

## **Tarentola and other gekkonid records from Djebel Ouarkiz (SW Morocco)**

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**Abstract.** *Tarentola mauritanica pallida* was recorded for the first time far inland in the Djebel Ouarkiz and Oued Drâa area, in south-western Morocco. The taxonomic characters proposed to identify this subspecies, *T. m. juliae*, and *T. boehmei* are discussed in view of the specimens observed during this survey. Other observations of gekkonid lizards in this area are also reported.

**Keywords.** *Tarentola mauritanica pallida*, taxonomy, Morocco.

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### INTRODUCTION

South-western Morocco harbours a wide diversity of gekkonid lizards including *Tarentola mauritanica* (*T. m. pallida* and *T. m. juliae*), *T. boehmei*, *T. annularis annularis*, *T. ephippiata hoggarensis*, *T. chazaliae*, *Ptyodactylus oudrii*, *Quedenfeldtia moerens*, *Stenodactylus petrii*, *S. sthenodactylus sthenodactylus*, *Saurodactylus brosetti*, and *Tropiocolotes algericus* (Bons and Geniez, 1996; Geniez et al., 2004; Sindaco and Jeremčenko, 2008). Within this region, Djebel Ouarkiz and Drâa valley are two large geographic areas relevant for the biogeography of some reptile species. Djebel Ouarkiz is a mountainous region northern to Drâa valley roughly oriented from WSW to ENE with great daily thermal fluctuations, scarce precipitations, and low vegetation cover (Monod, 1958; El Gharbaoui, 1987). There, reptiles with both Macaronesian and Mediterranean affinities are

present. Even being a low altitude mountain chain (770 m a.s.l.) it constitutes a sizeable barrier to exchanges between northern and southern species (i.e., genus *Uromastix*, *Acanthodactylus*, and *Sphenops*; Mateo et al., 1998; Fonseca et al., 2009). Drâa basin is a dry region occupied by hamada desert with *Acacia tortilis raddiana* and *Argania spinosa* trees and *Fagonia sp.* and *Nitraria sp.* scrubs in the basin (Guinea, 1948; Ozenda, 1991; personal observation).

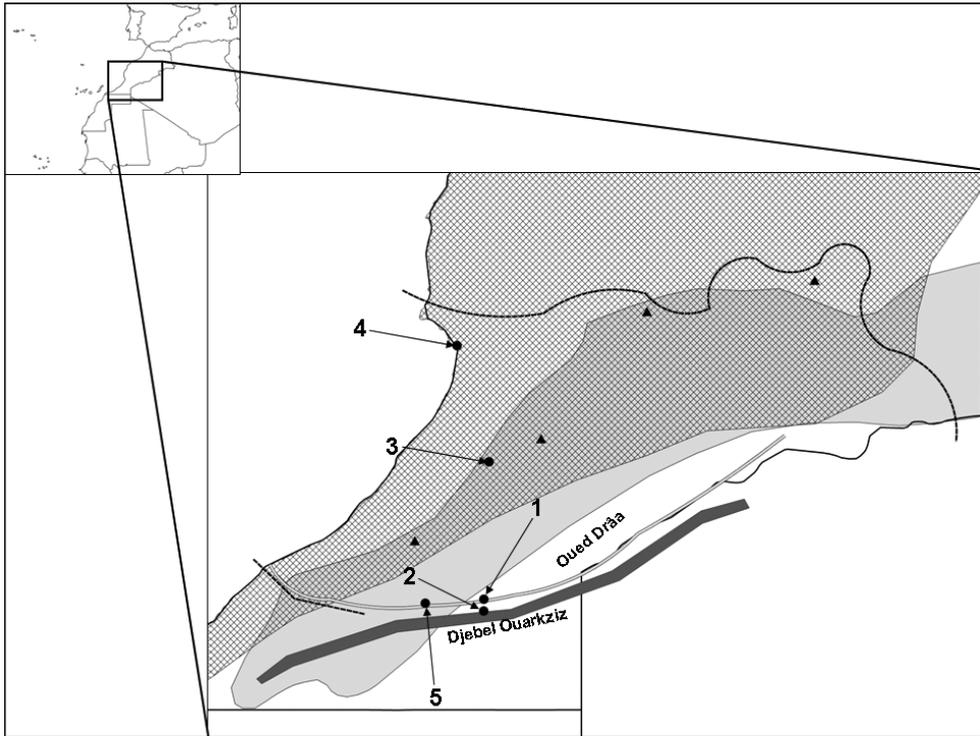
A four days survey in the Djebel Ouarkziz and Drâa valley area in the triangle between the cities of Assa, Zag, and the Aouinet Torkoz oasis was conducted from 20 to 23 May 2008 and the collected records of gekkonid lizards are here shown. All the specimens were identified through 5<sup>th</sup> toe lamellae number and characteristics of dorsal tubercles (Schleich et al., 1996; Geniez et al., 2004; Table 1). A *T. boehmei* sample was confirmed genetically using the 12s rRNA fragment following the same primers, methodology and conditions detailed in Harris et al. (2004a).

A gravid female (specimen #1) and a juvenile which corresponded morphologically to *T. m. pallida* were found in a ruined adobe house in the crossing of Drâa river basin and Assa-Zag road (locality 1; 28°31'N, 9°24'W, 214 m a.s.l.). An adult male was also found in Djebel Ouarkziz southern slope near the Assa-Zag road (specimen #2; locality 2; 28°25'N, 9°25'W, 340 m a.s.l.). Additionally, new localities for this species were found in other regions. A gravid female of *T. m. juliae* was found at Kerdous pass, along the road from Tiznit to Tafraoute (specimen #3; locality 3; 29°33'N, 9°22'W; 1092 m a.s.l.) and one juvenile (specimen #4) and one gravid female (specimen #5) of the same subspecies were found in Agadir (locality 4; 30°25'N, 9°37'W; 5 m a.s.l.). *T. boehmei* was only found in Aouinet Torkoz oasis (specimens #6 and #7; locality 5; 28°28'N, 9°51'W; 285 m a.s.l.; genbank accession number GU593722). In addition to *Tarentola*, other geckos found in this area during field work were *Tropicolotes algericus* (28°16'N, 9°20'W, 300 m a.s.l.) and *S. s. sthenodactylus* (28°35'N, 9°25'W, 299 m a.s.l.; 28°28'N, 9°24'W, 223 m a.s.l.; 28°18'N, 9°21'W; 283 m a.s.l.; both sides of Djebel Ouarkziz).

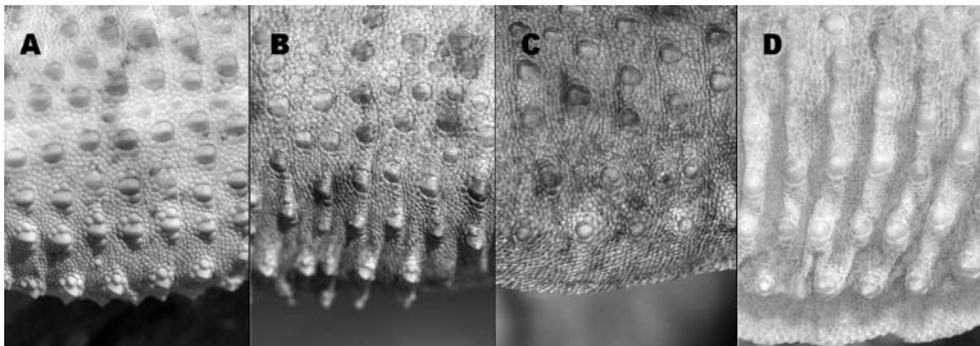
Geniez et al. (2000) indicated that *T. m. pallida* has not been yet reported in this area but it was expected to occur there. Records from Drâa river basin and Djebel Ouarkziz confirm this comment, and significantly increase the distribution of this subspecies to the east (Fig. 1). It is possible that the dry basin of the oued Drâa allow *T. m. pallida* to

**Table 1.** Taxonomic characters of the observed specimens of genus *Tarentola*. The localities of the specimens (see text) are shown in Fig. 1. Numbers in 'Origin' column refers to localities in text and Figure 1.

Origin	ssp.	5 <sup>th</sup> toe lamellae	Dorsal tubercles	Colour
#1 Oued Drâa (1)	<i>T. m. pallida</i>	17	Keeled without secondary rosette	Opaque dark grey
#2 Djebel Ouarkziz (2)	<i>T. m. pallida</i>	17	Keeled without secondary rosette	Opaque dark grey
#3 Anti-Atlas (3)	<i>T. m. juliae</i>	17	Keeled with (small) secondary rosette	Opaque brownish grey
#4 Agadir (4)	<i>T. m. juliae</i>	16	Keeled with secondary rosette	Opaque beige
#5 Agadir (4)	<i>T. m. juliae</i>	17	Keeled with secondary rosette	Opaque beige
#6 Aouinet Torkoz (5)	<i>T. boehmei</i>	16	Keeled without secondary rosette	Traslucent rosy
#7 Aouinet Torkoz (5)	<i>T. boehmei</i>	16	Keeled without secondary rosette	Traslucent rosy



**Fig. 1.** Distribution of *Tarentola mauritanica* ssp. (squared grey) and *T. boehmei* (uniform grey) in Morocco. Distribution maps were extracted from IUCN (2009). Numbers correspond to the sampling localities indicated in the text. ( ) indicate proposed sympatric localities for both species. Discontinuous lines show the limits among the proposed subspecies of *T. mauritanica* (*mauritanica* in the north, *juliae* in the middle and *pallida* in the south; Joger, 1984; Geniez et al., 1999, 2004).



**Fig. 2.** Characteristics of dorsal tubercles of A) *T. m. juliae* from Agadir (specimen #5), B) *T. m. juliae* from Anti-Atlas (specimen #3), C) *T. m. pallida* from Djebel Ouarkiz (specimen #2), and D) *T. boehmei* from Aouinet Torkoz (specimen #7).

expand inland in this northern range of its distribution (in this case more than 100 km), as previously proposed for *Stenodactylus petrii* (Herrmann and Herrmann, 2003).

In south-western Morocco, *T. mauritanica* ranges the Atlantic coast, while inland populations are scarce because it is substituted by *T. boehmei* (Bons and Geniez, 1996). Thus, both species (specifically the subspecies *T. m. juliae*) were proposed to be vicariant, although they may be sympatric in some places as Aoulouz, Tafraoute, Ouarzazate and Aït Bekkou (Joger, 1984; Bons and Geniez, 1996; Geniez et al., 1999). However, during this survey *T. boehmei* was only found in Aouinet Torkoz oasis, and thus, no strict sympatry was detected.

Both *T. boehmei* specimens found had 16 lamellae under 5<sup>th</sup> toe. Thus, the proposed characters of a higher number of lamellae in *T. boehmei* (more than 19 scales following Geniez et al., 2004; and 21 to 23 following Schleich et al., 1996) than in *T. m. pallida* (less than 19 scales following Geniez et al., 2004; 16 to 20 scales following Schleich et al., 1996) does not seem to have taxonomic value. *T. mauritanica* specimens were morphologically assigned to one of the proposed subspecies *juliae* or *pallida*. However, *T. m. juliae* specimen #3 (from Anti-Atlas) showed intermediate dorsal tubercles characteristics (Fig. 2) between specimen #5 (*T. m. juliae* from Agadir) and specimens #1 and #2 (*T. m. pallida* from Djebel Ouarkiz). These findings further confirm previous phylogenetic analyses showing that the mitochondrial lineages in Morocco are not in concordance with the current subspecific arrangement (Harris et al. 2004 a, b). Moreover, none of the *T. m. pallida* specimens found showed the translucent aspect described by Geniez et al. (1999, 2004). Nevertheless, probably it was because they all were captured when active during daylight or before dawn.

Finally, both *T. algericus* and *S. s. sthenodactylus* were previously known to occur in Djebel Ouarkiz area, and these records does not represent a significant increase in their distribution range, although records of *S. s. sthenodactylus* fulfil a distribution gap in the Assa region (Bons and Geniez, 1996). However, this area still remains poorly known and more fieldwork is needed.

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