

Small mammals recovered from owl pellets from Syria (Mammalia: Chiroptera, Rodentia)

by Adwan Shehab, Ahmad Daoud, Dieter Kock, and Zuhair Amr

Abstract. A total of 23 species of small mammals (5 Chiroptera and 18 Rodentia) were recovered from owl pellets collected from several localities in Syria. The occurrence of *Taphozous nudiventris magnus* on the Syrian Euphrates is part of a northwestern extension of the Iraqi population, extending into southern Turkey. The present material fills a distribution gap for *Otonycteris hemprichii* between the Syrian, Turkish and Iraqi localities. Records for two species of the genus *Microtus*, *Microtus (Microtus) socialis* and the problematic *M. (M.) philistinus*, are given. Comparative material was used to confirm the identity of both species. The known range for *M. socialis* is thereby extended considerably further eastwards. Similarly, the present records of *Cricetulus migratorius* and *Mus macedonicus* extend the range of both species eastwards. The record of *Eliomys melanurus* represents a noteworthy range extension further to the north.

Kurzfassung. Insgesamt 23 Arten von Kleinsäugetern (5 Chiroptera, 18 Rodentia) wurden aus Eulengewöllen identifiziert, die an zahlreichen Fundorten in Syrien gesammelt wurden. Das Vorkommen von *Taphozous nudiventris magnus* am syrischen Euphrat ist Teil des Verbreitungsgebietes, das sich vom Irak nordwestlich bis in die südliche Türkei erstreckt. Der Fund von *Otonycteris hemprichii* fällt in die Lücke zwischen bekannten türkischen, syrischen und irakischen Nachweisen. Zwei Arten der Gattung *Microtus* wurden an Hand von Vergleichsmaterial identifiziert: *Microtus (Microtus) socialis* und die problematische Art *M. (M.) philistinus*. Das Vorkommen von *M. socialis* erweitert sich damit beträchtlich nach Osten, ebenso auch durch die östlichen Nachweise für *Cricetulus migratorius* und *Mus macedonicus*. Für *Eliomys melanurus* wird das Vorkommen in nördlicher Richtung erweitert.

Key words. Middle East, Levant, small mammals, owl pellets, range extension.

Introduction

In the course of studying the biology and control of social voles of the genus *Microtus* in Syria, the senior author, AHMAD DAOUD, and ZUHAIR AMR collected owl pellets from several localities in the country. Previously small mammals identified from Syrian owl pellets have been reported by RZEBIK-KOWALSKA & NADACHOWSKI (1978), KOCK & NADER (1983), NADER & KOCK (1983), AUFRAY et al. (1990), NADACHOWSKI et al. (1990), KRUPP & SCHNEIDER (1991), KAHILA & HORWITZ (1994), KOCK et al. (1994), EBENAU (1996), KOCK (1998), OBUCH (2001), HUTTERER & KOCK (2002), and SHEHAB et al. (2003). These studies resulted in several additions to the mammal fauna of Syria: *Suncus etruscus* by RZEBIK-KOWALSKA & NADACHOWSKI (1978), *Crocidura katinka* by HUTTERER & KOCK (2002), *Rhinolophus mehelyi*, *Taphozous nudiventris*, *Myotis capaccinii*, and *Eptesicus bottae* by EBENAU (1996), *Mus "spretoides"* [= *macedonicus*] by AUFRAY et al. (1990) or *Mus cf. abbotti* [= *macedonicus*] by NADACHOWSKI et al. (1990), *Microtus irani* by KOCK & NADER (1983), *Gerbillus henleyi*, *G. cheesmani*, and *G. mesopotamiae* by KOCK (1998). Rarer spe-

cies were documented by OBUCH (2001: *Eliomys melanurus*, *Dryomys nitedula*) and SHEHAB et al. (2003: *D. nitedula*).

Despite these positive results, however, the mammals contained in owl pellets do not exceed a certain size due to the ability of the owls to deal with the prey item. Consequently, of the larger rodents such as *Nesokia indica* and *Tatera indica*, mainly subadult individuals are represented in the prey items. Furthermore, diurnal prey species such as *Acomys* sp. are only rarely caught by the owls. The open habitat preferred for hunting by *Tyto alba* and *Athene noctua* also offers few or no chances to prey upon forest species such as *Sciurus anomalus* and *Sylvaemus mystacinus*. Finally, both owl species are opportunistic hunters and will prey on those species which are most abundant, e.g. *Microtus* sp. during a population outbreak or *Mus musculus* in cultivated areas.

The pellets studied for this paper yield additional distribution data for the rather incompletely known Syrian small mammals and will help to identify faunal realms and centres of species diversity in Syria. The ranges of mammal species have been detailed and mapped by HARRISON & BATES (1991), so far as they were known to occur in Syria up to 1991.

Material and methods

Cave explorers from Germany have investigated the Euphrates valley and have discovered several places suitable for their research interest. A number of owl pellets were collected and the mammal remains contained therein were deposited in the Senckenberg Museum and identified. Biologists from the latter institution collected owl pellets in the Khabur River region for comparison with the antique fauna of Tell Sheikh Hammad.

Further series of pellets were later collected from various localities (see gazetteer), some of them identical with those sampled by the German cave exploration group. Each pellet was placed in a Petri dish containing water for at least 10 minutes. Pellets were teased apart and their contents were carefully isolated into separate vials. For most of the sites, positive identification of the breeding owl(s) was made. Representative materials were compared with reference specimens at the Forschungsinstitut Senckenberg and Museum (Frankfurt a. M., Germany) collected from Syria or the neighbouring areas of Turkey, Iraq, Jordan or Saudi Arabia. The collection of the latter institution houses further unpublished mammal specimens found in owl pellets, and these have been included in the present paper.

The initials given with each locality are for the most frequently cited collectors' names; less frequent ones remain unabbreviated. Unless otherwise specified, all osteological material listed is from owl pellets; if the predator was identified, its name is included as an abbreviation.

Abbreviations: A.D. = A. DAOUD; A.S. = A. SHEHAB; *A.n.* = *Athene noctua*; btw. = between (two localities); C.E. = C. EBENAU; D.K. = D. KOCK; lft = left; mand = mandible/-les; maxl = maxilla/-lae; R.K. = R. KINZELBACH; rt = right; ro = rostrum; *T.a.* = *Tyto alba*; SMF = Senckenberg Museum, Frankfurt a. M.

Results and discussion

A total of 24 species of small mammals representing two orders (Chiroptera and Rodentia) were recovered from owl pellets collected from various localities in Syria. Only two owl species were positively identified, the Barn Owl, *Tyto alba*, and the Little Owl, *Athene noctua*.

Tab. 1. Localities in Syria where owl pellets have been collected, together with the owl species observed.

Locality	Coordinates	Owl species
al`Hamra	35°27'N, 36°04'E	Unknown
Apamea = Qal`aat Al`Madiq	35°20'N, 36°02'E	<i>A.n.</i> and <i>T.a.</i>
ar`Raqqa, 7 km S of Euphrates	35°52'N, 39°01'E	Unknown
ar`Rasafeh = Russafa = ar`Rasafa	35°37'N, 38°05'E	<i>A.n.</i> and <i>T.a.</i>
as`Salahiya (Dura Europos)	34°45'N, 40°44'E	<i>T.a.</i>
Athar Maez	36°16'N, 36°51'E	<i>A.n.</i>
Bosr al`Sham	32°33'N, 36°30'E	Unknown
Deir Khabeih	33°21'N, 36°08'E	Unknown
Ebla ruins (Tell Mardikh-Ebla), 26 km SE Idlib	35°49'N, 36°48'E	<i>T.a.</i>
Euphrates Valley, 5 km S of, 12 km SE ar`Raqqa	35°52'N, 38°57'E	Unknown
Euphrates Valley, 7 km S of ar`Raqqa	35°52'N, 39°01'E	Unknown
Halabiye, S-bank Euphrates	35°41'N, 39°09'E	<i>T.a.</i>
Heraqla(btw.) Maharda and Shaizar, 25 km NW Hamah	35°57'N, 38°09'E	<i>A.n.</i>
Okersheih, Euphrates Valley, 12 km SE ar`Raqqa	35°19'N, 36°06'E	Unknown
Palmyra	35°51'N, 39°08'E	<i>A.n.</i>
Qal`aat al-Hosson (Crak des Chevaliers)	34°36'N, 38°15'E	Unknown
Qal`aat ar`Rahba, S-bank Euphrates	34°47'N, 36°18'E	<i>T.a.</i>
Qal`aat Ja`bar	34°58'N, 40°27'E	<i>T.a.</i>
Qal`aat Sheizar	35°21'N, 38°08'E	Unknown
Qal`aat Sukkara, 2 km SW of, Jebel Abdul Aziz	35°19'N, 36°36'E	Unknown
Qasret Mohammed Ali, S-bank Euphrates, 7 km S ar`Raqqa	36°24'N, 40°23'E	<i>A.n.</i>
Qater Maghara, near Qasret Moh. Ali Sergiopolis = ar`Rasafeh	35°52'N, 39°01'E	Unknown
Shah`Ranar, NW of al`Hamra	35°52'N, 39°01'E	<i>T.a.</i>
Shaizar and Maharda (btw.), 25 km NW Hamah	35°28'N, 36°14'E	<i>A.n.</i>
Tell al Budairi	35°19'N, 36°36'E	Unknown
	36°24'N, 40°46'E	<i>T.a.</i>

Chiroptera: Emballonuridae

Taphozous (Liponycteris) nudiventris magnus Wettstein, 1913

Material. Halabiye, 31.V.1989, colony in crevices of antique city wall, 1 ♂, 2 ♀ (3 skulls, 3 in alcohol), SMF 74084-6, D.K. – Qater Maghara, 22.II.1993, n2 (*T.a.*), SMF 80666, C.E. [EBENAU 1994b] – Qasret Mohammed Ali, 19.III.1996, 2 ad, 4 juv (*T.a.*), SMF 84474-79, C: EBENAU [EBENAU 1966]; *ibid.*, 28.VI.1998, A.S.

Measurements. HB ♂ 99.3, ♀ 107-108.3, T ♂ 32.8, ♀ 31.2-32.3, HF ♂ 19, ♀ 16.3-18.6, E ♂ 27.2, ♀ 26.6-28.6, FA ♂ 80.3, ♀ 77.5-80.2. – GrL skull ♂ 28.2, ♀ 28.6-29.7, GrL to C1/ ♂ 27.6, ♀ 28.3-29.4, CbL ♂ 26.5, ♀ 26.1-26.2, CbL to 1/ ♂ 25.9, ♀ 25.5-25.6, Mast ♂ 14.85, ♀ 15.7-15.83, BB ♂ 12.3, ♀ 12.2-12.55, Zyg ♂ 16.9, ♀ 17.63-17.9, C-C1/ ♂ 6.4, ♀ 6.6-6.8, M-M3/ ♂ 11.7, ♀ 11.6-11.8, C-M3/ ♂ alv 11.5, ♀ 11.1-11.3, dto crown ♂ 12.4, ♀ 12.0-12.1, IOR ♂ 8.4, ♀♀ 8.6-9.0, POR ♂ 5.1, ♀ 5.1-5.3, mand cdl ♂ 22.4, ♀ 21.9-22.4, mand ang ♂ 22.2, ♀ 22.6-23.0, C-M/3 ♂ 13.9, ♀ 13.4-13.6.

Distribution: Three skins of *T. nudiventris* were collected by the “Expedition to the Euphrates 1850” (DOBSON 1878), but their original data were lost in an accident during that expedition while on the Euphrates around Dura Europos; the collecting locality could have been inside presentday Syria. THOMAS (1915) included this material in the description of *T. kach-hensis babylonicus* (a junior synonym of *magnus* Wettstein 1913) from Mesopotamia on the Euphrates. EBENAU (1996) reported this species from owl pellets collected on the Euphrates

(see material listed above). The measurements of complete Syrian specimens (see above) prove that they represent the large-sized subspecies *T. n. magnus*. The occurrence of *T. n. magnus* on the Syrian Euphrates is part of a northwestern extension of the Iraqi population, which extends into southern Turkey to near Nizp, Gaziantep Prov. (SACHANOWICZ et al. 1999).

The Mesopotamian population is geographically widely separated from the neighbouring subspecies to the south-west, *T. n. nudiventris* (Cretzschmar 1830) in Palestine (TRISTRAM 1884, THOMAS 1915, J. AHARONI 1930, HARRISON 1964, ATALLAH 1977, HARRISON & BATES 1991: Lake Kinneret; ALLEN 1915, CLARKE 1977: walls of Jericho; BODENHEIMER 1935: Wadis nr Tiberias; HARRISON 1964: Wadi Ahmud N of Lake Tiberias).

Chiroptera: Vespertilionidae

Myotis capaccinii (Bonaparte, 1837)

Material. Qasret Mohammed Ali, 28.VI.1998, n1 (maxl tooththrow), A.S.

Remarks. Previous records labelled "Syria" (NEHRING 1886: *Vespertilio Capaccinii* [sic]; JENTINK 1888: *Vespertilio dasycneme*) may have originated from parts of the Near East which are currently in Turkey, Lebanon or Palestine. The species was first recorded from presentday Syria by EBENAU (1996) and WALTER & EBENAU (1997), who observed *M. capaccinii* at Qater Maghara and found remains in "Pigeon well cave" near ar'Raqqa. This occurrence on the Euphrates falls into the distribution gap between Iraq (SANBORN 1956: Kish ruins, as *M. c. bureschi* Heinrich 1936; KHAJURIA 1988: near Haditha, as *M. capaccinii* [sic!: 398] *bureschi*; ABUL-HAB & SHIHAB 1989: Baghdad), Lebanon, Jordan, and Israel (see HARRISON & BATES 1991, as *M. c. bureschi*). Since SANBORN (1956) first identified Iraqi *M. capaccinii* with the subspecies *bureschi*, described from Bulgaria, most subsequent records from the Near East have been assigned to this subspecies. However, TOPAL (1997) states that Iraqi *M. capaccinii* has significant differences when compared with typical *M. c. bureschi*. The subspecific status of the Near East population thus needs to be studied in detail.

Pipistrellus kuhlii (Kuhl, 1817)

Material. ar'Rasafeh (Sergiopolis), 28.III.1996, n1, SMF 84495, C.E. – Desert 5 km S of Euphrates Valley, 18.III.1996, n16, SMF 84413-21, C.E. – Qater Maghara, 19.III.1996, n1, SMF 84481, C.E. – Okersheih, 20.III.1996, n4, SMF 84445-48, C.E. – Dura Europos (as'Salahiya), 17.V.1989, n11 (ro; *T.a.*), SMF 80623, D.K. – Qasret Mohammed Ali, 28. VI.1998, A.S.

Remarks. This widely distributed bat has previously been found in Syria in owl pellets, as reported by NADER & KOCK (1983: Qal'aat ar'Rahba) and by EBENAU (1996: Qater Maghara).

Eptesicus bottae hingstoni Thomas, 1919

Material. Cliffs at S-side of Euphrates at Qater Maghara Cave, 19.III.1996, n1 (fragmented skull & mand; *T.a.*), SMF 84480, C.E.

Measurements. Breadth across upper canines (alveoli) 5.1; breadth across crowns of M3/ 7.04; length of upper tooththrow C-M3/ (alveoli) 5.66; postorbital constriction 3.85; length of mand from condyle 11.93; *ibid.*, from processus angularis 12.14; length of lower tooththrow C-M/3 (alveoli) 6.36.

Taxonomy. The few measurements available are of little diagnostic value, as most of the teeth have been lost. But the size of rostrum, breadth of M1/ and short M3/ agree with extensive comparative material of *E. b. hingstoni* as listed by NADER & KOCK (1990).

Distribution. The species was first recorded for Syria by EBENAU (1966), who observed *E. bottae* at Qater Maghara and found its remains in owl pellets at the same locality in 1993. With the present material, the range of the subsp. *hingstoni* is extended from the nearest known locality at al-Hadithah in the Iraqi Euphrates Valley (KHAJURIA 1988), north-westwards along this river, midway towards the nearest known occurrence of *E. bottae anatolicus* Felten, 1971, at Toprakkale near Ceyhan, Turkey (NADER & KOCK 1990).

Otonycteris hemprichii Peters, 1859

Material. Qal'aat ar'Rahba, 17.V.1989, n3 (3 rt mand; *T.a.*), SMF 74083, D.K.

Measurements. Length of mand from condyle 15.0-15.18; *ibid.* from processus angularis 15.3-15.75; lower tooththrow C-M/3 (alveoli) 8.6-8.75.

Remarks. The shape of the mandibles and position of tooth alveoles, and less significantly, their size agree closely with *O. hemprichii* from Cairo (SMF 25268: mand condylar length 16.0; *ibid.*, angular length 15.94) and Osh region, Kyrgyzstan (SMF 77781: mand condylar length 16.4; *ibid.*, angular length 16.8). This desert bat species has also been reported as the prey of owls in the central Sahara by HEIM DE BALSAC (1965: Djanet, Tassili des Ajjers, Algeria).

Distribution. Even before 1754, RUSSELL (1794) knew of two forms of “*Vespertilio murinus*” in Aleppo Bazaar, one of which was only rarely observed: “it was white and had ears longer than those of the former”. This might well have been an early observation of *O. hemprichii* in Syria, as the whitish colouration would exclude a *Plecotus* sp. It was more than two centuries before HARRISON (1964) could record a reliably identified specimen from the Syrian Desert and (1972) from Qaryateine [= Karyatein or Karyatin, of authors]. This latter locality, but based on other specimens, was doubtfully located in Jordan by QUMSIYEH (1985). The present material fills a distribution gap between the Syrian, Turkish and Iraqi localities as mapped by NADER & KOCK (1983); other distribution maps are either incomplete (HARRISON & BATES 1991) or have overestimated the range (GHARAIBEH & QUMSIYEH 1995).

Rodentia: Dipodidae

Jaculus jaculus (Linnaeus, 1758)

Material. Dura Europos (as'Salahiya), 17.V.1989, n2 (ro; *T.a.*), SMF 80638-9, D.K. – Qal'aat ar'Rahba, 14.III.1979, n3 (2 upper & 3 lower tooth rows; *T.a.*), SMF 60373, R.K.; *ibid.*, 17.V.1989, n1 (skull; *T.a.*), SMF 80650, D.K. – 5 km S of Euphrates Valley, 18.III.1996, n6 (partial skulls), SMF 84434-39, C.E. – ar'Rasafeh (Sergiopolis), 28.III.1996, n3 (partial skulls), SMF 84501-03, C.E.; *ibid.*, 28.VI.1998, n3 (2 skulls, 3 mxl., 3lft & 3 rt mand), A.S. – Okersheih, 28. VI.1998, n1 (1 rt mand), A.S.

Distribution. This species is apparently less common in Syria than *Allactaga euphratica* (see below). THOMAS (1921, 1922) had specimens from Karyatein; J. AHARONI (1930) mentions it from the northern Syrian Desert. HARRISON (1972) records it from Dayr az'Zawr, Palmyra, and from 40 km W of Palmyra. NADACHOWSKI et al. (1990) collected it 100 km E of Damascus at 30°36'N, 36°44'E.

Note. *J. jaculus* is commonly preyed upon by nocturnal raptors, as reported e.g. from Arabian countries by NADACHOWSKI et al. (1978: Hatra, Iraq), KADHIM (1979: Iraq), CLAYTON (1991: Kuwait), EVANS & BATES (1993: Harrat al Harrah, N-Saudi Arabia), and KOCK & NADER (1996: Jubail Wildlife Sanctuary, E-Saudi Arabia).

***Allactaga euphratica* Thomas, 1881**

Material. Tell al Budeiri, 23.V.1989, n1 (rt mand; *T.a.*), SMF 80563, D.K. – Qal'aat ar'Rahba, 17.V.1989, n1 (ro; *T.a.*), SMF 80651, D.K. – 5 km S of Euphrates Valley, 18.III.1996, n4 (partial skulls), SMF 84440-43, C.E. – ar'Rasafeh, 28. VI.1998, n1 (skull), A.S.

Distribution. The above records are all within the known Syrian range of this species (HARRISON & BATES 1991), which is to be complemented by records from ar'Raqqa, Bahrat [Lake] Hatuniya, and al-Hasaka (BAUER 1988) and at 2 km and at 8 km SE Tell Sheikh Hamad (KOCK et al. 1994), where *A. euphratica* was found in owl pellets, as it was previously in Qal'aat ar'Rahba (KOCK & NADER 1983); the latter locality is confirmed by the present material.

Rodentia: Gliridae

***Eliomys melanurus* (Wagner, 1839)**

Material. 2 km SW Qal'aat Sukkara, Jebel Abd al-Aziz, 2.X.1988, n1 (rt maxl; *A.n.*), SMF 80664, D.K.

Distribution. This record represents a noteworthy range extension to the north for *E. melanurus*. RUSSELL (1794, as *Mus quercinuus*) records it at Aleppo before 1754. Most probably this was the species found by LORTET (1883, as *Myoxus glis*) as rather common at Zabadani, upper Barada Valley. J. AHARONI (1917) collected it at Dschebé [= Jebel al-Geba], N of Qaryatein; however, the skull of this specimen is a *Graphiurus* sp. (NADER et al. 1983). Despite these few records, BODENHEIMER (1935) considered *E. melanurus* to be common in the Syrian desert though he only cited Mt. Hermon as a precise locality. Later, KAHMANN (1981) examined several more recent specimens from Mt. Hermon and from the Golan Heights (1200-2100m) at Mas'ada Forest (1000m), Birket Bab el-Haoua (900m), Ein Qunya, and Dan. From Damascus it was reported by GOLEMANSKY & DARWISH (1993), KRYŠTUFEK & KRAFT (1997) recorded it from Halabiye [SMF 74079, D.K.], and finally OBUCH (2001) found its remains at Halabiye, Yabrud, at Buransk in *T.a.* pellets, and at Palmyra in *Asio otus* pellets. So far is known at present, *E. melanurus* ranges north to Harran, 30 km S Urfa in S-Turkey (MISONNE 1957: sight record) and north-west into Iraq to Hatra [al-Hadr, 35°34'N, 42°42'E, 90 km SW Mossul] (NADACHOWSKI et al. 1978: from owl pellets) and to Mossul (KAHMANN 1978, 1981). Together with its preferred arid, rock habitat, *E. melanurus* is probably more widely distributed in Syria than is documented at present.

Rodentia: Spalacidae

***Nannospalax ehrenbergi* (Nehring, 1898)**

Material. Tell al Budeiri, 23.V.1989, n1 subad (skull & mand; *T.a.*), SMF 80562, D.K.

Distribution. The mole rat is widely distributed in W- Syria including the Golan Heights. Records are much scarcer in the interior of the country and are available only from Tall

Abiad and Ain Aarous (MISONNE 1957), and at Ceylanpınar, Turkey, opposite Ras al-Ain (LEHMANN 1969). Despite its subterranean mode of life, *N. ehrenbergi* is preyed upon by owls (MISONNE 1957: *A.n.*), also at Crak des Chevaliers (NADACHOWSKI et al. 1990), and in the Lebanon Mts. (BATE 1945: *Asio otus*).

Rodentia: Cricetidae

Cricetulus migratorius (Pallas, 1773)

Material. Btw. Shaizar and Maharda, 26.III.1980, n2 (ro with mand, 2 maxl with paired mand), SMF 60375, R.K. – ar'Rasafeh (Sergiopolis), 28.III.1996, n7 (*T.a.*), SMF 84497-500, C.E.

Distribution. Known records were summarised by HARRISON (1972) and are concentrated in the Aleppo region, at Hama and al-Karyatein. Remains of this species in owl pellets found at Qal'aat al-Hosson (Crak des Chevaliers) were studied by PRADEL (1981) and NADACHOWSKI et al. (1990). On Mt. Hermon *C. migratorius* was found by YOM-TOV (1988) and FILIPPUCCI et al. (1989). The present record from ar'Rasafeh extends the species range eastwards.

Mesocricetus auratus (Waterhouse, 1839)

Material. Ebla ruins [Tell Mardikh-Ebla], 31.V.1998, 1 juv (ro & 2 mand), SMF 88363, A.D.

Taxonomy. The present remains of a juvenile differ from the closely related *M. brandti* (Nehring, 1898) by shorter upper and lower molar rows and agree in this character with adult *M. auratus* (SMF 82129-31, Aleppo: tooth cusps worn), as already noticed by B. AHARONI (1932). The juvenile rostrum has the posterior palatal emargination more U-shaped than V-shaped, and closer to the last upper molar than illustrated by YIĞIT et al. (2000: Fig. 2a), but it is thought that the appearance changes with growth.

Distribution. Since its first mention in Syria (RUSSELL 1794: *Mus cricetus* Linn.) and its description from specimens collected at Aleppo (WATERHOUSE 1839), the range of this hamster appeared to be restricted to the Aleppo region (B. AHARONI 1932: Aleppo; Biliramun, NW of Aleppo; Azaze, N of Aleppo; NEHRING 1902a, b; OSBORN 1965 [sub *M. auritus* [sic!] nr Aleppo], MURPHY 1971, HARRISON 1972, KUMERLOEVE 1975, ATALLAH 1977; SMF 82129-31: Al-Collie Farm, SE of Jerablus). Only BODENHEIMER (1920) mentions the species as straying S to Beirut. However, this was never confirmed, and very likely originates from TRISTRAM'S (1884) note of *Cricetus nigricans* Brandt, 1832 [= *M. brandti*] being collected at the foot of Mt. Lebanon and of specimens of *M. auratus* seen in the Museum at Beirut. Nevertheless, *M. brandti* is recorded by HAMAR & SCHUTOWA (1966) from "Syria and Turkey" based on four specimens examined in the Museum für Naturkunde, Berlin, and that species is listed by MUSSER & CARLETON (1993) as occurring in Syria (and S to Lebanon and Israel). However, at our request, M. ADE, formerly curator of the mammal collection in Berlin, searched unsuccessfully for Syrian specimens. We do not know of any confirmed evidence (see also HARRISON 1972). – Recently, GATTERMANN et al. (2001) have recorded *M. auratus* from Jerablus [SMF 82129-31], and from Albel and Sheikh Riek (Rieh), both 50 km NE of Aleppo. Specimens from the present locality have been published by SHEHAB et al. (1999) and the range of the species is now known to extend into southern Turkey (DOĞRAMACI et al. 1994: Nizip, Gaziantep province; YIĞIT et al. 2000: Kilis).

Although the related *M. brandti* (Nehring, 1898) was found in owl pellets from Turkey (STEINER & VAUK 1966, SICKENBERG 1971) and MURPHY (1971) mentions owls as predators

of *M. auratus*, this hamster has not previously been found in owl pellets in Syria (SHEHAB et al. 1999).

Microtus (Microtus) socialis (Pallas, 1773)

Material. Ebla ruins (Tell Mardikh-Ebla), 31.V.1998, n1 (ro with mand), SMF 88357, A.D. – Athar Maez, VIII.1998, n1 (ro, 1 lft & 1 rt mand), SMF 88361, A.D. – Shah' Ranar, 27.VI.1998, n2 (1 skull, 2 lft & 2 rt mand; *A.n.*), SMF 88358, A.D. – btw. al'Hamra and Sahl, Al-Ghab, 26.X.1998, n2 (1 skull, 2 lft & 4 rt mand), SMF 88355-56, A.D. – Qal'aat al-Hosson (Crak des Chevaliers), 27.IV.1998, n2 (2 ro, 1 lft & 2 rt mand; *T.a.*), SMF 88362, A.D. – Deir Khabeih, III.1998, n2 (2 ro, 2 rt & 2 lft mand), SMF 88359-60, A.D. – Okersheih, 28. VI.1998, n2 (2 rt mand), A.D.

Comparative material. Iran: Kurdistan, 25.III.1962, n1 (skull, skin), SMF 44716, Institute Pasteur Tehran. – Ushan, Elburs Mts., 30 km NNE Teheran, 19.V.1974, 16.-17.V.1975, 12 ♂, 9 ♀ (21 skulls, 21 skins), SMF 47580, H. FELTEN, D. K. & K. WALCH. – Van, NE-Azerbaijan, 23.V.1975, 2 ♂ immat, 1 ♂ ad (3 skulls, 3 skins), SMF 48982-84, D. K. – Gedailu, 12 km S Aslandus, N-Azerbaijan, 24.V.1975, ♂ immat (skull, skin), SMF 48985, D.K.

Taxonomy. The skull characters of *M. socialis* from Turkey and Syria have been described by STORCH (1971, 1972), MORLOCK (1978) and KOCK & NADER (1983). This species can be differentiated from the sympatric *M. philistinus* (see below) by having the bullae still smaller than *M. guentheri* (8.4-8.5 in Syrian material), short upper and lower molar rows (upper tooth row in Syrian material 4.8-5.8), and the suprameatal triangle shorter (2.3-3.0 in Syrian specimens).

Distribution. Older records of voles from Syria identified as "*M. socialis*" are doubtful. TRISTRAM (1866, 1884), NEHRING (1902b); all as "*Arvicola socialis* Desmarest": desert of Sahara plains N of Damascus [= Es-Sahara plain]. – BODENHEIMER (1920): *Arvicola socialis* var. *syriaca* and var. *cinerescens*: deserts south of Damascus. – KOCK & NADER (1983) studied Syrian *Microtus* sp. and, while rejecting most records previously identified as "*M. socialis*", they identified true *M. socialis* from owl pellets collected between Shaizar and Maharda, 25 km NW Hamah, and accepted as correctly identified material from Aleppo, reported by ATALLAH (1978). The present record extends the species range surprisingly far eastwards into the ar'Raqa area, though apparently confined to the Euphrates valley with its moister soil and only rarely represented in owl pellets. In western Syria, *M. socialis* occurs sympatrically with *M. philistinus* at Ebla ruins (Tell Mardikh-Ebla), Athar Maez, Qal'aat al-Hosson, and btw. al'Hamra and Sahl.

Microtus (Microtus) philistinus Thomas, 1917

Material. Ebla ruins (Tell Mardikh-Ebla), 31.V.1998, n1 (skull, 2 mand), SMF 88348, A.D. – Athar Maez, VIII.1998, n1 (ro, lft mand), SMF 88347, A.D. – Qal'aat al-Hosson (Crak des Chevaliers), 27.IV.1998, n3 (1 ro, 3 lft & 2 rt mand; *T.a.*), SMF 88349, A.D. – btw. al'Hamra and Sahl, Al-Ghab, 26.X.1998, n5 (1 skull, 3 ro, 3 lft & 1 rt mand), SMF 88350-54, A.D.

Comparative material. Syria: SMF 64210-11, 15 km SE Aleppo, 3.IV.1961, 1 ♂ 1 ♀ (2 skins), R.E. LEWIS (V-6205, V-6207, ex AUB M-314, M-316) (= *irani* sensu KOCK & NADER 1983). – Orontes River N of Lake Homs, 1.IV.1979, ♂ (skull, skin), SMF 60411, R.K. (= *irani* sensu KOCK & NADER 1983). – Palestine: Givat Brenner, nr Tel-Aviv, 27.XI.1977, 1 ♂ 2 ♀♀ (3 skulls, 3 skins), SMF 54960-62, L. COHEN (= *irani* sensu KOCK & NADER 1983). – Ayanot, 31°55'N - 34°46'E, 1.VII.1978, 4 ♂♂ (4 skulls, 4 skins), SMF 55565-68, L. COHEN (= *irani* sensu KOCK & NADER 1983).

M. guentheri (Danford & Alston, 1880): Turkey: Incekum, Antalya Prov., 24.V.1966, ♀ (skull, skin), SMF 37488. – Abant, Bolu Prov., 7.-8.IX.1960, 2 ♂ 5 ♀ (7 skulls, 7 skins), SMF 37474-80, H.

KAHMANN. – Ankara, see MORLOK (1978). – Greece: Thivai, Boeotia, 21.II.1961, 1 ♂ 2 ♀ (3 skulls, 3 skins), SMF 26979-81, I. ONDRIAS.

M. irani Thomas, 1921: Turkey: Alişam, Elazığ Prov., 20.IX.1971, ♂ (skull, skin), SMF 42347. – Iran: Pahlevi Dej, Gorgan Prov., 13.V.1975, 3 ♂ immat 1 ♀ subad (4 skulls, 4 skins), SMF 48986-89, D.K. - 18 km W Karadj, 35°48'N, 51°00'E, Tehran Prov., 16. & 28.IV.1974, 4 ♀ (4 skulls, 4 skins), SMF 47576-79, H. FELTEN & K. WALCH.

Taxonomy. The differentiation of species of the genus *Microtus* in the Near East has not yet been definitively resolved. Karyotypes are not available for most specimens in collections. Skull morphology therefore has to be used to differentiate the *Microtus* sp. of the Near East (see references quoted above for *M. socialis*). Amongst these, *M. philistinus* according to its original description (THOMAS 1917) is characterised by a low rostrum (high in *M. guentheri* and its subspecies), and larger bullae (in *M. guentheri* clearly smaller). The present material shows these characters and is here considered to represent *M. philistinus*. It agrees with *M. irani* in having the molar tooth rows similar in length (6.0-6.8 in Syrian *M. philistinus*), the rostrum lower than in *M. guentheri*, the bullae larger than in *M. guentheri*, but still smaller (8.8-10.1) than *M. irani*, and the suprameatal triangle longer (3.1-3.45) than in *M. socialis* (see above)

Distribution. B. AHARONI (1932: sub *M. philistinus*; NEUHÄUSER 1936a, b: sub *M. (Sumeriomys) güntheri shevketi*; HARRISON 1972: sub *M. socialis guentheri*; ATALLAH 1978: sub *M. guentheri*) records this vole only from Azaze, N Aleppo, and HARRISON (1972: partim: pl. 191, no. HARR.2.4644; see KOCK & NADER 1983 sub *irani*) from 15 km SE Aleppo.

A Turkish population of *M. socialis* from Nizip, Gaziantep Prov., close to the Syrian border, studied by KEFELIOĞLU (1995), was assigned to *M. guentheri* by ÇOLAK et al. (1997). At Kilis, also adjoining the Syrian border, these authors identified *M. irani* (reddish-brown colouration). However, *M. irani* has bullae on average smaller than *M. guentheri* (ÇOLAK et al. 1997: Tab. 1), but based on the reddish hue of their fur colour and the shape of the skull (ÇOLAK et al. 1997: Fig. 4) these *M. irani* could possibly belong to *M. philistinus*.

Meriones crassus Sundevall, 1842

Material. Ar`Rasafeh, 28.VI.1998, n1 (ro, lft mand; *A.n.*), A.S.

Distribution. The range in Syria was detailed by KOCK (1998) and the present material confirms his findings.

Meriones tristrami Thomas, 1892

Material. Bosr al`Sham, 1997, n13 (11 maxl, 12 lft & 13 rt mand), A.S. – Qal`aat al-Hosson, 1.XII.1997, n4 (3 maxl, 3 lft & 4 rt mand), A.S.; ibidem, 27.IV.1998, n5 (5 maxl, 4 lft & 4 rt mand), A.S.; ibidem, 25.VI.1998, n5 (1 skull, 4 maxl, 3 lft & 5 rt mand), A.S. – Deir Khabeih, 24.III.1998, n3 (3 maxl, 3 lft & 3 rt mand), A.S. – Qal`aat Sheizar, 31.V.1998, n8 (7 maxl, 8 lft & 7 rt mand), A.S. – Apamea, 31.V.1998, n3 (3 maxl, 2 lft & 2 rt mand), A.S. – al`Hamra, 31.V.1998, n11 (11 skulls, 5 maxl, 6 lft & 6 rt mand), A.S.; ibidem, 27.VI.1998, n16 (6 skulls, 14 maxl, 14 lft & 16 rt mand), A.S. – Qal`aat Ja`bar, 28.VI.1998, n3 (3 maxl, 2 lft & 1 rt mand), A.S. – ar`Resafeh, 28.VI.1998, n12 (12 skulls, 26 maxl, 30 ft & 30 rt mand), A.S. – Qasret Mohammed Ali, 28.VI.1998, n13 (13 maxl, 8 lft & 10 rt mand), A.S. – Okersheih, 28.6.1998, n7 (7 maxl, 6 lft & 6 rt mand), A.S. – Heraqla, 29.VI.1998, n4 (4 maxl, 2 rt mand), A.S.

Remarks. This widely distributed species is often found in owl pellets (e.g. KOCK & NADER 1983, KOCK et al. 1994, KOCK 1998).

***Meriones lybicus* Lichtenstein, 1823**

Material. ar'Rasafeh, 28.VI.1998, n2 (2 ro; *A.n.*), A.S.

Remarks. This is the first record of the remains of the Lybian jird from owl pellets in Syria. Several studies in Jordan have failed to report this species among pellets of the three owls occurring in Jordan (AMR et al. 1997, AL-MELHIM et al. 1997, RIFAI et al. 1998, 2000).

***Gerbillus mesopotamiae* Harrison, 1956**

Material. Okersheih, 28.VI.1998, n2 (2 ro, 1 lft mand; *A.n.*), A.S.

Remarks. Recently recorded from several localities in Syria by KOCK (1998).

***Tatera indica taeniura* (Wagner, 1843)**

Material. Qasret Mohammed Ali, 28.VI.1998, n3 (3 maxl, 2 lft & 2 rt mand), A.S. – Okersheih, 28.6.1998, n4 (4 maxl, 4 lft & 3 rt mand), A.S. – Heraqla, 29.VI.1998, n1 (1 maxl), A.S.

Distribution. The range in Syria has been detailed by KOCK (1998), including several records from owl pellets.

Muridae***Mus musculus praetextus* Brants, 1827**

Material. Bosr al'Sham, 1997, 4 maxl, 5 lft, 4 rt, A.S. – Qal'aat al-Hosson, 1.XII.1997, n13 (2 maxl, 13 lft & 11 rt mand), A.S.; ibidem, 27.IV.1998, n5 (5 maxl, 4 lft & 4 rt mand), A.S.; Qal'aat al-Hosson, 25.VI.1998, n19 (2 skulls, 7 maxl, 19 lft & 10 rt mand), A.S. – Deir Khabeih, 24.III.1998, n11 (5 maxl, 6 lft & 11 rt mand), A.S. – Qal'aat Sheizar, 31.V.1998, n8 (7 maxl, 8 lft & 7 rt mand), A.S. – Apamea, 31.V.1998, n34 (29 maxl, 34 lft & 26 rt mand), A.S. – al'Hamra, 31.V.1998, n34 (22 skulls, 34 maxl, 33 lft & 28 rt mand), A.S.; ibidem, 27.VI.1998, n65 (65 skulls, 27 maxl, 37 lft & 36 rt mand), A.S. – Qal'aat Ja'bar, 28.VI.1998, n1 (1 maxl, 1 lft & 1 rt mand), A.S. – ar'Rasafeh, 28.VI.1998, n31 (27 skulls, 28 maxl, 26 lft & 31 rt mand), A.S. – Qasret Mohammed Ali, 28.VI.1998, n108 (69 skulls, 78 maxl, 103 lft & 108 rt mand), A.S. – Okersheih, 28.VI.1998, n22 (13 skulls, 11 maxl, 22 lft & 22 rt mand), A.S. – Heraqla, 29.VI.1998, n15 (10 skulls, 6 maxl, 7 lft & 15 rt mand), A.S. – Palmyra, 30.VI.1998, n4 (1 skull, 1 maxl, 4 lft & 2 rt mand), A.S. – Btw. Shaizar and Maharda, 26.III.1980, n2, SMF 60388, R.K. – ar'Resafefeh (Sergiopolis), 28.III.1996, n9, SMF 84550-54, C.E. – 5 km S of Euphrates Valley, 18.III.1996, n6, SMF 84444, C.E. – Euphrates Valley nr Qasret Mohammed Ali, 19.III.1996, n100, SMF 84486-93, C.E. – Okersheih, 20.III.1996, n61, SMF 84457-71, C.E. – Qater Maghara, 22.II.1993, n76 (16 Skulls & maxl, 31 ro, 9 lft & 8 rt maxl, 51 lft & 60 rt mand; *T.a.*), SMF 80678, C.E.; ibid., 19.III.1996, n100 (many fragments), SMF 84486-93, C.E. – Halabiye, 31.V.1989, n47 (5 ro & mand, 11 ro, 7 lft & 5 rt maxl; 39 lft & 42 rt mand; *T.a.*), SMF 80609-11, D.K. – Qal'aat ar'Rahba, 14.III.1979, n9 (*T.a.*), SMF 60378-86, R.K.; ibidem, 17.V.1989, n20 (6 skulls, , 4 lft & 2 rt maxl, 20 lft & 15 rt mand; *T.a.*), SMF 80661, D.K. – Dura Europos (as'Salahiya), 17.V.1989, n69 (*T.a.*), SMF 80640-49, D.K. – Wadi al-Agig, E of Tell Sheikh Hamad, 29.X.1986, n1, SMF 69141, F. KRUPP & W. SCHNEIDER. – Tell Sheikh Hamad, 28.X.1986, n1, SMF 69131, F. KRUPP & W. SCHNEIDER. – 2 km SE Tell Sheikh Hamad, 26.X.1986, n1, SMF 69130, F. KRUPP & W. SCHNEIDER. – Tell al Budeiri, 23.V.1989, n404 (247 ro, 7 lft & 6 rt maxl; 385 lft & 404 rt mand; *T.a.*), SMF 80608, D.K.

Remarks: This widespread and very common species is found regularly in owl pellets.

***Mus macedonicus* Petrov & Ruzic, 1983**

Material. Qater Maghara, 22.II.1993, n1 (left ro with malar process broad; *T.a.*), SMF 80677, C.E. – Okersheih, 20.III.1996, n1, SMF 84456, C.E.

Taxonomy. For the Mediterranean parts of the Near East, AUFFRAY et al. (1990) designated as *Mus "spretoides"* (a name not available according to the International Code of Zoological Nomenclature) the short-tailed outdoor species of the genus *Mus*, differing by a zygomatic index from *M. musculus*. The malar process at the upper base of the zygomatic plate is wide in *M. macedonicus*, but narrower in *M. musculus* (see also ORSINI et al. 1983, MACHOLAN 1996).

Distribution. This species was identified from owl pellets from the Golan Heights by AUFFRAY et al. (1990) and from Aleppo by HARRISON & BATES (1991). The present material extends the range eastwards into steppic regions along the Euphrates.

***Rattus rattus* (Linnaeus, 1758)**

Material. Nahr el-Kabir, 5 km SW Kafariya, road Lattakia - Jisr ech-Choghur, 7.III.1980, 1 juv (rt mand-fragment), SMF 60376, R.K. – Qal'aat al-Hosson, 25.VI.1998, n1 (skull), A.S. – al'Hamra, 27.VI.1998, n1 (1 skull, 1 maxl, 1 lft & 1 rt mand), A.S. – Shah'Ranar, 27.VI.1998, n1 (1 maxl, 1 lft & 1 rt mand), A.S.

Distribution. Surprisingly few records are available for *R. rattus* in Syria. RUSSELL (1794, *Mus rattus*) lists it from Aleppo; B. AHARONI (1932) records it from Hama and Damascus; it was found in owl pellets at Crak des Chevaliers (= Qal'aat al-Hosson) (NADACHOWSKI et al. 1990). The species was not found in the Tell Abiad and Ain Aarous regions (MISONNE 1957).

***Sylvaemus (Sylvaemus) iconicus* (Heptner, 1948)**

Material. Nahr al-Kabir, 5km SW Kafariya, road Latakia - Jisr ech-Choguhur, 7.III.1980, n3 (3 lft & 3 rt mand), SMF 60377, R.K.

Taxonomy. The species is identified by the skull characters detailed in FILIPPUCCI et al. (1996) and the specific name used here follows the results of the study by KRYŠTUFEK (2002), who examined several type specimens relevant to the nomenclature of *Sylvaemus* species in the Near East. Previous records of this species were either identified with *Apodemus sylvaticus* (Linnaeus 1758) and its assumed subspecies (*tauricus* Barrett-Hamilton, 1900, preoccupied by *tauricus* Pallas, 1811, = *iconicus* Heptner, 1948 = *kilikiae* Kretzoi, 1964), or with *A. flavicollis* (Melchior, 1834) as *A. f. argyropuloi* Heptner, 1948. Recently FILIPPUCCI et al. (1989), describing the small-sized *S. hermonensis*, stated that *S. sylvaticus* is absent in Israel and most records (except for Mt. Hermon) refer to *S. flavicollis*. Without re-examination of Syrian specimens, the only reliably recorded occurrence is Mt. Hermon (FILIPPUCCI et al. 1989, FILIPPUCCI 1992) at 1700 to 2200 m. a.s.l. (HAIM et al. 1993).

***Nesokia indica myosura* (Wagner, 1845)**

Material. Dura Europos (as'Salahiya), 17.V.1989, n2 juv (mand; *T.a.*), SMF 80637, D.K. – Qal'aat ar'Rahba, 17.V.1989, n2 (1 ro & mand, 2 lft mand), SMF 80659-60, D.K. – Tell al Budeiri, 23.V.1989, n4 (4 skulls, 3 lft & 3 rt mand; *T.a.*), SMF 80589-93, D.K. – Qater Maghara, 22.II.1993, n1 (1 lft & 1 rt mand; *T.a.*), SMF 80676, C.E. – Halabiye, 31.V.1989, n1 (1 rt maxl, 1 lft mand; *T.a.*), SMF 80621, D.K. – Qasret Mohammed Ali, 28.VI.1998, n1 (1 maxl), A.S. – Okersheih, 28.VI.1998, n3 (3 maxl, 2 lft & 1 rt mand), A.S.

Distribution. The few previous records by MISONNE (1957) from Sheikh Hassan, 60 km S of Tell Abiad, and by KOCK & NADER (1983) from Tell Abu Hurera and at Qal'aat ar'Rahba (owl pellets), are supplemented by the present material. The Syrian occurrences are confined

to river valleys (Euphrates, Khabur, Balikh). They represent an extension of this Oriental species from the Iraqi populations along the Euphrates. The Syrian population is disjunct from the nearest localities of *N. i. bacheri* Nehring, 1897, in the Jordan Rift Valley (see HARRISON & BATES 1991).

Acknowledgements. Sincere thanks are due to Prof Dr R. KINZELBACH, University of Rostock, Germany, and Mr. C. EBENAU, Essen, Germany, for depositing reference material in the Senckenberg Museum. Our appreciation is extended to Dr. M. ADE, Museum für Naturkunde of the Humboldt-Universität zu Berlin, for information on Syrian hamsters. We also extend our appreciation to Prof. Dr. FAWZI SAMARAH, Damascus University, and the Ministry of Agriculture for their encouragement and support.

This paper is Publication No. 163 of the Zentrale Bibliographie der Ergebnisse des interdisziplinären Forschungsprojekt-Schwerpunktes Tell Sheikh Hamad der Freien Universität Berlin.

References

- ABUL-HAB, J. & B. A. SHIHAB (1989): Ectoparasites of some bats from Iraq. – Bulletin of the Iraq Natural History Museum 8 (2): 59–64, Baghdad.
- AHARONI, B. (1932): Die Muriden von Palestina und Syrien. – Zeitschrift für Säugetierkunde 7: 166–240, Berlin.
- AHARONI, J. (1917): Zum Vorkommen der Säugetiere in Palästina und Syrien. – Zeitschrift des deutschen Palästina-Vereins 40: 235–242, Wiesbaden.
- AHARONI, J. (1930): Die Säugetiere Palästinas. – Zeitschrift für Säugetierkunde 5: 327–343, Berlin.
- ALLEN, G. M. (1915): Mammals collected by the Phillips Palestine Expedition. – Bulletin of the Museum of Comparative Zoology at Harvard College 59: 3–14, Cambridge (Mass.).
- AL-MELHIM, W., Z. AMR, A. DISI, A. & A. KATBEH-BADER (1997): On the diet of the Little Owl, *Athene noctua*, from Safawi area. – Zoology in the Middle East 15: 19–28, Heidelberg.
- AMR, Z. S., W. N. AL-MELHIM. & M. A. YOUSEF (1997): Mammal remains from pellets of the Eagle Owl, *Bubo bubo*, from Azraq Nature Reserve, Jordan. – Zoology in the Middle East 14: 5–10, Heidelberg.
- ATALLAH, S. I. (1977, 1978): Mammals of the eastern Mediterranean region: their ecology, systematics and zoogeographical relationships. – Säugetierkundliche Mitteilungen 25: 241–320, 26: 1–50, Munich.
- AUFFRAY, J. C., E. TCHERNOV, F. BONHOMME, G. HETH, S. SIMSON & E. NEVO (1990): Presence and ecological distribution of *Mus* “spretoides” and *Mus musculus domesticus* in Israel. Circum-Mediterranean vicariance in the genus *Mus*. – Zeitschrift für Säugetierkunde 55: 1–10, Hamburg & Berlin.
- BATE, D. M. A. (1945): Notes on small mammals from the Lebanon Mountains, Syria. – Annals and Magazine of natural History (11) 12: 141–158, London.
- BAUER, K. (1988): Noteworthy mammal records from the Summan Plateau/NE Saudi Arabia. – Annalen des naturhistorischen Museums Wien (B) 90: 43–50, Vienna.
- BODENHEIMER, F. S. (1920): Die Tierwelt Palästinas. Erster Teil. – Das Land der Bibel 3 (3): 1–38, Leipzig.
- BODENHEIMER, F. S. (1935): Animal life in Palestine. – Jerusalem, 506 pp.
- CLARKE, J. E. (1977): A preliminary list of Jordan’s mammals. – Amman, 20 pp.
- CLAYTON, D. A. (1991): The little owl *Athene noctua* and its food in Kuwait. – Sandgrouse 13: 2–6, Sandy.

- ÇOLAK, E., N. YİĞİT, M. SÖZEN & S. ÖZKURT (1997): Distribution and taxonomic status of the genus *Microtus* (Mammalia: Rodentia) in southeastern Turkey. – Israel Journal of Zoology 43: 391–396, Jerusalem.
- DOBSON, G. E. (1878): Catalogue of the Chiroptera in the collection of the British Museum. – London, xlii + 567 pp.
- DOĞRAMACI, S., H. KEFELIOĞLU, & I. GÜNDÜZ (1994): Karyological analysis of the species of *Mesocricetus* (Mammalia: Rodentia) in Anatolia [in Turkish, English summary]. – Turkish Journal of Zoology 18 (1): 41–45, Ankara.
- EBENAU, C. (1996): Faunistische Nachweise aus der Cater Magara (Syrien). – Der Antberg, Mitteilungen zur Karst u. Höhlenkunde no. 63: 44–47, Hemer.
- EVANS, M. & P. BATES (1993): Diet of the desert eagle owl in Harrat al Harrah Reserve, northern Saudi Arabia. – Ornithological Society of the Middle East, Bulletin no. 30: 26, Sandy.
- FILIPPUCCI, M. G. (1992): Allozyme variation and divergence among European, Middle Eastern, and North African species of the genus *Apodemus* (Rodentia, Muridae). – Israel Journal of Zoology 38: 193–218, Jerusalem.
- FILIPPUCCI, M. G., S. SIMSON, & E. NEVO (1989): Evolutionary biology of the genus *Apodemus* KAUP, 1829 in Israel. Allozymic and biometric analyses with description of a new species: *Apodemus hermonensis* (Rodentia, Muridae). – Bolletino di Zoologia 56: 361–376, Pisa.
- FILIPPUCCI, M. G., G. STORCH, & M. MACHOLAN (1996): Taxonomy of the genus *Sylvaemus* in western Anatolia - morphological and electrophoretic evidence. – Senckenbergiana biologica 75: 1–14, Frankfurt a.M.
- GATTERMANN, R., P. FRITSCHKE, K. NEUMANN, I. AL-HUSSEIN, A. KAYSER, M. ABIAD & R. YAKTI (2001): Notes on the current distribution and the ecology of wild golden hamsters (*Mesocricetus auratus*). – Journal of Zoology 254: 359–365, London.
- GHARAIBEH, B. M. & M. B. QUMSIYEH (1995): *Otonycteris hemprichii*. – Mammalian Species no. 514: 1–4, Lawrence (Ka).
- GOLEMANSKY, V. G & A. I. DARWISH (1993): *Eimeria melanuri* sp. n. (Coccidia, Eimeriidae), an intestinal parasite of *Eliomys melanurus* Wagner, 1840 (Rodentia, Gliridae) from Syria. – Acta Protozoologica 32 (4): 269–270, Warsaw.
- HAIM, A., A. RUBAL & J. HARARI (1993): Thermoregulatory “strategies” of two *Apodemus* species inhabiting a cold environment on Mount Hermon. p. 91–97. In: C. CAREY, G. L. FLORANT, B. A. WUNDER & B. HORWITZ (Eds.), Life in the cold: Ecological, physiological and molecular mechanisms. – San Francisco & Oxford, i-xii, 1–575 pp.
- HAMAR, M. & M. SCHUTOWA (1966): Neue Daten über die geographische Veränderlichkeit und die Entwicklung der Gattung *Mesocricetus* Nehring, 1898 (Glires, Mammalia). – Zeitschrift für Säugetierkunde 31: 237–251, Hamburg & Berlin.
- HARRISON, D. L. (1964): The mammals of Arabia, I. Insectivora, Chiroptera, Primates. – London, xx + 192 pp., London.
- HARRISON, D. L. (1972): The mammals of Arabia, III. Lagomorpha, Rodentia. – p. 383–670, London.
- HARRISON, D. L. & P. J. BATES (1991): The mammals of Arabia. – Sevenoaks, 2nd ed., xv + 354 pp.
- HEIM DE BALSAC, H. (1965): Quelques enseignements d'ordre faunistique tirés de l'étude du régime alimentaire de *Tyto alba* dans l'ouest de l'Afrique. – Alauda 33: 309–322, Paris.
- HUTTERER, R. & D. L. HARRISON (1988): A new look at the shrews (Soricidae) of Arabia. – Bonner zoologische Beiträge 39: 59–71, Bonn.
- HUTTERER, R. & D. KOCK (2002): Recent and ancient records of shrews from Syria, with notes on *Crocidura katinka* Bate, 1937 (Mammalia: Soricidae). – Bonner zoologische Beiträge 50: 249–258, Bonn.
- JENTINK, F. A. (1888): Catalogue systématique des mammifères (Rongeurs, insectivores, cheiroptères, édentés et marsupiaux). – Musée d'Histoire naturelle des Pays-Bas 12: 1–280, Leiden.
- KADHIM, A. H. (1979). Notes on the food, predators and reproduction of the lesser jerboa *Jaculus jaculus* (Linné, 1758) (Dipodidae: Rodentia) from Iraq. – Säugetierkundliche Mitteilungen 27: 312–314, Munich.

- KAHILA, G. & L. HORWITZ (1994): Prey species representation in barn owl pellets. – *Israel Journal of Zoology* 40: 100–101, Tel Aviv.
- KAHMANN, H. (1978): Anmerkung. p. 207. In: A. NADACHOWSKI, B. RZEBIK-KOWALSKA & A. H. KADHIM, The first record of *Eliomys melanurus* Wagner, 1840 (Gliridae, Mammalia), from Iraq. – *Säugetierkundliche Mitteilungen* 26: 206–207, Munich.
- KAHMANN, H. (1981): Zur Naturgeschichte des Löffelbilches, *Eliomys melanurus* Wagner, 1840 (Mammalia: Rodentia, Gliridae) (Eine vorläufige Untersuchung). – *Spixiana* 4: 1–37, Munich.
- KEFELIOĞLU, H. (1995): The taxonomy of the genus *Microtus* (Mammalia: Rodentia) and its distribution in Turkey [in Turkish]. – *Turkish Journal of Zoology* 19: 35–63, Ankara.
- KHAJURIA, H. (1988): A new species of rat-tailed bats (Chiroptera: Rhinopomatidae) from Iraq. – *Records of the Zoological Survey of India* 85: 391–402, Calcutta.
- KOCK, D. (1998): The gerbils and jirds of Syria (Mammalia: Rodentia: Muridae: Gerbillinae) – *Senckenbergiana biologica* 77: 117–122, Frankfurt a.M.
- KOCK, D., F. KRUPP & W. SCHNEIDER (1994): Einige Säugetiere aus dem Nahr al-Khabur-Gebiet, NE-Syrien. – *Säugetierkundliche Mitteilungen* 35: 177–183, Delligsen.
- KOCK, D. & I. A. NADER (1983): Pygmy shrew and rodents from the Near East (Mammalia: Soricidae, Rodentia). – *Senckenbergiana biologica* 64: 13–23, Frankfurt a.M.
- KOCK, D. & I. A. NADER (1996): Terrestrial mammals of the Jubail Marine Wildlife Sanctuary. p. 421–437. In: F. KRUPP, A. H. ABUZINADA & I. A. NADER (Eds.): A marine wildlife sanctuary for the Arabian Gulf. - Environmental Research and Conservation following the 1991 Gulf War Oil Spill. – [iv +] 514 pp., Riyadh & Frankfurt a.M.
- KRUPP, F. & W. SCHNEIDER (1991): Bestandserfassung der rezenten Fauna im Bereich des Nahr al-Häbūr. p. 69–85. In: H. KÜHNE, A. MAHMOUD & W. RÖLLIG (Eds.), *Berichte der Ausgrabung Tall Šēh Hamad/Dūr-Katlimu (Batsh)*, I. KÜHNE, H. (Hrsg.): Die rezente Umwelt von Tall Šēh Hamad und Daten zur Umweltrekonstruktion der assyrischen Stadt Dūr-Katlimu. – Berlin, 193 pp.
- KRYŠTUFEK, B. (2002): Identity of four *Apodemus* (*Sylvaemus*) types from the eastern Mediterranean and the Middle East. – *Mammalia* 66: 43–51, Paris.
- KRYŠTUFEK, B. & R. KRAFT (1997): Cranial variation and taxonomy of garden dormice (*Eliomys* Wagner, 1840) in the circum-Mediterranean realm. – *Mammalia* 61: 411–429, Paris.
- KUMERLOEVE, H. (1975): Die Säugetiere (Mammalia) Syriens und des Libanon. Eine vorläufige Übersicht (Stand 1974). – *Veröffentlichungen der zoologischen Staatssammlungen München* 18: 159–225, Munich.
- LEHMANN, E. VON (1965): Über die Säugetiere im Waldgebiet NW-Syriens. – *Sitzungsberichte der Gesellschaft naturforschender Freunde zu Berlin (N.F.)* 5 (1): 22–38, Berlin.
- LORTET, M. (1883): Das heutige Syrien, Teil 28. – *Globus* 43 (22): 337–344, Braunschweig.
- MACHOLAN, M. (1996): Key to European house mice (*Mus*). – *Folia Zoologica* 45: 209–217, Brno.
- MISONNE, X. (1957): Mammifères de la Turquie sud-orientale et du nord de la Syrie. – *Mammalia* 21: 53–67, Paris.
- MORLOK, W. F. (1978): Nagetiere aus der Türkei (Mammalia: Rodentia). – *Senckenbergiana biologica* 59: 155–162, Frankfurt a.M.
- MURPHY, M. (1971): Natural history of the Syrian golden hamster - a reconnaissance expedition. – *American Zoologist* 11: 632, Utica, N.Y.
- MUSSER, G. & M. D. CARLETON (1993): Family Muridae. p. 501–755. In: D. E. WILSON & D. M. REEDER (Eds.), *Mammal species of the world*. – Washington & London, 2nd ed., xviii + 1206 pp.
- NADACHOWSKI, A., B. RZEBIK-KOWALSKA & A. H. KADHIM (1978): The first record of *Eliomys melanurus* Wagner, 1840 (Gliridae, Mammalia), from Iraq. – *Säugetierkundliche Mitteilungen* 26: 206–207, Munich.
- NADACHOWSKI, A., J. SMIELOWSKI, B. RZEBIK-KOWALSKA & A. DAOUD (1990): Mammals from the Near East in Polish collections. – *Acta zoologica cracoviensia* 33 (6): 91–120, Kraków.
- NADER, I. A. & D. KOCK (1983): Notes on some bats from the Near East (Mammalia: Chiroptera). – *Zeitschrift für Säugetierkunde* 48: 1–9, Hamburg & Berlin.

- NADER, I. A. & D. KOCK (1990): *Eptesicus (Eptesicus) bottae* (Peters, 1869) in Saudi Arabia with notes on its subspecies and distribution (Mammalia: Chiroptera: Vespertilionidae). – *Senckenbergiana biologica* 70: 1–13, Frankfurt a.M. [for 1989].
- NADER, I. A., D. KOCK & A. K. D. AL-KHALILI (1983): *Eliomys melanurus* (Wagner, 1839) and *Praomys fumatus* (Peters 1878) from the Kingdom of Saudi Arabia (Mammalia: Rodentia). – *Senckenbergiana biologica* 63: 313–324; Frankfurt a. M. [for 1982].
- NEHRING, A. (1886): Katalog der Säugethiere. Zoologische Sammlung der Königlichen Landwirtschaftlichen Hochschule in Berlin. – Berlin, i-vii + 1-100 pp.
- NEHRING, A. (1902a): Über *Mesocricetus auratus* Waterh. – *Zoologischer Anzeiger* 26 (687): 57–60, Leipzig.
- NEHRING, A. (1902b): Die geographische Verbreitung der Säugetiere in Palästina und Syrien. – *Globus* 81 (20): 309-314, Braunschweig [text identical with: Mitteilungen und Nachrichten des deutschen Palästina-Vereins 1902: 49-63, Leipzig].
- NEUHÄUSER, G. (1936a): Diagnosen neuer kleinasiatischer Mäuse. – *Zeitschrift für Säugetierkunde* 11: 159–160, Berlin.
- NEUHÄUSER, G. (1936b): Die Muriden von Kleinasien. – *Zeitschrift für Säugetierkunde* 11: 161–236, Berlin.
- OBUCH, J. (2001): Dormice in the diet of owls in the Middle East. – *Trakya Üniversitesi Bilimsel Araştırmalar Dergisi* (B) 2 (2): 145–150; Edirne.
- ORSINI, Ph., F. BONHOMME, J. BRITTON-DAVIDIAN, H. CROSET, S. GERASIMOV & L. THALER (1983): Le complexe d'espèces du genre *Mus* en Europe Centrale et Orientale. II. Critères d'identification, répartition et caractéristiques écologiques. – *Zeitschrift für Säugetierkunde* 48: 86–95, Hamburg & Berlin.
- OSBORN, D. J. (1965): Rodents of the subfamilies Murinae, Gerbillinae, and Cricetinae from Turkey. – *Egyptian Publications of the Health Association* 40: 401–424, Cairo.
- PRADEL, A. (1981): Biometrical remarks on the hamster *Cricetulus migratorius* (Pallas, 1773) (Rodentia, Mammalia) from Krak des Chevaliers (Syria). – *Acta zoologica cracoviensia* 25 (11): 271–292, Kraków.
- QUMSIYEH, M. B. (1985): The bats of Egypt. – *Special Publication Museum Texas Tech University*, no. 23: 1–102, Lubbock.
- RIFAI, L. B., W. N. AL-MELHIM & Z. S. AMR (1998): On the diet of the Barn Owl, *Tyto alba*, in northern Jordan. – *Zoology in the Middle East* 16: 31–34, Heidelberg.
- RIFAI, L. B., W. N. AL-MELHIM, B. M. GHARAIBEH & Z. S. AMR (2000): The diet of the desert eagle owl, *Bubo bubo ascalaphus*, in the Eastern Desert of Jordan. – *Journal of Arid Environments* 44: 369–372, London.
- RUSSELL, A. (1794): The natural history of Aleppo. Containing a description of the city, and the principal natural productions in its neighbourhood. – London, 2nd ed., v + 430 + lx pp. [reprint Farnborough 1969].
- RZEBIK-KOWALSKA, B. & A. NADACHOWSKI (1978): Mammalogical results of the 1977 Near East Expedition of the Cracow Institute of Systematic and Experimental Zoology. – *Abstracts 2nd Congressus theriologicus internationalis*: 124, Brno.
- SACHANOWICZ, K., W. BOGDANOWICZ & S. MICHALAK (1999): First record of *Taphozous nudiventris* Cretzschmar, 1830 (Chiroptera, Emballonuridae) in Turkey. – *Mammalia* 63 (1): 105–107, Paris.
- SANBORN, C. C. (1956): Appendix C. Bats collected by the expedition. p. 77. In: H. FIELD, An anthropological reconnaissance in the Near East, 1950. – *Papers of the Peabody Museum* 48 (2): i-x, 1–119, Harvard.
- SHEHAB, A. H. (2004): Diet of the Eagle Owl, *Bubo bubo*, in Syria. – *Zoology in the Middle East* 33: 21–26, Heidelberg.
- SHEHAB, A. H., A. KOWALSKI & A. DAOUD (1999): Biometrical remarks on the golden hamster *Mesocricetus auratus* (Waterhouse, 1839) (Cricetidae, Rodentia) from Ebla (northern Syria). – *Acta zoologica cracoviensia* 42 (3): 403–406, Kraków.

- SHEHAB, A.H., O. MOUHRA, M. A. ABU BAKER & Z. S. AMR (2003): Observations on the forest dormouse, *Dryomys nitedula* (Pallas, 1779) (Rodentia: Gliridae), in Syria. – *Zoology in the Middle East* 29: 4–12, Heidelberg.
- SICKENBERG, O. (1971): Über das Vorkommen des Goldhamsters (*Mesocricetus auratus brandtier* [sic] Nehring, 1898) in Zentralanatolien. – *Säugetierkundliche Mitteilungen* 19: 362–363, Munich.
- STEINER, H. M. & G. VAUK (1966): Säugetiere aus dem Beyşehir-Gebiet (Wil. Konya, Kleinasien). – *Zoologischer Anzeiger* 176: 97–102, Jena.
- STORCH, G. (1971): Teil I. In: H. FELTEN, F. SPITZENBERGER & G. STORCH, Zur Kleinsäugerfauna West-Anatoliens. – *Senckenbergiana biologica* 52: 393–424, Frankfurt a.M.
- STORCH, G. (1972): *Microtus*. – In: D. KOCK, F. MALEC & G. STORCH, Rezente und subfossile Kleinsäuger aus dem Vilayet Elazığ, Ostanatolien. – *Zeitschrift für Säugetierkunde* 37: 204–229, Hamburg & Berlin.
- THOMAS, O. (1915): Notes on *Taphozous* and *Saccolaimus*. – *Journal of the Bombay Natural History Society* 24: 57–63, Bombay.
- THOMAS, O. (1917): A new vole from Palestine. – *Annals and Magazine of natural History* (8) 19: 450–451, London.
- THOMAS, O. (1921): The jerboa of Muscat. – *Annals and Magazine of natural History* (9) 8: 440–441, London.
- THOMAS, O. (1922): The forms of *Jaculus jaculus* in Egypt and Syria. – *Annals and Magazine of natural History* (9) 9: 295–297, London.
- TOPAL, G. (1997): A new mouse-eared bat species, from Nepal, with statistical analyses of some other species of subgenus *Leuconoe* (Chiroptera, Vespertilionidae). – *Acta Zoologica Academiae Scientiarum Hungaricae* 43: 375–502, Budapest.
- TRISTRAM, H. B. (1866): Report on the mammals of Palestine. – *Proceedings of the Zoological Society* 1866: 84–93, London.
- TRISTRAM, H. B. (1884): The survey of western Palestine. The fauna and flora of Palestine. – London, xxii + 455 pp.
- WALTER, G. & C. EBENAU (1997): Nachweise von Fledermausfliegen aus Syrien (Diptera: Streblidae, Nycteribiidae). – *Zoology in the Middle East* 14: 37–46, Heidelberg.
- WATERHOUSE, G. R. (1839): Description of a new species of hamster (*Cricetus auratus*). – *Proceedings of the Zoological Society* 1839: 57, London.
- YİĞİT, N., B. COLAK, M. SÖZEN, S. ÖZKURT, R. VERİMLİ (2000): The distribution, morphology, and karyology of the genus *Mesocricetus* (Mammalia: Rodentia) in Turkey. – *Folia Zoologica* 49 (3): 167–174, Praha.
- YOM-TOV, Y. 1988: The zoogeography of the birds and mammals of Israel. p. 389–409. In: Y. YOM-TOV & E. TCHERNOV (Eds.), *The zoogeography of Israel. The distribution and abundance at a zoogeographical crossroad*. – Dordrecht, Boston & Lancaster, 600 pp.

Authors' addresses: Dr. Adwan Shehab, General Commission for Scientific Agricultural Research (GCSAR), Douma, P.O. Box 113, Damascus, Syria. – Prof. Ahmad Daoud, Department of Biology, Faculty of Sciences, Tishreen University, P.O. Box 4933, Latakia, Syria. – Dr. Dieter Kock, Forschungsinstitut Senckenberg, Senckenberganlage 25, 60325 Frankfurt a.M., Germany. – Prof. Dr. Zuhair Amr, Department of Biology, Jordan University of Science and Technology. P.O. Box 3030, Irbid, Jordan. – Email contact: amrz@just.edu.jo.