Zootaxa 3904 (2): 249–260
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3904.2.4
http://zoobank.org/urn:lsid:zoobank.org:pub:202CD0EA-19B0-4A9F-9881-AEC2CCC04388

A New Iranian *Phrynocephalus* (Reptilia: Squamata: Agamidae) from the hottest place on earth and a key to the genus *Phrynocephalus* in southwestern Asia and Arabia

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Abstract

A new species of agamid lizard, *Phrynocephalus lutensis* **sp. nov.**, is described from the Lut Desert in Iran. It is a species adapted to wind-blown sand in this semi-isolated basin. It appears to be most closely similar to *P. luteoguttatus* and *P. euptilopus* on the basis of external morphology. A key to the 19 known *Phrynocephalus* species of southwestern Asia and Arabia is presented for the first time.

Key words: Dasht-e Lut, Lut Desert, Kerman Province, checklist

Introduction

The Dasht-e Lut (Lut desert) is a semi-enclosed basin, a playa, partially ringed by mountains, characteristic of several such semi-isolated structures in Central Asia and Iran with internal drainage. These playas represent Quaternary lake beds where evaporation was periodically in balance with water flow; fluctuations in lake levels are evident in the shoreline terraces around today's playas. Currently evaporation exceeds the drainage from encircling mountains. Periodic flooding and evaporation have resulted in the spectacular geomorphology of the Dasht-e Lut. (Sepehr & Almodaresi 2013) The species described here was collected in the southeastern portion of the Lut, called Rig-e Yalan (Mega Dune) (Fig.1). As with other basins in Iran subject to strong westerly winds, it contains isolated dunes and flats of accumulated sand. In the Dasht-e Lut, summer heat is exceptionally high, reputed to be the highest surface temperatures recorded anywhere. This region of the Dasht-e Lut, in addition to *Phrynocephalus lutensis* **sp. nov.**, may be expected to yield other narrowly distributed endemics once it has been more thoroughly explored by collectors and biologists and existing specimens in collections have been carefully examined and perhaps submitted to molecular analysis. Among others, species in the genus *Ophiomorus* should be expected to occur (see Anderson & Leviton 1966), as well as sand-adapted species of *Eremias* and *Acanthodactylus*. There may well be unique populations of animals suited to the many other landforms of the Lut.

Barabanov and Ananjeva (2007) recognize 37 species in the genus *Phrynocephalus* Kaup 1825. Subsequent to that paper, two new species have been described, *P. ananjevae* Melnikov, Melnikova, Nazarov & Rajabizadeh 2013 and *P. ahvazicus* Melnikov, Melnikova, Nazarov, Rajabizadeh, Al-Johany, Amr & Ananjeva 2014. Melnikov, *et al.* (2014) revised *P. arabicus* and resurrected *P. nejdensis* Haas 1957 and *P. macropeltis* Haas 1957. This brings the total to 42, including that described herein. The distribution of the genus stretches from western Middle Asia through Central Asia to western China, in southwestern Asia from Jordan east to Afghanistan and Pakistan and south to the Arabian Peninsula.

The origin of the genus is uncertain. *Phrynocephalus laungwalaensis* Sharma 1978 was removed from the genus *Phrynocephalus* and placed in the monotypic genus *Bufoniceps* Arnold 1992 in large part because it has an

Accepted by S. Carranza: 14 Nov. 2014; published: 6 Jan. 2015

Phrycocephalus lutensis **sp. nov..** Kamali & Anderson. Iran. IUCN: not yet assessed.
Phrynocephalus luteoguttatus Boulenger 1887. Afghanistan, Pakistan. IUCN: least concern.
Phrynocephalus macropeltis Haas 1957. Saudi Arabia. IUCN: Not yet assessed.
Phrynocephalus maculatus J. Anderson 1872. Iran, Afghanistan, Pakistan, Arabian Peninsula, Iraq, Jordan, Turkmenistan. IUCN: not yet assessed.
Phrynocephalus mystaceus (Pallas 1776). Iran, Central Asian Republics. IUCN: not yet assessed.
Phrynocephalus nejdensis Haas 1957. Saudi Arabia. IUCN: not yet assessed.
Phrynocephalus ornatus Boulenger 1887. Iran, Afghanistan, Pakistan. IUCN: least concern.
Phrynocephalus persicus De Filippi 1863. Iran. IUCN: vulnerable.
Phrynocephalus raddei Boettger 1890. Central Asian Republics, Iran, Afghanistan. IUCN: not yet assessed.
Phrynocephalus scutellatus (Olivier 1807). Iran, Afghanistan, Pakistan. IUCN: not yet assessed.
Phrynocephalus sogdianus Chernov 1948. Central Asian Republics, Afghanistan. IUCN: not yet assessed.

*Melnikov *et al.* (2014) in their review of the *Phrynocephalus* complex distinguish the species *P. ananjeva, P. macropeltis*, and *P. nejdensis* primarily on the basis of a molecular analysis. They do not include many morphological and meristic characters that serve as key characters for identification, although they are primarily recognizable on the basis of coloration of living animals. The same is largely the case for *P. ahvazicus* as well (Melnikov *et al*., 2014). (See color photos in these two papers for colors and patterns in living specimens).

The status of *P. horvathi* is not yet settled. It has been considered a subspecies of *both P. helioscopus* and *P. persicus;* IUCN Red list treats it as a full species; based on relative distributions, we favor provisionally the *P. persicus horvathi* designation for purposes of the key.

Discussion

Based on Arnold's (1999) analysis of external morphology and his phylogenetic tree, *Phrynocephalus lutensis* **sp. nov.** would form a clade with *P. euptilopus* Alcock & Finn 1896 (Fig. 5) and to *P. luteoguttatus* Boulenger 1887 (Fig. 6), and these to a larger clade also including *P. interscapularis* and *P. sogdianus*. All occur in similar sandy deserts, *P. interscapularis* the most widely distributed, the other four narrowly distributed, *P. lutensis* in southeastern Iran, *P. luteoguttatus* and *P. euptilopus* in the Dasht-e Margo south of the Helmand River in southwestern Afghanistan and Pakistani Balochistan. Still lacking is a morphological and molecular analysis of the entire genus and a phylogeographical hypothesis based thereon. However, as we lack for *P. lutensis* **sp. nov.**. Arnold's analysis of skeletal and soft anatomy, this remains only a speculation.

Acknowledgments

We thank the brothers Mehrdad and Babak Ghazvinian, who collected the specimens and took the habitat photo. We are grateful to our collegue, Tigran Tadevosyan for alerting us to the papers by Melnikov *et al*. (2009) and Solovjeva *et al*. 2011. Omid Mozaffari prepared the map (Fig. 1). We also thank Shahrzad Malekzadeh and Soheila Shafiei for helping us in measurements and meristic studies. Vladimir Malikov conveyed the specimens to the museum in St. Petersburg.

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