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Contribution to the herpetology of southern Libya

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Abstract. The herpetofauna of southwestern Libya has been surveyed during 2005-2006. Overall, two amphibian and 18 reptile species were found; of these, 16 reptile species are reported for the first time for Morzoq Province and one lizard, *Tarentola mauritanica*, for Sabha Province.

Keywords. Herpetofauna, Libya, distribution.

INTRODUCTION

Previous herpetological activities in Libya resulted in the addition of many records to the known herpetofaunal species (e.g., Werner, 1909; Boulenger, 1914; Scortecci, 1935a, b, c, 1937a, b; Schnurrenberger, 1958; Kramer and Schnurrenberger, 1963; Schleich, 1987; Sindaco, 1995; Laurent et al., 1997; Frynta et al., 2000; Pieh and Perälä, 2002; Wilms, 2004; Ibrahim and Ineich, 2005). However, Libya is still the least-studied country herpetologically when compared to the adjacent countries in North Africa (Boulenger, 1891; Anderson, 1898; Bons, 1958; Marx, 1968; Blanc, 1978, 1979; Blanc and Ineich, 1985; Le Berre, 1989; Salvador, 1996; Bons et Geniez, 1996; Schleich et al., 1996; Saleh, 1997; Baha El Din, 2006). Most of previous studies were concentrated in the northern Libya. On the contrary, the vast area of the southern Fezzan desert, in the southwestern part of Libya, between Morzoq Province and Ghat, has received little attention regarding the herpetofauna. For example, Kramer and Schnurrenberger (1963) reported only two snakes from the south (Morzoq Province) out of 18 species they recorded from Libya. In their review, Schleich et al. (1996) reported 50 species of amphibians and reptiles from Libya including seven species from Ghat and one species of toad from Morzoq City. Frynta et al. (2000) reported two amphibians and 25 reptiles from 30 different localities in Libya including one toad and 11 reptiles from Sabha and Ghat Provinces. Scortecci (1937b) identified the only toad found in Ghat as *Bufo regularis*. However, the identification of this toad is still under debate, since Jöger (1981) assumed that this species is *Bufo xeros*, suggesting that the range

of *B. regularis* extends farther south in Africa than the Ghat area. The aim of the present study was (1) to enhance knowledge of herpetology in Libya by surveying a large sector of unstudied areas in the western part of the south, and (2) to report on the occurrence and taxonomic status of the Ghat toad, *Bufo* sp.

MATERIALS AND METHODS

Study site

The study was conducted in Sha'abeyyat Morzoq (Morzoq Province), Great Socialist People's Libyan Arab Jamahireyya. The study site covers an area of at least 20,000 km^2 from Tmessah in the extreme east of the province to Tsawah, Wadi Otba in the extreme west, and from Taraghen southward to Al-Qatroun. Fig. 1 shows the map of Libya with study sites.

More than forty field trips were made in Morzoq Province from September 2005 through July 2006 (all seasons), covering 20 localities in at least 200 field hours. Some localities were visited as many as five times. Field trips were launched from Taraghen which was surveyed several times during a period of 10 months. Field trips were also made to Sabha City (Sabha Province) and Ghodwah between Taraghen and Sabha during this period. During 4-8 July 2006, a field excursion was made to Ghat in the extreme southwestern part of the country.

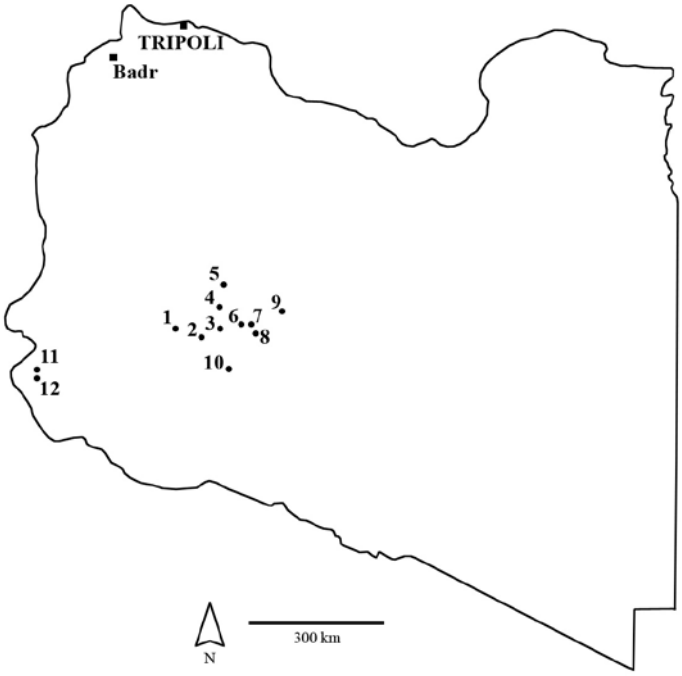

Fig. 1. Main study sites: 1) Tsawah; 2) Morzoq; 3) Taraghen; 4) Ghodwah; 5) Sabha City; 6) Om Al-Araneb; 7) Zowailah; 8) Majdoul; 9) Tmessah; 10) Al-Qatroun; 11) Ghat; 12) Al-Berkah.

Study sites were chosen to represent different reptile habitats including the sand dunes east of Taraghen village; sand steppes belonging to the great sand desert (Adhan Morzoq) south of Taraghen; gravel and red coarse sand areas (which make up a large part of the desert); green farms that occupy up to 28,000 ha in some areas (e.g., Om Al-Araneb and Zowailah) and the mountainous limestone plateaus such as Majdoul and sandy and rocky areas in the Ghat region. Urban settlements were checked for reptiles whenever possible. Surveys were made during the day and night. Range extension from previously known localities was calculated for animals by km as straight-line distances. Searches for amphibians were undertaken around water wells, on farms and in places known by local people to have frogs (e.g., in Ghat). Faunistic information on amphibians and reptiles is shown in Appendix 1.

Field techniques

To verify identifications, animals were collected by hand and with rubber bands. Other sampling techniques including turning rocks over and excavation of burrows were also used. Tracks of animal were considered positive indicators of their existence. A number of specimens were brought alive to the author by students and volunteers. Specimens were preserved in 10% formalin or 70% alcohol. Voucher specimens were deposited in the collection of the Faculty of Arts and Sciences, Sabha University at Taraghen (ZCT), in the Paris National Museum of Natural History (MNHN) and in Adel Ibrahim Collection (AIC). Ecological notes for each species were recorded whenever possible.

RESULTS

Two amphibian species and 18 species of reptiles were recorded from southwestern Libya. Of these, 16 reptile species are reported for the first time for Morzoq Province and one lizard, *Tarentola mauritanica* for Sabha Province.

SPECIES ACCOUNTS

Amphibia: Anura: Bufonidae

Green toad, *Bufo viridis* Laurenti, 1768. This toad was found in cultivated fields, such as those in Om Al-Araneb that consist of thousands of cultivated acres of edible vegetables, fruits and animal fodder. Toads observed in these localities showed a color difference distinct from Morzoq area individuals. The former had brighter green spots on the back. Toads were generally active throughout the year except for cold days. No hibernation was noted in late autumn (November) and early winter (December). This species was recorded in Taraghen by Scortecci (1935a) and in Cyrenaica (Schleich et al., 1996), extending its range by at least 900 km to Taraghen.

Subdesert toad, *Bufo xeros* Tandy, Tandy, Keith and Duff-McKay, 1976. This toad was common in Ghat, found in pools and puddles on local farms at Tunin and nearby the water station at Al-Berkat. The toads had different colors, ranging between grayish brown,

olive and reddish with pairs of identical dark olive patches on the dorsum that were partially bordered with black. All individuals had a light colored- middorsal line. Tubercles with one or more sharp spines on the upper side of the body and creamy granular venter. The foot was slightly webbed, with well developed anterior and exterior metacarpal tubercles suitable for use in digging. Tadpoles of this species were olive brown spotted with black. Croaking was heard at a distance, thus the toads could be easily located. However, on some occasions, toads were found in swampy areas with dense vegetation within the farms which made them difficult to catch. Toads were commonly seen in highest density just after sunset. During the day, the toads concealed themselves under vegetation that covers most of the pool bottom, and in some cases, it reaches 30 cm above the pool bottom. In addition to their intensive night activity, tadpoles were observed swimming near surface during the day.

Reptilia: Squamata: Sauria: Agamidae

Bibron's agama, *Agama impalearis* Boettger, 1874. A single individual was observed on a big boulder in the Ghat area through binoculars. The followings characters were noted: upper side reddish brown, head, neck and shoulders with several groups of large spines, no gular pouch. Observation suggested that this individual was most likely *Agama impalearis*.

Bell's dab-lizard, *Uromastyx acanthinura* Merrem, 1820. This species was common in Morzoq Province, confirming its existence in South Libya (see Frynta et al., 2000). The species was observed all year around and several individuals were captured during spring and summer but released at the point of capture, including a pregnant female captured in Zowailah on 25 June 2006. The range of this species was extended by 700 km from Badr to Taraghen (Ibrahim and Ineich, 2005).

Gekkonidae

Ragazzi's fan-footed gecko, *Ptyodactylus ragazzii* Anderson, 1889. This gecko was very common in Majdoul and Ghat. In Majdoul, it was observed in residential areas, on building walls, inside houses and around lights. In farms, it was encountered on old ruins and boulders around wells. It became active just before sunset so that several individuals were captured by day. In Ghat, this species was the most conspicuous gecko and encountered almost everywhere on building walls at Tunin, in Ghat New City and on recently constructed buildings. An isolated population inhabited the rest house complexes affiliated with Sabha University at Ghat. Lizards were commonly seen on the walls of buildings and occasionally inside the main entrances and climbing up the higher stories (up to 15 m high). This species was active from sunset to dawn but remained concealed during the day when the air temperature might exceed 40 °C during July. No other scansorial geckos were observed in these places. This gecko appears to be most active during summer. As many as 50 geckos could be counted during one hour of observation in Tunin. This gecko was recently reported from the Ghat area by Frynta et al. (2000), increasing its distributional record by 500 km to Majdoul.

Petrie's gecko, *Stenodactylus petrii* Anderson, 1896. Geckos were only encountered in soft sandy areas. Apparently, these geckos commence their activity immediately after sunset. Presence of this gecko in Taraghen extended its range by 700 km from the Badr village (Ibrahim and Ineich, 2005) and by 900 km from Cyrenaica (Scortecci, 1935a).

Elegant gecko, *Stenodactylus sthenodactylus* (Lichtenstein, 1823). This was a common cursorial gecko, observed in coarse sand areas in several localities. On 14 May, a female deposited two white shelled eggs in captivity three days after capture. This gecko showed a wide distribution in both Morzoq and Sabha provinces which was increased by 1000 km from Cyrenaica to Tsawah (Calabresi, 1923; Zavattari, 1930; Scortecci, 1935a).

Moorish gecko, *Tarentola mauritanica* (Linnaeus, 1758). The species seemed to be uncommon in Morzoq Province, but more common in Sabha City where it was the only scansorial gecko, observed on walls, around lights, even in downtown especially during summer. This gecko was nocturnal, active from sunset to dawn. The distribution range was extended by about 800 km from the known localities in Cyrenaica (Zavattari, 1930; Frynta et. al., 2000).

Tripoli dwarf gecko, *Tropiocolotes tripolitanus* Peters, 1880. The gecko's local name is "Bu Kash-shash". This species was a very common cursorial gecko, found elsewhere in Morzoq Province on the surface of the sand, under rocks, bricks, tree logs, leaf litter and inside houses. A large number of specimens were observed but not collected. This gecko was frequent in the northern part (Werner, 1909; Zavattari, 1930; Frynta et al., 2000; Ibrahim and Ineich, 2005) extending the range by at least 700 km to Taraghen. In the south, it was recorded from Al-Fejaj (Frynta et al., 2000), extending its range by 250 km southeast to Tsawah.

Lacertidae

Bosc's fringe-toed lizard, *Acanthodactylus boskianus* (Daudin, 1802). This species was observed on hard terrain with sparse vegetation. It was most active during morning hours between 09:00-11:00 hrs. This species was captured from northern sandy plains in Cyrenaica (Calabresi, 1923), Al-Khums (Frynta et al., 2000), and Badr (Ibrahim and Ineich, 2005). In the south, it was reported from Al-Fejaj (Frynta et al., 2000), increasing its distribution by 150 km eastward to Mosequeen.

Nidua lizard, *Acanthodactylus scutellatus* (Audouin, 1809). Individuals were sandy brown, reticulated with conspicuous white and black spots on dorsum; the tail resembles *A. longipes*, but the dorsal scales of tibia and femoral pores (Baha El-Din, 1994) follow the typical pattern for *scutellatus*. Only a few lizards were observed during winter and spring, thus it may be active all year around. In Badr village, it was also active in sunny days in winter (Ibrahim and Ineich, 2005). This species was reported from Cyrenaica (Werner, 1909; Calabresi, 1923; Zavattari, 1930) increasing its distribution by 950 km to Morzoq.

Red-spotted desert-racer, *Mesalina rubropunctata* (Lichtenstein, 1823). A single individual of this species was collected. This lizard was reported from Ghat (Schleich et al., 1996) and in Sinawin at the extreme northwest of Libya (Frynta et al., 2000), extending its range by 550 and 700 km respectively to Zowailah.

Scincidae

Ocellated skink, *Chalcides ocellatus ocellatus* (Forskål, 1775). This skink was found on farms and in green areas around houses. The known distributional range of *C. ocellatus* was increased by 900 km from Cyrenaica to Taraghen (Calabresi, 1923; Zavattari, 1930).

Sand fish, *Scincus scincus scincus* (Linnaeus, 1758). Five specimens of these lizards were captured by pit-fall traps from sand dunes in Morzoq province, recording a range extension of 700 km from Badr to Tsawah (Ibrahim and Ineich, 2005).

Varanidae

Desert monitor, *Varanus griseus griseus* (Daudin, 1803). Although its conspicuous tracks were often observed in Taraghen and its surrounding sand dunes, only one young individual was captured. This species was previously reported from the extreme northeast (Zavattari, 1930) and northwest (Ibrahim and Ineich, 2005) of Libya, recording an extension of 900 and 700 km respectively to Taraghen.

Colubridae

Moila snake, *Malpolon moilensis* (Reuss, 1834). An adult female was captured in an old abandoned building at Tsawah. This record fills a big gap of the distribution of this snake in the Libyan Saharan. The range was extended by 750 km southward from Tripoli and 1,000 km westward from Kufra (Kramer and Schnurrenberger, 1963).

Schokari Sand Snake, *Psammophis schokari schokari* (Forskål, 1775). This snake was encountered in sandy areas elsewhere in Morzoq province and in Ghodwah. It was also captured from cultivated fields. This snake was active throughout the year. *P. schokari* was previously recorded in Zowailah, Tmessah, and Morzoq (Kramer and Schnurrenberger, 1963) and in Cyrenaica (Calabresi, 1923) extending its range by 950 km from Morzoq.

Clifford's snake, *Spalerosophis diadema cliffordi* (Schlegel, 1837). Ten individuals were collected from nine localities in Morzoq Province. Of these, six snakes were captured in late autumn (November) and winter (December and January). Thus, it seemed active all year around. Young individuals first appeared in April and May. In the south, this snake was reported from Zowailah (Loveridge, 1940), Tmessah (Schnurrenberger, 1958) and from Gabroon (Frynta et al., 2000).

Viperidae

Horned viper, *Cerastes cerastes cerastes* (Linnaeus, 1758). This was a well-known snake in the south Libyan Desert. Eight individuals were caught. Among these, six individuals were captured in December. All vipers were reddish brown with distinct dorsal patterns and had full horns except for a juvenile from Majdoul which possessed two rudimentary horns. Frynta et al. (2000) reported two almost hornless vipers with no dorsal pattern from Al-Awaynat, 400 km southwest Sabha. The distribution range of this snake was increased from Al-Awaynat by 450 km to Majdoul and by 900 km from Benghazi (Calabresi, 1923) to Haj Hjeel.

Avicenna's viper, *Cerastes vipera* (Linnaeus, 1758). Two individuals were captured in sandy areas. The distributional record of this viper is increased by 750 km from Badr southward to Zowailah (Ibrahim and Ineich, 2005) and 700 km from the Ghat area (Scortecci, 1939).

DISCUSSION

All reptiles collected from Morzoq Province during this study are reported for the first time except for two snakes, *Psammophis schokari* and *Spalerosophis diadema* (Kramer and Schnurrenberger, 1963). The reason that little attention has been paid to this area is probably due to inaccessibility and lack of logistic facilities that do not encourage researchers to work or to stay long in the area. In addition, the ambient temperature is high throughout most of the year, except for a few weeks in winter. Most of herpetological exploration to this country has been conducted in the north rather than in the south (see Boulenger, 1914; Zavattari, 1922, 1929; Calabresi, 1923; Scortecci, 1939; Schnurrenberger, 1959; Schleich, 1984, 1989; Frynta et al., 2000; Ibrahim and Ineich, 2005). The few visits that researchers have made in the far south in the country have been to well-known areas, such as the Al-Kufrah oasis in the southeast (e.g., Peters in Rohlfs, 1881; Vinciguerra, 1930; Scortecci, 1935c); Ghat (a tourist destination in the far western south) and to the cities of Morzoq and Sabha which were former regional capitals (see Scortecci, 1935a, 1937a; Frynta et al., 2000).

This study confirms the occurrence of *Bufo xeros* in the Ghat area which is now the only locality known for the species in Libya. Scortecci (1937b) found *B. xeros* in great numbers hunting around wells, springs and puddles, but at that time, the species was undescribed. Two other frogs were reported from the Ghat area, *Dicroglossus occipitalis* from Tunin and *Rana saharica* from Oasis Tin Al-Kun (Scortecci, 1937a). Intensive searches in these areas revealed a complete absence of these frogs probably because of the massive environmental changes in the area. The springs and puddles mentioned by Scortecci have dried up. It was reported that *Dicroglossus occipitalis* had been introduced to the area to control mosquitoes. However, there are a number of farms in Tunin each with a man-made pool in which toads (*B. xeros*) are encountered. Similarly, Al-Berkah (Arabic proper), which means "puddle", has also been changed as springs and puddles are no longer found, but toads were observed at the water station and on one farm. Most of

the species recorded in Morzoq Province were active during the winter except on cold days in contrast to the behavior of the same species in northern Libya. For example, the horned vipers and sand vipers that were active in December and January in the south (this study) do not appear in the northwest corner of Libya during winter and start their activity in spring (Ibrahim and Ineich, 2005). Schnurrenberger (1959) observed that these vipers were also active in winter and hibernated in January and February except on warm days which could be explained as a function of air temperature. Coastal areas of Libya have a typical Mediterranean climate, and average temperatures ranging from about 30 °C to 8 °C. The south, on the other hand, experiences desert-type climates with summer temperatures soaring over 50 °C and with below-zero nights. In Morzoq and Sabha Provinces, air temperature is generally high most of the year months; winters are mild, with air temperatures ranging from 4 °C to 35 °C.

The record of a single specimen of *Mesalina rubropunctata* in Zowailah increased the distribution of this lizard largely from previously known records within the country. The rarity of this species in the Libyan Desert was evident in this study. This is in agreement with Schleich et al. (1996) who reported that the population density of this species was very low in Libya. Frynta et al. (2000) reported on a single specimen from Sinawan. Likewise, Ibrahim and Ineich (2005) reported an additional specimen from Badr during April. In Egypt, this lizard exhibited low encounter rate in the Sinai desert, in contrast with other lacertid species (Adel Ibrahim, unpubl. data). It is believed that activity of this lizard depends – in particular – on the intensity of insolation (Schleich et al., 1996). In Israel, it emerges in some special weather conditions (Y. Werner, pers. comm.).

The distribution of many species has been greatly affected by the habitat types in the southern Libyan Sahara. The sand dune community includes *Acanthodactylus scutellatus*, *Chalcides ocellatus, Cerastes vipera, Scincus scincus*, *Stenodactylus petrii* and *Varanus griseus,* while in firm sand biotope, *Acanthodactylus boskianus*, *Cerastes cerastes*, *Mesalina rubropunctata, Stenodactylus sthenodactylus* and *Tropiocolotes tripolitanus* are found. Old buildings in Tunin usually had a high density of *Ptyodactylus ragazzii*. This gecko moved to the Ghat new town with modern rural houses as well as newly established buildings near town, showing a good colonization ability. The prevalence of *P. ragazzii* in Ghat and Majdoul is possibly related to the mountainous nature of these locations which may also explain why no scansorial geckos occur in Taraghen which is not surrounded by any kind of hills or mountains. Moreover, the nearest rocky area to Taraghen is about 100 km apart.

In addition to their presence in sandy localities, *Psammophis schokari* and *Spalerosophis diadema* were encountered on cultivated farms. The occurrence of these species in green fields was previously reported in Sinai (Ghobashi et al., 1990) and in the Suez Canal area (Adel Ibrahim, unpubl. data). The availability of food such as frogs, rats and even lizards may attract snakes to these places.

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Appendix 1. Faunistic information on the herpetofauna recorded in southwestern Libya during 2005-2006. MNHN= Museum National d'Histoire Naturelle, Paris; ZCT= Zoological Collection at Taraghen; AIC= Adel Ibrahim Collection, Egypt.

Species name	n	Locality	Date	Gazetteer of south Libyan locations	Voucher specimens
Bufo viridis	4	Taraghen, university dormitory	22 November 2005	25° 55' 45"N, 14° 26' 33"E	ZCT 2005.5-8
	1	Taraghen, agriculture project	1 May 2006	25° 56' 13"N, 14° 28' 40"E	ZCT 2006.43
	1	Morzoq	24 November 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.9
	3	Om Al-Araneb	17 December 2005	26° 08' 02"N, 14° 44' 06"E	ZCT 2005.21-23
	4	Om Al-Araneb	28 December 2005	26° 08' 02"N, 14° 44' 06"E	ZCT 2005.37-40
	1	Om Al-Araneb	24 March 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.24
	1	Om Al-Araneb	6 June 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.68
Bufo xeros	2	Al-Berkah, 8 km southeast Ghat	4 July 2006	24° 52' 11"N, 10° 10' 26"E	MNHN 2006.2533-2535
	1	Tunin district, Ghat	5 July 2006	24° 58' 03"N, 10° 10' 22"E	
Agama impalearis	1	2 km from the City of Ghat	6 July 2006	24° 58' 07"N, 10° 10' 05"E	ZCT 2006.73
Uromastyx acanthinura	1	Majdoul	21 December 2005	25° 55' 37"N, 15° 07' 20"E	ZCT 2005.31
	1	Tmessah	29 April 2006	26° 23' 20"N, 15° 47' 48"E	AIC 2006.1550
	1	Zowailah	25 June 2006	26° 10' 55"N, 15° 06' 52"E	ZCT 2006.70
Ptyodactylus ragazzii	2	Majdoul	7 May 2006	5° 55' 37"N, 15° 07' 20"E	ZCT 2006.47-48
	1	Majdoul	3 June 2006	5° 55' 37"N, 15° 07' 20"E	AIC 2006.1573
	1	Zowailah	23 May 2006	26° 10' 55"N, 15° 06' 52"E	ZCT 2006.63-64
	1	Zowailah	18 June 2006	26° 10' 55"N, 15° 06' 52"E	ZCT 2006.69
	1	Ghat	4 July 2006	24° 58' 07"N, 10° 10' 05"E	ZCT 2006.72
Stenodactylus petrii	1	10 km south of Taraghen	11 May 2006	25° 51' 29"N, 14° 25' 50"E	ZCT 2006.54
	1	Ghat	6 July 2006	24° 58' 07"N, 10° 10' 05"E	ZCT 2006.74
Stenodactylus sthenodactylus	2	Ghodwa	26 November 2005	26° 27' 59"N, 14° 18' 17"E	ZCT 2005.11-12
	1	Majdoul	17 December 2005	5° 55' 37"N, 15° 07' 20"E	ZCT 2005.24
	1	Morzoq	21 December 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.32
	1	Az-Zytouna, 15 km east of Taraghen	2 April 2006	25° 54' 44"N, 14° 34' 29"E	ZCT 2006.25
	1	Tsawah	7 May 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.49
	1	Taraghen,	14 May 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.56
	1	Om Al-Araneb	15 May 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.58

(Continue)

Appendix 1. Continued.

Species name	n	Locality	Date	Gazetteer of south Libyan locations	Voucher specimens
Tarentola mauritanica	1	Om Al-Araneb	6 May 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.45
	1	Om Al-Araneb	10 June 2006	26° 08' 02"N, 14° 44' 06"E	AIC 2006.1574
	1	Sabha City	14 October 2005	27° 01' 59"N, 14° 26' 00"E	ZCT 2005.01
Tropiocolotes tripolitanus	1	Haj Hjeel	28 October 2005	25° 55' 47"N, 14° 02' 40"E	ZCT 2005.02
	1	Ghodwa	29 November 2005	26° 27' 59"N, 14° 18' 17"E	ZCT 2005.14
	4	Ghodwa	8 May 2006	26° 27' 59"N, 14° 18' 17"E	AIC 2006.1568-71
	1	Tsawah	29 November 2005	25° 59' 46"N, 13° 30' 03"E	ZCT 2005.15
	5	Tsawah	10 April 2006	25° 59' 46"N, 13° 30' 03"E	ZCT 2006.28-32
	1	Tsawah	28 May 2006	25° 59' 46"N, 13° 30' 03"E	ZCT 2006.65
	1	Majdoul	29 November 2005	5° 55' 37"N, 15° 07' 20"E	ZCT 2005.16
	1	Majdoul	14 January 2006	5° 55' 37"N, 15° 07' 20"E	ZCT 2006.15-21
	1	Morzoq	30 November 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.16
	1	Zowailah	17 December 2005	26° 10' 55"N, 15° 06' 52"E	ZCT 2005.25
	3	Al-Bedair	17 December 2005	26° 07' 50"N, 14° 53' 12"E	ZCT 2005.26-28
	5	Jizaw	13 January 2006	25° 53' 12"N, 14° 09' 15"E	ZCT 2006.09-13
	2	Az-Zytouna	8 April 2006	25° 54' 44"N, 14° 34' 29"E	ZCT 2006.26-27
	1	Az-Zytouna	14 May 2006	25° 54' 44"N, 14° 34' 29"E	ZCT 2006.57
	5	Taraghen	8 January 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.01-05
	1	Taraghen	27 June 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.71
	1	Om Al-Araneb	15 May 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.59
Acanthodactylus boskianus	1	Taraghen	3 November 2005	25° 59' 35"N, 13° 31' 00"E	ZCT 2005.04
	1	Mosequeen	10 April 2005	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.33
	1	Mosequeen	29 April 2006	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.41
	1	Mosequeen	29 May 2006	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.66
	1	Morzoq	18 May 2006	25° 55' 24"N, 13° 54' 59"E	AIC 2006.1572
Acanthodactylus scutellatus	1	Morzoq	28 December 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.41
	1	Ghodwah	12 May 2006	26° 27' 59"N, 14° 18' 17"E	ZCT 2006.55
Mesalina rubropunctata	1	Zowailah	17 December 2005	26° 10' 55"N, 15° 06' 52"E	ZCT 2005.29

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Appendix 1. Continued.

Species name	n	Locality	Date	Gazetteer of south Libyan locations	Voucher specimens
Chalcides ocellatus	1	Al-Qlaib	28 December 2005		ZCT 2005.42
	1	Taraghen	28 December 2005	25° 59' 35"N, 13° 31' 00"E	ZCT 2005.43
	1	Taraghen	20 March 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.23
	1	Dougal	29 December 2005	26° 05' 23"N, 13° 40' 01"E	ZCT 2005.45
	1	Ghodwah	22 May 2006	26° 27' 59"N, 14° 18' 17"E	ZCT 2006.62
	1	Mosequeen	29 May 2006	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.67
Scincus scincus	1	Al-Jabbar	15 April 2006	25° 54' 30"N, 14° 33' 38"E	ZCT 2006.35
	1	Tmessah	29 April 2006	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.42
	1	Tmessah	15 May 2005	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.60
	3	Ash-showaish	7 May 2006	25° 54' 4"N, 14° 34' 50"E	ZCT 2006.50-52
Varanus griseus	1	Az-Zytouna	6 May 2006	25° 54' 44"N, 14° 34' 29"E	ZCT 2006.46
Malpolon moilensis	1	Tsawah	17 December 2005	25° 59' 46"N, 13° 30' 03"E	ZCT 2005.30
Psammophis schokari	1	Morzoq	14 December 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.20
	1	Ghodwah	2 January 2006	26° 27' 59"N, 14° 18' 17"E	AIC 2006.1543
	1	Majdoul	14 January 2006	5° 55' 37"N, 15° 07' 20"E	ZCT 2006.22
	1	Om Al-Araneb	11 January 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.07
	1	Al-Qatroun	4 May 2006	24° 56' 00"N, 14° 38' 30"E	ZCT 2006.44
Spalerosophis diadema	1	Al-Jabbar	25 November 2005	25° 54' 30"N, 14° 33' 38"E	ZCT 2005.10
	1	Haj Hjeel	28 November 2005	25° 55' 47"N, 14° 02' 40"E	ZCT 2005.13
	1	Zowailah	1 December 2005	26° 10' 55"N, 15° 06' 52"E	ZCT 2005.18
	1	Zowailah	12 January 2006	26° 10' 55"N, 15° 06' 52"E	ZCT 2006.08
	1	Az-Zytouna	1 December 2005	25° 54' 44"N, 14° 34' 29"E	AIC 2005.1540
	1	Tsawah	25 December 2005	25° 59' 46"N, 13° 30' 03"E	ZCT 2005.36
	1	Morzoq	28 December 2005	25° 55' 24"N, 13° 54' 59"E	ZCT 2005.44
	1	Taraghen	10 April 2006	25° 59' 35"N, 13° 31' 00"E	ZCT 2006.34
	1	Majdoul	10 April 2006	5° 55' 37"N, 15° 07' 20"E	AIC 2006.1545
	1	Ghodwah	10 April 2006	26° 27' 59"N, 14° 18' 17"E	AIC 2006.1546
	1	Tmessah	23 April 2006	26° 23' 20"N, 15° 47' 48"E	ZCT 2006.36
	1	Om Al-Araneb	15 May 2006	26° 08' 02"N, 14° 44' 06"E	ZCT 2006.61

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Appendix 1. Continued.

Species name	n	Locality	Date	Gazetteer of south Libyan locations	Voucher specimens
Cerastes cerastes	1	Haj Hjeel	28 October 2005	25° 55' 47"N, 14° 02' 40"E	ZCT 2005.03
	1	Fonqol	30 November 2005	25° 55' 06"N, 14° 15' 53"E	ZCT 2005.17
	1	Fonqol	9 December 2005	25° 55' 06"N, 14° 15' 53"E	ZCT 2005.19
	2	Az-Zytouna	10, 21 December 2005	25° 54' 44"N, 14° 34' 29"E	ZCT 2005.18, 33
	1	Majdoul	21 December 2005	5° 55' 37"N, 15° 07' 20"E	ZCT 2005.34-35
	1	Majdoul	7 May 2006	5° 55' 37"N, 15° 07' 20"E	ZCT 2006.53
	1	Ghodwah	29 December 2005	26° 27' 59"N, 14° 18' 17"E	ZCT 2005.46
Cerastes vipera	1	Ma'afan, 10 south of Taraghen	21 December 2005	25° 54' 01"N, 14° 34' 45"E	ZCT 2005.36
	1	Zowailah	8 January 2006	26° 10' 55"N, 15° 06' 52"E	ZCT 2006.06