A new locality record of *Phrynocephalus maculatus* ANDERSON, 1872, from Jordan

One adult male of the Spotted Toad-headed Agama *Phrynocephalus maculatus* ANDERSON, 1872, was collected on highway 5 (Maán to the Saudi Arabian Border) between Al-Mudawwara and Al-Mudawwara Al-Jadida, about 3 km north of Al-Mudawwara Al-Jadida at approximately 29°14'5.74"N / 36°3'37.84"E, 690 m a.s.l. on May 10, 2011 by one of the authors (S. S.). This record is located about 300 km south of the population at Abar al-Hazim. Because of the largely unknown distribution of *P. maculatus* in Jordan, this new locality record is considered important enough to be reported. The specimen was preserved in 96 % ethanol at the capture site and later transferred to 70 % ethanol. Morphometric data were taken with a digital caliper at an accuracy of 0.1 mm. The specimen is now kept in the collection of the Zoologisches Forschungsmuseum A. Koenig in Bonn, Germany (ZFMK 92815).

Phrynocephalus maculatus inhabits a wide Range from SW Pakistan, S Afghanistan through Iran and eastern Arabia to SE Jordan (SINDACO & JEREMCENKO 2008). The type locality of the species "Awada, Shiraz, Persia" was corrected to Abadeh, north of Shiraz by BLANFORD (1876) which is according to BARABANOV & ANANJEVA (2007) located in the Province of Fars, Iran, at approx. 31°10'N, 52°37'E.

Phrynocephalus m. maculatus is found from the Central Plateau of Iran, at elevations from about 500-3,000 m a.s.l., eastward through southern Afghanistan and Baluchistan as far as Nushki, Pakistan (ANDERSON 1999). Records of *P. maculatus* west of the Zagros Mountains (i. e., Arabian Peninsula) should be assigned to the taxon

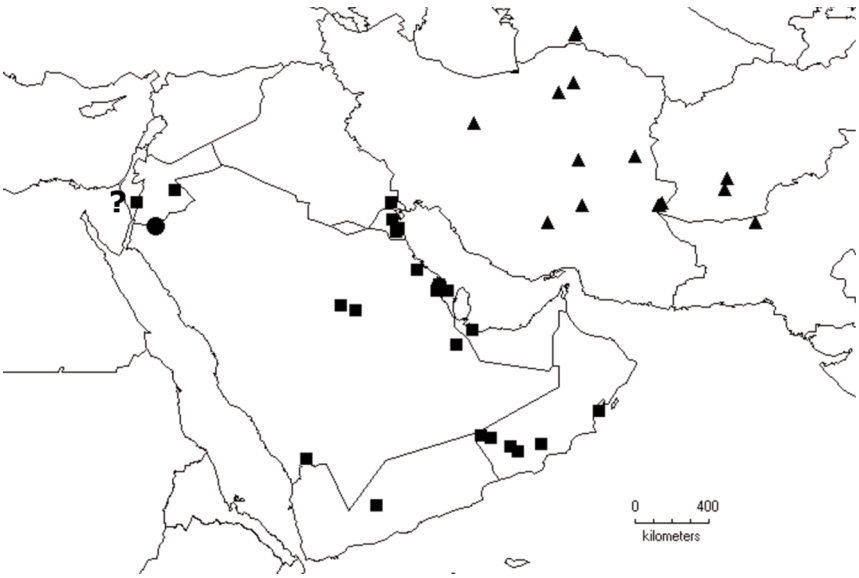

Fig. 1: Distribution of *Phrynocephalus maculatus*. ▲ - *Phrynocephalus maculatus maculatus* ANDERSON, 1872, ■ - *Phrynocephalus maculatus longicaudatus* HAAS, 1957, ● - new locality near Al-Mudawwara. **?** ■ - approximate location published by AL-QURAN (2009). Map drawing by T. M. WILMS and S. SCHOLZ.

longicaudatus which is currently known from Jordan, Kuwait, Saudi Arabia, Oman and the United Arabian Emirates (ARNOLD 1980; ANDERSON 1999; BAKER et al. 2005; GARDNER 2005, 2009; SINDACO & JEREMČENKO 2008). Furthermore, the species is mentioned to occur in Iraq by SMITH (1935), KHALAF (1959) and WERMUTH (1966). ARNOLD (1986) also included Syria into the range of the species. The subspecies *P. m. longicaudatus* HAAS, 1957 was described on the basis of specimens originating from Doha Dhalum, Saudi Arabia. As the name implies, the subspecies is characterized by a long tail which is longer than twice the distance from the gular fold to the vent. Further diagnostic characteristics given by HAAS (1957) are: (i) enlarged posterior supraorbital scales, which are larger than the middorsal scales, (ii) nostrils which are directed anteriorily, and (iii) a few dorsal scales keeled or with an indication of mucronation. However, ARNOLD (1986) states that the characters listed by HAAS (1957) as diagnostic for *longicaudatus* do not consistently separate Arabian populations from more eastern ones.

A population of this lizard was just recently discovered in Jordan, and thus, is not listed for the country in the comprehensive work on the herpetofauna of Jordan by DISI et al. (2001). The first record of *P. m. longicaudatus* in Jordan was published by BAKER et al. (2005) based on specimens from the close vicinity of Abar Al-Hazim. AL-QURAN (2009) mentions the presence of *P. maculatus* from the vicinity of Wadi Araba without giving exact locations or descriptions of the respective specimens.

Figure 1 gives an overview of verified locations of *P. maculatus*. It includes distribution data from BOULENGER (1920), PARKER (1931), HAAS & HAAS (1957), BATTERSBY (1959), GALLAGHER (1971), EISSA & EL-ASSY (1975), ARNOLD (1980), AL-SADOON (1988), ROSS (1989), MARTENS (1996), MEINIG & KESSLER (1998), and SEUFER et al. (1999). Additional information was obtained from the following sources: Arctos - MVZ Herp Catalog; California Academy of Sciences (CAS) - CAS Herpetology Collection Catalog; Field Museum - FMNH Herpetology Collections; Florida Mus Nat Hist (UF) - Herpetology speci-

Table 1: Information on the collected specimen (ZFMK 92815) of *Phrynocephalus maculatus longicaudatus* HAAS, 1957, compared with data from BAKER et al. (2005) and HAAS (1957). SVL - Snout-Vent Length, TL - Tail length, TotL - Total length, l/r - left/right, ZFMK - Zoologisches Forschungsmuseum A. Koenig, Bonn, * - derived from data for TL and TotL, ** - derived from data for SVL and TL, M - male(s), F - female(s).

Data source	Locality	Sex	*n*	SVL (mm)	TL (mm)	TotL (mm)	Distance from gular fold to vent (mm)	Upper labials (l/r)	Lower labials (l/r)	Scales between nasals
ZFMK 92815	Mudawwarah, Jordan	M	1	61.0	88.0	149	41.6	17/16	12/12	1 (3)
BAKER et al. (2005)	Abar al Hazim, Jordan	M	1	67	99	166**	45	15/15	14/15	3
		F	4	56-64	80-89	136-155**	37-46	14-18	13-16	3
HAAS (1957)	Doha Dhalum, Saudi Arabia	M	3	72-73*	114-124	186-196	-	-	-	-
		F	2	63-66*	96-105	159-171	-	-	-	-

Fig. 2: Dorsal aspect of *Phrynocephalus maculatus longicaudatus* HAAS, 1957, ZFMK 92815.

Fig. 3: Ventral aspect of *Phrynocephalus maculatus longicaudatus* HAAS, 1957, ZFMK 92815.

Fig. 4: *Phrynocephalus maculatus longicaudatus* HAAS, 1957, ZFMK 92815, live at the collection site near Al-Mudawwara (Jordan).

mens; University of Kansas Biodiversity Institute - Herpetology Collection (Accessed on 8/12/2011 through the HerpNet2 Portal at < http://www.herpnet2.org >). The new locality record represents the westernmost verified population of the species. Furthermore it may indicate the presence of populations in northwestern Saudi Arabia.

Pholidosis.- The posterior supraorbital scales are enlarged and flattened and somewhat larger than the middorsal scales. The original scalation of the central upper head area is obscured by a scar but the enlarged character of these scales is still evident being of a rather irregular shape and longer than wide as described in HAAS's (1957) diagnosis. The dorsal scales are not keeled, but slightly mucronate closer to the neck. The mental is larger than the adjacent labials. The number of upper labials is 17/16 (left/right), of lower labials 12/12. The nasals are separated by one enlarged scale; above and below this central scale, the nasals are separated by three scales. The nostrils are directed anteriorily.

Measurements.- Total length is 149.0 mm, snout-vent length 61.0 mm and tail length 88.0 mm; distance from gular fold to vent is 41.6 mm. Accordingly, the tail length is 1.44 times the snout-vent length and 2.1 the distance from gular fold to vent. The head is 16.3 mm long and 14.7 mm wide. Table 1 gives an overview on some metric and meristic data published by HAAS (1957) and BAKER (2005) in comparison with the specimen from Mudawwara.

Color and pattern (Figs. 2-4).- The top of the head is greyish with some light scales interspersed between darker ones but without forming any distinct pattern. The dorsal surface of the body is greyish, speckled with small light-colored dots arranged in a somewhat regular manner. A total of seven brown crossbands can be counted from the neck to the level of the vent. The tail is banded with five dark-grey to black crossbands and terminates in a black tip for the posterior third of its length.

The ventral aspect shows a light grey to dirty white gular area and a whitish belly. The tail has a deep salmon to orange coloration from the vent across the anterior half of its length. The posterior half of the tail is of a solid black coloration.

Notes on biology.- The specimen was found basking on the highway on May 10, at about 11:00 a. m. The surrounding habitat was a hard and stony ground with minimal, almost absent vegetation cover. This is clearly different from the preferences of *Phrynocephalus arabicus* ANDERSON, 1894, which exclusively occurs in or close to sand dune habitats (BAKER et al. 2004; DISI et al. 2001; S. S., F. S. & C. R. pers. obs.). In the vicinity of Al-Mudawwara both *P. arabicus* and *P. maculatus* can be found, but are spatially separated from each other by their different habitat preferences (DISI pers. comm.; S. S., F. S. & C. R. pers. obs.).

Like the Jordanian specimens from Abar Al-Hazim, the individual from Al-Mudawwara conforms to the diagnosis of *Phrynocephalus maculatus longicaudatus*. Despite of the lack of consistent morphological differences between the subspecies of *P. maculatus*, biogeographical implications suggest that both taxa may be separated on species level (ANDERSON 1999). The main fact pointing in this direction is the spatial discontinuity between the ranges of *P. m. maculatus* and *P. m. longicaudatus* combined with the observation that there is no other species of *Phrynocephalus* which developed subspecies on both sides of the Zagros Mountains. This mountain range could therefore be considered a major biogeographic barrier to the members of the genus *Phrynocephalus*. Further studies are needed to evaluate the morphology, biogeography and phylogeny of the taxa within *P. maculatus*.

ACKNOWLEDGMENTS: We would like to thank Prof. Dr. Ahmand M. DISI (Amman) for his generous hospitality and the useful information regarding the distribution and habitat preferences of the both *Phrynocephalus* species found in Jordan.

REFERENCES: AL-QURAN, S. (2009): The herpetofauna of the southern Jordan.- American-Eurasian Journal of Agricultural and Environmental Sciences (electronic resource), Faisalabad; 6 (4): 385-391. AL-SADOON, M. K. (1988): Survey of the reptile fauna of the Kingdom of Saudi Arabia. II. The lizards and amphisbaenian fauna of Riyadh Province.- Bulletin of the Maryland Herpetological Society, Baltimore; 24: 58-76. AL SIRHAN, A. R. & BROWN, G. (2010): The status of the two Toad-headed Agamas, *Phrynocephalus arabicus* (ANDERSON, 1894) and *Phrynocephalus maculatus* (ANDERSON, 1872), in Kuwait.- Zoology in the Middle East, Heidelberg; 51: 23-30. ANDERSON, J. (1872): On some Persian, Himalayan and other reptiles.- Proceedings of the Zoological Society of London, London; 1872 (2): 371-304. ANDERSON, S. C. (1999): The lizards of Iran; Ithaca, New York (Society for the Study of Amphibians and Reptiles), pp. 442. ARNOLD, E. N. (1980): The reptiles and amphibians of Dhofar, southern Arabia.- Journal of Oman Studies Special Report, Muscat; 2: 273-332. ARNOLD, E. N. (1986): A key and annotated check list to the lizards and amphisbaenians of Arabia.- Fauna of Saudi Arabia, Jeddah; 8: 385-435. BAKER, M. A. & SIROKY, P. & AMR, Z. & MODRÝ, D. (2005): Discovery of a population of *Phrynocephalus maculatus* ANDERSON, 1872 in the Hashemite Kingdom of Jordan.- Herpetozoa, Wien; 18 (3/4): 107-113. BARABANOV & ANANJEVA (2007): Catalogue of the available scientific species-group names for lizards of the genus *Phrynocephalus* KAUP, 1825 (Reptilia, Sauria, Agamidae).- Zootaxa, Auckland; 1399: 1-56. BLANFORD, W. T. (1876): List of Reptilia and Amphibia collected by the late Dr. STOLICZKA in Kashmir, Ladák, Eastern Turkmenistan and Wakhán, with descriptions of new species.- Journal of the Asiatic Society of Bengal, Calcutta; 44 (3): 191-196. BOULENGER, G. A. (1920): A list of lizards from Mesopotamia collected by members of the Mesopotamian Expeditionary Force 1915-1919.- Journal of the Bombay Natural History Society, Byculla, Bombay; 27: 351-353. DISI, A. M. & MODRÝ, D. & NEČAS, P. & RIFAI, L. (2001): Amphibians and reptiles of the Hashemite Kingdom of Jordan. An Atlas and Field Guide; Frankfurt am Main (Edition Chimaira), pp. 408. EISSA, S. M. & EL ASSY, Y. S. (1975): Record of certain reptilian species found in Kuwait.- Journal of the University of Kuwait (Science), Kuwait; 2: 123-146. GALLAGHER M. D. (1971): Amphibians and reptiles of Bahrain; Bahrain (privately published), pp. 40. GARDNER, D. (2005): Terrestrial reptiles; pp. 229-241. In: HELLYER, P. & ASPINALL, S. (Eds.): The Emirates. A natural history. London (Trident Press). GARDNER, A.S. (2009): Mapping the terrestrial reptile distributions in Oman and the United Arabian Emirates.- ZooKeys, Sofia; 31: 165-177. HAAS, G. (1957): Some amphibians and reptiles from Arabia.- Proceedings of the California Academy of Sciences, San Francisco; 29 (3): 47-86. HAAS, G. & BATTERSBY J. C. (1959): Amphibians and reptiles from Arabia.- Copeia, Lawrence, Kansas; 1959 (3): 196-202. KHALAF, K. T. (1959): Reptiles of Iraq, with some notes on the amphibians; Bagdad (Ar-Rabitta Press), pp. v, 96. KHAN, M. S. (2006): Amphibians and reptiles of Pakistan; Malabar, Florida (Krieger Publishing Company), pp. xvi, 311. LEVITON, A. E. & ANDERSON, S. C. & ADLER, K. K. & MINTON, S. A. (1992): Handbook to Middle East amphibians and reptiles; Oxford, Ohio (Society for the Study of Amphibians and Reptiles), pp. vii, 252 [Contributions to Herpetology Vol. 8]. MARTENS, H. (1996): A preliminary survey of the terrestrial reptiles and sea snakes in the Jubail Marine Wildlife Sanctuary; pp. 360-373. In: KRUPP, F. & ABUZINADA, A. H. & NADER, I. A. (Eds.): A marine wildlife sanctuary for the Arabian Gulf: environmental research and conservation following the 1991 Gulf War Oil Spill; Riyadh, Frankfurt a. M. (NCWCD - National Commission for Wildlife Conservation and Development, Riyadh and Senckenberg Research Institute, Frankfurt). MEINIG, H. & KESSLER, H. (1998): Herpetologische Beobachtungen im Rahmen einer Nationalparksplanung: Barr al Hikman und Masirah Island, Sultanat von Oman.- Faunistische Abhandlungen Museum für Tierkunde,

Dresden; 21: 89-97. PARKER, H. W. (1931): Some reptiles and amphibians from S.E. Arabia.- Annals and Magazine of Natural History, London; 10: 514-522. ROSS, W. (1989): Notes on ecology and behaviour with special reference to tail signalling in *Phrynocephalus maculatus* (Reptilia: Agamidae).- Fauna of Saudi Arabia, Jeddah; 10: 417-422. SEUFER, H. & KOWALSKI, T. & ZILGER, H. J. (1999): Herpetologische Impressionen einer Reise in den Oman.- Herpetofauna, Weinstadt; 21 (119): 24-34. SINDACO, R. & JEREMČENKO, V. K. (2008): The reptiles of the Western Palaearctic. 1. Annotated checklist and distribution atlas of the turtles, crocodiles, amphisbaenians and lizards of Europe, North Africa, Middle East and Central Asia; Latina (Edizione Belvedere), pp. 579. SMITH (1935): The fauna of British India, including Ceylon and Burma. Reptilia and Amphibia. The Fauna of British India Vol. 2. Sauria; London (Taylor & Francis Ltd.), pp. 440. WERMUTH, H. (1965): Liste der rezenten Amphibien und Reptilien. Gekkonidae, Pygopodidae, Xanthusiidae; Berlin (W. de Gruyter & Co.), pp. I-XXII, 1-246. In: MERTENS, R. & HENNIG, W. (Eds.): Das Tierreich: Eine Zusammenstellung und Kennzeichnung der rezenten Tierformen; Vol. 80.

KEY WORDS: Reptilia: Squamata: Sauria: Agamidae; *Phrynocephalus maculatus longicaudatus*, new locality record, Al-Mudawwara, southern Jordan, Middle East, distribution, morphology

SUBMITTED: May 25, 2012

AUTHORS: Sebastian SCHOLZ (correspoding author, < chinemys@web.de >), Goethe Universität Frankfurt, Senckenberganlage 31, 60325 Frankfurt am Main, Germany, and Zoologischer Garten Frankfurt, Bernhard-Grzimek-Allee 1, 60316 Frankfurt am Main, Germany; Falk SIEGENTHALER, Am Kirchborn 17, 55126 Mainz, Germany; Clemens RADSPIELER, Hauptstraße 23, 94166 Prienbach am Inn, Germany; Thomas M. WILMS, Zoologischer Garten Frankfurt, Bernhard-Grzimek-Allee 1, 60316 Frankfurt am Main, Germany