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A new *Uromastyx* species from south-eastern Arabia, with comments on the taxonomy of *Uromastyx aegyptia* (FORSKÅL, 1775)

(Squamata: Sauria: Agamidae)

Eine neue *Uromastyx* - Art aus dem südöstlichen Arabien, mit Kommentaren zur Taxonomie von *Uromastyx aegyptia* (FORSKÅL, 1775)

(Squamata: Sauria: Agamidae)

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KURZFASSUNG

Es wird ein Überblick über die taxonomischen Verhältnisse innerhalb der *Uromastyx aegyptia* - Gruppe gegeben, insbesondere wird der taxonomische Rang der Taxa *aegyptia* und *microlepis* diskutiert. Es werden ein Neotypus für *aegyptia* und ein Lectotypus für *microlepis* designiert.

Uromastyx leptieni sp. n. wird aus dem südöstlichen Arabien beschrieben. Die neue Art unterscheidet sich von ihrem Schwestertaxon *U. aegyptia* durch größere Ventralia und durch eine abweichende Färbung und Zeichnung der Jungtiere. *Uromastyx leptieni* sp. n. ist im nördlichen Oman und im Osten der Vereinigten Arabischen Emirate beheimatet.

ABSTRACT

An overview on the taxonomy of the *Uromastyx aegyptia* group is given and the taxonomic rank of the taxa *aegyptia* and *microlepis* is discussed. A neotype of *aegyptia* and a lectotype of *microlepis* is designated.

Uromastyx leptieni sp. n. is described from south eastern Arabia. It is distinguished from its sister taxon *U. aegyptia* by larger ventral scales and a different colour pattern of the juveniles. *Uromastyx leptieni* sp. n. inhabits northern Oman and the eastern parts of the United Arab Emirates.

KEY WORDS

Reptilia: Sauria: Agamidae: Leiolepidinae: *Uromastyx leptieni* sp. n., *U. aegyptia aegyptia*, *U. aegyptia microlepis*; distribution, taxonomy; Arabia

INTRODUCTION

Within the *Uromastyx aegyptia* group, three different taxa were described: most recently *U. occidentalis* (MATEO et al. 1998) from the western Sahara and much earlier two long and well-known taxa *aegyptia* (FORSKÅL, 1775) and *microlepis* BLANFORD, 1874. The validity of the latter two taxa has been under debate until now. *Uromastyx aegyptia* was described by FORSKÅL and published after the author's death in 1775 by C. NIEBUHR. The second taxon was described one century later as *U. microlepis*. The diagnostic features (sensu BLANFORD 1874) to distinguish these two taxa from each other are the lack of enlarged tubercular scales on the flanks and the presence of skin folds at the sides of the neck covered with tubercles in *microlepis*. In the present study, the second character has been found insufficient to discriminate the above taxa properly.

SCHMIDT (1939) pointed out, that it is sometimes difficult to distinguish *aegyptia* from *microlepis* by the presence or absence of enlarged scales on the flanks due to the variability of this character in some populations. In the following decades, *microlepis* was considered to be a valid species by many authors while MERTENS (1956) suggested that *microlepis* could be a subspecies of *U. aegyptia*. However, this point of view was not adopted by other authors until the 1980s.

MOODY (1987) suggested *microlepis* to be a synonym of the nominotypic subspecies, because: "the only character used in earlier literature to diagnose *aegyptia* (spiny scales on the flanks) is variable

throughout the range of both species; and no other diagnostic characters have been discovered". MOODY's (1987) point of view was followed by JOGER (1987) and SCHÄTTI & GASPERETTI (1994). ARNOLD (1980) supposed, that *aegyptia* and *microlepis* might be conspecific and treated *microlepis* as a subspecies of *U. aegyptia* in subsequent papers (ARNOLD 1986, 1987). LEVITON et al. (1992) and WILMS (1995) adopted this point of view and pointed out, that it would not be justified to synonymize *microlepis* with *aegyptia* before greater knowledge on the geographic variability of these taxa would have been gained. ANDERSON (1999) followed MOODY's (1987) point of view and treated *microlepis* as a synonym of *U. aegyptia.*

MATERIALS AND METHODS

In the present study, 61 specimens of the *U. aegyptia* group from the Natural History Museum, London (BMNH), Naturhistorisches Museum Wien (NMW), Museo Zoologico de "La Specola", Firenze (MZUF), and Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn (ZFMK) have been examined. This study was carried out within the framework of a revision of the entire genus, where a total of 622 specimens have been investigated (WILMS 1998).

For each specimen the following data were routinely recorded: snout-vent length, length of tail (if intact), head width (between anterior margins of ear openings), head length (from tip of snout to anterior margin of left ear opening), width of tail between 4th and 5th whorl, maximum tail width at 5th whorl, number of tail whorls, number of scales beneath 4th toe (left), number of gular scales (from mental scale to a hypothetic line between anterior margins of ear openings), number of scales around mid-body, number of ventral scales (between gular- and inguinal folds), number of scales around 5th whorl, number of preano-femoral pores (left and right), number of enlarged scales at anterior margin of ear opening, number of scales between subocculars and supralabials, number of scales from middle of inferior margin of ear opening to mental scale (left and right), number of scales from upper to lower margin of left ear opening (approx. three scale rows in front of anterior margin of ear opening), number of scales from upper end of left ear opening to first enlarged subocular scale, presence or absence of enlarged tubercular scales at the flanks, of enlarged tubercular scales at the dorsum, and of interscalary scales between the whorls.

Basic statistics of all data were calculated (e.g., fig. 2). Moreover, the coefficient of differentiation concept of MAYR (1975) was applied to the data sets.

RESULTS

To solve the above mentioned taxonomic problems is the main objective of the present paper. Two characters proved to be diagnostic. All specimens belonging to *aegyptia* s. str. have enlarged tubercles scattered in their flank scalation, whereas most of the examined specimens of *microlepis* lack this feature (figs. 13, 14). Some specimens of *microlepis*, especially from the northern parts of the range (e.g., Kirkuk, Iraq), have very few, slightly enlarged lateral tubercles. They never reach the size of the tubercles found in *aegyptia* s. str. and they have a different distribution. If present, in *microlepis* the lateral tubercles are restricted to the rear parts of the body just in front of the insertion of the hind legs, whereas in *aegyptia* they are scattered over the whole flank scalation.

Furthermore, the scale counts between the gular and inguinal folds are different in both taxa. The values are 126-158 (mean 142; n = 18) in *aegyptia* and 149-193 (mean 171.8; n = 35) in *microlepis*. The coefficient of differentiation (D) (sensu MAYR 1975) is 1.265 for this character. This is a little less than can be expected between subspecies (D = 1.28) and corresponds to a non-overlap of the counts of 89 - 90%. Beside that, *microlepis* seems to be more colourful than *aegyptia* s. str. in showing occasionally a yellow or greenish coloration.

Further studies are needed to analyse whether both taxa interbreed at the contact zone of their ranges or not. This potential contact zone should be expected to run east of Wadi Araba (Jordan and Israel) and east of Wadi Sawawin in the Jabal as-Sinfa region (Saudi Arabia). The animals examined from both localities are without any doubt members of *aegyptia* s. str., while specimens east of that region are exclusively *microlepis*. Because of the overall similarity of both taxa and their parapatric distribution we think it justified to treat *microlepis* as a subspecies of *U. aegyptia*, at least until reproductive isolation mechanisms between both taxa will be demonstrated.

The syntypes of *microlepis* have been included in the present study, but type material of *aegyptia* could not be traced. ANDERSON (1999) regarded the holotype of FORSKÅL's *Lacerta aegyptia* as "not located". Moreover FORSKÅL's (1775) short latin description: "*Lacerta aegyptia*, HASSELQ. p. 302. Aegyptiis Dabb. Obs. Femora teretia sine verrucis. Cauda verticillata non longa. Squama patentes, subconicae, mucronatae. Corpus nudum, rugosum" referred to a name already used by HASSELQUIST in the pre-Linnean time, so that perhaps no particular specimen has been used in the function of a type specimen. Finally, the zoological specimens collected by FORSKÅL have partly been lost due to a nautical accident, and only molluscs and some fishes finally reached Copenhagen (SPÄRCK 1963; WOLFF 1979; RASMUSSEN 1986; PIEPER in litt. 2000).

Because of the debate concerning the validity and the taxonomic rank of the taxon *microlepis* and the description of a new, closely related species, we think that it is necessary to designate a neotype for the taxon *Uromastyx aegyptia* (Art. 75.3 ICZN).

From the two syntypes of *Uromastyx microlepis* (BMNH 1946.8.11.67; BMNH 1946.8.14.55) we designate BMNH 1946.8. 14.55 as the lectotype. This decision is due to the better state of preservation and completeness of the specimen.

TAXONOMIC ACCOUNT

I. *Uromastyx aegyptia aegyptia* (FORSKÅL, 1775)

1775 *Lacerta aegyptia* FORSKÅL, Descr. Anim. Itin. orient.: 13. Locus typicus: Ägypten (fide WERMUTH 1967), Neotype (design. hoc loco): ZFMK 44216. Locus typicus: Suez, Egypt.
1775 *Lacerta harbai* FORSKÅL (? syn. fide MERREM 1820), Descr. Anim. Itin. orient.: 9.
1802 *Stellio spinipes* DAUDIN, Hist. nat. gén. part. Rept. 4: 31.
1820 *Uromastyx spinipes* - MERREM, Tent. Syst. Amph.: 56.
1820 *Lacerta herbai* - MERREM (nomen substitutum pro *Lacerta harbai* FORSKÅL 1775), Tent. Syst. Amph.: 56.
1822 *Mastigura spinipes* - FLEMING, Philos. Zool., 2: 277.
1885 *Uromastix spinipes* - BOULENGER, Cat. Liz. Brit. Mus. (Ed. 2) 1: 407.
1896 *Uromastix aegyptius* - ANDERSON, Contrib. Herpetol. Arabia: 79, 85.
1898 *Uromastix aegyptius* - ANDERSON, Zool. Egypt, 1 Rept. Batr.: 129.
1933 *Uromastyx aegyptia* - FLOWER, Proc. zool. Soc. London 1933 (3): 779.
1956 *Uromastix aegyptius* - SCHMIDT & MARX, Fieldiana, Zool., 39: 26.
1960 *Uromastix aegyptius* - PASTEUR & BONS, Cat. act. Rept. Maroc: 46.
1961 *Uromastix aegyptius* - BARASH & HOOFIEN, Rept. Israel: 101.
1962 *Uromastyx aegyptia* - KHALIL & HUSSEIN, Bull. Zool. Soc. Egypt. 17: 80.
1968 *Uromastix aegyptius* - MARX, Special Publ. U.S. Narv. Med. Res. Unit 3: 13.
1982 *Uromastyx aegyptius* - WERNER, Herp. Comun. Wildl. Res. Rep. 13: 155.
1986 *Uromastyx aegyptius* - JOGER, Studies in Herpetology: 187.
1987 *Uromastyx aegyptius* - WERNER, Brit. Herp. Soc. Bull 19: 6.
1987 *Uromastyx aegyptius* - MOODY, Proc. 4th General Meeting of the Societas Europaea Herpetologica: 287.
1987 *Uromastyx a. aegyptius* - ARNOLD, Proc. Symp. Fauna Zoogeogr. Middle East. 28: 249.
1994 *Uromastyx aegyptia* - SCHÄTTI & GASPARETTI, Fauna of Saudi Arabia 14: 369.
1995 *Uromastyx aegyptia aegyptia* - WILMS, Dornschwanzagamen: 71.
1999 *Uromastyx aegyptius* - ANDERSON, Lizards of Iran: 290.

Diagnosis

Uromastyx aegyptia is distinguished from *U. asmussi* (STRAUCH, 1863), *U. loricata* (BLANFORD, 1874), and *U. hardwickii* GRAY, 1827 by the absence of intercalary scales between the annuli of the tail, from *U. thomasi* PARKER, 1930 and *U. princeps* O'SHAUGHNESSY, 1880 by the proportionately longer tail (25.0-35.16% of snout-vent length in *U. thomasi* and 34.62-52.55% in *U.*

princeps versus 66.67-102.83% in *aegyptia* and 60.18-78.0% in *microlepis*) and from the species of the *acanthinura* group [*acanthinura* BELL, 1825, *nigriventris* ROTHSCHILD & HARTERT, 1912, *dispar* HEYDEN, 1827, *maliensis* JOGER & LAMBERT, 1996, *flavifasciata* MERTENS, 1962, *geyri* L. MÜLLER, 1922] by the higher number of scales around midbody (142-231 in the *U. acanthinura* species group versus 247-311 in *aegyptia* and 255-391 in *microlepis*).

It differs from the taxa of the *U. ocellata* group [*benti* (ANDERSON, 1894), *ocellata* LICHTENSTEIN, 1823, *ornata* HEYDEN, 1827, *macfadyeni* PARKER, 1932, *philbyi* PARKER, 1938] by the arrangement of the annuli of the tail, in that the last 8-21 whorls consist of a continuous scale row each in the *ocellata* group, while only the last 2-8 whorls are made up of a continuous scale row each in the *U. aegyptia* group.

Uromastyx aegyptia differs from *U. occidentalis* MATEO, GENIEZ, LÓPEZ-JURADO & BONS, 1998 in having femoral- and preanal pores. Furthermore *U. occidentalis* lacks tubercular scales on the flanks which is a diagnostic feature of *U. aegyptia aegyptia*. The taxon *microlepis* is distinguished from *aegyptia* by the lack of enlarged tubercular scales scattered over the scalation of the flanks and by smaller scales. For differences between *U. aegyptia* and the new species described herein see chapter III.

Description of the neotype of *Uromastyx aegyptia aegyptia*

Neotype: ZFMK 44216, adult male, Egypt, Suez at the road to Cairo, coll. I. REHAK, leg. VIII. 1982 (figs. 10, 11).

Snout-vent length (SVL): 27.8 cm; tail length 23.4 cm. Total length: 51.2 cm. Tail length is 84.17 % of SVL. Head length (HL): 47 mm; head width (HW): 43.5 mm; width of tail between 4th and 5th whorl: 43 mm; maximum tail width at 5th whorl: 51 mm; 322 scales around midbody; 155 scale rows between gular and inguinal folds, 46 gular scales from a hypothetic line between anterior margins of ear openings to mental scale; 27 (left) and 31 (right) scales between middle of inferior margin of ear opening and mental scale; 5 scale rows between supralabials and enlarged suboculars on either side; 31 scales around 5th whorl, 22 tail whorls; 16 subdigital lamellae beneath 4th toe; 18 (left) and 19 (right) preanal/femoral pores.

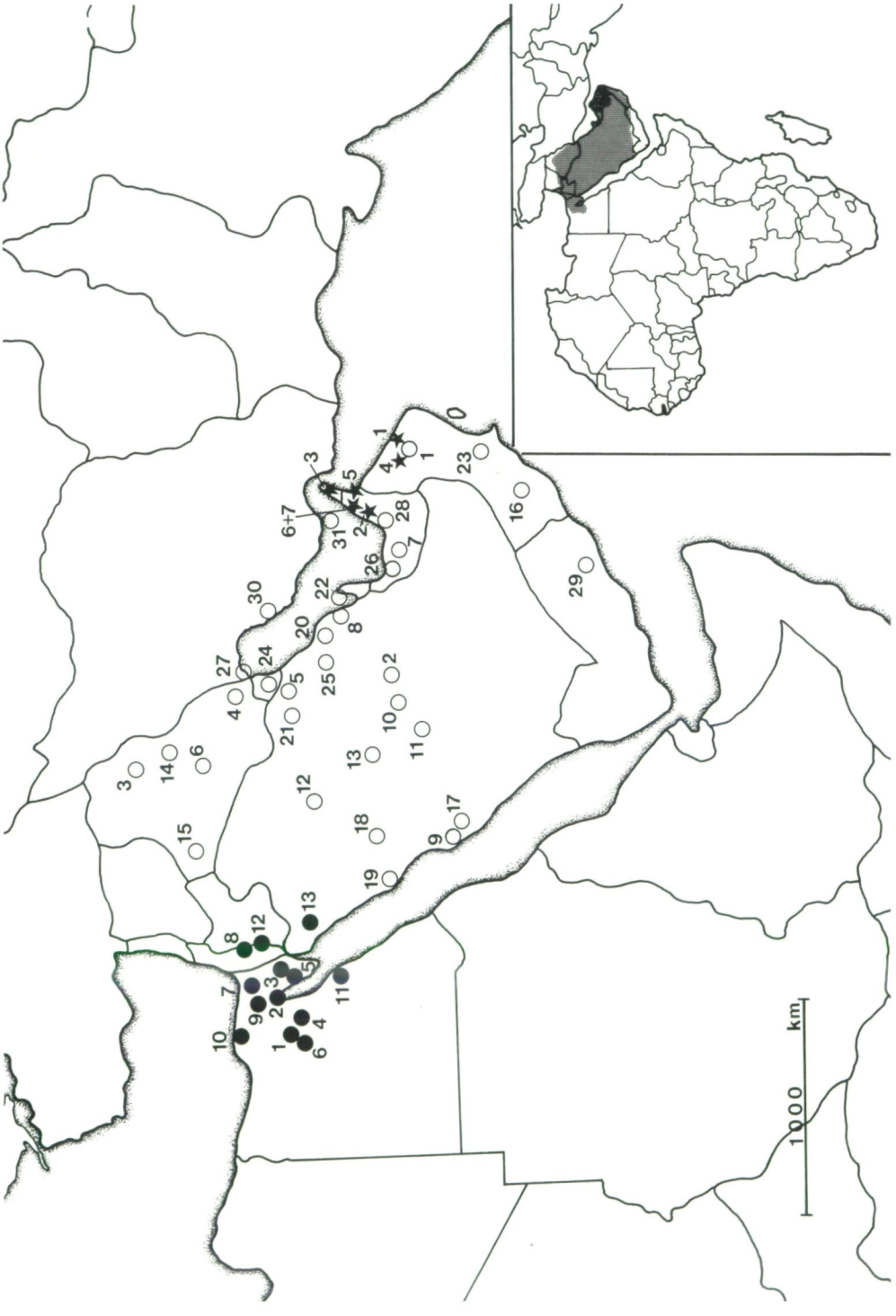
Head covered with irregularly arranged scales of different size: smallest above the eyes; slightly pointed in the occipital region; very small in the neck. Nostrils big; 3 (left) and 4 (right) scale rows between nostril and supralabial scales. Anterior margins of ear openings covered with enlarged, triangular pointed scales (4 left / 5 right). Scales of underside of head small. Scales of chest, belly, and underside of

Fig. 1 (opposite page): Distribution of *Uromastyx leptieni* sp. n. and *U. aegyptia* (FORSKÅL, 1775). Localities without source are from museum specimens (see appendix).
Abb. 1 (gegenüberliegende Seite): Verbreitung von *Uromastyx leptieni* sp. n. und *U. aegyptia* (FORSKÅL, 1775). Fundorte ohne Quellenangabe stammen von Museumsexemplaren (siehe Appendix).

★ - *Uromastyx leptieni* sp. n.. 1 - Muscat; 2 - Jebel Ali; 3 - Munay, Trucial Oman; 4 - Vicinity of Rostaq, 5 - Wadi Siji; 6 - Tawi Bil Khabis; 7 - S Jebel Jayah.

● - *Uromastyx aegyptia aegyptia*. 1 - 120 km S Cairo (ANDERSON 1898), Khanka/ NE of Cairo (FLOWER 1933), 35 km SE.of Cairo (KHALIL & HUSSEIN 1962); 2 - Suez, Jebel Suez (MARX 1968); 3 - Sinai (Jebel el Tik); 4 - Kutamiya region, Wadi Iseili (MARX 1968); 16 km W Oasis Feiran; 6 - Wadi Hof (Helwan), Wadi Digla (FLOWER 1933); 7 - El Turkmania near Maghara (FLOWER 1933); 8 - vicinity of Hazeva (Arava Valley, Israel) (BOUSKILA 1985); 9 - between Suez and Ismailia; 10 Beltim (ANDERSON 1898); 11 - Vicinity of Hurgharda; 12 - Wadi Araba (Israel and Jordania); 13 - Wadi Sawawin in the Jabal as Sinfa region.

O - *Uromastyx aegyptia microlepis* 1 - 100 km from Muscat (Oman); 2 - 100 km NE Riyad (Saudi Arabia); 3 - Kirkuk (Iraq); 4 - 50 km W Basrah (Iraq), 60 km W Basrah (BLANFORD 1874); 5 - Wadi al Miyah (MANDAVILLE 1965); 6 - W Karbala (Iraq) (KEVORK & AL UTHMAN 1972); 7 - 23°45'N, 53°33'E (LEVITON & ANDERSON 1967); 8 - Al Jubail, 70 km N Bahrein (SCHMIDT 1939); 9 - Jedda (FARAG & BANAJA 1980); 10 - Al Quwayiyah (TILBURY 1988); 11 - Wadi Sirra; 12 - Sa'ira; 13 - Anaiza (SCHMIDT 1941); 14 - Bagdad; 15 - Rutba (SCHMIDT 1939); 16 - Wadi Qitbit (ARNOLD 1980); 17 - Wadi Fatimah; 18 - Madinah; 19 - Yanbu al Bahr (FARAG & BANAJA 1980); 20 - Dharan (HAAS 1957); 21 - between Al Gaisumah (= Al Quaysumah) and Turaif (HAAS & WERNER 1969); 22 - Bahrein, Ras Al Barr; 23 - Jiddât al Harasis; 24 - Kuwait; 25 - Dib Dibah; 26 - Jebel Gaddah near Jebel Dannah; 27 - Fao; 28 - Abu Dhabi (Al Hamran, Bada Zaid); 29 - Hadramaut (Bin Khautar, Jol); 30 - Rudkhaneh-ye Shapur, 31 - Sirri Island (Iran) (ANDERSON 1999).



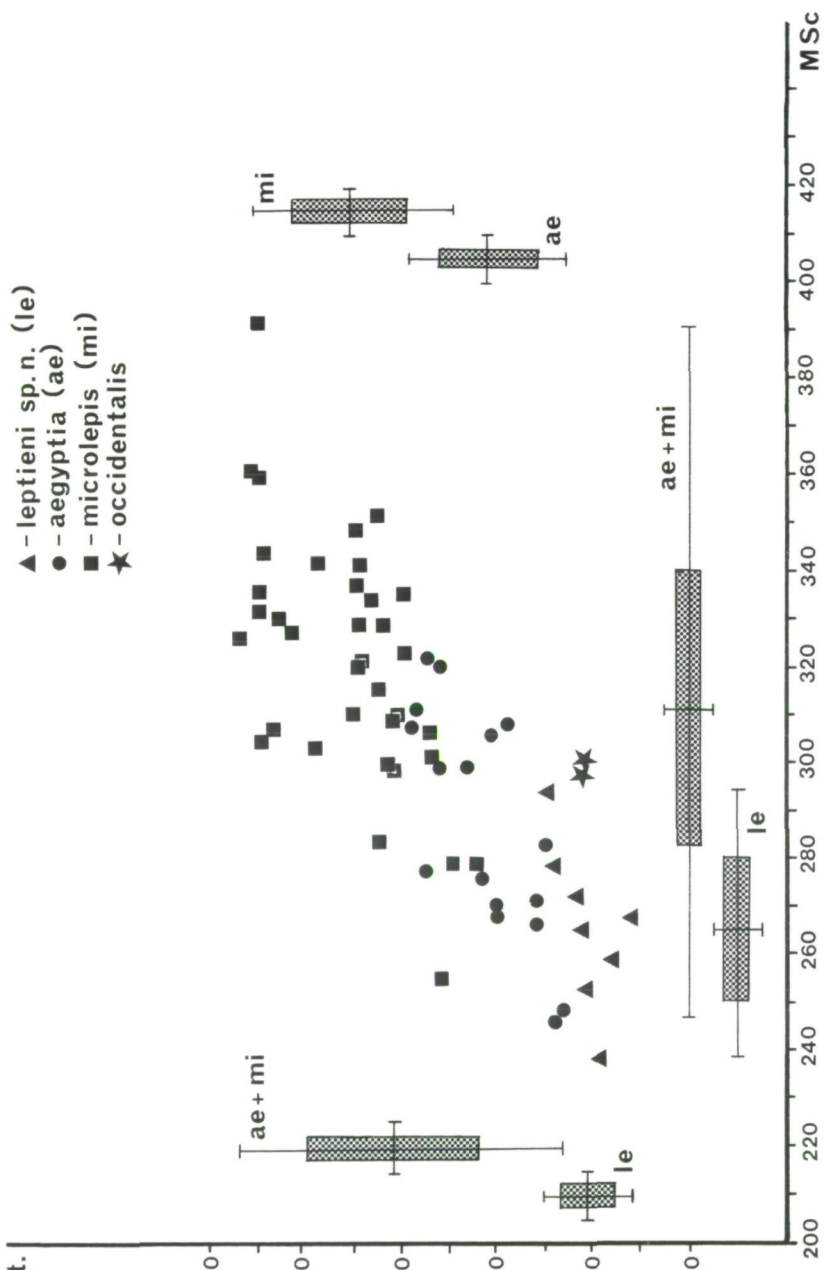


Fig. 2: Scatter plot and basic statistics of the number of transversal rows of ventrals (Vent.) and the number of scales around midbody (M Sc) in *Uromastyx leptieni* sp. n. (▲, le; n = 8), *U. ae. aegyptia* (●, ae; n = 18), *U. ae. microlepis* (■, mi; n = 35), and *U. occidentalis* (★; n = 2).

Abb. 2: Streudiagramm und statistische Kenngrößen der Anzahl der Ventralia-Querreihen (Vent.) und der Anzahl von Schuppen um die Rumpfmitte (M Sc) bei *Uromastyx leptieni* sp. n. (▲, le; n = 8), *U. ae. aegyptia* (●, ae; n = 18), *U. ae. microlepis* (■, mi; n = 35) und *U. occidentalis* (★; n = 2).

extremities smooth. Scales of soles slightly keeled. 3-4 distinct keels on subdigital scales.

Scales of back small and smooth. At the flanks enlarged lateral tubercles. Sides of sacral region with distinctly enlarged tubercular scales. Scales of upper side of upper arms smooth, scales of forearm smooth or slightly pointed. Scales on back of upper arms distinctly enlarged, some slightly keeled. Dorsal parts of hind legs covered with enlarged tubercular scales intermixed with very small, smooth scales. Scales on upper side of feet enlarged, distinctly keeled.

Back and head greyish with some darker symmetrical spots. Upper side of tail yellowish. Extremities greyish, arms lighter than back. Neck dark grey. Underside of head and throat dark grey. Chest up to forelegs greyish. Underside of forelegs grey. Belly from forelegs to midbody with greyish dots, rest of the belly, underside of hindlegs and underside of tail yellowish brown with some greyish dots.

Variability

Total length: 129-716 mm; tail length: 66.67-102.83% of SVL; HL: 19-64 mm; HW: 14-58 mm; HW/HL: 0.84-0.99. Number of tail whorls 20-23; number of subdigital scales under 4th toe: 16-20; number of gular scales: 33-59; number of scales around midbody: 247-322; number of ventral scales: 126-158; number of scales around 5th whorl: 29-36; number of preanal/ femoral pores: 14-20; scales between suboculars and supralabial scales: 4-7; number of scales between middle of inferior margin of ear opening and mental scale: 24-41.

Distribution

The nominotypic subspecies inhabits nothern Egypt east of the river Nile, the Sinai Peninsula, Israel and extreme northwestern Saudi Arabia (Wadi Sawawin / Jabal as Sinfa). The borderline between the ranges of the taxa *aegyptia* and *microlepis* runs obviously east of Wadi Araba in Israel and Jordan and east of Wadi Sawawin in the Jabal as Sinfa region of Saudi Arabia.

Several authors of the 19th century reported on the discovery of big-growing *Uromastyx* from the western parts of the Sahara. Those animals could, most likely, be members of the recently described *U. occidentalis*. For discussion see MATEO et al. (1998).

In addition, one specimen referred to "*Uromastyx spinipes*" (= *U. aegyptia*) by PETERS (1880) from Sokna (Libya) is a misidentified specimen of *U. acanthinura*.

Until today, there is no documented record of *U. aegyptia* west of the Nile.

II. *Uromastyx aegyptia microlepis* BLANFORD, 1874

1874 *Uromastix microlepis* BLANFORD, Proc. zool. Soc. London, 1874: 658. Lectotype (design. hoc loco): BM 1946.8.14.55 (Old number BM 74.8.11.1). Locus typicus: Vicinity of Basrah, Iraq.

1885 *Uromastix microlepis* - BOULENGER, Cat. Liz. brit. Mus. 1: 407.

1920 *Uromastix microlepis* - BOULENGER, Journ. Bombay. Nat. Hist. Soc. 27: 351.

1939 *Uromastyx microlepis* - SCHMIDT, Field Mus. nat. Hist. Zool. 24: 59.

1939 *Uromastyx aegyptius* - SCHMIDT (syn. fide LEVITON et al. 1992), Field Mus. nat. Hist. Zool. 24: 59.

1941 *Uromastyx aegyptius* - SCHMIDT (syn. fide LEVITON et al. 1992), Field Mus. nat. Hist. Zool. 24 (16): 162.

1956 *Uromastyx aegyptius microlepis* - MERTENS, Jh. Ver. vaterl. Naturk. Württemberg, 111: 93.

1957 *Uromastyx microlepis* - HAAS, Proc. California Acad. Sci. 29 (4): 70.

1959 *Uromastix aegyptius* - KHALAF (syn. fide LEVITON et al. 1992) Rept. Iraq: 22.

1959 *Uromastix microlepis* - KHALAF, Rept. Iraq: 22.

1959 *Uromastix microlepis* - HAAS & BATTERSBY, Copeia 1959 (3): 197.

1960 *Uromastix microlepis* - KHALAF, Iraq nat. Hist. Mus. Publ.18: 13.

1963 *Uromastix microlepis* - ANDERSON, Proc. California Acad. Sci. 31 (4): 475.

1967 *Uromastyx microlepis* - LEVITON & ANDERSON, Proc. California Acad. Sci. 35: 164.

1969 *Uromastix microlepis* - HAAS & WERNER, Bull. Mus. Comp. Zool., 138 (6): 341.

1972 *Uromastix aegyptius* - KEVORK & AL-UTHMAN (syn fide LEVITON et al. 1992), Bull. Iraq nat. Hist. Mus. 5 (2): 26.

1980 *Uromastyx microlepis* - ARNOLD, J. Oman Stud. Spec. Rep. 2: 293.

1980 *Uromastix aegyptius* - FARAG & BANAJA, Bull. Fac. Sci. K.A.U. 4: 12.

1983 *Uromastix microlepis* - CLOUDSLEY-THOMPSON, British Herp. Soc. Bull 7: 77.

1986 *Uromastyx microlepis* - JOGER, Studies in Herpetology: 187.

1986 *Uromastyx aegyptius microlepis* - ARNOLD, Fauna of Saudi Arabia 8: 392.

1987 *Uromastyx aegyptius* - MOODY, Proc. 4th Gen-

eral Meeting of the Societas Europaea Herpetologica: 287.

1987 *Uromastyx microlepis microlepis* - ARNOLD (ex errore), Proc. Symp. Fauna Zoogeogr. Middle East 28: 249.

1987 *Uromastyx aegyptius microlepis* - ARNOLD, Proc. Symp. Fauna Zoogeogr. Middle East. 28: 249.

1988 *Uromastyx microlepis* - TILBURY, J. Herp. Assoc. Africa 34: 26.

1992 *Uromastyx aegyptius microlepis* - LEVITON et al., Handbook to Middle East Amph. & Rept.: 23.

1994 *Uromastyx aegyptia* - SCHÄTTI & GASPARETTI, Fauna of Saudi Arabia 14: 369.

1995 *Uromastyx aegyptia microlepis* - WILMS, Dornschwanzagamen: 72.

1999 *Uromastyx aegyptius* - ANDERSON, Lizards of Iran: 290.

Diagnosis

Diagnosing *microlepis* against all other *Uromastyx* species is the same as with *aegyptia* with the exception of *U. occidentalis*. *Uromastyx aegyptia microlepis* differs from *U. occidentalis* in having femoral and preanal pores. For differences between *U. a. microlepis* and *U. a. aegyptia* as well as the new species described herein see diagnoses in chapters I. and III.

Description of the lectotype of *Uromastyx aegyptia microlepis*

Lectotype: BMNH 1946.8.14.55. adult male, Iraq, Basrah. leg. Capt. PHILLIPS (without date).

SVL: 25 cm; tail length: 18 cm; total length: 43 cm. Tail length is 72 % of SVL. HL: 40 mm; HW: 34 mm; width of tail between 4th and 5th whorl: 26.5 mm; maximum tail width at 5th whort: 35 mm; 327 scales around midbody; 184 scale rows between gular and inguinal folds; 58 gular scales from a hypothetic line between anterior margins of ear openings to mental scale; 31 (left) and 33 (right) scales between middle of inferior margin of ear opening and mental scale; 7 (left) and 6 (right) scale rows between supralabials and enlarged suboculars; 34 scales around 5th whorl; 22 tail whorls; 18 subdigital lamellae beneath 4th toe; 14 (left) and 15 (right) preanal/femoral pores.

Upper side of head covered with convex scales, largest on snout, occiput, and forehead between eyes. Nostrils lateral, oval rather large. Rostral enlarged; mental smaller than rostral. Chin covered with very small convex scales, except near the sublabials; scales of neck equally small, subconical or mucronate. Scales on back and sides all small, mucronate. No enlarged scales on the sides. Abdominal scales rhomboidal, arranged in transverse rows. Scales of anterior portion of fore limb like abdominal scales, those on the posterior surface the size of dorsal scales. A few slightly enlarged scales on the outer surface of the forearm. Scales on hind limb larger on the inner, smaller on the outer surface. A row of large conical tubercles passes down the front of the tarsus, and large spinose tubercles are scattered over its outer surface. Feet and toes covered beneath with keeled scales.

The coloration is olive-grey with small rather indistinct darker spots on the back; the lower parts and the tail are rather pale.

Variability

Total length: 107-668 mm; tail length: 60.18-79.03% of SVL; HL: 15-62 mm; HW: 13-56 mm; HW/HL: 0.86-0.99. Number of tail whorls: 20-24; number of subdigital scales under 4th toe: 14-23; number of gular scales: 38-65; number of scales around midbody: 255-391; number of ventral scales: 149-193; number of scales around 5th whorl: 30-43; number of preanal/femoral pores: 13-21; scales between suboculars and supralabial scales: 5-8; number of scales between middle of inferior margin of ear opening and mental scale: 27-49.

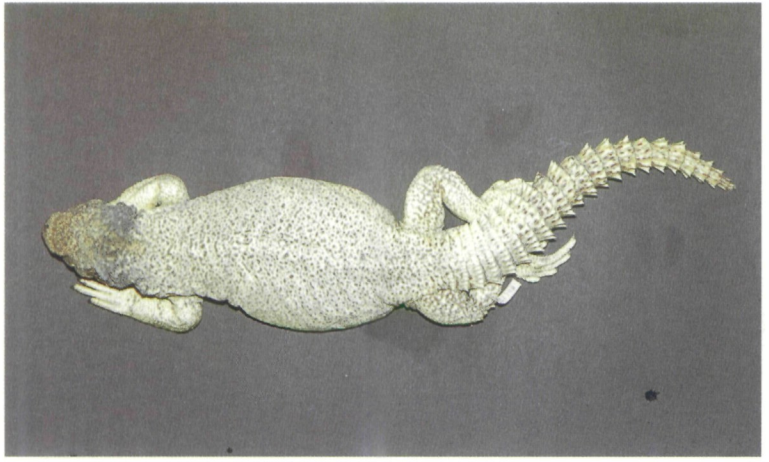
Figs. 3 - 6 (opposite page): *Uromastyx leptieni* sp. n. Photographs: T. WILMS (Bonn).
Abb. 3 - 6 (gegenüberliegende Seite): *Uromastyx leptieni* sp. n. Photos: T. WILMS (Bonn).

Fig. 3: Holotype (ZFMK 52398), dorsal view. / Abb. 3: Holotypus (ZFMK 52398), Dorsalansicht.

Fig. 4: Holotype (ZFMK 52398), ventral view. / Abb. 4: Holotypus (ZFMK 52398), Ventralansicht.

Fig. 5: Juvenile (BMNH 1973.2040, Jebel Ali, Dubai; total length 14.5 cm), dorsal view.
Abb. 5: Jungtier (BMNH 1973.2040, Jebel Ali, Dubai; Gesamtlänge 14,5 cm), Dorsalansicht.

Fig. 6: Juvenile (BMNH 1973.2040, Jebel Ali, Dubai; total length 14.5cm), ventral view.
Abb. 6: Jungtier (BMNH 1973.2040, Jebel Ali, Dubai; Gesamtlänge 14,5 cm), Ventralansicht.



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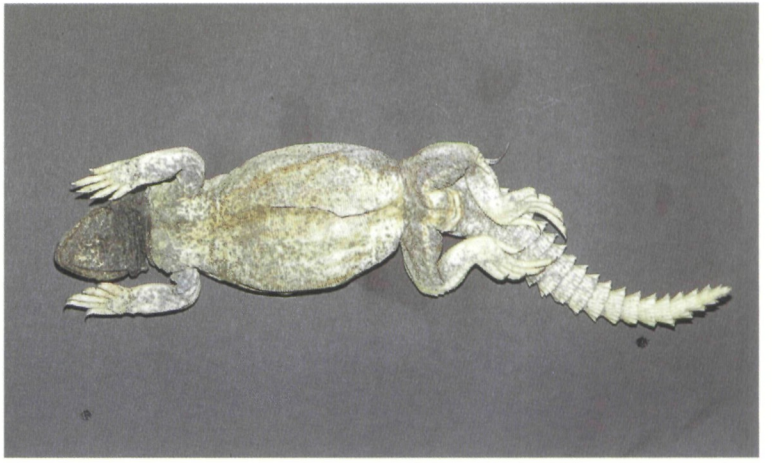

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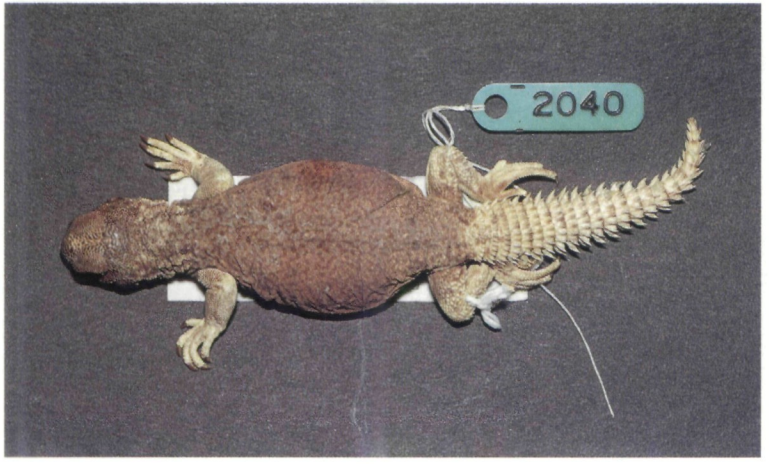

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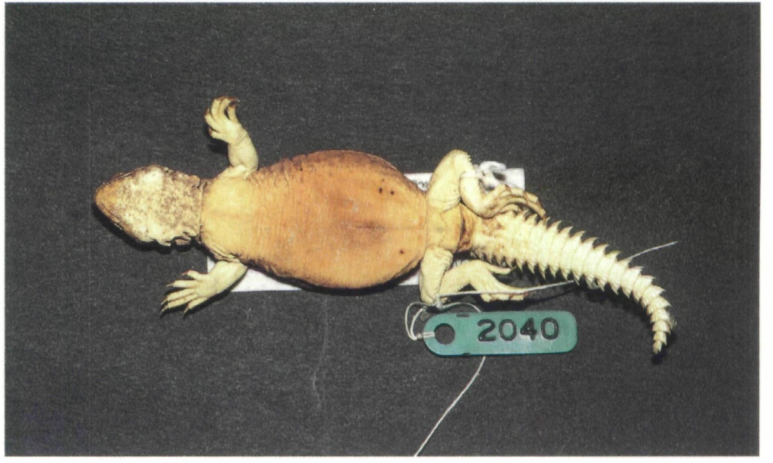

Distribution

The subspecies *microlepis* lives in the deserts and semideserts of the Arabian peninsula (Saudi Arabia, Yemen, Oman, United Arab Emirates, Qatar, Kuwait) and in Jordan, Syria, Iraq and coastal Iran.

During the evaluation of the data sets obtained in this study, it was obvious that the specimens from south east Arabia differ from both *aegyptia* and *microlepis* in several characters.

These specimens will be described below as

III. *Uromastyx leptieni* sp. n. (figs. 3-9)

1984 *Uromastyx microlepis* (non BLANFORD, 1874) - ARNOLD, J. Zool. London 204: 333.
1995 *Uromastyx aegyptia microlepis* (non BLANFORD, 1874) - WILMS, Dornschwanzagamen: 68, 69 (figs. 51, 52).

Diagnosis

Uromastyx leptieni sp. n. is a big-growing member of the *U. aegyptia* group, which is distinguished from *U. asmussi*, *U. loricata*, and *U. hardwickii* by the absence of intercalary scales between the annuli of the tail; from *U. thomasi* and *U. princeps* by the proportionately longer tail (25.0-35.16% of snout-vent length in *U. thomasi* and 34.62-52.55% in *U. princeps* versus 70.59-87.28 in *U. leptieni*), and from the taxa of the *U. acanthinura* complex (*acanthinura*, *nigriventris*, *dispar*, *maliensis*, *flavifasciata*, *geyri*) by the increased number of scales around midbody (142-231 in the *U. acanthinura* group versus 238-297 in *U. leptieni*). It differs from the taxa of the *U. ocellata* group (*benti*, *ocellata*, *ornata*, *macfadyeni*, *philbyi*) by the arrangement of the annuli of the tail, in that 8-21 whorls consist of a continuous scale row each in the *ocellata* group while only the last 2-7 whorls are made up of a continuous scale row each in *leptieni*.

From *U. aegyptia*, *U. leptieni* is distinguished by the juvenile colour pattern [reddish-brown with dark brown vermiculation in *leptieni* versus greyish-brown with dorsal crossbands of pale to bright yellow,

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Figs. 7 - 10 (opposite page): Photographs 7, 8, 10 - T. WILMS (Bonn), 9 - E. N. ARNOLD (London).
Abb. 7 - 10 (gegenüberliegende Seite): Photos 7, 8, 10 - T. WILMS (Bonn) , 9 - E. N. ARNOLD (London).

Fig. 7: Adult male *Uromastyx leptieni* sp. n. (BMNH 85.II.7.4, Muscat, Oman; total length 53 cm).
Abb. 7: Adultes Männchen von *Uromastyx leptieni* sp. n. (BMNH 85.II.7.4, Muskat, Oman; Gesamtlänge 53 cm).

Fig. 8: Adult male *Uromastyx leptieni* sp. n. (BMNH 85.II.7.4, Muscat, Oman; total length 53 cm). Observe the plate-like structures along the vertebral line.
Abb. 8: Adultes Männchen von *Uromastyx leptieni* sp. n. (BMNH 85.II.7.4, Muskat, Oman; Gesamtlänge 53 cm) mit schildartigen Strukturen entlang der Rückenmitte.

Fig. 9: Living specimen of *Uromastyx leptieni* sp. n. from south of Jebel Jayah, UAE (BMNH 1973.2039).
Abb. 9: Lebendes Exemplar *Uromastyx leptieni* sp. n.von südlich des Jebel Jayah, VAE (BMNH 1973.2039).

Fig. 10: Neotype of *Uromastyx aegyptia aegyptia* (ZFMK 44216), dorsal view.
Abb. 10: Neotypus von *Uromastyx aegyptia aegyptia* (ZFMK 44216), Dorsalansicht.

Figs. 11 - 14 (over next page): Photographs T. WILMS (Bonn).
Abb. 11- 14 (übernächste Seite): Photos T. WILMS (Bonn).

Fig. 11: Neotype of *Uromastyx aegyptia aegyptia* (ZFMK 44216), ventral view.
Abb. 11: Neotypus von *Uromastyx aegyptia aegyptia* (ZFMK 44216), Ventralansicht.

Fig. 12: Juvenile *Uromastyx aegyptia aegyptia* (ZFMK 46507) [top] and *U. a. microlepis* (ZFMK 43648) [bottom], dorsal view.
Abb. 12: Jungtiere von *Uromastyx aegyptia aegyptia* (ZFMK 46507) [oben] und *U. a. microlepis* (ZFMK 43648) [unten], Dorsalansicht.

Fig. 13: Juvenile *Uromastyx aegyptia aegyptia* (ZFMK 46507), scalation of sacral region and flank.
Abb. 13: Jungtier von *Uromastyx aegyptia aegyptia* (ZFMK 46507), Beschuppung von Sakralregion und Flanke.

Fig. 14: Juvenile *Uromastyx aegyptia microlepis* (ZFMK 43648), scalation of sacral region and flank.
Abb. 14: Jungtier von *Uromastyx aegyptia microlepis* (ZFMK 43648), Beschuppung von Sakralregion und Flanke.

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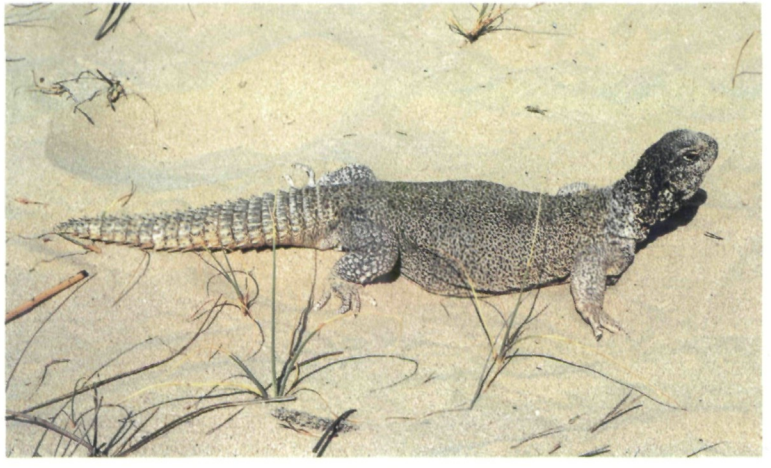

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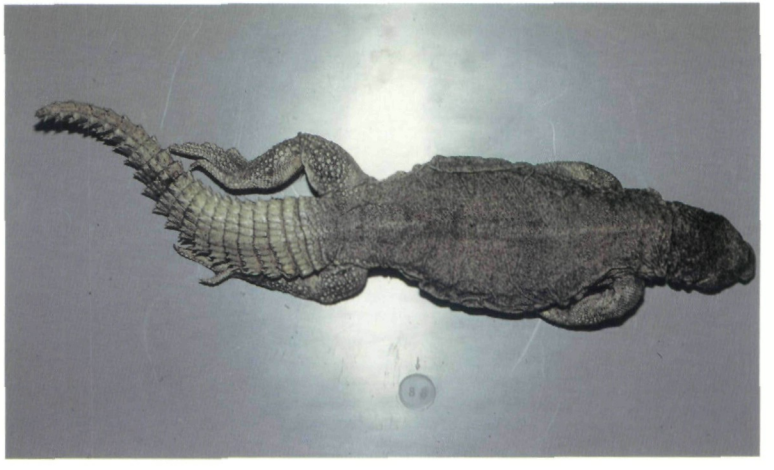

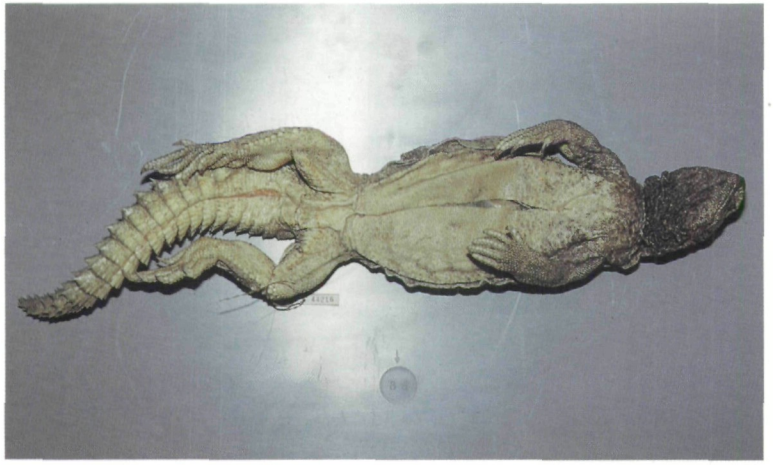

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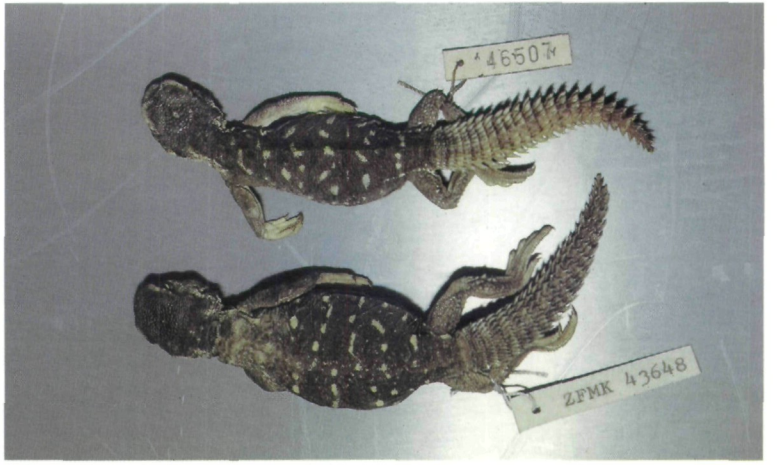

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sometimes reddish ocelli in *aegyptia*] (figs. 5, 12) and the lower number of ventral scales [112-130 (mean 121.3) in *leptieni* versus 126-158 (mean 142) in *aegyptia* and 149-193 (mean 171.9) in *microlepis*]. *Uromastyx leptieni* is different from *microlepis* in having enlarged scales on the flanks.

Uromastyx leptieni differs from *U. occidentalis* in having femoral and preanal pores and by the presence of tubercular scales scattered across the scalation of the flanks.

Holotype

ZFMK 52398, adult female, Wadi Sijii, United Arab Emirates (UAE), coll. R. LEPTIEN, VI. 1983 (figs. 3, 4).

Description of the holotype of *Uromastyx leptieni* sp. n.

Total length: 44.4 cm; SVL: 25.4 cm; tail length: 19 cm (74.8% of SVL); HL: 45.3 mm; HW: 42 mm; width of tail between 4th and 5th whorl: 30.5 mm; maximum tail width at 5th whorl: 40 mm; 271 scales around midbody; 123 scale rows between gular and inguinal folds, 41 gular scales from a hypothetic line between anterior margins of ear openings to mental scale; 32 (left) and 33 (right) scales between middle of inferior margin of ear opening and mental scale; 6 scale rows between supralabials and enlarged suboculars on either side; 30 scales around 5th whorl, 22 tail whorls, only the last two whorls made up as single continuous scale rows; 18 subdigital lamellae beneath 4th toe; 16 (left) and 15 (right) preanal / femoral pores.

Head covered with irregularly arranged scales of different size; scales smallest above the eyes. Occipital and nuchal scales small and slightly pointed; at the neck, mostly on its sides, intermixed with enlarged, triangular pointed scales. Anterior margins of ear openings with enlarged, pointed scales.

Dorsal scales small and smooth. Scales on dorsal parts of forelegs slightly keeled. Scales of ventral parts of upper arm very small; scales on forearm triangular and keeled. Scales of soles distinctly keeled; each subdigital scale with 3-4 keels. Forelegs and back without enlarged tubercles. At the flanks, a row of enlarged tubercular scales, extending from sacral region almost to insertion of forelegs.

Dorsal parts of hind legs with enlarged tubercular scales placed among very small and smooth scales. Ventral parts with smooth scales, on the lower leg resembling the ventral scales in size and shape. Scales on ventral parts of thigh distinctly smaller than ventral scales.

Scales on upper side of feet distinctly keeled. Tail consisting of 22 annuli.

Back, upper side of tail and upper side of hind legs yellowish brown with small dark, irregularly distributed, dark dots. Upper side of forelegs yellowish brown. Neck and throat black. Head yellowish brown, dark brown marbled. Underside of head mostly black with some yellowish brown dots. Ventral parts of forelegs, chest, and abdomen marbled with grey. Ventral parts of hind legs and first half of underside of tail greyish.

Paratypes

BMNH 85.II.7.4, adult male, Muscat, Sultanate of Oman, A. S. G. JAYAKAR (without date); BMNH 85.II.7.5, juvenile, Muscat, Sultanate of Oman, A. S. G. JAYAKAR (without date); BMNH 1973.2039, adult male, south of Jebel Jayah, UAE, E. N. ARNOLD, 04.05.1973; BMNH 1973.2040, juvenile, Jebel Ali, SW. of Dubai, UAE, E. N. ARNOLD, 04.05.1973; BMNH 1973.2041, adult female, Tawi Bil Khabis, 25 km WSW Dayd, UAE, E. N. ARNOLD, 04.05. 1973; BMNH 1973.721, juvenile, Munay Trucial Oman, Sultanate of Oman, M. D. GALLAGHER, 10.03.1973; BMNH 1975.958, adult male, vicinity of Rostaq (23°24'N 58°03'E), Sultanate of Oman, J. BADDELEY, 06.04.1975.

Variability

In respect to habitus and coloration, BMNH 1975.958, BMNH 1973.2039, and 1973.2041 agree well with the holotype. The enlarged tubercular scales on the flanks are more pronounced than in the holotype.

The throat of BMNH 1975.958 is marbled with black and orange. A series of enlarged plate-like scales extends along the vertebral line from the middle of the back to the sacral region. Such plates are also present in BMNH 1973.2040 (juvenile,

figs. 5, 6). In BMNH 1973.721 (juvenile), this structure is only weakly developed, but is very clear in BMNH 85.II.7.4 (figs. 7, 8). In the latter specimen, a big adult male, the diameter of these plates equals the diameter of three to four scales of the paravertebral scalation. This specimen is entirely olive-grey. In the juvenile BMNH 85.II.7.5 from the same locality as BMNH 85.II.7.4, these plate-like scales are missing. It seems that this structure is only present in males.

The coloration of the juveniles (BMNH 1973.2040, BMNH 1973.721, and BMNH 85.II.7.5) is homogeneous. They are reddish-brown to dark brown with a dark brown to black reticular pattern.

Total length: 131-530 mm; tail length: 70.59-87.28% of SVL; HL: 16.5-52 mm; HW: 15-47 mm; HW/HL: 0.85-0.93. Number of tail whorls: 22-24; number of subdigital scales under 4th toe: 17-21; number of gular scales: 40-47; number of scales around midbody: 238-294; number of transversal rows of ventral scales: 112-130; number of scales around 5th whorl: 32-37; number of preanal/femoral scales (either side): 12-19; scale rows between subocular and supralabial scales: 5-7; number of scales between middle of inferior margin of ear opening and mental scale: 30-37.

Etymology

The specific name of the new taxon is dedicated to the collector of the holotype, Mr. ROLF LEPTIEN (Alveslohe, Germany).

Distribution

The new species described here is known from the vicinity of Muscat in the south through the Batina coastal plain and the eastern foothills of the Hajar al-Gharbi mountains to the Musandam Peninsula in the north (Oman, United Arab Emirates). The westernmost locality is Jebel Ali, approximately 50 km southwest of Dubai. According to TROLL & PAFFEN (1980) the climate is tropical summer-humid in the higher areas of the Hajar al-Gharbi and semihumid tropical at its borders. The Batina plain is a tropical semidesert or desert. The rather mesic Hajar al-Gharbi works as a barrier for the genus *Uromastyx* which is highly adapted to arid conditions. *Uromastyx leptieni* lives east of the Hajar al-Gharbi mountains, while *U. aegyptia microlepis* occurs west of the Hajar. So far known, the distribution areas of the above apparently allopatric taxa are separated by a distance of at least about 100 km, both north [*microlepis* - Abu Dhabi (Al Hamran, Bada Zaid); *leptieni* - Jebel Ali southwest of Dubai] and south [*microlepis* - approximately 100 km inland of Muscat; *leptieni* - Muscat] of the Hajar al-Gharbi mountains, where their territories seem to approach closest.

DISCUSSION

The description of *U. leptieni* sp. n. raises the total number of species of the *aegyptia* species-group to three (four taxa). The distribution centre of this group is the Arabian Peninsula and adjacent countries (Egypt, Israel, Jordan, Syria, Iraq, Iran, Saudi Arabia, Yemen, Oman, United Arab emirates, Quatar, Kuwait); three out of four taxa are restricted to this area. However, one species (*U. occidentalis*) inhabits the southern parts of the western Sahara (Morocco), some 5,000 km from that region.

The combination of three characters distinguishes the subspecies *aegyptia* and *microlepis*: number of ventrals, number of scales around midbody (see fig. 2), and presence/absence or distribution of lateral tubercles (figs. 13, 14). The confusion regarding the differentiation of these two taxa is obviously due to the variability of one main character (lateral tubercles). According to SCHMIDT (1939), it is difficult to distinguish both forms by means of the presence or absence of enlarged lateral tubercles. This problem can be solved, if the distribution pattern of the tubercles is included in the analysis. Few specimens of *microlepis* have slightly enlarged lateral tubercles, which are situated exclusively at the rear parts of the body. They are much smaller than tubercles in *aegyptia*. As far as we know, enlarged lateral tubercles occur exclusively in specimens from the northern parts of the range of *microlepis*. Whether

this is due to gene flow between *aegyptia* and *microlepis* is not known. ANDERSON (1999) did not find any tubercles on the flanks of specimens from gulf coastal Arabia.

A second confusing fact was the presence of a hitherto unknown species of *Uromastyx* in extreme south-eastern Arabia. MOODY's (1987) conclusion, to synonymize *microlepis* and *aegyptia*, is likely to be based on data obtained from specimens of *U. leptieni* sp. n. which were part of his material studied.

Uromastyx leptieni sp. n. can be distinguished from *U. aegyptia* by the numbers of ventral and midbody scales, the presence of enlarged middorsal scales in males (see fig. 8) and the colour-pattern of the juveniles. It is obvious that *leptieni* differs considerably from the closely related parapatric taxon *microlepis* (see fig. 2). This could be due to character displacement.

Uromastyx occidentalis is known from two individuals only. Within the *U. aegyptia* complex, the main diagnostic character of this species is the lack of preanal and femoral pores. In the holotype, an adult male, there are no pores visible (MATEO et al. 1998). In some specimens (mainly females) of *aegyptia* and *microlepis* the pores are reduced, however they are clearly visible.

APPENDIX

Museum acronyms

BMNH	The Natural History Museum, London;
MZUF	Museo Zoologico de "La Specola", Firenze;
NMW	Naturhistorisches Museum Wien;
ZFMK	Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn.

Specimens studied

Uromastyx leptieni sp. n. (n = 8): United Arab Emirates (UAE), Wadi Siji: ZFMK 52398 (holotype); Muscat (Oman): BMNH 85.II.7.4, BMNH 85.II.7.5; S. Jebel Jayah, (UAE): BMNH 1973.2039; Jebel Ali, Dubai (UAE): BMNH 1973.2040; 25 km WSW Tawi Bil Khabis, (UAE): BMNH 1973.2041; Munay Trucial Oman (Oman): BMNH 1973.721; Near Rostaq (23° 24'N 58°03'E) (Oman): BMNH 1975.958 (paratypes).

Uromastyx aegyptia aegyptia (n = 18): Near Hurgharda (Egypt): ZFMK 64404; Beltim (Egypt): NMW 21111, BMNH 97.10.28.213; Cairo (Egypt): NMW 21182:1&2, NMW 21187; Suez (Egypt): ZFMK 39073, ZFMK 44216, NMW 21183, BMNH 97.10.28.212; Tor / Sinai (Egypt): BMNH 1908.6.9.6; Lower Egypt: ZFMK 2703-2704; Wadi Araba (Israel): BMNH 1951.1.2.55; Wadi Araba (Jordan): ZFMK 64406; Sawawin (Saudi Arabia): MZUF 28899; without exact locality: ZFMK 46502 & 46504.

Uromastyx aegyptia microlepis (n = 35): Al Hamran (Abu Dhabi): BMNH 1972.1259; Near Bada Zaid (Abu Dhabi): BMNH 1972.833; Bahrain: BMNH 1971.748; Ras Al Barr (Bahrain): BMNH 1970.2481 & 82; Fao: BMNH 88.12.6.8, BMNH 85.7.11.11; Basrah (Iraq): BMNH 1946.8.14.55, BMNH 1946.8.11.67 (syntypes), ZFMK 20267, ZFMK 21091; Kuwait: BMNH 1978.2072; Miofa (East Arabia): BMNH 1950.1.5.4; 100 km inland of Muskat (Oman): ZFMK 42413-14; Jiddat al Harassis (Oman): BMNH 1980.569; 100 km NE Riyadh (Saudi Arabia): ZFMK 43648, ZFMK 43649; 26°56'N, 38°59'O (Saudi Arabia): BMNH 1988.214; 30 km SE Ronya (Saudi Arabia): BMNH 1985.880; Al Rawdah, N Khobar (Saudi Arabia): BMNH 1988.93; Dib Dibah (Saudi Arabia): 1982.1327-28; El Gaisuma-Turaif (Saudi Arabia): BMNH 1952.1.3.51; Ruma (Saudi Arabia): BMNH 1970.2076; Shigree (Saudi Arabia): BMNH 1986.435, BMNH without number; Jebel Gaddah near Jebel Dannah (UAE): BMNH 1996.207; Bin Khautar (Yemen): BMNH 1930.6.30.3; N Yol (Yemen): BMNH 1953. 1.8.50; Kirkuk (Iraq): ZFMK 44907-11.

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