

The Distribution of Bats (Mammalia: Chiroptera) in Syria

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> Abstract

The present study consists of both new records and literary data for 23 species of bats reported from Syria. Sixteen species of bats belonging to 6 families have been collected either by mist nets or recovered from owl pellets during the present study. Families Pteropodidae, Emballonuridae, Hipposideridae, and Molossidae are represented by a single species for each family; *Rousettus aegyptiacus*, *Taphozous nudiventris*, *Asellia tridens*, and *Tadarida teniotis* respectively. Family Rhinolophidae is represented by three species; *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, and *Rhinolophus euryale*. Family Vespertilionidae is represented by five genera (*Eptesicus*, *Myotis*, *Pipistrellus*, *Otonycteris*, and *Miniopterus*) and nine species; *Eptesicus bottae*, *Eptesicus serotinus*, *Myotis myotis*, *Myotis blythii*, *Myotis emarginatus*, *Myotis capaccinii*, *Pipistrellus kuhlii*, *Otonycteris hemprichii*, and *Miniopterus schreibersii* respectively. We also include distributional data for seven species which have been collected previously but have not during the present study (*Rhinolophus blasii*, *Rhinolophus mehelyi*, *Myotis aurascens*, *Myotis nattereri*, *Pipistrellus pipistrellus*, *Hypsugo savii*, and *Plecotus macrobullaris*). Thus, the bat fauna of Syria consists of 23 species belonging to twelve genera and six families. External and cranial measurements are given for most species. Notes on biology and ecology as well as distribution maps and a complete listing for all previous and recent records are provided for each species. *Tadarida teniotis* is mentioned for the first time for Syria in this review.

> Kurzfassung

Die vorliegende Studie enthält sowohl neue Beobachtungen als auch Literaturdaten von 23 Fledermausarten aus Syrien. 16 Fledermausarten aus 6 Familien wurden entweder durch Netzfang oder in Eulengewöllen nachgewiesen. Die Familien Pteropodidae, Emballonuridae, Hipposideridae und Molossidae sind jeweils durch eine Art vertreten: *Rousettus aegyptiacus*, *Taphozous nudiventris*, *Asellia tridens* und *Tadarida teniotis*. Die Familie Rhinolophidae wird durch drei Arten repräsentiert: *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros* und *Rhinolophus euryale*. Die Familie Vespertilionidae wird vertreten durch fünf Gattungen (*Eptesicus*, *Myotis*, *Pipistrellus*, *Otonycteris* und *Miniopterus*) und neun Arten: *Eptesicus bottae*, *Eptesicus serotinus*, *Myotis myotis*, *Myotis blythii*, *Myotis emarginatus*, *Myotis capaccinii*, *Pipistrellus kuhlii*, *Otonycteris hemprichii* und *Miniopterus schreibersii*. Eingeschlossen sind auch Daten von sieben Arten, die während der vorliegenden Studie nicht nachgewiesen werden konnten (*Rhinolophus blasii*, *Rhinolophus mehelyi*, *Myotis aurascens*, *Myotis nattereri*, *Pipistrellus pipistrellus*, *Hypsugo savii* und *Plecotus macrobullaris*). So besteht die Fledermausfauna Syriens aus 23 Arten aus 12 Gattungen und 6 Familien. Von den meisten Arten werden äußere Messwerte und Schädelmessdaten mitgeteilt. Bemerkungen zur Biologie und Ökologie sowie Verbreitungskarten und eine vollständige Liste aller älteren und gegenwärtigen Nachweise werden von jeder Art mitgeteilt. *Tadarida teniotis* wird das erste Mal für Syrien in dieser Arbeit nachgewiesen.

> Key words

Bats, Chiroptera, Mammals, Syria, Distribution, Systematics.

Introduction

Most of our knowledge on the bat fauna of Syria is based on old records (WETTSTEIN, 1913; TROUËSSART & KOLLMAN, 1923; HARRISON & LEWIS, 1961; ATALLAH & HARRISON, 1967; ATALLAH, 1977; NADER & KOCK, 1983). Only recently some publications focused on the bats of Syria (BENDA *et al.*, 2003a; SHEHAB *et al.*, 2004 and 2006; SHEHAB & MAMKHAIR, 2004 and 2006). Since 2004 we organized several field trips covering most of Syria for the purpose of studying the biodiversity and ecology of the bat fauna of Syria.

Within the past few years, much interest among Eastern European zoologists focused on zoogeography, systematics and distribution of bats in the Palaearctic Region and the Eastern Mediterranean (BENDA & HORÁČEK, 1998; HORÁČEK *et al.*, 2000; HANÁK *et al.*, 2001; BENDA *et al.*, 2003b; BENDA & KARATAŞ, 2005). These contributions increased our knowledge concerning the distribution and zoogeographical affinities for several bat species in Syria. Additionally, the Chiroptera of Jordan was intensively studied over the past two decades (QUMSIYEH *et al.*, 1992, 1998; AMR *et al.*, 2006), where a total of 24 species were recorded.

In this paper, we present data on distribution and ecology of Syrian bats and on their conservation.

Materials and Methods

A total of 27 localities representing different habitats in Syria were visited (see Appendix - Gazetteer). Bats were netted with mist nets (6 × 3 m) placed on caves entrances, paths among old ruins, and near river banks. Bats were also collected by hand from crevices and fissures using hand nets and leather gloves. Cranial remains of bats recovered from owl pellets including skulls and mandibles were also examined.

The material of this study was prepared as museum specimens (skin and skull), and housed in the collection of the General Commission for Scientific Agricultural Research (GCSAR), Damascus, Syria.

The lists of new records are arranged in alphabetical order and each record consists of the following information: number of locality as indicated in the map, name of province (muhafaza) (name of district, town or nahiye), name of the locality; date, number of specimen and/or observed bats with their age (juv: juvenile, sad.: subadult= mean pre-breeding animal, not juvenile or breeding adult., ad.: adult), name of the collector(s) and the collection number of museum material deposited in GZCS: A. Shehab collection in GCSAR.

The following abbreviations were used (alc. *or* A: alcohol, lact.: lactating, preg.: pregnant, ind.: indi-

Tab. 1. Comparative romanizations table of most common transliteration standards using DIN 31635, ISO 233, ISO/R 233, UN, ALA-LC, Encyclopaedia of Islam, and Islām Ansiklopedisi.

Letter	International Latin Transcription	Letter	International Latin Transcription
ء	e, -, '	ط	ṭ, ta
ا	ā	ظ	z, ẓ
آ	ā, â, 'aa	ع	a, '
ب	be	غ	gh, ġ, ğ
ت	te	ف	f
ث	th	ق	ka, q
ج	j, c, ġ	ك	ke
ح	h, ḥā	ل	l
خ	kha	م	m
د	d	ن	n
ذ	z, dh, ḏ	و	w
ر	r	ه	h, ~
ز	z	ة	h, t (<i>zero when in absolute state</i>)
س	s	لا	lā, la
ش	sh, š, ş	ي	y, y (<i>consonantal</i>) e or ī (<i>lengthening</i>)
ص	s, ş	ى	ÿ, à, ā
ض	d, ḏ	ال	el-, al-

vidual(s)). In text, following arabic names are used for indication of name of localities: *Kal'a* (Qal'at or Citadel)= Castle, *Magara*= Cave, *Nehr*= River. Arabic letters' transcription is given in Table 1.

The following symbols were used for map legends: museum specimens (○), observation (■), owl pellet material (Φ), parasitological study (*); red symbols: new data; white symbols: data from literature) and province (muhafaza) centers (●).

Abbreviations

TL = Total length; HB = head and body length; TaL = tail length; HF = hind foot length (claw not included); E = ear length; Wsp = wingspan; FA = forearm length; Tra= Tragus; Atra= antitragus; Nil = length of nose leaf; Nilw = width of nose leaf; F1= length of the first digit; D5 = length of the fifth digit; D3 = length of the third digit; D4.1 = length of the first phalanx of the fourth digit; D4.2 = length of the second phalanx of the fourth digit; GtL = greatest length of skull; CbL = condylobasal length; ZB = zygomatic breadth; BB = brain case breadth; IB = interorbital (postorbital constriction) breadth; C-M³ = length of maxillary teeth row;

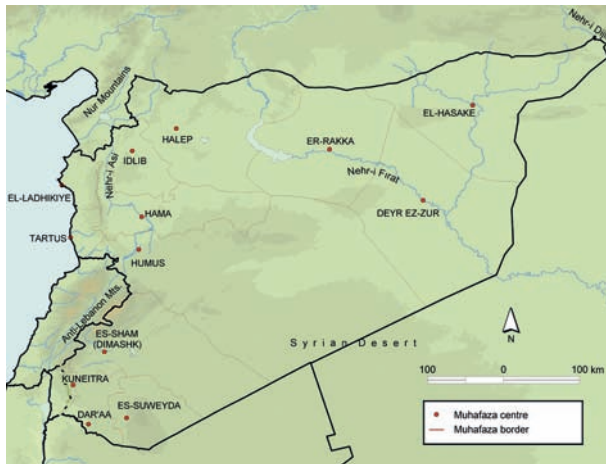


Fig. 1. Geographic Setting of Syria.

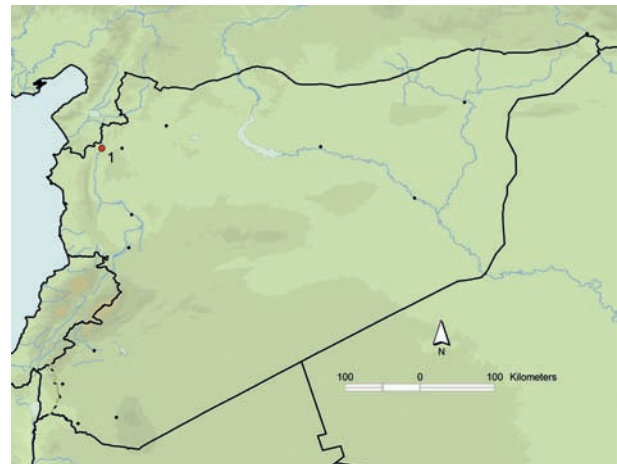


Fig. 2. Records of the Egyptian fruit bat, *Rousettus aegyptiacus* in Syria: 1. Hamama.

$C-M_3$ = length of mandibular teeth row; C^1-C^1 = inner distance between tips of upper canines; M^1 = upper molar; M = mandible length; MB = mastoid breadth; $\pm SD$ = standard deviation; N = number of specimens.

Geographic Setting of Syria

The Syrian Arab Republic is located within the heart of the Middle East with an area of 185,180 km². It borders Turkey to the north, Jordan to the south, Lebanon to the west, and Iraq to the east. Syria is divided into 14 provinces (Muhafaza), namely; Dar'aa, Deyr ez-Zur, es-Sham (Dimashk), Rif Dimashk, es-Suweyda, Kuneitra, Halep, Hamā, el-Haseke, Humus, Idlib, el-Ladhikiye, er-Rakka and Tartus (Fig. 1).

Biogeographically, Syria is divided into two main regions; the coastal zone and the Eastern Plateau. The coastal region consists of a narrow, double mountain belt enclosing a depression in the west. These mountains stretch along the Mediterranean Sea from the Turkish border in the north, reaching the Lebanon Mountains in the south. Nusayriye Mountains, a range paralleling the coastal plain, has an average elevation of 1212 meters; the highest peak is about 1575 meters. The western slopes catch moisture from the western sea winds and are thus more fertile and more heavily populated than the eastern slopes. Inland and farther south, the Anti-Lebanon Mountains rise to peaks of over 2700 meters on the Syrian-Lebanese frontier and spread in spurs eastward toward the plateau region. The eastern slopes have little rainfall and vegetation and merge eventually with the desert. In the coastal zone rain fall ranges between 750–1000 mm annually.

The Eastern Plateau comprises the majority of Syria. The entire eastern plateau region is intersected by a low chain of mountains, extending northeastwards from the Jebel el-Arab to the Euphrates River. South

of these mountains lies a barren desert region known as the Hamad. North of the Jebel er-Ruwak and east of the city of Humus is another barren area known as the Humus Desert. Northeast of the Euphrates River, which originates in the mountains of Turkey and flows diagonally across Syria into Iraq, is the fertile Jazirah region that is watered by the tributaries of the Euphrates. The area underwent irrigation improvements during the 1960s and 1970s, and it provides substantial cereal and cotton crops. In the Eastern Plateau annual rain fall ranges between 150–250 mm.

List of Bat Species

Family Pteropodidae (Fruit Bats)

Rousettus aegyptiacus (E. GEOFFROY, 1810) Egyptian fruit bat

Distributional Records (Fig. 2):

New data of collected specimens: *Idlib*: Hamama, el-Menfa Cave (139 m) [1a], 6. August 2006, A. Karataş, A. Shehab, M. Sözen & I. Mamkhair, *leg.*, 5 sad. ♀♀, 2 ad. ♀♀ with young, 1 ad. ♀ preg. (released immediately after taking measurements), 2 ad. ♂♂ (GZCS 1741, 1742). From owl pellets: *Idlib*: Hamama, surrounding fruit garden near el-Menfa Cave [1b], 2004, N= 1 ex *Bubo bubo* pellet (GZCS 551).

New data of observed specimens: *Idlib*: Hamama, el-Menfa Cave (139 m) [1a], 24. January 2006, 5/6. August 2006, A. Karataş, A. Shehab, M. Sözen & I. Mamkhair, *obs.*, a maternity colony of c. 2000 ind.

Published data: *Idlib*: Hamama, el-Menfa Cave (139 m) [1a], 6. July 2004 (wrongly given as 05. July 2004, 18. July 2004, 6. September 2004, 11. October 2004) (SHEHAB & MAMKHAIR, 2004).



Fig. 3. Nehr-i Asi (Orontes River) and el-Menfa cave from which the Egyptian fruit bat, *R. aegyptiacus* was collected.

Remarks: A large colony of around 2000 individuals was observed in a deep cave along the most northern end of the Orontes River (Fig. 3). The cave is prehistoric. Locally it is called “*el-Menfa*” or “*en-Nashiye*”, implying its difficult access and bad smell. Detailed description of this cave was given by SHEHAB & MAMKHAIR (2004). Bats were roosting in clusters of hundreds to the ceiling (Fig. 4). This cave harbors the Egyptian fruit bats only.

On 6 July 2004, 36 (24 females and 12 males) specimens were collected. Most of the collected specimens were sexually mature; males with large scrotal testes (12–13 mm, N= 4). Of the 24 females, nine were pregnant and each with a single foetus, one with a suckling newborn, and six subadults, while the rest has developed teats. On 6 September 2004, 10 specimens (4 males and 6 females) were collected, measured and 6 were subsequently released. Males were sexually mature; two females were with suckling newborns (Fig. 5) and three females were pregnant and gave birth later on 11–13 September 2004. During 6 August 2006, we observed two lactating females with their young and one pregnant female of 9 examined females, which were subsequently released. The population of the Egyptian fruit bat at el-Menfa Cave estimated to be

larger on 2006 in contrast to 2004 estimation. The total population was approximately 2000 specimens.

Discussion

ATALLAH (1977) reported that this species is abundant in Lebanon. It was also reported from many localities in Jordan and Palestine (AMR *et al.*, 1987, QUMSIYEH, 1996, AMR, 2000). The Egyptian fruit bat is an African species that penetrated northwards reaching Cyprus, Syria and Turkey. KARATAŞ *et al.* (2003) showed the distribution of *R. aegyptiacus* in southern Turkey, and indicated several large colonies (1000-1500 individuals) from Hatay, Mersin, and Antalya provinces.

Measurements of the Syrian population of the Egyptian fruit bat (Fig. 6; Table 2) agree with those given by HARRISON & BATES (1991) for *R. a. aegyptiacus* collected from Lebanon and Palestine. However, all measurements for the Syrian specimens were larger than those given by KARATAŞ *et al.* (2003) for the Turkish specimens with the body weight (88 ± 2.9 g; 71–150 g) and length of forearm (90 ± 4.9 mm; 81–93 mm). SHEHAB & MAMKHAIR (2004) assumed that some of the Turkish specimens were probably subadults, since the

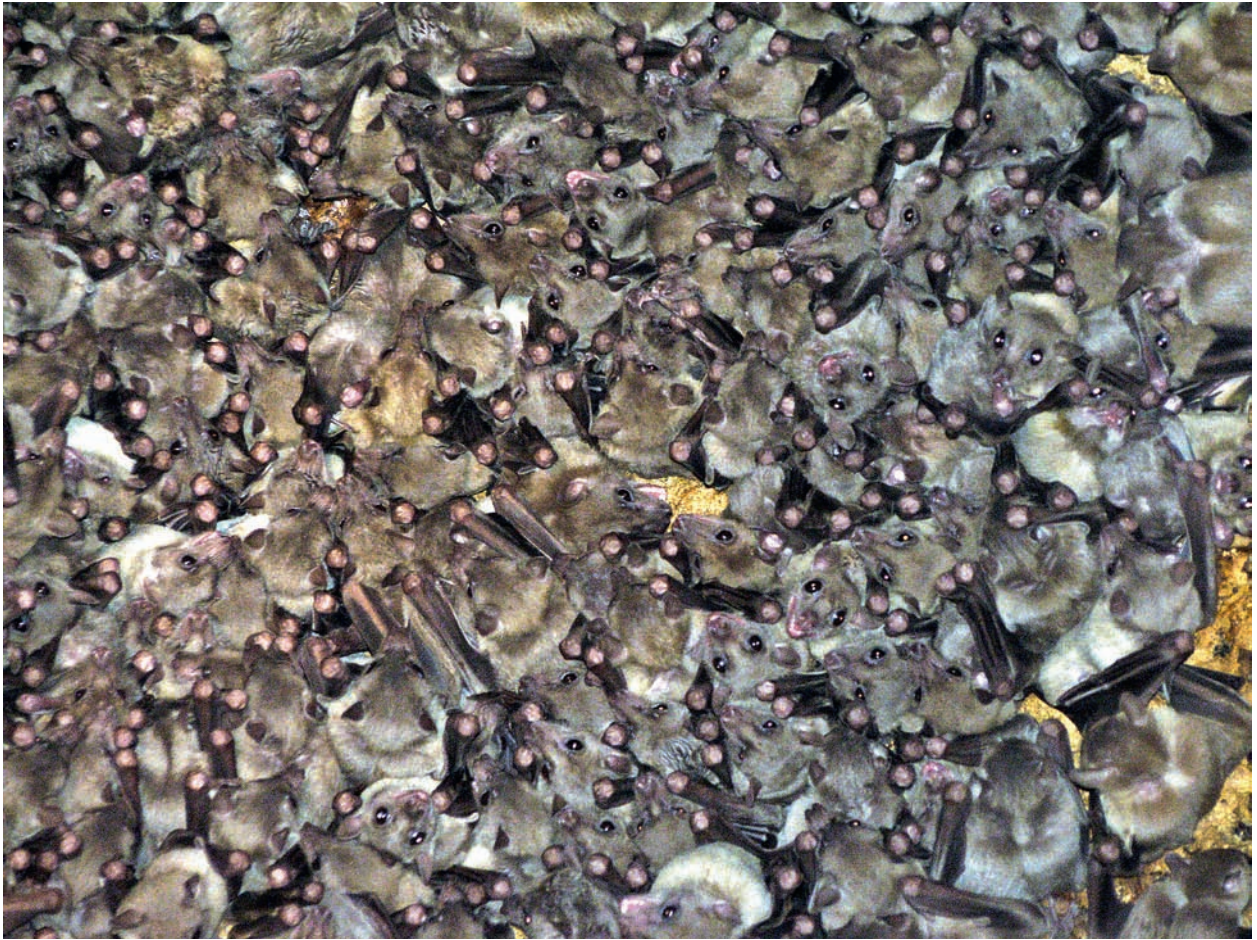


Fig. 4. A cluster of hundreds of *Rousettus aegyptiacus* hanging in el-Menfa Cave.



Fig. 5. Lactating female with a young of *R. aegyptiacus* from el-Menfa, Idlib.



Fig. 6. Lateral, ventral, and dorsal view of skull and mandible of *R. aegyptiacus* from Idlib.

forearm length for adults from Lebanon, Palestine and Syria was not less than 87 mm. But one of the authors (A.K.) re-investigated Turkish specimens and they were determined as adults. There is probably a cline in size.

Previous studies reported that *R. aegyptiacus* often roosts with other bat species. KARATAŞ *et al.* (2003) re-

ported that *Rhinolophus ferrumequinum*, *Rh. euryale*, *Rh. mehelyi*, *Myotis myotis*, *M. blythii*, *My. capaccinii*, and *Miniopterus schreibersii* were found roosting in the same caves with *R. aegyptiacus* in Turkey. On the other hand, AMR *et al.* (1987) found a large colony of *R. aegyptiacus* with no other bat species in a cave overlooking the Yarmūk River, Jordan.

Tab. 2. External and cranial measurements (mm) and weight (g) of the Egyptian fruit bat, *Rousettus aegyptiacus* from el-Menfa Cave.

	N	Min.	Max.	Average	±SD
TL	5	115	175	141.0	24.0
HB	22	124.7	166.5	140.5	10.5
TaL	29	12.0	23.5	14.8	2.7
HF	29	20.3	30.0	22.4	1.8
E	29	20.0	24.0	22.1	1.1
W	2	140.0	150.0	145.0	5.0
Wsp	28	500	650	557.5	39.0
FA	26	87.0	98.0	92.3	3.1
GtL	19	41.0	45.4	43.0	1.2
CbL	17	39.0	43.5	41.2	1.2
ZB	16	23.9	28.2	25.9	1.3
BB	18	15.8	17.8	16.8	0.6
MB	2	16.4	16.5	16.5	0.0
IB	20	7.4	9.5	8.2	0.5
C-M ³	20	15.7	17.7	16.6	0.4
C-M ₃	18	17.0	18.8	18.0	0.5
M	19	32.0	34.9	33.7	0.8

Farmers of the coastal region observed the presence of a bat feeding on their groves of orange and Loquat (*Eriobotria japonica*) trees. Thus it was possible to locate the fruit bat along the coastal region (SHEHAB & MAMKHAIR, 2004). Also unpublished reports in the Ministry of Agriculture and Agriarian Reform in Syria mentioned damages by fruit bats from ez-Zebadani (near the Syrian Lebanon borders).

Family Emballonuridae (Tomb Bats)

Taphozous nudiventris CRETZSCHMAR, 1830 Naked-bellied tomb bat

Distributional Records (Fig. 7):

New data of collected specimens: *Deyr ez-Zur*: cliffs in Ayn Jum'aa [1], 13/14. August 2006, A. Karataş, leg., 1 ♀ (GZCS 1781). From owl pellets: *Deyr ez-Zur*: cliffs in Ayn Jum'aa (210–230 m) [1], 13. August 2006, N= 4 (4 mandibles= 4L+4R) ex *Tyto alba* pellets (GZCS 549); Halebiyye ruins [2], 2001, 7 intact skulls ex *Tyto alba* pellets (GZCS 494–500); Kal'at er-Rahba (241 m) [3], 22. May 2000, N= 1 ex *Tyto alba* pellets (GZCS 509); 14. August 2006, N= 2 ex *Tyto alba* (GZCS 547); es-Salihiyye (Dura Europus) [5], 10. March 2004, N= 1 ex *Tyto alba* pellets (GZCS 516). *er-Rakka*: el-Ukershe [7], 13. August 2006, N= 1 (1 left mandible) ex *Tyto alba* (GZCS 552) (new data).

New data of observed specimens: *Deyr ez-Zur*: cliffs in Ayn Jum'aa (210–230 m) [1], 13. August 2006, A. Karataş,

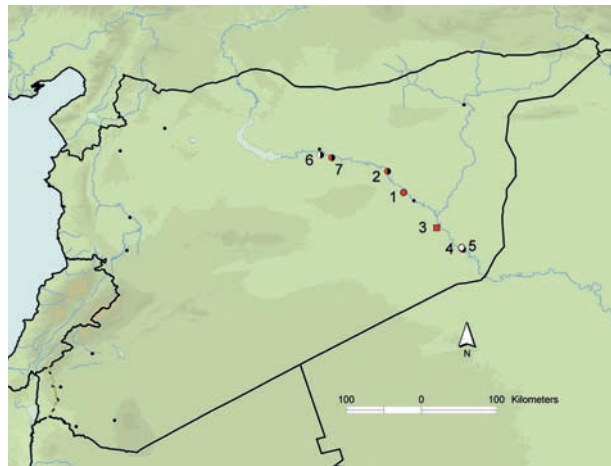


Fig. 7. Records of the naked-bellied tomb bat, *Taphozous nudiventris*, in Syria: 1. Ayn Jum'aa, 2. Halebiyye, 3. Kal'at er-Rahba, 4. Nehr-i Furat near es-Salihiyye, 5. es-Salihiyye, 6. Khasret Muhammed Ali and Khatir Magara, 7. el-Ukershe.

A. Shehab, M. Sözen, Z.S. Amr & I. Mamkhair, obs., three separated noisemaker colonies in the cliffs; 13/14. August 2006, A. Karataş, obs., hunting 10-30 ind.; Kal'at er-Rahba (241 m) [3], 14. August 2006, A. Shehab, A. Karataş, M. Sözen, Z.S. Amr & I. Mamkhair, obs., c. 200 ind.

Published data: *Deyr ez-Zur*: Halebiyye [2], 31. May 1989, D. Kock, obs. (SHEHAB *et al.*, 2004); Nehr-i Fırat [4], 1850 (DOBSON, 1878; cf. THOMAS, 1915; *sensu* SHEHAB *et al.*, 2004). *er-Rakka*: Khasret "Qasret" Mohammed Ali [6a] (EBENAU, 1996); 19. March 1996, C. Ebenau, leg. (EBENAU, 1966; SHEHAB *et al.*, 2004); *ibid.*, 28. June 1998 (SHEHAB *et al.*, 2004); Khatir "Qater" Magara [6b], 22. February 1993, C. Ebenau, leg. (EBENAU, 1994; SHEHAB *et al.*, 2004).

Remarks: A large population of this bat was observed on 13 August 2006 at Ayn Jum'aa near Deyr ez-Zur. About 200-300 animals were spotted in several crevices located on cliffs on the southern side of the Euphrates. Bats were very noisy when approached and moved deeper in the crevices during attempts to capture them. Faecal remains were in relatively large quantity with strong odor. Also, another population was spotted on 14 August 2006 in Kal'at er-Rahba (Fig. 8, 9). This colony was hiding in vertical crevices less than 10 cm wide. Hundreds of bats were observed packed in small flat narrow crevices that extends deep to the inside. Also, one population was observed in an open cave near Ayn Jum'aa, hanging to the highest point of the cave. Despite the effort to capture specimens by mist nets, the animals were hesitant to leave their crevices.

Under the roosting sites of the naked-bellied tomb bat at Ayn Jum'aa, we observed several individuals of the Barn Owl, *Tyto alba*, and many pellets were collected. Mandibles (4 left and 4 right) of this species and remains of 14 skulls of *Pipistrellus kuhlii* were recovered. Seven intact skulls of *T. nudiventris* were recovered from Barn Owl's pellets collected from Halebiyye in 2001, additionally.



Fig. 8. Kal'at er-Rahba which is roost of *Asellia tridens*, *Taphozous nudiventris*, *Eptesicus bottae*, *E. serotinus*, *Otonycteris hemprichii*, and *Pipistrellus kuhlii*.



Fig. 9. The naked-bellied tomb bat, *Taphozous nudiventris* in a crevice at Kal'at er-Rahba.

Tab. 3. External and cranial measurements (*mm*) and weight (*g*) of the naked-bellied tomb bat, *Taphozous nudiventris* from Syria (one live specimen and 7 skulls recovered from Barn Owl pellets collected from Halebiyye and Kal'at er-Rahba).

	N	Min.	Max.	Average	±SD
TL	1	139.0	139.0	139.0	0.0
HB	1	103.0	103.0	103.0	0.0
TaL	1	32.0	32.0	32.0	0.0
HF	1	20.0	20.0	20.0	0.0
E	1	21.0	21.0	21.0	0.0
W	1	66.0	66.0	66.0	0.0
FA	1	74.0	74.0	74.0	0.0
GtL	6	27.5	30.7	29.4	1.2
CbL	7	24.1	26.1	24.9	0.6
ZB	8	13.3	17.8	16.6	1.4
BB	8	12.8	13.9	13.3	0.3
IB	6	5.2	5.5	5.31	0.1
C-M ³	6	11.1	12.0	11.7	0.3
C-M ₃	7	13.2	13.9	13.5	0.2
M	7	20.4	22.4	21.6	0.6

Discussion

The naked-bellied tomb bat is very common along the Euphrates and Tigris (HATT, 1959; HARRISON & BATES, 1991); however, its presence in Turkey was only recently confirmed (SACHANOWICZ *et al.*, 1999; KARATAŞ & SÖZEN, 2003). The measurements of Syrian specimens prove them to represent the large sized subspe-

cies *T. n. magnus*. The occurrence of *T. n. magnus* on the Syrian Euphrates is part of a northwestern extension of the Iraqi population, extending into southern Turkey to near Nizip, Gaziantep Prov. (SACHANOWICZ *et al.*, 1999). External and cranial measurements for the naked-bellied tomb bat, *T. nudiventris magnus* from Syria are indicated in Table 3.

Family Hipposideridae (Leaf-nosed Bats)

Asellia tridens (É. GEOFFROY, 1813)

Trident leaf-nosed bat

Distributional Records (Fig. 10):

New data of collected specimens: *Deyr ez-Zur*: el-Mesreb [3], 13. August 2006, A. Karataş, Z.S. Amr, I. Mamkhair, A. Shehab, & M. Sözen, *leg.*, 4 lact. ♀♀ (GZCS 1782-1785). *Halep*: Kal'at en-Nejm (360 m) [5], 11. August 2006, A. Karataş, Z.S. Amr, I. Mamkhair, A. Shehab, & M. Sözen, *leg.*, 2 ad. ♀♀, 1 sad. ♀, 1 juv. ♂ (GZCS 1772-1775). From owl pellets: *Deyr ez-Zur*: Halebiyye [1], 2001, A. Shehab, *col.*, N= 14 ex *Tyto alba* pellets (GZCS 502); es-Salihiyye (Dura Europus) [4], 10. March 2004, A. Shehab, *col.*, N= 5 ex *Tyto alba* pellets (GZCS 517).

New data of observed specimens: *Deyr ez-Zur*: Kal'at er-Rahba (241 m) [2], 14. August 2006, A. Karataş, *obs.*, 1 ind.; el-Mesreb [3], 13. August 2006, A. Karataş, M. Sözen, I. Mamkhair, A. Shehab & Z.S. Amr, *leg.*, min. 2500 in two caves, closed each other (c. 400–500 ind. in 1st cave; c. 2000–2500 ind. in 2nd cave with the reddish animals –adults– were about 5 %). *Halep*: Kal'at en-Nejm (360 m) [5], 11. August 2006, A. Karataş, Z.S. Amr, I. Mamkhair, A. Shehab, & M. Sözen, *obs.*, a maternity colony of c. 20–30 females carrying young and subadults (*obs.*).

Published data: *Deyr ez-Zur*: Halebiyye [1], 15.-17. August 1978, R. Kinzelbach, *leg.* (NADER & KOCK, 1983; cf. HARRISON & BATES, 1991). *Humus*: Tadmur "Palmyra" [6], 23 April (ATALLAH & HARRISON, 1967; cf. HARRISON & BATES, 1991); the brine lug by Palmyra, 1993 (EBENAU, 1996); Hammam (Afqa spring), near Tadmur (Palmyra) [7], 11. March 1979, R. Kinzelbach *leg.* (NADER & KOCK, 1983; cf. HARRISON & BATES, 1991). *er-Rakka*: Khatir "Cater" Cave and Pigeon well "Taubenbrunnen" Cave [8] (EBENAU, 1996).

Remarks: A colony of about of 40–50 animals, including juveniles and some females carrying young was observed on 11 August 2006 in an underground dark large room in Kal'at en-Nejm. This castle is located on the southern side of the Euphrates with several alleys and corridors. This colony consists of mostly subadults and few adult individuals. On 13 August 2006 at el-Mesreb Village, two large colonies (500 and 2500 individuals) were found in two separate caves very close to each other. The caves are natural with low roofs not more than 2 meters height. Thick layers (10–20 cm) of fresh and old guano were accumulated across the caves, mainly in the largest cave. Adults have a brilliant reddish orange coloration on the back while subadults are yellowish gray. Similarly most individuals were subadults (about 90 %). Many females carrying young were observed and photographed (Fig. 11).

We visited both caves on 26 March 2006, but observed only piles of guano and not a single bat was seen. The trident leaf-nosed bat was found roosting with no other bat species in el-Mesreb caves, in con-

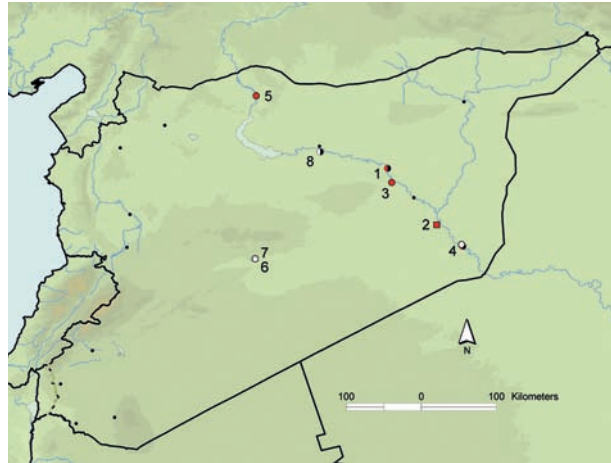


Fig. 10. Records of the trident leaf-nosed bat, *Asellia tridens*, in Syria: 1. Halebiyye, 2. Kal'at er-Rahba, 3. el-Mesreb, 4. es-Salihiyye (Dura Europus), 5. Kal'at en-Nejm, 6. Tadmur "Palmyra", 7. Hammam (Afqa spring), 8. Khatir Cave. Square denotes observation records.



Fig. 11. A lactating female of the trident leaf-nosed bat, *Asellia tridens*, from el-Mesreb Cave.

trast to Kal'at en-Nejm, where *Eptesicus serotinus*, was found to dwell near the roosting site of the trident leaf-nosed bat, however, in separate cellars. *Asellia tridens* was also recovered along with *Eptesicus bottae*, *Myotis capaccinii*, *Pipistrellus kuhlii* and *Taphozous nudiventris* from owl pellets collected in Halebiyye, and in combination with *P. kuhlii* and *T. nudiventris* at es-Salihiyye (Dura Europus). The farmers declared that they collected guano from el-Abdül Cave to fertilize their vegetable crops.

Discussion

The trident leaf-nosed bat is a colonial species that occurs across much of Africa, throughout the Middle East and into southwest Asia (HARRISON & BATES,

Tab. 4. External and cranial measurements (mm) and weight (g) of the trident leaf-nosed bat, *A. tridens*.

	N	Min.	Max.	Average	±SD
TL	8	80.0	87.0	84.0	2.2
TaL	8	24.0	28.0	25.8	1.4
HF	6	7.5	11.0	9.5	1.1
E	6	15.0	22.0	18.0	2.3
W	8	9.0	12.0	10.3	0.8
Wsp	3	310.0	325.0	318.3	6.2
FA	6	47.7	53.0	50.2	2.0
Tra	2	7.0	7.0	7.0	0.0
Atra	2	4.5	5.0	4.8	0.3
F1	2	6.0	6.5	4.8	0.3
GtL	7	17.6	19.0	18.3	0.4
CbL	6	16.3	17.3	16.7	0.3
ZB	7	9.2	11.1	10.3	0.6
BB	7	7.9	8.3	8.1	0.1
IB	7	2.3	2.6	2.5	0.1
C ¹	3	2.2	3.4	2.8	0.5
C ²	6	6.3	7.1	6.7	0.3
M ³	3	6.0	7.3	6.7	0.5
M	7	12.6	13.6	13.1	0.4

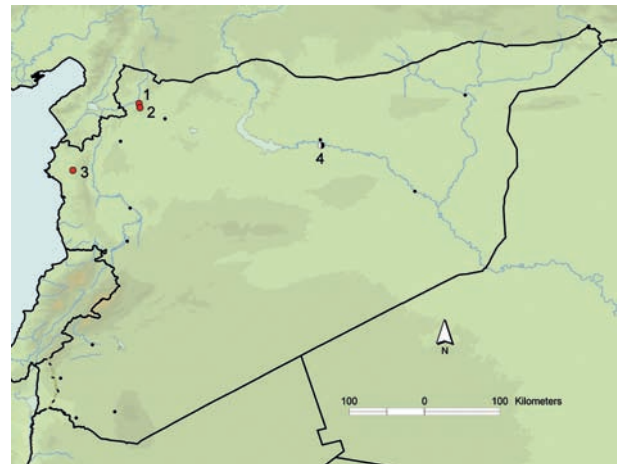
1991), and can be found in large numbers. DEBLASE (1980) reported on colonies reaching up to five thousand bats in a cave in Iran. Seasonal abundance of this bat was reported; HARRISON (1957) stated that the number of individuals declined sharply in winter and increased again in summer in caves between Ramadi and Habbaniye in Iraq. We have a similar observation in el-Mesreb, where both visited caves were void of bats in March, and two large colonies reappeared in August. External and cranial measurements for the trident leaf-nosed bat are shown in Table 4.

Family Rhinolophidae (Horseshoe Bats)

Rhinolophus ferrumequinum (SCHREBER, 1774) Greater horseshoe bat

Distributional Records (Fig. 12):

Published data: *Halep*: 30 km W Halep, Kal'at es-Sem'an (St. Sam'aa Citadel) [1], 20. July 2004, A. Shehab, I. Mamkhaier & Z.S. Amr, *leg.* (SHEHAB & MAMKHAIR, in press); near Basufan [2], 25. January 2006, A. Shehab & I. Mamkhaier, *leg.* (SHEHAB & MAMKHAIR, in press). –*el-Ladhikiye*: Kal'at es-Salahaddin (Salahaddin Citadel), 30 km E el-Ladhikiye (700 m) [3], 8. September 2004, A. Shehab & I. Mamkhaier, *leg.* (GZCS 1705-1711) (SHEHAB & MAMKHAIR, in press).

**Fig. 12.** Records of the greater horseshoe bat, *Rh. ferrumequinum*, in Syria: 1. Kal'at es-Sem'an, 2. Basufan, 3. Kal'at es-Salahaddin, 4. Khatir Cave.

er-Rakka: Khatir "Cater" Cave and Pigeon well "Taubenbrunnen" Cave [4], March 1993, C. Ebenau, *leg.* (EBENAU, 1996).

Remarks: A colony of about 75 individuals was observed in a dark cellar in Kal'at es-Sem'an on 20 July 2004 (Fig. 13 A). It was found along with *Myotis emarginatus*. Another colony of 100–150 horseshoe bats (*Rh. ferrumequinum* in combination with *Rh. euryale*) was found in a large room (6m × 6m × 6m) in Kal'at es-Salahaddin (Salahaddin Citadel) (Figs. 14, 17). This castle is situated in a dense Mediterranean forest of pine and oak. The room has two entrances and a narrow window. Two clusters of bats were found hanging separately in the roof crevices; one cluster was larger than the other. A huge amount of bat droppings (more than 50 kg) accumulated on the floor of the room's center (SHEHAB & MAMKHAIR, 2006).

Most of the collected specimens were sexually mature females without embryos, although, one female had developed teats (3.5 mm). A single hibernating adult male was collected from an open cave in Basufan on 25 January 2006. The same cellar in Kal'at es-Sem'an was visited later on 2 February 2005 and 25 January 2006, and found void of bats. Similarly, the room in Kal'at es-Salahaddin was visited on 23 January 2006, and it was not occupied by bats.

Discussion

This bat is widely distributed from northern India, south to northwestern Africa and throughout temperate Eurasia including Great Britain and Japan (HARRISON & BATES, 1991; HORÁČEK *et al.*, 2000). In the Middle East, it inhabits the Mediterranean ecozone especially in the mountains and forested regions and avoids extreme desert habitats (QUMSIYEH *et al.*, 1998).

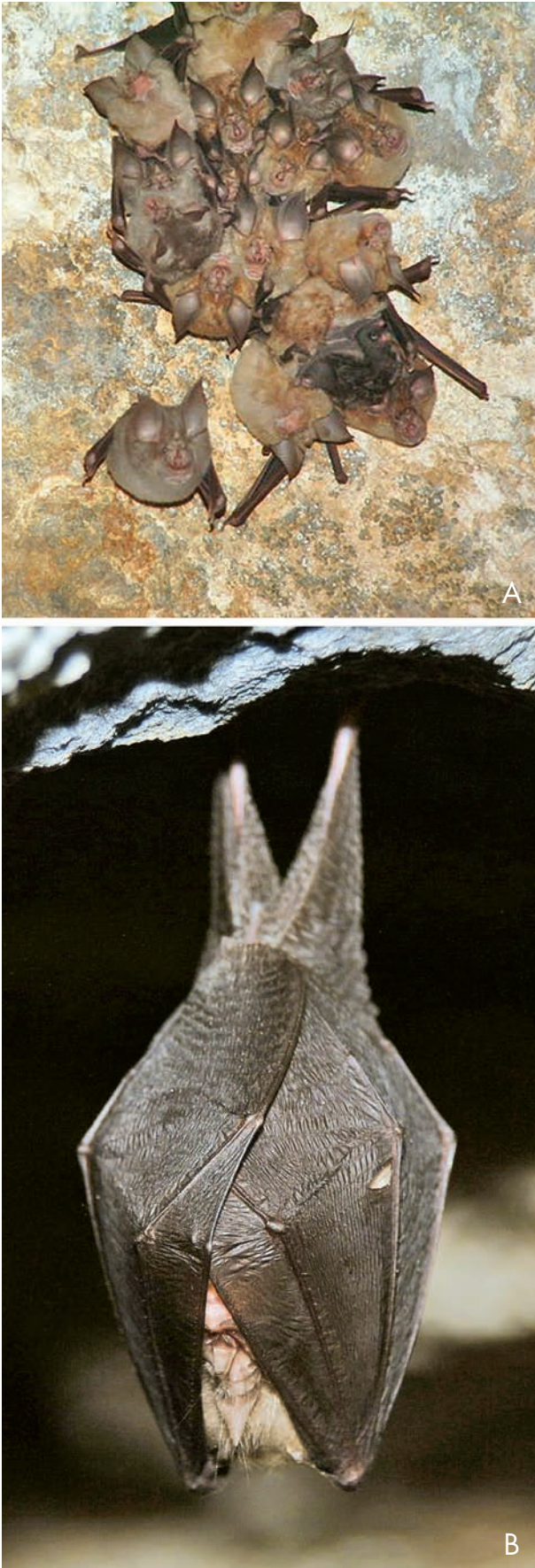


Fig. 13. A small colony of the greater horseshoe bat, *Rhinolophus ferrumequinum*, in a cellar at Kal'at es-Sem'an (A) and a solitary hibernating lesser horseshoe bat, *Rh. hipposideros*, in a cave at Kal'at el-Merkab (B).

Tab. 5. External and cranial measurements (*mm*) and weight (*g*) of the greater horseshoe bat, *Rh. ferrumequinum* from Syria.

	N	Min.	Max.	Average	±SD
HB	13	53.0	69.8	58.5	4.2
TaL	13	32.5	38.5	35.5	1.9
HF	13	10.1	11.9	11.0	0.6
E	13	19.5	25.0	22.3	1.4
W	1	13.0	13.0	13.0	0.0
Wsp	12	290.0	380.0	352.1	28.4
FA	13	54.7	59.1	57.0	1.4
D3	6	78.7	86.2	83.7	2.6
D5	6	65.5	70.7	67.4	1.7
D4.1	6	10.6	11.8	11.3	0.4
D4.2	6	17.1	18.7	17.9	0.5
Nll	1	13.8	13.8	13.8	0.0
Nlw	1	7.4	7.4	7.4	0.0
GtL	12	22.5	23.9	23.1	0.4
CbL	13	20.0	21.3	20.7	0.4
ZB	13	11.1	12.6	12.0	0.4
BB	13	9.9	10.5	10.2	0.2
IB	13	2.6	2.9	2.7	0.1
C ¹ -C ¹	13	3.0	4.5	4.2	0.4
C-M ³	13	8.3	8.8	8.6	0.1
C-M ₃	13	8.9	9.5	9.2	0.2
M	13	15.5	16.5	16.1	0.3

This species shares caves with *Rh. euryale* as well as *Rh. hipposideros* (QUMSIYEH *et al.*, 1998). ATALLAH (1977) also reported that *Rh. ferrumequinum* and *Rh. euryale* were found roosting together in groups of 30–50 bats in Lebanon and Jordan, even in the same cluster. In Turkey, RUDOLPH *et al.* (2005) found the greater horseshoe bat to share a cave with other 8 bat species including *Rh. blasii*, *Rh. euryale*, *Rh. mehelyi*, *M. myotis*, *M. blythii*, *M. capaccinii*, *M. emarginatus*, and *Miniopterus schreibersii* in Balikesir (Turkey), while KARATAŞ *et al.* (2003) found *Rh. ferrumequinum* and *Rh. euryale* roosting in the same cave with *Rousettus aegyptiacus* in southern Turkey. Several workers addressed the severe decline of this species across its range (MICKLEBURGH *et al.*, 2002). HARRISON & BATES (1991) reported a specimen from Tripoli, Syria, referred to *Rh. f. ferrumequinum*, in BMNH collection; we omitted this record from the Syrian chiropterean fauna, since Tripoli is presently in Lebanon out of the Syrian borders.

External and cranial measurements for the greater horseshoe bat are indicated in Table 5.



Fig. 14. The greater horseshoe bat, *Rh. ferrumequinum*, from Kal'at es-Sem'an (left) and the Mediterranean horseshoe bat, *Rh. euryale* from Hamama (right).

Rhinolophus hipposideros (BECHSTEIN, 1800)
Lesser horseshoe bat

Distributional Records (Fig. 15):

New data of observed specimens: *Idlib:* Hamama, a small cave behind artificial wall used by shepherds (c. 100 m N of el-Menfa Cave) (178 m) [2], 5. August 2006 & 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhair, *obs.*, a colony of 15-20 juv. or sad.

Published data: *Halep:* Basufān, c. 30 km NW Halep, an underground cave, used by villagers as shelter for domestic animals [1], 2. February 2005, A. Shehab & I. Mamkhair, *leg.* (SHEHAB *et al.*, in press). *Tartus:* Kal'at el-Merkab [3], 23. January 2006, A. Shehab & I. Mamkhair, *leg.* (SHEHAB *et al.*, in press).

Remarks: A solitary hibernating female, hanging in an underground cave used by locals as a shelter for donkeys and horses was collected from Basufān. The specimen collected from Kal'at el-Merkab was also a solitary hibernating male (Fig. 13 B) in a lateral dark underground tunnel (SHEHAB *et al.*, 2006). On 6 August 2006, at least 15 individuals were observed in a cave near Hamama, 100 m north of el-Menfa Cave, most of these animals were subadults or juveniles.

Discussion

This species have been recorded from all the neighbouring countries; Lebanon, Jordan, Palestine and Turkey (ATALLAH, 1977; HARRISON & BATES, 1991;

Tab. 6. External and cranial measurements (mm) and weight (g) of the lesser horseshoe bat, *Rhinolophus hipposideros* from Northern Syria.

	N	min	max	Average	±SD
HB	2	37.5	38.6	38.05	0.55
TaL	2	24.7	26.5	25.6	0.9
HF	2	6.6	6.6	6.6	0.0
E	2	13.8	15.4	14.6	0.8
W	1	3.0	3.0	3.0	0.0
Wsp	2	210	210	210	0.0
T/HB (%)	2	64	70.7	67.4	4.7
FA	2	35.8	37.4	36.6	0.8
D3	1	54.0	54.0	54.0	0.0
D5	1	50.5	50.5	50.5	0.0
D4.1	1	7.2	7.2	7.2	0.0
D4.2	1	12.5	12.5	12.5	0.0
Nll	1	11.0	11.0	11.0	0.0
Nlw	1	5.6	5.6	5.6	0.0
GtL	2	15.9	16.1	16.0	0.1
CbL	2	14.1	14.1	14.1	0.0
ZB	2	7.2	7.4	7.3	0.1
BB	2	6.8	6.8	6.8	0.0
IB	2	1.7	1.8	1.75	0.05
C ¹ -C ¹	2	2.5	2.7	2.6	0.1
C-M ³	2	5.1	5.5	5.3	0.2
C-M ₃	2	5.6	5.7	5.65	0.05
M	2	9.7	10.0	9.85	0.15

QUMSIYEH, 1996; AMR, 2000; KARATAŞ *et al.*, 2006). The lesser horseshoe bat is more common in the northern Mediterranean climatic zone rather than in arid re-

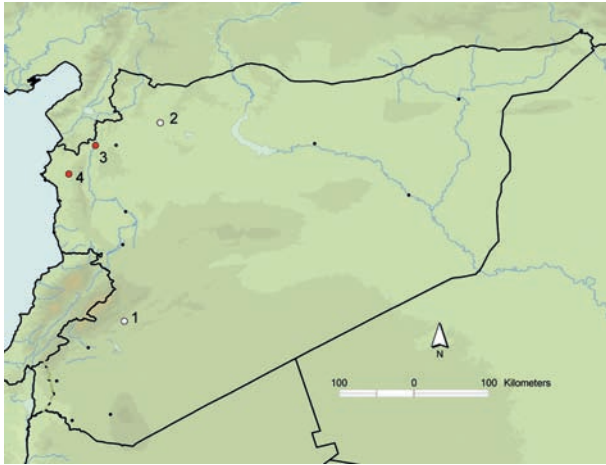


Fig. 15. Records of the lesser horseshoe bat, *Rhinolophus hipposideros* in Syria: 1. Basufan, 2. Hamama, 3. Kal'at el-Merkab.

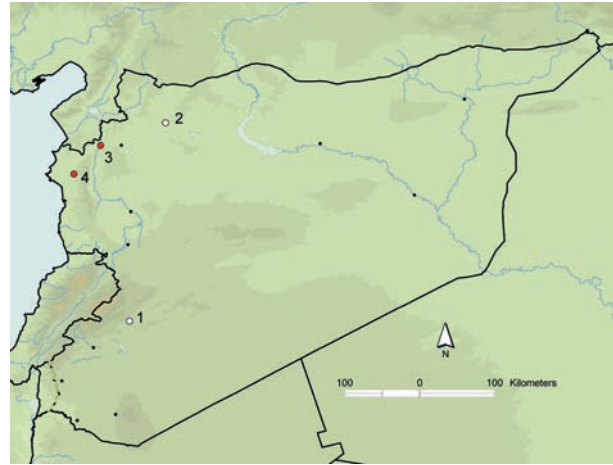


Fig. 16. Records of the Mediterranean horseshoe bat, *Rh. euryale* in Syria: 1. Jerud, 2. Halep, 3. Hamama, 4. Kal'at es-Salahaddin.

gions. QUMSIYEH (1980) obtained hibernating individuals in Dibbine Forest, Jordan, during February. Later QUMSIYEH *et al.* (1986) collected active individuals in August. Also ATALLAH (1977) reported that only one or two specimens were observed. The observation of many subadults on 6 August 2006 suggests that the reproduction season for this species in Syria started in early summer. External and cranial measurements for the Lesser horseshoe bat, *Rh. hipposideros* are presented in Table 6.

Rhinolophus euryale BLASIUS, 1853
Mediterranean horseshoe bat

Distributional Records (Fig. 16):

New data of collected specimens: *Idlib:* Hamama, a big cave (151 m) [3], 24. January 2006, A. Shehab & I. Mamkhair, *leg.*, 4 ♂♂ (skin and skull, GZCS 1735-1738). *el-Ladhikiye:* Kal'at es-Salahaddin (Salahaddin Citadel), 30 km E el-Ladhikiye (700 m) [4], 8. September 2004, A. Shehab & I. Mamkhair, *leg.*, 3 ♂♂, 1 ♀ (GZCS 1712-1715), 2 mummies (sex?) (GZCS 425-426).

Published data: *Dimashk (Sham):* Jerud "Djeroud" [1] (TROUËSSART & KOLLMANN, 1923; cf. HARRISON & BATES, 1991). *Halep:* Halep "Aleppo" [2] (WETTSTEIN, 1913; cf. HARRISON & BATES, 1991).

Remarks: This species was collected along with *Rh. ferrumequinum* from Kal'at es-Salahaddin and with *Myotis capaccinii* in a cave in Hamama on 24 January 2006. *Rh. euryale* is a medium-sized horseshoe bat, with a wingspan extending up to 300 mm. The tail is up to 22.5 mm and like in all rhinolophids entirely included in the uropatagium. In contrast to *Rh. ferrumequinum*, the tail of *Rh. euryale* measures less than half of head and body length (T/HB = 46.9% ± 3.98). The second phalanx of fourth finger (P4.2 = 17.1 ± 1.3



Fig. 17. Dorsal view of the skulls of *Rh. euryale* (left) and *Rh. ferrumequinum* (middle) and lateral view of *Rh. euryale* (right) from northern Syria (the arrow is pointing to the first upper premolar).

mm) is about twice as long as the first phalanx (P4.1 = 8.3 ± 1.8 mm) (Table 7). The superior connecting process of the sella is pointed in side view, and the lancet is triangular without marked concave edge at its base (Fig. 14). The ears are long, pointed and without tragus. The pelage is long, soft and dense, grayish brown in the back, while lighter on the abdomen. The skull is smaller than that of *Rh. ferrumequinum* (Fig. 17). The GtL is up to 18.6 mm. The rostrum is elevated behind the nasal orifice forming pronounced nasal bulb. The sagittal crest is not well developed. The tympanic bullae are small (SHEHAB & MAMKHAIR, 2006).

26 bat mummified specimens were collected from a fumigated small room in Kal'at es-Salahaddin on 8 September 2004. 2 mummies belonging to *Rh. euryale* and the rest (24 mummies) to *Myotis emarginatus*. We were informed by custodian of Kal'at es-Salahaddin that a local person came and fumigated that room to collect several bats for the use in folk medicine. At our visit on 23 January 2006, the large room in Kal'at es-Salahaddin was unoccupied by any bat, neither by *Rh. euryale* nor by *Rh. ferrumequinum*. This may suggest that these two species have the same emigration behaviour.

Tab. 7. External and cranial measurements (mm) of the Mediterranean horseshoe bat, *Rh. euryale* from Syria.

	N	Min.	Max.	Average	±SD
HB	8	42.8	58.5	49.3	5.2
TaL	8	19.9	41.5	26.5	7.8
HF	8	8.8	10.5	9.8	0.5
E	7	15.8	21.2	19.2	1.8
Wsp	5	225.0	300.0	289.0	17.4
FA	8	45.1	56.9	47.6	3.6
D3	6	66.6	90.0	74.3	7.5
D5	6	51.1	74.0	58.8	7.4
D4.1	6	6.1	11.5	8.3	1.8
D4.2	6	15.2	19.5	17.1	1.3
Nll	4	11.5	12.7	12.2	0.5
Nlw	4	7.0	7.7	7.3	0.3
GtL	8	17.9	19.8	18.7	0.6
CbL	8	16.0	17.3	16.6	0.5
ZB	8	8.8	9.5	9.2	0.2
BB	8	8.2	8.8	8.6	0.2
IB	8	2.2	2.6	2.4	0.1
C ¹ -C ¹	4	2.9	3.2	3.1	0.1
C-M ³	8	5.9	6.8	6.3	0.3
C-M ₃	8	6.3	7.7	6.8	0.5
M	7	11.3	12.0	11.7	0.2

Discussion

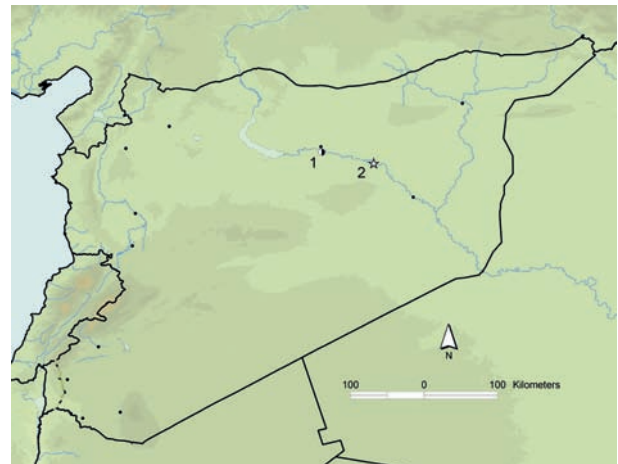
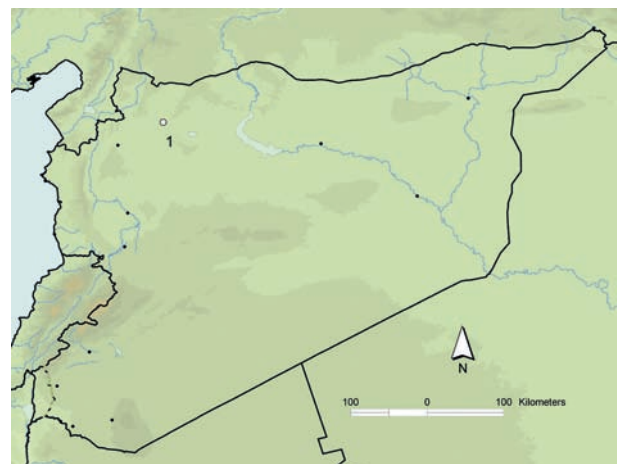
The Mediterranean horseshoe bat is a European species with a distribution that extends the Mediterranean Region and North Africa (HORÁČEK *et al.*, 2000). As mentioned earlier, this bat is associated with *Rh. ferrumequinum* and inhabits forested areas across its range in the Middle East (AMR *et al.*, 2006).

HARRISON & BATES (1991) stated that there were no details concerning the measurements or lancet shape for specimens previously assigned to *Rh. euryale* that have been reported from Halep by WETTSTEIN (1913) and from Jerud by TROUSSART & KOLLMAN (1923). Therefore, they are only tentatively referred to *Rh. euryale*, following DEBLASE (1972).

Rhinolophus mehelyi MATSCHIE, 1901
Mehely's horseshoe bat

Distributional Records (Fig. 18):

Published data: *er-Rakka*: Khatir "Cater" Cave and Pigeon well "Taubenbrunnen" Cave [1] (EBENAU, 1996); c. 60 km E er-Rakka, near Ma'dān "Maadan", middle of the Euphrates valley, "Staubleichenhöhle", a small karstic cave [2], (EBENAU, 1996); *ibid.*, 13. March 1994, 20. March 1996, C. Ebenau, *leg.* (WALTER & EBENAU, 1997).

**Fig. 18.** Distribution of Mehely's horseshoe bat, *Rhinolophus mehelyi* in Syria: 1. Khatir Cave, 2. Ma'dān.**Fig. 19.** Distribution of Blasius' horseshoe bat, *Rhinolophus blasii* in Syria: 1. Halep.

Remarks: This species was not collected during the present survey. EBENAU (1996) recovered cranial and bone remains of this bat from Khatir Cave. Also, WALTER & EBENAU (1997) recovered ectoparasites from this bat from 60 km E er-Rakka, near Ma'dān, along the Euphrates.

Rhinolophus blasii Peters, 1866
Blasius' horseshoe bat

Distributional Records (Fig. 19):

Published data: *Halep*: Halep "Aleppo", N= 14 (WETTSTEIN, 1913; cf. HARRISON & BATES, 1991).

Remarks: Blasius' horseshoe bat was not collected during this survey. A single record of this bat was reported by WETTSTEIN (1913) from Halep.

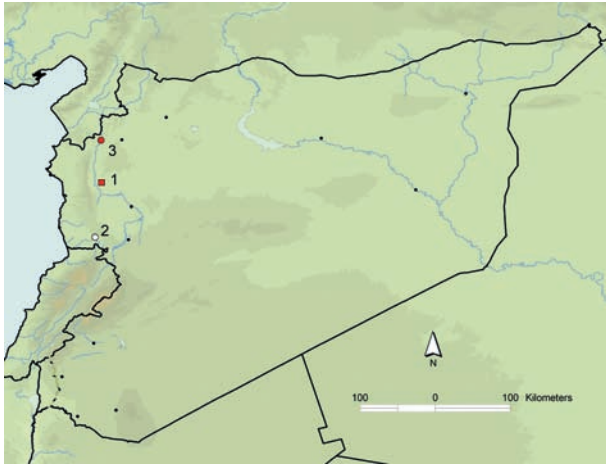


Fig. 20. Records of the greater mouse-eared bat, *Myotis myotis* in Syria: 1. Kal'at el-Madik (Apamea Citadel), 2. Tel Kalakh, Kal'at el-Husun, 3. Hamama.

Family Vespertilionidae (Vespertilioned Bats)

Myotis myotis (BORKHAUSEN, 1797) Greater mouse-eared bat

Distributional Records (Fig. 20):

New data of collected specimens: Idlib: Hamama, a big cave (151 m) [3], 3. July 2005, A. Shehab, I. Mamkhair, Z.S. Amr & M. Abu Baker, *leg.*, 4 ♀♀ (GZCS 1717-1718, 1828-1829); *ibid.*, 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhair, *leg.*, 4 ♂♂, 1 ♀ (GZCS 1755, 1757, 1758, 1764, 1765).

New data of observed specimens: Hamā: Kal'at el-Madik (Apamea) [1] (270 m), 8. August 2006, A. Karataş, A. Shehab, M. Sözen & I. Mamkhair, *obs.-photo.*, total 4 ind. (solitary). Idlib: Hamama, a big cave (151 m) [3], 3. July 2005, A. Shehab, I. Mamkhair, Z.S. Amr & M. Abu Baker, *obs.*, 1500–2000 animals of two species (*M. myotis* + *Miniopterus schreibersii*) (*obs.*); *ibid.*, 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhair, *obs.*, a colony of c. 2000–2500 bats of three species (*M. myotis* + *M. capaccinii* + *Miniopterus schreibersii*).

Published data: Humus: Tel Kalakh, the dungeons of Kal'at el-Husun "Krak des Chevalier" [2], 8. December 1952, D. Potter, *leg.* (HARRISON & LEWIS, 1961; cf. KUMERLOEVE, 1975; cf. HARRISON & BATES, 1991); *ibid.*, 23. July 1977, K. KOWALSKI *et al.*, *leg.* (NADACHOWSKII *et al.*, 1990; cf. HARRISON & BATES, 1991).

Remarks: A large colony of 1500–2000 individuals was found in a cave situated along the Orontes River. The cave is about 150 m long with a height of 20 m. It is about 1 km from el-Menfa Cave. Another species, *Miniopterus schreibersii*, was found within this cave on 3 July 2005. However, on 23 January 2006, this cave was void of *M. myotis* and *Miniopterus schreibersii*, and only *Rh. euryale* and *M. capaccinii* were observed. On 6 August 2006, a large population

Tab. 8. External and cranial measurements (mm) and weight (g) of the greater mouse-eared bat, *Myotis myotis* from Hamama Cave.

	N	Min.	Max.	Average	±SD
TL	5	120.0	141.0	133.2	7.7
HB	2	73.0	74.0	73.5	0.5
TaL	7	48.0	62.0	55.9	4.3
HF	7	13.0	18.0	14.9	1.7
E	7	25.0	28.0	26.6	1.2
W	5	20.0	26.0	23.0	2.0
FA	7	63.0	68.0	64.7	1.7
Tra	7	10.0	13.5	11.7	1.1
F1	1	11.0	11.0	11.0	0.0
D3	2	105.0	106.0	105.5	0.5
D4	2	85.0	89.0	87.0	2.0
D5	2	82.0	83.0	82.5	0.5
GtL	5	25.3	26.2	25.6	0.3
CbL	5	23.5	24.6	24.0	0.4
ZB	5	15.2	15.7	15.5	0.2
BB	5	10.6	11.3	10.8	0.3
IB	5	5.0	5.4	5.2	0.1
C ¹ -C ¹	5	4.2	4.4	4.3	0.1
C-M ³	5	10.1	10.9	10.5	0.3
C-M ₃	5	11.0	11.5	11.3	0.2
M	5	19.7	20.5	20.0	0.3

of 2000–2500 individuals (three species, *M. myotis*, *M. capaccinii*, *Miniopterus schreibersii*, roosting together) were observed and several specimens were collected randomly by hand net from that the cave (Fig. 21). In contrast to our findings in that cave on July 2005, *M. capaccinii* was absent on that date, while reappeared in this cave on August 2006. Actually it was not possible to estimate the percentage of each species in the cave, due to the large number of bats inside the cave. Four individual (each one hanging separately) were observed on 8 August 2006 in Kal'at el-Madik (Apamea Citadel). All the collected animals of this species were adults and the dissected females were not pregnant, however, two females had developed teats. Two adult males collected on August 2006 had large testes (5.5 × 2.8 mm and 5.3 × 3.4 mm).

Discussion: A colony of several thousands was found in a cave near Havran, Western Turkey (RUDOLPH *et al.*, 2005). Similarly, it was found to share its habitats with several *Myotis* sp. as well as other horseshoe bats. LEWIS & HARRISON (1962) gave an account on the population structure of this species in Lebanon. They indicated migratory behaviour of this species during October. The results suggest that *Myotis myotis* is a



Fig. 21. A colony of *M. myotis* roosting with *M. capaccinii* and *Miniopterus schreibersii* in Hamama Cave.

migratory species and occupies different roosting sites in winter. The population of bats at Hamama cave was larger on August 2006 than in July 2005.

External and cranial measurements of *M. myotis* from Syria are given in Table 8.

Myotis blythii (TOMES, 1857)
Lesser mouse-eared bat

Distributional Records (Fig. 22):

New data of collected specimens: From owl pellets: *Humus*: Kal'at el-Husun [1], 8. July 2004, A. Shehab, I. Mamkhair & Z. Amr, *leg.*, N=2 ex *Tyto alba* pellets (GZCS 505).

Published data: *Humus*: Tel Kalakh, the dungeons of Kal'at el-Husun "Kraak des Chevalier" [1], 8. December 1952, D. Potter, *leg.* (HARRISON & LEWIS, 1961; cf. KUMERLOEVE, 1975; cf. NADACHOWSKII *et al.*, 1990; cf. HARRISON & BATES, 1991); *ibid.*, 23. July 1977, K. Kowalski *et al.*, *leg.*, (NADACHOWSKII *et al.*, 1990).

Remarks: Remains of two skulls, one of them intact, were recovered from owl pellets. All previous records from Syria are from the same locality (HARRISON & LEWIS, 1961; NADACHOWSKII *et al.*, 1990).

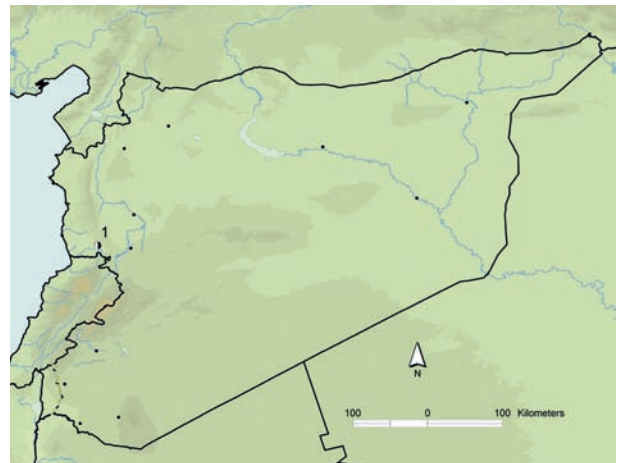


Fig. 22. Records of the lesser mouse-eared bat, *Myotis blythii* in Syria: 1. Tel Kalakh, Kal'at el-Husun.

Discussion

The lesser mouse-eared bat is distributed throughout Europe, mountainous western North Africa, North Asia, South and Southeast Asia, West and Central Asia. In the Middle East, it is mostly associated with mountainous-forested regions (AMR, 2000). In Havran, Western Turkey, RUDOLPH *et al.* (2005) found this bat

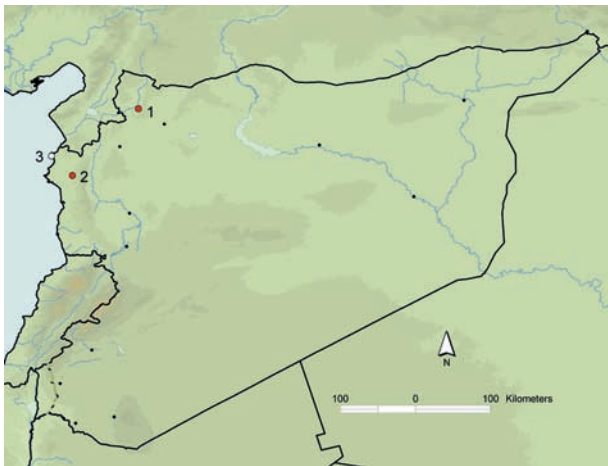


Fig. 23. Records of Geoffroy's bat, *Myotis emarginatus* in Syria: 1. Kal'at es-Sem'an, 2. Kal'at es-Salahaddin, 3. Ra's el-Basit.

in sympatry with seven other species including four horseshoe bats and another three *Myotis* spp.

Cranial measurements taken from a skull of *M. blythii* ex *Tyto alba* pellets (GZCS 505) are as follows: GtL 21.8, CbL 20.8, ZB 14.1, BB 10.0, IB 5.1, C-M³ 9.3, C-M₃ 9.8, M 16.4 mm.

Myotis emarginatus (E. Geoffroy, 1806) Geoffroy's Bat

Distributional Records (Fig. 23):

New data of collected specimens: *Halep*: Kal'at es-Sem'an (St. Sam'aa Citadel), 30 km W Halep [1], 20. July 2004, A. Shehab, I. Mamkhair & Z.S. Amr, *leg.*, 2 ind. (skin and skull, GZCS 1719, 1827). *el-Ladhikiye*: Kal'at es-Salahaddin (Salahaddin Citadel), 30 km E el-Ladhikiye (700 m) [2], 8. September 2004, A. Shehab, I. Mamkhair, *leg.*, N= 24 mummies (GZCS 401-424).

New data of observed specimens: *Halep*: Kal'at es-Sem'an (St. Sam'aa Citadel), 30 km W Halep [1], 20. July 2004, a colony of 75–100 animals of *Rh. ferrumequinum* and *M. emarginatus*, A. SHEHAB, *obs.*

Published data: *el-Ladhikiye*: Ra's el-Basit "Ras al-Basit" [3], 18. May 1995 (BENDA, 1996).

Remarks: Two specimens were mistnetted in underground cellars in Kal'at es-Sem'an. These cellars were also inhabited by *Rh. ferrumequinum*. Many mummified bats were found scattered on the floor inside a small underground room (4 × 2.5 × 2.5 m) in Kal'at es-Salahaddin on 8 September 2004. 26 intact mummies were collected, 24 of them were belonged to *M. emarginatus* and two to *Rh. euryale* (see remarks under *Rh. euryale*).

Discussion: Geoffroy's Bat has been reported only from mesic forested habitats in Jordan (QUMSIYEH

Tab. 9. External and cranial measurements (mm) of Geoffroy's bat, *Myotis emarginatus*.

	N	Min.	Max.	Average	±SD
TL	1	91.5	91.5	91.5	0.0
HB	1	44.4	44.4	44.4	0.0
TaL	2	36.7	40.7	38.7	2.0
HF	18	8.3	9.5	8.8	0.4
E	2	14.0	14.6	14.3	0.3
Wsp	1	225.0	225.0	225.0	0.0
FA	17	37.5	41.6	39.7	1.3
GtL	19	15.0	16.6	16.0	0.5
CbL	17	14.0	15.6	14.9	0.5
ZB	18	8.8	9.8	9.5	0.2
BB	18	7.0	9.0	7.7	0.4
IB	23	3.3	3.9	3.7	0.2
C-M ³	24	5.6	6.5	6.2	0.2
C-M ₃	24	5.9	7.1	6.7	0.3
M	24	10.1	12.8	11.9	0.5

et al., 1998). It inhabits caverns; a large colony that consisting of females only was observed in Mount Carmel (HARRISON & BATES, 1991). Similar findings were reported by RUDOLPH *et al.* (2005) from a cave near Havran (Balıkesir Prov.), Western Turkey. They also found a nursery, young and females only. They found Geoffroy's Bat sympatric with several *Myotis* sp. as well as different horseshoe bats. KARATAŞ & ÖZGÜL (2006) mapped the distribution of this species in Turkey, and indicated several localities close to the north-western Turkish-Syrian borders. According to these authors most records of Geoffroy's Bat are from coastal areas. External and cranial measurements of *M. emarginatus* from Syria are presented in Table 9.

Myotis aurascens KUZYAKIN, 1935 Eastern whiskered bat

Distributional Records (Fig. 24):

Published data: Mount Hermon, 2. September 1994, B. Shalmon, *leg.* (BENDA & KARATAŞ, 2005).

Remarks: The occurrence of this species in Syria is based on a single specimen collected at Mount Hermon in 1994 (BENDA & KARATAŞ, 2005). MENDELSSOHN & YOM-TOV (1999) referred to this specimen as *Myotis mystacinus*. BENDA & KARATAŞ (2005) revised the *Myotis mystacinus* morpho-group comparing material from its whole range with statistical methods. They concluded that all "*M. mystacinus*" from Anatolia and Syria are in fact *M. aurascens*. *M. aurascens* is the

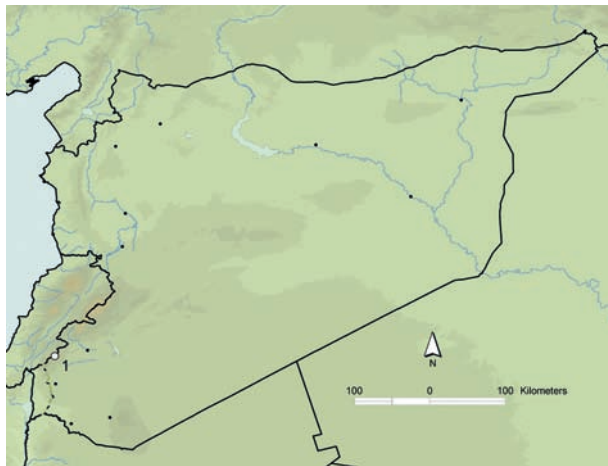


Fig. 24. Record of the Eastern whiskered bat, *Myotis aurascens* in Syria: 1. Mount Hermon.

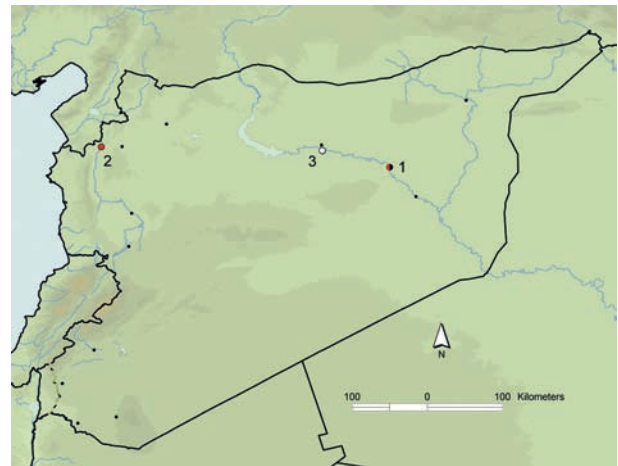


Fig. 25. Records of the long-fingered bat, *Myotis capaccinii* in Syria: 1. Halebiyye, 2. Hamama, 3. Khatir Magara and Khasret Muhammed Ali.

most widely distributed and abundant species of the group in south-eastern Europe (BENDA & TSYTSULINA, 2000).

DOBSON (1878) reported a specimen of *M. mystacinus* (s. l.) from “Syria” (= the Levant in the present-time sense) from the collection of the British Natural History Museum. TRISTRAM (1884) mentioned *M. mystacinus* “in Southern Lebanon” [= southern edge of the Lebanon Mts.], which may be identical with the above BMNH individual. Several subsequent authors accepted this record of *M. mystacinus* (s. l.) in “Syria” (DORIA, 1887; TROUËSSART, 1879, 1897; MÉHELY, 1900; PALACKÝ, 1902; RYBERG, 1947) (after BENDA & KARATAŞ, 2005), although there is no reference commenting on origin and fate of this specimens available (see e.g. HARRISON, 1964; KUMERLOEVE, 1975; HARRISON & BATES, 1991).

Myotis capaccinii (BONAPARTE, 1837) Long-fingered bat

Distributional Records (Fig. 25):

New data of collected specimens: *Idlib:* Hamama, a big cave (151 m) [2], 24. January 2006, 4 ad. ♂♂ (GZCS 1739, 1740, 1808, 1809); 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhaïr, *leg.*, 1 ad. ♂, 4 ad. ♀♀, 1 lact. ♀ (GZCS 1743-1747, 1756). From owl pellets: *Deyr ez-Zur:* Halebiyye [1], 2001, A. Shehab, *leg.*, N= 28 ex *Tyto alba* pellets (GZCS 503).

New data of observed specimens: *Idlib:* Hamama, a big cave [2], 24. January 2006, A. Shehab & I. Mamkhaïr, *obs.*, 30-40 hibernating bats of two species (*M. capaccinii* + *Rh. euryale*); 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhaïr, *obs.*, a colony of 30-40 ind.

Published data: “SYRIA” (NEHRING, 1886; cf. JENTINK, 1888; sensu SHEHAB *et al.*, 2004). *er-Rakka:* middle of the Euphrates Valley [3a], 12. March 1994, Khatir “Qater” Magara and Pigeon well “Taubenbrunnen” Cave, C. Ebenau,

Tab. 10. External and cranial measurements (mm) and weight (g) of the long-fingered bat, *Myotis capaccinii*.

	N	Min.	Max.	Average	±SD
TL	6	87.0	95.0	91.8	2.7
HB	4	46.5	50.0	48.6	1.4
TaL	10	36.0	41.0	38.4	1.6
HF	10	9.6	13.0	11.2	1.3
E	10	12.0	16.0	14.2	1.2
W	6	8.4	9.3	8.9	0.3
Wsp	9	235.0	284.0	259.9	17.6
FA	10	39.8	42.5	40.9	0.9
Tra	10	6.5	9.0	7.3	0.9
GtL	5	15.3	15.6	15.5	0.1
CbL	5	13.8	14.7	14.4	0.3
ZB	5	9.0	9.5	9.3	0.2
BB	5	7.8	8.0	7.9	0.1
IB	3	3.6	4.0	3.8	0.1
C ¹ -C ¹	1	3.0	3.0	3.0	0.0
C-M ³	3	5.7	6.7	6.0	0.5
C-M ₃	3	5.9	6.1	6.0	0.1
M	5	11.2	11.3	11.2	0.1

obs. & leg. (EBENAU, 1996; WALTER & EBENAU, 1997; cf. SHEHAB *et al.*, 2004); Khasret “Qasret” Muhammed Ali [3b], 28. June 1998, A. Shehab, *col.* (SHEHAB *et al.*, 2004).

Remarks: On 6 August 2006, a colony of 30–40 bats was observed in a cave near Hamama Village, and about 1 km south of el-Menfa Cave. It was found along with *M. myotis* and *Miniopterus schreibersii*. On 24 January 2006, there were only tens of hibernating bats in the same cave, of which we collected four individuals together with *Rh. euryale*, whereas no *M. myotis*

were found. On 3 July 2005 this cave was occupied by *M. myotis* and *Miniopterus schreibersii* whereas no *M. capaccinii* was found (Fig. 21).

Discussion: The long-fingered bat is known as a cave-dwelling species. Few localities are given by HARRISON & BATES (1991) from Jordan, Lebanon and Palestine, where its occurrence is confined to mesic and Mediterranean ecozones. External and cranial measurements of *M. capaccinii* from Syria are given in Table 10.

Myotis nattereri (KUHLE, 1817)
Natterer's bat

Remarks: BENDA *et al.* (1999) listed *M. nattereri* for the Syrian bat fauna, however, without a specified locality. During our field trips, we did not meet this species. One of the authors (A.K.) found this bat in Belen (Hatay) (KARATAŞ, 2000) and Nizip (Gaziantep, Turkey), in the north of Syria (see KARATAŞ & SACHANOWICZ, in press).

Pipistrellus pipistrellus (SCHREBER, 1774)
The Common pipistrelle

Distributional Records (Fig. 26):

Published data: *Dimashk (Sham):* Ma'lūla "Maalula" (c. 1770 m) [1], 30. April 2001, J. Obuch, *leg.* (BENDA *et al.*, 2003a, 2004a); Serghaya (c. 1330 m) [2], 28. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtová, *leg.* (BENDA *et al.*, 2003, 2004); *ibid.* "Dimashq" (HULVA *et al.*, 2004). *el-Ladhikiye:* Kassab (c. 1700 m), border crossing-point [3], 3. July 1998, M. Andreas, P. Benda & M. Uhrin, *leg.* (BENDA *et al.*, 2003a, 2004a); Rabi'ah (c. 620 m) [4], 1. July 1998, M. Andreas, P. Benda & M. Uhrin, *leg.* (BENDA *et al.*, 2003a, 2004a); Ra's el-Basit "Ras al-Basit" (c. 10 m) [5], 29. April 2001, R. Lučan, *leg.* (BENDA *et al.*, 2003a, 2004a); Silenfe "Slinfeh" (c. 1350 m) [6], 29. June 1998, M. Andreas, P. Benda & M. Uhrin, *leg.* (BENDA *et al.*, 2003a, 2004a; HULVA *et al.*, 2004). *Tartus:* Bāniyās (c. 10 m) [7], 31. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtová, *leg.* (BENDA *et al.*, 2003a, 2004a; HULVA *et al.*, 2004).

Remarks: No specimens of the common pipistrelle were collected during our survey. On the other hand, BENDA *et al.* (2003a) collected several specimens from seven localities near Sham (Damascus) and the coastal mountains (see Fig. 26). In the Levant, this bat was recorded from Lebanon and Palestine also in caves situated in the coastal regions (LEWIS & HARRISON, 1962; MENDELSSOHN & YOM-TOV, 1999). BENDA *et al.* (2003a) pointed out the existence of a genetic difference between samples of *P. pipistrellus*, from Syria and from central-European and stated that this separa-

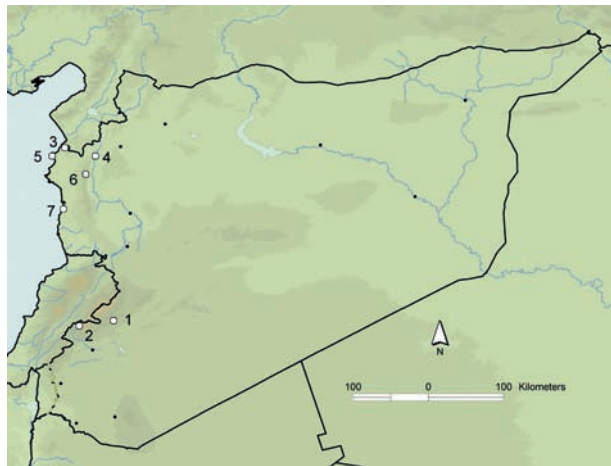


Fig. 26. Records of the common pipistrelle, *Pipistrellus pipistrellus* in Syria: 1. Ma'lūla, 2. Serghaya, 3. Kassab, 4. Rabi'ah, 5. Ra's el-Basit, 6. Silenfe, 7. Bāniyās.

tion is probably due to geographic isolation during the glaciation events in the western Palaearctic.

Pipistrellus kuhlii (NATTERER in KUHLE, 1817)
Kuhl's pipistrelle

Distributional Records (Fig. 27):

New data of collected specimens: *Dar'aa:* Ayn Dakar, 40 km W Dar'aa [1], 28. February 2006, A. Shehab, *leg.*, 3 ♂♂, 3 ♀♀ (GZCS 1732-1734, 1824-1826). *Deyr ez-Zur:* Kal'at er-Rahba (241 m) [4], 14. August 2006, A. Karataş, Z.S. Amr, I. Mamkhair, & M. Sözen, *net.* 3 ind. (released), *net.* 1 ♂ (GZCS 1793). *Halep:* Kasr Sallum (390 m) [16], 10. August 2006, A. Karataş, I. Mamkhair, A. Shehab, Z.S. Amr, & M. Sözen, *leg.*, 1 juv. ♂, 1 ad. ♂ (GZCS 1770-1771). *el-Haseke:* Deyr Dejle, Nehr-i Dicle (Tigris River) [21], 7. July 2005, A. Shehab, I. Mamkhair & M. Abu Baker, *leg.*, 1 ad. ♂, 5 ♀♀, 1 lact. ♀ (GZCS 1723-1726, 1819-1821). *er-Rakka:* Fekhaykha (Fkhaikha) [32], A. Shehab, I. Mamkhair, M. Abu Baker & Z.S. Amr, *obs.*, 21. July 2004, 1 ♂, 6 ♀♀ (GZCS 1727-1731, 1822-1823); 4. July 2005, N= ? From owl pellets: *Deyr ez-Zur:* Ayn Jum'aa, cliff (210-230 m) [2], 13. August 2006, A. Shehab, I. Mamkhair, Z.S. Amr, A. Karataş & M. Sözen, N= 31 (=14+5+6+4+2) skulls ex *Tyto alba* pellets (GZCS 548); Halebiyye [3], 2001, A. Shehab, *col.*, N= 94 ex *Tyto alba* pellets (GZCS 504); Kal'at er-Rahba (241 m) [4], 22. May 2000, A. Shehab, *col.*, N= 11 ex owl pellets (GZCS 507 [15]); el-Mesreb [6], 13. August 2006, A. Shehab, Z.S. Amr, I. Mamkhair, A. Karataş & M. Sözen, N= 4 skulls (GZCS 550); es-Salihiyye [8], 10. March 2004, N= 83 ex *Tyto alba* pellets (GZCS 518); 28. March 2006, A. Shehab & I. Mamkhair, *col.*, N= 4 ex *Tyto alba* pellets (GZCS 526). *Dimashk (Sham):* Serghaya, 50 km NW Dimashk [13], A. Shehab, *col.*, 2004, N= 1 ex owl pellets (GZCS 555). *Halep:* Kal'at en-Nejm (360 m) [15], May 2000, A. Shehab, *col.*, N= 37 skulls (in three pellets there were 6 bat's skull in each) ex *Tyto alba* pellets (GZCS 510). *Hamā:* ez-Zawe – Musyāf [20], 28. March 2001, A. Shehab,

col., N= 10 ex owl pellets (GZCS 511). –*el-Haseke*: el-Kamishli, Heymu [22], 6. July 2005, I. Mamkhair & A. Shehab, col., N= 8 ex *Athena noctua* pellets (GZCS 519); Tel Baydar, 39 km NW el-Haseke [23], 6. July 2005, I. Mamkhair & A. Shehab, col., N= 1 ex *Tyto alba* pellets (GZCS 554). *el-Ladhikiye*: Jub el-Ghar [26], 19. July 2004, A. Shehab, col., N= 4 ex *Tyto alba* pellets (GZCS 520). *er-Rakka*: er-Rasafe (Sergiopolis), old water reservoirs, 21. May 2000, N= 3 (GZCS 512); 22. July 2004, N= 3 ex *Tyto alba* pellets (GZCS 524); 13. August 2006, 3 skulls ex owl pellets.

New data of observed specimens: *Halep*: Kasr Sallum (390 m) [16], 10. August 2006, A. Karataş, I. Mamkhair, Z.S. Amr, A. Shehab & M. Sözen, *obs.*, c. 10 ind. hanging inside slit crevices in the ceiling and the walls. *el-Haseke*: Deyr Dejle, Nehr-i Dicle (Tigris River) [21], 7. July 2005, A. Shehab, I. Mamkhair & M. Abu Baker, *obs.*, several animals were roosting inside the ceiling of a room made of mud. *er-Rakka*: er-Rakka (centrum), Nehr-i Furat (under bridge) (250 m), 11/12. August 2006, A. Karataş & M. Sözen, *obs.-photo.*, min. 30 ind. (in separate groups) hanging under the bridge; *er-Rakka*: Fekhaykha (Fkhaikha) [32], 21. July 2004, A. Shehab, I. Mamkhair & M. Abu Baker, *obs.*, several animals were roosting inside the ceiling of a room made of mud.

Published data: *Deyr ez-Zur*: Kal'at er-Rahba „Qal'aat ar'Rahba“, 3 km SW road junction, 45 km SE Deyr ez-Zur, S bank of Euphrate [4], 14. March 1979, R. Kinzelbach, *leg.* (NADER & KOCK, 1983); Māri (Tel el-Hariri) “Mari” archeological excavations (190 m) [5], 18. June 1996 (OBUCH & KRIŠTÍN, 2004); Meyadin “Majadin” on the Euphrates [7] (WETTSTEIN, 1913; cf. NADER & KOCK, 1983; cf. HARRISON & BATES, 1991); es-Salihyye „(Dura Europos)“ [8], 17. May 1989, D. Kock, *col.* (SHEHAB *et al.*, 2004); Tel esh-Sheikh Ahmed „Tell Sheikh Hamad“ – archaeological excavations on the left bank of the River Khabur (280 m) [9], 19.-20. June 1996 (OBUCH & KRIŠTÍN, 2004). *Dimashk (Sham)*: Dimashk “Damascus” [10], (WETTSTEIN, 1913; cf. HARRISON & BATES, 1991); NE Dimashk “Damas” [11], H. Gadeau de Kerville, *leg.* (BENDA *et al.*, 2004); Jerud (Djeroud) [12] (TROUSSART & KOLLMANN, 1923; cf. KUMERLOEVE, 1975; cf. HARRISON & BATES, 1991); et-Tewāni “el Tawani”, Anti-Lebanon Mts. [14], 21. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a). –*Hamā*: Kal'at el-Madik “Qala'at Al Moudik (= Apamea)” [17], 25. March 1980, R. Kinzelbach, *leg.* (NADER & KOCK, 1983 (cf. HARRISON & BATES, 1991); BENDA *et al.*, 2004); Kasr “Qasr” ibn Wardan [18], 31. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a); Tel Salhab “Talsh'hab” [19], 25. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a). *Humus*: Kal'at el-Husun “Qala'at al Hosn” [24], 10. May 2001, R. Luëan, *leg.* (BENDA *et al.*, 2004a). –*Idlib*: Katura “Qatura” [25], 2. June 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a). *el-Ladhikiye*: Kantara “Qantara” [27], 30. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004); Ra's el-Basit “Ras al-Basit” [28], 29. April 2001 & 3. June 2001, M. Andreas, P. Benda, R. Luëan, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a); Sata [29], 29. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtoová, *leg.* (BENDA *et al.*, 2004a). –*er-Rakka*: er-Rakka “Raqqā” [30] (WETTSTEIN, 1913; cf. HARRISON & BATES, 1991); 12 km

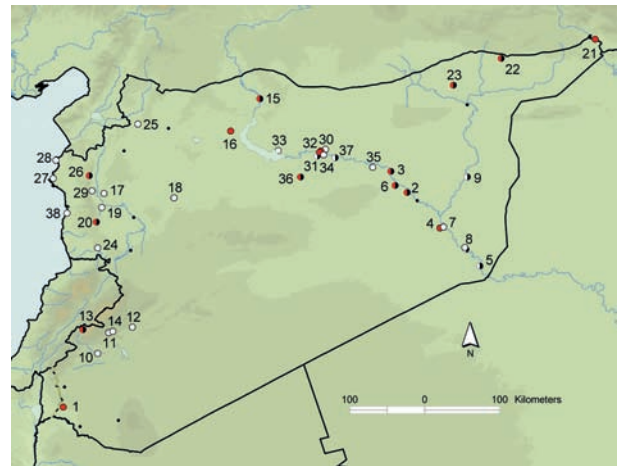


Fig. 27. Records of Kuhl's pipistrelle, *Pipistrellus kuhlii* in Syria: 1. Ayn Dakar, 2. Ayn Jum'aa, 3. Halebiyye, 4. Kal'at er-Rahba, 5. Māri (Tel el-Hariri), 6. el-Mesreb, 7. Meyadin, 8. es-Salihyye, 9. Tel esh-Sheikh Ahmed, 10. Dimashk, 11. NE Dimashk, 12. Jerud, 13. Serghaya, 14. et-Tewāni, 15. Kal'at en-Nejm, 16. Kasr Sallum, 17. Kal'at el-Madik (Apamea), 18. Kasr ibn Wardan, 19. Tel Salhab, 20. ez-Zawe – Musyāf, 21. Deyr Dejle, 22. Heymu, 23. Tel Baydar, 24. Kal'at el-Husun, 25. Katura, 26. Jub el-Ghar, 27. Qantara, 28. Ra's el-Basit, 29. Sata, 30. er-Rakka, 31. 12 km SE er-Rakka, 32. Fekhaykha, 33. Kal'a Jabar, 34. Khatir Magara, 35. Ma'dān, 36. er-Rasafe (Sergiopolis), 37. el-Ukershe, 38. Bāniyās.

Table 11. External and cranial measurements (mm) and weight (g) of Kuhl's pipistrelle, *Pipistrellus kuhlii*. BENDA & RUEDI (2004) divided the Western Palaearctic *P. kuhlii* into three distinct subspecies. One corresponds to the nominative subspecies *P. k. kuhlii* (circum-Mediterranean), one to a desert form *P. k. deserti* living in the Sahara and *P. k. lepidus* is distributed in the Middle East (Syria and Iran).

	N	Min.	Max.	Average	±SD
TL	3	78.9	91.0	85.0	5.4
HB	19	39.1	46.6	43.9	2.0
TaL	23	29.6	41.2	36.9	2.5
HF	22	5.5	8.1	6.5	0.5
E	22	10.0	13.0	11.8	0.8
W	6	3.0	6.5	4.8	1.3
Wsp	16	200.0	250.0	222.2	13.7
FA	22	32.3	36.5	34.6	1.2
Tra	2	4.0	6.9	5.5	1.5
D1	1	5.0	5.0	5.0	0.0
D2	11	52.1	61.6	58.5	3.0
D3	11	43.2	52.2	48.9	2.9
D5	11	39.2	45.9	42.8	2.0
GtL	26	12.8	14.2	13.4	0.4
CbL	24	11.8	13.6	12.8	0.5
ZB	21	7.6	8.9	8.3	0.4
MB	1	7.7	7.7	7.7	0.0
BB	25	6.4	7.3	6.9	0.2
IB	27	3.3	3.7	3.5	0.1
C ¹ -C ¹	3	2.9	3.0	2.9	0.1
C-M ³	26	4.1	6.8	4.9	0.5
C-M ₃	23	5.0	5.6	5.2	0.2
M	27	9.4	11.9	10.0	0.5

SE er-Rakka, desert, 5 km S of Euphrates Valley [31], 18. March 1996, C. Ebenau, *leg.* (SHEHAB *et al.*, 2004); Khasret “Qasret” Muhammed Ali [34] (EBENAU, 1996); *ibid.*, 28. June 1998 (SHEHAB *et al.*, 2004); Khatir “Qater” Magara, 19. March 1996 (SHEHAB *et al.*, 2004); er-Rasafe – ruins of a town, abandoned in the XIth century (310 m) [36], 14. April 2001 (OBUCH & KRISTÍN, 2004); *ibid.*, 28. March 1996, C. Ebenau, *col.* (SHEHAB *et al.*, 2004); el-Ukershe “Okersheih”, Euphrates Valley, 12 km SE er-Rakka [37], 20. March 1996, C. Ebenau, *leg.* (SHEHAB *et al.*, 2004); Kal’a Jabar “Qala’at Ja’abar” [33], 12. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtová, *leg.* (BENDA *et al.*, 2004a); Khatir “Qater” Magara [34] (EBENAU, 1996); highway, near Ma’dān “Maadan” [35] (EBENAU, 1994; 1996). *Tartus: Bāniyās* [38], 31. May 2001, M. Andreas, P. Benda, A. Reiter & D. Weinfurtová, *leg.* (BENDA *et al.*, 2004a).

Remarks: This is by far the most common species observed during the present study. It was found roosting in old ruins, under bridges (in the city centrum of er-Rakka), local houses built with mud and reed roofs.

Discussion: Kuhl’s pipistrelle is a very adaptable and flexible species that can inhabit a large variety of habitats. Its vast distribution covers almost all the climatic zones in Syria. STENCEL (1961) studied the distribution of this species in Lebanon and commented on its relationship to man. Its abundance may be due to its adaptability to roost in almost any shelter, including inhabited human dwellings. This bat was the most common species recovered from owl pellets in Syria (SHEHAB *et al.*, 2004). External and cranial measurements of *P. kuhlii* from Syria are shown in Table 11.

Hypsugo savii (BONAPARTE, 1837) Savi’s pipistrelle

Remarks: BENDA *et al.* (1999) listed *H. savii* for Syrian fauna, however, without a specified locality. During our field trip, we did not meet this species. One of the authors (A.K.) found this bat in Viranşehir (Ş.Urfa) in the north of the Turkish-Syrian border (see KARATAŞ & SACHANOWICZ, *in press*).

Eptesicus bottae (Peters, 1869) Botta’s serotine

Distributional Records (Fig. 28):

New data of collected specimens: *Deyr ez-Zur:* Kal’at er-Rahba [2] (241 m), 14. August 2006, A. Karataş, *net.* 1 ♂ (GZCS 1795). From owl pellets: *Deyr ez-Zur:* Halebiyye [1], 2001, N= 1 (4 post canine teeth) ex *Tyto alba* pellet (GZCS 501 [107]). *er-Rakka:* cliffs at S-side of Euphrates at Khatir “Qater” Magara [4], 19. March 1996, C. Ebenau,

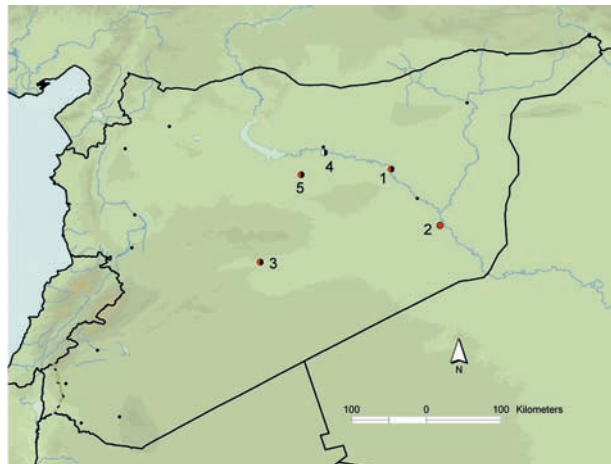


Fig. 28. Records of Botta’s serotine, *Eptesicus bottae* in Syria: 1. Halebiyye, 2. Kal’at er-Rahba, 3. Kal’at-u Fakhraddin el-Mani, 4. Khatir Magara, 5. er-Russefe.



Fig. 29. Botta’s serotine, *Eptesicus bottae* mistnetted from Kal’at er-Rahba.

leg. (SHEHAB *et al.*, 2004); er-Russefe (old water reservoirs) [5], 21. May 2000, N= 3 ex *Tyto alba* pellets (GZCS 514); 22. July 2004, N= 1 ex *Tyto alba* pellets (GZCS 523); 13. August 2006, 1 skull ex owl pellets.

New data of observed specimen: *Humus:* Tadmur (Palmyra), Kal’at-u Fakhraddin el-Mani [3] (560 m) 15. August 2006, A. Karataş, A. Shehab, M. Sözen, Z.S. Amr & I. Mamkhair, *obs. & photo.* 1 ind.

Published data: *er-Rakka:* Khatir “Qater” Magara [4], 1993 (EBENAU, 1966; cf. SHEHAB *et al.*, 2004).

Remarks: One individual was observed roosting solitary in a crevice at Kal’at-u Fakhraddin el-Mani, 3 km W Tadmur (Palmyra) on 15 August 2006. This bat was collected in a mistnet and photographed. Later it escaped into a deep narrow crevice in the wall (Fig. 29).

Discussion: The species was first recorded for Syria by EBENAU (1966). Subsequent collection of owl pellets

Tab. 12. Cranial measurements (mm) of Botta's serotine, *Eptesicus bottae* recovered from owl pellets.

	N	Min.	Max.	Average	±SD
GtL	2	15.7	16.4	16.1	0.4
CbL	1	16.3	16.3	16.3	0.0
ZB	4	10.2	11.0	10.6	0.4
BB	4	8.2	8.4	8.3	0.1
IB	4	3.7	4.9	4.2	0.5
C-M ³	3	6.0	6.4	6.1	0.2
C-M ₃	3	6.3	6.9	6.6	0.3
M	4	12.0	12.5	12.2	0.2

from Khatir Magara yielded several specimens of this bat (SHEHAB *et al.*, 2004). Also, SHEHAB *et al.* (2004) stated that the collected material extends the range of the subspecies *hingstoni* THOMAS, 1919 from the nearest known locality at el-Haditha in the Iraki Euphrates Valley (KHAJURIA, 1988) northwestwards along this river, midway towards the nearest known occurrence of *E. bottae anatolicus* FELTEN, 1971, at Toprakkale near Ceyhan, Turkey (NADER & KOCK, 1990). Our specimens are consistent with *E. b. hingstoni* with pallid colour and smaller size than *E. b. anatolicus* (Table 12). Botta's serotine is an oasis adapted species. It was collected at farms in the middle of the desert in Jordan (AMR *et al.*, 2006). All Syrian records represent arid habitats with close-by farm land.

Eptesicus serotinus (SCHREBER, 1774) Serotine

Distributional Records (Fig. 30):

New data of collected specimens: *Deyr ez-Zur*: Kal'at er-Rahba (241 m) [1], 14. August 2006, A. Karataş, *leg.*, 2 ♂♂ (GZCS 1791-1792). *Halep*: Kal'at en-Nejm [2] (360 m), 11. August 2006, A. Karataş, M. Sözen, I. Mamkhair & Z.S. Amr, *leg.*, 1 ♂ (GZCS 1776). **From owl pellets:** *Humus*: Kal'at el-Husun [3], 8. July 2004, N= 1 ex *Tyto alba* pellets (GZCS 506).

Published data: *er-Rakka*: Khatir "Qater" Magara [4] (EBENAU, 1996).

Remarks: One adult male of *E. serotinus* was collected from Kal'at en-Nejm on 11 August 2006. This bat was found roosting solitary among stones of the ceiling a large and long corridor of the castle (Fig. 31). A colony of about of 40–50 animals of *Asellia tridens* was found roosting nearby, but in a separate cellar.

Tyto alba's pellets collected from Kal'at el-Husun on 08 July 2004, yielded remains of *E. serotinus* and *Myotis blythi*. At Kal'at er-Rahba, on 14 August 2006

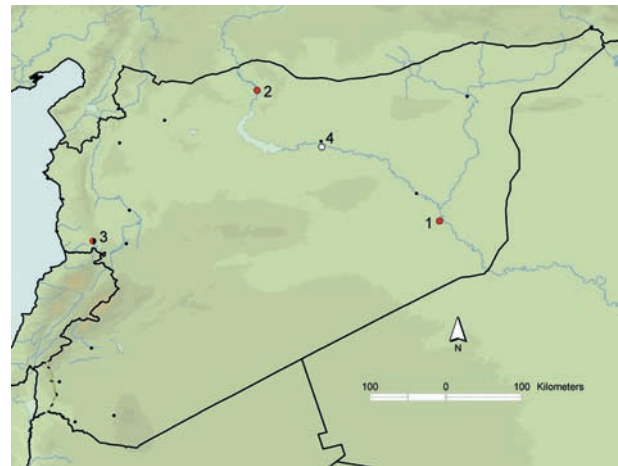


Fig. 30. Records of the serotine, *Eptesicus serotinus* in Syria: 1. Kal'at er-Rahba, 2. Kal'at en-Nejm, 3. Kal'at el-Husun, 4. Khatir Magara.



Fig. 31. A specimen of the serotine, *Eptesicus serotinus* from Kal'at en-Nejm.

three other bat species were mistnetted (*E. bottae*, *Pi-pistrellus kuhlii*, *Otonycteris hemprichii*) and two other bat species *T. nudiventris* and *Asellia tridens* were observed.

Discussion: In Europe, this bat species is common in wooded areas, however, it was collected from arid regions along the Euphrates, and from one locality within the Mediterranean ecozone. In contrast to *Taphozous nudiventris*, *Otonycteris hemprichii* and *Pipistrellus kuhlii* this species is rarely found in owl pellets, which may suggest that this species does not hibernate Kal'at er-Rahba where it would be easily caught by owls. External and cranial measurements of *E. serotinus* from Syria are shown in Table 13.

Tab. 13. External and cranial measurements (mm) and weight (g) of the serotine, *Eptesicus serotinus* from Syria.

	N	Min.	Max.	Average	±SD
TL	4	107.0	142.0	127.8	13.5
TaL	4	45.0	58.0	50.6	4.9
HF	4	10.3	12.5	11.5	0.9
E	4	16.5	20.0	18.5	1.4
W	4	10.6	22.0	18.2	4.4
Wsp	4	280.0	380.0	350.0	41.2
FA	4	40.3	54.3	49.7	5.5
Tra	4	8.0	10.0	8.7	0.8
D1	3	7.5	11.5	9.3	1.7
GtL	3	21.4	22.8	22.1	0.6
CbL	3	20.4	21.3	20.9	0.4
ZB	3	14.3	15.0	14.7	0.3
MB	2	11.7	12.3	12.0	0.3
BB	3	10.2	10.5	10.4	0.1
IB	3	4.4	4.8	4.6	0.2
C ¹ -C ¹	1	7.3	7.3	7.3	0.0
C-M ³	3	7.8	8.2	8.0	0.2
C-M ₃	3	8.6	9.1	8.9	0.2
M	3	16.3	16.5	16.5	0.1

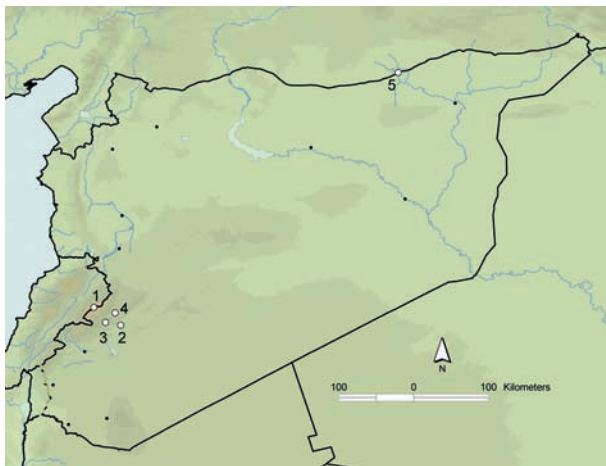


Fig. 32. Records of the Caucasian long-eared bat, *Plecotus macrobullaris* in Syria: 1. Anti-Lebanon Mts., 2. Jerud, 3. Ma'lūla, 4. Yebrūd, 5. Ra's el-Ayn.

Plecotus macrobullaris KUZUYAKIN, 1965
Caucasian long-eared bat

Distributional Records (Fig. 32):

Anti-Lebanon Mts. [1] (SPITZENBERGER *et al.*, 2006). **Di-mashk (Sham):** Jerud "Djeroud" [2] (TROUËSSART & KOLLMANN, 1923; cf. KUMERLOEVE, 1975; cf. "as *Plecotus austriacus christii*" HARRISON & BATES, 1991); *ibid.*, 1908, H. Gadeaude Kerville, *leg.* (BENDA *et al.*, 2004); Ma'lūla "Maalūla" [3], 30. April 2001, P. Munclinger & P. Nová, *leg.*

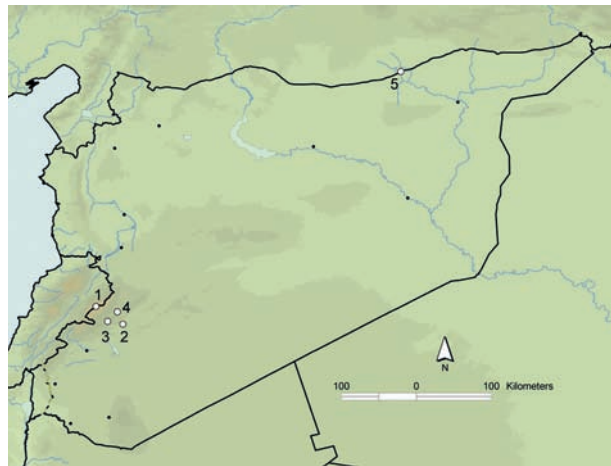


Fig. 33. Records of the Hemprich's long-eared bat, *Otonycteris hemprichii* in Syria: 1. Kal'at er-Rahba, 2. Halep, 3. Karyeteyn, 4. er-Rasafe, 5. el-Ukershe, 6. Syrian Desert.

(BENDA *et al.*, 2004); Yebrūd "Yabroud" [4], 27. June 1998, M. Andreas, P. Benda & M. Uhrin, *leg.* (BENDA *et al.*, 2004; JUSTE *et al.*, 2004). **el-Haseke:** Ra's el-Ayn "Ras el Ayn" [5], 22. May 2001, M. Andreas, P. Benda, A. Reiter & D. Wein-furtová, *leg.* (BENDA *et al.*, 2004).

Remarks: For a long time the Syrian *Plecotus* population was referred to *P. austriacus christiei*, a pale semi-desert subspecies with greatly inflated bullae and no inflations on the muzzle (HARRISON & BATES, 1991; KRUSKOP & LAVRENCHEK, 2000). It was thought to occur in Egypt, Syria and Palestine (HARRISON & BATES, 1991) and has also been reported from Eritrea (LARGEN *et al.*, 1974) and Sudan (KOOPTMAN, 1975). According to recent literature, Syrian *Plecotus* represents *P. macrobullaris* (BENDA *et al.*, 2004; JUSTE *et al.*, 2004; KARATAŞ *et al.*, 2003; SPITZENBERGER *et al.*, 2006).

Otonycteris hemprichii PETERS, 1859
Hemprich's long-eared bat

Distributional Records (Fig. 33):

New data of collected specimens: *Deyr ez-Zur:* Kal'at er-Rahba (241 m) [1], 14. August 2006, A. Karataş & Z.S. Amr, *net.* 1 ad. ♂ (GZCS 1794). **From owl pellets:** *Deyr ez-Zur:* Kal'at er-Rahba (241 m) [1], 22. May 2000, A. Shehab, *leg.*, N= 9 skull ex *Tyto alba* pellets (GZCS 508 [15]); 14. August 2006, N= 27 ex *Tyto alba* pellets (GZCS 527-546). *er-Rakka:* er-Rasafe, (old water reservoirs) [4], 21. May 2000, N= 4 ex *Tyto alba* pellets (GZCS 513, 515); 22. July 2004, N= 3+1? ex *Tyto alba* pellets (GZCS 521-522); 13. August 2006, N= 3 skulls ex owl pellets (new data); el-Ukershe [5], 13. August 2006, N= 2 (2 L + 1 R) mandibles ex *Tyto alba* (GZCS 553).

Published data: *Deyr ez-Zur:* Kal'at er-Rahba "Qal'at ar'Rahba" [1], 17. May 1989, D. Kock, *leg.* (SHEHAB *et al.*, 2004). *Halep:* "Aleppo Bazaar" [2] "as *Vespertilio murinus*"



Fig. 34. Hemprich's long-eared bat, *Otonycteris hemprichii* from Kal'at er-Rahba.

(obs.) (RUSSELL, 1794; sensu SHEHAB *et al.*, 2004). *Humus*: Karyeteyn "Qaryateine = Karyatein = Karyatin" [3] (ATTAL-LAH, 1977; cf. HARRISON, 1972; cf. KUMERLOEVE, 1975; cf. HARRISON & BATES, 1991; cf. SHEHAB *et al.*, 2004). Syrian Desert [6] (no exact locality) (HARRISON, 1964; HARRISON & BATES, 1991; cf. SHEHAB *et al.*, 2004).

Remarks: A single specimen was mist netted from Kal'at er-Rahba (Fig. 34). This species roosts in rock fissures or in cracks of buildings. Remains of about 27 individuals were recovered from owl pellets from Kal'at er-Rahba, indicating its abundance. Five bat species were found to dwell together with this species at Kal'at er-Rahba; *Asellia tridens*, *Eptesicus bottae*, *Eptesicus serotinus*, *Pipistrellus kuhlii* and *Taphozous nudiventris*.

Discussion: It is wide-ranging in arid zones, occurring across the Maghreb to Egypt, and through the Middle East to Tajikistan and Kashmir. This large insectivorous species has been collected elsewhere in the Middle East by mist-netting over pools (QUMSIYEH *et al.*, 1998). External measurements of a male from Kal'at er-Rahba are taken as follows: TL 127, TaL 55, HF 13.5, E 37.5, W 20, Wsp 390, FA 56.2, Tra 16, F1 9, TA 25.5 mm. Cranial measurements of *O. hemprichii* from Syria are seen in Table 14.

Miniopterus schreibersii (KUHLE, 1819)
Bent-winged bat

Distributional Records (Fig. 35):

New data of collected specimens: *Idlib*: Hamama, a big cave (151 m) [2], 3. July 2005, A. Shehab, I. Mamkhair, M. Abu Baker & Z.S. Amr, *leg.*, 2 ♂♂, 8 ♀♀ (GZCS 1720, 1810–1818).

Tab. 14. Cranial measurements (mm) of *Otonycteris hemprichii* recovered from owl pellets.

	N	Min.	Max.	Average	±SD
GtL	17	20.8	24.1	22.0	0.9
CbL	16	19.4	22.2	20.8	0.7
ZB	18	13.7	15.2	14.5	0.4
BB	18	10.1	12.0	11.1	0.4
IB	18	4.2	5.0	4.5	0.2
C-M ³	19	7.6	8.8	8.1	0.3
C-M ₃	16	8.4	9.5	9.0	0.3
M	21	15.5	17.3	16.2	0.5
C ¹ -C ¹	1	6.1	6.1	6.1	0.0
MB	1	11.4	11.4	11.4	0.0

New data of observed specimens: *Idlib*: Hamama, a big cave [2], 3. July 2005, A. Shehab, I. Mamkhair, Z.S. Amr & M. Abu Baker, *obs.*, a colony of 1500-2000 animals of two species (*M. myotis* + *Miniopterus schreibersii*); 6. August 2006, A. Karataş, M. Sözen, A. Shehab & I. Mamkhair, *obs.*, a colony of 30-40 ind.

Published data: *Halep*: "Aleppo" [1], (WETTSTEIN, 1913; cf. KUMERLOEVE, 1975; cf. HARRISON & BATES, 1991). *er-Rakka*: Khatir "Cater" Cave and Pigeon well "Taubenbrunnen" Cave [3] (EBENAU, 1996); middle of the Euphrates Valley, Pigeon well "Taubenbrunnen" Cave, 10. March 1994, C. Ebenau, *leg.* (WALTER & EBENAU, 1997).

Remarks: A large population of 1500-2000 individuals was found in a cave situated along the Orontes River. The cave is about 150 m long with a height of 20 m. Its distance from el-Menfa Cave is only about 1 km. Another species was found in this cave; *M. myotis* on 3 July 2005. However, in January 2006, this cave was void of *Miniopterus schreibersii* and *M. myotis*, and only *Rh. euryale* and *M. capaccinii* were observed. On 6 August 2006, a larger colony consisting mostly of *M.*

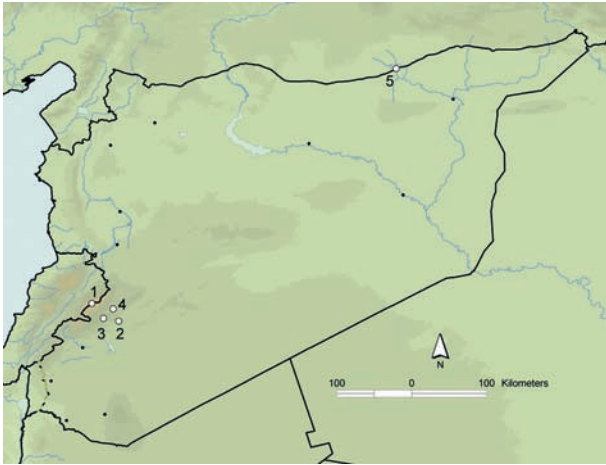


Fig. 35. Records of the bent-winged bat, *Miniopterus schreibersii* in Syria: 1. Halep, 2. Hamama, 3. Khatir Cave and Pigeon well Cave.

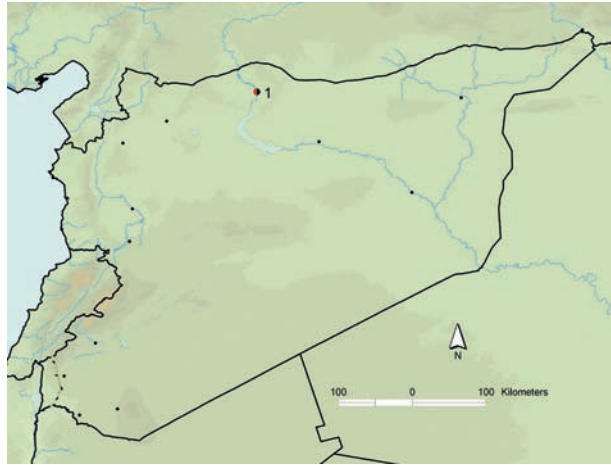


Fig. 36. Distribution of the European free-tailed bat, *Tadarida teniotis*, in Syria: 1. Kal'at en-Nejm.

Tab. 15. External and cranial measurements (mm) of the bent-winged bat, *Miniopterus schreibersii*.

	N	Min.	Max.	Average	±SD
HB	10	42.5	56.5	50.1	4.0
TaL	10	33.0	43.1	38.3	3.8
HF	10	9.2	11.3	10.4	0.7
E	10	10.0	13.12	11.1	0.8
Wsp	9	245.0	310.0	266.7	23.8
FA	10	39.8	45.5	42.8	2.0
Tra	2	4.5	5.5	5.0	0.5
D3.1	3	11.0	12.0	11.4	0.4
D3.2	3	25.0	30.6	28.2	2.4
D3.3	3	8.0	8.0	8.0	0.0
GtL	6	15.3	15.7	15.4	0.1
CbL	6	14.2	14.9	14.5	0.2
ZB	6	8.18	9.2	8.8	0.4
BB	6	7.6	7.9	7.8	0.1
IB	6	3.6	3.9	3.7	0.1
C-M ³	6	5.6	5.9	5.7	0.1
C-M ₃	6	6.1	6.4	6.3	0.1
M	6	11.2	11.6	11.3	0.1

myotis and less *M. capaccinii* was found in the cave with together *Miniopterus schreibersii* (Fig. 21). This may suggest emigration behavior of this species along with *M. myotis* in winter.

Discussion: This bat was recorded from Halep and Euphrates Valley by WETTSTEIN (1913) and WALTER & EBENAU (1997) recovered ectoparasites from this bat near er-Rakka. External and cranial dimensions of examined specimens of *Miniopterus schreibersii* from Syria are given in Table 15.



Fig. 37. The skull of the European free-tailed bat, *Tadarida teniotis* from Kal'at en-Nejm.

Family Molossidae (Free-tailed bats)

Tadarida teniotis (RAFINESQUE, 1814) European free-tailed bat

Distributional Records (Fig. 36):

New data of collected specimens: *Halep:* Kal'at en-Nejm (360 m) [1], 11. August 2006, A. SHEHAB, leg., 1 intact skull, ex *Tyto alba* pellets (GZCS 525).

Remarks: A complete skull was recovered from an owl pellet (Fig. 37). This is the first record of the European free-tailed bat to Syria. Its cranial measurements as follow: GtL 23.8, CbL 23.1, ZB 14.1, BB 11.9, IB 5.1, C-M³ 8.6, C-M₃ 9.3, M 16.8 mm.

Discussion: The free-tailed bat is common in Jordan, where it was collected from a wide range of habitats (AMR *et al.*, 2006). Also, it was collected from Lebanon and Palestine (LEWIS & HARRISON, 1962; HARRISON, 1964) and along the Euphrates Valley in just north of Turkish-Syrian border (KARATAŞ *et al.*, 2006).

Tab. 16. Syrian bat records with respect to its province (muhafaza).

	Dar'aa	Deyr ez-Zur	Dimashk (Sham)	Halep	Hamā	el-Haseke	Humus	Idlib	el-Ladhikiye	er-Rakka	Tartus	TOTAL RECORDS
<i>Rousettus aegyptiacus</i>	–	–	–	–	–	–	–	1	–	–	–	1
<i>Taphozous nudiventris</i>	–	1	–	–	–	–	–	–	–	1	–	2
<i>Asellia tridens</i>	–	1	–	1	–	–	1	–	–	1	–	4
<i>Rhinolophus ferrumequinum</i>	–	–	–	1	–	–	–	–	1	1	–	3
<i>Rhinolophus hipposideros</i>	–	–	–	1	–	–	–	1	–	–	1	3
<i>Rhinolophus euryale</i>	–	–	1	1	–	–	–	1	1	–	–	4
<i>Rhinolophus blasii</i>	–	–	–	1	–	–	–	–	–	–	–	1
<i>Rhinolophus mehelyi</i>	–	–	–	–	–	–	–	–	–	1	–	1
<i>Myotis myotis</i>	–	–	–	–	1	–	1	1	–	–	–	3
<i>Myotis blythii</i>	–	–	–	–	–	–	1	–	–	–	–	1
<i>Myotis emarginatus</i>	–	–	–	1	–	–	–	–	1	–	–	2
<i>Myotis aurascens</i>	–	–	1	–	–	–	–	–	–	–	–	1
<i>Myotis capaccinii</i>	–	–	–	–	–	–	–	1	–	1	–	2
<i>Pipistrellus pipistrellus</i>	–	–	1	–	–	–	–	–	1	–	1	3
<i>Pipistrellus kuhlii</i>	1	1	1	1	1	1	1	1	1	1	1	11
<i>Eptesicus bottae</i>	–	1	–	–	–	–	1	–	–	1	–	3
<i>Eptesicus serotinus</i>	–	1	–	1	–	–	1	–	–	–	–	3
<i>Plecotus macrobullaris</i>	–	–	1	–	–	1	–	–	–	–	–	2
<i>Otonycteris hemprichii</i>	–	1	–	1	–	–	1	–	–	1	–	4
<i>Miniopterus schreibersii</i>	–	–	–	1	–	–	–	1	–	–	–	2
<i>Tadarida teniotis</i>	–	–	–	1	–	–	–	–	–	–	–	1
TOTAL RECORDS	1	6	5	11	2	2	7	7	5	8	3	57

Conclusion

Our records belong to 23 bats species in 11 Syrian muhafazas (provinces) (Table 16). Of these muhafazas, Halep looks like the richest muhafaza with eleven bat species. In el-Ladhikiye we found eight, in Humus and Idlib seven, in Deyr ez-Zur six, in es-Sham five, in Tartus three, in Hamā and el-Haseke two, and in Dar'aa only one species. Of all species, *Pipistrellus kuhlii* is the most common and was found in all eleven muhafazas.

We analysed the records summarized in Table 16 using the software MVSP 3.2. With respect to this cluster analysis (Fig. 38), Syria can be divided into three zones: (1) Mediterranean zone including Idlib, el-Ladhikiye, es-Sham, and Tartus. (2) Dry zone (steppe, desert and semi-desert areas) including Deyr ez-Zur, Halep, Humus, and er-Rakka. (3). Transitional zone including Dar'aa, Hamā, and el-Haseke.

The last zone is transitional zone between first and second zones and has a relatively poor fauna with a low number of bat species. *Pipistrellus kuhlii* and *Myotis myotis* were recorded from Hamā, and *Plecotus macrobullaris* from el-Haseke (Table 16).

In the neighboring countries, 37 bat species have been recorded from Turkey (BENDA & HORÁČEK, 1998; BENDA & KARATAŞ, 2005; KARATAŞ *et al.*, 2006), 33 from Palestine (MENDELSSOHN & YOM-TOV, 1999), 24 from Jordan, 23 from Saudi Arabia, and 21 from Iraq (AMR *et al.*, 2006).

Species expected to occur in Syria are *Rhinopoma hardwickii*, *Rhinopoma microphyllum*, *Taphozous perforatus*, *Nycteris thebaica*, and *Nyctalus noctula* which were found near the Golan Heights (MENDELSSOHN & YOM-TOV, 1999). Also, *Eptesicus nasutus* and *Barbastella leucomelas* may be part of the Syrian bat fauna.

The Egyptian Fruit Bat, *R. aegyptiacus*, seems to be confined to one locality on the inner coastal

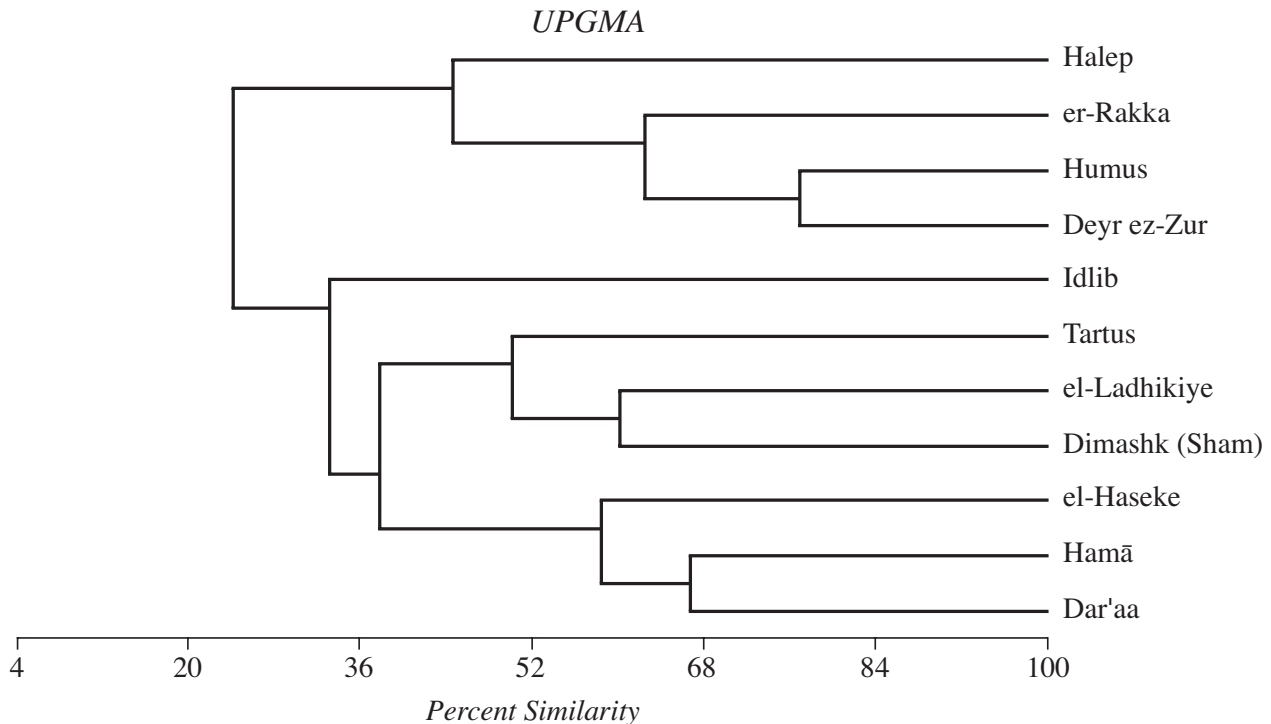


Fig. 38. Results of UPGMA cluster analysis on correlations among zoogeographic units with respect to the data given in Table 16.

mountains. It probably never succeeded to penetrate eastwards despite the presence of large water bodies. Similar observations were reported from south western Turkey (KARATAŞ *et al.*, 2003).

The caves along the Orontes River, such as el-Menfa cave should be declared as an Important Mammal Area, since it harbours a large number of bats and also relatively high species richness (one cave with 4 species, and one cave with a large population of the Egyptian Fruit Bat).

Similarly, el-Mesreb caves near the Euphrates harbour a large population of *Aselia tridens*. The Syrian authorities responsible for nature conservation should adopt a strategy to protect such populations.

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Appendix – Gazetteer

	Locality ¹	Latitude	Longitude
1	Ayn Dakar, 40 km W <i>Dar'aa</i>	32°51'37.45''	35°54'10.30''
2	Ayn Jum'aa, 13 km W <i>Deyr ez-Zur</i>	35°25'50.2''	40°01'36.7''
3	Bāniyās, <i>Tartus</i>	35°11'	35°57'
4	Basufān, 30 km WN <i>Halep</i>	36°26'10.53''	36°55'41.68''
5	Deyr Dejle, on Tigris River, <i>el-Haseke</i>	37°16'09.70''	42°17'09.61''
6	<i>Deyr ez-Zur</i>	35°33'	40°18'
7	Fekhaykha, 5 km SW <i>er-Rakka</i>	35°54'46''	38°58'47.3''
8	Halebiyye, S-bank Euphrates, 50 km W <i>Deyr ez-Zur</i>	35°43'06.56	39°48'59.43
9	<i>Halep</i> (Aleppo)	36°12'	37°10'
10	Hamama (el-Menfa Cave), 35 km W <i>Idlib</i>	35°55'47.4''	36°23'25.6''
11	Hamama (sheep cave), 35 km W <i>Idlib</i>	35°55'32.1''	36°23'13.0''
12	Heymu, 5 km W el-Kamishli, <i>el-Haseke</i>	37°02'31.28''	41°09'45.30''
13	<i>Humus</i> (= Hims)	34°44'12.9''	36°42'53.7''
14	Jerud "Djeroud", <i>Dimashk</i>	33°49'	36°44'
15	Jub el-Ghar, <i>el-Ladhikiye</i>	35°38'	36°13'
16	Kal'at-u Fakhraddin el-Mani, 3 km W Tadmur, <i>Humus</i>	34°33'44.9''	38°15'25.9''
17	Kal'at el-Husun (Crak des Chevaliers), 60 km W <i>Humus</i>	34°47'17.50''	36°16'10.17
18	Kal'at el-Merkab, 45 km N <i>Tartus</i>	35°09'02.82''	35°56'58.33''
19	Kal'at el-Madik, 55 km NW <i>Hamā</i>	35°25'09.2''	36°23'35.4''
20	Kal'at en-Nejm, 110 km NE <i>Halep</i>	36°33'17.2''	38°15'43.9''
21	Kal'at er-Rahba, 50 km E <i>Deyr ez-Zur</i>	35°.00'17.4''	40°25'23.0''
22	Kal'at es-Salaheddin, 30 km E <i>el-Ladhikiye</i>	35°35'40.12''	36°03'18.49''
23	Kal'at es-Sem'an, 30 km W <i>Halep</i>	36°22'55.03''	36°51'23.25''
24	Karyeteyn (Qaryateine), <i>Humus</i>	34°14'	37°14'
25	Kasr Sallum, 70 km E <i>Halep</i>	36°10'02.5''	37°54'49.3''
26	Kassab, <i>el-Ladhikiye</i>	35°55'	35°58'
27	Katura (Qatura), <i>Idlib</i>	36°15'	36°05'
28	Katir Magara and Kasret Muhammed Ali, <i>er-Rakka</i>	35°52'54.4''	39°01'40.8''
29	Ma'dān (Maadan), c. 60 km E <i>er-Rakka</i>	35°45'	39°40'
30	Ma'lūla (Maalula), <i>Dimashk</i>	33°51'	36°33'
31	Māri (Tel el-Hariri), <i>Deyr ez-Zur</i>	34°33'	40°54'
32	el-Mesreb (el-Abdūl), 20 km NW <i>Deyr ez-Zur</i>	35°30'54.7''	39°53'07.3''
33	Meyadin on the Euphrates, <i>Deyr ez-Zur</i>	35°01'	40°28'
34	Rabi'ah, <i>el-Ladhikiye</i>	35°49'	36°20'
35	<i>er-Rakka</i> , under Euphrates bridge	35°55'38.1''	38°59'34.4''
36	er-Rasafe, 54 km SW <i>er-Rakka</i>	35°37'41.07''	38°45'22.87''
37	Ra's el-Ayn, <i>el-Haseke</i>	36°51'	40°04'
38	Ra's el-Basit, <i>el-Ladhikiye</i>	35°52'	35°50'
39	es-Salihiyye (Dura Europus), 95 km SE <i>Deyr ez-Zur</i>	34°44'38.05''	40°43'13.34''
40	Serghaya, 50 km NW <i>Dimashk</i>	33°47'20.18''	36°08'36.06''

41	<i>es-Sham (Dimashk = Damascus)</i>	33°26′	36°17′
42	Sılenfe, <i>el-Ladhikiye</i>	35°36′	36°13′
43	Tadmur (Palmyra), <i>Humus</i>	34°33′21.7″	39°16′27.4″
44	Tel Beydar, 39 km NW <i>el-Haseke</i>	36°34′59.83″	40°31′30.26″
45	Et-Tewāni, <i>Dimashk</i>	33°46′	36°30′
46	el-Ukershe, <i>er-Rakka</i>	35°50′49.0″	39°09′53.0″
47	Yebrūd, <i>Dimashk</i>	33°58′	36°40′
48	ez-Zawe – Musyāf, 50 km W <i>Hamā</i>	35°04′55.67″	36°18′11.65″

¹ Provinces (muhafazas) names are in italic. Other Syrian localities' names mentioned in the text as follows:

Dar'aa	Idlib	Nehr-i Dijle (Tigris River)
Hamā	el-Kamishli	Nehr-i Furat (Euphrates River)
el-Haseke	el-Ladhikiye	Tartus