New distribution notes for terrestrial herpetofauna from Morocco

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Abstract. Additional data on the distribution of terrestrial herpetofauna from Morocco are presented, based on fieldwork carried out in March and May 2008. Thirty-eight species were recorded from 78 localities. Some of these represent considerable range extensions for the species, indicating that more prospection is needed to complement the existing knowledge of herpetofauna from this country.

Key words: Distribution, Morocco, reptiles, amphibians

Morocco covers an area of over 400,000 km² in Northwest Africa, and has the highest diversity of herpetofauna in the Western Mediterranean region. Together with Tunisia and Algeria it forms the Maghreb, a well defined biogeographic entity. Including a wide variety of habitats, from Saharan through to Mediterranean, Morocco also has four large mountain ranges – the Rif, Middle, High and Anti-Atlas – that support this diverse fauna. Bons and Geniez (1996) accepted 104 species of which 22% were endemic. Several taxa have been shown to be species complexes since then, and formally split (e.g. Wade 2001). Phylogeographic analyses of herpetofauna from this region, whilst not as extensive as those for European fauna, are becoming more common and indicate that many of the widespread species may also represent species complexes (e.g. Harris et al. 2004, Perera et al. 2007, Carranza et al. 2008, Paulo et al. 2008, Kapli et al. 2008). Although the distribution of many species is relatively well known, for example through the detailed maps from Bons and Geniez (1996), recent notes have reported considerable range extensions for several species (e.g. Fahd et al. 2008, Harris et al. 2008), indicating that more fieldwork is necessary to precisely delimit the ranges of many species and subspecies. Here we report the findings of two trips to Morocco, carried out in March and May 2008, both of approximately 2 weeks. A total of 78 localities were sampled (Fig. 1 and Table 1). Whenever a species was observed the coordinates were marked with a GPS. Thirty-eight species of amphibians and reptiles were recorded. Details on the species observed per locality can be found in Appendix 1. Where these are of particular interest, more details are given.

Regarding members of the family Gekkonidae, six different genera were recorded, of which the most common was Tarentola. Tarentola chazaliae (Mocquard, 1895) was found at two localities (73 and 77). Locality 77 represents one of the most inland populations known for this species, which is generally found only within 25 km of the Atlantic coast (Fig. 2a). Tarentola mauritanica (L., 1758) is reported from 17 localities (1, 2, 6, 9, 12, 19, 21, 50, 54, 55, 58, 60, 61, 64, 65, 66 and 77). Al-
### Table 1. Localities sampled in the present study. Coordinates are given in WGS84 coordinate system. Location of the sites is represented in Fig. 1.

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though two subspecies have been described in Morocco (Bons and Geniez 1996), these do not correspond with genetic differentiation (Harris et al. 2004, Rato et al. 2010), and thus pending more detailed investigations all were recorded only as *T. mauritanica*.

Similarly *Ptyodactylus oudrii* Lataste, 1880 (Localities 25, 28, 36, 37, 56, 59, 60 and 70) appears to be a species complex (Perera and Harris 2010), but currently distinct lineages can only be identified using genetic markers. *Quedenfeldtia trachyblepharus* (Boettger, 1874) and *Quedenfeldtia moerens* (Chabanaud, 1916) were both found at five different localities (21, 41, 46, 50, 51 and 23, 25, 26, 56, 61 respectively). Many of the localities recorded for *Quedenfeldtia* in the region around Jebel Sirwah from Bons and Geniez (1996) are of undetermined species, due to the two species of *Quedenfeldtia* being widely confused prior to the work of Arnold (1990). Our findings confirm that *Q. trachyblepharus* is found in this region (localities 50 and 51). *Saurodactylus brosseti* Bons & Pasteur, 1957 was another widespread species found at 15 localities (1, 2, 18, 26, 55, 56, 57, 59, 60, 62, 63, 64, 65, 72 and 78; Fig. 2b). Locality 26 considerably extends the range of *S. brosseti* by more than 100 km from the nearest previously known populations, and is also one of the few known localities on the southern side of the Atlas Mountains. Recently reported new localities for both *S. brosseti* and *S. fasciatus* (Harris et al. 2008 and this manuscript) indicate that there are more areas where these two species are found within a few kilometres of each other (Fig. 2b). *Stenodactylus sthenodactylus* (Liechtenstein, 1823) were noted at two localities (27 and 74). Locality 27 extends the range of *S. sthenodactylus* more into the foothills of the High Atlas Mountains (Fig. 2c). Several individuals were observed here active at night, in a flat scrub area near the road.

Following the revised taxonomy of Arnold et al. (2007), seven genera of the family Lacertidae were recorded, including three species of *Acanthodactylus* (*Acanthodactylus aureus* Günther, 1903, *Acanthodactylus boskianus* (Daudin, 1802) and *Acanthodactylus erythrurus* (Schinz, 1833)), *Timon tangitanus* (Boulenger, 1881), *Psammodromus algirus* (L., 1758) and *Mesalina guttulata* (Liechtenstein, 1823). *Scelarcis perspicillata* (Düméril & Bibron, 1839) was identified at three localities (12, 46 and 51). These corresponded to the *chabanaudi* (localities 12 and 46) and *perspicillata* (locality 51) forms, although subspecies do not always correspond to genetic

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**Figure 1.** Map of the study area and principal localities sampled (see table 1 for more details).
lineages in this apparent species complex (Perera et al. 2007). *Atlantolacerta andreanskyi* (Werner, 1929) was found at three localities (41, 46 and 50). This species is endemic to the High Atlas mountains, between 2000 and 3800m, and has quite disjunct populations. Although localities 46 and 50 are close to previously reported localities, they both represent new populations, indicating that *A. andreanskyi* may be found in more high-mountain valleys given additional prospection effort in this rarely-visited region. *Podarcis vaucheri* (Boulenger, 1905) is reported from localities 12, 14, 15, 19, 21, 23, 25, 38, 39, 40, 43, 45, 50 and 51. *Podarcis vaucheri* represents a species complex in North Africa (Pinho et al. 2006, Lima et al. 2009), and in Morocco includes a highly genetically divergent lineage in Jebel Sirwah, locality 51.

![Figure 2. Distribution maps and pictures of some of the species found. Small dots represent previous published records (Bons and Geniez 1996, Harris et al. 2008) and triangles represent the new localities reported. All inset pictures are individuals captured during the field trip. In b) the inset picture corresponds to the individual of *S. brosei* from locality 26; in d) the image corresponds to the *B. tingitanus* specimen found in locality 8 (see text for more details).](image-url)
(Pinho et al. 2006). Localities recorded here near Jebel Sirwah, for example locality 50, may represent this “entity”, but this remains to be confirmed with genetic markers.

Three species of skinks (Family Scincidae) were recorded. The finding of Chalcides manueli Hediger, 1935 at locality 51 is particularly interesting. This population was quite abundant, with several specimens observed along a stream on the Jebel Sirwah mountain. This considerably extends the range of C. manueli to the East. At the same time this species was not previously known from altitudes above 256m (Bons and Geniez 1996), while this location is above 2000m. Although C. montanus have previously been reported from near this area, the identification as C. manueli was confirmed using DNA sequencing (unpublished result). Given the degree of genetic distinctiveness of P. vaucheri from this area (Harris et al. 2002, Pinho et al. 2006), and the complex genetic patterns observed in several Chalcides species (Carranza et al. 2008) this population clearly deserves to be further studied.

Chalcides lanzai Pasteur 1967 was found only at locality 11. Considered a subspecies of C. montanus until recently, it is currently accepted as a full species (Carranza et al. 2008), being restricted to the high Plateaux of the Middle Atlas. The only other species of skink noted was Eumeces algeriensis Peters, 1864, at localities 18 and 63.

Representatives from both families of amphisbaenia known from Morocco were observed. Trogonophis wiegmanni Kaup, 1830 (family Trogonophidae) was found at locality 10. Blanus tingitanus Busack, 1988 (family Blanidae) was found at locality 8. This endemism is easily recognized from the other species of the same genera present in Morocco, B. mettetali, by the number of preanal pores (5-6 in B. tingitanus and 8 or more in B. mettetali; Busack 1988). Locality 8 extends slightly the southwestern distribution limit of this species (Fig. 2d).

Nine species of snakes were identified, belonging to nine different genera and four different families. From the family Leptotyphlopidae, Leptotyphlops macrorhynchus (Jan, 1861) was found at one locality (27). Although widespread in North Africa, in Morocco this unmistakable snake was first recorded only in 1957 (Pasteur and Bons 1957), and only 10 observations have been made to date (Bons and Geniez 1996). This specimen was found at night under a small rock in flat scrub land near a road, along with several S. sthenodactylus (Fig. 2e). Five species traditionally assigned to the family Colubridae were found (although alternative taxonomies exist, as noted in Speybroeck et al. 2010). The individual of Psammophis schokari (Forskål, 1775) at locality 67 was a road-killed specimen. Natrix maura (L., 1758) was found near water in agricultural fields in the surroundings of a small village (locality 21), and had most probably been killed (decapitated) by people from the area. The finding of another snake killed similarly nearby highlights the negative impact of humans on snake populations. Other colubrid snakes found were Hemorrhois hippocrepis L., 1758 at locality 3, Coronella girondica (Daudin, 1803) at locality 14 and Macroprotodon cucullatus (Geoffroy Saint-Hilaire, 1827) at locality 15. A single member of the Viperidae family, Cerastes cerastes (L., 1758), was seen at locality 47, crossing a road at dusk. Similarly a Naja haje (L., 1758), family Elapidae, was seen at locality 76 basking by the side of a road in the early morning. This was a large specimen for Morocco, well over 1.5m in length. It was deliberately run over by a passing truck just as we approached, again highlighting the negative anthropogenic influence on this species. The low number of observations in southern Morocco (Fig. 2f) probably reflects more limited prospection in this region rather than a relative rareness of the species.
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References


Appendix 1. Species of amphibians and reptiles found in each locality sampled.

| Species                        | Locality 1 | Locality 2 | Locality 3 | Locality 4 | Locality 5 | Locality 6 | Locality 7 | Locality 8 | Locality 9 | Locality 10 | Locality 11 | Locality 12 | Locality 13 | Locality 14 | Locality 15 | Locality 16 | Locality 17 | Locality 18 | Locality 19 | Locality 20 | Locality 21 | Locality 22 | Locality 23 | Locality 24 | Locality 25 | Locality 26 | Locality 27 | Locality 28 | Locality 29 | Locality 30 | Locality 31 | Locality 32 | Locality 33 | Locality 34 | Locality 35 | Locality 36 | Locality 37 | Locality 38 | Locality 39 | Locality 40 | Locality 41 | Locality 42 | Locality 43 | Locality 44 | Locality 45 | Locality 46 | Locality 47 | Locality 48 | Locality 49 | Locality 50 | Locality 51 | Locality 52 | Locality 53 | Locality 54 | Locality 55 | Locality 56 | Locality 57 | Locality 58 | Locality 59 | Locality 60 | Locality 61 | Locality 62 | Locality 63 | Locality 64 | Locality 65 | Locality 66 | Locality 67 | Locality 68 | Locality 69 | Locality 70 | Locality 71 | Locality 72 | Locality 73 | Locality 74 | Locality 75 | Locality 76 | Locality 77 | Locality 78 |