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FIRST RECORDS OF MOORISH GECKO *TARENTOLA MAURITANICA* AND TURKISH GECKO *HEMIDACTYLUS TURCICUS* (SQUAMATA, GEKKONIDAE) IN THE SOUTHERN METALLIFEROUS HILLS, TUSCANY, ITALY

Abstract - Moorish gecko *Tarentola mauritanica* and Turkish gecko *Hemydactilus turcicus* are among the most widely distributed lizards of the Mediterranean basin. However, records for these species at altitudes above 400 m a.s.l. are few. In this paper, we document the presence of these species in a hilly area in the northernmost part of the Province of Grosseto (Tuscany, Central Italy). In particular, Moorish geckoes were found up to 609 m a.s.l. since early 2000s. First individuals were possibly introduced with transport of building materials: the average increase in winter temperature of the past recent years might have helped the establishment of breeding populations.

Key words - *Tarentola mauritanica*, *Hemydactilus turcicus*, 609 m a.s.l., Province of Grosseto, winter temperature increase.

Riassunto - *Prime osservazioni di geco comune* Tarentola mauritanica *e di geco verrucoso* Hemydactilus turcicus *(Squamata, Gekkonidae) nelle colline metallifere meridionali, Toscana, Italia* - Il geco comune e il geco verrucoso sono tra i Sauri più diffusi del bacino del Mediterraneo. Tuttavia, le segnalazioni sopra i 400 m sul livello del mare sono scarse per entrambe queste specie. In questo lavoro, si documenta per la prima volta la presenza di queste specie in un'area collinare della porzione più settentrionale della Provincia di Grosseto (Toscana, Italia centrale). In particolare, esemplari di geco comune sono stati osservati fino a 609 m slm, a partire dagli anni 2000. I primi individui potrebbero essere stati importati attraverso il trasporto di materiale edile (mattoni forati): l'aumento delle temperature medie invernali avrebbe dunque potuto favorire il loro insediamento e la loro riproduzione.

Key words - Geco comune, geco verrucoso, 600 m slm, Provincia di Grosseto, aumento delle temperature invernali.

INTRODUCTION

The Moorish gecko *Tarentola mauritanica* (Linnaeus, 1758. Hereafter: TM) is a common Saurian species native of the Mediterranean from Portugal to Israel, Sinai, and Maghreb. The species was also introduced in North America and in some oceanic islands (*e.g.*, Báez and Biscoito, 1993; Bologna *et al.*, 2007; Barreiros *et al.*, 2010). In Italy, TM is present and commonly observed along all the coastal areas, as well as in some inland areas (Abruzzi, Emilia Romagna, Lombardy, Veneto, Trentino Alto Adige and Piedmont: Guarino and Picariello, 2006; Corti *et al.*, 2011), often as a result of man-driven introductions (Bologna *et al.*, 2007). The species is typical of natural ravines and man-made environments such as urban areas, dry stone walls, houses and woodpiles. It is active during both day and night, with a higher nocturnal peak. In sub-montane areas, TM is established especially in the presence of evergreen woodland and mixed deciduous forests, with dominance of *Quercus* sp.. Even if TM has been recorded up to 2300 m a.s.l. in Spain (Vogrin *et al.*, 2009) and to 2100 m a.s.l. in Morocco (Bons and Geniez, 1996), 84% of reports in Italy are under 400 m a.s.l., 15% between 400 and 800 m a.s.l., and just 1% above 800 m a.s.l. (Guarino and Picariello, 2006). In Tuscany, it is well-distributed along the coastline, more localized and perhaps introduced in the inland (Vanni and Nistri, 2006; Aprea *et al.*, 2011). The Turkish gecko *Hemydactilus turcicus* (Linnaeus, 1758. Hereafter: HT) shows a similar distribution as TM for Europe, North Africa and the Middle East, where its range is expanding (*e.g.*, Yildiz *et al.*, 2007; Sindaco and Jeremčenko, 2008). It is also present in Somalia and in Asia, from Saudi Arabia to Pakistan. It has been introduced in the whole American continent (Bologna *et al.*, 2007). Some authors consider the populations from South-Eastern Asia and Somalia as belonging to a different species, *H. robustus*, according to genetic evidence (Carranza and Arnold, 2006; Sindaco and Jeremčenko, 2008). In Italy, HT presents a more strictly coastal distribution than TM, even if it passively reached some inland areas (Lombardy, Friuli, Abruzzi inland: Vanni and Nistri, 2006; Sacchi and Delaguerre, 2011) and sometimes it established (Sacchi and Delaguerre, 2011). HT is typically linked to basal low altitudes, just only 3.4% of Italian records being located above 500 m a.s.l. (Venchi, 2006). The maximum altitude at which it was found in Tuscany was 600 m a.s.l. (Montecristo island: Vanni and Nistri, 2006). The presence of HT in the regional hinterland is quite localized and sporadic (Vanni and Nistri, 2006; Piazzini *et al.*, 2010): it is recorded in the surrounding of Siena (Piazzini *et al.*, 2010), where it is supposed to have expanded recently, and in Valdarno (Vanni and Nistri, 2006). Authors agree its presence in both these areas is due to accidental introduction (Piazzini *et al.*, 2010). The species is highly synanthropic, and more markedly nocturnal than TM (Vogrin and Miklic, 2005; Bologna *et al.*, 2007). TM's habitat of

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preference is represented by ruins, stone walls, houses and abandoned buildings. Despite its high synanthropy, HT's nocturnal habits make its presence more difficult to detect with respect to TM. However, geckoes are recorded even in more natural areas, away from artificial lightings.

Material and methods

Our survey involved the villages of Massa Marittima and Prata (altitudinal range: 175-916 m a.s.l.). The two villages are set in the southern Tuscan area known as Colline Metallifere (Metalliferous Hills) and are about 16 km distant from the sea. We collected the first data about the presence of TM and HT in this area.

Results and Discussion

Tab. 1 and Fig. 1 provide a synoptic overview of the collected observations.
One single adult HT was sighted on 9th July 2011 climbing on the Medieval walls of Massa Marittima. TM seems to be more widespread. TM is present in Massa Marittima since before 2004. Many records of

Tab. 1 - Observation years, locations and altitudes in the study area.

Species	Year	Location	Cohordinates N	Cohordinates E	Altitude
HT	2011	Massa Marittima	43.051714	10.887606	358 m asl
TM	Before 2004	Massa Marittima	43.049858	10.887767	360 m asl
TM	Before 2004	Massa Marittima	43.049364	10.894100	406 m asl
TM	Before 2004	Massa Marittima	43.050831	10.889681	387 m asl
TM	Before 2004	Massa Marittima	43.035219	10.895258	405 m asl
TM	Before 2004	Ghirlanda	43.059206	10.901000	276 m asl
TM	Before 2004	Schiantapetto	43.033503	10.883117	175 m asl
TM	2009	Prata	43.085500	10.983475	574 m asl
TM	2010	Prata	43.082561	10.985458	595 m asl
TM	2011	Prata	43.083039	10.986503	599 m asl
TM	2011	Prata	43.085811	10.986100	609 m asl

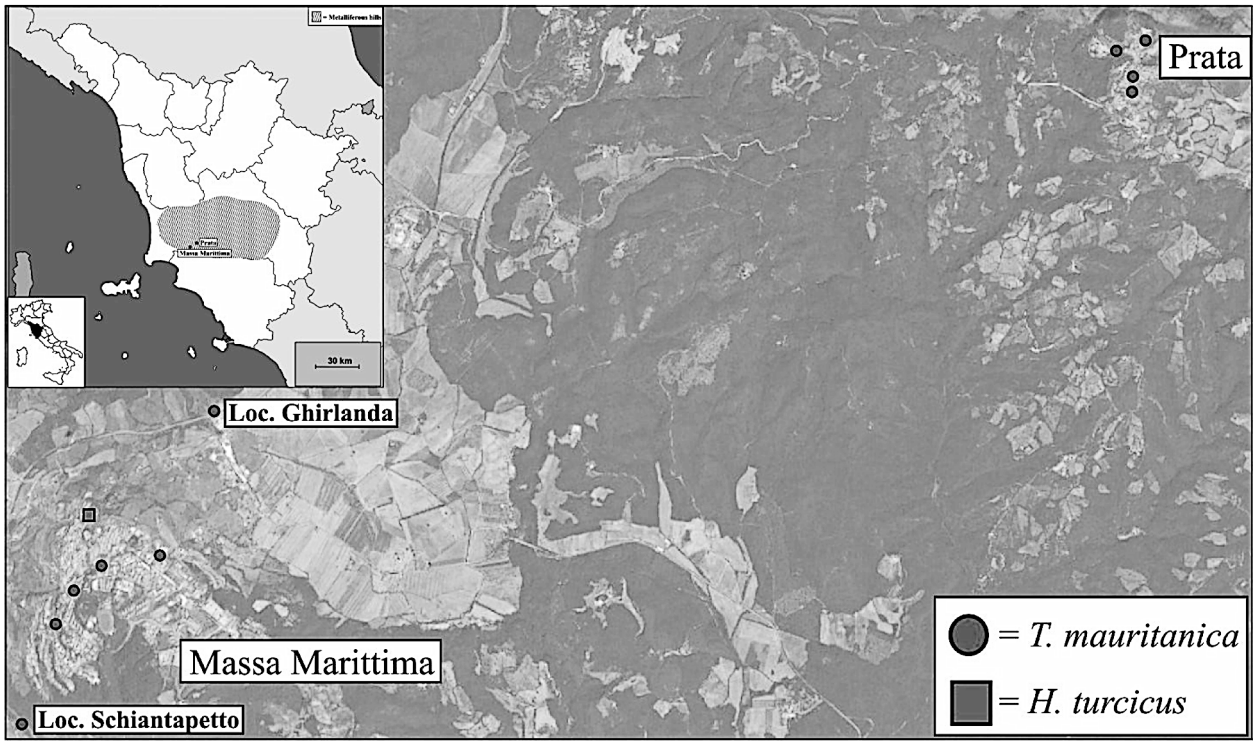

Fig. 1 - Occurrence points of Moorish and Turkish gecko in Massa Marittima and Prata.

this species of all age classes were collected between 2004 and 2011 and include young and adult specimens, both inside Massa Marittima and in its less elevated surroundings (localities of Ghirlanda and Schiantapetto). Some adult TM were detected inside the village of Prata for the first time in 2009 and, again, in 2010 and 2011 (up to 609 m a.s.l.). In 2011, the first reproduction event has been documented (two young individual in August).
TM is supposed to have reached this area through human-mediated introduction, possibly by transporting building material. On the other side, the presence of geckoes in the surrounding countryside cannot be excluded, resulting from a natural range expansion from lower areas. No complete data are available about range-expansion rates and dispersal abilities of geckoes; they could have remained undetected just because living in poorly lit and not sampled places, until they naturally colonized built-up areas where artificial lightings increased their detectability.
Average winter temperature in Massa Marittima was every year above 5°C: in Prata, instead, it was always 1-2°C lower, at least until 2006. So, the altitudinal range expansion up to 609 m a.s.l. of TM (Prata) could be related to a temperature increase after 2007, with particular reference to winter months (Meteorological station: Campiano. www.idropisa.it. Downloaded on August 2011: Fig. 2).

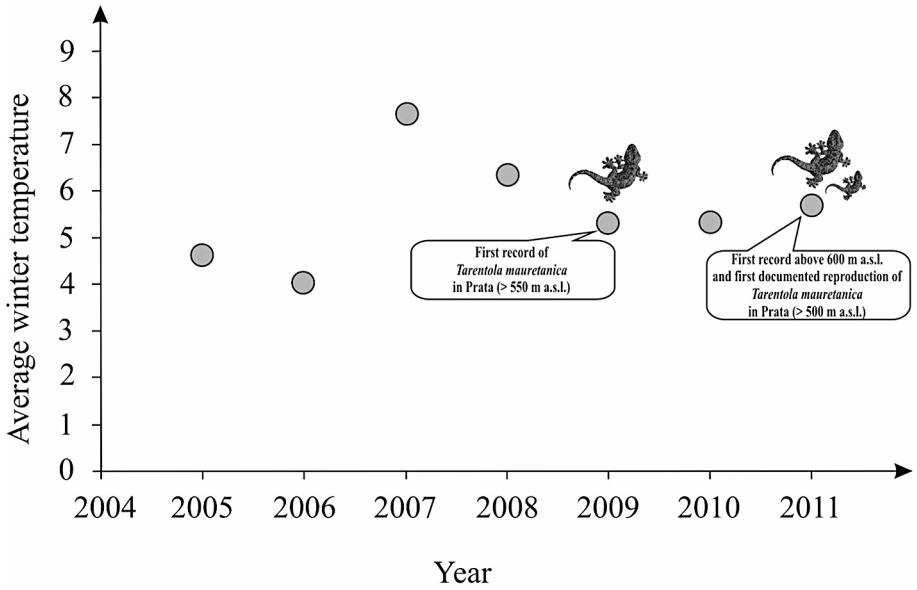

Fig. 2 - Winter temperature increase in the last 8 winters around Prata (Grosseto, Italy).

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