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First Record of the Moorish Gecko *Tarentola mauritanica* (Linnaeus, 1758) (Squamata: Phyllodactylidae) for Bulgaria

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Abstract: We report the first record of the western Mediterranean gecko species *Tarentola mauritanica* (Phyllodactylidae) in Bulgaria. This record is based on two observations from the inland and the coastal part of the country. We consider both records as the presumable result of the accidental human-mediated introduction. These records represent the fourth gecko species (in addition to *Mediodactylus kotschyi, M. danilewskii* and *H. turcicus*) found in Bulgaria. Because the species has the ability to further spreading, the monitoring on potential localities of *T. mauritanica* in Bulgaria with native gecko species is necessary.

Key words: range extension, introduction, indigenous species, eastern Balkans, Black Sea region.

Introduction

The Moorish Gecko Tarentola mauritanica (Linnaeus, 1758), is a common and very adaptive species, especially in the western Mediterranean areas (SILLERO et al. 2014). The centre of the distribution and origin of the species is probably in the Maghreb area in north-western Africa (HARRIS et al. 2004, RATO et al. 2016). From this area, the species colonised various parts of the Mediterranean, including the Balkan Peninsula (MAČAT et al. 2014). The colonisation was natural but probably also with human intervention, as currently well observed on its phylogeographic pattern (HARRIS et al. 2004). Up to now, T. mauritanica was recorded from Adriatic (Croatia, Montenegro, Albania), Aegean (Greece) and Ionian (Greece) regions of the Balkan Peninsula or surrounding islands, e.g. Corfu, Crete, Hvar and Sazan (BRUNO 1989, LISIČIĆ et al. 2012, MAČÁT et al. 2014, SILLERO et al. 2014, MIZERAKIS & STRA-

CHINIS 2017, MIZSEI et al. 2017, LJUBISAVLJEVIĆ ET al. 2018, STRACHINIS & PAFILIS 2018, STRACHINIS et al. 2020, SZABOLCS et al. 2021). However, it has never been found in the eastern parts of the peninsula or in the Black Sea region (Fig. 1). Therefore, we here provide the first data of this species, genus and family for Bulgaria.

Materials and Methods

Individuals of *T. mauritanica* were identified based on the large pointed tubercles across the robust body and claws that are present only on 3^{rd} and 4^{th} toe (Fig. 2). We thus compared below the described observations of the species from Bulgaria with published sources related to the Balkan Peninsula and wider Mediterranean region of Europe using three types of data as presented on the map (Fig. 1): green squares represent 50 x 50 km grid cells where the species occurs according to SILLERO et al. (2014), orange



Fig. 1. The distribution of *Tarentola mauritanica* in Europe (after SILLERO et al. 2014 and other published sources) in the context of two new records from Bulgaria (BG): 1 = Sofia, 2 = Slanchev Bryag. Country codes are according to ISO 3166-2.



Fig. 2. Individuals of Tarentola mauritanica recorded from Bulgaria. A - Sofia, Druzhba; B - Slanchev Bryag.

squares represent 50 x 50 km grid cells where data include introduced populations according to SILLE-RO et al. (2014) and purple circles refer to the localities of the species given by BRUNO (1989), MAČÁT et al. (2014), MIZERAKIS & STRACHINIS (2017), MIZSEI et al. (2017), STRACHINIS & PAFILIS (2018), SZABOLCS et al. (2021) that were not presented by SILLERO et al. (2014). The orange squares in the map are, however, not visualised in the printed version of the original paper SILLERO et al. (2014), and are available as a supplementary file only (see SILLERO et al. 2014, *introduced_rep.shp*). Map visualization is under WGS 84 UTM 35N.

Results

We here report first records of *Tarentola mauritanica* (family Phyllodactylidae) for Bulgaria. The first observation of the species was recorded on 26 November 2020 around 10 a.m. in the Druzhba residential area near Druzhba subway station in the capital city of Sofia (N42°39'27" E23°23'35", 560 m a.s.l., UTM 10 x 10 km: FN92). One adult individual (Fig. 2A) was found inside the building serving as a shop providing goods from Greece. The second observation comes from Staria Vazel Street of Slanchev Bryag (Sunny Beach) on the Black Sea coast (N42°42'03" E27°42'26", 2 m a.s.l., UTM 10 x 10 km: NH52). Again, this observation contained one individual (Fig. 2B) that was observed around 3 p.m. on 8 January 2021 during the warm winter weather (air temperature $+13^{\circ}$ C). The individuals was observed in the yard of a residential building. Both records are also the first confirmed species' presences for the eastern Balkans and the Black Sea region.

Discussion

Both records represent an important contribution to the herpetofauna of Bulgaria suggesting the recent spread of this species to the eastern parts of the Balkan Peninsula and broader Black Sea region. Tarentola mauritanica was recently observed from several new regions or localities of the Balkans (LISIČIĆ et al. 2012, STRACHINIS & PAFILIS 2018). The easternmost records for the Balkans are published from Lesbos Island in eastern Aegean, ca 13 km from the Turkey territory (see MIZERAKIS & STRACHINIS 2017, STRACHINIS et al. 2020; Fig. 1). It suggests that the species could have probably a wider distribution in the eastern Mediterranean, likely due to human activities. Thus, further records are only a question of fieldwork effort. This could be probably also true for Bulgaria. Here we presented two records observed in a short period of time suggesting a possible wider presence of the species on other suitable localities. We consider both records as a result of the accidental human-mediated introduction. We expect that further observations may come from similar places characterised by high level of human activities (e.g. big cities or the Black Sea coast).

Geckoes are very good colonisers out of their native species range, with many of examples through Europe. Good examples from the Mediterranean area are Hemidactylus turcicus (Linnaeus, 1758) and Mediodactylus kotschyi (Steindachner, 1870). The second species was able to colonise different places in the Balkans, some of them relatively far from the known species range (UROŠEVIĆ et al. 2016, KOTSAKIOZI et al. 2018). The gecko fauna of the Black Sea region is relatively poor compared to the Mediterranean (cf. SPEYBROECK et al. 2020) and contains probably only native species, Mediodactylus danilewskii (Strauch, 1887). Other species recorded from the region, i.e. *H. turcicus* (Turkey) and Tenuidactylus bogdanovi Nazarov and Poyarkov, 2013 (Ukraine), are not native and rather considered as results of historical or recent introductions (RATO et al. 2011, KRASYLENKO & KUKUSHKIN 2017). Our records of T. mauritanica, representing the fourth

recorded gecko species for Bulgaria (see *M. kotschyi* [not confirmed by genetic data] and *H. turcicus* in southwestern Bulgaria; cf. GVOŽDÍK & ŠNAJDR 2001, PULEV et al. 2014, KOTSAKIOZI et al. 2018), are thus examples of non-native gecko species found in the Black Sea region that needs further attention.

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