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Recent and ancient records of shrews from Syria, with notes on *Crocidura katinka* Bate, 1937 (Mammalia: Soricidae)¹

Rainer Hutterer & Dieter Kock

Abstract. The distribution and taxonomy of shrews of the genera *Suncus* and *Crocidura* found in Syria is reviewed. *Crocidura katinka* Bate, 1937, so far known only from fossil remains from the Pleistocene of the Tabun Cave (Israel), was identified in fresh owl pellets from Syria.

Key words. Pleistocene, Holocene, shrews, Syria, Israel, taxonomy, distribution.

Introduction

The study of the vertebrate fauna of Syria as briefly outlined by Kock (1998) is continued here with a review of the Soricidae presently known from this country within the pre-war borders of 1966, i.e. including the Golan Heights. The family is currently represented in Syria by only two species: *Suncus etruscus* (Savi, 1822) and *Crocidura suaveolens* (Pallas, 1811), to which a new discovery is added by this study. The range of *Suncus murinus* (Linnaeus, 1766) was mapped by Misonne (1959) reaching westwards to the coast of Syria. This is erroneous, however.

The low species diversity in Syria is probably due to the biogeographic location of the country and the consequent lack of habitat suitable for shrews. However, the discovery of an unknown species in the Near East, *Crocidura ramona* Ivanitskaya, Shenbrot & Nevo, 1996, and of a species of *Crocidura* previously known from Pleistocene fossils only (this paper) indicates that intensive search will add to the knowledge of Soricidae in apparently marginal arid habitats.

Material and methods

We studied new material from Syria obtained during biological and archaeological surveys in the context of previous studies and the literature. Sources are given in the species accounts and in the acknowledgements.

The original references to the taxa mentioned below are fully quoted by Harrison & Bates (1991) and Hutterer (1993). Ancient records which may refer to Syrian territory or which are just extralimital are given in square brackets.

Measurements were taken with a digital caliper to the nearest of 0.01 mm. The set of linear distances taken from skulls and presented in table 1 is shown in fig. 1.

Abbreviations: alc = alcohol preserved; crn = skull; skl = skeleton; BM = British Museum of Natural History (now The Natural History Museum), London; LM = Liverpool Museum, Liverpool; NHMC = Natural History Museum of Crete, Irakleio; SMF = Senckenberg Museum, Frankfurt a. M.; ZFMK = Zoologisches Forschungsinstitut A. Koenig, Bonn.

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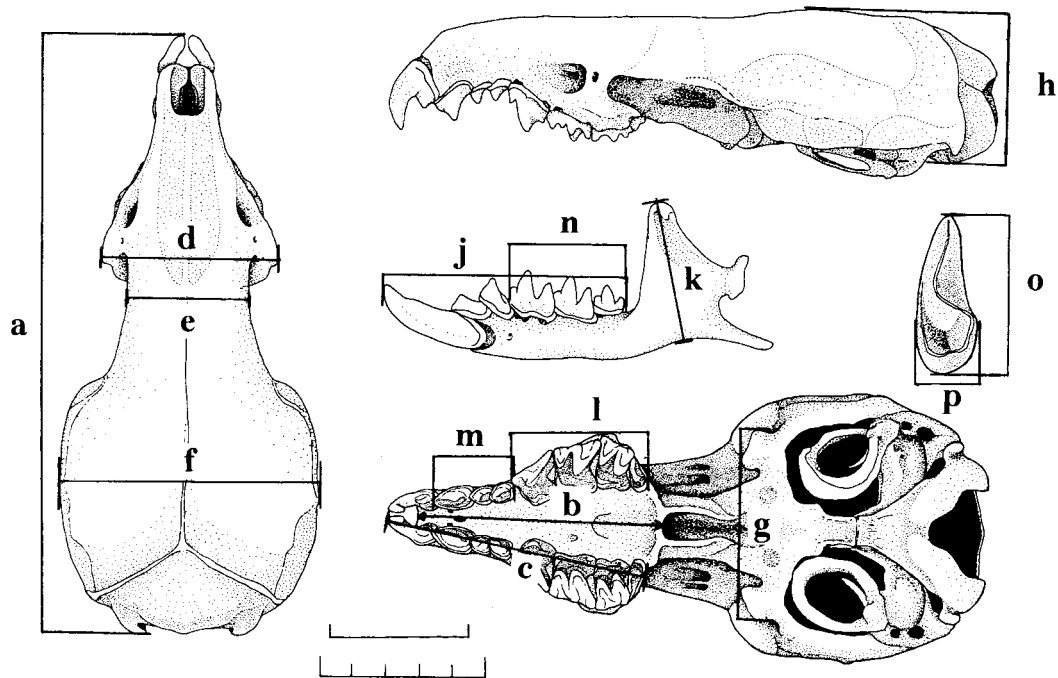


Fig. 1. A cranium and mandible of *Crocidura arabica* (holotype, modified from Hutterer & Harrison 1988), with the 15 measurements taken for this study indicated. a, Condylar-incisive length; b, Palatal length; c, Upper toothrow length; d, Maxillary breadth; e, Interorbital width; f, Greatest width; g, Postglenoid width; h, Braincase height; j, Lower toothrow; k, Coronoid height; l, Distance P4-/M3/; m, Distance U1-/3/; n, Distance m1-/3/; o, Width of M3/; p, Length of M3/. Scales represent 5 mm (skull and mandible) or 1 mm (enlarged M3/), respectively.

Species accounts

Soricidae Fischer, 1817

Suncus etruscus (Savi, 1822)

Material: 2 km SW Qal'at Sukkara, 36°24'N – 40°23'E, Jebel Abd al-Aziz, 2.X.1988; n1 (right mandible ex *Athene noctua* pellets) SMF 80662, D. Kock. – Tell Bdeiri [Budeiri], 36°24'N – 40°46'E, E-bank Khabur River, 23.V.1989; n2 (2 partial crn ex *Tyto alba* pellets) SMF 80560-1, D. Kock. – As-Salahiya (Duro Europus), 34°44'30.N – 40°44'E, S-bank Euphrates, 17.V.1989; n6 (6 rostra ex *Tyto alba* pellets) SMF 80625-31, D. Kock.

Distribution: As elsewhere in the Mediterranean, *S. etruscus* in Syria has been recorded mainly from owl pellets collected at Qal'at al-Hosn (Crac des Chevaliers) (Rzebik-Kowalska & Nadachowski 1978; Nadachowski et al. 1990), between Shaizar and Maharda, 25 km NW Hammah (Kock & Nader 1983), from Qater Maghara, Hussein al-Achmad village, 35°53'N – 39°01'E, ca. 2.5 km W of Ratla, S-bank Euphrates Valley, 7 km S Raqqa, and "Pigeon Shaft Cave", Raqqa (Ebenau 1966) [SMF 84472-3]. Apart from these records, *S. etruscus* has been trapped at Tell Sheikh Hamad, E-bank Khabur River (Krupp & Schneider 1991, Kock et al. 1994).

The present material extends the Syrian range along the Nahar al-Khabur northwards towards S-Anatolia and eastwards along the Euphrates valley to connect

with known Iraqi occurrences (see Kock & Nader 1983, Hutterer & Harrison 1988). In Jordan this species seems to range further east into arid regions, i.e. Azraq (Atallah 1966). The Syrian occurrences are within the Mediterranean area and on the banks of permanent rivers, except in the Jebel Abd al-Aziz, where *S. etruscus* was found in a nearly arid habitat with growth of herbs, grasses, and sparse pistacia trees.

Crocidura suaveolens (Pallas, 1811)

Material: Maquam Assayedh, 35°40'35"N – 35°51'22"E, 20 km N Lattakia, 12.IV.1999; 4 ? sex (alc) NHMC 80.5.20.34–37, P. Lymberakis. – Furunlok Forest nr Kastel Maaf, ca 570 m, 40 km NE Lattakia, 12.–24.VIII.1964; 4 males, 4 females (crn, skin, skl) ZFMK 64.1437–44, E. v. Lehmann. -- Frouluk, 35°50'N – 36°01'E, near Rabiaa, NE Lattakia, 4.VI.1989; male (crn, skin, skl) SMF 74081, D. Kock. -- Qal'at al-Hosn (Crac des Chevaliers), 34°47'N – 36°18'E, btw. Homs and Hamidiye, 8.III.1979; ? sex (crn, alc) SMF 60372, R. Kinzelbach. – Halab, 25 km NW Aleppo, 36°14'N – 37°10'E, 1997; 1 ? (crn), ZFMK 99.062, B. v. Bülow. -- Djerablous, 3.VI.1964; female (crn, skin) ZFMK 64.698, H. Kumerloeve. -- Ar-Raqqa, 8/9th century Islamic settlement, excavations 1982–1993; n5 (4 rostra fragments, 1 left mandible), SMF 90374, 90494–97, C. Becker. -- Qanawat, 32°44'30 N – 36°37'E, Jebel Hauran, 12.V.1989; female (crn, skin, skl) SMF 74080, D. Kock. – Tell Bdeiri [Budeiri], 36°24'N – 40°46'E, E-bank Khabur River, 23.V.1989; 2 ? sex (2 crn ex *Tyto alba* pellets) SMF 80558–9, D. Kock.

Taxonomy: Correcting the identifications of this taxon, Hutterer & Harrison (1988) consider all previous Syrian records of *C. russula* (Hermann, 1780), *gueldenstaedtii* Pallas, 1811, *monacha* Thomas, 1906, *portali* Thomas, 1920, *Suncus tristrami* Bodenheimer, 1935, etc. to actually represent *C. suaveolens*. However, the re-establishment of *Crocidura gmelini* (Pallas, 1811) by Hoffmann (1996a) and of *C. gueldenstaedtii* by Biltueva et al. (1999) complicates matters and calls for a thorough analysis of this group in the Near East.

Distribution: Allen 1915, sub *russula* [repeated by Bodenheimer 1935, sub *russula*; Harrison 1964, sub *russula monacha*]: Baniyas, S Mt Hermon. – Lehmann 1965, sub *gueldenstaedti* [repeated by Kumerloeve 1975, sub *C. russula monacha*; Harrison & Bates 1991, sub *C. suaveolens*, erroneously quoted as from two separate localities]: Furunlok Forest nr Kastel Maaf, ca 570 m, 40 km NE Lattakia. – Hellwing 1973, sub *C. russula monacha*: two unspecified localities on Golan. – Lulav 1978, *C. suaveolens portali*: Lake Kinneret area [the NE-part comprising Syrian territory]. – Anonymous 1986, *Crocidura* sp.: Mt Hermon, 2000 m. – Nadachowski et al. 1990: *Crocidura* sp. (here considered as identical with *suaveolens*, of which a complete specimen has been collected at the same locality as listed above): Crac des Chevaliers [Qal'at al-Hosn]. – Mendelssohn & Yom-Tov 1999, *C. suaveolens* and *C. leucodon*: range includes Golan.

The new material extends the range of this shrew eastwards into the Khabur region and the hill ranges of N-Syria to connect with known occurrences of *C. suaveolens* in S-Turkey (Lehmann 1966, sub *gueldenstaedti*: Diyarbakir; Morlok 1978, sub *C. gueldenstaedti*: Ceylanpinar, Vil. Urfa, SMF 53693-4). In Jordan this shrew extends further east into arid regions (Clarke 1977, sub *russula*: Azraq), while the southeasternmost record in Syria (Jebel Hauran) was obtained in oak scrub (*Quercus* sp.) of Mediterranean type.

Note: Numerous unidentified *Crocidura* were reported recently from Palestine, Israel, and Syria: Mt. Hermon at 2000 m; tracks (sic!) in Arava Valley nr Yotvata, Enot

Tzukim in Judean Desert, and En Gedi (Anonymous 1986); from owl pellets at Ma'aleh Ephraim, 32°04'N – 35°23'E (Ilani 1987); *Crocidura* ? *russula* from En Gedi being studied to determine their precise taxonomic status (Ilani & Shalmon 1985). Shehab et al. (1999) collected *Crocidura* sp. at Ain Arab (Agricultural Res. Station), 20 km E of As'Sweida, 1500 m, which probably is identical with *C. suaveolens*, occurring in Jebel Hauran (see material listed above).

***Crocidura katinka* Bate, 1937**

Material: Halabiya, 35°41'N – 39°49'E, S-bank Euphrates, 31.V.1989, ?sex (rostrum, pair of mandibles, ex fresh *Tyto alba* pellet) SMF 80622, D. Kock. -- 2 km SW Qal'at Sukkara, 36°24'N – 40°23'E, Jebel Abd al-Aziz, 2.X.1988, ?sex (right mandible fragment ex *Athene noctua* pellets), SMF 80663, D. Kock, F. Krupp & G. Eppler.

Measurements: Table 1.

Diagnosis: "A small and primitive *Crocidura*, about the size of *C. portali* [= *suaveolens*?], but snout comparatively shorter; upper cheek-teeth simple and massive in outline. The maximum height and width of the mandibular condyle are almost equal" (Bate 1937a).

Description: In a monograph published in the same year, Bate (1937b) added a full description and comparison to her first brief diagnosis (Bate 1937a). She also supplied good illustrations of the holotype skull which are reproduced here (Figs 2–4). The holotype (BM M 16147) consists of the anterior portion of a skull of an old adult animal with most teeth except the right M2/ and M3/. The new fragment from Syria, which we assign to *C. katinka*, is more complete; it shows all characters of the holotype and in addition shows a broad interorbital region and the anterior portion of a broad and rounded braincase (Figs 5–8).

The skull is small with a short rostrum, a broad interorbital region, and a rounded braincase. Superior articular facets are well developed. The dorsal roof of the skull is flattened, but probably slightly inflated along the braincase. The infraorbital bridge is of normal size. The first upper incisor is short, the three upper unicuspid are small, the tip of the third one subequal to the tip of the parastyle of the fourth upper premolar. PM4/ with lingual protocone; upper molars massive, posterior border not markedly excavated; M3/ relatively large. In lingual view the two anterior foramina incisiva are in one line with the tips of the first upper unicuspid. Mandibular ramus short and stout, coronoid process comparatively low and wide. The two rami of the condyle subequal in length. Lower incisor short with a simple blade. M/3 with an entoconid crest.

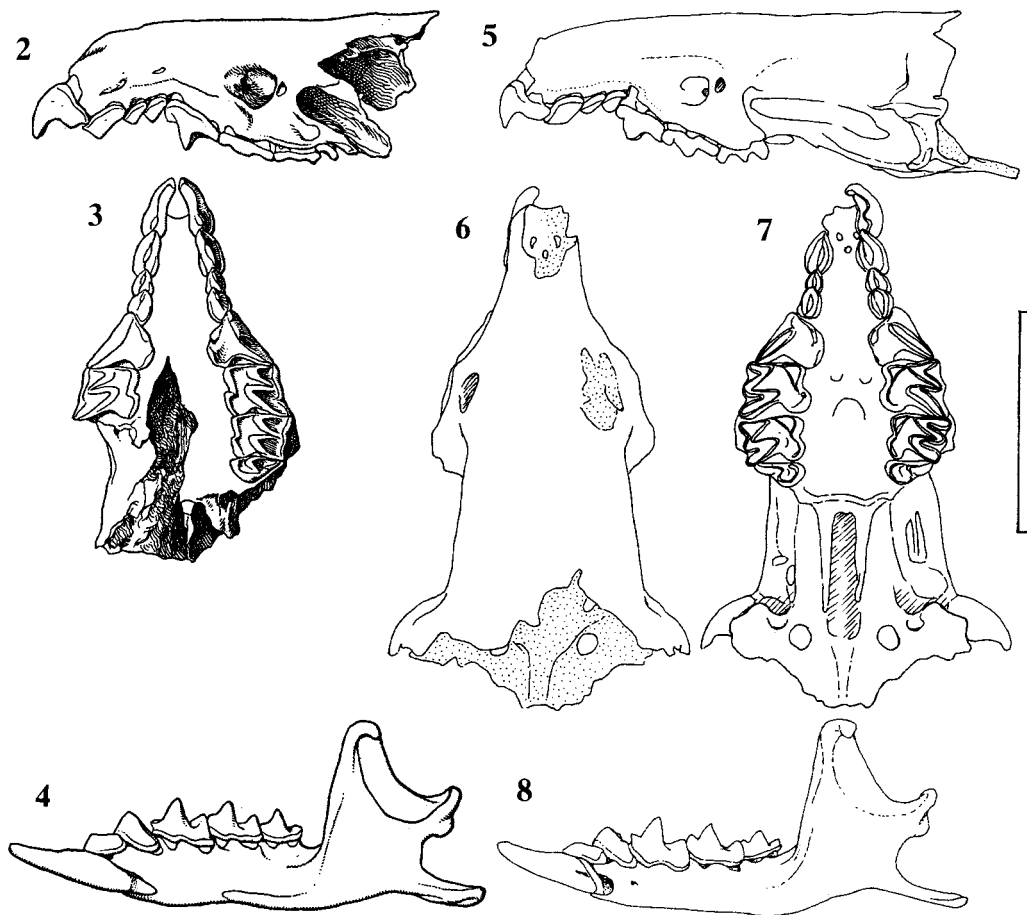
A mandibular fragment (more robust than *S. etruscus*) from a different Syrian locality (Jebel Abd al-Aziz) is also assigned to *C. katinka*. In this specimen the distance M/1-/3 measures 3.05 mm, which is even shorter than in the specimen from Halabiya (3.43 mm), and far out of the range of Syrian *C. suaveolens*.

Comparisons: *Crocidura katinka* is smaller than any other species of *Crocidura* known from Europe, the Middle East, or Arabia (Hutterer & Harrison 1988; Hoffmann 1996), although the taxon is currently treated as a synonym of *C. suaveolens* in the palaeontological literature (e.g. Heller 1970; Rabinovich & Tchernov 1996; Tchernov 1998). *C. leucodon* (Hermann, 1780) (currently including as synonyms *samaritana* Bate, 1937a, from Tabun Cave, transit of Upper Acheulean to Lower

Table 1: Selected cranial and dental measurements. Measurements taken by RH if not otherwise stated.

Taxon, Specimen(s)	<i>katinka</i> Israel holotype M15274	<i>katinka</i> Syria SMF 80.622	<i>bottegi</i> Ethiopia BM (n=3)	<i>bottegoides</i> Ethiopia LM (n=3)	<i>religiosa</i> Egypt neotype	<i>obscurior</i> Guinea holotype	<i>arabica</i> Oman holotype	<i>gmelini</i> Iran neotype	<i>ramona</i> Israel paratype	<i>portali</i> Israel holotype	<i>suaveolens</i> Syria ZFMK (\bar{x} , n=9)
Source*	1	2	3	3	2	4	5	6	2	7	2
Measurement											
Condylo-incisive length	–	–	15.05	14.73	15.9	17.0	17.7	17.6	18.3	–	19.20
Palatal length	6.58	6.88	5.90	5.67	–	–	7.3	–	7.7	–	7.85
Upper toothrow length	7.27	6.99	6.17	5.97	6.5	7.5	7.6	7.8	7.6	6.9	8.41
Maxillary breadth	–	4.92	4.23	3.47	4.5	5.3	5.4	5.4	5.5	–	5.80
Interorbital width	3.74	3.61	3.33	3.30	3.6	4.0	3.6	3.9	4.0	4.0	4.11
Greatest width	–	–	6.85	7.10	6.9	8.0	7.7	7.9	8.4	–	8.80
Postglenoid width	–	5.24	4.57	4.73	4.8	–	–	–	–	–	6.12
Braincase height	–	–	3.85	4.07	3.5	–	3.9	–	4.2	–	–
Lower toothrow	–	6.67	5.70	5.47	6.0	7.0	7.1	–	7.1	–	7.70
Coronoid height	–	4.07	3.27	3.20	3.4	–	4.2	–	4.6	4.7	4.57
Distance P4/-M3/	4.12	4.12	–	–	–	–	–	–	–	–	4.77
Distance U1/-3/	1.98	2.00	–	–	–	–	–	–	–	–	–
Distance m/1-3/	–	3.43	–	–	–	–	–	–	3.8	–	3.89
Width of M3/	–	1.16	–	–	–	–	1.05	–	1.20	–	–
Length of M3/	–	0.54	–	–	–	–	0.42	–	0.42	–	–

* 1 measured by P. D. Jenkins (in litt.); 2 this study; 3 Hutterer & Yalden 1990; 4 Heim de Balsac 1958; 5 Hutterer & Harrison 1988; 6 Hoffmann 1996; 7 measured by B. Kryštufek (in litt.).



Figs 2–8. *Crocidura katinka* Bate, 1937. – 2–4, holotype BM M15274 from the Pleistocene of Tabun Cave, Israel, cranium in lateral and ventral view and left mandible in labial view (reproduced from Bate 1937b, p. 161); 5–8, SMF 80622, fragment from owl pellets from Syria, cranium in lateral, dorsal and ventral view, and left mandible in labial view. Both figures reduced approximately to the same scale. Scale bar = 5 mm.

Levalloiso-Mousterian, fide Heller 1970: 15, 46; *judaica* Thomas 1919; and *lasia* Thomas, 1906), *suaveolens*, *susiana* Redding & Lay, 1978, *arabica* Hutterer & Harrison, 1988, *ramona*, and *gmelini* (Pallas, 1811) are considerably larger in skull dimensions. Table 1 provides some cranial measurements of the latter three species.

If we extend the comparison to the African continent, then *C. floweri* Dollman, 1915, *C. whitakeri* de Winton, 1898, *C. alexandrisi* Vesmanis, 1977, and *C. religiosa* (I. Geoffroy, 1827) should be considered, all of which occur in Egypt or Libya (*alexandrisi*). The first three species have larger skulls with different proportions (see measurements in Vesmanis 1977; Osborn & Helmy 1980; Hutterer 1987). Some agreement in overall size, position of protocone on PM4/ and shape of M1-2/ (with a cusplet between protocone and hypocone), is found with *religiosa*, but this species has a much flatter rostrum and an extremely narrow infraorbital bridge.

C. katinka also shares some cranial characters with species of the *C. bottegi* Thomas, 1898 group, such as a large third upper molar, short and stout rostrum, or

inflated braincase. However, *C. katinka* is larger in all cranial dimensions than *C. bottegi* (type locality: NE Lake Turkana, Ethiopia), *C. bottegoides* Hutterer & Yalden, 1990 (type locality: Bale Mts, Ethiopia), and *C. obscurior* Heim de Balsac, 1958 (type locality: Mt. Nimba, Guinea).

Discussion

We conclude that *Crociodura katinka* represents a valid species which still exists in Syria. We are aware, however, that the evidence presented here is not overwhelming. A fragmentary skull and a piece of a mandible extracted from fresh owl pellets is all we have at hand. However, the conformity of these pieces in size and shape with the holotype of *C. katinka* from the Pleistocene of Israel is so striking, and the size difference between *C. katinka* and Syrian *C. suaveolens* so enormous, that we think this to be sufficient evidence for the hypothesis that *C. katinka* is still alive. If this assumption holds true, then Syria houses a precious natural heritage within its boundaries. Our interpretation is also supported by the almost sympatric occurrence of *C. suaveolens* and *C. katinka*. The new specimens of *C. katinka* were taken on the south bank of the Euphrates, while a sample of *C. suaveolens* from Ar-Raqqa, an Islamic settlement dating from the 8./9.th century (Becker, in litt.), was taken on the north bank of the river at a distance of a few tens of kilometres. We suggest that faunal surveys on both sides of the Euphrates valley should be conducted in order to map the ranges of both species in detail, and to collect a complete specimen of *C. katinka* which would allow to test our hypothesis against results obtained by the study of external characters and genetic distances.

It is also possible that *C. katinka* has a much wider distribution in the Levant and the Arabian Peninsula. Harrison & Bates (1991) noted that specimens of *C. suaveolens* from Arabia were considerably variable in pelage colour. The range of skull measurements presented by these authors approaches the size of *C. katinka* in some of the minimum values given. They conclude: "Possibly a second subspecies should be recognised within the region since specimens from southern Israel, Sinai and Saudi Arabia appear to be relatively small, as compared to those from northern Israel and Lebanon. If this proves to be the case the name *portali* is available." Since this was written, Ivanitskaya et al. (1996) described *Crociodura ramona* as a new species from southern Israel, a species with a purely white belly like in the holotype of *C. portali*. In skull size, *C. ramona*, *C. portali* and *C. gmelini* (in the sense of Hoffmann 1996a, b) are rather close (Table 1), but all three taxa are larger than *C. katinka*. Future studies should therefore also focus on the relationship of the three taxa and on a better definition of *C. gmelini* in general. Hoffmann (1996a) did not discuss the name *portali*, although Thomas (1920) stated that its nearest allies were *C. ilensis* Miller, 1901 from Central Asia and "*Sorex gmelini* Pallas", which Thomas considered undeterminable. In a subsequent paper, Hoffmann (1996b) included specimens from Israel, Jordan, Syria, Egypt (Sinai), and Yemen in *C. gmelini* and discussed Thomas's (1920) reflections on *C. portali*. However, in a more recent distribution map (Jiang & Hoffmann 2001) the records from the Near East and Yemen have been omitted. *C. ilensis* was included in *C. gmelini* by Hoffmann (1996a). It is therefore possible that *C. gmelini* extends into Syria and Israel. A possible relationship of *C. gmelini* with *C. katinka* still has to be examined.

Alternatively the Syrian *C. katinka* may be related to some African shrews. Enzyme electrophoretic studies (Maddalena 1990), RNA sequences (Quérrouil et al. 2001) as well as chromosome counts (Lavrenchenko et al. 1997; Schlitter et al. 1999) indicate that *C. bottegi*, *C. obscurior*, *C. bottegoides* and a number of other Ethiopian highland shrews may have Palaearctic rather than African affinities. The cranial similarity of *C. katinka* with species of the *C. bottegi* group may therefore reflect an interesting phylogenetic relationship.

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Zusammenfassung

Es wird eine Übersicht rezenter und historischer Funde von Spitzmäusen der Gattungen *Suncus* und *Crocidura* in Syrien gegeben. Das Taxon *Crocidura katinka* Bate, 1937, welches bisher nur aus pleistozänen Ablagerungen der Tabun Cave in Israel bekannt war, wird erstmals für Syrien aus frischen Eulengewöllen nachgewiesen.

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Dr. Rainer Hutterer, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany; email: r.hutterer.zfmk@uni-bonn.de.

Dr. Dieter Kock, Forschungsinstitut Senckenberg, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany; email: dkock@sng.uni-frankfurt.de.