fact that the current expansion of the species could be intervening in the rescue of a population that hypothetically might have remained isolated during the last century, as previously suggested by Palacios *et al.* (1992). The greater abundance of the mongoose in the southern

regions of the Peninsula (Palomares 2007) could indicate that small populations in the northern areas had passed by almost unnoticed. At this point, new phylogeographic studies being carried out will bring new light on the stage of distribution of the Iberian mongoose.

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