

## The Egyptian Tortoise, *Testudo kleinmanni* LORTET, 1883 in Libya

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**Abstract.** The range and the status of the Egyptian tortoise *Testudo kleinmanni* in Libya are poorly known due to the country's political isolation. The results of our own studies are compared critically with all hitherto published reports, and are summarized. During visits to Libya in 2005, 2006 and 2007 a total of 79 living *T. kleinmanni* were found at 28 different localities. Our conclusions permit a more accurate delineation of the range of *T. kleinmanni* in this country. Once contiguous with Egyptian populations, now virtually extinct, the species ranges continuously from the eastern border nearly to Tripoli in the west. Contrary to previous indications, *T. kleinmanni* is absent from the tableland of the Jabal al Akhdar and from its northern and western coastal foothills. On the other hand, it is widespread along the coastal area of the Gulf of Sirte, continuing into Tripolitania along the coast to the vicinity of Tripoli. Evidence for the presence of *T. kleinmanni* in the Jabal Nafusa Range south of there does not exist, though the species occurs on the eastern and northern slopes of those mountains. Limited ecological observations of the species are presented, including a list of plants which serve as food or hiding places for *T. kleinmanni*. Our investigations confirm that there still exists heavy exploitation of tortoises in Libya for the international animal trade.

Key words. Chelonia, Testudinae, *Testudo kleinmanni*, distribution, Libya, conservation.

### Introduction

Of all Mediterranean *Testudo* species the Egyptian tortoise, *Testudo kleinmanni*, has been the least researched. Since LORTET's description in 1887, a few works about its ecology have been published (FLOWER 1933, GEFFEN & MENDELSSOHN 1988, 1989, 1991, MENDELSSOHN & GEFFEN 1995). In Egypt, the species has been exterminated except for two or three relictual populations (BAHA EL DIN et al. 2003, BAHA EL DIN 2006, PERÄLÄ 2006). The present distribution in Israel is restricted to the northern Negev desert, mostly near the Egyptian border (BRINGSØE & BUSKIRK 1998, PERÄLÄ 2001, 2006). *Testudo kleinmanni* is classified by PERÄLÄ as "critically endangered," the highest category of threat (PERÄLÄ 2005). His assessment of the global population is based almost entirely on his understanding of the species' status in Libya (PERÄLÄ 2005). Surprisingly, a large number of *T. kleinmanni* of Libyan origin is still trad-

ed illegally. A considerable discrepancy exists between the number of illegally traded animals and the estimated total population (PERÄLÄ 2005). As early as 1898 the species was presumed to be present beyond "the west of Egypt" (ANDERSON 1898), but the distribution and population status in Libya remained poorly understood to the present day. In this article we present the results of three trips (March 2005, April 2006 and March 2007) to Libya which clarify our understanding of its Libyan distribution while modifying certain previous assumptions.

### Early records

The terra typica of *Testudo kleinmanni* was described as "dans les sables de la basse Egypt, surtout dans les environs d'Alexandrie, Egypte" (in the sand dunes of lower Egypt, especially in the surroundings of Alexandria, Egypt) in 1883 by LORTET (LORTET



Fig. 1. Map showing place names cited in early records and recent records sections of *Testudo kleinmanni*.

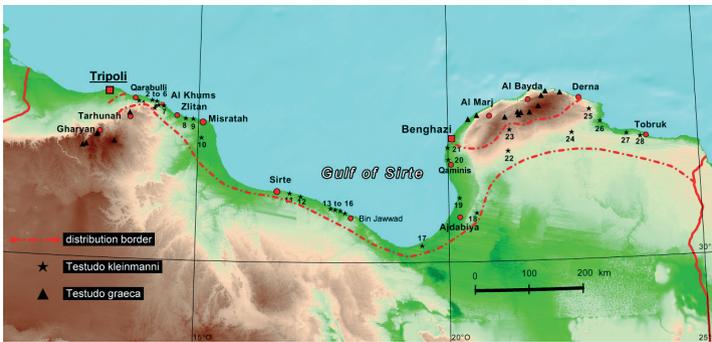


Fig. 2. Map showing distributions of species of *Testudo* in northern Africa. Localities for *Testudo kleinmanni* are numbered and starred, and are further explained in Tab. 1. Our localities for *T. graeca* are indicated by triangles. Dotted lines delineate the Libyan distribution of *T. kleinmanni*.

1887). Most historical sites lie within Egypt (BUSKIRK 1985). Interestingly, ANDERSON (1898) correctly surmised its presence further west, referring to a tortoise collected by Rohlfs at Kufra Oasis and identified by PETERS (PETERS 1880, ROHLFS 1881). Indeed, two tortoise specimens found on this Libyan expedition are mentioned in this work, each identified as a different species. The passage is cited verbatim below:

„Von Professor W. PETERS in Berlin: Von besonders hervorzuhebenden Amphibien wurden von der Expedition eingesandt. Chelonii. 1. *Testudo graeca* LINNE. – ein junges Exemplar in Uadi Tessiua, Januar 1879. 2. *Testudo campanulata* WAHLBAUM (*Testudo marginata* SCHÖPF). – Eine junge Schale bei Bir-Milrha; Ende December 1878.“ (ROHLFS 1881).

Apparently, this expedition collected two different tortoises, which unfortunately no longer exist in the Berlin Natural History Museum (R. GÜNTHER pers. comm.). The obvious confusion of *Testudo campanulata* with *T. kleinmanni* – due to the remarkable resemblance of the plastron pattern of a juvenile *Testudo marginata* to that of an adult *T. kleinmanni* – was neither recognized by WERNER in 1909, nor by ANDERSON or subsequent authors (*Testudo campanulata* STRAUCH, 1862 is a junior synonym of *Testudo marginata* SCHOEPPF, 1795). Insofar as the ROHLFS record was even mentioned, only the specimen identified as *Testudo graeca* was cited (WERNER 1909, CALABRESI 1923). Strangely, the alleged locality of Kufra Oasis lies about 900 km inland from the coast, far beyond credible habitat conditions for genus *Testudo*,

causing expressions of scepticism from some later authors (LOVERIDGE & WILLIAMS 1957, BUSKIRK 1985). The locality of Bir Milrha, according to the map attached to ROHLFS' book, lies at the edge of the Jabal Nafusah, a few kilometres W Tarhunah. If the tortoise collected there was indeed a *T. kleinmanni*, this would be the earliest species record both for Tripolitania and Libya.

As early as 1909, WERNER recorded *Testudo leithi* from Barka (the OttomanTurkish term for Cyrenaica). WERNER's find was the first unequivocal record of *T. kleinmanni* for Libya; until the re-designation of (*Pseudo-*) *Testudo kleinmanni* by LOVERIDGE & WILLIAMS in 1957, all subsequent authors used the taxonomic binomen *T. leithii* GÜNTHER, 1869 for *T. kleinmanni* (LOVERIDGE & WILLIAMS 1957). Although imprecise for indicating merely the region, 'Barka' (Barca), numerous subsequent records from this area reaffirm the widespread presence of *T. kleinmanni* in northern Cyrenaica. However, Barca is not to be confused with the city of Barce (today Al Marj) as plotted later in the distribution maps by IVERSON (IVERSON 1986, 1992). CALABRESI (1924) reported a male specimen near Derna found in February 1922. Shortly afterwards, on a zoological collecting trip to Giarabub Oasis between two former Italian army posts, Esc Scegga and Bir Sceferzen, VINCIGUERRA recorded four adult specimens of *T. leithii* (VINCIGUERRA 1927). These former military posts are located near the Egyptian frontier, 40 and 80 kilometres inland. Later speculation about the occurrence of this species at Giarabub (Jaghub) is probably based on this source (IVERSON 1992, PERÄLÄ 2005).

The remaining two Libyan localities cited by LOVERIDGE and WILLIAMS in 1957 deserve discussion (LOVERIDGE & WILLIAMS 1957):

1. "Wadi Tessina in Oasis Kufra". As already mentioned above, this record based on ROHLFS (1881) is mistaken in linking both localities to the same geographical entity, as well as in the identification of the species, almost certainly *T. graeca*. Confusion is unfortunately abetted by the *lapsus calami* of ROHLFS' "Tessiua."



Fig. 3. A female *Testudo kleinmanni* (from locality 16, carapace length 12.1 cm and 374 g).

2. "Sirtica." Based in part on communication between the late MICHAEL J. LAMBERT and J. BUSKIRK, IVERSON plots this as the coastal town of "Sirte." However, the Roman name Sirtica was used for the entire coastal region of Central Libya along the Gulf of Sirte between the provinces of Tripolitania and Cyrenaica, and never for the city of Sirte. Thus it is an imprecise locality, but a very important one affirmed by the authors' field work over the past 3 years.

#### Recent records

The mammologist Dr. HENRY W. SETZER collected three *T. kleinmanni* near the city of Qaminis in the summer of 1955 (BUSKIRK 1985) and deposited them in the USNM (Smithsonian Institution). In 1983 H.H. SCHLEICH investigated the herpetofauna of Kouf National Park in the Jabal al Akhdar (northern Cyrenaica) in which he restricted the tortoise's presence to the *Artemisia* steppe south of the Jabal al Akhdar itself (SCHLEICH et al. 1996). His published records include two new localities, followed by his repetition of known Libyan sites as he understood them: "south of Slonta, 30 km south of Mekhili, 35 km south of Derna, Wadi Giarabub (75 km south of Tobruk) and Tobruk" (SCHLEICH 1989). FRITZ and BUSKIRK explicitly document the species from Tripolitania for the first time (FRITZ & BUSKIRK 1997), providing a locality between Tarhuna and Bin Gashir

as well as one near Al Khums. FRYNTA found a specimen in the excavated area of the archaeological site of Leptis Magna (FRYNTA et al. 2000). During the 1980s, ZYCH collected specimens of *T. kleinmanni* 50 km south of Tripoli on the slopes of the Jabal Nafusah as well as 50–60 km E Tripoli near the coast (SIROKY & FRITZ 2007). BAHA EL DIN found *T. kleinmanni* in April 2002 a few kilometres E Tobruk, as well as about 30 km west of Tobruk on the road to Derna, and on the southern periphery of the Jabal al Akhdar close to Mekhili (BAHA EL DIN 2002). PIEH found *T. kleinmanni* 20 km SE Derna on the road to Tobruk as well as in the Wadi Derna and at Leptis Magna (PERÄLÄ 2005). WUERSCHNER provides less precise locality information for his specimens “from the vicinity of the cities of Tripoli and Misuratha in northwestern Libya” (WUERSCHNER 2002). To better visualize the Libyan localities discussed in this paper, please refer to Fig. 1.

The earliest records of *T. kleinmanni* in Libya included imprecision or actual error, and were misinterpreted or dismissed by later researchers. Closer review of the historical sources indicate the known presence of the species in all three regions of the Libyan Mediterranean littoral: Cyrenaica, the Gulf of Sirte, and Tripolitania.

### Study sites and methods

Our investigations took place in the course of three trips to Libya, in March 2005, April 2006 and March 2007, corresponding to the season of greatest activity of *Testudo kleinmanni* (GEFFEN & MENDELSSOHN 1989). Portions of 31 days were spent searching for tortoises. Our route took us from the Tunisian border in the west along the Libyan coast all the way to the port of Tobruk in the east. Additionally, we combed parts of the Jabal Nafusah, in the hinterland of Tripoli, and of the Jabal al Akhdar in Cyrenaica in search of tortoises. The vastness of the potential distribution zone precluded carrying out more rig-

orous surveys. Additionally, we interviewed local people of prominence, and with the assistance of an interpreter, both shepherds and other rural folk concerning the local occurrence of tortoises. In the same manner we attempted to gather information about collecting activities. People interviewed could not clearly distinguish between *T. kleinmanni* and *Testudo graeca* based on the photographs shown to them. Each specific site at which any tortoise was found was documented by GPS; each tortoise was documented photographically, and basic data (gender, carapace length, and weight) were recorded before they were released. Carapace length was measured with a digital caliper and weight with an electronic pocket scale. Insofar as was possible, ecological data were noted. Plants were identified in the field or at home with the clue of detailed photos (SCHÖNFELDER & SCHÖNFELDER 2002, Conservatoire et Jardin botaniques de la Ville de Geneve and South African National Biodiversity Institute 2007, The Hebrew University of Jerusalem 2007). Food plants were identified by observing active tortoises or by closer examination of feeding signs along tortoises traces in sandy habitats. Finally, on each trip we attended a market in Tripoli at which a large number of tortoises (of both species) along with many other animals were offered for sale. The spelling of the localities is in accordance with the map “Libya” (Map for Businessmen & Tourists 1:1 750 000, Gizi Map, Budapest).

### Results

A total of 28 sites yielded *T. kleinmanni* (Fig. 2, Table 1), extending from Qarabulli (about 50 km E Tripoli) to Tobruk in coastal Cyrenaica. Individual localities are explained in Table 1 (exact geographical coordinates withheld by the authors in order to discourage illegal collection). The highest locality lies 380 metres above sea level about 30 km south of Tākniš, on the southern slopes of the Jabal al Akhdar. This is the highest altitude in Africa

Tab. 1. Habitat descriptions of the localities of *Testudo kleinmanni* as mapped in Fig. 2, and number of specimens recorded (m = male, f = female, j = juvenile) at each locality.

Nr. Fig.2	m,f,j	Locality	Habitat
1	0,0,1	Near Qarabulli	Sand dunes near coast, dense vegetation
2	1,2,0	Between Khiyar and Al Khums	Hillside near coast, margin of abandoned agricultural land
3	0,1,0	Between Khiyar and Al Khums	Extensively used agricultural area
4	0,1,0	Between Khiyar and Al Khums	Margin of abandoned agricultural land
5	0,2,0	Near Al Qasabat	Hillside about 17 km distant from the coast
6	0,1,0	Near Al Qasabat	Hillside about 208 m.a.s.l.
7	0,1,0	Leptis Magna	Excavation area
8	1,0,1	West of Zlitan	Sand dunes near coast
9	1,0,0	West of Misratha	Sand dunes near coast
10	1,1,0	North of Al Kararim	Sandy area with scattered wheat fields
11	0,1,1	20 km east of Sirte	Grazing land near coast
12	6,1,2	50 km east of Sirte	Sparsely vegetated sand dunes used for grazing
13	1,0,0	110 km east of Sirte	Sparsely vegetated sand dunes used for grazing
14	0,1,0	40 km west of Bin Jawwad	Sparsely vegetated sand dunes used for grazing
15	0,2,1	30 km west of Bin Jawwad	Sparsely vegetated sand dunes used for grazing
16	2,5,4	25 km west of Bin Jawwad	Sparsely vegetated sand dunes used for grazing
17	1,1,0	Bishr	Grazing land near town
18	1,0,0	40 km north west of Ajdabija	Steppe
19	2,0,0	Coast near Sultan	Farm land on sandy soil
20	0,1,0	Near Qaminis	Scattered wheat fields
21	1,0,0	15 km north of Qaminis	Scattered wheat fields near coast
22	0,1,0	Between Masus and Al Kharrubah	Steppe with extremely sparse vegetation
23	0,1,0	Between Al Kharrubah and Täknis	Depression, surrounded by stony hills, 376 m.a.s.l.
24	1,0,0	5 km east of Mukhayla	Margin of wheat fields within a depression
25	1,0,0	Near Martubah	Grazing land, stony area
26	8,11,4	Near At Tamimi	Valley with scattered wheat fields surrounded by low hills
27	0,1,0	40 km west of Tobruk	Roadside, surrounded by steppe
28	0,2,0	10 km west of Tobruk	Farm land, cultivated field

at which *T. kleinmanni* has been documented so far. Locality 22 is about 90 kilometres distant from the coast, the most inland site at which we recorded *T. kleinmanni*. The substrate associated with tortoises varied considerably, from extremely rocky habitats of the Marmarika Plateau in eastern Libya, to steppes and semi-desert south of the Jabal al Akhdar, and included areas of pure sandy

soil. The latter typify the Gulf of Sirte, with rather scanty vegetation, as well as coastal Tripolitania in which more dense plant growth prevailed. We never found the animals in the salt marshes (*sabkhat*) which are widespread locally in all regions near primary dune complexes in the immediate coastal vicinity. In the highlands of the Jabal al Akhdar and in its northern and western coastal



Fig. 4. *Testudo kleinmanni* in a very stony habitat (locality 26).



Fig. 5. Sandy habitat in the Sirte region (locality 12).

foothills the soil consists of red, very loamy earth. We could not document the presence of *T. kleinmanni* there either, although we found *T. graeca*. Plants found in *T. kleinmanni* habitats are listed in Table 2. In addition to those plants and shrubs providing cover sites, identifiable plants consumed by the tortoises are marked.

In 2007 we were able to visit various biotopes immediately after strong rain showers. Remarkably, no standing water could be found in the habitat in spite of rain pools along the roads and particularly where the earth had been compacted by man. Apparently, water seeps below the surface immediately, or drains away quickly in stonier habitats.

One day in March, we experienced in coastal Sirte a morning of very heavy fog.



Fig. 6. Habitat on the southern slopes of the Jabal al Akhdar (locality 23). In the background wheat fields at the foot of stony hills. A tortoise is located amidst the flowers in the center of the picture.

Visibility was down to less than 30 m. The resulting dew may represent a source of water for the tortoises in this arid environment. Successive visits to several places during each of the three years enabled us to observe the astonishing variability of the vegetation differing from year to year, to a great extent due to the strongly differing winter precipitation. We found animals of all age groups, from the newly hatched to the very aged. The adult female tortoise from locality 22 (Tab.1 and Fig.2) had a carapace length of 14.1 cm and weighed 471 g. This animal nearly equals the maximum carapace length of 14.4 cm recorded for *T. kleinmanni* (FARKAS et al. 1997). One animal, estimated to be three years old by its growth annuli, weighed 31 g and had a carapace length of 5.1 cm; a two-year-old weighed 22 g at a length of 4.7 cm, and a one-year-old animal weighed 16 g at a length of 4.3 cm. An approximately 8 year-old female, probably newly mature weighed 199 g at a length of 9.6 cm (GEFFEN & MENDELSSOHN 1991). Shepherds confirmed that while they observe active animals during the winter months (from December to February), the main season of tortoise activity according to them is during April, May and June. Interestingly our guide had observed an active *T. kleinmanni* crossing the road on a hot summer night. As the number of our localities near At Tamimi indicate, the species still occurs at least locally

in high density. Thus, a farmer at Bishr told us that his children collected 35 *T. kleinmanni* of all age groups on a single day on his farm land, which we estimated to be about 4 ha.

### Discussion

In eastern Libya *T. kleinmanni* is found on the so-called Marmarika Plateau, a calcareous tableland which includes sandstone areas and presents a steppe landscape. The region is sparsely inhabited, and aside from pastoralism, the only form of agriculture practiced is the cultivation of wheat in scattered favourable sites during the winter months. The tortoises appear to occur in particularly high density in this area. At a two-hectare site near At Tamimi we found 23 individual specimens cumulatively in three years. Two adult males, identified photographically, were found in two successive years within a radius of a few metres. Typically, animals there were found at the foot of stony hills, as well as in the transitional area of extensively used agricultural areas. The Marmarika Plateau extends approximately to the city of Derna. From there, the mountains of the Jabal al Akhdar (reaching nearly 900 m a. s. l.) spread westwards along the coast up to Benghazi. In all recent published distribution maps of *T. kleinmanni* this region, northern Cyrenaica, is identified as the heartland of the range (GUYOT JACKSON 2004, SROKY & FRITZ 2007). The Jabal al Akhdar (meaning “The Green Mountains” due to the unusually dense vegetation, including trees and shrubs) is a relictual Mediterranean phytogeographic island in arid northeastern Africa, favoured by high precipitation both in the highlands and coastal foothills. The clayey soil there is intensely red-coloured and retains water very well. In these mountains and along their coastal littoral to the north we found *T. graeca* exclusively (FRITZ et al. 2007, PIEH & PERÄLÄ 2002, VAN DER KUYL et al. 2005). SCHLEICH’s prolonged investigation of the herpetofauna of Kouf National Park likewise yielded numer-

Tab. 2. Plants found in different habitats of *Testudo kleinmanni*. Plants used as food by *T. kleinmanni* are marked with “+”, whereas plants not used are marked with “-“. Same symbols for plants used as hiding places “+” or not “-“.

Scientific name	Food	Hiding places
<i>Aizoon hispanicum</i>	+	-
<i>Anthemis</i> spec.	+	-
<i>Artemis monosperma</i>	-	+
<i>Astragalus caprinus</i>	-	+
<i>Atriplex leucoclada</i>	-	+
<i>Bassia arabica</i>	-	+
<i>Coridothymus capitatus</i>	-	+
<i>Emex spinosa</i>	+	-
<i>Ephedra</i> spec.	-	+
<i>Eremobium aegypticum</i>	-	+
<i>Erodium ciconium</i>	+	-
<i>Launaea nudicaulis</i>	+	-
<i>Limonium lobatum</i>	-	+
<i>Lotus edulis</i>	+	-
<i>Lotus halophilus</i>	+	-
<i>Lycium europaeum</i>	-	+
<i>Malva sylvestris</i>	+	-
<i>Matthiola</i> spec.	+	-
<i>Medicago orbicularis</i>	+	-
<i>Medicago polymorpha</i>	+	-
<i>Mesembryanthemum nodiflorum</i>	+	-
<i>Panicum turgidum</i>	-	+
<i>Paronychia argentea</i>	-	+
<i>Plantago albicans</i>	+	-
<i>Reichardia tingitana</i>	+	-
<i>Retama raetam</i>	-	+
<i>Rumex vesicularis</i>	+	-
<i>Silene villosa</i>	+	-
<i>Sinapis alba</i>	+	-
<i>Suaeda vermiculata</i>	-	+
<i>Traganum nudatum</i>	+	-
<i>Tripleurospermum auriculatum</i>	+	-
<i>Vicia</i> spec.	+	-
<i>Zilla spinosa</i>	-	+

ous *T. graeca*, but not a single *T. kleinmanni* with any certainty (SCHLEICH 1987). Kouf National Park occupies the central area of the

mountains from the coast to the highest elevations. South of the main ridge of the Jabal al Akhdar the precipitation decreases drastically because of the rain shadow effect. There, a scanty shrub vegetation changes bit by bit into a semi-desert to the south. This steppe belt stretches along the Jabal al Akhdar inland from Derna to Qaminis on the eastern shore of the Gulf of Sirte. Here, we found only *T. kleinmanni*. All confirmed historical Cyrenaica records as well for this species are from this area immediately east, south, and west of the Jabal al Akhdar.

*Testudo kleinmanni* occurs here up to an altitude of about 400 m a. s. l. Sympatric occurrence with *T. graeca* could not be confirmed. However, two of our sites for the respective species lie only 30 km from each other. One confirmed locality for *T. kleinmanni* is close to Qaminis, south of Benghazi at the western coastal edge of the Jabal al Akhdar. This city appears to us to represent the approximate boundary between *T. graeca* to the north and *T. kleinmanni*, and corresponds to the change in vegetation zones occurring there (ANONYMOUS 1988). This area of Cyrenaica was long considered to be the westernmost edge of the range of *T. kleinmanni* (BUSKIRK 1985, SCHLEICH et al. 1996, BAHA EL DIN 2006). Geographically the Gulf of Sirte begins here. We first extended the natural occurrence of the species along the Gulf of Sirte near Bin Jawwad in 2005, where the vegetation and soil structure corroborate the credibility of the discovery (SCHNEIDER & SCHNEIDER 2006). Our subsequent records in 2006 and 2007 have proven their presence unequivocally, even along the southernmost dip of the Gulf at Bishr. Practically everywhere in the Sirte region, our inquiries concerning the tortoise's occurrence were confirmed. The remarkable fact is that *T. kleinmanni* occurs between Sirte and Bin Jawwad exclusively in secondary sand dunes habitats. The dunes are reinforced by shrubs like *Artemisia monosperma*, *Ephedra* sp. and *Atriplex* sp., and in the early spring, the dune valleys are carpeted by numerous annual flowering plants which

serve as food. The animals select the root area of the shrubs as hiding places where they half-bury themselves in the sand. Rarely did we find animals sheltered in the entrances of rodent burrows. Locally resident Bedouins estimate the occurrence along the Gulf of Sirte to about 15 km inland. This habitat is heavily reminiscent of the biotopes of the northern Sinai Peninsula and differs sharply from the distinctly stony substrate of the Marmarika. In the coastal area of the western Sirte, vast salt marshes can be found which are not inhabited by the species. Indeed, shepherds asked here by us also confirmed the occurrence of tortoises further inland.

Heretofore published records of the species in Tripolitania lie primarily in the region of Al Khums – Leptis Magna. FRYNTA et al. (2000) qualify their find in the ancient city of Leptis Magna by noting the possibility of introduction or release. BAHA EL DIN denies the natural occurrence of the species in Tripolitania and consequently attributes all records to introductions (BAHA EL DIN 2002). Nevertheless, FRITZ and BUSKIRK (1997) confirmed the occurrence of the species in this Libyan region on the basis of several museum specimens with concrete locality data from Tripolitania. They include in the range the whole eastern Jabal Nafusah in the area of the towns of Tarhuna and Gharyan and grant credibility to the locality information provided by locals to LUTZ GEISLER (FRITZ & BUSKIRK 1997). SIROKY and FRITZ refer to four specimens now in the National Museum of Prague collected in the early 1980s from 50 km south of Tripoli in the foothills of the Jabal Nafusah, as well as from 50–60 km E of the capital on the Mediterranean coast (SIROKY & FRITZ 2007).

Each year we have seen *T. kleinmanni* offered for sale in an animal shop in Tripoli. According to staff, they receive the animals from the vicinity of Khiyar near the coast and from Tarhunah as well as Gharyan further inland and at higher elevation. Along with *T. kleinmanni* a huge number *T. graeca* (FRITZ et al. 2007, PIEH & PERÄLÄ 2002, VAN DER KUYL et

al. 2005) of different sizes were offered. The shop assistants do not distinguish among the animals by species, but merely by size. Presumably on account of such inexact information, further supported by the statements of locals transmitted to LUTZ GEISSLER, the assumption came about that *T. kleinmanni* occurs in the Jabal Nafusah. For the area of Gharyan we conclude that this is not possible merely because of the altitude (close to 1,000 m a. s. l.). In the course of our searches we found *T. graeca* here exclusively – specimens whose size and shape strongly resemble those described by HIGHFIELD (1990) from neighbouring Tunisia as *Furculachelys nabeulensis* (HIGHFIELD 1990). Concerning the region around the city of Tarhuna at an altitude of about 400 m a. s. l. it is more difficult to delineate the distribution by species. Indeed, there is BRONGERSMA's historical record of *T. kleinmanni* between Tarhunah and Bin Gashir, unfortunately too inexact (FRITZ & BUSKIRK 1997). ROHLFS hitherto overlooked 1878 record of a *T. campanulata* at Bir Milrha (ROHLFS 1881) is almost certainly the earliest record of *T. kleinmanni* in Libya, further supported by the author's travelog and attached map corresponding to the current locality of Biar Maji 15 km west of Tarhunah. The route from Tarhunah to Bin Gashir runs mainly north of the Jabal Nafusah through the plain of Jefara. Therefore this site cannot be construed as confirmation of the occurrence of the species in the Jabal Nafusah itself. It remains unsettled whether the animals were found in the mountains or in the plain. In the region around Tarhunah we could confirm only the presence of *T. graeca*. At present there is no proof of the presence of *T. kleinmanni* in the Jabal Nafusah.

Our investigations confirm the presence of the species in eastern Tripolitania from Misratah to Qarabulli in a narrow coastal strip. The distribution further extends inland to the Jefara Plain fronting the northern edge of the Jabal Nafusah. From Qarabulli westwards along the coast, a broad belt of sand dunes extends along the coast to Al Aziziyah,

SSW Tripoli, near which *T. kleinmanni* seems to reach the western limit of its coastal distribution. Further to the west we received ever scantier clues to tortoises' presence, which we could not confirm ourselves. On the other hand, ZYCH's records confirms an occurrence in this belt of sand dunes south of Tripoli (SIROKY & FRITZ 2007). Both BRONGERSMA and ROHLFS had to cross this region on the way to Tarhuna or Bir Milrha, they could also have collected their animals there. In the Jabal Nafusah the species seems to occur only on the northern and eastern slopes, up to about 200 m a. s. l. between Al Khums and Khijar. Clear evidence of an occurrence of *T. kleinmanni* elsewhere in the mountains is lacking, as is sympatry with *T. graeca*. Our easternmost locality for *T. graeca* lay about 10 km E Tarhunah at 340 m a. s. l.

According to the investigations carried out by BAHA EL DIN, the Egyptian tortoise has nearly disappeared from the country after which it was named (BAHA EL DIN et al. 2003). In the eighties and nineties of the last century thousands of animals of this species, presumably of Libyan origin exclusively, were traded in Egypt (BAHA EL DIN et al. 2003). As recently as autumn 2006, two groups consisting of 400 and 200 *T. kleinmanni* allegedly exported illegally from Libya were confiscated in Italy (PHILIPPEN 2006, PHILIPPEN pers. comm.). Apparently, there is a considerable discrepancy between these high figures and the presumed status of this tortoise in Libya. In a work for the IUCN, PERÄLÄ estimated the global population at only 5000 adult animals and classified the species as "critically endangered" (PERÄLÄ 2005). This author's conclusion was not based on any field research with the species in Libya but was speculative and based on the observations of individuals having had a cursory familiarity with the species in Libya. Both DEVAUX and later WENMAN saw the urgency to conduct field work in order to get a better idea of the population status in Libya (DEVAUX 1997, WENMAN 2001). Even in the course of our first trip to Libya in 2005 we were struck by the

relative abundance of *T. kleinmanni* and its presence in areas from which it had not been recorded nor expected, based on all hitherto published works concerning Libya (PERÄLÄ 2005, SCHNEIDER & SCHNEIDER 2006). Thus we intend to set the record straight, and hope that our findings will be corroborated and complemented by future surveys. As our tally of localities clearly indicates, *T. kleinmanni* is distributed continuously from Tobruk to the vicinity of Tripoli. Although we were unable to visit the coastal area between Tobruk and the Egyptian border, we infer the presence of the species there as well, in accordance with the geographical conditions and the statements of locals.

### Threats

As already mentioned, we inquired specifically about the collecting of tortoises. Keeping tortoises is widespread in rural areas and is especially popular among children. Tortoises are considered to be good luck charms and are thus gathered in the surroundings and kept at home. Furthermore, tortoises are collected especially in western Tripolitania and around Tobruk and then sold to dealers, mostly by shepherds (foreign workers in particular) as well as by older children. A 13-year-old schoolboy, for instance, showed us the tortoises he had caught by himself and which he kept in a fenced yard of about 20 square meters in At Tamimi. At that time he owned 8 *T. kleinmanni* which he had collected in the surroundings of the town and intended to resell them for one dinar (about 60 Euro-cents) each to Egyptian dealers. The previous winter he had sold 30 animals. Such practices seem to be widespread. The animals are smuggled into Tunisia, Malta and Italy or are brought by Egyptian dealers into their homeland. Controlling the sea-routes in particular is hardly possible. Even at expos in the USA wild-caught animals are still offered openly (BIDMON 2002). We estimated the number of *T. kleinmanni* offered for sale

in Tripoli in 2005 at about 150 adult animals, in 2006 at 200 animals, and in 2007 at 50 animals. This removal surely decimates the remaining populations. Thus, inhabitants of Tobruk informed us of a very dense population of tortoises in a fenced and inaccessible area around a power station near the city.

Habitat destruction due to agricultural conversion, including intensive olive culture, cereal cultivation and row crops, plays an important role in Tripolitania. Overgrazing by sheep and goats and the resulting reduction of the vegetation cover as well as food plants have universally negative consequences for the tortoises' population density. *Testudo kleinmanni* seems to be least affected by adverse human impact along the Gulf of Sirte. In this region no collecting yet takes place as far as we know. There is little human impact on the land except for the extensive grazing of goats, sheep and camels, and the presence of a few oil shipping depots.

The greatest threat to the species in our opinion is the persistent collecting for the animal trade. Libyan authorities are seeking to put an end to collection and exportation by enacting legislation which would prevent continuing illegal removal from Libya. Considering the global species status, they indeed bear a crucial responsibility for the long-term survival of these "Libyan" tortoises.

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