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Bats (Mammalia: Chiroptera) of the Eastern Mediterranean. Part 1. Review of distribution and taxonomy of bats in Turkey

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Abstract. A complete list of all bat records up to now available from Turkey was compiled based on both the literary references and the original data. It is supplemented with distribution maps and brief summary of distributional and taxonomic status of each species. In total it covers 869 locality records of 31 chiropteran species: viz. *Rousettus aegyptiacus* (14 records), *Rhinolophus ferrumequinum* (104), *R. hipposideros* (65), *R. euryale* (47), *R. mehelyi* (24), *R. blasii* (29), *Myotis myotis* (63), *M. blythii* (82), *M. bechsteinii* (5), *M. nattereri* (17), *M. emarginatus* (19), *M. mystacinus* (28), *M. brandtii* (2), *M. daubentonii* (7), *M. cappaccinii* (27), *Vespertilio murinus* (3), *Eptesicus serotinus* (40), *E. bottae* (18), *Hypsugo savii* (18), *Pipistrellus pipistrellus* (72), *Pipistrellus nathusii* (6), *P. kuhlii* (45), *Nyctalus noctula* (6), *N. leisleri* (6), *N. lasiopterus* (1), *Otonycteris hemprichi* (1), *Barbastella barbastellus* s. l. (8), *Plecotus auritus* (17), *P. austriacus* (11), *Miniopterus schreibersii* (58), and *Tadarida teniotis* (26). Several other species, such as *Taphozous nudiventris*, *Asellia tridens*, *Myotis schaubi*, and *Eptesicus nilssonii*, were recorded in closest neighbourhood of the Turkish territory and are looked upon as hot candidates to the Turkish fauna. In more species, a taxonomic inhomogenity (expressed e. g. with appearance of different subspecies) over the Turkish territory was demonstrated. Based on structural differences in bat fauna, the territory of Turkey was subdivided into three major faunal regions: (1) humid coastal region (northern, western and southwestern coast), (2) arid region of Central Anatolia, Armenian Highlands and Kurdistan, and (3) southern region of Cilician lowland, Hatay and Mesopotamia (that represents a borderline between a fauna of the West-Palearctic arboreal type and that of the Saharo-Sindian eremial).

Zoogeography, distribution, taxonomy Chiroptera, Turkey, the Balkans, Middle East Palearctic region

INTRODUCTION

Biogeography of the Mediterranean region is traditionally understood to be a very attractive topics not only because of actual complexity and greatly variegated specificities of different areas of that region but also as a refugial zone for whole biota of the Western Palearctics, and, consequently, as a key region for understanding to history and evolutionary paths governing the past development of contemporary communities of Central Europe.

The territory of Turkey (Figs 1, 2) can be supposed to play a top role in these connections. With its square of 779 452 km^2, it covers as well the southern part of the Balkans, humid Pontic region and Armenian Highlands as the severe rocky-desert steppes in the Central Anatolia, the largest shoreline among the Mediterranean countries and correspondingly extensive coastal regions. It interconnects the southern offshoots of the Palearctic arboreal in the Balkans with that in Transcaucasia as well as with the steppes and deserts of the Mesopotamian lowlands. It is a region in which the earliest agricultural civilisation of the West arose and which was exposed during whole the Holocene

to an impact of human civilisation. Apparently, all these factors have had to reflect also in biota of this country what makes it one of the most important region also from the zoogeographic point of view. Nevertheless, in contrast to the Levant region of the Eastern Mediterranean for which mammal fauna several extensive summaries are available (Harrison 1964, Atallah 1977, Harrison & Bates 1991, Qumsiyeh 1996), only little is available for the territory of Turkey. The present paper is hence intended to provide a basic summary of the current state of knowledge on just a one group of mammals of this country. It results of an international research project conducted by the Charles University Prague (Czech Republic) in cooperation with the Slovenian Natural History Museum Ljubljana (Slovenia) and the Thracian University Edirne (Turkey).

Introductory exposition on chiropteran biogeography of the Eastern Mediterranean, summarizing also the data obtained from the other countries of that region and providing a contextual framework to the present paper was already presented in our earlier contribution (Horáček et al. 1998).

Bat research in Turkey

Bat fauna of recent territory of the Republic of Turkey (Figs 1, 2) remained for long only poorly known. Until 1950's, all information was limited onto several occassional records mentioned in frame of general surveys often dealing with other than bat and/or Turkish topics (e. g., Danford & Alston 1877, 1880, Dobson 1878, Doria 1887, Satunin 1913, Wettstein 1926). The popularizing article by Şadoglu (1953) represents perhaps the first Turkish paper that concerns, though in general, just bats. At the beginning of sixties, Melâhat Çaglar (Istanbul) and Hermann Kahmann (Munich) started a regular field study of Turkish bats which resulted in a series of papers (Çaglar 1961a, b, c, Kahmann 1962, Kahman & Çaglar 1960) later extended in the complete lists of bat records to date available from Turkey (Çaglar 1965, 1968, 1969). In 60's and 70's, an ornithologist Hans Kumerloeve (Bonn) undertook several research trips in Turkey at which he also collected an extensive material of mammals including bats. His records were published either by him or in cooperation with Ernst von Lehman (Kumerloeve 1975, Lehmann 1966, 1969). Later, Kumerloeve (1975) compiled a very important comprehensive monograph on Turkish mammals that listed also all references and previous research efforts concerning that topic. Since the beginning of sixties, knowledge on Turkish mammals has continously been supplemented with results of research trips undertaken by German and Austrian zoologists Heinz Felten, Gerhard Storch, Dieter Kock (Frankfurt a. M.), Friederike Spitzenberger and Hans M. Steiner (Vienna), some of which spent even several years in Turkey. Several of the papers resulting of their study were focused just to distribution and systematics of bats (Felten 1971, Felten et al. 1977, Kock et al. 1972, Spitzenberger 1994, 1996, Steiner & Gaisler 1994). Since beginning of 80's, the knowledge on Turkish bats has become essentially contributed by a new generation of Turkish zoologists, particularly by Irfan Albayrak (Ankara). His papers survey primarily a number of new records he obtained even from the regions which bat fauna was practically unknown (Albayrak 1985, 1987, 1988, 1990, 1990a, 1991, 1991a, 1993, 1993a). The above mentioned list is to be supplemented with the records obtained during short term research trips by several other zoologists (Bülow 1997, Corbet & Morris 1967, Crucitti 1988, Helversen 1989, Kinzelbach 1986, Nadachovski et al. 1990, Osborn 1963, Strinati 1959, van Winden 1988) as well as with data dispersed in the papers dealing with bat parasites (Hůrka 1972, Kock 1974, 1989, Peterson et al. 1976, Peus 1976, 1978a, b, Theodor 1967).

Although the number of publications devoted to Turkish bats may seem large, in contrast to neighbouring countries, there is only one chiropteran taxon described from tooday Turkish territory, viz. *Eptesicus anatolicus* Felten, 1971. This is surprisingly few even in comparison with other mammalian orders (cf. Kumerloeve 1975), viz. Insectivora – 9 descriptions (of which 6 names are in use even nowdays), Rodentia – 54 (36), Carnivora – 7 (5), Artiodactyla – 10(4).

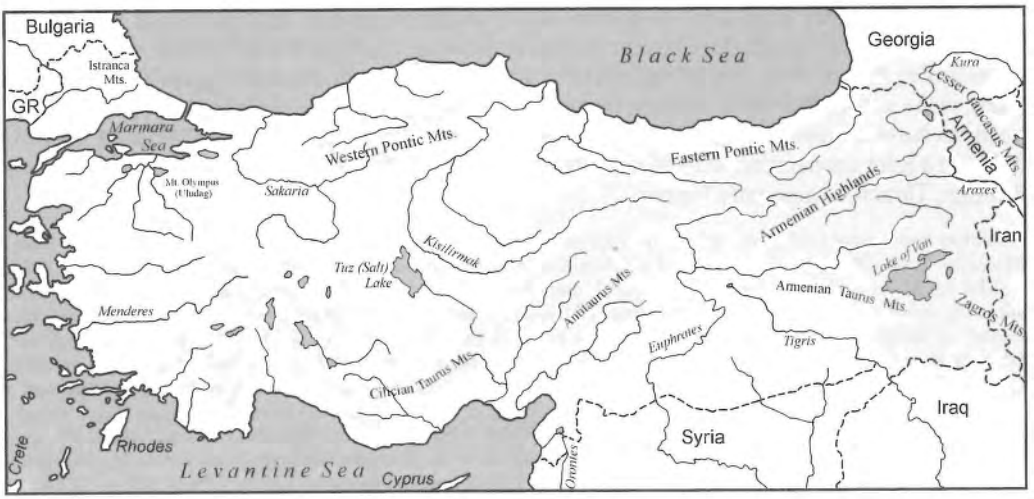

Fig. 1. A general map of Turkey, main features mentioned in text; dashed area denote territory up 1500 m a. s. l.

As evident of the above survey, the number of bat records obtained from the recent territory of Turkey grows large which calls for a complete survey of all the available records. The previous attemps in that direction are either outdated viz. Çaglar (1965, or 1968 and 1969), Kumerloeve (1975), or apparently incomplete – Dogramaci (1989) mentioned 13 bat species only. The summaries provided by Albayrak (1990, 1993) concern unfortunately his own records only. Moreover, it is to be taken in account that in addition to the records yet published, there is a large number of unpublished occasional records including the museum specimens collected by various visitors in frame of the trips focused to other than bat topics.

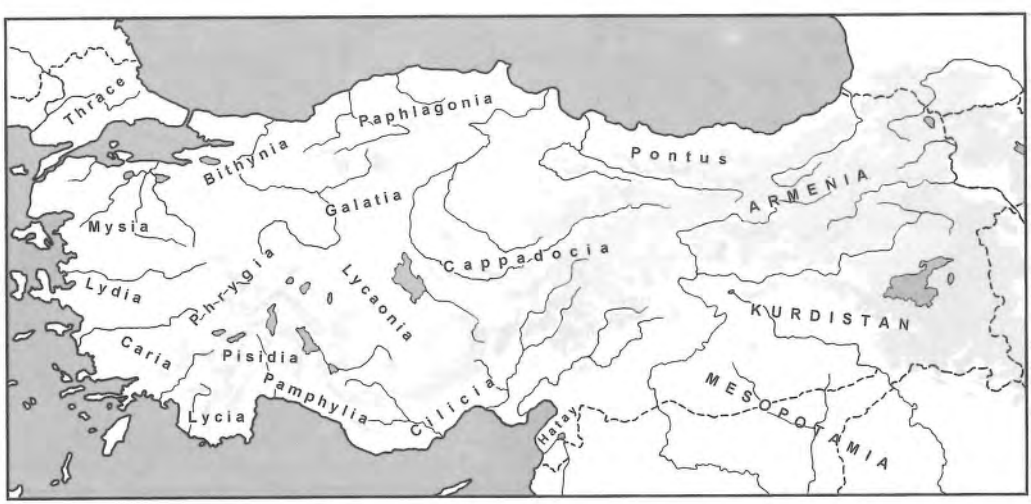

Fig. 2. A general map of Turkey, main historical regions as understood in this paper.

The present paper is intended to survey all the available records both published and unpublished including the records dispersed in various collections, kindly provided by their curators, and, in particular, the not yet surveyed records obtained during our own research trips in Turkey undertaken, in the years 1990–1998. Most of them were undertaken in frame of the project "Evolutionary relations between mammals of Central Europe and those of the Mediterranean" (GAČR 206/93/0531) in a joint cooperation with Slovene Natural History Museum Ljubljana and Department of Biology, Thracian University Edirne.

Localities were named with respect to allow an easy later confirmation according to a map atlas Türkei, Euro-Reiseatlas 1:800 000. Berlin-Gütersloh-München-Stuttgart: RV Reise- und Verkehrsverlag GmbH, 96 pp., 1991.

The list of records (arranged in alphabetical, and chronological order respectively) include for each item the following information: the name of the district (villáyet) (in spaced types), the name of the locality [in brackets number of the locality from the map; in *italics* those not indicated in a map], and/or description of record site, date, number of recorded animals with a sex indication (m – male, f – female, s. i. – sex indefined), age (j – juvenile, s [sa] – subadult, a [ad] – adult) and physiological condition (G – pregnancy, L – lactation), and, in some instances, a collection of museum material deposition (CUP = Department of Zoology, Charles University, Prague, Czech Republic, NMP = National Museum, Prague, Czech Republic, NMW = Natural History Museum, Vienna, Austria, PMSL = Slovene Natural History Museum, Ljubljana, Slovenia, SMF = Senckenberg Museum Frankfurt a. M., Germany, SNMB = Slovak National Museum, Bratislava, Slovakia, TUE = Thracian University Edirne, Turkey, ZIN = Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia).

The data adopted from literature and/or museum collections include a reference to an original author. For the technical reasons, some of the letters used in Turkish alphabet were printed without the specific accents, thus, in the following text, g is uses instead of ğ, as well as i instead ı.

For purpose of biogeographic comparisons in frame of the present paper, the territory of Turkey was subdivided into six main units (Fig. 3, Tab 1) delimited with respect to the phytocoenological subdivision of the Middle East by Zohary (1973): (1) Northern forests: Region of euxinian and sub-euxinian mesic deciduous and mixed forest (1a Thrace; 1b Western Pontus; 1c Eastern Pontus); (2) Mediterranean woodland: Region of Mediterranean woodland climax, incl. subalpine forests of *Cedretea libani* (2a Aegean coast, incl. Dardanelles, Lydia and Caria; 2b Western

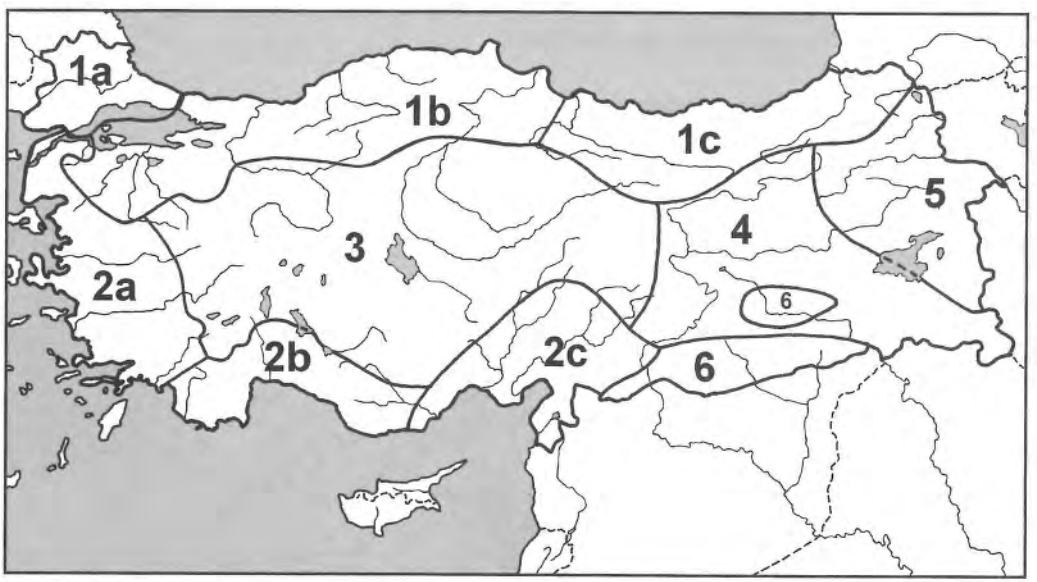

Fig. 3. Map of Turkey with subdivision into the major biogeographic regions, in sense of Zohary (1973), see text.

Levantine coast. incl. Lycia and Pamphylia; 2c Eastern Levantine coast, incl. Southern Antitaurus Mts., Cilicia and Hatay); (3) Central Anatolian steppes: Region of xero-euxinian steppe-forest, incl. Central Anatolian dwarf-shrub steppes; (4) Kurdistan: Region of Kurdo-Zagrosian xerophilous deciduous steppe forest; (5) Armenian Highlands: Region of mosaics of Anatolian *Artemisietea fragrantis armeniaca* and sub-euxinian oak forests; (6) Upper Mesopotamia: Region of Mesopotamian steppes incl. Mediterranean steppe-maquis.

LIST OF SPECIES

Rousettus aegyptiacus (Geoffroy, 1810)

RECORDS. **Original data**: I ç e l: Narlikuyu [1], 29 Oct. 1993: remains of 1 ind. in a pellet of cf. *Strix aluco*; – Silifke [2], Castle of Silifke, 30 July 1996: obs. 1 ind. (leg. Storchová). – H a t a y: Çevlik [3], 3 July 1998: right mandible in a fresh pellet of *Strix aluco* (leg. Obuch). – **Literary data**: A d a n a: Adana [4], Milli Mensucat Fabrikasi factory, 1 ind. (Albayrak 1993). – A n t a l y a: gardens near Alanya [5], 15 Aug. 1975: 1 ind. (Kinzelbach 1986); – Finike [6], Cliff cave, remains of 3 ind. in subfossil deposite (Corbet & Morris 1967). – H a t a y: Antakya [7], April 1955: 2 ind. ad., 4 ind. sa (Eisentraut 1959, Lehmann 1966); – Bedirge (= Serinyol) [8], 1964–65 (Kumerloeve 1975); – Harbiye [9], 12 Sept. 1971: 2m (Spitzenberger 1979); – Harbiye magarasi cave [9], colony ca 200 ind., coll. 32 ind. (Albayrak 1990); – Harbiye village [9], (Dermacta köyü) cave, 16 Febr. 1960: 2f (Kahmann & Çaglar 1960, Çaglar 1965, 1968); – Iskenderun [10], gardens in the town (Kumerloeve 1975); – Narlica magarasi cave [11] (Şadoglu 1953); – southern part of the dist., S of the Amanus Mts. (= Nur Daglari) (Kumerloeve 1975); – vicinity of Antakya [9], 1953: 59 ind. (mummies) (Lehmann 1966). – I ç e l: near Gülnar [12], 27 March 1986: 1 ind. (Kinzelbach 1986); – Tarsus [13], Say köyü village, Delikli magarasi cave, 2 ind. (Albayrak 1993); – Tasucu [14], 23 April 1992: "etwa ein Dutzend" (Bülow 1997).

DISTRIBUTIONAL STATUS (Fig. 4). In the territory of Turkey, *R. aegyptiacus* reaches the northern margins of its World distribution range. The records come from the South-Anatolian coast and from Hatay. The Turkish population (similarly like that in Cyprus) is to be looked upon as quite isolated as the distribution range is, based on the present knowledge, apparently discontinuous over the East-Mediterranean region. Namely, this species has not been reported either from the Syrian part of Orontes valley neighbouring the Turkish range, and, surprisingly, from Syria at all (Harrison &

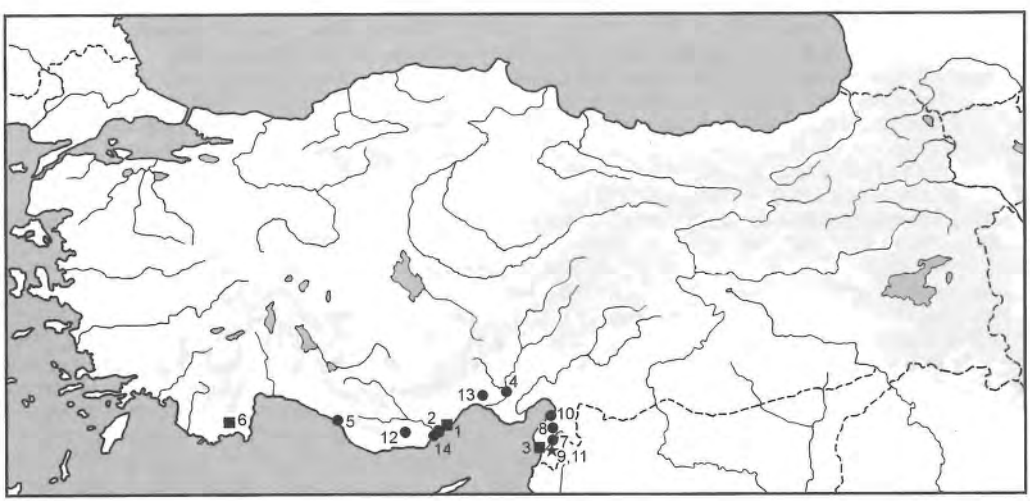

Fig. 4. Records of *Rousettus aegyptiacus* in Turkey. Squares denote the osteological findings, asterisks the records of nursery colonies and circles the all other records.

Bates 1991). This fact is especially noteworthy because this species is known common in Jordan and Israel, where (e. g. in the Jordan River valley) it was even considered a serious agricultural pest. The discontinuity of distributional data in the Levant may results of a lack of field data, of course, and of generally poor knowledge on bat fauna of Syria (cf. Benda 1996). Nevertheless, against expectancy this species was not recorded even during our recent expeditions in Syria. The biogeographic interpretation of the population of *Rousettus aegyptiacus* from the Northern Levant remains, hence, an open question.

TAXONOMIC STATUS. Eisentraut (1959) who analyzed the material from all sides of the distribution range (including specimens from Turkey) arranged the Turkish sample under the nominotypic subspecies *R. aegyptiacus aegyptiacus* (Geoffroy, 1810) (terra typica: Giza, Egypt). In general, the western part of the species range, north of Sahara, is colonized by two forms which may be looked upon as separate subspecies (Harrison & Bates 1991, Hayman & Hill 1971, Nader 1975), viz. *R. a. aegyptiacus* (Turkey, the Levant, Cyprus, and Egypt to the Middle Arabia) and *R. a. arabicus* Anderson et de Winton, 1902 (t. t.: Aden, Yemen) (Southern Arabia to Pakistan).

Rhinolophus ferrumequinum (Schreber, 1774)

RECORDS. **Original data**: B u r d u r: Bucak [1], Susuz Han, small cave near ruins, 25 March 1992: 1f (leg. Zukal). – E r z u r u m: Köprübaşi [2], a small cave below a castle, 9 Sept. 1995: obs. 1 ind. – H a t a y: Çevlik [3], ancient tombs, 20 May 1995: net. 1m, 9fa, NMP (spec. Nos 47928–47932, 48089–48093; cf. Benda 1996), 29 Sept. 1995: 2f (leg. Mlíkovský), 1 July 1997: 2 mummies. – I ç e l: Bozagaç, Yalan Dünya magarasi cave [4], 30 Oct. 1993: net. 4m, CUP. – K i r k l a r e l i: Igneada [5], Longoz, Bezergan magarasi cave, 9 May 1992: obs. 4 ind. (leg. Reiter, Andreas & Sádlová), 22 June 1994: net. 1m, 4f, CUP; – Sarpdere, Dupnisa magarasi cave [6], 16 Oct. 1993: net. 1f, CUP; Summer 1995, PMSL (leg. Kryštufek); – Sarpdere, Kiz magarasi cave [7], 17 Oct. 1993: obs. 1 ind. – K o c a e l i: Hereke [8], cave, 25 June 1969: nurs. colony, coll. 2m, 3f, SNMB (leg. Matoušek; cf. Benda 1996). – K o n y a: Tinaztepe magarasi caves [9], 8 May 1997: coll. 2ms (leg. Wolf). – M u g l a: Kaya (n. Fethiye) [10], 22 April 1992: coll. 1m, CUP (leg. Hanák). – S a k a r y a: Hanyatak [11], a small cave, 27 June 1994: net. 1 ind., CUP. – S a m s u n: Kürtler [12], solitary house on the coast, 23 Oct. 1993: coll. 1f, CUP. – T u n c e l i: blind train tunnel in the Euphratus river valley n. Derebük village [13], 27 Oct. 1993: coll. 1m, CUP, 14 Sept. 1995: net. 1m, 10f, 1 s.i., CUP. – Z o n g u l d a k: Çayir [14], Çayirköy magarasi cave, 20 Oct. 1993: obs. 1 ind.; – Safranbolu [15], Mencilar (= Mencilis) magarasi cave, 2 Nov. 1994: 55 ind. (semitorpid); – Yenice [16], a large cave n. railway, 1 July 1994: obs. a colony 80 ind., 2 July 1994: net. 1f, CUP. – **Literary data**: A d a n a: Haruniye [17], 6 ind. (Lehmann 1966); – Karaisali [18], Kapikaya köyü village, Eski cami mosque, 3 ind. (Albayrak 1993). – A d i y a m a n: Karadut [19], cave, 7 June 1992: 7 ind. (from owl's pellets) (Obuch 1994); – Kuyucak bucagi [20], 1 ind. (Albayrak 1990); – Pinaryayla köyü village [21], 2 ind. (Albayrak 1990); – Zey köyü village [22], 15 ind. (Albayrak 1990). – A f y o n: Bolvadin [23], Dişli, Kişlak mevkii, 1 ind. (Albayrak 1993); – Çaykişla köyü village [24], cave, 4 March 1963: 2m (Çaglar 1965, 1968). – A n k a r a: Gerdu (n. Emir Gölü) [25], 19 August 1953: 1m (DeBlase & Martin 1973). – A n t a l y a: Beşkonak [26], 30 June 1986: 1faL (Helversen 1989b); – Çatallar [27], cave, sum. 1965: 3 ind. (Corbet & Morris 1967); – Finike [28], Cliff cave, sum. 1965: skeleton of 1 ind. (Corbet & Morris 1967); – Kaş [29], Limanagzi, Hidirellez magarasi cave, 4 ind. (Albayrak 1993); – Perge [30], 9 Oct. 1984: 7 ind. (Helversen 1989b); – Yalniz [31], rock shelter, summer 1965: 1 ind. (Corbet & Morris 1967). – B a l i k e s i r: Erdek [32], cave, 7 Oct. 1967: 1 mummy (Steiner & Gaisler 1994); – Havran [33], 17 March 1969: 1m (Felten et al. 1977); Havran, cave, 11 April 1965: 7m (Çaglar 1965, 1968); Havran Inönü köyü magarasi cave, 1 ind. (Albayrak 1993); – Iliça Çiftl. [34], 24 Sept. 1960: 1m, 1f (Felten et al. 1977). – B o l u: 10 km N of Bolu [35], 16 Sept. 1965: 1m, 1f (Felten et al. 1977); – Düzce [36], Aydinpinar köyü village, 1 ind. (Albayrak 1993); – Sarikaya (n. Gerede) [37], cave, 23 Febr. 1964: 16m, 6f (Çaglar 1965, 1968); – Seben [38], Celtikliderе köyü, Kilinçdere mevkii, 1 ind (Albayrak 1993). – B u r s a: Inkaya [39], Kuşini cave, 18 March 1969: 1m, 5f (Kock 1974, Felten et al. 1977). – Ç a n a k k a l e: 4 km S of Yalova [40], 30 May 1967 (Hůrka 1972, Peus 1978a), 7 May 1968 (Peus 1978a); – Eceabat [41], Kilitbahir Tabyalari, 3 ind. (Albayarak 1993). – Ç a n k i r i: Eskipazar [42], 24 Sept. 1965: 2m, 1f (Kock 1974, Peus 1976, Felten et al. 1977); – Yukari Kayayanlari köyü village [43], 4 ind. (Albayrak 1993). – D e n i z l i: Çukur köyü [44], Çamlik mezari, 1 ind. (Albayrak 1993). – D i y a r b a k i r: Ergani [45], Sesverenpinar köyü village, Han magarasi caves, 1 ind. (Albayrak 1990); – Surlar [46], Kardeşler Burcu, 8 ind. (Albayrak 1990). – E d i r n e: Greek-Turkish border, August 1971 (Kumerloeve 1975). – E l a z i g: Harput [47], Anguzunoba mevkii, Sarikayaliklar, 3 ind. (Albayrak 1990). – E r z i n c a n: Çaglayan [48], Girlevik köyü village, 4 ind. (Al-

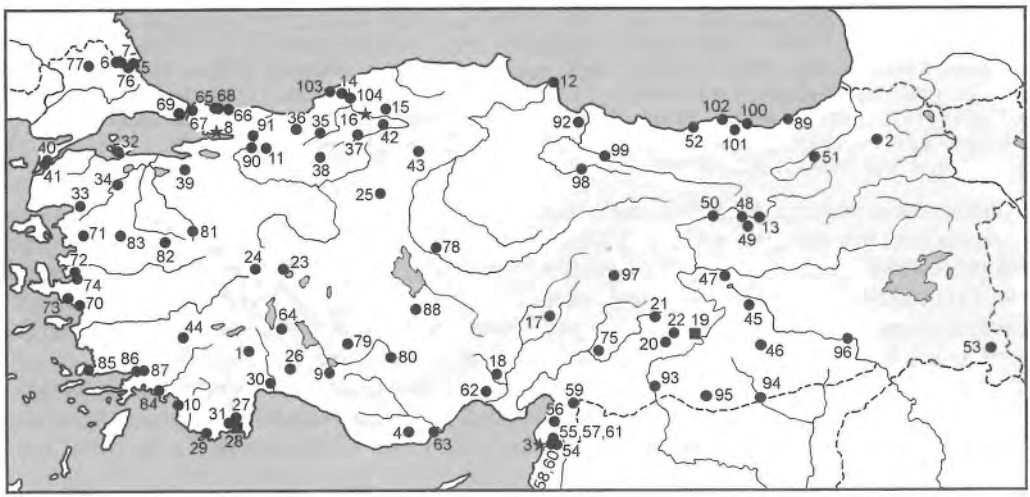

Fig. 5. Records of *Rhinolophus ferrumequinum* in Turkey. For symbol explanations see Fig. 4.

bayrak 1990); – Kalecik köyü village [49], 2 ind. (Albayrak 1990); – Castle of Kemah [50], 3 ind. (Albayrak 1990). – E r z u r u m: Çamlimagara cave [51], 10 Sept. 1967: 1m (Steiner & Gaisler 1994). – G i r e s u n: Espiye [52], cave, 2 August 1983: 2m (Helversen 1989b). – H a k k â r i: Dezköy [53], 5 ind. (Albayrak 1990). – H a t a y: Altinözü [54], Kozkalesi köyü village, 13 ind. (Albayrak 1990); – Antakya [55] (Theodor 1967); – Belen [56], Şenbük, Castle of Bakras, 2 ind. (Albayrak 1990); – Habibinecar dagi (n. Antakya) [57], aquaeductus, 18–22 Febr. 1960: 28m, 3f (Kahmann & Çaglar 1960, Çaglar 1965, 1968, Kock 1974); – Harbiye magarasi cave [58], 1 ind. (Albayrak 1990); – Harbiye [58], 3 ind. (Felten et al. 1977); – Hassa [59], Akbez bucagi, 4 ind. (Albayrak 1990); – Narlica magarasi cave [60] (Şadoglu 1953); – Senpiyer [61], vicinity of Kilisesi, 1 ind. (Albayrak 1990). – I ç e l: Tarsus [62], Yanikkisla Köy village, 19 March 1953: 1 ind. (Lehmann 1966) = Yenikisla köyü village (Çaglar 1968); – Taşucu (n. Silifke) [63], cave, 11 Febr. 1961: 1m (Çaglar 1965, 1968). – I s p a r t a: Anamas [64], 18 Febr. 1969: 1m, 1f (Felten et al. 1977). – I s t a n b u l: 10 km W of Şile [65], Satzmal magarasi cave, 29 April 1955: 1m, 1f (Strinati 1959); – Hacilli (W of Agva) [66], Yassikaya caves, 30 April 1955: 6m, 3f (Strinati 1959); – Sakli köyü village (n. Beykoz) [67], cave, 30 May 1959: 1f (Çaglar 1965, 1968); – Şile [68], cave, 19 March 1964: 8m, 8f (Çaglar 1965, 1968); – Tower of Fort Rummel Hisar [69], 1 Sept. 1953: 1f (DeBlase & Martin 1973); – vicinity of Istanbul (Kumerloeve 1975). – I z m i r: Ahmetbeyli [70], 15 April 1966: 1 ind. (Kock 1974), 16 Febr. 1969: 1m (Felten et al. 1977); – Bergama [71], 2 April 1969: 1f (Felten et al. 1977), 8 June 1977: 4 ind. (Kock 1989); Bergama, Akropolis, ruins, 17 Sept. 1960: 3m, 9f (Çaglar 1965, 1968); – Bornova [72], 20 Febr. 1969: 1m (Felten et al. 1977); – Gümüldür [73], 15 April 1969: 1f (Felten et al. 1977), Incirli pit, 2 ind. (Albayrak 1993); – Smirne (= Izmir) [74], 1870: "numerosi esemplari" (Doria 1887). – K a h r a m a n M a r a ş: Sarikaya köyü village [75], 13 ind. (Albayrak 1990). – K i r k l a r e l i: Demirköy, Saridere (= Sarpdere) köyü village, Kiz magarasi cave [7], 1 ind. (Albayrak 1993); – Demirköy, Sivriler köyü village [76], Arnavutdere, 1 ind. (Albayrak 1993); – Kayali deresi [77], 28 ind. (Albayrak 1993). – K i r ş e h i r: D. Inlimurat magaralari caves [78], 1 ind. (Albayrak 1993). – K o n y a: Güneydere (Botsa) köyü ini [79], 2 ind. (Albayrak 1993); – Kara Dag Mts. [80] (Osborn 1963). – K ü t a h y a: Sabuncupinar [81], Yenice çiftligi, 1 ind. (Albayrak 1993). – M a n i s a: Demirci [82], Çataoluk köyü village, Delikyar magarasi cave, 10 ind. (Albayrak 1993); – Yüksek Çobanisa [83], 15 March 1969: 2m, 1f (Felten et al. 1977). – M u ğ l a: Dalyan [84], Kaunos harabeleri ruins, 1 ind. (Albayrak 1993, Baran et al. 1994); – Farilya köyü village (n. Bodrum) [85], cave, 27 April 1964: 2m (Çaglar 1965, 1968); – Gökova Körfezi [86], castle of Akyaka köyü village, 1 ind. (Albayrak 1993); – Kaya köyü village [10], 26 March 1969: 1m (Felten et al. 1977); – Kerme körfezi [87], Akyaka köyü village, 14 ind. (Albayrak 1993). – N i ğ d e: (= Aksaray) Sultanhani [88], 28 August 1975: 1ma, 1ms, 9fa, 2fs (Nader & Kock 1983). – R i z e: Rize [89], mosque, 16 June 1960: 1m (Çaglar 1965, 1968). – S a k a r y a: Geyve [90], Ark köyü village, Vaysallar mahallesi, 3 ind. (Albayrak 1993); – Karaçam köyü village [91], ruins of building, 31 March 1963: 2m, 1f (Çaglar 1965, 1968). – S a m s u n: Asragaç köyü village [92], Kelkaya mahallesi, 3 ind. (Albayrak 1990). – Ş a n l i U r f a: Castle of Birecik [93], 7 ind.

(Albayrak 1990); – Ceylanpinar [94], 18 May 1968: 1f (Lehmann 1969); – Harran [95], Şuayipşar köyü village, 2 ind. (Albayrak 1990). – S i i r t: Gökçebag köyü village [96], 3 ind. (Albayrak 1990). – S i v a s: Gürün [97], Şugul mahallesi, 1 ind. (Albayrak 1990). – T o k a t: Geraz mahallesi [98], 1 ind. (Albayrak 1990); – Niksar [99], castle, 25 Febr. 1960: 1m, 2f (Çaglar 1965, 1968). – T r a b z o n: Trabzon (no exact loc.) [100] (Çaglar 1965, 1968); – Scalita [101] (Osborn 1963); – Vakfikebir [102], cave, 21 April 1969: 1m (Steiner & Gaisler 1994). – Z o n g u l d a k: Filyos [103], cave, 13 Sept. 1964: 1m, 1f (Çaglar 1965, 1968); – Saz köyü village [104], ruins of a building, 9 Sept. 1964: 3f (Çaglar 1965, 1968).

DISTRIBUTIONAL STATUS (Fig. 5). This species occurs in all regions of Turkey and belongs here among the most common bat species (Tab. 1). Similarly as in the northern part of its distribution range (Horáček 1984) even in Turkey this species tend to occupy synanthropic habitats (cf. the record No. 12) in addition to caves which yielded a great majority of its records. Hibernating colonies in caves are formed at least from the beginning of November to the end of March. As in other species, continuous data on course of hibernation in Turkey still absent, of course.

TAXONOMIC STATUS. Turkish population of this species was first taxonomically evaluated by Kumerloeve (1975) who expected a nominotypic subspecies *R. ferrumequinum ferrumequinum* (Schreber, 1774) (terra typica: France) in Thrace while for the Eastern Anatolia he expected the form *R. f. irani* Cheesman, 1921 (t. t.: Shiraz, Iran). This decision followed a concept proposed by Aellen (1959) but, unfortunatelly, no one of these authors keyed the forms by metrical and/or morpholo-gical characters except for an index LCd/LAt. Felten et al. (1977) suggested that whole the territory of Turkey (including the Eastern Anatolia) as well as the Levant is colonized by a nominotypic form while this does not concern of Afghanistan and Iran that, according to the Aellen's (1959) character, belong to *R. f. irani*. Felten et al. (1977) pointed out also a specific situation with the samples from (FYR) Macedonia, the Northern Greece and Sicily for which they proposed the name *R. f. martinoi* Petrov, 1941 (t. t.: Trifunovićevo, Macedonia) and discussed a possible synonymy of *R. f. irani* and *R. f. proximus* Andersen, 1905 (t. t.: Gilgit, Kashmir). The latter question has also been discussed by Strelkov et al. (1978) who show that the characters discriminating both the forms as suggested by previous authors largely are not valid for the Turkmen specimens which moreover are generally smaller than those from Iran and Afghanistan. DeBlase (1980) reports *R. f. irani* also from the Eastern Turkey and Nader & Kock (1983) from Iraq including the higher altitudes of that country. Koopman (1994) considers the form *R. f. irani* a younger synonym of *R. f. proximus* which range he states as "Southwestern Asia east to Kashmir".

Variation in the Southeastern Europe was investigated in details by Kryštufek (1993) who described here a cline trend in metrical characters for which he doubts separate status of *R. f. martinoi* that is thus considered to be synonymous with the nominotypic subspecies. The cline variation in size within whole the Western Palearctic range has also been demonstrated by DePaz (1995) who discusses it from the ecological point of view without suggesting any taxonomical inferrences. Analyzing the sample from the Northeastern Turkey with aid of the Aellen's index, Steiner & Gaisler (1994) found it to belong to *R. f. ferrumequinum*. The same conclusions can be preliminary drawn also based on our own material most of which come just from the Northeastern Turkey (LCd/LAt 0.63–0.84, $\bar{x}$=0.703, n=12).

In conclusions, the data mentioned above indicate that there may be a slight cline increase in size from the west to the east over territory of Turkey but to which degree it is combined with shifts in other characters and/or with variation of a categorial type, it remains a task of further study.

Rhinolophus hipposideros (Bechstein, 1800)

RECORDS. **Original data**: B u r d u r: Taşkapi [1], Insuyu magarasi cave, 24 March 1992: net. 2m, 1f (leg. Zukal). – Ç a n a k k a l e: Gökçeada Island [2], 1994: 4 ind., TUE (leg. Özkan). – E r z u r u m: 10 km SW of Aydogu [3], canyon, 9 Sept. 1995: det. min. 1 ind. – H a t a y: Çevlik [4], ancient tombs, 1 July 1997: obs. 1 ind. sa; – Konacik

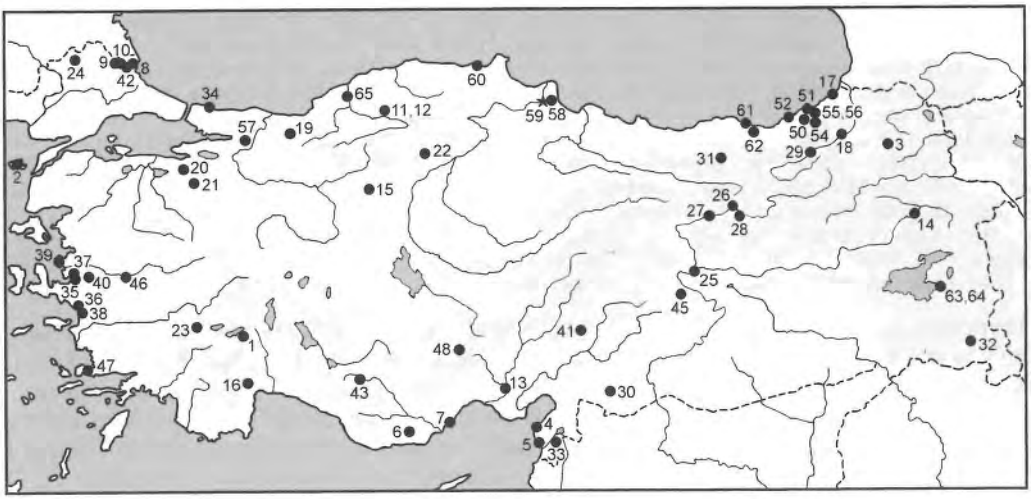

Fig. 6. Records of *Rhinolophus hipposideros* in Turkey. For symbol explanations see Fig. 4.

[5], 24 Oct. 1991: net. 1m, NMP (spec. No. 51476, leg. Červený). – I ç e l: Bozagaç [6], Yalan Dünya magarasi cave, 30 Oct. 1993: net. 2m, 2f, CUP; – Narlikuyu [7], small cave 29 Oct. 1993: net. 1f, CUP. – K ı r k l a r e l i: Igneada, Longoz, Mermer magarasi cave [8], 9 May 1992: obs. 1 ind. (leg. Reiter, Andreas & Sádlová); – Sarpdere, Dupnisa magarasi cave [9], 16 Oct. 1993: obs. 1 ind.; – Sarpdere, Kiz magarasi cave [10], 17 Oct. 1993: obs. 1 ind., 22 June 1994: obs. 2 ind. – Z o n g u l d a k: Safranbolu, a small house n. Mencilar (= Mencilis) magarasi cave [11], 4 July 1994: coll. 1m, CUP; – Safranbolu, Mencilar (= Mencilis) magarasi cave [12], 2 Nov. 1994: obs. 4 ind. (semitorpid). – **Literary data**: A d a n a: "Adana-Gebiet" [13], 1 ind. sa (mummy) (Lehmann 1966). – A g r ı: Hamur [14], 1 ind. (Albayrak 1990). – A n k a r a: Yenikent [15], 3 ind. (Albayrak 1993). – A n t a l y a: abandoned building n. Termessos [16], 30 Sept. 1984: 1 ind. (Helversen 1989b). – A r t v i n: Hopa [17], Sarp köyü camii mosque, 1 ind. (Albayrak 1990); – Yusufeli [18], Kiliçkaya bucagi, 26 ind. (Albayrak 1990). – B o l u: Düzce [19], Aydinpinar köyü village, 1 ind. (Albayrak 1993). – B u r s a: Bursa [20], building, 19 June 1961: 1f (Çaglar 1965, 1968); – Uludag [21], Karazliyayla, ruins of building, 12 Sept. 1960: 1f (Çaglar 1961a, 1965, 1968). – Ç a n a k k a l e: Gökceada [2], monastery n. Baraj, 20 ind. (Albayrak 1993). – Ç a n k ı r ı: Çankiri (no exact loc.) [22] (Çaglar 1965, 1968). – D e n i z l i: Dereköy [23], 23 Febr. 1969: 1m (Felten et al. 1977). – E d i r n e: Lalapaşa [24], Sinanköyü magaralari caves, 1 ind. (Albayrak 1993). – E l a z i g: Keban [25], Nimri magaralari caves, 3 ind. (Albayrak 1990). – E r z i n c a n: Erzincan [26], building of Pest Control Research Institute, 3 ind. (Albayrak 1990); – Kemah [27], Dizdar Çay creek mill, 3 ind. (Albayrak 1990); – Terzibaba cemetery [28], tanner factory, 8 ind. (Albayrak 1990). – E r z u r u m: Çoruh Nehri (W of Ispir) [29], 3 August 1987: 1 ind. (Helversen 1989b). – G a z i a n t e p: Mezarlik magaralari caves [30], 1 ind. (Albayrak 1990). – G ü m ü ş h a n e: Baglarbaşi mahallesi [31], 1 ind. (Albayrak 1990). – H a k k â r i: Nestoranian church [32], 16 km ENE Hakkâri, 16 Aug. 1973: 4f (Spitzenberger 1979). – H a t a y: Altinözü [33], Kozkalesi köyü village, 4 ind. (Albayrak 1990). – I s t a n b u l: 10 km W of Sile [34], Satzmal magarasi cave, 29 April 1955: 4f (Strinati 1959). – I z m i r: Smirne (= Izmir) [35], 1870: 1 ind. (Doria 1887), Izmir (no exact loc.) (Çaglar 1965, 1968); – Ahmetbeyli [36], 16 Febr. 1969: 1m (Felten et al. 1977); – Bornova [37], 20 Febr. 1969 and 6 April 1969: 4m (Felten et al. 1977); – Ephesus (= Efes) [38], 12 Aug. 1976: 1m, 1f (Spitzenberger 1979); – Foça [39], 26 April 1985: 1f (Helversen 1989b); – Kemalpaşa [40], cave, 10 Jan. 1960: 1m, 22 May 1961: 1f (Çaglar 1961a, 1965, 1968). – K a h r a m a n M a r a ş: Döngel magaralari caves [41], 1 ind. (Albayrak 1990). – K ı r k l a r e l i: Demirköy, Saridere (= Sarpdere) köyü village, Kiz magarasi cave [10], 9 ind. (Albayrak 1993); – Şeytanderesi [42], Kazankaya, 1 ind. (Albayrak 1993). – K o n y a: Göksu Nehri (E of Hadim) [43], 24–27 June 1986: 3 ind. (Helversen 1989b); – Icme Pinari cave (SE of Arak) [*44*], 1 March 1969: 1m (Felten et al. 1977). – M a l a t y a: Eski Malatya [45], Kervansaray, 1 ind. (Albayrak 1990). – M a n i s a: Salihli yolu [46], 1 ind. (Albayrak 1993). – M u ğ l a: Bodrum [47], Farliya köyü village, cave, 27 April 1964: 1m (Çaglar 1965, 1968). – N i ğ d e: Madenköy [48], 1 Aug. 1970: 1m (Spitzenberger 1979); – R i z e: Lamgo köyü village [*49*], mosque, 18 June 1960: 3f (Çaglar 1961a, 1965, 1968), 8 ind. (Albayrak

1990); – Ortaköy (Hemişin) bucagi [50], Akyamaç köyü village, 26 ind. (Albayrak 1990); – Pazar [51], Sivrikale köyü village, 8 ind. (Albayrak 1990); – Rize [52], tank, 14 June 1960: 7m, 28f (Çaglar 1961a, 1965, 1968); – Sarnic [*53*], 6 ind. (Felten et al. 1977); – Şenyuva (n. Çamlihemsin) [54], house, 24 August 1967: 3f, 8 Sept. 1968: 1m (Steiner & Gaisler 1994); – Sivrikale köyü village [51], mosque, 15 June 1960: 4f (Çaglar 1961a, 1965, 1968); – Soga (n. Pazar) [55], house, 6 Sept. 1968: 3m, 3f (Steiner & Gaisler 1994); – Tezine (n. Pazar) [56], house, 5 Sept. 1968: 1f (Steiner & Gaisler 1994). – S a k a r y a: Sapanca [57], Istanbuldere (Erdemli) köyü village, 11 ind. (Albayrak 1993). – S a m s u n: Düvecik köyü village [58], 3 ind. (Albayrak 1990); – Tozköy (20 km S of Bafra) [59], 30–31 July 1983: obs. 2 nursery colonies (Helversen 1989b). – S i n o p: Ayancik [60], Inalti köyü village, Dörthavuz Camii mosque, 25 ind. (Albayrak 1993). – T r a b z o n: Trabzon (no exact loc.) [61] (Çaglar 1965, 1968); – Kutlugün köyü village [62], 9 ind. (Albayrak 1990). – V a n: Van (no exact loc.) [63] (Andersen 1905, Çaglar 1965, 1968); – Castle of Van [64], 10 ind. (Albayrak 1990). – Z o n g u l d a k: Çaycuma [65], Sazköyü, 11 ind. (Albayrak 1993); – Saz köyü village [65], ruins of building, 9 Sept. 1964: 2f (Çaglar 1965, 1968).

DISTRIBUTIONAL STATUS (Fig. 6). This species belongs among those which records in Turkey are quite a frequent. Although found in all biogeographic regions (except for the Upper Mesopotamia), it seems rare in the Central Anatolian platteau (Tab. 1).

TAXONOMIC STATUS. Aellen (1959) suggests that the region of the Eastern Caucasus Mts. and the Northwestern Iran (and hence also the Eastern Turkey) is colonized by the nominotypic subspecies inhabiting also most of the European range, i. e. *R. hipposideros hipposideros* (Bechstein, 1800) (terra typica: France), while the Eastern part of the range, Turkmenistan and Afghanistan is colonized with a different form, *R. h. midas* Anderesen, 1905 (t. t.: Jask, Persian Gulf). Lehmann (1966), without quoting details, reports from Adana (Southern Turkey) *R. h. minimus* Heuglin, 1861 (t. t.: Keren, Eritrea). Saint-Girons & Caubere (1966) demonstrated a cline increase in size over Europe, from the west to the east onwards, while the populations from the Southeastern Europe and the Mediterranean they consider a separate subspecies, *R. h. minimus*. Correspondingly, Hayman & Hill (1971) consider that the Mediterranean populations (and populations of the Eastern Africa from Ethiopia to Egypt) differ from those of the continental Europe, and except for Morocco inhabited by a subspecies *R. h. escalare* Andersen, 1918 (t. t.: Mogador, Morocco), they arranged them all under the form *R. h. minimus*. The topic was reanalyzed in details by Felten et al. (1977) who subdivided the Mediterranean material in four groups based on morphology of infraorbital region, position of minute preamolars and size. The geographic ranges of these groups coidentified with the above mentioned subspecies were as follows: *R. h. hipposideros* continental Europe from Portugal to Greece and Israel, *R. h. minimus* Ethiopia (= Eritrea, i. e. terra typica) and Crete, *R. h. midas* the Northeastern Anatolia, Afghanistan, *R. h. escalare* the Northwestern Africa, Malta, Sicily, Pantelleria and the Western Anatolia (in the last area perhaps an undescribed form, eventually). Though such a result may look obscure from the zoogeographic point of view, it undoubtedly demonstrates that just in Turkey the situation with the species in question is indeed a very complicated.

Corbet (1978) simplifies the view by accepting two subspecies only, viz. *R. h. midas* (from Iraq to Kashmir) and *R. h. hipposideros* (remaing part of the Palearctic range, including Turkey). DeBlase (1980) synonymizing his *R. h. billanyani* DeBlase, 1975 (t. t.: Fars, Iran) with *R. h. midas*, extends the range of *R. h. midas* to the Eastern Turkey although he tentatively considers there also *R. h. hipposideros*. Qumsiyeh (1985) reports for Sinai *R. h. minimus* similarly as do Harrison & Bates (1991) for whole the Western Arabia (except for Syria), and in contrast to Iraq for which they report *R. h. midas*. Koopman (1994) recognizes 7 subspecies, judging of his brief characteristics of ranges, he may expected *R. h. minimus* for Turkey. Steiner & Gaisler (1994) identified (based on criteria by Felten et al. 1977) their sample from the province of Rize as *R. h. midas* and tentatively excluded all remaining three subspecies mentioned by Felten et al. (1977), including *R. h. hipposideros*.

Already the above mentioned survey illustrates well how complicated the systematics of *Rhinolophus hipposideros* in Turkey actually may be. In cannot be excluded that just here we meet at

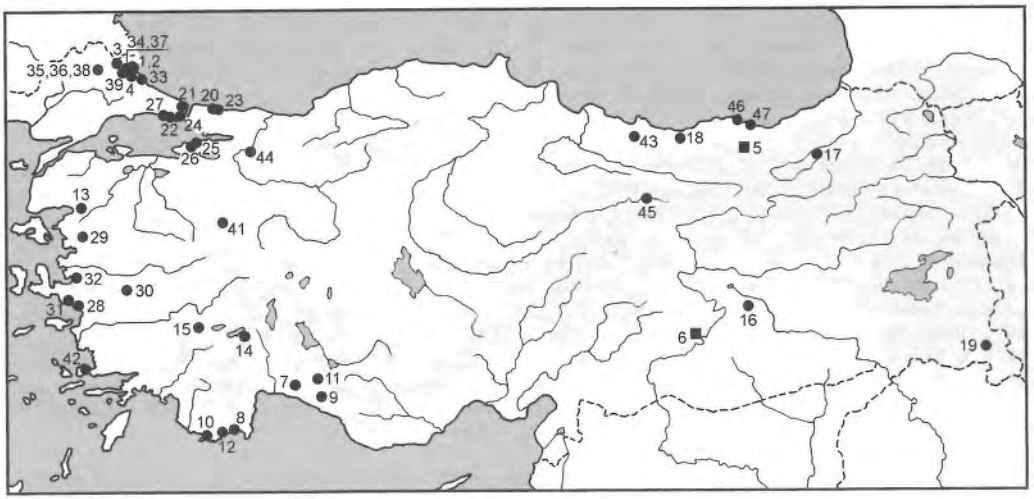

Fig. 7. Records of *Rhinolophus euryale* in Turkey. For symbol explanations see Fig. 4.

least one or two zones of step-like shifts in phenotypic variation, i. e. the boundaries delimiting taxonomically separated populations that can be recognized as subspecies, eventually. In these connections, the results of karyological studies are particularly worth of mentioning (Zima et al. 1992, Horáček & Zima 1996). While 2n=56 karyotype was found in Europe, the Caucasus Mts. and in the Balkans (Greece and Bulgaria), in Jordan (Qumsiyeh et al. 1986), Asia Minor (the records Nos 7 and 11, cf. Horáček & Zima 1996), in the Central Iran and Syria (own unpublished results) 2n=58, and in Kirghizia 2n=62 (Zima et al. 1991; the Kirghiz form probably represents a separate species, cf. Horáček & Zima 1996). The taxonomic meaning of these differences as well as their correspondence with variation pattern in other characters are just one of the topics that are to be carefuly reexamined to achieve a real comprehension to systematics of *R. hipposideros* in Turkey.

Rhinolophus euryale Blasius, 1853

Records. **Original data**: K i r k l a r e l i: Igneada, Longoz, Bezergan magarasi cave [1], 22 June 1994: net. 3m, 2f, CUP; – Igneada, Longoz, Mermer magarasi cave [2], 9 May 1992: obs. several hundred ind. (leg. Reiter, Andreas & Sádlová); – Sarpdere, Dupnisa magarasi cave [3], 16 Oct. 1993: net. 1m, CUP; – small cave in a quarry n. Safe suyu spring (3 km NW Sergen) [4], 1 Sept. 1996: net. 3ms, 1ma, 1fs, coll. 1ms, 1fs, NMP (spec. Nos 47951, 47953). – T r a b z o n: Maçka [5], a cave 6 km SW, 26 Oct. 1993: traces of a colony, 1 part. skeleton, CUP. – **Literary data**: A d i y a m a n: Karadut [6], cave, 7 June 1992: 2 ind. (from owl's pellets) (Obuch 1994). – A n t a l y a: Aspendos [7], vault of amphitheatre, 7 Oct. 1984: 1 ind. (Helversen 1989b); – W of Finike [8], 2 ind. (DeBlase 1972), Finike, Cliff cave, sum. 1965: 5 ind. (Corbet & Morris 1967); – Incekum [9], 22 May 1966: 1f (Felten et al. 1977); – Kaş [10], Limanagzi, Hidirellez magarasi cave, 1 ind. (Albayrak 1993); – Manavgat [11], ancient aquaeduct, 30 June 1986: 1f (Helversen 1989b); – Myra [12], tombs, 4 Oct. 1984: 1 ind. (Helversen 1989b). – B a l i k e s i r: Havran [13], Inönü köyü magarasi cave, 2 ind. (Albayrak 1993). – B u r d u r: Insuyu magarasi cave [14], 4 ind. (Albayrak 1993). – D e n i z l i: Dereköy (n. Kaklik) [15], 23 Febr. 1969: 1f (Felten et al. 1977). – D i y a r b a k i r: Çayirderc (n. Ergani) [16], 24 Oct. 1968: 2f (DeBlase & Martin 1973). – E r z u r u m: Çamlimagara [17], cave, 10 Sept. 1967: 1 mummy (Steiner & Gaisler 1994). – G i r e s u n: Kayadibi mahallesi [18], Dagdibi magarasi cave, 2 ind. (Albayrak 1990). – H a k k â r i: Dezköy [19], 10 ind. (Albayrak 1990). – I s t a n b u l: 10 km W of Sile [20], Satzmal magarasi cave, 29 April 1955: 8 ind. (Strinati 1959); – Belgrat Orman [21], 23 May and 25 June 1968 (Hůrka 1972); – Küçükçekmece [22], Halkali, cave, 15 May 1971: 3m, 1f (DeBlase

& Martin 1973, Peterson et al. 1976); – Sile [23], cave, 10 Sept. 1963: 6m, 5f, 12 July 1965: 9mj, 2fa, 4faL, 5fj (Çaglar 1965, 1968); – Istanbul [24], 1 ind. (DeBlase 1972); – Yalova [25], Sogucak köyü magaralari caves, 1 ind. (Albayrak 1993); – Yalova Termal [26], 1 ind. (Albayrak 1993); – Yarimburgaz [27], cave, 19 May 1960: 1f (Çaglar 1965, 1968). – I z m i r: Ahmetbeyli [28], 15 April 1969: 1f (Felten et al. 1977); – Bergama [29], 2 April 1969: 1m, 2f (Kock 1974, Felten et al. 1977), 8 June 1977: 8 ind. (Kock 1989), Bergama, Akropolis, ruins, 17 Sept. 1960: 1m (Çaglar 1965, 1968); – Birgi (n. Ödemis) [30], March 1960: 1 ind. (Osborn 1963); – Gümüldür [31], 15 April 1969: 1m (Felten et al. 1977), Incirli pit, 5 ind. (Albayrak 1993); – Smirne (= Izmir) [32], 1870: 1m (Doria 1887), Smyrna (= Izmir), 1 ind. (DeBlase 1972). – K i r k l a r e l i: cave SE of Kiykoy [33], 3 June 1968 (Hůrka 1972); – Demirköy [34], cave, 12 July 1961: 6m, 6mj, 4faL, 6fj (Çaglar 1965, 1968); – Eriklik cave [35], 20 Sept. 1963: 4m, 1f (Çaglar 1965, 1968); – Kirklareli [36], cave, 6 Sept. 1961: 1mj, 2fa, 1fj (Çaglar 1965, 1968); – Seytanderesi [37], cave, 12 July 1961: 7mj, 3faL, 11fj (Çaglar 1965, 1968); – Sogucak köyü village [38], cave, 20 July 1961: 2fj (Çaglar 1965, 1968); – Yenicekoy [39], cave, 20 July 1961: 1m, 1fj (Çaglar 1965, 1968). – K o n y a: Arak (n. Sarkikaraagac) [*40*], 1 March 1969: 1m, 2f (Felten et al. 1977). – K ü t a h y a: Aslanapa [41], Arslanar köyü village, Saricakaya mevkii (Göldere), 1 ind. (Albayrak 1993). – M u g l a: Farliya köyü village (NW of Bodrum) [42], 22 March 1969: 2m, 4f, 1 ind. (Felten et al. 1977). – O r d u: Yaraşli köyü village [43], 2 ind. (Albayrak 1990). – S a k a r y a: Geyve [44], Ark köyü village, Vaysallar mahallesi, 5 ind. (Albayrak 1993). – S i v a s: Zara [45], 2 ind. (DeBlase 1972). – T r a b z o n: Akçaabat [46], cave, 4 April 1969: 9m, 17f (Steiner & Gaisler 1994); – Kirechane [47], cave, 21 June 1960: 1f (Çaglar 1965, 1968).

DISTRIBUTIONAL STATUS (Fig. 7). There is a relativelly large number of records (Tab. 1) which supposedly provide a realistic picture on distribution of this species. The record suggests there may be a considerable hiatus, comprising over 500 km, between the Thracian and West-Anatolian populations and that of the Eastern Anatolia. In contrast to the hiatus in the Central Anatolia, the distribution seem continuous in both the other directions, i. e. with that in the Balkans in the western part (Mitchell-Jones et al. in press) and that in the Zagros Mts. and Trascaucasia in the eastern part, respectivelly (DeBlase 1980, Vereščagin 1959).

TAXONOMIC STATUS. Most of the recent authors discussing geographic variation in *R. euryale* (DeBlase 1980, Corbet 1978, Koopman 1994) consider it to be a monotypic taxon, i. e. *R. euryale euryale* Blasius, 1853 (terra typica: Milan, Italy). Hayman & Hill (1971) and Harrison & Bates (1991) arranged the Arabian sample provisionally under the name *R. e. judaicus* Andersen et Matschie, 1904 (t. t.: Jerusalem, Palestine) although they expect that "further research may show it to be a synonym of *R. e. euryale*". *R. e. judaicus* is reported from Iraq by Niazi (1976). Felten et al. (1977) arranged provisionally all the European and Persian samples under *R. e. euryale*, those from the Eastern Mediterranean and the Levant to *R. e. judaicus*, and those from the Northwestern Africa to *R. e. barbarus* Andersen et Matschie, 1904 (t. t.: Tangiers, Morocco). DeBlase (1980) expects that whole the region of the Middle East is colonized by *R. e. euryale* while *R. e. judaicus* and *R. e. nordmanni* Satunin, 1911 (t. t.: Pavlovsk, Georgia) are not to be considered as valid subspecies. Analyzing the materials from Erzurum and Trabzon provinces of Turkey, Steiner & Gaisler (1994) resignate to identify it as to a subspecific status.

In summary, intraspecific variation in *R. euryale* is still only poorly known and it remains a task of future reseach. In respect to a specific distributional situation (see above), it is just the Turkish material that for such a study can be of a key role.

Rhinolophus mehelyi Matschie, 1901

RECORDS. **Original data**: B u r d u r: Taşkapi [1], Insuyu magarasi cave, 1 Nov. 1993: net. 1m, CUP. – I ç e l: Narlikuyu [2], 29 Oct. 1993: remain of 1 ind. of *R.* cf. *mehelyi* in a pellet of cf. *Strix aluco*. – K i r k l a r e l i: small cave in a quarry n. Safe suyu spring (3 km NW Sergen) [3], 1 Sept. 1996: net. 1fa, NMP (spec. No. 47961). – **Literary data**: A f y o n: Emirdag [4], cave, 17 April 1964: 1m (Çaglar 1965, 1968). – A n t a l y a: Side [5], amphitheatre, 13 April 1987: 1m (Helversen 1989b). – B a l i k e s i r: Erdek [6], cave, 7 Oct. 1967: 1m, 1f (Steiner & Gaisler 1994); – Havran [7], cave, 17 May 1961: 6f (Çaglar 1965, 1968, DeBlase 1972); – Ilica Çiftl. [8], 24 Sept. 1960: 1f (Felten et al. 1977); – Karakaya [9] (Kahmann 1962). – B u r d u r: Insuyu caves [1], 24 Febr. 1969: 1f (Felten et al. 1977). – Ç a n a k k a l e: 4 km S of Yalova [10] (Hůrka 1972). – D e n i z l i: Dereköy

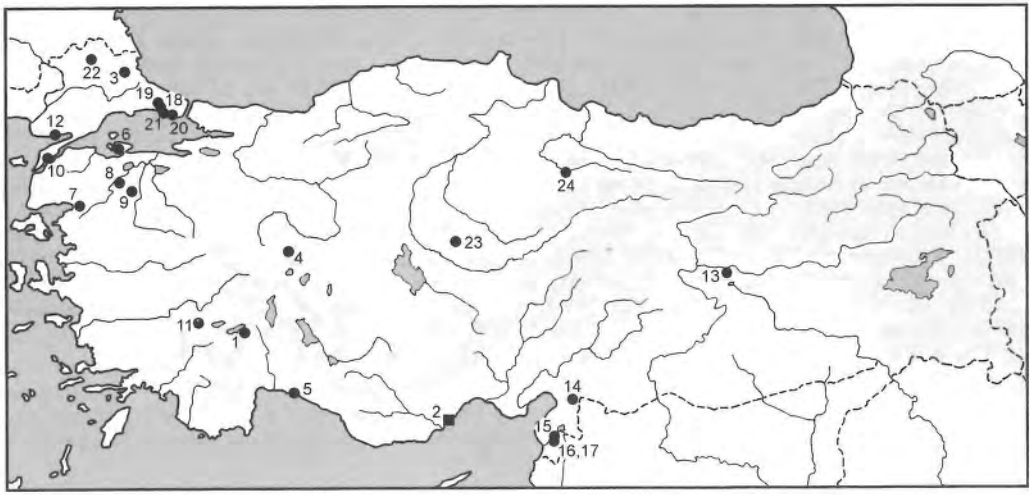

Fig. 8. Records of *Rhinolophus mehelyi* in Turkey. For symbol explanations see Fig. 4.

[11], 23 Febr. 1969: 4m (Kock 1974, Felten et al. 1977). – E d i r n e: Ibrice (n. Keşan) [12], cave, 4 August 1987: 1m (Crucitti 1988). – E l a z i g: Harput [13], Anguzunoba mahallesi, Sarikayaliklar, 3 ind. (Albayrak 1990); – H a t a y: Akbez bucagi [14], 6 ind. (Albayrak 1990); – Antakya [15], aquaeductus St. Pierre, 18 Febr. 1960: 1 ind. (Kock 1974), Senpiyer, aquaeductus, 25 Febr. 1960: 1f (Çaglar 1965, 1968); – Harbiye [16], cave (Kahmann 1962); – Narlica köyü village [17], cave, 17 Febr. 1960: 1m (Kahmann & Çaglar 1960, Çaglar 1965, 1968, Felten et al. 1977). – I s t a n b u l: Gökceli (n. Catalca) [18], cave, 21 May 1964: 1f (Çaglar 1965, 1968); – Incegiz (n. Çatalca) [19], cave, 29 Jan. 1960: 1f (Kahmann & Çaglar 1960, Çaglar 1965, 1968, Felten et al. 1977); – Küçükçekmece [20] (Kahmann 1962); – Yarimburgaz [21], cave, 31 July 1962: 1f (Çaglar 1965, 1968). – K i r k l a r e l i: Kayali köyü deresi valley [22], 2 ind. (Albayrak 1993). – K i r ş e h i r: Seyfe [23], subterranean cavities, 26–27 July 1983: 3m (Helversen 1989b). – T o k a t: Pazar bucagi [24], Ballica köyü village, Inderesi magarasi cave, 1 ind. (Albayrak 1990).

DISTRIBUTIONAL STATUS (Fig. 8). The number of records (24 localities) is not sufficient for a detailed distributional analyses. The records are dispersed almost regularly over whole the country.

TAXONOMIC STATUS. Most authors consider this species monotypic, i. e. as *R. mehelyi mehelyi* Matschie, 1901 (terra typica: Bucharest, Romania). In respect to materials from the Middle East this holds true of DeBlase (1972, 1980), Felten et al. (1977), Harrison & Bates (1991), Koopman (1994), Steiner & Gaisler (1994). Some other authors (Corbet 1978, Hayman & Hill 1971) suggest the populations from Morocco and/or whole the Northwestern Africa to be considered as a separate West-Mediterranean subspecies *R. m. carpetanus* Cabrera, 1904 (t. t.: Madrid, Spain).

Rhinolophus blasii Peters, 1866

RECORDS. **Original data**: B u r d u r: Taşkapi [1], Insuyu magarasi cave, 1 Nov. 1993: net. 23 ind., CUP. – I ç e l: Narlikuyu [2], Cehennem cave, 2 May 1991: net. 3m, CUP (leg. Hanzal), 3 August 1992: net. 6m, NMP (spec. Nos 47917–47922). – K i r k l a r e l i: Igneada, Longoz, Mermer magarasi cave [3], 9 May 1992: obs. several hundred ind. (leg. Reiter, Andreas & Sádlová); – Igneada, Longoz, Bezergan magarasi cave [4], 22 June 1994: net. 3m, 1f, CUP, 3 Sept. 1996: net. 1ma; – small cave in a quarry n. Safe suyu spring (3 km NW Sergen) [5], 1 Sept. 1996: obs. colony ca 300 ind., net. 4ma, 7ms, 6fa, 3fs, coll. 2ma, 1ms, 2fa, 2fs, NMP (spec. Nos 47952, 47954–47958, 47960). – Z o n g u l d a k: Yenice [6], a large cave n. railway, 2 July 1994: net. 1m, CUP. – **Literary data**: A n t a l y a: Finike, "Porcupine den" [7], sum. 1965: 1 ind. (Corbet & Morris 1967); – Finike, Cliff cave [8], sum. 1965: 2 ind. (Corbet & Morris 1967); – Manavgat river (n. Ibradi) [9], under bridge, 28 June 1986: 1m, 1f

(Helversen 1989b); – N of Beşkonak [10], 10 Oct. 1984: 1f (Helversen 1989b); – Perge [11], 9 Oct. 1984: 1f (Helversen 1989b). – B a l i k e s i r: Havran [12], 17 March 1969: 2f (Kock 1974, Felten et al. 1977), cave, 17 May 1961: 5m, 5f, 11 April 1965: 3m, 2f (Çaglar 1965, 1968); – Ilica Çiftl. [13], 24 Sept. 1960: 1m, 2f (Kock 1974, Felten et al. 1977). – B u r d u r: 12 km S of Burdur [14], 24 Febr. 1969: 1m, 1f (Felten et al. 1977); – Dutalan [*15*], 25 Febr. 1969: 3m, 6f (Felten et al. 1977). – B u r s a: cave n. Olyat [16], Ulu Dag, 19 July 1967: 6 ind. (Kock 1974). – H a t a y: Harbiye (n. Antakya) [17], cave, 23 Febr. 1960: 1m, 1f (Kahmann & Çaglar 1960, Çaglar 1965, 1968, Felten et al. 1977); – Narlica [18], cave, 17 Febr. 1960: 1f (Kahmann & Çaglar 1960). – I ç e l: 8 km NW of Anamur [19], cave, 18 April 1987: 2m (Helversen 1989b); – Anamur [20], cave, 17 Febr. 1961: 1m (Çaglar 1965); – Lamas (n. Mersin) [21], cave, 22 Febr. 1961: 1m, 1f (Çaglar 1965, 1968). – I s t a n b u l: Incegiz [22], cave, 29 Jan. 1960: 1f (Kahmann & Çaglar 1960, Çaglar 1965, 1968, Felten et al. 1977); – Küçükçekmece [23], 13 March 1960: 2m (Kahmann & Çaglar 1960, Felten et al. 1977); – Yarimburgaz [24], cave, 12 March 1960: 1m (Çaglar 1965, 1968). – I z m i r: Ahmetbeyli [25], 16 Febr. 1969: 1m (Felten et al. 1977). – K i r k l a r e l i: Demirköy, Saridere (= Sarpdere) köyü village, Kiz magarasi cave [26], 6 ind. (Albayrak 1993); – Kirklareli [27], cave, 6 Sept. 1961: 3m (Çaglar 1965, 1968); – Yeniceköy [28], cave, 20 July 1961: 1mj, 1fj (Çaglar 1965, 1968). – M u g l a: Farilya (n. Bodrum) [29], 22 March 1969: 1m (Felten et al. 1977).

Rhinolophus blasii / euryale

Original data: H a t a y: Çevlik [30], ancient tombs, 1 July 1997: obs. 4 ind. sa. – K i r k l a r e l i: Sarpdere, Kiz magarasi cave [26], 17 Oct. 1993: obs. min. 5 ind. – **Literary datum**: I ç e l: Kulakköy village [31], abandoned houses in the forest, Spring 1987: 4 ind. (van Winden 1988).

DISTRIBUTIONAL STATUS (Fig. 9). *R. blasii* has been recorded only from the western and southern part of Turkey. Considering, that this species is distributed in Transcacaucasia as well as in almost whole territory of Iran and Afghanistan (Bobrinskij et al. 1965, DeBlase 1980, Felten et al. 1977), it can be assumed that possibly it may come in account in the Eastern Anatolia, too.

TAXONOMIC STATUS. Many authors (Aellen 1959, Corbet 1978, DeBlase 1980, Harrison & Bates 1991, Hayman & Hill 1971, Koopman 1994, etc.) consider this species monotypic in whole range of its distribution, i. e. as *R. blasii blasii* Peters, 1866 (terra typica: Italy). Felten et al. (1977) found a considerable difference between the European and West-Anatolian samples (belonging to *R. b. blasii*), and a bigger form from Iran and Afghanistan he consequently described as *R. b. meyeroehmi* Felten, 1977 (t. t.: Pashtunkot, Afghanistan). The later authors (see above) however, consider

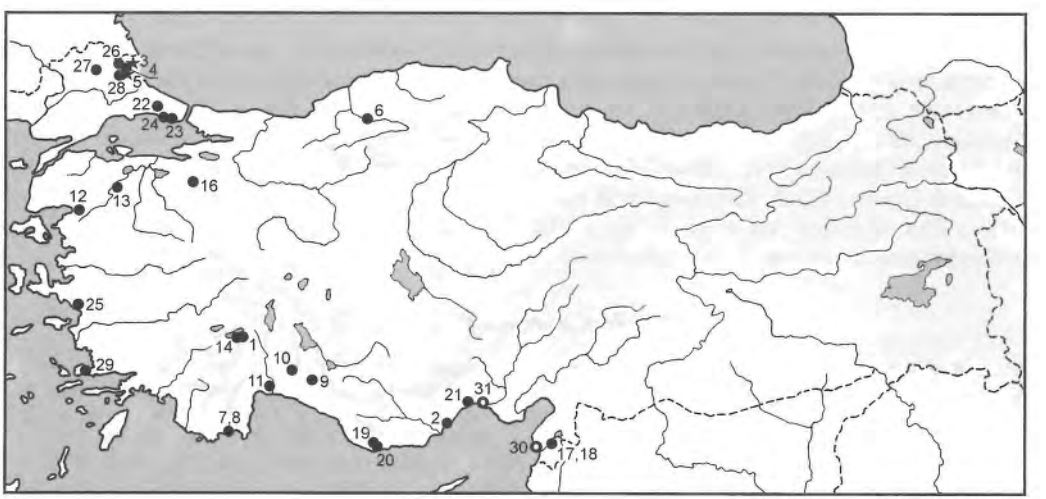

Fig. 9. Records of *Rhinolophus blasii* in Turkey. For symbol explanations see Fig. 4, open symbols denote records of unidentified medium-sized bats of genus *Rhinolophus* (see text).

this form to fall in variation range of the nominotypic form and synonymized *R. b. meyeroehmi* with *R. b. blasii* (cf. e. g. Koopman 1994). Anyhow, at least in respect to the African populations, the taxonomic situation of *R. blasii* is for of being clear and calls far a detailed revision.

Myotis myotis (Borkhausen, 1797)

Records. **Original data**: Bolu: Çepni [1], travertine, remains of 1 ind. in pellets of *Bubo bubo*. – Kirklareli: Sarpdere, Dupnisa magarasi cave [2], 16 Oct. 1993: net. 2m, 2f, CUP, Summer 1995, PMSL (leg. Kryštufek). – Tunceli: blind train tunnel in the Euphratus river valley n. Derebük village [3], 27 Oct. 1993: coll. 1m, CUP, 14 Sept. 1995: net. 1m, CUP. – Zonguldak: Yenice, a large cave n. railway [4], 1 July 1994: obs. a colony 500 ind., 2 July 1994: net. 2m, 13f, CUP, obs. inside the cave – only 2 ind. – **Literary data**: Adiyaman: Karadut [5], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – Afyon: Emirdag [6], cave, 17 April 1964: 2f (Çaglar 1965, 1969). – Amasya: Merzifon [7], Gümüştepe köyü village, 1 ind. (Albayrak 1990). – Antalya: Finike [8], Cliff cave, sum. 1965: one intact dentary and some fragments (Corbet & Morris 1967); – Inecikum [9], 21 May 1966: 3m, 1f (Kock 1974, Felten et al. 1977); – Kaş [10], 10 June 1966: 20f (Kock 1974, Felten et al. 1977), Kaş, Limanagzi, Hidirellez magarasi cave, 3 ind. (Albayrak 1993); – Konakle [*11*], 21 May 1966: 1m (Felten et al. 1977); – Side [12], amphitheatre, 3 Oct. 1984 and 30 June 1986 (Helversen 1989b). – Aydin: Milet [13], 7 August 1986: 2m (Spitzenberger 1996). – Balikesir: Havran [14], cave, 17 May 1961: 1f, 11 April 1965: 7f (Çaglar 1965, 1969); – Havran, cave 8 km E [15], 3 August 1986: 1m, 3f (Spitzenberger 1996). – Bilecik: Bilecik [16], cave, 26 April 1961: 13f (Çaglar 1965, 1969). – Burdur: Insuyu cave [17], 24 Febr. 1969 and 24 June 1969: 1m, 2f (Felten et al. 1977, Spitzenberger 1996). – Bursa: Teleferik cukuru hollow [18] (Çaglar 1969). – Çankiri: Eskipazar [19], 24 Sept. 1965: 1m (Kock 1974, Felten et al. 1977). – Denizli: Dereköy [20], 23 Febr. 1969: 1f (Felten et al. 1977); – Dereköy, cave, 2 km S of Kaklik [21], 25 Febr. 1969: 1f (Spitzenberger 1996); – Zeytinlik köyü village [22], cave, 20 April 1964: 1m, 12f (Çaglar 1965, 1969). – Diyarbakir: Birklin magarasi cave [23], 1 km NW Lice, 27 July 1984: 1f (Spitzenberger 1996); – Çermik [24], Kalecik köyü magarasi cave, 6 ind. (Albayrak 1990); – Hilar magaralari caves (6 km SW Ergani) [25], 26 July 1984: 2m (Spitzenberger 1996). – Edirne: Lalapaşa [26], Sinanköyü magaralari caves, 11 ind. (Albayrak 1993). – Erzurum: Çamlimagara [27], cave, 10 Sept. 1967: 4 mummies (Steiner & Gaisler 1994); – Elmali (SW of Ispir) [28], big cave, 6 August 1983: nursery colony of several houndred specimens (Helversen 1989b). – Eskişehir: Alpu [29], Kelkaya Gölcti, 1 ind. (Albayrak 1993). – Gümüşhane: Mescitli köyü village [30], 5 ind. (Albayrak 1990). – Hatay: Dermacta köyü village [31] (Çaglar 1969); – Harbiye [32], cave, 23 Febr. 1960: 1f, 21 May 1960: 5m, 2f (Kahmann & Çaglar 1960, Çaglar 1965, Felten et al. 1977, Spitzenberger 1996); – Narlica köyü village [33], Karanlik magarasi cave, 19 ind. (Albayrak 1990). – Içel: Gülek Bogazi (Kizil Tabya) [34], 9 August 1963: 1m (Lehmann 1966, Kumerloeve 1975); – Tarsus [35], Say köyü village, Delikli magarasi cave, 6 ind. (Albayrak 1993). – Isparta: Anamas [36], 27 May 1966: 19m, 45f (Kock 1974, Felten et al. 1977), Zindan magarasi cave, 25 June 1969: 6m, 2f (Spitzenberger 1996). – Istanbul: Gökçeli (n. Çatalça) [37], cave, 26 May 1960: 2m, 8f (Kahmann & Çaglar 1960, Çaglar 1965, 1969, Kock 1974, Felten et al. 1977); – Karababa magarasi cave (near Çatalça) [38], 3 April 1960: 1f (Spitzenberger 1996); – Küçükçekmece [39], 12 March 1960: 1f (Kahmann & Çaglar 1960, Felten et al. 1977), Halkali cave, 15 May 1971: 2m, 3f (DeBlase & Martin 1973, Peterson et al. 1976); – Ortaköy (n. Yalova) [40], ruins of a mill, 15 March 1964: 2f (Çaglar 1965, 1969); – Sakli köyü village (n. Beykoz) [41], cave, 10 July 1960: 1m (Çaglar 1965, 1969); – Yarimburgaz [42], cave, 22 April 1959: 2f, 12 March 1960: 1m, 19 May 1960: 2m, 4f, 31 July 1960: 7m, 1faL (Çaglar 1965, 1969, Spitzenberger 1996). – Izmir: Bergama [43], Asklepion, 4 August 1986: 1f (Spitzenberger 1996); – Efes [44], Vedius Gymnasion, 6 August 1986: 1m (Spitzenberger 1996), Han N Vedius Gymnasion, 2 August 1984: 1m (Spitzenberger 1996). – Kars: Aralych-Bezirk (= vicinity of Aralik) [45] (Satunin 1913); – "das Plateau von Kars" [46] (Satunin 1913); – Tuzluca [47], 14 Sept. 1967 (Peus 1976). – Kirklareli: cave SE of Kiyiköy [48], 3 June 1968: 2m (Spitzenberger 1996, cf. Hůrka 1972). – Kirşehir: D. Inlimurat magaralari caves [49], 2 ind. (Albayrak 1993); – Seyfe Gölü [50], subterranean cavern, 26–27 July 1983: 7m, 5f (Helversen 1989b). – Konya: Han [51], 39 km W Konya, 29 July 1984: 1m (Spitzenberger 1996); – Sizma köyü [52], Kuzey magarasi cave, 2 ind. (Albayrak 1993). – Nevşehir: Derinkuyu [53], Yerebatan şehir underground town, 1 ind. (Albayrak 1993); – Derinkuyu, 24 km W [54], 14 July 1975: 4f (Spitzenberger 1996); – Göreme [55], ruins, 4 July 1975: 1m (Spitzenberger 1996); – Gülşehir [56], Açiksaray harabeleri, 2 ind. (Albayrak 1993), Açik Saray, 15 July 1975: 1m (Spitzenberger 1996, cf. Peus 1978b); – Nevşehir [57], July 1975 (Peus 1978b). – Nigde: Agzikarahan [58], 18 July 1975: 1m (Spitzenberger 1996); – Gümüşler [59], Epcik magarasi cave, 2 ind. (Albayrak 1993). – Ordu: Yaraşli köyü village [60], 17 ind. (Albayrak 1990). – Şanli Urfa: Birecik [61], castle, 17 Sept. 1958: 1m (Çaglar 1965, 1969). – Sinop: Boyabat Kalesi castle [62], 1 ind. (Albayrak 1993). – Tokat: Turhal [63], Pazar, Ballica köyü village, Inderesi mevkii, 7 ind. (Albayrak 1990). – Trabzon: Akçaabat [64], cave, 12 Sept.

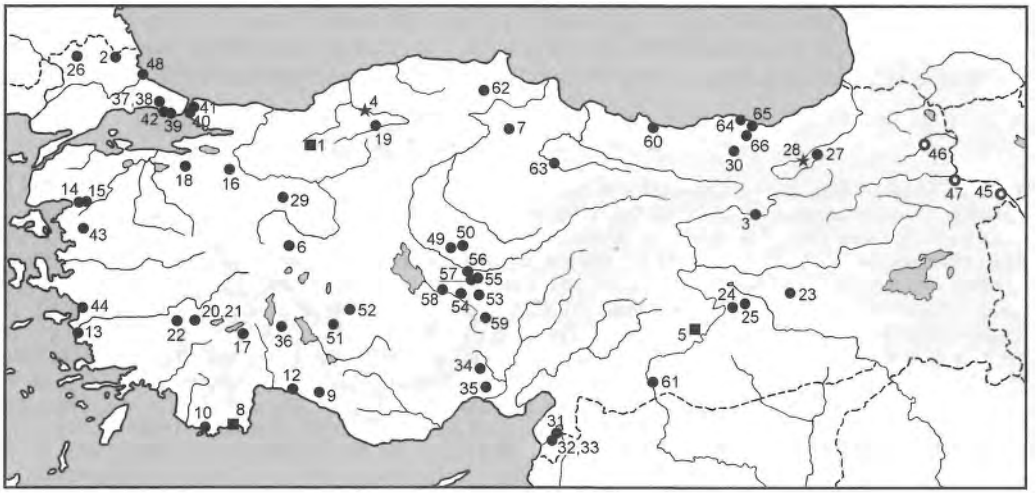

Fig. 10. Records of *Myotis myotis* in Turkey. For symbol explanations see Fig. 4, open symbols denote reidentified records previously refered as of *M. myotis* (see text).

1961: 2m, 2f (Çaglar 1965, 1969), 4 April 1969: 1f (Steiner & Gaisler 1994); – Kirechane [65], cave, 18 May 1960: 5m (Çaglar 1965, 1969); – Maçka [66], Bagişli köyü village, 2 ind. (Albayrak 1990).

DISTRIBUTIONAL STATUS (Fig. 10). In the Eastern Turkey, *M. myotis* reaches the eastern margin of its distribution range. The records from Armenian Highlands and Caucasus Mts. reported by Satunin (1913) were reidentified as belonging to *Myotis oxygnathus omari* Thomas, 1906 (i. e. *M. blythii omari*) by Kusjakin (1935). Vereščagin (1959) described all the recent and subrecent Caucasian records of the a large-sized *Myotis* as the only species, *M. blythii* (not *M. myotis*). This conclusion has been confirmed also by other Russian authors (Bobrinskij et al. 1965, Strelkov 1972, Pavlinov et al. 1995). With an exception of Armenian Highlands and Mesopotamia, *M. myotis* occurs quite abundant throughout the whole western part of Turkey (63 records).

TAXONOMIC STATUS. Turkish population of *Myotis myotis* has been many times taxonomically evaluated and analyzed in details. Strelkov (1972) suggested that the area of the Levant and Asia Minor is colonized by the form *M. myotis macrocephalicus* Harrison et Lewis, 1961 (terra typica: Amchite, Lebanon), the form described based on the metrical skull differences in the material obtained from Syria and Lebanon by Harrison & Lewis (1961). In the area of the Balkans and Asia Minor, these authors expected an intermediate form between *M. m. myotis* (Borkhausen, 1797) (t. t.: Thuringia, Germany) and *M. m. macrocephalicus*. *M. m. macrocephalicus* was also mentioned from the Cilician Taurus Mts. by Kumerloeve (1975). Corbet (1978) refers *M. m. myotis* to the European range (incl. the Balkans), *M. m. macrocephalicus* to Lebanon and Palestina, but he give no mention about bats of the Asian part of Turkey (Anatolia). Felten et al. (1977) described a cline increase in metrical characters from the Western to the Eastern Turkey, and therefore, discussed the existence of subspecies *M. m. macrocephalicus* in the Levant. The West-Turkish sample he ranked among nominotypic form of *M. m. myotis*. Harrison & Bates (1991) and Koopman (1994) mentioned from Turkey both the forms: *M. m. myotis* and *M. m. macrocephalicus*. However, Steiner & Gaisler (1994) and Benda (1993) who analyzed the material from Trabzon and Erzurum province, arranged it under the subspecies *M. m. myotis*. The latter author also described cline increase in size throughout the

whole Mediterranean from the west to the east with a steep character shift just in Turkey. Benda & Horáček (1995a, b) mentioned these phenomena again, and, in respect to it, they have rearranged the North-African form *M. blythii punicus* Felten, 1977 in context of the species *M. myotis*. Spitzenberger (1996) also identified the shift of metrical characters in Asia Minor, described it with more details, and concluded that the population of *M. myotis* occuring in the Cilician lowland, in Hatay (in Turkey), and in the Levantine states belongs to an independent subspecies (i. e. *M. m. macrocephalicus*) whereas the rest of Turkish territory is inhabited just by *M. m. myotis* (comp. Steiner & Gaisler 1994). Arlettaz (1995) and Arlettaz et al. (1997) supposed that *M. blythii omari* could represent a small-sized marginal form of *M. myotis* (similarly as it is the case with *M. m. punicus*) but it was found improbable by Benda & Horáček (1995a). Nevertheless, to be sure, the species status of *omari*-population is to be reexamined using all available approaches (the non-morphological including).

Myotis blythii (Tomes, 1857)

Records. **Original data**: B i t l i s: Alaman Han [1], 16 May 1997: coll. 1ma (leg. Wolf). – B o l u: Çepni [2], a large cavern in a travertine body, 14 June 1990: obs. 1 ind. – G ü m ü ş h a n e: Güzyurdu [3], a small cave in a mountain pass 2300 m, 15 Sept. 1995: obs. 1–3 ind. (incl. a male display). – E r z i n c a n: Tercan [4], 16 May 1998: obs. nurs. colony, coll. 1faL, NMP (spec. No. 48088, leg. Bílek). – H a t a y: Антиохия (= Antakya) [5], 2m, ZIN (spec. Nos 9465, 9466, leg. Rolle). – I ç e l: Narlikuyu [6], 29 Oct. 1993: remain of 1 ind. in pellets of cf. *Strix aluco*. – K a r s: Ani [7], ruins of Armenian town, 20 May 1997: obs. 2 ind. in a wall fissure; – Bogakale [8], 21 May 1997: remain of 1 ind. in pellets of cf. *Strix aluco* (leg. Obuch); – 5 km N of Sirbasan [9], small tunnel under railway, 10 Sept. 1995: net. 1m, obs. 1 cf. m (a male display). – K ı r k l a r e l i: Sarpdere, Dupnisa magarasi cave [10], 16 Oct. 1993: net. 11ma, 4ms, 4fa, 2fs, coll. 8m, 2f, CUP; Summer 1995, PMSL (leg. Kryštufek). – S i v a s: Zara [11], Demiryurt, Summer 1995, PMSL (leg. Kryštufek). – V a n: Castle of Van [12], 28 July 1992: net. 4m, NMP (spec. Nos 47904–47908; cf. Benda & Horáček 1995a); – Muradiye, Seytan Köprüsü cave [13], 27 July 1992: net. 1m, NMP (spec. No. 47903; cf. Benda & Horáček 1995a). – **Literary data**: A d a n a: S of Düziçi [14], 1914: 4f (Spitzenberger 1996); – Toprakkale [15], ruins of crusader castle, 17 August 1977: 2 ind. (from owl's pellets) (Nadachowski et al. 1990). – A d i y a m a n: Karadut [16], cave, 7 June 1992: 5 ind. (from owl's pellets) (Obuch 1994); – Kuyucak bucagi [17], 1 ind. (Albayrak 1990). – A g r i: Dogubeyazit, Ishakpaşa Saray [18], 21 July 1984: 1m (Spitzenberger 1996); – Karasu spring [19], 29 June 1960 (Theodor 1967). – A n t a l y a: Alara hani [20], 16 August 1986: 1m, 1f (Spitzenberger 1996, cf. Spitzenberger 1994); – Agullu (1 km N) [21], 13 August 1986: 1m (Spitzenberger 1996); – Kaş [22], 10 June 1966: 6f (Kock 1974, Felten et al. 1977). – A r t v i n: Ardanuç [23], gorge, 12 August 1983: 1m (Helversen 1989b). – A y d ı n: Milet (n. Söke) [24], ruins, 23 Sept. 1960: 2m (Çaglar 1965, 1969), Milet, 7 August 1986: 1m (Spitzenberger 1996). – B a l ı k e s i r: Denkçiler mahallesi [25], 1 ind. (Albayrak 1993); – Erdek [26], cave, 7 Oct. 1967: 1m, 4f (Steiner & Gaisler 1994); – Manyas Gölü [27], 24 August (July) 1960: 4m (Kock 1974, Felten et al. 1977). – B i n g ö l: Kigi [28], Kerek magarasi cave, 13 July 1984: 13f (Spitzenberger 1996). – B i t l i s: 7 miles SW of Tatvan [29], old ruins, 27–28 July 1954: 7m, 2f (DeBlase & Martin 1973); – between Çanak düzü and Anadere [30], 17 July 1984: 2m (Spitzenberger 1996); – Eleman Hani [1], 3 ind. (Albayrak 1990), Alaman hani, 16 July 1984: 3m, 2f (Spitzenberger 1996); – Han [31], 2 km N Bitlis, 15 July 1984: 1m (Spitzenberger 1996). – B o l u: Mudurnu yolu [32], 10 km, 1 ind. (Albayrak 1993). – Ç a n a k k a l e: Yalova [33], hill SW, 30 May 1967: 2m (Spitzenberger 1996). – Ç a n k ı r ı: Ilgaz [34], under bridge over the Devrez Çayi, 15 August 1983: 1ma (Helversen 1989b). – D i y a r b a k ı r: Çermik [35], cave, 21 Sept. 1962: 7m, 4f (Çaglar 1965, 1969), Kalecik köyü magarasi cave, 1 ind. (Albayrak 1990); – Ergani [36], Sesverenpinar köyü village, Han magarasi cave, 2 ind. (Albayrak 1990); – Ergani [37], Hilar magarasi cave (6 km SW), 26 July 1984: 4m (Spitzenberger 1996); – Surlar [38], Yedikardeşler Burcu, 1 ind. (Albayrak 1990). – E d i r n e: Ibrice (n. Keşan) [39], cave, 4 August 1987: 1f (Crucitti 1988); – Lalapaşa [40], Sinanköyü magaralari caves, 1 ind. (Albayrak 1993). – E l a z i g: Harput kalesi castle [41], Dere hamami, 1 ind. (Albayrak 1990). – E r z i n c a n: Başpinar [42], 13 km E, 9 July 1984: 2m (Spitzenberger 1996); – Tercan [4], Mamahatun Kervansarayi, 20 ind. (Albayrak 1990). – E r z u r u m: Çamlimagara [43], cave, 10 Sept. 1967: 2 mummies (Steiner & Gaisler 1994); – Hasankale [44], Köprüköy bucagi, Çobandede köprüsü bridge, 1 ind. (Albayrak 1990); – Sohun Dere [45], under bridge, 7 August 1983: 1m (Helversen 1989b). – E s k i ş e h i r: Alpu [46], Kelkaya gölcti, 1 ind. (Albayrak 1993). – H a t a y: Akbez bucagi [47], 9 ind. (Albayrak 1990); – Antakya [4] (Harrison 1964); – Belen [48], above the Topbogazi Gecidi pass, 9 June 1992: 1 ind. (from owl's pellets) (Obuch 1994); – Dermacta köyü village [49] (Çaglar 1969); – Harbiye (n. Antakya) [50], cave, 21 May 1960: 8f (Çaglar 1965, 1969,

Felten et al. 1977, Spitzenberger 1979, 1996); – Narlica köyü village [51], Karanlik magarasi cave, 20 May 1960: 4m (Çaglar 1965, 1969), 12 Sept. 1971: 2m, 1f (Spitzenberger 1996, cf. Felten et al. 1977), 16 ind. (Albayrak 1990). – I ç e l: Anamur [52], Bugulu magarasi cave, 1 ind. (Albayrak 1993). – Tarsus [53], Say köyü magaralari caves, 1 ind. (Albayrak 1993). – I s p a r t a: Anamas [54], 27 May 1966 and 25 June 1969: 4m, 10f (Kock 1974, Felten et al. 1977), Zindan magarasi cave, 25 June 1969: 2m (Spitzenberger 1996). – I s t a n b u l: Gökçeli (n. Çatalca) [55], cave, 26 May 1960: 1m, 4f (Çaglar 1965, 1969, Felten et al. 1977); – Küçükçekmece [56] (Çaglar 1969, Felten et al. 1977), Halkali cave, 15 May 1971: 9m, 1f (DeBlase & Martin 1973, Peterson et al. 1976); – Yalova [57], Sogucak köyü magaralari caves, 4 ind. (Albayrak 1993); – Yarimburgaz [58], cave, 19 May 1960: 1m, 6f, 31 July 1960: 5m, 14 f (2faL) (Çaglar 1965, 1969), 31 July 1960: 1f (Spitzenberger 1996). – I z m i r: Asklepion (n. Bergama) [59], ruins, 17 Sept. 1960: 1m, 1f (Çaglar 1965, 1969), 4 August 1986: 2m, 1f (Spitzenberger 1996); – Bergama [59], hellenistic aquaeduct, 5 August 1986: 1m (Spitzenberger 1996); – Gümüldür [60], Incirli pit, 3 ind. (Albayrak 1993). – K a r s: Aralych-Bezirk (= vicinity of Aralik) [61] (Satunin 1913; mentioned as *M. myotis*, but reexamined by Kusjakin 1935); – Tuzluca [62], mine gallery, 14 Sept. 1967: 5m, 2f (Steiner & Gaisler 1994, cf. Peus 1976). – K i r k l a r e l i: Alpullu [63], Mimarsinan köprüsü bridge, 1 ind. (Albayrak 1993); – cave SE of Kiyiköy [64], 3 June 1968: 3m (Spitzenberger 1996, cf. Hůrka 1972); – Eriklice köyü village [65], 1 ind. (Albayrak 1993). – K i r ş e h i r: D. Inlimurat magaralari caves [66], 1 ind. (Albayrak 1993); – Seyfe Gölü [67], subterranean cavern, 26 July 1983: 1f (Helversen 1989b). – K o c a e l i: Gebze [68], old building, 1 June 1964: 3f (Çaglar 1965, 1969). – K o n y a: Sizma köyü village [69], Obruk magarasi cave, 2 ind. (Albayrak 1993). – K ü t a h y a: Sapuncupinar [70], Yeniçe çiftligi, 3 ind. (Albayrak 1993). – M u ş: Dere Mahallesi [71], 10 ind. (Albayrak 1990); – Sütlüce köyü köprüsü bridge [72], 6 ind. (Albayrak 1990). – N e v ş e h i r: Derinkuyu [73], 24 km W, 14 July 1975: 2f (Spitzenberger 1996); – Sarihan [74], 17 July 1975: 2m (Spitzenberger 1996). – N i g d e: Agzikarahan [75], 18 July 1975: 3m (Spitzenberger 1996). – O r d u: Yaraşli köyü village [76], 2 ind. (Albayrak 1990). – S i i r t: Gökçebak köyü village [77], 1 ind. (Albayrak 1990). – T o k a t: Turhal [78], Pazar, Ballica (Abayci) köyü village, Inderesi mevkii, 6 ind. (Albayrak 1990). – V a n: Castle of Van [12], 25 ind. (Albayrak 1990), 19 July 1984: 1m (Spitzenberger 1996); – Isle Akdamar [79], 18 July 1984: 4m (Spitzenberger 1996); – Kiziltaş [80], 6 km S, 19 July 1984: 2m (Spitzenberger 1996); – narrow cliff cave on the mountainside at Van [81], 14 July 1954: 7m, 15f (DeBlase & Martin 1973). – Y o z g a t: Şefaatli [82], Armagan köyü village, 3 ind. (Albayrak 1993). – Anatolia (undef.): "Charne bei Jarbaschi, in der Charunje Ebene, Kleinasien", Spring 1914 (Wettstein 1926) [= S Düzici (Adana dist.) sensu Spitzenberger (1996)]; – Ulukista (?= Ulukişla, C-Anatolia), 1906 (Topál 1971).

DISTRIBUTIONAL STATUS (Fig. 11). *M. blythii* has been found in whole Turkey, also in arid areas, with an exception of the Upper Mesopotamia. It is the second most frequent bat species in Turkey, just after *R. ferrumequinum* (Tab. 1).

TAXONOMIC STATUS. The Persian form *M. myotis omari* Thomas, 1906 (terra typica: Derbent, Iran) was rearranged under the species *M. blythii* by Kusjakin (1935; comp. Kuzjakin 1934). Harrison & Lewis (1961) synonymized *M. myotis risorius* Cheesman, 1921 (t. t.: Shiraz, Iran) with *M. m. omari* and also confirmed their belonging to *M. blythii* (they considered *M. blythii omari* as a subspecies distributed over the whole Middle East). Hayman & Hill (1971) considered *M. blythii oxygnathus* (Monticelli, 1885) (t. t.: Basilicata, Italy), the form first assigned to *M. blythii* by Ellerman & Morrison-Scott (1951), as a subspecies inhabiting a large territory, from Morocco, through the Southern Europe, the Middle East to the Central Asia. Topál (1971) confirmed the synonymy of Indian *M. blythii blythii* (Tomes, 1857) with *M. dobsoni* Trouessart, 1879, and also the synonymy of *M. b. risorius* and *M. b. omari*, which range is hence from Crete, through Asia Minor, Caucasus Mts. and Transcaucasia to the Persian mountains incl. Kopetdag Mts., i. e. the southaestern to *M. b. oxygnathus* inhabiting Europe up to Crimea. The first, who analyzed the geographic variation of *M. blythii* over whole range of its distribution was Strelkov (1972). He has considered the subspecies *M. b. oxygnathus* distributed in continental Europe from Spain to Crimea (incl. Turkish Thrace), and *M. b. omari* inhabiting Caucasus Mts. and Transcaucasia, Asia Minor, the Western Turkmenistan and the whole Middle East, the Mediterranean islands and the Northern Africa. Corbet (1978) inclined to this opinion (without mentioning Anatolian populations). Felten et al. (1977) subdivided the Anatolian population into two groups, corresponding to subspecies: *M. b. oxygnathus* (continental Europe and the Western Anatolia) and *M. b. omari* (Eastern Anatolia eastward of

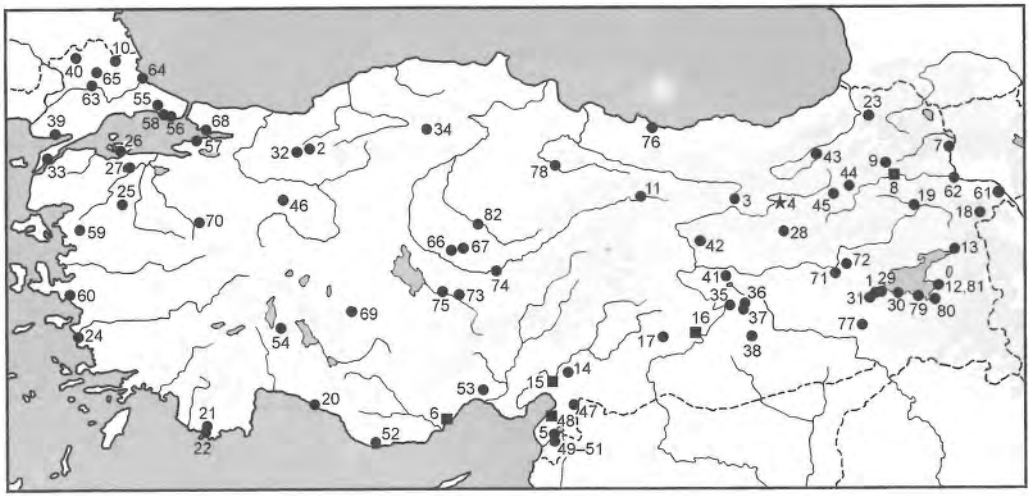

Fig. 11. Records of *Myotis blythii* in Turkey. For symbol explanations see Fig. 4.

Hatay, and in the whole rest of range in the whole Middle East), the opinion which, at least as Turkey is considered, was adopted also by DeBlase (1980), Harrison & Bates (1991) and Koopman (1994). Steiner & Gaisler (1994) resignated to classify the subspecific status of their samples from provinces of Balikesir, Kars and Erzurum.

Benda & Horáček (1995a, b) found a cline increase in metrical characters from the west to the east throughout whole the Mediterranean terminating in Transcaucasia and Iran, with a step shift in Asia Minor that separates *M. b. oxygnathus* from *M. b. omari* (which can thus be expect also in the Eastern Turkey). Spitzenberger (1996) describes the same trend in Anatolia from the west to the east, though she does not distinguish individual subspecies.

In the context of taxonomical status of *M. blythii* in Turkey it is important to give a note on *M. blythii lesviacus* Iliopoulou, 1984, a form described from the Lesbos (= Midilini) island, Greece (Iliopoulou-Georgudaki 1984), ca 10 kilometers distant from the Turkish coast. This description was based on differences of the island form from both that of Peloponnese (as a sample of "continental" *M. b. oxygnathus*) and of Crete (*M. b. omari*). *M. blythii lesviacus* was proposed as intermediate form between both of the subspecies. However, subspecific status of that form is doubted by later authors (Benda & Horáček 1995b, Arlettaz et al. 1997) though accepted by Koopman (1994).

In conclusions, *M. blythii* is to be looked upon as a taxon which, in the Mediterranean region, exhibits a considerable morphometric variation. Its general pattern includes: (a) cline increase in size from the west to the east and (b) supposedly stepped shift in the region of Middle East that terminates with the largest form of the species, *M. b. omari*. The Northwest-African population (*punicus*) belongs rather to *M. myotis* than to *M. blythii* (cf. Benda & Horáček 1995a, b, Arlettaz et al. 1997 for details).

Myotis bechsteinii (Kuhl, 1817)

Records. **Original data**: K i r k l a r e l i: Sarpdere, Dupnisa magarasi cave [1], 16 Oct. 1993: net. 1m, CUP, 17 Oct. 1993: net. 1m, PMSL; – Velika Köprüsü bridge (8 km SW of Demirköy) [2], 5 May 1992: net. 1 ind. (leg.Reiter, Andreas & Sádlová). – **Literary data**: A n t a l y a: Köprü Irmagi (N of Beşkonak) [3], gorge, 1m

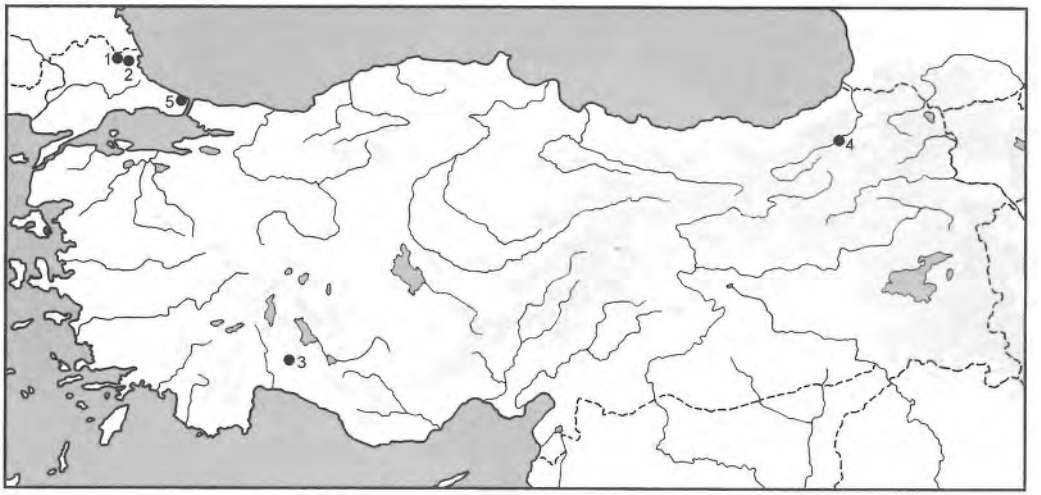

Fig. 12. Records of *Myotis bechsteinii* in Turkey. For symbol explanations see Fig. 4.

(Helversen 1989b). – A r t v i n: Yusufeli, Kiliçkaya bucagi [4], 1 ind. (Albayrak 1990). – I s t a n b u l: Belgrad forest [5], tree hollow, 23 June (year undef.): 1fa (Kahmann 1962).

DISTRIBUTIONAL STATUS (Fig. 12). More records of this rare species are available only from Thrace. One East-Pontic record (No. 4) may refer to the southeastern part of distribution range that covers Caucasus Mts., Transcaucasia and Kopetdag Mts. (DeBlase 1980, Vereščagin 1959). The Pamphylian record (No. 3) is the southernmost record of this species in whole distribution range (cf. Corbet 1978, Mitchell-Jones et al. in press). It suggests that *M. bechsteinii* may occur even in the region where it was not expected.

TAXONOMIC STATUS. Because of quite a restricted number of records (except for Central Europe), the geographic variation of *M. bechsteinii* has not yet been described. The population of the whole distribution range is generally arranged under nominotypic form *M. bechsteinii bechsteinii* (Kuhl, 1817) (terra typica: Hanau, Germany) (Corbet 1978, DeBlase 1980, Koopman 1994).

Myotis nattereri (Kuhl, 1817)

RECORDS. **Original data**: I ç e l: Bozagaç [1], Yalan Dünya magarasi cave, 30 Oct. 1993: net. 2m, CUP; – Narlikuyu [2], Cennet cave, 4 August 1992: net. 1f, NMP (spec. No. 47924); – Silifke [3], Castle of Silifke, 1 August 1992: obs. colony ca 15 ind., net. 3f, coll. 1f, NMP (spec. No. 47916). – K a r s: 5 km W of Sarikamiş [4], small tunnel under railway, 11 Sept. 1995: coll. 1m, CUP (previously mentioned as *M. schaubi*, viz. Benda & Horáček 1998). – K i r k l a r e l i: Sarpdere, Dupnisa magarasi cave [5], 16 Oct. 1993: net. 1m, CUP. – **Literary data**: A n t a l y a: Alanya [6], 1m (leg. Issel; Benda & Horáček 1995a, cf. Horáček & Hanák 1984); – Alara hani [7], 16 August 1986 (Spitzenberger 1994); – Beşkonak [8], small creek, 10 Oct. 1984: 1f (Helversen 1989b); – Incekum [9], 21 May 1966: 1m, 9f, SMF (Kock 1974, Benda & Horáček 1995a, cf. Horáček & Hanák 1984); – Manavgat [10], ancient aquaeduct, 29–30 June 1986: 1m, 1f (Helversen 1989b); – Side [11], large vault in amphitheatre, 13 April 1987: 1m (Helversen 1989b); – Termessos [12], abandoned building, 30 Sept. 1984: 1m (Helversen 1989b). – A r t v i n: Ardanuç [13], small cave, 12 August 1983: colony of 40–50 ind. (3faL, 5fs, 3j) (Helversen 1989b). – Ç a n a k k a l e: Eceabat [14], Kilitbahir village, 14 July 1984: 2mj, 1fa (Albayrak 1993, 1993a); – Seddülbahir [15], 1 June 1967: 7f, NMW (Benda & Horáček 1995a, Peus 1978a, cf. Horáček & Hanák 1984). – D e n i z l i: Aşagidere köyü village [16], 30 August 1984: 5ma, 7fa (Albayrak 1993, 1993a). – V a n: Muradiye [17], Bendimahi, rock chimney, 5 June 1992: 1 ind. (from owl's pellets) (Obuch 1994).

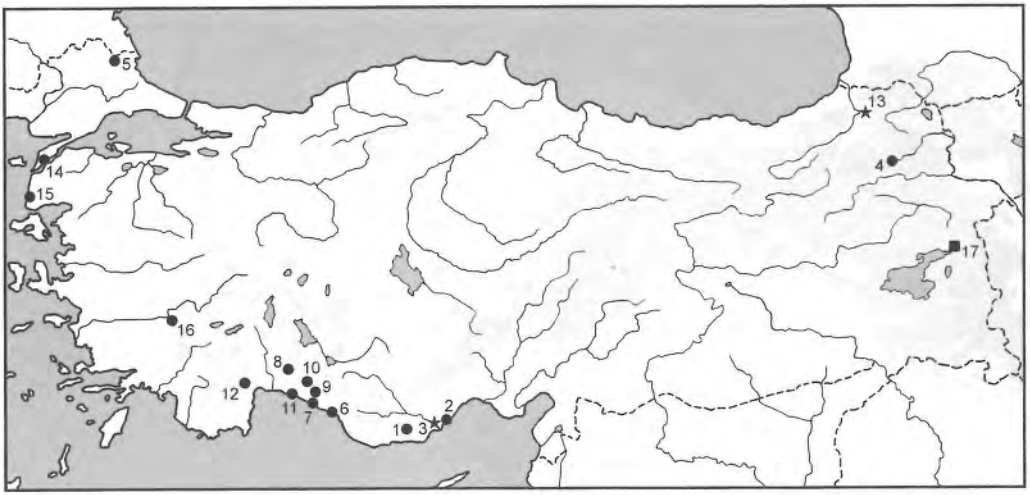

Fig. 13. Records of *Myotis nattereri* in Turkey. For symbol explanations see Fig. 4.

DISTRIBUTIONAL STATUS (Fig. 13). According up to now data, *M. nattereri* inhabits Turkey in two distinct populations, the Western population occuring in Thrace and in the Mediterranian coast, and the eastern one that extends the population of Transcaucasia and the Northern Iran.

TAXONOMIC STATUS. Corbet (1978) reported four subspecies: *M. nattereri nattereri* (Kuhl, 1817) (terra typica: Hanau, Germany) from the European territory, *M. n. araxeus* Dahl, 1947 (t. t.: Araxes River valley, Armenia) from Armenia and the Northwestern Iran, *M. n. tschuliensis* Kusjakin, 1935 (t. t.: Chuli, Kopetdag Mts., Turkmenistan) from Kopetdag Mts., and *M. n. hoveli* Harrison, 1964 (t. t.: Aqua Bella, Palestine) from Palestine. At that time, there was no records of *M. nattereri* in Asian part of Turkey (cf. Kumerloeve 1975). Strelkov et al. (1978) confirmed that *M. n. tschuliensis* from Turkmenistan and Transcaucasia is larger in cranial measurements than members of the European populations. Rzebik-Kowalska et al. (1978) reported *M. nattereri* from the Northern Iraq, and pointed out its differences from the nominotypic form.

Horáček & Hanák (1984) in respect to sympatric occurrence distinguished a small and a big form of the *M. nattereri*-group in Armenian Highlands of Armenia and Iran (cf. also Harrison 1963) as separate species: *M. schaubi araxenus* and *M. nattereri*. The differences among the local populations of the latter species in the Middle East were found to substantiate their subdivision in two subspecies, i. e. *M. n. tschuliensis* (Kopetdag Mts., Transcaucasia, Northern Iraq and the Northern Iran), and *M. n. nattereri* (Europe, from Spain to Ural Mts., the Western Turkey up to Israel, and the Northwestern Africa). Helversen (1989b) found all his Turkish material (incl. that from province of Artvin) to fall in variation range of *M. n. nattereri*. Albayrak (1993a) arranged all his West-Turkish samples under the form *M. n. hoveli,* according to the criteria of Horáček & Hanák (1984) who, of course, found the differences between *M. n. hoveli* and *M. n. nattereri* much less apparent than those between *M. n. nattereri* and *M. n. tschuliensis* and included *M. n. hoveli* in synonymy of *M. n. nattereri*, a view adopted also by Koopman (1994). Benda & Horáček (1995a) described a cline shift in metrical characters in the whole areal of distribution, from the west to the east, and accepted the conclusions mentioned above.

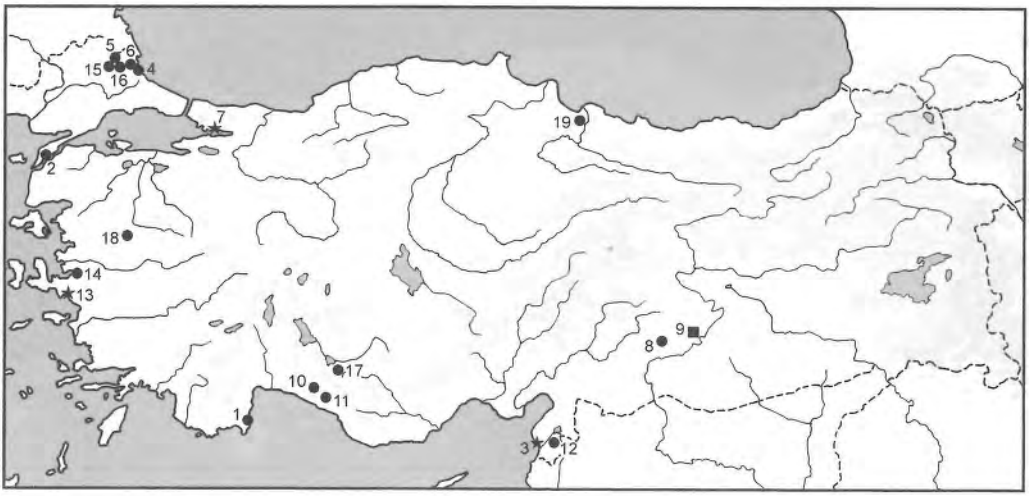

Fig. 14. Records of *Myotis emarginatus* in Turkey. For symbol explanations see Fig. 4.

Consequently, most of the territory of Turkey is inhabited by a nominotypic subspecies *M. n. nattereri* that exhibits here the characters approaching the state in its southernmost populations ("*hoveli*"). Besides it, however, *M. n. tschuliensis* can be predicted for the territory of the Eastern Turkey, and, in the Armenian Highlands and/or Turkish Kurdistan, also *M. schaubi araxenus* can be expected.

Myotis emarginatus (Geoffroy, 1806)

RECORDS. **Original data**: A n t a l y a: Olympos [1], 31 Aug. 1984: 1m, NMW (spec. No. 34373). – Ç a n a k k a l e: Yalova [2], ruins of a castle 4 km to S, 31 May 1967: 1f, NMW (spec. No. 11815). – H a t a y: Çevlik [3], ancient tombs, 20 May 1995: 11fa, NMP (spec. Nos 47933–47943; cf. Benda 1996). – K ı r k l a r e l i: Kiyiköy (= Midye) [4], a cave S, 2 June 1968: 7f, 1 s. i., NMW (spec. Nos 13419, 13423, 13426–13431); – Sarpdere, Dupnisa magarasi cave [5], 16 Oct. 1993: net. 1m, CUP; – small cave in a quarry n. Safe suyu spring (3 km NW Sergen) [6], 1 Sept. 1996: net. 1m, NMP (spec. No. 47959). – K o c a e l i: Hereke [7], cave, 25 June 1969: 6fa, SNMB (leg. Matoušek; cf. Benda 1996). – **Literary data**: A d i y a m a n: Indere (Zey) köyü village [8], 3 ind. (Albayrak 1990); – Karadut [9], cave, 7 June 1992: 3 ind. (from owl's pellets) (Obuch 1994). – A n t a l y a: bridge over Manavgat river (n. Ibradi) [10], 28 June 1986: 3j (Helversen 1989b); – Manavgat [11], ancient aquaeduct, 29 June 1986: 1mj (Helversen 1989b). – H a t a y: Altinözü [12], Kozkalesi köyü village, 4 ind. (Albayrak 1990). – I z m i r: Gümüldür [13], Incirli pit, nurs. colony ca 200 ind., coll. 36 ind. (Albayrak 1993); – Smirne (= Izmir) [14], 1870: "numerosi esemplari" (Doria 1887). – K ı r k l a r e l i: Kazankaya, Şeytanderesi cave [15], 12 July 1961: 2mj, 1faL, 4fj (Çaglar 1961c, 1965, 1969); – Yeniceköy [16], cave, 20 July 1961: 1fj (Çaglar 1961c, 1965, 1969). – K o n y a: Üçpinar (SW of Bozkir) [17], 27 June 1986: 1m (Helversen 1989b). – M a n i s a: Demirci [18], Çataloluk köyü village, Delikyar magarasi cave, 8 ind. (Albayrak 1993). – S a m s u n: Kelkaya mahallesi [19], Asaragaç köyü village, 9 ind. (Albayrak 1990).

DISTRIBUTIONAL STATUS (Fig. 14). *M. emarginatus* occurs in relatively humid regions of Turkish coast and of the Euphrates River valley (cf. Benda 1996).

TAXONOMIC STATUS. Geographic variation over whole the range of distribution has as yet not been studied in *M. emarginatus* (Topál in press). Kumerloeve (1975) considered the samples from Thrace to belong to the nominotypic form *M. emarginatus emarginatus* (Geoffroy, 1806) (terra typica: Charlemont, France). Corbet (1978) reported subspecies *M. e. emarginatus* for the European range,

and *M. e. desertorum* (Dobson, 1875) (t. t.: Jalq, Baluchistan) for Iran and the Central Asia. At the time, no records were available from Asia Minor (cf. Kumerloeve 1975). Based on differences in colouration, Strelkov et al. (1978) distinguished in the sample from Turkmenistan, two different forms, viz. *M. e. desertorum* in Kopetdag Mts. and in the valley of Murghab River, and *M. e. saturatus* Kuzjakin, 1934 (t. t.: Tashkent, Uzbekistan) in the Kugitangtau range (Eastern Turkmenistan). DeBlase (1980) reported *M. e. emarginatus* in the west of Iran. Harrison & Bates (1991) attributed the same name to the Arabian population (with an exception of Oman). The same opinion was presented also by Koopman (1994).

Topál (in press) tends to suppose that Europe up to Caucasus Mts. is inhabited by *M. e. emarginatus*, and Caucasus Mts., (the Great) Armenia and Kopetdag Mts. by the form *M. e. turcomanicus* Bobrinskii, 1925 (t. t.: Murghab River valley, Turkmenistan). The form *M. e. desertorum* could occur in Baluchistan and Oman, and *M. e. saturatus* in the Central Asia.

Myotis mystacinus (Kuhl, 1817)

RECORDS. **Original data**: B o l u: Çepni [1], travertine, remains of 1 ind. in pellets of *Bubo bubo*. – I ç e l: Narlikuyu [2], 29 Oct. 1993: remain of 1 ind. in pellets of cf. *Strix aluco*. – K a r s: Аралых (= Aralik) [3], 2m, 2f, 2 s. i., ZIN (spec. Nos 9002–9005, 9011–9013, leg. Satunin, rev. Benda, cf. Strelkov 1983b); – 5 km N of Sirbasan [4], small tunnel under railway, 10 Sept. 1995: net. 2m, NMP (spec. Nos 48094, 48095). – K i r k l a r e l i: Sarpdere, Dupnisa magarasi cave [5], Summer 1995, PMSL (leg. Kryštufek). – V a n: Castle of Van [6], 28 July 1992: net. 4m, NMP (spec. Nos 47912–47915). – **Literary data**: A d i y a m a n: Karadut [7], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – A n k a r a: Kirmir Çayi (S of Kizilcahamam) [8], over a river, 17–19 June 1986: 2m, 2f (Helversen 1989b). – A n t a l y a: Beşkonak [9], valley, 10 Oct. 1984: 1f (Helversen 1989b); – bridge over the Manavgat river (n. Ibradi) [10], 28 June 1986: 1 mummy (Helversen 1989b). – B i t l i s: Tatvan [11], Karşiyaka mahallesi, 20 July 1977: 1ma, 8fa, 1fj (Albayrak 1990, 1991). – B u r s a: Nilüfer Çayi (S of Uludag) [12], 21–22 July 1983: 4f (Helversen 1989b). – Ç a n k i r i: Devrez Çayi (n. Ilgaz) [13], under a bridge, 15 August 1983: 1m (Helversen 1989b). – E r z u r u m: Çoruh valley betw. Ispir and Yusufeli [14], 5 August 1983: 1f (Helversen 1989b); – NW of Ispir [15], 4 August 1983: 1m (Helversen 1989b); – Sohun Dere [16], a rocky valley, 7 August 1983: 2m, 4f (Helversen 1989b). – I ç e l: n. Mersin [17], 8 Nov. 1913: 1m (Kumerloeve 1975). – I z m i r: Seferihisar [18], Doganbey Burnu, 10 June 1985: 3mj, 3fa, 2fj (Albayrak 1991, 1993); – Smirne (= Izmir) [19], 1870: 2 ind. (Doria 1887). – K i r k l a r e l i: 5 km W of Igneada [20], 13 May 1967 (Hůrka 1972). – K o n y a: Üçpinar (SW of Bozkir) [21], 27 June 1986: 1m, 1f (Helversen 1989b). – M u ş: Alpaslan D.Ü.Ç (= state farm) [22], 8 July 1979: 1ma, 1mj, 10fa (Albayrak 1990, 1991). – R i z e: Hemşin (= Ortaköy) (Çaglar 1969) = Çat (n. Çamlihemşin), 4–13 August 1967: nursery colony (Peus 1976) – this material was reexamined by Steiner & Gaisler (1994) as *Myotis brandtii* (see below). – V a n: Castle of Van [6], 27 July 1977: 1fa, 1fj (Albayrak 1990, 1991). – NE Anatolia (no exact loc.), ind. in Russian collections (Çaglar 1965; see above [3], resp. Strelkov 1983b).

Myotis cf. *mystacinus*

RECORDS. **Original data**: A r t v i n: Murgul, Damar [23], in the village, 3 Sept. 1995: det. min. 10 ind. – B u r s a: Uludag, 1450 m [24], 29 July 1994: det. 1 ind.; – Uludag, 1700 m [25], 28 July 1994: det. 1–2 ind. – I s t a n b u l: Yalova Termal [26], over a brook below a dam, 24 June 1990: det. 1 ind. – K o c a e l i: Fevziye [27], 4 km S of Altinova, 23 June 1990: det. – T r a b z o n: Sumelas [28], 25 Oct. 1993: det. min. 1 ind.

DISTRIBUTIONAL STATUS (Fig. 15). *M. mystacinus* inhabits all regions of Turkey except for Central Anatolian steppes in the middle part of Asia Minor, and it belongs there, as in the Balkans, among the most common bat species (Tab. 1). The Turkey is the southern margin of its Mediterranean distribution range, that pass then through Persian Azerbaijan, Zagros, Elborz and Kopetdag Mts. into the Central Asia (DeBlase 1980, Kock 1996, Strelkov 1983a, b). Dobson (1878) reported a specimen of *M. mystacinus* coming from a southern region (Syria) in the collection of British Museum but Harrison (1964) and Harrison & Bates (1991) do not comment this specimen and do not consider this species to be a member of Arabian fauna (but cf. Qumsiyeh 1996).

TAXONOMIC STATUS. Taxonomy of *M. mystacinus*-group was several times discussed, supplemented and revised (Hanák 1965, Kuzjakin 1950, Topál 1958). Among other, these studies resulted in exlu-

sion of the form *Myotis brandtii* (Eversmann, 1845) from context of the species *M. mystacinus* (Gauckler & Kraus 1970, Hanák 1970) and revision of the European findings of *M. ikonnikovi* Ognev, 1912 (terra typica: Ussuri River valley, Russian Far East) (viz. Abelencev et al. 1956, Kvartirnikov 1957), that were included into *M. mystacinus* (Hanák 1965). Stubbe & Chotolochu (1968) proposed an overall classification of Palearctic populations of *M. mystacinus* (within the species concept sensu Ellerman & Morrison-Scott 1951) but they did not included Caucasian and Turkish populations. Corbet (1978) distinguished several subspecies in the whole range of distribution: *M. mystacinus mystacinus* (Kuhl, 1817) (t. t.: Germany) in Europe and the Western Asia (incl. Turkey and Caucasus Mts.), *M. m. transcaspicus* Ognev et Heptner, 1928 (t. t.: Mikhailovskoj, Kopetdag Mts., Turkmenistan) in Kopedag Mts. and Central Asia, *M. m. przewalskii* Bobrinskoj, 1926 (t. t.: Moldja River valley, Eastern Turkestan, China) in the Western China and Mongolia, *M. m. meinertzhageni* Thomas, 1926, (t. t.: Ladak, Kashmir) in Himalayas and Pamir Mts. and *M. m. sogdianus* Kuzjakin, 1934 (t. t.: Tashkent, Uzbekistan) in the Central Asia. The most extensive revision was published by Strelkov (1983a). He analyzed the population of the Eastern Europe and the Northern Asia and subdivided it in four subspecies: *M. m. mystacinus* inhabiting the forest zone of Europe and of the Southwestern Siberia; *M. m. popovi* Strelkov, 1983 (t. t.: Crimea, Ukraine), occuring in Moldavia, in the Southern Ukraine and in Ciscaucasia, so mostly in steppe areas; *M. m. aurascens* Kusjakin, 1935 (t. t.: Vladikavkaz, Southern Russia) inhabiting the forest zone of Caucasus Mts.; *M. m. przewalskii*, that occurs in the Middle Asia, Mongolia and the Western China (in two size-types, comp. Kruskop & Borissenko 1996). Koopman (1994) has distinguished more subspecies in the Asian part of the distribution range: *M. m. transcaspicus*, *M. m. sogdianus*, *M. m. nipalensis* (Dobson, 1871) (t. t.: Katmandu, Nepal), *M. m. davidi* (Peters, 1869) (t. t.: Peking, China) in addition to *M. m. przewalskii* mentioned to that region by Strelkov (1983). Recently, based on the Strelkov's (1983a) proposal, was described a new subspecies, *M. m. mongolicus* Kruskop et Borissenko, 1996 (t. t.: Barun-Torey Lake, Russia).

The above list of opinions illustrates well the fact that taxonomy of *M. mystacinus* and present classification of individual populations are quite confused. Nevertheless, the population of boreal zone incl. the Central and the Northern Europe, and Northern Asia seems to be relatively homogenous in morphometrical respect and can be tentatively classified as belonging to the nominotypic subspecies *M. m. mystacinus*.

The disunity in evaluation concerns in particular "the southern" populations of *M. mystacinus* s. l., inhabiting the Southern Palearctics in the range from Balkans to China, so Turkey including. In agreement with experience of other students, Helversen (1989a, b) reports that in the territory of the Balkans and Turkey (and further to the east), there are still two other species, not yet distinguished from true *M. mystacinus*. So, the group should consist of three species: (a) a small-sized form with the forearm lenght up to 32 mm, with short and pale auricles and tragi that slighly exceed breaking of the posterior ear margin (tentatively coidentified with *M. ikonnikovi* or yet undescribed form); (b) a large form that Helversen (1989a) coidentified with the Central European *M. mystacinus*; and (c) a form temporary called *M. przewalskii*, that should be extremely well-built, with massive baculum, strongly reduced P^3 and P_3, and nonspecified differences in skull, chromosomes and ecology. Concerning the Turkish populations, Helversen (1989b) found that individuals of *M.* "*mystacinus*" *przewalskii* from the province of Erzurum have longer forearms (35–36 mm, n=6), than those from the Western Anatolia (32.5–34.5 mm, n=13). The name *M. przewalskii* and the name for the "new" species, Helversen (1989a) inferrs from an older study by Stubbe & Chotolchu (1968). They showed the variation of *M. mystacinus* in the whole areal of distribution, and suggested its taxonomic status, but they did not exclude the form *M. brandtii* as a species. It is important to note that the closest verified records of *M. ikonnikovi* come from the Western Altai Mts., the Eastern Kazakh-

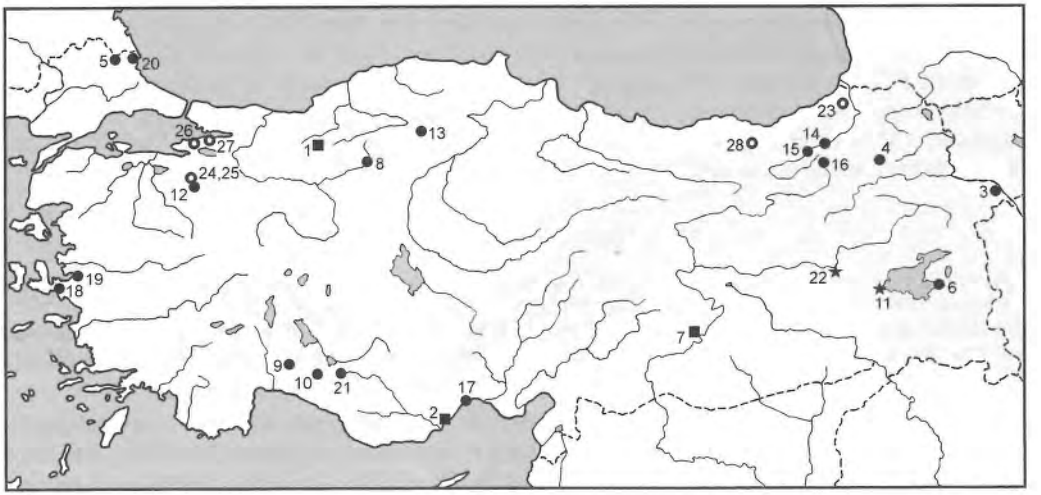

Fig. 15. Records of *Myotis mystacinus* in Turkey. For symbol explanations see Fig. 4, open symbols denote bat detector records of *Myotis* cf. *mystacinus* (see text).

stan (Strelkov & Šajmardanov 1983), i. e. from the area of sympatry with *M. mystacinus* and also *M. brandtii*. Anyhow, Strelkov (1983a) reported from the northern part of Caucasus Mts. finding of a bat corresponding in size with *M. ikonnikovi* (LCr 12.2 mm) from the Far East. Volleth (1987) with aid of NOR chromosome staining, distinguished two forms of *M. mystacinus*-group in the Balkans, differing from the Central-European population of *M. mystacinus* and *M. brandtii* in NORs localisation ("*Myotis* sp. A" and "*Myotis* sp. B").

There are two descriptions available from the Eastern Meditteranean: *M. mystacinus bulgaricus* Heinrich, 1936 (t. t.: E of Plovdiv, Bulgaria), now considered as a synonyme of the nominotypic subspecies (cf. Corbet 1978, Hanák 1965), and *M. mystacinus hajastanicus* Argyropulo, 1939 (t. t.: E of Sevan Lake, Armenia), the form, that has been, according to absolutely largest size, relatively long tail, and cranial characters, distinguished by Argyropulo (1939) from *M. m. brandtii*, *M. m. transcaspicus*, *M. m. kukunoriensis* and *M. m. przewalskii*. Hanák (1965) has considered *M. m. hajastanicus* as a valid subspecies, and besides the type series ranks there also the finding of Harrison (1963) from Gutur-Su (Northwestern Iran). Strelkov (1983a) who reexamined the type series considered the description of *M. m. hajastanicus* as incorrect, but he has not provided a conclusion on the status of the population from the Lesser Caucasus Mts. and the Armenian Highlands. Albayrak (1991) who studied Turkish populations of *M. mystacinus*, and compared them with literary data (i. e., Hanák 1970, Gauckler & Kraus 1970), has claimed the nominotypic subspecies does not occur in the territory of Turkey and atributed all his records to *M. m. hajastanicus* (refusing the opinion on its synonymy with *M. m. mystacinus* by Gauckler & Kraus 1970).

In conclusions, a question of phyletic diversification and actual content of *M. mystacinus*-group is among the most complicated tasks of contemporary chiropteran systematics. *M. mystacinus*-like bats represent one of the target phenotypes into which phylogenetic divergence of vespertilionid bats tends to canalize. There is an extremely large variation in frame of this principaly generalized phenotype. It may include as well a temporary divergence of local populations, a cline variation as it may result of a parallel variation in supposedly quite a distant lineages. To distinguish

in each region and each sample which kind of variation does here play a role is almost beyond scope of standard morphometric techniques. The topics call for a profound revision of all available material in the Palearctic range (including type material of all taxa named within this group) using a combined application of both the traditional and new taxonomic approaches. In any case, for the moment, it seems clear that just in the territory of Turkey at least three different forms do occur. Which is their actual status and actual distribution pattern remains a task of further study.

Myotis brandtii (Eversmann, 1845)

RECORDS. **Literary data**: R i z e: Çamlihemşin, Çatköy [1], 27 August 1967: 4ms, 3fs, 11 July 1980: 1ms, 1fs (Albayrak 1990, 1991); – Çat (S of Çamlihemşin) [1], house, 6 August 1967: 3f, 10 August 1967: 5f, 2 Sept. 1967: 1m (Steiner & Gaisler 1994, cf. Peus 1976); – Hemşin (= Ortaköy), by Çaglar (1969) mentioned as *M. mystacinus*, but reexamined by Steiner & Gaisler (1994) (under locality Çamlihemşin); – Meydan (S of Çamlihemşin) [2], pile of logs (in forest), 7 Sept. 1968: 1fj (Steiner & Gaisler 1994).

DISTRIBUTIONAL STATUS (Fig. 16). All Turkish records of *M. brandtii* come from one restricted area in the Easternmost Pontus, and most probably belong to an isolated population inhabiting also Caucasus Mts. and Transcaucasia (Strelkov et al. 1978, Strelkov 1983a, Ilyin et al. 1998). In the Eastern Turkey, the occurrence of *M. brandtii* has been expected already by Kumerloeve (1975). The other area where it may possibly occur is the mountain part of Thrace (Istranca Mts.) neighbouring the Bulgarian mountains where this species has been already found (Horáček et al. 1974, Ivanova 1998, Pandurska & Beshkov 1998). The question whether these two populations are interconnected through the Pontic mountains remains still open, of course.

TAXONOMIC STATUS. Geographic variation in the East-European and the Asian parts of distribution range of *Myotis brandtii* has been revised by Strelkov (1983). He reported two subspecies: *M. brandtii gracilis* Ognev, 1927 (terra typica: Vladivostok, Russian Far East), that occurs in Far East and the Eastern Siberia, and *M. b. brandtii* (Eversmann, 1845) (t. t.: Spassk, Southern Ural Mts., Russia) inhabiting the rest of the distribution range, with exception of a supposedly isolated population in Caucasus Mts. and Transcaucasia (i. e. incl. the Eastern Turkey), which taxonomic status Strelkov (1983a) kept as unclear. Turkish material coming from one and the same locality was studied by Albayrak (1991) and Steiner & Gaisler (1994) who found no esential differences from the morphometrical diagnosis of the species as understood based on the European samples.

Myotis daubentonii (Kuhl, 1817)

RECORDS. **Original data**: B o l u: Abant Gölü [1], S bank of the lake, 13 June 1998: det. min. 5 ind. – K i r k l a r e l i: Igneada, Longoz [2], a stream in woodland, 9 May 1992: net. 3 ind. (leg. Reiter, Andreas & Sádlová), 23 June 1994: net. 1m, 1f, CUP; – Sarpdere, Dupnisa magarasi cave [3], 16 Oct. 1993: net. 2m, 1f, CUP; – Velika Köprüsü bridge (8 km SW of Demirköy) [4], 5 May 1992: net. 2 ind. (leg. Reiter, Andreas & Sádlová), 30 August 1996: net. 2ms, NMP (spec. Nos 47944, 47945). – **Literary data**: B o l u: 10 km W of Mudurnu (= "Mudurnu yolu") [5], 1 Sept. 1986: 5ms, 1fs (Albayrak 1988, 1993). – B u r s a: Çaybaşi (S of Uludag Mts.) [6], Nilüfer Çayi creek, 22 July 1983:3m (Helversen 1989b). – S a m s u n: Tozköy (20 km S of Bafra) [7], small river, 30 July 1983: 3m (Helversen 1989b). – Turkey (no exact loc.) (Theodor 1967).

DISTRIBUTIONAL STATUS (Fig. 16). An occurrence of *M. daubentonii* in Thrace and Western Pontus evidently extends its Balkan range. There is no evidence of this species in Caucasus Mts. and Transcaucasia. In the Northwestern Turkey, this species reaches the southernmost margin of its distributional range in the Eastern Mediterranean (viz. Bogdanowicz 1994, Mitchell-Jones et al. in press).

TAXONOMIC STATUS. Corbet (1978) reported the nominotypic subspecies *M. daubentonii daubentonii* (Kuhl, 1817) (terra typica: Hanau, Germany) only from the whole range of distribution. Hanák &

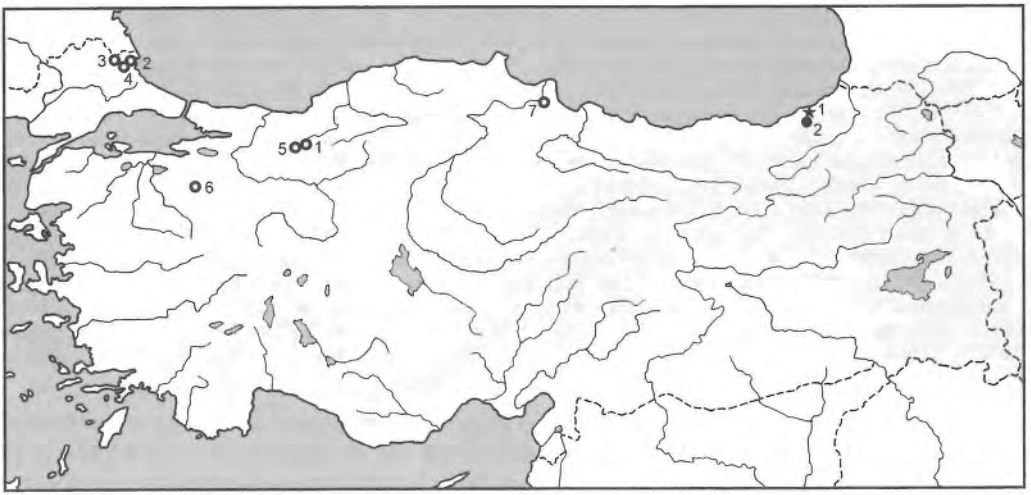

Fig. 16. Records of *Myotis brandtii* (closed symbols) and *M. daubentonii* (open symbols) in Turkey. For symbol explanations see Fig. 4.

Horáček (1984) proposed three well (in metrical characters) defined subspecies inhabiting the Western Palearctics: *M. d. nathalinae* Tupinier, 1977 (t. t.: Cabezzarrubias, Spain) for the Iberian peninsula, *M. d. daubentonii* for the Central Europe and *M. d. volgensis* (Eversmann, 1840) (t. t.: Ural Mts., Russia) in the Eastern Europe and Siberia. However, they did not mention the Balkan and Ciscaucasian populations (the Turkish samples were not evaluated). Albayrak (1988), who first reported this species for Turkey, claimed that in size his specimens are smaller in comparison with data by Hanák & Horáček (1984). Also Helversen (1989b) noticed the differences: he reported, that the specimens from Uludag Mts. are smaller and more reddish than those from Samsun province where the bats are bigger and dark brown-grey (the similar observation he reported also for Greece: bats in the Prespa Lake are bigger than those from Chalkidiki peninsula). Bogdanowicz (1990, 1994), based on taxonomical comparison of the material from whole Europe, arranged both the Siberian and European populations to the nominotypic subspecies. He also stated cline shift of metrical characters in agreement with the Bergmann's rule, just with the exception of the marginal southernmost populations (Southern Portugal and Macedonia). Thus, the geographic variation in *M. daubentonii* can be characterised by cline increase in size either from the west to the east, and from the south to the north. It is still an open question, however, whether the specificity of the southernmost population in the Eastern Mediterranean (i. e. those from Turkey) are indeed so large that would be worth of a nomenclatoric separation at the level of subspecies.

Myotis capaccinii (Bonaparte, 1837)

Records. **Original data**: A n t a l y a: Sahil [1], 26 April 1992: net. 1f, CUP (leg. Hanák). – B o l u: Çepni [2], travertine, remains of 1 ind. in a pellet of *Bubo bubo*. – I ç e l: Bozagaç [3], Yalan Dünya magarasi cave, 30 Oct. 1993: net. 1f, CUP. – I s t a n b u l: Yalova Termal [4], over a brook below a dam, 24 June 1990: det. 2 ind. – K i r k l a r e l i: Igneada, Longoz, a stream in woodland [5], 23 June 1994: det. 1 ind.; – Igneada, Longoz [6], Bezergan magarasi cave, 9 May 1992: obs. 3 ind. (leg. Reiter, Andreas & Sádlová), 22 June 1994: net. 1m, CUP; – Sarpdere, Dupnisa magarasi cave [7], 16 Oct. 1993: net. 1m, 5f, CUP; Summer 1995, PMSL (leg. Kryštufek). – **Literary data**: A n t a l y a: Kaş [8], 10 June 1966: 6 ind. (Kock 1974); – Manavgat [9], ancient aquaeduct, 13

April 1987: 5 ind. (Helversen 1989b). – A y d i n: Sultanhisar [10], ancient Nyssa, 5 May 1985: 1f (Helversen 1989b). – B a l i k e s i r: Koyunkaya (n. Manyas) [11], cave, 26 Sept. 1960: 1m (Çaglar 1961b, 1965, 1969). – B u r d u r: Insuyu magarasi cave [12], 11 April 1966: 75 ind., 24 Febr. and 24 June 1969: 8 ind. (Kock 1974), 8 July 1987: 4m, 2f (Albayrak 1990a, 1993). – B u r s a: river SE of Inegöl [13], 20 July 1987: 1m (Helversen 1989b). – E d i r n e: Ibrice (n. Keşan) [14], cave, 4 August 1987: 1m, 2fa, 3fs (Crucitti 1988). – H a t a y: Antakya [15], 20 Febr. 1960: 1 ind. (Kahmann & Çaglar 1960); – Habibinecar dagi (n. Antakya) [16], aquaeductus, 16 Febr. 1960: 3m, 1f (Çaglar 1961b, 1965); – Harbiye (n. Antakya) [17], cave, 23 Febr. 1960: 1m, 26 May 1960: 1m (Çaglar 1961b, 1965); – Narlica köyü village [18], cave, 16–23 Febr. 1960: 4m, 5f (Kahmann & Çaglar 1960, Çaglar 1961b, 1965, 1969, Kock 1974), Karalik magarasi cave, 12 Nov. 1979: 7m, 1f (Albayrak 1990, 1990a). – I ç e l: n. Tarsus [19], 23 July 1959 (Osborn 1963); – Tasucu (n. Silifke) [20], cave, 11 Febr. 1961: 1m (Çaglar 1961b, 1965, 1969). – I s t a n b u l: Küçükçekmece [21] (Çaglar 1969), Halkali cave, 15May 1971: 12f (DeBlase & Martin 1973); – Şile, Sofular köyü village [22], cave, 30 Sept. 1987: 4m, 2f (Albayrak 1990a, 1993); – Yarimburgaz [23], cave, 31 July 1960: 1m, 2f (Çaglar 1961b, 1965). – I z m i r: Bergama [24], 8 June 1977: 22 ind. (Kock 1989), Bergama, ruins (Kahmann 1962). – K i r k l a r e l i: 5 km W of Igneada [25], 13 May 1967 (Hůrka 1972); – Demirköy [26], cave, 17 July 1961: 1f (Çaglar 1965, 1969), 10 May 1967 (Hůrka 1972). – K o n y a: Üçpinar (SW of Bozkir) [27], 27 June 1986: 8m, 3f (Helversen 1989b).

DISTRIBUTIONAL STATUS (Fig. 17). *M. capaccinii* is known only from the coastal areas of the Western and the Southern Turkey. The Turkish records delimit the eastern margin of the distribution range of this species, which continues to the south through the Levant into the Southeastern Mesopotamia and the Southern Iran (DeBlase 1980, Harrison & Bates 1991).

TAXONOMIC STATUS. Kumerloeve (1975) supposed that subspecies *M. capaccinii bureschi* (Heinrich, 1936) (terra typica: Karamlek, Stranja [= Istranca] Mts., Bulgaria) occured in Thrace. Except for Corbet (1978) who doubted its validity and reported the nominotypic subspecies *M. c. capaccinii* (Bonaparte, 1837) (t. t.: Sicily, Italy) only, many authors (DeBlase 1980, Harrison & Bates 1991, Koopman 1994) accepted the Kumerloeve's conclusion that the Turkish range is inhabited by subspecies *M. c. bureschi*. The Turkish sample was factually evaluated by Albayrak (1990a) who considered Turkish populations to belong to the subspecies *M. c. capaccinii* (although he supposed that populations from Israel and Iran differ from the others in some cranial characters).

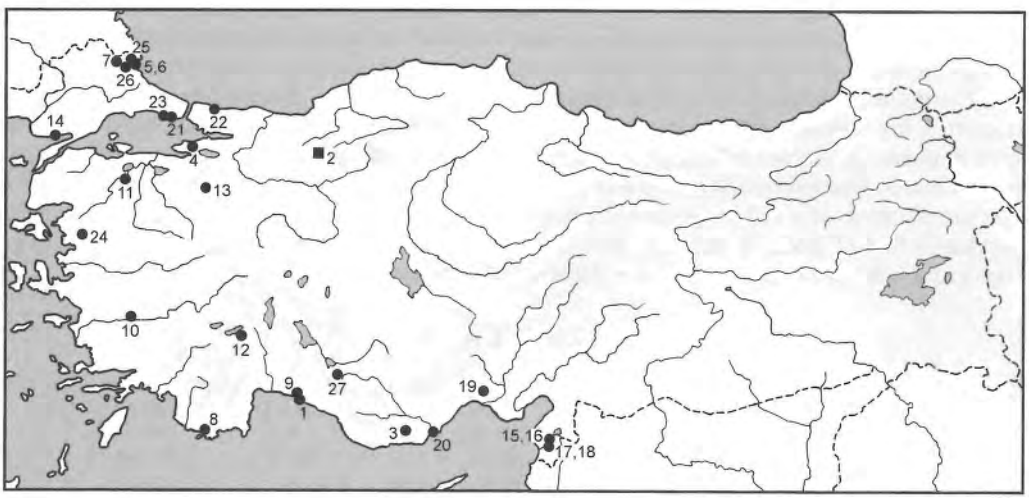

Fig. 17. Records of *Myotis capaccinii* in Turkey. For symbol explanations see Fig. 4.

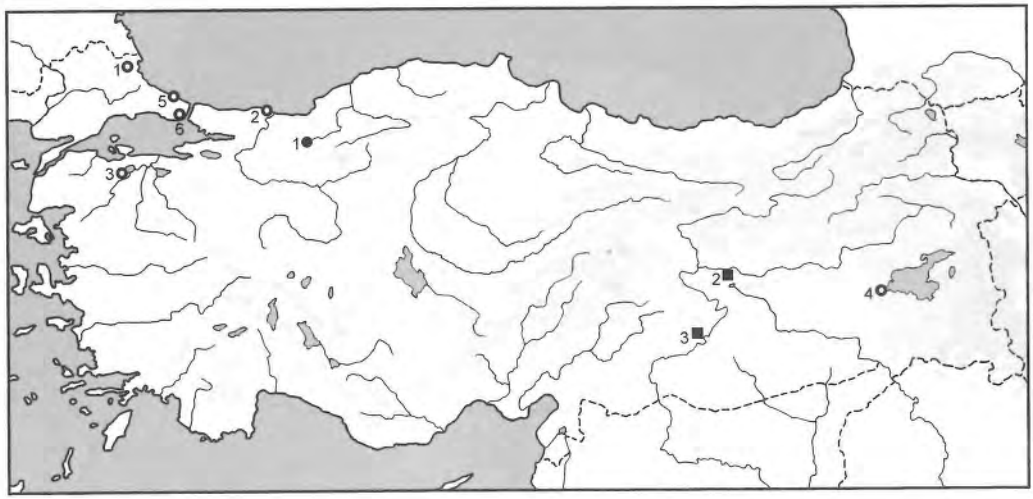

Fig. 18. Records of *Vespertilio murinus* (closed symbols) and *Pipistrellus nathusii* (open symbols) in Turkey. For symbol explanations see Fig. 4.

Vespertilio murinus Linnaeus, 1758

RECORDS. **Original data**: B o l u: Abant Gölü lake [1], 24 June 1994: det. 1 ind., 26 June 1994: det. 1 ind. – E l a z i g: Harput [2], Buzluk magarasi cave, 27 Oct. 1993: 1 ind. in a subfossil deposit. – **Literary datum**: A d i y a m a n: Karadut [3], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994).

DISTRIBUTIONAL STATUS (Fig. 18). There are only three findings of *V. murinus* in Turkey. They make the southern margin of its distribution range in the Eastern Mediterranean. Strelkov (1997a, b) has supposed that Mediterranean does not belong to the range of reproduction of *V. murinus* (i. e. region of nursery colonies) but to the area of seasonal migrations only.

TAXONOMIC STATUS. Corbet (1978) reported nominotypic subspecies *V. m. murinus* Linnaeus, 1758 (terra typica: Sweden) for the areal from Europe to the Amur region. Many other authors (DeBlase 1980, Koopman 1994, Strelkov et al. 1978) consent to this statement.

Eptesicus serotinus (Schreber, 1774)

RECORDS. **Original data**: A n k a r a: Kurutlutepe [1], shore of Tuz Gölü lake, 13 June 1998: remains of 1 ind. in pellets of cf. *Bubo bubo* (leg. Obuch). – A r t v i n: Murgul [2], Damar, in the village, 3 Sept. 1995: det. min. 1 ind. – B o l u: environs of the town (Thermal) [3], 12 June 1990: det. min. 1 ind. – Ç o r u m: Hattuşaş [4], 22 April 1996: remain of 1 ind. in pellets of cf. *Strix aluco* (leg. Obuch). – E d i r n e: Edirne [5], town, 28 Oct. 1994: det. 2–3 ind. – E l a z i g: Harput [6], Buzluk magarasi cave, 27 Oct. 1993: net. 1 ind., CUP. – E s k i ş e h i r: a rocky massif 10 km NE Sivrihisar [7], 4 July 1994: det. 1–2 ind. – I ç e l: Narlikuyu [8], 29 Oct. 1993: remain of 1 ind. in pellets of cf. *Strix aluco*. – I s t a n b u l: Yalova [9], a town outskirts, 21 June 1990: det. min. 1 ind. – K a r s: Ani [10], ruins of Armenian town, 20 May 1997: obs. 1 ind. in a wall fissure; – Карызман (= Kagizman) [11], 1896: 2m, 1f, ZIN (spec. Nos 4876–4878, leg. Satunin). – K a y s e r i: Yeşilhisar [12], 3 km NW Akköy, Summer 1995, PMSL (leg. Kryštufek). – S i n o p: a village between Yaliköy and Kabali [13], 22 Oct. 1993: det. min. 1 ind. – S i v a s: Gücük (n. Sarkişla) [14], Summer 1995, PMSL (leg. Kryštufek). – Z o n g u l d a k: 10 km SW Karabük [15], 1 July 1994: det. swarming of a colony; – Yenice [16], in the village, 1 July 1994: det. 1 ind. – no exact loc.: Turkish-Persian border, 20 April 1914: 1f, ZIN (spec. No. 48507, leg. Nesterov). – **Literary data**: A d a n a: Kadirli [17], small colony, coll. 2 ind. (Albayrak 1993). – A d i y a m a n: Karadut [18], cave, 7 June 1992: 2 ind. (from owl's pellets) (Obuch 1994). – A n k a r a: Şerefli Koçhisar [19], arid valley, 28 June 1986: det. (Helversen

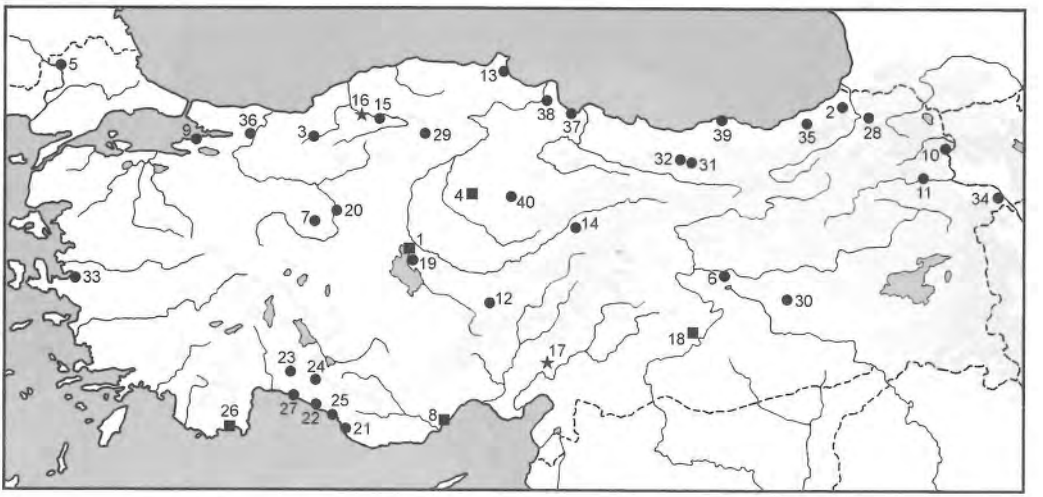

Fig. 19. Records of *Eptesicus serotinus* in Turkey. For symbol explanations see Fig. 4.

1989b); – Yassihöyük (= Gordion) [20], 25 July 1983: det. (Helversen 1989b). – A n t a l y a: 9 km NW of Gazipaşa [21], obs. (Spitzenberger 1994); – Alara hani [22], 16 August 1986: obs. group of ca 50 ind., 4 single ind., 4 couple of ind., group of 3 and 8 ind. (coll. 2m, 7f) (Spitzenberger 1994); – Beşkonak [23], 30 June 1986: 2f (Helversen 1989b); – bridge over Manavgat river (n. Ibradi) [24], 28 June 1986: det. (Helversen 1989b); – Castle of Alanya [25], obs. (Spitzenberger 1994); – Finike [26], Cliff cave, summer 1965: 1 maxilla (Corbet & Morris 1967); – Side [27], amphitheatre, 30 June 1986: 1m (Helversen 1989b). – A r t v i n: gorge below Ardanuç [28], 12 August 1983: 1fj (Helversen 1989b). – Ç a n k i r i: Devrez Çayi creek (n. Ilgaz) [29], 15 August 1983: 5f (Helversen 1989b). – D i y a r b a k i r: Birklin magaralari cave (n. Lice) [30], 27 July 1984: 1 ind. juv. (Spitzenberger 1994). – G i r e s u n: Kemaliye Köyü village [31], schoolhouse, 10 ind. (Albayrak 1990); – mountain forest betw. Kümbet and Tamdere [32], 1 August 1983: det. (Helversen 1989b). – I z m i r: Izmir (no exact loc.) [33] (Çaglar 1965). – K a r s: Aralych-Bezirk (= vicinity of Aralik) [34] (Satunin 1913); – "das Plateau von Kars" (Satunin 1913). – R i z e: Şenyuva (S of Çamlihemsin) [35], house, 24 August 1967: 1m (Steiner & Gaisler 1994). – S a k a r y a: Istanbuldere köyü village (n. Adapazari) [36], behind the window, 15 August 1963: 1f (Çaglar 1965, 1969). – S a m s u n: Karadeniz Pest Control Research Institute [37], 4 ind. (Albayrak 1990); – Tozköy (20 km S of Bafra) [38], 30 July 1983: 1mj, 1f (Helversen 1989b). – T r a b z o n: Vakfikebir [39], Beşikdüzü bucagi, Takazli Köyü village, 14 ind. (Albayrak 1990). – Y o z g a t: Issa-fakir [40], 1m, 1f (Danford & Alston 1877) = Isar-Fakir (Dobson 1878) = Isafakir (Çaglar 1965) = Isakfakir (Spitzenberger 1994).

DISTRIBUTIONAL STATUS (Fig. 19). Altogether 40 records of *E. serotinus* cover, similarly as in some of above mention species (i. e. *R. hipposideros*, *M. blythii*), almost the whole area of Turkey, i. e. all biogeographic units, except for the region of Mesopotamian steppes (Tab. 1).

TAXONOMIC STATUS. According to Corbet (1978) whole Europe up to Caucasus Mts. is inhabited by the nominotypic subspecies *E. serotinus serotinus* (Schreber, 1774) (terra typica: France), the Southwestern Iran by *E. s. shiraziensis* (Dobson, 1871) (t. t.: Shiraz, Iran), Kopetdag Mts. and Central Asia by *E. s. turcomanus* (Eversmann, 1840) (t. t.: between Caspian and Aral Lakes), and some other forms occur in Afghanistan and in the eastern part of the range (*E. s. pachyomus* (Tomes, 1857), *E. s. pashtonus* Gaisler, 1970, etc.). Strelkov et al. (1978) have reported *E. s. serotinus* from higher altitudes of the Western and Central Kopetdag Mts. and *E. s. turcomanus* from the Eastern Kopetdag Mts. and deserts north of it. Gaisler (1970), Harrison & Bates (1991) and Koopman (1994) consider territory of Asia Minor as part of the range of *E. s. serotinus*. DeBlase (1980) arranged the samples from Transcaucasia and Kurdistan up to the Kopetdag Mts. to *E. s. serotinus*,

while that from the Southern Zagros Mts. to *E. s. shiraziensis*. Steiner & Gaisler (1994) did not find any differences between the East-Turkish sample and *E. s. serotinus* from Central Europe.

A detailed analysis of the Turkish material of *E. serotinus* was undertaken by Spitzenberger (1994). She has assumed that nominotypic subspecies is dispersed from Europe (incl. the Balkans), through the Pontic Mts., Transcaucasia and the Southern Caspian coast up to Kopetdag Mts. In contrast, her samples from the Southern Anatolia differed at a subspecific level (exhibiting the same colouration as *E. s. turcomanus*, and the same size as *E. s. shiraziensis*) though their subspecific status was not formally specified because of scarcity of prerequisite comparative material.

Consequently, it seem possible to conclude that territory of Turkey may is a zone of transition between two forms differing at a subspecific level, i. e. *E. s. serotinus* (Northern Turkey), and the southern one, that can be tentatively coindetified with *E. s. shiraziensis*.

Eptesicus bottae (Peters, 1869)

RECORDS. **Original data**: I ç e l: Bozagaç [1], Yalan Dünya magarasi cave, 30 Oct. 1993: net. 1m, CUP; – Narlikuyu [2], 29 Oct. 1993: remain of 2 ind. in pellets of cf. *Strix aluco*; – Narlikuyu, Cennet cave [3], 4 August 1992: net. 1m, NMP (spec. No. 47925). – **Literary data**: A d a n a: Toprakkale [4], 5 August 1976: 1m, 1fs (Nader & Kock 1990). – A d i y a m a n: Karadut [5], cave, 7 June 1992: 11 ind. (from owl's pellets) (Obuch 1994). – A n t a l y a: Alanya [6], 21 May 1966: 1f (Felten 1971); – Belkis köyü village [7], 30 July 1984: 4m, 16f (Spitzenberger 1994); – Myra (n. Kale) [8], 13 August 1986: 1m, 1f (Spitzenberger 1994); – Olimpos (n. Kumluca) [9], 31 July 1984: 1m (Spitzenberger 1994). – I ç e l: 5 km SW of Tasucu [10], 18 August 1986: 2f (Spitzenberger 1994); – Anamur [11], old fort of castle, 3 Sept. 1975: 1fa (Nader & Kock 1983); – Anamurium (n. Anamur) [12], 17 August 1986: 1m, 1f (Spitzenberger 1994); – Castle of Mamure (5 km SE of Anamur) [13], 17 August 1986: 1f (Spitzenberger 1994); – Castle of Tokmar (11 km SW of Bogsak) [14], 18 August 1986: 1f (Spitzenberger 1994); – Silifke [15], 19 August 1986: 1m, 1f (Spitzenberger 1994). – I z m i r: Efes [16], 2 August 1984 and 6 August 1986: 5m, 13f (Spitzenberger 1994); – Selcuk [17], 5 August 1986: 2m (Spitzenberger 1994). – M a n i s a: Sartmustafa [18], Sardes, 1m, 1f (Spitzenberger 1994).

DISTRIBUTIONAL STATUS (Fig. 20). *E. bottae* has been recorded only in the southern part of Asia Minor (*E. bottae anatolicus*). There may be a continual extension of its range to the south (al-

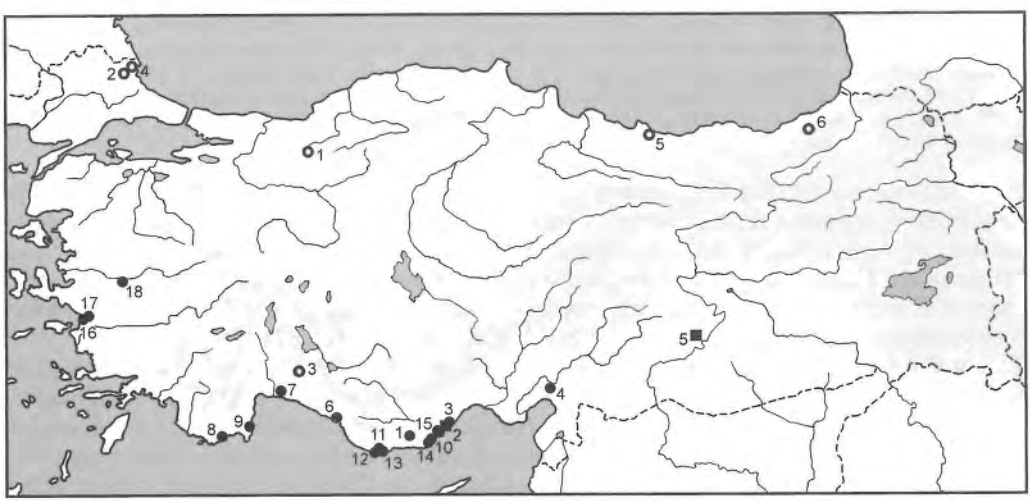

Fig. 20. Records of *Eptesicus bottae* (closed symbols) and *Nyctalus leisleri* (open symbols) in Turkey. For symbol explanations see Fig. 4.

though no Syrian records is available as yet) to the Northern Iraq (Harrison 1956) and the Persian Zagros Mts. (DeBlase 1980, own data), and it was found also in Greek island of Rhodes (Spitzenberger in litt.). Of course, this species (*E. bottae ognevi*) is also known from Transcaucasia (Georgia, Azerbaijan) and Persian Azerbaijan (DeBlase 1980, Hanák & Gaisler 1971, Nader & Kock 1990); from Nakhichevan (Naxçivan) where it was found even in the Araxes River valley, just bordering the Nortwestern Turkey. Thus, appearence of an other population in the Armenian Highlands and the Eastern Pontus, *E. bottae ognevi*, can be more than expected (cf. Koopman 1994).

TAXONOMIC STATUS. The first record of *E. bottae* from Turkey was obtained by Felten (1971) in Alanya (Antalya Province). He described it as a new species *E. anatolicus* Felten, 1971, and distinguished it from *E. bottae hingstoni* Thomas, 1919 (terra typica: Baghdad, Iraq) according to metrical characters. This become the only description of a bat species from today Turkish territory. Harrison (1975) reexamined the Arabian material of *E. bottae*, and included Felten's description in *E. bottae*, as an independent subspecies *E. bottae anatolicus* Felten, 1971. This solution was confirmed by many other authors (Corbet 1978, DeBlase 1980, Harrison & Bates 1991, Nader & Kock 1990, Spitzenberger 1994).

Hanák & Gaisler (1971) arranged originally independent species *E. ognevi* (Bobrinskii, 1918) (t. t.: Bukhara, Uzbekistan) under *E. bottae* which have been accepted also by Nader & Kock (1990) and Koopman (1993, 1994).

Hypsugo savii (Bonaparte, 1837)

RECORDS. **Original data**: E l a z i g: Harput [1], Buzluk magarasi cave, 27 Oct. 1993: net. 1m, CUP. – E r z u r u m: 10 km SW of Aydogdu [2], canyon, 9 Sept. 1995: det. min. 1 ind. – E s k i ş e h i r: a rocky massiff 10 km NE Sivrihisar [3], 4 July 1994: det. 1–2 ind. – I ç e l: Bozagaç [4], Yalan Dünya magarasi cave, 30 Oct. 1993: net. 1m, CUP. – Ş a n l i U r f a: Birecik [5], 15 July 1996: 1fj, found dead in rocks, CUP (leg. Voříšek). – T r a b z o n: Sumelas [6], 25 Oct. 1993: det. min. 1 ind. – V a n: Castle of Van [7], 28 July 1992: net. 2m, NMP (spec. No. 47909, 47910); – Muradiye, Seytan Köprüsü cave [8], 27 July 1992: net. 1m, NMP (spec. No. 47904). – Z o n g u l d a k: Safranbolu [9], Mencilar (= Mencilis) magarasi cave, 4 July 1994: det. 5–10 ind. – **Literary data**: A d i y a m a n: Karadut [10], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – A n k a r a: Ankara [11], building of Faculty of Science, Ankara University, 2 ind. (Albayrak 1993); – Ankara, four lokalities (one S of Ankara) [12] (Albayrak 1985, Helversen 1989b); – Yassihöyük (= Gordion) [13], 25 July 1983: 2m, 2f (Helversen 1989b). – A n t a l y a: Beşkonak [14], Köprü Irmagi river, 10 Oct. 1984: 1f, 30 June 1986: 2m, 1f (Helversen 1989b). – A r t v i n: Ardanuç [15], river in gorge, 12 August 1983: 1m (Helversen 1989b). – B u r s a: river SE of Inegöl [16], 20 July 1987: 1m (Helversen 1989b). – H a t a y: Belen [17], above the Topbogazi Gecidi pass, 9 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – I ç e l: n. Tarsus [18], 23 July 1959 (Osborn 1963). – V a n: Castle of Van [7], 1 ind. (Albayrak 1990).

DISTRIBUTIONAL STATUS (Fig. 21). Although actual record in Turkey is far not rich, in analogy with neighbouring regions it seem possible to expect that *H. savii* inhabits probably almost the whole territory of Turkey. Surprisingly, this species has not been found on the Aegean coast of Asia Minor and in Thrace though, according to the findings from the Balkan peninsula (see Mitchell-Jones et al. in press), it seems to be very common in all neighbouring areas, including the islands. Incidentally, this species was also very rarely recorded in Iran (DeBlase 1980).

TAXONOMIC STATUS. Corbet (1978) showed the form *H. savii savii* (Bonaparte, 1837) (terra typica: Pisa, Italy) in Europe and the Northern Africa, *H. s. caucasicus* (Satunin, 1901) (t. t.: Tbilisi, Georgia) in Caucasus Mts. up to the Western China. Harrison (1964) reported the form *H. s. caucasicus* for the Arabian part of range of distribution (and the Southern Turkey). Similar identification was proposed also for a sample from Tarsus Mts. by Kumerloeve (1975) and for other regions of the Southwestern Asia by many other authors (Bekenov et al. 1985, DeBlase 1980, Harrison & Bates 1991, Strelkov et al. 1978).

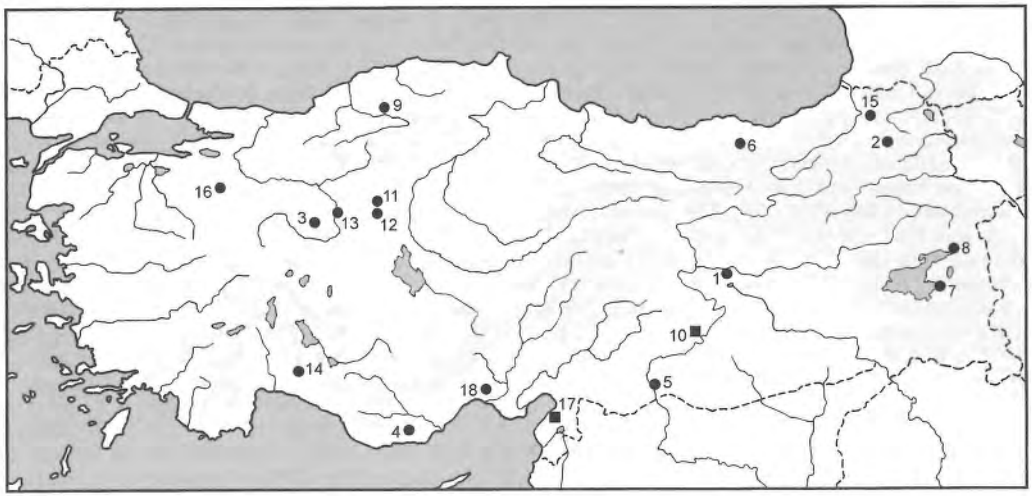

Fig. 21. Records of *Hypsugo savii* in Turkey. For symbol explanations see Fig. 4.

Horáček & Hanák (1986), who revised the material from the whole range of distribution, stated that the form *H. s. caucasicus* is distributed from Crimea, Turkey, Cyprus and Lebanon to Central Asia, while Europe, incl. the Balkans, is inhabited by *H. s. savii*. In contrast to Corbet (1978), they respected subspecific status of the Spanish and the North-African populations, *H. s. ochromixtus* (Cabrera, 1904) (t. t.: Madrid, Spain). Helversen (1989) noticed in more detail the colouration of the Turkish population: in Anatolia there are individuals with "sandy-golden back with long silky fur contrasting with black ears and muzzle", similary as in populations in the Aegean islands what contrasts with the dark individuals from the Greek mainland. These findings could correspond with the geographic separation suggested by Horáček & Hanák (1986). Anyhow, *H. savii* is extremely variegate in colouration (Dulić 1978) and taxonomical meaning of that character was doubted also by Arlettaz et al. (1993). Nevertheless, the mean population state of that character undoubtedly shows a considerable geographic differences and it is worth to be taken in account.

Pipistrellus pipistrellus (Schreber, 1774)

Records. **Original data**: A n t a l y a: Kinik (n. Kaş) [1], 25 April 1992: net. 1f, CUP (leg. Hanák). – A r t v i n: Murgul [2], Damar, in the village, 3 Sept. 1995: det. min. 1 ind. – B o l u: Abant Gölü lake [3], 24–26 June 1994: det. 3–5 ind. – B u r s a: Uludag [4], 1450 m, 29 July 1994: det. 1 ind. – E d i r n e: Edirne [5], old serail, 30 Oct. 1994: det. min. 8 ind., Selimiye Camii mosque, 28 Oct. 1994: det. min. 10 ind. – I ç e l: Narlikuyu [6], 29 Oct. 1993: remain of 3 ind. in pellets of cf. *Strix aluco*. – I s t a n b u l: Istanbul, near hippodrome [7], 25 June 1990: det. 5 ind.; – Simila [8], a village n. Yalova, 24 June 1990: det. 1 ind.; – Yalova [9], a town outskirts, 21 June 1990: det. min. 1 ind.; – Yalova Termal [10], over a brook below a dam, 24 June 1990: det. min. 1 ind. – I z m i r: Bergama [11], in the town, 3 Nov. 1993: det. min. 1 ind. – K a r s: Tuzluca [12], salt pit, 20 May 1997: remain of 1 ind. in a pellet of cf. *Strix aluco* (leg. Obuch). – K i r k l a r e l i: Velika Köprüsü bridge (8 km SW of Demirköy) [13], 5 May 1992: net. 1 ind. (leg. Reiter, Andreas & Sádlová), 30 August 1996: net. 1ms, 1fs, NMP (spec. Nos 47946, 47947). – K o c a e l i: Altinova [14], town outskirts, 23 June 1990: det. min. 1 ind.; – Fevziye (4 km S of Altinova) [15], 23 June 1990: det. min. 1 ind. – N e v ş e h i r: Göreme [16], cave 500 NE, 26 July 1996: net. 1 ind. (leg. Munclinger), 27 July 1996: net. 1fa (leg. Munclinger). – S a k a r y a: Denizköy [17], solitary house, 6 April 1992 1m (leg. Zukal). – S i n o p: a village between Yaliköy and Kabali [18], 22 Oct. 1993: det. min. 1 ind. – **Literary data**: A d a n a: Haruniye [19], 1953 (Kumerloeve 1975); – Karaisali [20], Baskif köyü village, 3 ind.

(Albayrak 1993); – Karataş [21], Spring 1987: 15–20 ind. obs. (van Winden 1988); – Tuzla [22], brick wall of the tearoom, 18 May 1987: obs. colony min. 99 ind. (van Winden 1988). – Adiyaman: Karadut [23], cave, 7 June 1992: 2 ind. (from owl's pellets) (Obuch 1994). – Ankara: Ankara [24], building of Faculty of Science, Ankara University, 3 ind. (Albayrak 1993), Ankara, a house, 24 August 1953: 1m (DeBlase & Martin 1973); – Çankaya [25], 23 Sept. 1978: 2fa (Albayrak 1987); – S of Kizilcahamam [26], det. (Helversen 1989b); – Yassihöyük [27], det. (Helversen 1989b). – Antalya: Beşkonak [28], 30 June 1986: 1faP (Helversen 1989b); – Demre (= Kale) [29], det. (Helversen 1989b); – Serik [30], cave, 7 Febr. 1960: 2f (Çaglar 1965, 1969); – Yalniz [31], house, sum. 1965: obs. colony (coll. 2 ind.) (Corbet & Morris 1967, cf. Neuhauser & DeBlase 1971). – Artvin: Artvin [32], Genya hotel, 16 July 1979: 13mj, 22fa, 14fj (Albayrak 1987, 1990). – Aydin: Kuşadasi [33], 13 June 1985: 12fa (Albayrak 1987, 1993). – Balikesir: Dinkçiler dist. [34], 18 June 1977: 1ma, 1fa (Albayrak 1987, 1993). – Bursa: Iznik [35], Elbeyli köyü village, 5 ind. (Albayrak 1993); – Nilüfer Çayi creek (S of the Uludag) [36], det. (Helversen 1989b); – Uludag [4], det. (Helversen 1989b). – Çanakkale: Gelibolu [37], building, 30 July 1962: 1fj (Çaglar 1965, 1969); – Gökçeada I. [38], Suürünleri building, 12 Sept. 1983: 3ma, 1fa (Albayrak 1987, 1993). – Çankiri: Çankiri (no exact loc.) [39] (Çaglar 1965). – Denizli: Baskarci [40], behind the window, 5 May 1962: 30f (Çaglar 1965, 1969). – Hatay: Bedirge (= Serinyol) [41], 23 April 1965: 3f, 28 April 1965: 1f (Lehmann 1966); – Narlica magarasi cave [42] (Şadoglu 1953); – vicinity of Antakya [43], 1953: 1m (mummy) (Lehmann 1966). – Içel: Kulakköy village [44], Spring 1987: 10–15 ind. obs. (van Winden 1988). – Isparta: Pazarköy [45], 27 May 1966: 8 ind. (Kock 1974). – Istanbul: Bebek [46], house, 12 May 1959: 1 ind. (Osborn 1963); – Incegiz (n. Çatalca) [47], cave, 29 nov. 1959: 1f (Çaglar 1965, 1969); – Tuzla [48], 20 Jan. 1964: 1m (Çaglar 1965, 1969); – Vaniköy [*49*], building, 6 Sept. 1962: 1m (Çaglar 1965, 1969); – Vezneciler [*50*], building, 22 Nov. 1963: 1m (Çaglar 1965, 1969); – Zekeriya köyü village [*51*], 1963: 1m, 2f (Çaglar 1965, 1969). – Izmir: Balikiosa (=? Balikliova) [52], 23 April 1969 (Peus 1976); – Izmir (no exact loc.) [53] (Çaglar 1965); – Çeşme [54], Alacati, Pazaryeri mosque, 25 August 1984: 6fa (Albayrak 1987, 1993); – n. Foça [55], det. (Helversen 1989b). – Kars: Aralik [56] (n. Igdir), D. Ü. Ç. (= state farm), 25 August 1968: 1fa (Albayrak 1987). – Kastamonu: Araç [57], 18 August 1984: 10fa (Albayrak 1987), Forest directory building, 22 ind. (Albayrak 1993). – Kirklarcli: Alpullu [58], 8 July 1985: 1ma, 4fa (Albayrak 1987, 1993); – Pinarhisar [59], tree hollow, 5 August 1963: 1m (Çaglar 1965, 1969). – Konya: n. Bozkir [60], det. (Helversen 1989b). – Manisa: Muradiye [61], Atatürk school, 14 June 1985: 10fa (Albayrak 1987, 1993). – Mugla: Dalyan [62], Ortaca, 26 May 1985: 30fa (Albayrak 1987, 1993), Dalyan, roof of a house, colony of 8–9 ind. (Baran et al. 1994); – Fethiye [63], cave, 9 Febr. 1960: 1m (Çaglar 1965, 1969); – Sultaniye [64], Ilica dist., 1 ind. (Baran et al. 1994); – Yarasli köyü village [65], 30 ind. (Albayrak 1993). – Rize: Rize [66], house, 19 Sept. 1967: 1f (Steiner & Gaisler 1994), 20 Sept. 1967 (Peus 1976); – Şenyuva [67], house, 31 August 1967: 1f (Steiner & Gaisler 1994); – Ülkü (S of Çamlihemşin) [68], house, 31 August 1967: 1f, 1 Sept. 1967: 2m, 10 Sept. 1968: 11f, 12 April 1969: 1f (Steiner & Gaisler 1994, cf. Peus 1976), 11 Sept. 1968, 11 April 1969 (Peus 1976). – Sakarya: Adapazari [69], Sakarya river, det. (Helversen 1989b). – Tokat: Turhal [70], Pazar bucagi, 12 August 1978: 1fj (Albayrak 1987, 1990). – Van: Erciş [71], Atatürk school, 3 July 1979: nursery colony, coll. 30fa, 1fj (Albayrak 1987, 1990). – Zonguldak: Çaycuma [72], Saz köyü village, 5 ind. (Albayrak 1993).

DISTRIBUTIONAL STATUS (Fig. 22). *P. pipistrellus* is the third most common bat species in Turkey (Tab. 1). It is partialy common in the coastal regions while number of records is much smaller in arid areas of the Central and Eastern Anatolia.

TAXONOMIC STATUS. The first who mentioned taxonomical status of the Turkish population of *P. pipistrellus* was Hanák (in Lehmann 1966). He attributed the whole Mediterranean population to *P. pipistrellus mediterraneus* Cabrera, 1904 (terra typica: Valencia, Spain). The other taxa that come in account, viz. *P. p. bactrianus* Satunin, 1905 (t. t.: Tedžen, Turkmenistan) and *P. p. aladdin* Thomas, 1905 (t. t.: Iran) were studied by Neuhauser & DeBlase (1971), who considered them synonymous (with the prior name *P. p. aladdin*) and delimited the distribution range of this form from Lake of Van and Zagros Mts. to Central Asia and China. Moreover, Corbet (1978) suggested that the populations of Europe, Asia Minor and Palestina belong to the form *P. p. pipistrellus* (Schreber, 1774) (t. t.: France) to which he synonymized also the form *P. p. mediterraneus* while the populations from Iran, Central Asia and Afghanistan he arranged under *P. p. aladdin* (sensu Neuhauser & DeBlase 1971). This view was adopted also by Harrison & Bates (1991), Koopman (1994) and DeBlase (1980) who contributed it with records of *P. p. pipistrellus* from Transcaucasia and Elborz Mts., while, at the same time, those from Kurdistan and Zagros Mts. coidentified with *P. p. aladdin*. Strelkov et al. (1978) arranged the Turkmen population under *P. p. bactrianus* that he kept separat-

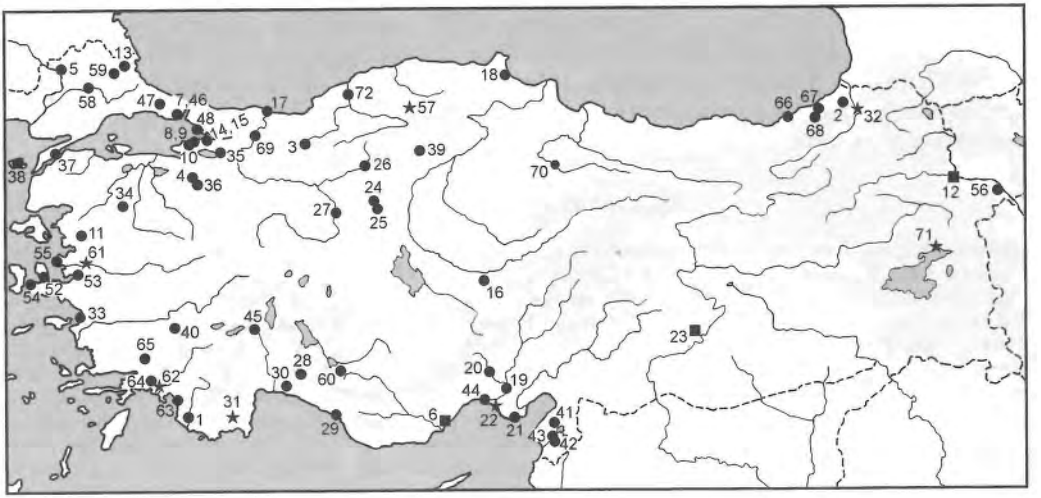

Fig. 22. Records of *Pipistrellus pipistrellus* in Turkey. For symbol explanations see Fig. 4.

ed from *P. p. aladdin*. The Turkish sample has been evaluated by Albayrak (1987) and Steiner & Gaisler (1994). Albayrak (1987) attributed the samples from the Northern and Western Turkey to *P. p. pipistrellus* while those from the Turkish Kurdistan to *P. p. aladdin*. Between these two regions he expected a broad zone of transition (that was however doubted by the Cilician findings). On the contrary, Steiner & Gaisler (1994) attributed their sample from the Rize province (and proposed for whole Asia Minor) to the form *P. p. mediterraneus*, so they refused its synonymy with the nominotypic form.

Anyhow, systematics of *P. pipistrellus* has recently been considerably contributed with discovery of two clades differing both in echolocation and some genetic markers (Barratt et al. 1997, Jones & Parijs 1993 etc.). Already the uncertainities with morphological discrimination between these two, genetically quite distant forms, suggest that *P. pipistrellus* may be just a taxon that include a considerable spectrum of hidden phyletic diversity and this may concern just of the "southern" forms we meet in Turkey.

Pipistrellus nathusii (Keyserling et Blasius, 1839)

RECORDS. **Original data**: K i r k l a r e l i: Velika Köprüsü bridge (8 km SW of Demirköy) [1], 15 Oct. 1993: net. 3f, CUP. – S a k a r y a: Denizköy [2], solitary house, 3 April 1992: net. 1f (leg. Zukal), 5 April 1992: net. 1m, 4f, 6 s. i. (leg. Zukal), 6 April 1992: net. 2m (leg. Zukal). – **Literary data**: B a l i k e s i r: Manyassee (= Kuş Gölü) [3], 30 Sept. 1964: 3m, 2f (Lehmann 1966). – B i t l i s: Tatvan [4], Karşiyaka mahallesi, 1 ind. (Albayrak 1990). – I s t a n b u l: 3 km SW of Karaburun (Terkos Gölü) [5], 20 May 1967 (Peus 1978a); – Stanbul (= Istanbul) [6], November 1958: 1mj (23 July 1958 ringed in Voronež reserve, Russia) (Kameneva & Panjutin 1960, cf. Strelkov 1969, 1971). – Anatolia (undef.): Asia Minore (= Asia Minor), 1 ind. (as *Vesperugo abramus*, in Mus. of Florence, Italy) (Doria 1887).

DISTRIBUTIONAL STATUS (Fig. 18). There are only five records of *P. nathusii* from Turkey, all representing marginal points of the species' distribution range (comp. Mitchell-Jones et al. in press, Strelkov 1997a, b). As shown by Strelkov (1997a, b) and Horáček et al. (1998) a great majority of records of *P. nathusii* refers to individual bats at time of seasonal migrations without any nursery colony having been recorded.

TAXONOMIC STATUS. As Corbet (1978) and Koopman (1994) reported, this species is monotypic and all populations belong to the form *P. nathusii nathusii* (Keyserling et Blasius, 1839) (terra typica: Berlin, Germany). A lack of local variation is in a good agreement with social organisation of this species which includes a long distance seasonal migrations combinated with extensively promiscuous mating system etc.

Pipistrellus kuhlii (Kuhl, 1817)

RECORDS. **Original data**: A d a n a: Deveciuşagi [1], sea shore, 26 Oct. 1991: net. 1m (leg. Červený). – A n t a l y a: Kinik (n. Kaş) [2], 23 April 1992: net. 1f, CUP (leg. Hanák). – A r t v i n: Murgul [3], Damar, in the village, 3 Sept. 1995: det. min. 1 ind. – B o l u: Bolu [4], environs of the town (Thermal), 12 June 1990: det. min. 2 ind. – E d i r n e: Edirne [5], town, Selimiye Camii mosque, 28 Oct. 1994: det. 1 ind.; neighbourhood of Edirne, 1993–1994: 2 ind., TUE (leg. Özkan); – E r z u r u m: Horasan [6], town, 11 Sept. 1995: det. 1 ind. – H a t a y: Александретта (= Iskenderun) [7], 1895: 2f, ZIN (spec. Nos 5020, 5021, leg. Rolle), 6 July 1899: 1 ind., ZIN (spec. No. 6899, leg Zarudnyj); Iskenderun, city, 30 July 1991: net. 2f, NMP (spec. Nos 47901, 47902); – Çevlik [8], 3 July 1998: remains of two ind. in pellets of *Strix aluco* (leg. Obuch); – Konacik [9], 24 Oct. 1991: net. 1f, NMP (spec. No. 51475, leg. Červený). – I ç e l: Narlikuyu, Cehennem cave [10], 3 August 1992: net. 1m, NMP (spec. No. 47923). – I s t a n b u l: Yalova [11], a town outskirts, 21 June 1990: det. min. 1 ind. – S a k a r y a: Denizköy [12], solitary house, 5 April 1992: net. 1f (leg. Zukal). – Ş a n l i U r f a: Harran [13], Sept. 1991: coll. 3m (leg. Frynta & Sádlová), remains of 47 specimens in pellets of *Tyto alba* (leg. Frynta & Sádlová). – no exact loc.: Turkish-Persian border, 25 April 1914: 2 ind., ZIN (spec. Nos 5007, 5008, leg. Nesterov). – **Literary data**: A d a n a: Haruniye [14], end of May 1953, mummies (Lehmann 1966); – Toprakkale [15], ruins of crusader castle, 17 August 1977: 1 ind. (from owl's pellets) (Nadachowski et al. 1990); – Sepici mahallesi [16], building of State Pest Control Research Institute, 10 ind. (Albayrak 1993). – A n t a l y a: Finike [17], 11 ind. (Albayrak 1993); – Kaş [18], 1 ind. (Albayrak 1993). – E l a z i g: Alişam [19], 17., 25 to 27 Sept. 1971: 6m, 6f (Kock et al. 1972); – Elazig [20], 18 Sept. 1971: 1f (Kock et al. 1972). – E r z u r u m: Hasankale [21], Köprüköy bucagi, schoolhouse, 3 ind. (Albayrak 1990). – G a z i a n t e p: Islahiye [22], 1 ind. (Albayrak 1990); – Room Kalch [23], Euphrates (Danford & Alston 1880) = Rumkale – Firat (Çaglar 1965, 1969). – H a t a y: 5 miles N of Iskenderun [24], curtain in a building, 10 August 1954: 1m (DeBlase & Martin 1973); – Antakya [25], 20 Febr. 1960: 1m (Çaglar 1965, 1969, cf. Kahmann & Çaglar 1960); – Arsuz [26], building, 18 Oct. 1954: 3m, 6f (DeBlase & Martin 1973); – Aşagioba köyü village [27], schoolhouse, 20 ind. (Albayrak 1990); – Dermacta köyü village (n. Harbiye) [28] (Çaglar 1969); – Muradbasi [*29*], middle of May 1953, mummies (Lehmann 1966); – Oglakören köyü village [*30*], schoolhouse, 32 ind. (Albayrak 1990); – Paşa köyü village [*31*], schoolhouse, 3 ind. (Albayrak 1990); – Serinyol bucagi [32], Alahan köyü village, castle, 1 ind. (Albayrak 1990), mosque, 13 ind. (Albayrak 1990). – I ç e l: Kitzkalesi (= Kizkalesi) (20 km E of Silifke) [33], 1 Sept. 1975: 1ma (Nader & Kock 1983); – Silifke [34], behind window, 10 Febr. 1961: 1m, 4f (Çaglar 1965, 1969), Silifke, betw. boards, 13 Febr. 1961: 1m, 2f (Çaglar 1965, 1969). – K a h r a m a n M a r a ş: Kahramanmaraş [35], house (Danford & Alston 1880). – K a r s: Aralych-Bezirk (= vicinity of Aralik) [36] (Satunin 1913); – Igdir [37], D.Ü.Ç (= state farm), 44 ind. (Albayrak 1990). – K a y s e r i: Kayseri (no exact loc.) [38] (Çaglar 1965). – M a r d i n: Atli Village (= Kasra Kanco) (40 km SW of Mardin) [39], 28 July 1970: 1m, 1f (Nader & Kock 1983); – Mardin ovasi [40], 3 ind. (Albayrak 1990). – M u g l a: Dalaman [41], D.Ü.Ç. (= state farm), 1 ind. (Albayrak 1993); – n. Fethiye [42], March 1960: 2 ind. (Osborn 1963). – Ş a n l i U r f a: Ceylanpinar [43], 18 May 1968: 1m, 1f (Lehmann 1969); – Harran [13], Şuayipşar köyü village, ruins, 1 ind. (Albayrak 1990); – Horozum köyü village [44], schoolhouse, 3 ind. (Albayrak 1990), (=?) Horzumlu köyü village, tree hollow, 24 August 1961: 1m, 1f Sept. 1963: 2m, 5f (Çaglar 1965, 1969); – Tokluoglu hill [*45*], 2 ind. (Albayrak 1990).

DISTRIBUTIONAL STATUS (Fig. 23). *P. kuhlii* is an euconstant element of Turkish bat fauna. It occurs in all biogeographic regions of Turkey (which otherwise holds true for *R. ferrumequinum* only). In the Cilician coast and Mesopotamia, it is even the most common species at all (Tab. 1). The same holds true also for neighbouring southern regions, i. e. the Syrian and Iraq Mesopotamia and the Levant (Harrison & Bates 1991) while it is not the case with those neighbouring Turkey in the North, since in most of the Balkans this species is fairly rare and/or absents at all (Mitchell-Jones et al. in press).
TAXONOMIC STATUS. Already Lewis & Harrison (1962) noted that in the Mediterranean region, the populations of *P. kuhlii* exhibit considerable cline variation in pelage colouration, those from the southern regions being much paler than those in the European part of the region. The paler forms

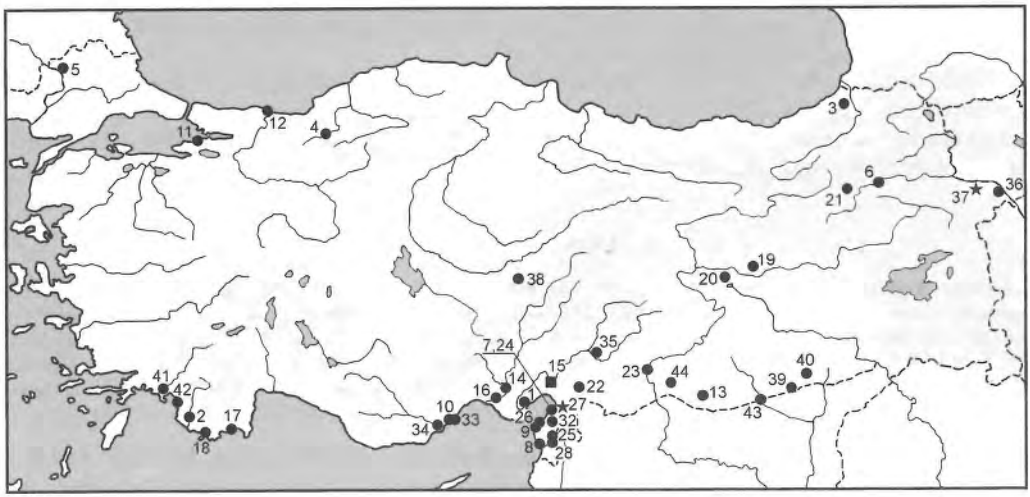

Fig. 23. Records of *Pipistrellus kuhlii* in Turkey. For symbol explanations see Fig. 4.

were traditionally distinguished from the nominotypic form, *P. kuhlii kuhlii* (Kuhl, 1817) (terra typica: Terst, Italy), as separate subspecies. At least three names come here in account, viz. *P. k. lepidus* Blyth, 1845 (t. t.: Kandahar, Afghanistan), *P. k. ikhwanius* Cheesman et Hinton, 1924 (t. t.: Hufuf, Hasa, Saudi Arabia) and *P. k. marginatus* (Cretzschmar, 1830) (t. t.: Arabia Petraea). It is not clear, however, to which degree (and by which characters) these pale southern forms differ each from the other. Hence, some authors proposed their synonymy. Kock et al. (1972), who evaluated the East-Anatolian *P. kuhlii* in details, found it to be distinctly paler that bats from the European Mediterranean but resignated to decide whether it is to be identified as *P. k. lepidus* or *P. k. ikhwanius*. Gaisler (1970) evaluated the Afghan sample and concluded that the name *P. k. lepidus* is an older synonyme of *P. k. ikhwanius*. Kumerloeve (1975) suggested, according to Harrison (1964), that Turkey is colonized by the southern form *P. k. ikhwanius*. Corbet (1978) reported only the nominotypic form for the whole area of distribution of this species, perhaps in account of that the differences among populations are not stepped but gradual. Strelkov et al. (1978) and DeBlase (1980) with reference to Gaisler (1970), reported the form *P. k. lepidus* from Kopetdag Mts. and the whole Iran. DeBlase (1980) also supposed, that the name *P. k. lepidus* could be a younger synonym of the name *P. k. marginatus* and Qumsiyeh (1985), though noted the differences between the extremely pale form inhabiting Egypt and Palestine and the darker one from Lebanon, Syria and Turkey synonymized them all, i. e. at least *P. k. ikhwanius* (and supposedly also *lepidus*) with *P. k. marginatus*. Nader & Kock (1983) suggested that the Mediterranean populations are an intermediate form between *P. k. kuhlii* and *P. k. ikhwanius*. Harrison & Bates (1991) distinguished in Arabia the northwestern form under the name *P. k. kuhlii*, and the southern desert form under the name *P. k. ikhwanius*, but they described also an intermediate (in colouration) form of the Levant. Steiner & Gaisler (1994) mentioned from the Northern Iran intermediate forms (both in metrical and colouration characters) between *P. k. kuhlii* and *P. k. marginatus* (sensu Qumsiyeh 1985). Summing all this up, it seem possible to conclude that over the Eastern Mediterranean there is a gradual transition between a paler form in south and a darker one that can be coidentified with the nominotypic form. Whether at least in some parts of this region that cline approaches a pattern of a categorial

variation (which then would substantiate different subspecific status of the respective population) remains a task of a further comparative study.

Unfortunately, although *P. kuhlii* represents a common species throughout whole the Mediterranean (being even one of index species of that region), and in some areas it has even expanded its range during last decades (cf. Rakhmatulina 1989, 1996, Bauer 1996, Strelkov & Il'in 1990), a detailed study of its geographic variation is still missing.

Nyctalus noctula (Schreber, 1774)

RECORDS. **Original data**: E d i r n e: Edirne [1], neighbourhood, 1994: 1 ind., TUE (leg. Özkan). – K i r k l a r e l i: Igneada, Longoz, river (n. a forest nursery) [2], 9 May 1992: net. 2 ind. (leg. Reiter, Andreas & Sádlová); – Igneada, Longoz, sea shore [3], 2 Sept. 1996: det. 1 ind.; – Velika Köprüsü bridge (8 km SW of Demirköy) [4], 15 Oct. 1993: net. 2f, CUP, 31 August 1996: net. 1ma, NMP (spec. No. 47950). – **Literary data**: A d i y a m a n: Karadut [5], cave, 7 June 1992: 9 ind. (from owl's pellets) (Obuch 1994). – E d i r n e: Edirne [1], Selimiye Camii mosque, small colony, coll. 6 ind. (Albayrak 1993). – I ç e l: n. Tarsus [6], 23 July 1959: 1 ind. (Osborn 1963).

DISTRIBUTIONAL STATUS (Fig. 24). A limited number of records available from Turkey come from two regions: the woodland region of Thrace (Istranca Mts.) neighbouring the records in Bulgarian and Greek mountains (cf. Mitchell-Jones et al. in press), and the Southern Anatolia near to those in the Levant region (viz. Harrison 1962, Harrison & Bates 1991). Although a great deal of the Mediterranean records of *N. noctula* comes from the transient period and may concern migrants of the northern populations (Strelkov 1997a, b), it is apparently not the case at least with those from the Levant region (cf. Harrison 1962) and supposedly also those from the Southern Anatolia.

TAXONOMIC STATUS. Harrison (1962) based on the sample from Lebanon described a new subspecies *N. noctula lebanoticus* Harrison, 1962 (terra typica: Natural Bridge, Lebanon) distinguished from the nominotypic form *N. n. noctula* (Schreber, 1774) (t. t.: France) by a dark colour of pelage. He compared it with the Central Asian form *N. n. meklenburzevi* Kuzjakin, 1934 (t. t.: Tashkent, Uzbekistan) which is considered to be very pale, and with the East-Asian forms generally dark coloured but metrically different. He also mentioned the Persian examples of the nominotypic subspecies. Corbet (1978) reported *N. n. noctula* for Europe (incl. the Balkans), *N. n. lebanoticus* for the Levant, and *N. n. meklenburzevi* for the Central Asia. Records from Transcaucasia and Iran has been attributed to the nominotypic form only (DeBlase 1980, Strelkov et al. 1978).

As mentioned above, Strelkov (1997a, b) has supposed that all findings of *N. noctula* in the Mediterranean are just examples of migrating individuals which area of reproduction lies northern of ca 45° N (except for Caucasus Mts. and Transcaucasia). It seems quite probable, of course, that besides of them there exist even in that region a resident, supposedly non-migrating population, more or less isolated from those of the nominotypic form. This is the case of the Levant population and most probably it concerns also that of the Southern Anatolia. Unfortunately, the record is still so scarce that it is quite impossible to draw any definite opinion.

Nyctalus leisleri (Kuhl, 1817)

RECORDS. **Original data**: B o l u: Abant Gölü [1], S bank of the lake, 13 June 1998: det. min. 3 ind., net. 1ma, NMP (spec. No. 47979); – K i r k l a r e l i: Velika Köprüsü bridge (8 km SW of Demirköy) [2], 15 Oct. 1993: net. 1f, CUP, 16 Oct. 1993: net. 2f, CUP, 31 August 1996: net. 2m, NMP (spec. Nos 47948, 47949). – **Literary data**: A n t a l y a: Köprü Irmagi (N of Beşkonak) [3], forest, 10 Oct. 1984: 1m (Helversen 1989b). – K i r k l a r e l i: 5 km W of Igneada [4], 15 May 1967 (Peus 1978a). – O r d u: Ordu [5], 9 Dec. 1960: 1m (30 July 1958 ringed in Voronež, Russia) (Panjutin 1980). – R i z e: Hemşin (Çaglar 1969) = Ülkü (S of Çamlihemşin) [6], house, 29 August 1967: 1m, 31 August 1967: 1m, 10 Sept. 1968: 2m, 1f, 12 April 1969: 1m (Steiner & Gaisler 1994).

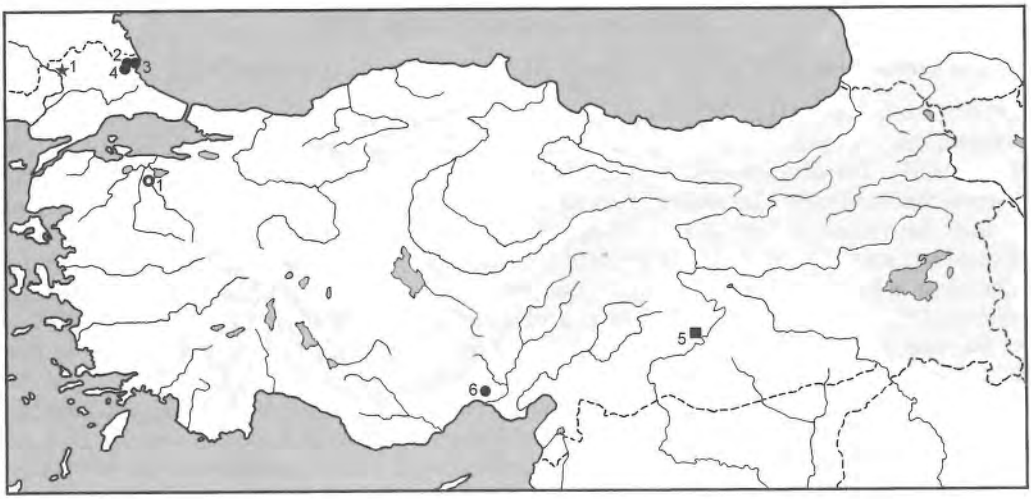

Fig. 24. Records of *Nyctalus noctula* (closed symbols) and *N. lasiopterus* (open symbol) in Turkey. For symbol explanations see Fig. 4.

DISTRIBUTIONAL STATUS (Fig. 20). Few Turkish records represent the southern marginal points of the Eastern Mediterranean distribution range of *N. leisleri* (Corbet 1978, Mitchell-Jones et al. in press). A great majority of the East-Mediterranean records of this species come from the spring and/or autumn transient period and concerns not a resident population but migrants (Horáček et al. 1998).
TAXONOMIC STATUS. Corbet (1978) and Koopman (1994) has supposed that except for populations from the Atlantic islands (Madeira and Azores), *N. leisleri* (Kuhl, 1817) (terra typica: Hanau, Germany) exists in just one nominotypic form. This opinion is consistent also with that by DeBlase (1980) who evaluated the sample from Iran and Palmeirim (1991) who studied variation in the westernmost range of the species. Steiner & Gaisler (1994) with reference to them include their Turkish records in *N. l. leisleri* what because of the above mentioned distributional reason is undoubtedly a very substantiated. A question is, however, whether a lack of geographic variation concerns also the Central-Asiatic part of the range colonized with mutually quite isolated and supposedly non-migrating local population (cf. Rybin et al. 1989).

Nyctalus lasiopterus (Schreber, 1780)

RECORD. **Literary datum**: B u r s a: Mustafakemalpaşa dist. [1], tree hollow (Kahmann 1962).

DISTRIBUTIONAL STATUS (Fig. 24). Until now, *N. lasiopterus* has been from Turkey reported only once, probably at time of its migration period. Ten records are available from Caucasus Mts. and Transcaucasia (cf. Tsytsulina 1998), and, hence, this species can be expected also in the Northeastern Anatolia.
TAXONOMIC STATUS. Corbet (1978), DeBlase (1980) and Koopman (1994) considered this species monotypic and all its populations arranged under *N. lasiopterus lasiopterus* (Schreber, 1780) (terra typica: Italy).

Otonycteris hemprichi Peters, 1859

RECORD. **Literary datum**: Ş a n l i U r f a: Birecik [1], 11 May 1972: 1m (Kumerloeve 1975).

DISTRIBUTIONAL STATUS (Fig. 25). The only record of *O. hemprichi* from Turkey represents the northwestern marginal point of its distribution range in the Middle East (viz. Horáček 1991, Nader & Kock 1983). The distributional pattern of this species is conform with that characterising the Saharo-Sindian Desert Mammals in the sense of Harrison (1964) which reach the northen margins of their distribution in Turkish part of Upper Mesopotamia.

TAXONOMIC STATUS. Corbet (1978) reported for Israel and Arabia a subspecies *O. hemprichi jin* Cheesman et Hinton, 1924 (terra typica: Hufuf, Saudi Arabia), for Iraq *O. h. petersi* Anderson et de Winton, 1902 (t. t.: Fao, Persian Gulf, Iraq), and for Northeastern Iran *O. h. cinerea* Satunin, 1909 (t. t.: Bamrud, Khorasan, Northeastern Iran). The Turkish population apparently belongs to that inhabiting the Syrian desert and Palestine, where Qumsiyeh (1985) located the form *O. h. jin,* the view adopted also by Koopman (1994). In contrary, Harrison & Bates (1991) has proposed that the form inhabiting the Syrian desert and Iraq should be classified as *O. h. petersi* whereas *O. h. jin* inhabits the area more to the south. Horáček (1991) found a cline variation in size and pelage colouration from Maghreb through Egypt up to the Central Asia and doubted a reality of subspecies within this species at all.

Barbastella Gray, 1821

RECORDS. **Original data**: K ı r k l a r e l i: Sarpdere [1], Dupnisa magarasi cave, 16 Oct. 1993: net. 5m, 5f, CUP. – N e v ş e h i r: Göreme [2], cave 500 NE, 26 July 1996: net. 1fa (leg. Munclinger). – **Literary data**: A d i y a m a n: Karadut [3], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – A r t v i n: Ardanuç [4], cave, 12 August 1983: 1fa (Helversen 1989b). – R i z e: Hemşin (= Ortaköy) [5] (Çaglar 1969); – Şenyuva (S of Çamlıhemşin) [6], house, 24 August 1967: 2m (Steiner & Gaisler 1994, cf. Kumerloeve 1975); – Soga (n. Tesine) [7], house, 6 Sept. 1968: 1m (Steiner & Gaisler 1994, cf. Kumerloeve 1975); – Ülkü (S of Çamlıhemşin) [8], house, 31 August 1967: 2m, 2f, 1 Sept. 1967: 2m, 6 Sept. 1968: 1m, 10 Sept. 1968: 1m (Steiner & Gaisler 1994, cf. Kumerloeve 1975).

DISTRIBUTIONAL STATUS (Fig. 25). Few records of barbastelle in Turkey come from three quite separated geographic regions: (a) Istranca Mts. in Thrace, (b) the Easternmost Pontus, and (c) steppes of Central Anatolia. While the former two are among just the best developed patches of humid woodland habitats in Turkey and both neighbour the non-Turkish regions from which more records of *B. barbastellus* are available (cf. e. g. Mitchell-Jones et al. in press, Bobrinskij et al. 1965), the region (c) differs quite a much. It is characterized with a dry and climatically quite severe rocky steppes of Central Anatolia almost without any woodland vegetation. Both the records in that region (Nos 2 and 3) are quite isolated as well from the former ones (that can be looked upon as offshoots of more or less continuous distribution of *B. barbastellus*) as from the other nearest records of this genus which are available from central Iran (DeBlase 1980) and Israel (Harrison & Makin 1988, Harrison & Bates 1991).

TAXONOMIC STATUS. The genus is considered to consist of two species, both coming in account also in the Eastern Mediterranean and the Middle East (Bobrinskij et al. 1965, Corbet 1978, DeBlase 1980, Koopman 1993, 1994, Kuzjakin 1950, Vereščagin 1959, Pavlinov et al. 1995 etc.): *B. barbastellus* (Schreber, 1774) (terra typica: Burgundy, France) distributed in the northwestern part of Palearctic region (European temperate forests up to Caucasus Mts.) and *B. leucomelas* (Cretzschmar, 1826) (t. t.: Arabia Petraea [= Sinai]) in the major part of the Middle East (from the Northeastern Africa and Arabia to Central Asia). *B. leucomelas* consists of two subspecies, nominotypic *B. l. leucomelas*, and *B. l. darjelingensis* (Hodgson, 1855) (t. t.: Darjeeling, Northeastern India), the population of the Middle East being arranged under the nominotypic subspecies (Corbet 1978, DeBlase 1980,

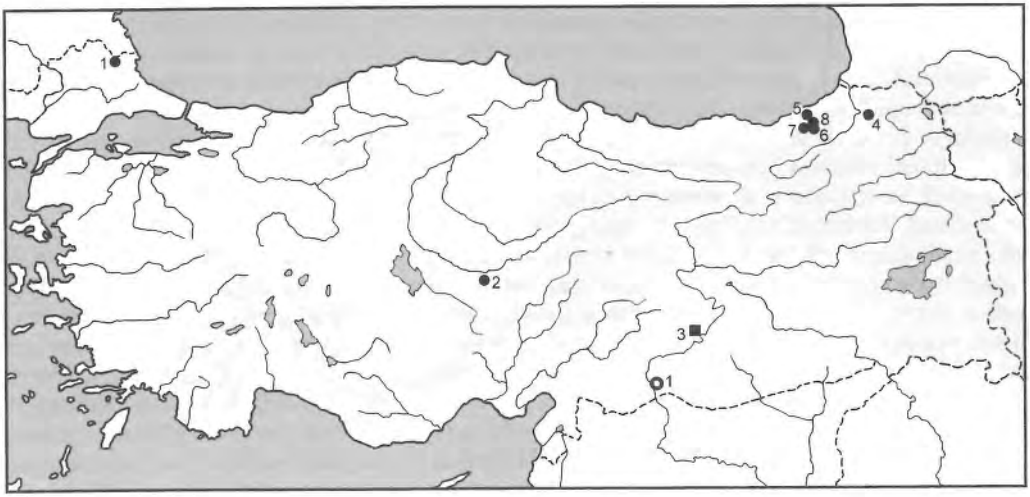

Fig. 25. Records of *Otonycteris hemprichi* (open symbol) and *Barbastella* sp. (closed symbols) in Turkey. For symbol explanations see Fig. 4.

Harrison & Bates 1991, Koopman 1994); Strelkov et al. (1978) synonymized with the nominotypic form also *B. l. caspica* Satunin, 1908 (t. t.: Kubaly, Pirsagat River, Azerbaijan) and *B. l. walteri* Bianchi, 1916 (t. t.: Transcaspia), comp. Kuzjakin (1934). *Barbastella barbastellus* is considered a monotypic taxon as a rule (Corbet 1978, Koopman 1994).

Both the species are discriminated particularly based on differences in shape of auricle, namely by a presence of a distinct lobule at the outer margin of pinae in *B. barbastellus* and its absence in *B. leucomelas*. As shown e. g. by Hackethal et al. (1988), both these character states occur even in a Mid-European population of *B. barbastellus* and, hence, its validity for species diagnosis is doubtfull. Hackethal et al. (1988) demonstrated, moreover, that in the southern part of Central Europe, the frequency of "*leucomelas*" morphotype is higher than in the Northeastern Europe. Neither the other characters discriminating both the species (cf. Harrison & Makin 1988) are more impressive. These concern mainly bigger size and somewhat paler colouration in "*leucomelas*". According to Kuzjakin (1950) and Bobrinskij et al. (1965), the forearm lenght of the morphotype "*barbastellus*" is 36–41 mm, of the morphotype "*leucomelas*", it is 41.2–45 mm. Koopman (1994) reported 36–41, 38–45 mm respectively. DeBlase (1980) showed for *B. leucomelas* from Iran the forearm lenght 42.0–42.8 mm (n=3). There is no zone of sympatry except for southern Transcaucasia which is, of course, factually based on simultaneous appearance of the two auricle morphotypes only (Rahmatulina in litt.).

The individuals caught in humid woodland regions of Eastern Pontus and Thrace correspond in auricle characters to "*barbastellus*" morphotype (Helversen 1989b, Steiner & Gaisler 1994). The bat caught in Cappadocia was unusually big (forearm lenght 43.0 mm) and, unfortunately, it was letted free without its auricle morphotype was examined. Its size would fit rather to a variation range of "*lecomelas*" than "*barbastellus*" but neither this character is indeed discriminating (note a variation span of the forearm lenght in a sample of 405 individuals of *B. barbastellus* netted in one South-Moravian locality (Czech Rep.): 36.8–43.2 mm with a mean 39.5 mm, one individual over 43 mm and 6 over 42 mm).

Summing up, there are several critical moments in taxonomy of this genus. It is doubtful that the southern part of the range is colonized continuously as it is the case in the northern form, *B. barbastellus*. The more probable is that it is splitted in mutually isolated and quite inabundant vicariant populations which share the characters that, in frame of the genus, are apparently plesiomorfic (e. g. auricle withouth a lobule, less developed lacrimal crest, less contrasting colouration etc.). Mutual relations between the eastern group of these populations (i. e. *B. l. darjelingensis*) and the *B. leucomelas* s. str. seem to be even less apparent than the similarities between "*leucomelas*" and "*barbastellus*". The lectotype specimen of *B. leucomelas* (SMF No. 4373) is moreover of a small size (CM^3 4.6 mm, CM_3 5.0 mm) and falls largely in variation range of "*barbastellus*" morphotype (cf. also Kock 1969). In almost all regions, *B. lecomelas* s. l. is quite a rare species and, hence, the realistic data on actual variation pattern within individual populations, that are prerequisite to any taxonomic conclusion, are largely not available. Consequently, since the characters discriminating the respective named taxa are faint only and there is no clear prove of sympatry between any of them, it seem reasonable to consider them, for the moment, as vicariant elements of a sole polytypic species rather than a couple of distinct species. This concept is preferred at least because it calls for a carefull analysis of an overall pattern of geographic variation within whole the genus than for a search for seemingly reliable discriminating criteria established just with aid of a very limited comparative samples, as a rule.

Plecotus auritus (Linnaeus, 1758)

RECORDS. **Original data**: H a t a y: Çevlik [1], ancient tombs, 1 July 1997: coll. 1m, NMP (spec. No. 48087). – K i r k l a r e l i: Sarpdere, Kiz magarasi cave [2], 17 Oct. 1993: net. 1m, CUP. – V a n: Castle of Van [3], 28 July 1992: net. 1f, NMP (spec. No. 47911). – **Literary data**: E r z i n c a n: Kemah, Castle of Kemah [4], Suluklar, 24 Sept. 1978: 1ma (Albayrak 1990, 1991a). – E r z u r u m: Hasankale [5], Köprüköy, schoolhouse, 4 August 1980: 5ma, 1fa, 18 June 1981: small colony (5fa) (Albayrak 1990, 1991a). – H a t a y: near Antakya [6], 20 Feb. 1960: 1m (Kahmann & Çaglar 1960, Çaglar 1965); – Antakya [7], aquaeductus, 20 Febr. 1960: 1m (Çaglar 1965); – Habibinecar dagi [8] (Çaglar 1969). – I s t a n b u l: Tower of Fort Rummel Hisar [9], 2 Sept. 1953: 1f (DeBlase & Martin 1973). – K a r s: N bank of Çildir Lake [10], tunnel, 11 August 1987: 1fa (Helversen 1989b); – "das Plateau von Kars" [11] (Satunin 1913). – K a y s e r i: Başakpinar, Örenönü, resp. Örenköyü [12], 20 June 1987: 4ma, 1fa (Albayrak 1991a, 1993). – K o n y a: Aksaray road, 40 km, Akbaş Hani Kuyusu [13], 21 Sept. 1986: 9fa (Albayrak 1991a, 1993); – Karapinar, Apak [14], 31 May 1976: 1ma (Albayrak 1991a). – N e v ş e h i r: Gülşehir, Açiksaray Harabeleri [15], 18 June 1987: 6fa (Albayrak 1991a, 1993). – N i g d e: Gümüşler, Eski Manastir [16], 26 May 1987: 1ma (Albayrak 1991a, 1993). – R i z e: Ülkü (S of Çamlihemşin) [17], house, 31 August 1967: 1m (Steiner & Gaisler 1994).

DISTRIBUTIONAL STATUS (Fig. 26). *P. auritus* reaches in Turkey the southern margin of its distribution range (Mitchell-Jones et al. in press, Strelkov 1988). Besides of the Thracian and East-Pontic woodlans regions where this species can well be expected (cf. also *B. barbastellus*), a more than a half of its records come from two other regions with quite a different vegetation pattern. The two Thracian records continue those from the Bulgarian mountains, 6 records in the Pontic region can be similarly related to the Transcaucasian records (Strelkov 1988); but it is undoubtedly not the case either with five records from Central Anatolia by Albayrak (1991a, 1993) and three from the province of Hatay. Those from Hatay were doubted already by Harrison (1964) who considered the sample reported by Kahmann & Çaglar (1960) as *P. austriacus* (see Kumerloeve 1975, Nader & Kock 1983). In any case, it does not seem probable that distribution range is continuous in Turkey. The recent data suggests a vicariant situation, at least as concern: "the northern" (Thrace and Pontus) and "the southern" (Anatolian steppes and Hatay) populations.

TAXONOMIC STATUS. Taxonomic status of the Turkish populations of *Plecotus auritus* has not yet been evaluated. More authors (Corbet 1978, Hanák 1966, Koopman 1994, Strelkov 1988) recognized in the Western Palearctics (from Caucasus Mts. to the west) just one subspecies *P. auritus*

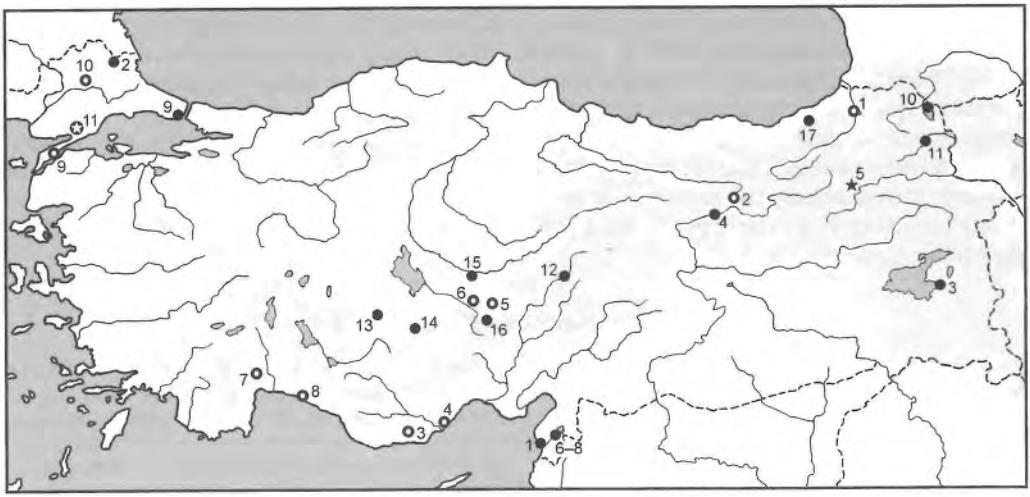

Fig. 26. Records of *Plecotus auritus* (closed symbols) and *P. austriacus* (open symbols) in Turkey. For symbol explanations see Fig. 4.

auritus (Linnaeus, 1758) (terra typica: Sweden). For Turkish material this opinion was adopted also by Helversen (1989) and Steiner & Gaisler (1994). Anyhow, an appearance of both the West-Palearctic species of the genus *Plecotus*, a smaller *Plecotus auritus* (Linnaeus, 1758) and a bigger *P. austriacus* (Fischer, 1829), in Turkey was mentioned by many authors (i. e., Kumerloeve 1975, Nader & Kock 1983, Helversen 1990). However, a larger sample was first collected by Albayrak (1991a) who used a shape of baculum as the diagnostic character to discriminate these species. Based on it (and perhaps also according to some metrical characters) he classified all his sample from Asia Minor as *P. auritus*, and a small sample from Thrace as *P. austriacus*. He also claimed that the other characters, i. e. cranial and dental ones, are for the Turkish populations not sufficiently specific. His results are in contrasts with the traditional opinions according to which all bats of the genus *Plecotus* in the Middle East belong to *Plecotus austriacus* that is represented there with a subspecies *P. a. christiei* Gray, 1838 (DeBlase 1980, Hanák 1966, Hanák & Elgadi 1984, Harrison 1964, Harrison & Bates 1991, Qumsiyeh 1985) characterised by a smaller body size but sharing with *P. austriacus* large bullae tympanicae. Also colouration in this form is paler and do not fit to the state in European *P. austriacus*. Albayrak (1991a) has identified whole his Anatolian material as *P. auritus* what sounds strange at least in respect to habitat requirements of *P. auritus* which in other regions are strictly linked to a woodland vegetation (cf. e. g. Hanák 1969).

Anyhow, the set of morphological characters by which Albayrak identify the South-Anatolian sample is undoubtedly valid and indeed differs considerably from that characterizing the nominotypic subspecies of *P. austriacus.* This situation reminds that described by Ibañez & Fernandez (1985) in their comparison of *Plecotus* bats from Canary Islands and Iberian peninsula. The bats from Canary Islands which correspond in body size to *P. austriacus* while in phenetic characters (shape of baculum, size of canines, shape of processus angularis and namely the lenght of thumb) they remind rather *P. auritus*, were evaluated as an independent species *Plecotus teneriffae* Barrett-Hamilton, 1907 (t. t.: Orotava, Teneriffe I.). Such a "mixture" of characters of both the "standard" Palearctic species is moreover typic also for Central-Asian populations which are usually,

according to a standard classification scheme of the genus established by Hanák (1966), classified within *P. austriacus* (Strelkov 1988, Rybin et al. 1989). Simply said, it seems that in frame of the whole Palearctic region, the taxonomic situation of the genus *Plecotus* is perhaps much more intricated than it was expected and, undoubtedly, it calls for a new comprehensive revision. The situation revealed just in context of the Turkish *P. auritus* illustrates it quite a well. For the moment, we tentativelly conclude that (a) the populations from the northern arboreal zone of Turkey most probably indeed belong to *P. auritus* s. str. while (b) the taxonomic status of those from the Central Anatolia and Hatay is to be kept uncertain until a detailed revision of the genus in frame of whole the Middle East is accomplished.

Plecotus austriacus (Fischer, 1829)

RECORDS. **Original data**: A r t v i n: Artvin [1], 1907: 1f, ZIN (spec. No. 8698, leg. Voronov, rev. Hanák; cf. Strelkov 1988). – G ü m ü ş h a n e: Güzyurdu [2], a small cave in a mountain pass 2300 m, 15 Sept. 1995: obs. 2–3 ind. – I ç e l: Bozagaç, Yalan Dünya magarasi cave [3], 30 Oct. 1993: net. 2m, 1f, CUP; – Narlikuyu [4], small cave, 29 Oct. 1993: net. 1m, CUP. – K a y s e r i: Yeşilhisar [5], 3 km NW Akköy, Summer 1995, PMSL (leg. Kryštufek). – N i g d e: Hcrala, Nargölü [6], cave, 29 July 1996: net. 1m (leg. Munclinger). – **Literary data**: A n t a l y a: Karain cave (n. Döşemeatli) [7], 5 Sept. 1975: 1m (Nader & Kock 1983); – Side [8], vault of ancient theatre, 13 April 1987: 1m (Helversen 1989b). – Ç a n a k k a l e: Gelibolu [9], Kilitbahir redoubts, 9 Sept. 1983: 1ma (Albayrak 1991a, 1993). – K ı r k l a r e l i: Babaeski [10], Mimar Sinan Bridge, 8 July 1985: 1ma (Albayrak 1991a, 1993). – T e k i r d a g: Kuru Dag [11], road tunnel, 19 July 1987: small colony, coll. 4 ind. (1m, 1f) (Helversen 1989b).

DISTRIBUTIONAL STATUS (Fig. 26). The situation concerning this species is not completely clear because of the reasons mentioned in the previous species. On the base, of known records, it can be assumed that the distribution of *P. austriacus* in Turkey covers the distribution pattern discussed in the frame of the previous species. Both in Balkans neighbouring the Thracian Turkish records and in Transcaucasia connected with those from the Eastern Pontus, *P. austriacus* ranks among relativelly common species and more records are reported also from the Levant (Harrison & Bates 1991). Relations among the populations of these regions remain, even in respect to the Turkish record, unclear, of course. A lack of records in the Northern Anatolia as well as in the Western Anatolia is also worth of attention.

TAXONOMIC STATUS. The major problems concerning the Turkish *P. austriacus* have already been discussed in context of the previous species. Anyhow, even in frame of a traditional concept the situation is far of being easy. The European range is attributed to the nominotypic subspecies *P. austriacus austriacus* (Fischer, 1829) (terra typica: Vienna, Austria) while the population in the Adriatic islands were described as a separate subspecies *P. a. kolombatovici* Dulić, 1980 (t. t.: Žrnovo, Korčula I., Croatia) that tentatively was accepted by other authors (Horáček et al. in press, Koopman 1994, Strelkov 1988). In the Middle East region, there are, of course three to four other named forms that come here in account, viz. *P. a. christiei* Gray, 1838 (t. t.: Northern Africa [= Sinai]), *P. a. wardi* Thomas, 1911 (t. t.: Ladak, Kashmir), *P. a. macrobullaris* Kuzjakin, 1965 (t. t.: Vladikavkaz, Caucasus Mts., Southern Russia), and *P. a. turkmenicus* Strelkov, 1985 (t. t.: Mangyšlak, Western Ustjurt, Turkmenistan). Hanák (1966) named subspecies *P. a. austriacus*, in European range, incl. Caucasus Mts., *P. a. wardi* in the Central Asia, and *P. a. christiei* in the Northern Africa. Hanák's opinion was generally accepted and shared also by Corbet (1978) and Koopman (1994) who supplements it with the Caucasian subspecies *P. a. macrobullaris*. DeBlase (1980) preliminary arranged the Persian population under the subspecies *P. a. wardi*. The last and the most detailed revision was published by Strelkov (1988). He analysed the population of the East-European and Asian range and draw for it the following subspecific arrangement: *P. a. austriacus* (Europe to the Southern Ukraine), *P. a. wardi* (Caucasus Mts., Transcaucasia, Asia Minor, Iran and the mountains

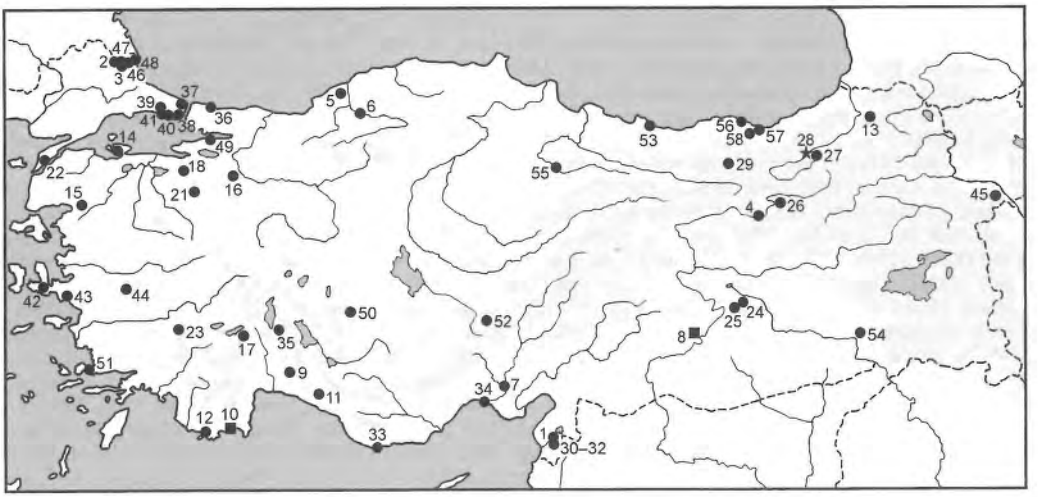

Fig. 27. Records of *Miniopterus schreibersii* in Turkey. For symbol explanations see Fig. 4.

of the Central Asia), *P. a. turkmenicus* (Kopetdag Mts. and the Northwestern Karakum desert), *P. a. kozlovi* Bobrinskoj, 1926 (t. t.: Barun Zasak, Eastern Tsaydam, China) in the Central Asia (Mongolia and the Eastern Turkestan) and *P. a. christiei* from the Northern Africa. As the Turkish material is concerned, Helversen (1989b) described his material as a typical *P. austriacus* but differing in colouration from the Central-European samples, and our own experiences fit these observation too.

Miniopterus schreibersii (Kuhl, 1817)

Records. **Original data**: Hatay: Антиохия (= Antakya) [1], 2m, ZIN (spec. Nos 5012, 5013, leg. Rolle). – Kirklareli: Sarpdere, Dupnisa magarasi cave [2], 16 Oct. 1993: net. 16m, 12f, CUP; Summer 1995, PMSL (leg. Kryštufek); – Velika Köprüsü bridge (8 km SW of Demirköy) [3], 15 Oct. 1993: net. 1f, CUP. – Tunceli: blind train tunnel in the Euphratus river valley n. Derebük village [4], 14 Sept. 1995: 1f, CUP. – Zonguldak: Çayir [5], Çayirköy magarasi cave, 20 Oct. 1993: net. 2m, 1f, CUP; – Yenice [6], a large cave n. railway, 2 July 1994: net. 3m, CUP. – **Literary data**: Adana: Haruniye [7], 37 mummies (Lehmann 1966). – Adiyaman: Karadut [8], cave, 7 June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – Antalya: Beşkonak [9], Köprü Irmagi river, 10 Oct. 1984: 1f (Helversen 1989b); – Finike [10], Cliff cave, sum. 1965: 1 skull (Corbet & Morris 1967); – Incekum [11], 20–22 May 1966: 35 ind. (Kock 1974); – Kaş [12], Limanagzi, Hizirellez magarasi cave, 1 ind. (Albayrak 1993). – Artvin: cave N of Ardanuç [13], 12–13 August 1983: 5m, 4f (Helversen 1989b). – Balikesir: Erdek [14], cave, 7 Oct. 1967: 5m, 5f (Steiner & Gaisler 1994); – Havran [15], cave, 17 May 1961: 1m, 2f, 11 April 1965: 7m (Çaglar 1965, 1969), Inönü köyü magarasi cave, 3 ind. (Albayrak 1993). – Bilecik: Bilecik [16], cave, 26 April 1961: 1f (Çaglar 1965, 1969). – Burdur: Insuyu magarasi cave [17], 11 April 1966: 5 ind. (Kock 1974), (date undef.) 3 ind. (Albayrak 1993). – Bursa: Bursa [18], 20 April 1966: 47 ind. (Kock 1974); – Inkaya Köyü village, Suini cave [*19*], 11 May 1955: 3m, 1f (Strinati 1959), 17 Oct. 1963: 1m, 6f, 24 May 1964: 11m, 15f (Çaglar 1965, 1969); – Inkaya, Kusini cave [*20*], 18 March 1969: 1m, 5f (Kock 1974), Kuşini magarasi cave, 1 ind. (Albayrak 1993); – Nilüfer Çayi creek (S of Uludag Mts.) [21], 21 July 1983: 1m (Helversen 1989b). – Çanakkale: 4 km S of Yalova [22], 29 May 1967 and 8 May 1968 (Hůrka 1972), 7 May 1968 (Peus 1978a). – Denizli: Findikdagi [23], cave, 3 May 1963: 2m, 2f (Çaglar 1965). – Diyarbakir: Çayirderc (W of Ergani) [24], 23 Oct. 1968: 1m (DeBlase & Martin 1973); – Çermik [25], Kalecik köyü magarasi cave, 4 ind. (Albayrak 1990). – Erzincan: Tercan [26], Mamahatun kervansarayi, 11 ind. (Albayrak 1990). – Erzurum: Çamlimagara [27], cave, 10 Sept. 1967: 3m, 4f, 1 mummy (Steiner & Gaisler 1994); – Ispir [28], Elmali village, cave, 6 August 1983: a colony about 200 ind. (Helversen 1989b), Çamlica magarasi cave, 24 ind. (Albayrak 1990). – Gümüşhane: Mescitli köyü [29], 7 ind. (Albayrak 1990). – Hatay: Dermacta köyü village (n. Antakya)

[30] (Çaglar 1969); – Harbiye magarasi cave [31], 2 ind. (Albayrak 1990), Harbiye, cave, 23 Febr. 1960: 1m, 19 May 1960: 9m (Çaglar 1965); – Narlica köyü village [32], cave, 19 Febr. 1960: 2m, 2f (Kahmann & Çaglar 1960, Çaglar 1965, 1969), Karanlik magarasi cave, 3 ind. (Albayrak 1990). – I ç e l: Anamur [33], ruins, 18 Febr. 1961: 1f (Çaglar 1965, 1969); – Kulakköy village [34], abandoned houses, Spring 1987: obs. 2 ind. (van Winden 1988). – I s p a r t a: Aksu (Anamas) [35], Zindan magarasi cave, 8 ind. (Albayrak 1993). – I s t a n b u l: 10 km W of Sile [36], Satzmal magarasi cave, 29 April 1955: 4 ind. (Strinati 1959); – Belgrat Orman [37], 23 May and 25 June 1968 (Hůrka 1972); – tower of Fort Rummel Hisar [38], 1 Sept. 1953: 13m, 1f (DeBlase & Martin 1973); – Gökceli (n. Çatalca) [39], cave, 26 May 1960: 9m, 6f (Çaglar 1965, 1969); – Küçükçekmece [40] (Çaglar 1969), Halkali, 15 May 1971: 19m, 9f (DeBlase & Martin 1973, Peterson et al. 1976); – Yarimburguz [41], cave, 22 April 1959: 2m, 2f, 19 May 1960: 1m (Çaglar 1965). – I z m i r: betw. Çeşme and Urla [42], street, 14 April 1969: 1 ind (Kock 1974); – Gümüldür [43], Incirli pit, 1 ind. (Albayrak 1993); – Zeytinlik köyü village [44], cave, 20 April 1963: 2m (Çaglar 1965, 1969). – K a r s: Aralik, Küçük Agri Dagi (Lesser Ararat Mt.) [45], Serdarbulak yaylasi, 15 ind. (Albayrak 1990). – K i r k l a r e l i: Demirköy [46], cave, 17 July 1961: 6m, 1f (Çaglar 1965, 1969); – Demirköy, Samandere (= Sarpdere) köyü village, Kiz magarasi cave [47], 2 ind. (Albayrak 1993); – Igneada [48], Tripez magarasi cave, 5 ind. (Albayrak 1993). – K o c a e l i: Ayazma köyü village (n. Karamürsel) [49], cave, 29 Dec. 1959: 1f (Çaglar 1965, 1969). – K o n y a: Sizma köyü village [50], Kuzey magarasi cave, 3 ind. (Albayrak 1993). – M u g l a: Farilya köyü village (n. Bodrum) [51], cave, 2 April 1964: 11m, 1f (Çaglar 1965, 1969). – N i g d e: Gümüşler [52], Epcik magarasi cave, 2 ind. (Albayrak 1993). – O r d u: Yaraşli köyü village [53], 40 ind. (Albayrak 1990). – S i i r t: Saglarca (Billursi) köyü village [54], 8 ind. (Albayrak 1990). – T o k a t: Turhal, Pazar (Abayel) köyü village [55], Inderesi mevkii, 5 ind. (Albayrak 1990). – T r a b z o n: Akçaabat [56], cave, 12 Sept. 1961: 2m, 10f (Çaglar 1965, 1969), 20 Sept. 1967: 2m, 2f, 4 April 1969: 5m, 6f (Steiner & Gaisler 1994); – Kireçhane [57], cave, 21 June 1960: 1m (Çaglar 1965, 1969); – Maçka, Bagişli (= Barişli) köyü village [58], 8 ind. (Albayrak 1990). – Z o n g u l d a k: Yenice (n. Karabük) [6], cave, 4 Jan. 1960: 1m, 3f (Çaglar 1965, 1969).

DISTRIBUTIONAL STATUS (Fig. 27). *M. schreibersii* has been recorded in all biogeographic regions of Turkey (Tab. 1), except for the Mesopotamian steppes. The most records come from the coastal regions.

TAXONOMIC STATUS. Corbet (1978) coidentified whole the European population with *M. s. schreibersii* (Kuhl, 1817) (terra typica: Banat, Hungary), those from Asia Minor and Caucasus Mts. up to Kopetdag Mts. with *M. s. pallidus* Thomas, 1907 (t. t.: shore of Caspian Sea, Iran) while the Eastern ones from India to Japan with *M. s. fuliginosus* (Hodgson, 1835) (t. t.: Nepal). The differences between the nominotypic form and *M. s. pallidus* lie mainly in a paler colouration of the latter, and in this respect, many authors (DeBlase 1980, Harrison & Bates 1991, Koopman 1994, Nader & Kock 1987, Strelkov et al. 1978) confirmed that concept of subspecific subdivision which attributed the territory of Asia Minor to *M. s. pallidus*. The Turkish material was actually analyzed only by Steiner & Gaisler (1994) who identified *M. s. schreibersii* in the Western Anatolia (record No. 14) and *M. s. pallidus* in the Eastern Anatolia (provinces of Trabzon and Erzurum).

Tadarida teniotis (Rafinesque, 1814)

RECORDS. **Original data**: A r t v i n: Murgul, Damar [1], in the village, 3 Sept. 1995: det. min. 1 ind. – E r z u r u m: Hinis [2], town, 13 Sept. 1995: det. 1 ind. – E s k i ş e h i r: a rocky massiff 10 NE of Sivrihisar [3], 4 July 1994: det. 2–3 ind. – G ü m ü ş h a n e: Güzyurdu, a mountain pass 2300 m [4], 15 Sept. 1995: det. 1 ind. – H a t a y: Konacik [5], a rocky fissure, 24 Oct. 1991: obs. min. 3 ind. (leg. Červený). – I ç e l: Narlikuyu [6], a cliff above sea shore, 28 Oct. 1991: obs. 1 ind. (leg. Červený). – I z m i r: Bergama [7], in the town, 3 Nov. 1993: det. min. 1 ind. – K a y s e r i: Akköy [8], bank of lake, 20 Oct. 1991: det. 1 ind. (leg. Červený). – T o k a t: Castle of Tokat [9], 17 Sept. 1995: det. 1 ind. – **Literary data**: A g r i: Hamur Çayi creek bank [10], 9 ind. (Albayrak 1990). – A n k a r a: Yassihöyük (= Gordion) [11], 25 June 1983: det. (Helversen 1989b). – A n t a l y a: Finike, Cliff cave [12], sum. 1965: 1 mandible (Corbet & Morris 1967); – Finike, harbour [13], 4 Oct. 1984: det. (Helversen 1989b); – Manavgat river (n. Ibradi) [14], bridge, 28 June 1986: det. (Helversen 1989b); – Topraktepe (n. Akseki) [15], mountains, 6 Oct. 1984: det. (Helversen 1989b). – A r t v i n: n. Ardanuc [16], small river, 12 August 1983: 1ms (Helversen 1989b). – B u r d u r: S edge of the Burdur lake [17], 1 July 1986: det. (Helversen 1989b). – Ç a n a k k a l e: SE of Ayvacik [18], 3 April 1987: det. (Helversen 1989b). – E r z u r u m: Erzurum [19] (Lewis & Harrison 1962); – valley of Çoruh Nehri river (E of Ispir) [20], 5 August 1987: det. (Helversen 1989b). – G i r e s u n: Kümbet (S of Dereli) [21], 31 July 1983: obs. (Helversen 1989b). – H a t a y: Belen, above the Topbogazi Gecidi pass [22], 9

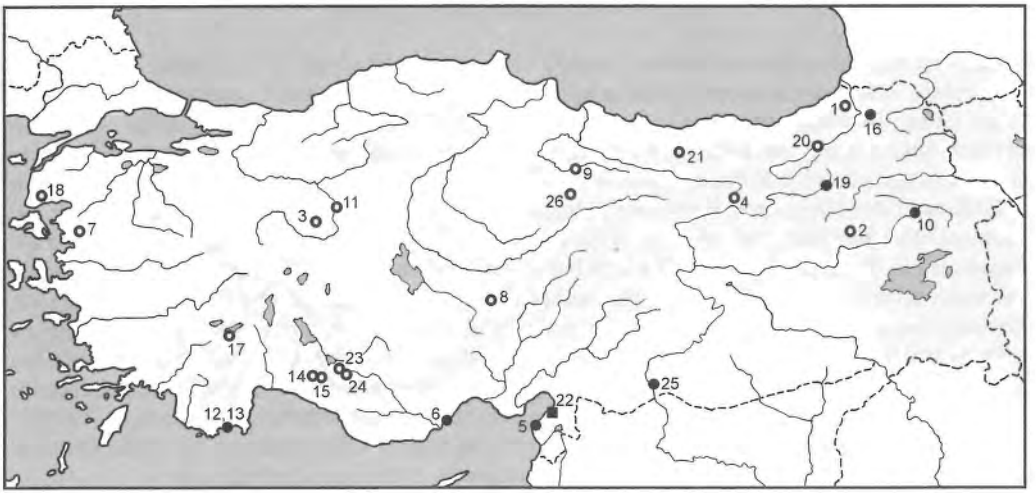

Fig. 28. Records of *Tadarida teniotis* in Turkey. For symbol explanations see Fig. 4, open symbols denote bat detector records.

June 1992: 1 ind. (from owl's pellets) (Obuch 1994). – K o n y a: Üçpinar (n. Bozkir) [23], 27 June 1986: det. (Helversen 1989b); – valley of Göksu Nehri river (n. Hadim) [24], 24–26 June 1986: det. (Helversen 1989b). – Ş a n l i U r f a: Birecik [25], Euphrates bridge, 26 May 1964: 4f (Lehmann 1966, Kumerloeve 1975), date undef.: 4 ind. (Albayrak 1990). – S i v a s: Çamlibel pass (n. Yildizeli) [26], 25 July 1987: det. (Helversen 1989b).

DISTRIBUTIONAL STATUS (Fig. 28). In comparison with the last survey of distribution of this species in the Mediterranean region (Kock & Nader 1984) which reported only two records of *T. teniotis* in the Southern Anatolia and one from Erzurum (Northwestern Anatolia), the picture of this topics has radically changed. The recent records suggest that *T. teniotis* is distributed probably over almost whole the Asian part of Turkey.

TAXONOMIC STATUS. The first, who noticed the Turkish population of *T. teniotis* was Lehmann (1966). He attributed the findings from Birecik to the nominotypic form *T. t. teniotis* (Rafinesque, 1814) (terra typica: Sicily, Italy). Hayman & Hill (1971) supposed, that populations living in Egypt, in Maghreb and in the Middle East belong to the form *T. teniotis rueppelli* (Temminck, 1826) (t. t.: Egypt). Corbet (1978) considered this name as a synonyme of the nominotypic which he applied for the whole Western Palearctics. Kock & Nader (1984), who revised the type material and the distribution of this species, considered the Turkish population as a part of the Middle Eastern population that should, according to them, belong to the colour different *T. t. rueppelli*, the view adopted also by some other authors (Harrison & Bates 1991, Qumsiyeh 1985). DeBlase (1980) respects both subspecies but the finding from Elborz Mts. (Northern Iran) he arranges under the form *T. t. teniotis*. The form *T. t. rueppelli* he shows just from the coast of the Persian Gulf.

Similary as in many other species, also in the case of *T. teniotis*, it holds that without geographic variation over whole species range is comprehended, the taxonomic status of the Turkish population cannot be established for sure.

DISCUSSION AND CONCLUSIONS

Until present, the bat fauna of Turkey consists of 31 species (see Tab. 1). Except for two (*Myotis dasycneme*, *Eptesicus nilssonii*) it includes all species composing the European continental bat fauna (sensu Mitchell-Jones et al. in press), what means 29 species and 94% of the European species. On contrary, the Turkish bat fauna is richer by *Rousettus aegyptiacus* and *Otonycteris hemprichi* that absent in Europe. Out of 44 species composing the Middle East bat fauna (in sense of DeBlase 1980, Harrison & Bates 1991, Horáček & Hanák 1984, and Steiner & Gaisler 1994; the Tropical Ethiopian Mammals in sense of Harrison 1964 being excluded), 27 species, i. e. 61% were found also in Turkey. In general, Turkish bat fauna exhibits maximum resemblace to the West-Palearctic arboreal. Most of the elements characteristic of the Arabian South Palearctic eremial (i. e. *Rhinolophus clivosus*, *Tadarida aegyptiaca*, *Eptesicus nasutus*, *Hypsugo ariel* (incl. *H. bodenheimeri* and *H. arabicus*), *Pipistrellus rueppelli*, as well as the families Rhinopomatidae, Emballonuridae, Nycteridae, and Hipposideridae) do not reach the territory of Turkey and/or are represented with quite exceptional marginal records (*Otonycteris hemprichi*, *Rousettus aegyptiacus*). The only two species of such a character occur here more regularly, viz. *Pipistrellus kuhlii* and *Eptesicus bottae*, both attaining maximum abundance in the South-Anatolian coast regions.

However, only a few species inhabit the whole Turkish territory (i. e. all biogeographic regions) and only two were actually found in all biogeographic zones, viz. *Rhinolophus ferrumequinum* and *Pipistrellus kuhlii*. Both the species are distributed as well in most of the Mediterranean as in the regions of the Levant and Mesopotamia (Harrison & Bates 1991).

In Turkey, many species reach the southern and/or the southeastern margin of their World distribution. This is characteristic of the elements of the West-Palearctic arboreal that are distributed mainly in the zone of temperate forests and reach maximum density in continental Europe and Siberia. The following members of the Turkish fauna belong in this group: *M. bechsteinii*, *M. mystacinus*, *M. brandtii*, *M. daubentonii*, *V. murinus*, *P. nathusii*, *N. leisleri*, *N. lasiopterus*, *B. barbastellus* (s. s.) and *P. auritus*. These species do not live more to the south, i. e. in Arabia sensu Harrison (1964), some of them, however, appear in the fauna of Iran (DeBlase 1980, Steiner & Gaisler 1994). *M. myotis*, and also *M. capaccinii*, reach in Turkey the eastern margin of their distribution range. *M. myotis* occurs also in the coastal areas of the Levant up to the Central Israel (Harrison & Bates 1991) but it does not live to the east from the Rize–Erzurum–Diyarbakir–Antakya line in Turkey (see Fig. 10). *M. capaccinii* inhabits only the Aegean and Levantine coastal areas from Thrace up to Hatay (see Fig. 17) and Israel, respectively (similary as *M. myotis*), i. e. a relatively humid areas but it also reaches, of course, the lower Mesopotamia and the Southern Iran (DeBlase 1980, Harrison & Bates 1991, own data).

The next group of species consists of those which are distributed in almost whole territory of Turkey except for Mesopotamia. These forms belonging to a group of "Boreal Eurasian Mammals" in the sense of Harrison (1964: Fig. 1) are distributed also in all neighbouring regions except for just the Mesopotamian steppes, i. e. in the Levantine coast, in a region north of Dead Sea, Zagros Mts. and in the Northern Iran up to Kopetdag Mts. (DeBlase's 1980 "Northern" species). Such a distributional pattern can be observed in *R. euryale*, *M. blythii*, *M. emarginatus*, *E. serotinus*, *H. savii*, and *P. pipistrellus*, and probably also in *M. nattereri*. To a considerable degree it fits also to a situation revealed in *R. hipposideros*, *R. blasii*, *P. austriacus*, and *M. schreibersii* which ranges continue much far in the south.

The last group consists of species which reach just in Turkey the northern and/or the northwestern margin of their distributional range (Fig. 30). This group consists of *R. aegyptiacus*, *E. bottae*, and *O. hemprichi*, in the moment, although its enrichment with extralimital records of some other species can be expected. First, this may concern of *Taphozous nudiventris* Cretzschmar, 1830,

Tab. 1. Number of records in individual biogeographic units (see text and Fig. 3)

Species \ region	1a	1b	1c	1	2a	2b	2c	2	3	4	5	6	Suma
Rousettus aegyptiacus	–	–	–	–	–	3	11	14	–	–	–	–	14
Rhinolophus ferrumequinum	6	22	10	38	15	11	14	40	10	13	–	3	104
Rhinolophus hipposideros	5	12	15	32	9	3	7	19	5	6	3	–	65
Rhinolophus euryale	15	5	7	27	7	6	–	13	4	3	–	–	47
Rhinolophus mehelyi	7	3	–	10	3	1	5	9	4	1	–	–	24
Rhinolophus blasii	9	3	–	12	3	7	4	14	3	–	–	–	29
Myotis myotis	7	9	7	23	6	6	6	18	17	5	(3)	–	63
Myotis blythii	9	8	4	21	4	5	10	19	10	19	13	–	82
Myotis bechsteinii	3	–	1	4	–	1	–	1	–	–	–	–	5
Myotis nattereri	1	–	1	2	3	8	2	13	–	–	2	–	17
Myotis emarginatus	5	1	1	7	4	4	2	10	–	2	–	–	19
Myotis mystacinus	2	8	6	16	2	3	2	7	–	3	2	–	28
Myotis brandtii	–	–	2	2	–	–	–	–	–	–	–	–	2
Myotis daubentonii	3	4	–	7	–	–	–	–	–	–	–	–	7
Myotis capaccinii	8	5	–	13	2	5	6	13	1	–	–	–	27
Vespertilio murinus	–	1	–	1	–	–	–	–	–	2	–	–	3
Eptesicus serotinus	1	9	6	16	1	7	2	10	8	3	3	–	40
Eptesicus bottae	–	–	–	–	3	8	6	17	–	1	–	–	18
Hypsugo savii	–	2	3	5	–	2	3	5	4	2	2	–	18
Pipistrellus pipistrellus	9	19	5	33	13	7	9	29	6	1	3	–	72
Pipistrellus nathusii	3	2	–	5	–	–	–	–	–	1	–	–	6
Pipistrellus kuhlii	1	3	1	5	1	4	22	27	1	2	4	6	45
Nyctalus noctula	4	–	–	4	–	–	1	1	–	1	–	–	6
Nyctalus leisleri	2	1	2	5	–	1	–	1	–	–	–	–	6
Nyctalus lasiopterus	–	1	–	1	–	–	–	–	–	–	–	–	1
Otonycteris hemprichi	–	–	–	–	–	–	–	–	–	–	–	1	1
Barbastella barbastellus s. l.	1	–	5	6	–	–	–	–	1	1	–	–	8
Plecotus auritus	2	–	1	3	–	–	4	4	5	1	4	–	17
Plecotus austriacus	2	–	2	4	1	3	1	5	2	–	–	–	11
Miniopterus schreibersii	10	10	8	28	7	6	6	19	4	6	1	–	58
Tadarida teniotis	–	–	4	4	2	6	4	12	6	1	3	–	26
Total (no. records)	115	128	91	334	86	107	127	320	91	74	40	10	869
Total (no. species)	23	20	20	28	18	22	21	24	17	20	11	3	31
records per species	5.0	6.4	4.6	11.9	4.8	4.9	6.0	13.3	5.4	3.7	3.6	3.3	28.0

that is widely distributed in Mesopotamia almost up to Mosul (the nearest ca 150 km from the Turkish border) (Harrison & Bates 1991, own data). However the closest (ca 60 km from the Turkish border) is a site in Basket Mts., on the western bank of the Urumiyah Lake, Northwestern Iran, that repeatedly provided in total 36 specimens (DeBlase 1980, Lay 1967). An other species that can be expected in the Turkish territory, is *Asellia tridens* (Geoffroy, 1813). The northern margin of its distributional range runs through the Central Syria, Mesopotamia and Zagros Mts. (DeBlase 1980, Harrison & Bates 1991). The closest finding has been reported by Wettstein (1913): 49 specimens from Mosul (Northern Iraq), so ca 100 km to the south from the Turkish border. A distribution pattern similar to *O. hemprichi* exhibit also *Rhinopoma microphyllum* (Brünnich, 1782) and *R. hardwickei* Gray, 1831 (viz. van Cakenberghe & de Vree 1994). Although they are not known from Syria, this does not mean too much because of almost a complete lack of knowledge on bats of that country (cf. Benda 1996). Out of "the southern" species, known from the Lower Mesopotamia and/or the Southern Levant (sensu DeBlase 1980, Harrison & Bates 1991), also *Eptesicus nasutus* (Dobson, 1877) and *Pipistrellus rueppelli* (Fischer, 1829) may come in account, eventually. Their

closest records (cf. Harrison & Bates 1991) are, of course, already fairly distant from the Turkish border.

Although it is greatly probable that there will be more addition to a list of Turkish bat fauna, it seems less probable that it will be due to the species which main ranges lie northeastern and/or northwestern of the Turkish territory, i. e. those inhabiting the Balkans and/or Trancaucasia. One of such species is *Eptesicus nilssonii* (Keyserling et Blasius, 1847) which is known both from Transcaucasia (Azerbaijan, Georgia) and the Northern Iran, and from Bulgaria (DeBlase 1980, Hanák & Horáček 1986). All its records from these regions are quite exceptional, of course, and are related to patches of boreal woodlands, mutually quite isolated. If it is so, then it cannot be excluded that such an isolated population could inhabit also the higher altitudes of the Northern Turkey, like Istranca Mts., Armenian Highlands or the Eastern Pontic Mts. Similary, *M. brandtii* announced so far only from the Eastern Pontus, can be found in Instanca Mts. since in the Southern Bulgaria it has already been recorded (Horáček et al. 1974). The other forms unknown from Turkey, as yet, are *Myotis schaubi* Kormos, 1934, and *Eptesicus bottae ognevi* (Bobrinskii, 1918) reported from Transcaucasia and from the Northern Iran. In the Nakhichevan (= Naxçivan) part of the Araxes River valley they were recorded directly from the Turkish border (viz. Horáček & Hanák 1984, Nader & Kock 1990). Therefore they can probably live also on the Turkish site of this valley, and maybe even further to the north-west (cf. Koopman 1994).

The structure of chiropteran records obtained from individual biogeographic units (Tab. 1) was examined with aid of parametric correlation and UPGMA cluster analysis. The results (Fig. 29) splitted whole the region in three areas exhibiting a corresponding degree of faunal similarity, viz. (1) the humid western and coastal northern part of Turkey, (2) the arid regions of the Central and Eastern Anatolia, and (3) the southern parts (East-Levantine coast, Mesopotamia) which fauna is the most distant from all. Worth mentioning is also the pattern of relations among the areas of the group (1). A compact group of the Thrace, exhibiting the Balkan faunal pattern and the region of Northwestern Anatolia is faunally closely related to the western coast of Anatolia, apparently influenced also with effect of the Aegean archipelago. The most relative to them is fauna of

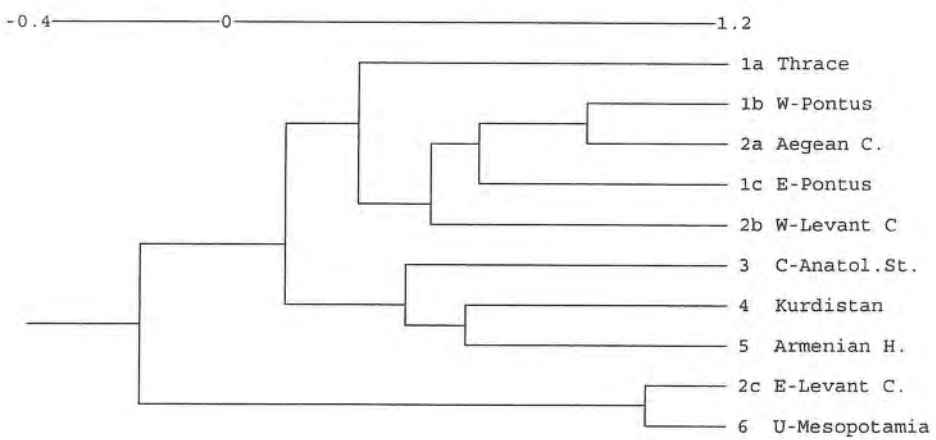

Fig. 29. Results of UPGMA cluster analysis on correlations among biogeographic units based on the data summarized in Tab. 1 (see also Fig. 3).

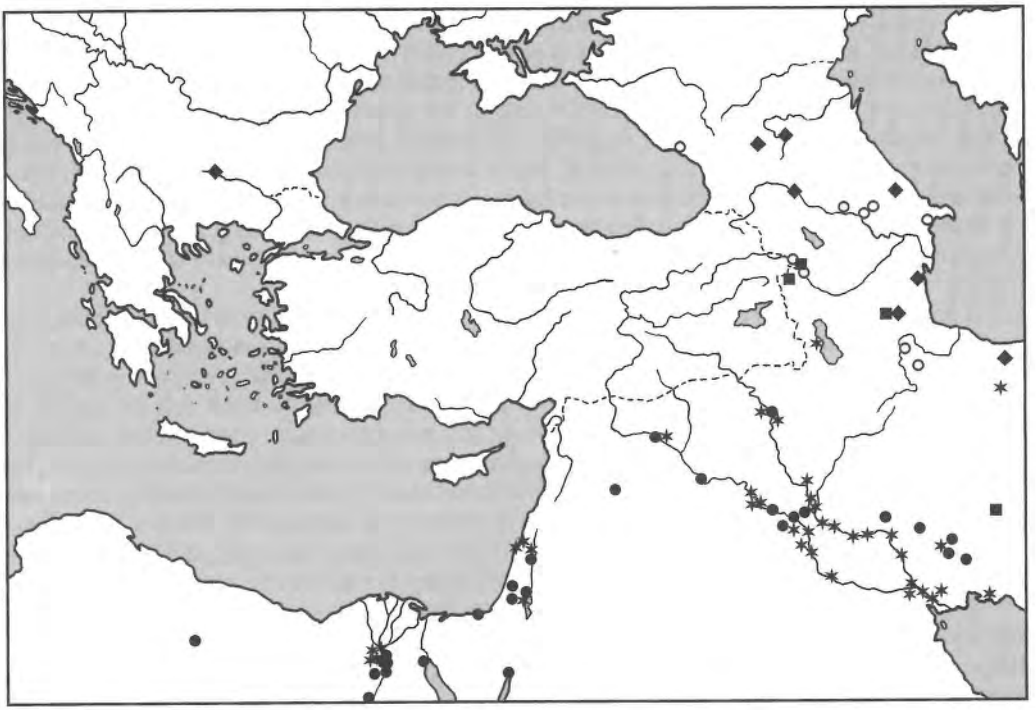

Fig. 30. Map of Turkey and surrounding regions of the Eastern Mediterranean with records of some bat species that may come in account for Turkish fauna: *Taphozous nudiventris* (✶), *Asellia tridens* (●), *Myotis schaubi* (■), *Eptesicus nilssonii* (◆), and *E. bottae ognevi* (O). Records after DeBlase (1980), Hanák & Horáček (1986), Harrison & Bates (1991), Horáček & Hanák (1984), Ilyin et al. (1998), Nader & Kock (1990), Qumsiyeh (1985), and Vereščagin (1959), and our own data.

the Eastern Pontus, close to Transcaucasia. As well in the case of the former group as with Pontus the most characteristic feature is a considerable representation of the elements of the European Boreal type (cf. Tab 1).

The analysis confirmed that the major difference in faunal structure are between the Northwestern and the Southeastern Turkey: the territory of the Upper Mesopotamia and Hatay is either poor in the boreal elements and it contains the forms that do not appear in any other regions (namely those representing a group of Saharo-Sindian Desert Mammals in sense of Harrison 1964). The Central and Eastern Anatolian plateau are inhabited by the transient type of fauna, that neither can be coidentified with the Boreal pattern of the Nortwestern region nor with the afro-eremial aspects of the Southeastern zone. It is relativelly poor, and in contrast with both the other major groups, without any forms that would be exclusive just for this region. Worth mentioning is, that in more species it seems possible to correlate the borderlines between the above mentined major zoogeographic regions with the transitional zones among phenotypically different populations (that may be considered as different subspecies, eventually). The following taxa may serve as examples: *R. ferrumequinum* (*R. f. ferrumequinum* in the west, *R. f. irani* in the east), *M. myotis* (*M. m. myotis* and *M. m. macrocephalicus*), *M. blythii* (*M. b. oxygnathus* and *M. b. omari*), *M. nattereri* (*M. n. nattereri* and *M. n. tschuliensis*), *M. emarginatus* (*M. e. emarginatus* and *M. e. turcomanicus*),

Hypsugo savii (*H. s. savii* and *H. s. caucasicus*), *Miniopterus schreibersii* (*M. s. schreibersii* and *M. s. pallidus*) and probably it may concern also the other species. Another type of geographic variation, the difference between the North-Turkish populations (so Pontic) and the South-Turkish populations (Taurus Mts.) probably exists in bats of the genus *Eptesicus*. The northern part of Turkey is inhabited by *E. serotinus serotinus*, the southern parts by *E. s. shiraziensis*, or some other subspecies. Similarly, in contrast to *E. bottae anatolicus*, another subspecies, *E. b. ognevi*, inhabits Transcaucasia and probably also the Northeastern Turkey. In respect to the categorial-like shifts in geographic variation in all the above mentioned species, the most significant transitional zone is apparently that which connects the Cilician coast, the northern margins of the Mesopotamia and the Van region, in Turkey.

As demonstrated earlier (Benda & Horáček 1995a), and as indicated by the above results, it is particularly just the region of Eastern Turkey that represents the most significant intergradation zone between different faunal and taxonomical units which apparently had to respond to different ecological and historical condition. In other words, it seems symptomatical that the region of Kurdistan is a hot spot not only in ethnical, political, cultural or geological contextes but, apparently, also as the faunal history and phylogenetic dynamics are concerned. Just that region can be looked upon as an organization knot by which the faunal history of the Eastern Mediterranean has always been modified, and in general it concerns the territory of Turkey at all. Already the excitating fact that 22 of 31 species composing theTurkish bat fauna reach here margins of their distribution illustrates quite a well that just the territory of Turkey represents one of the most important border zone within the whole Western Palearctic. Last but not least, as shown above, the region of the Middle East and the Turkish territory is of a crucial significance also for comprehension to taxonomy, phylogentic dynamics and classification of more chiropteran species and/or species groups. Just here do arise as urgent problems the questions of species content of the groups which in other regions look like seemingly monotypic taxa. In particular this concerns of *Myotis mystacinus*-group, bats of the genus *Plecotus* and *Barbastella*, and, at the level of itraspecific variation, also *Eptesicus* spp., *Rhinolophus hipposideros*, *Myotis emarginatus*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Otonycteris hemprichi*, *Miniopterus schreibersii*, *Tadarida teniotis* and probably some others. All these topics call for a profound analyses which results could largerly extent current understanding not only to the chiropteran taxonomy but to general patterns of phylogenetic and distributional dynamic in the region where the geological, climatic and environmental history have, for more than ten thousands years, continuously combined with a multisided impact of human civilisation.

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REFERENCES

ABELENCEV V. I., PIDOPLIČKO I. G. & POPOV B. M. 1956: *Fauna Ukraini. Tom 1. Ssavci. Vipusk 1* [*Fauna of Ukraine. Volume 1. Mammals. Part 1*]. Kiev, 448 pp (in Russian).

AELLEN V. 1959: Contribution a l'étude de la faune d'Afghanistan 9. Chiroptères. *Rev. Suisse Zool.* **66**: 353–386.

ALBAYRAK I. 1985: Researches on bats of Ankara Province (Mammalia: Chiroptera). *Comm. Fac. Sci. Univ. Ankara, S. C* **3**: 1–25 (in Turkish, English abstr.).

ALBAYRAK I. 1987: A new record of Pipistrellus pipistrellus ala[ddi]n for Turkey. *Comm. Fac. Sci. Univ. Ankara, S. C* **5**: 31–37.

ALBAYRAK I. 1988: The presence of Myotis daubentoni (Kuhl, 1819) in Turkey. *Mammalia* **52**: 415–418.

ALBAYRAK I. 1990: The bats of Eastern Anatolia and their distribution (Mammalia, Chiroptera). *Doga – Turk. J. Zool.* **14**: 214–228 (in Turkish, English abstr.).

ALBAYRAK I. 1990a: The long-fingered bat (Myotis capaccinii) from Turkey. *Doga – Turk. J. Zool.* **14**: 150–155.

ALBAYRAK I. 1991: Studies on Myotis mystacinus and Myotis brandti (Mammalia, Chiroptera) in Turkey. *Mammalia* **55**: 113–120.

ALBAYRAK I. 1991a: Identification of Plecotus auritus (Linnaeus, 1758) and Plecotus austriacus (Fischer, 1829) (Mammalia: Chiroptera) in Turkey. *J. Biol. Fac. Sci. Arts, Gazi Univ.* **2**: 129–136.

ALBAYRAK I. 1993: The bats of Western Turkey and their distribution (Mammalia: Chiroptera). *Doga – Turk. J. Zool.* **17**: 237–257 (in Turkish, English abstr.).

ALBAYRAK I. 1993a: Natterer's bat Myotis nattereri (Kuhl, 1818) (Mammalia: Chiroptera) in Turkey. *Mammalia* **57**: 49–54.

ANDERSEN K. 1905: On some bats of the genus Rhinolophus, with remarks on their mutual affinities, and descriptions of twenty-six new forms. *Proc. Zool. Soc. Lond.* **1905**(2): 75–145.

ARGYROPULO A. I. 1939: Über einige Säugetiere Armeniens. *Trudy Biol. Inst. Armjan. Fil. AN SSSR* **3**, *Zool. Sbor.* **1**: 25–66 (in Russian, Germ. summary).

ARLETTAZ R. 1995: *Ecology of the mouse-eared bats (Myotis myotis and Myotis blythii): Zoogeography, niche, competition and foraging.* Martigny, Switzerland: Horns Publishers, 208 pp.

ARLETTAZ R., GUILBERT E., LUGON A., MÉDARD P. & SIERRO A. 1993: Variability of fur coloration in Savi's bat Hypsugo savii (Bonaparte, 1837). *Bonn. Zool. Beitr.* 44: 293–297.

ARLETTAZ R., RUEDI M., IBAÑEZ C., PALMEIRIM J. & HAUSSER J. 1997: A new perspective on the zoogeography of the sibling mouse-eared bat species Myotis myotis and Myotis blythii: morphological, genetical and ecological evidence. *J. Zool., Lond.* **242**: 45–62.

ATALLAH S. I. 1977: Mammals of the Eastern Mediterranean Region; their Ecology, Systematics and Zoogeographical Relationships. *Säugetierk. Mitt.* **25**: 241–320.

BARAN I., KUMLUTAŞ Y., KASKA Y. & TÜRKOZAN O. 1994: Research on the Amphibia, Reptilia and Mammalia Species of the Köycegiz-Dalyan Special Protected Area. *Doga – Turk. J. Zool.* **18**: 203–219.

BARRATT E. M., DEAVILLE R., BURLAND T. M., BRUFORD M. W., JONES G., RACEY P. A. & WAYNE R. K. 1997: DNA answers the call of pipistrelle bat species. *Nature* **387**: 138–139.

BAUER K. 1996: Ausbreitung der Weißrandfledermaus Pipistrellus kuhlii (Kuhl, 1819) in Österreich (Chiroptera, Vespertilionidae). *Mitt. Landesmus. Joanneum Zool.* **50**: 17–24.

BEKENOV A., BUTOVSKIJ P. M., KASABEKOV B. B., LANKIN P. M., STRELKOV P. P., STOGOV I. I., FEDOSENKO A. K., ŠAJMARDANOV R. T. & ŠUBIN I. G. 1985: *Mlekopitajuščie Kazahstana v četyreh tomah. Tom četvertyj. Nasekomojadnye i rukokrylye* [*Mammals of Kazakhstan in four volumes. Volume four. Insectivora and Chiroptera*]. Alma-Ata: Nauka, 280 pp (in Russian, Engl. title).

BENDA P. 1993: *Morfometrická proměnlivost západopalearktických forem podrodu Myotis* [*Morphometric variation of West-Palearctic forms of the subgenus Myotis*]. Diploma thesis, Department of Zoology, Faculty of Sciences, Charles University, Praha, 153 pp (in Czech).

BENDA P. 1996: Distribution of Geoffroy's bat, Myotis emarginatus (Chiroptera: Vespertilionidae), in the Levant region. *Folia Zool.* **45**: 193–199.

BENDA P. & HORÁČEK I. 1995a: Geographic variation in three species of Myotis (Mammalia: Chiroptera) in South of the Western Palearctics. *Acta Soc. Zool. Bohem.* **59**: 17–39.
BENDA P. & HORÁČEK I. 1995b: Biometrics of Myotis myotis and Myotis blythi. *Myotis* **32–33**: 45–55.
BENDA P. & HORÁČEK I. 1998: Bats of the genus Myotis (Chiroptera: Vespertilionidae) in Turkey. Pp.: 349–350. In: *Abstracts. Euro-American Mammal Congres. Santiago de Compostela, 19–24 July, 1998*. Santiago de Compostela: Univ. de Santiago de Compostela, 424 pp.
BOBRINSKIJ N. A., KUZNECOV B. A. & KUZJAKIN A. P. 1965: *Opredelitel' mlekopitajuščih SSSR* [*Key of mammals of the USSR*]. Moskva: Izdatel'stvo Prosveščcnie, 383 pp (in Russian).
BOGDANOWICZ W. 1990: Geographic variation and taxonomy of Daubenton's bat, Myotis daubentoni, in Europe. *J. Mamm.* **71**: 205–218.
BOGDANOWICZ W. 1994: Myotis daubentonii. *Mamm. Species* **475**: 1–9.
BÜLOW B. v. 1997: Ägyptischer Flughund (Rousettus egyptiacus) in der Süd-Türkei. *Säugetierk. Inf.* **12**: 326–327.
ÇAGLAR M. 1961a: [About lesser horseshoe bat (Rhinolophus hipposideros)]. *Türk Biol. Derg.* **11**(1): 11–13 (in Turkish).
ÇAGLAR M. 1961b: [About long-fingered bat, Myotis (Leuconoe) capaccinii]. *Türk Biol. Derg.* **11**(2): 35–37 (in Turkish).
ÇAGLAR M. 1961c: Myotis c. emarginatus (Geoffroy, 1806), in der europaischen Türkei. *Istanbul Üniv. Fen Fak. Mec., Seri B* **26**(3–4): 125–134.
ÇAGLAR M. 1965: Chiropterenfauna der Türkei. *Istanbul Üniv. Fen Fak. Mec., Seri B* **30**: 125–134.
ÇAGLAR M. 1968: [Bats of Turkey – I]. *Türk. Biol. Derg.* **18**: 5–18 (in Turkish, Engl. title).
ÇAGLAR M. 1969: [Bats of Turkey II.]. *Türk. Biol. Derg.* **19**: 88–106 (in Turkish, Engl. title).
CORBET G. B. 1978: *The Mammals of the Palearctic Region: a taxonomic review*. London-Ithaca: British Museum (Natural History) and Cornell Univ. Press, 314 pp.
CORBET G. B. & MORRIS P. A. 1967: A collection of recent and subfossil mammals from southern Turkey (Asia Minor), including the dormouse Myomimus personatus. *J. Natur. Histor.* **1**(4): 561–569.
CRUCITTI P. 1988: Chirotteri della Tracia e dell'Isola di Samotracia. *Atti Soc. Ital. Sci. Natur. Museo Civ. Stor. Natur. Milano* **129**: 78–84.
DANFORD C. G. & ALSTON E. R. 1877: On the mammals of Asia Minor. Part I. *Proc. Zool. Soc. Lond.* **1877**: 270–282.
DANFORD C. G. & ALSTON E. R. 1880: On the mammals of Asia Minor. Part II. *Proc. Zool. Soc. Lond.* **1880**: 50–64.
DEBLASE A. F. 1972: Rhinolophus euryale and R. mehelyi (Chiroptera, Rhinolophidae) in Egypt and Southwest Asia. *Israel J. Zool.* **21**: 1–12.
DEBLASE A. F. 1980: The bats of Iran: systematics, distribution, ecology. *Fieldiana Zool. (N. S.)* **4**: 1–424.
DEBLASE A. F. & MARTIN R. L. 1973: Distributional notes on bats (Chiroptera: Rhinolophidae, Vespertilionidae) from Turkey. *Mammalia* **37**: 598–602.
DEPAZ O. 1995: Geographic variation of the Greater horseshoe bat (Rhinolophus ferrumequinum) in the West-half of the Palearctic Region. *Myotis* **32–33**: 33–44.
DOBSON G. E. 1878: *Catalogue of the Chiroptera in the Collection of the British Museum*. London: British Museum (Natural History), 567 pp.
DOGRAMACI S. 1989: Mammalian Fauna of Turkey. *Ondokuz Mayis Üniv. Fen Fak. Derg.* **1**: 107–136 (in Turkish, Engl. abstract).
DORIA G. 1887: I chirotteri trovati finora in Liguria. *Ann. Mus. Civ. Stor. Natur. Genova, S. 2* **4**(1886): 385–474.
DULIĆ B. 1978: Morphology of the hair of Pipistrellus savii (Bonaparte 1837). Pp.: 51–61. In: OLEMBO R. J., CASTELINO J. B. & MUTERE F. A. (eds.): *Proceedings of the Fourth International Bat Research Conference*. Nairobi: Kenya National Academy for Advancement of Arts and Sciences.
EISENTRAUT M. 1959: Der Rassenkreis Rousettus aegyptiacus E. Geoffr. *Bonn. Zool. Beitr.* **10**: 218–235.
ELLERMAN J. R. & MORISSON-SCOTT T. C. S. 1951: *Checklist of Palearctic and Indian Mammals*. London: British Museum Natural History, 810 pp.
FELTEN H. 1971: Eine neue Art der Fledermaus-Gattung Eptesicus aus Kleinasien (Chiroptera: Vespertilionidae). *Senckenbergiana Biol.* **52**: 371–376.
FELTEN H., SPITZENBERGER F. & STORCH G. 1977: Zur Kleinsäugerfauna Westanatoliens. Teil IIIa. *Senckenbergiana Biol.* **58**: 1–44.
GAISLER J. 1970: The bats (Chiroptera) collected in Afghanistan by the Czechoslovak expeditions of 1965–1967. *Acta Sci. Natur. Brno* **4**(6): 1–56.
GAUCKLER A. & KRAUS M. 1970: Kennzeichen und Verbreitung von Myotis brandti (Eversmann, 1845). *Ztschr. Säugetierk.* **35**: 113–124.

HACKETHAL H., GRIMMBERGER E. & HAENSEL J. 1988: Untersuchungen zur morphologischen Variablität der Mopsfledermaus, Barbastella barbastellus (Schreber, 1774) (Chiroptera, Vespertilionidae). *Nyctalus (N. F.), Berlin* **2**(5): 431–444.

HANÁK V. 1965: Zur Systematik der Bartfledermaus Myotis mystacinus Kuhl, 1819 und über das Vorkommen von Myotis ikonnikovi Ognev, 1912 in Europa. *Věst. Čs. Společ. Zool.* **29**: 353–367.

HANÁK V. 1966: Zur Systematik und Verbreitung der Gattung Plecotus, Geoffroy, 1818 (Mammalia, Chiroptera). *Lynx (Praha), n. s.* **6**: 57–66.

HANÁK V. 1969: Ökologische Bemerkungen zur Verbreitung der Langohren (Gattung Plecotus Geoffroy, 1818) in der Tschechoslowakei. *Lynx (Praha), n. s.* **10**: 35–39.

HANÁK V. 1970: Notes on the distribution and systematics of Myotis mystacinus Kuhl, 1819. *Bijdr. Dierk.* **40**: 40–44.

HANÁK V. & GAISLER J. 1971: The status of Eptesicus ognevi Bobrinskii, 1918, and remarks on some other species of this genus (Mammalia: Chiroptera). *Věst. Čs. Společ. Zool.* **35**: 11–24.

HANÁK V. & ELGADI A. 1984: On the bat fauna (Chiroptera) of Libya. *Věst Čs. Společ. Zool.* **48**: 165–187.

HANÁK V. & HORÁČEK I. 1984: Some comments on the taxonomy of Myotis daubentoni (Kuhl, 1819) (Chiroptera, Mammalia). *Myotis* **21–22**: 7–19.

HANÁK V. & HORÁČEK I. 1986: Zur Südgrenze des Areals von Eptesicus nilssoni (Chiroptera: Vespertilionidae). *Ann. Naturhistor. Mus. Wien* **88/89**: 297–308.

HARRISON D. L. 1956: Mammals from Kurdistan, Iraq, with description of a new bat. *J. Mamm.* **37**: 257–263.

HARRISON D. L. 1962: A new subspecies of the noctule bat (Nyctalus noctula Schreber, 1774) from Lebanon. *Proc. Zool. Soc. Lond.* **139**: 337–339.

HARRISON D. L. 1963: Report on a collection of bats (Microchiroptera) from N. W. Iran. *Ztschr. Säugetierk.* **28**: 301–308.

HARRISON D. L. 1964: *The mammals of Arabia. Vol. I.* London: Benn, 192 pp.

HARRISON D. L. 1975: Scientific results of the Oman Flora and Fauna Survey, 1975. Description of a new subspecies of Botta's serotine (Eptesicus bottae Peters, 1869, Chiroptera: Vespertilionidae) from Oman. *Mammalia* **39**: 415–418.

HARRISON D. L. & LEWIS R. E. 1961: The large mouse-eared bats of the Middle East, with description of a new subspecies. *J. Mamm.* **42**: 372–380.

HARRISON D. L. & MAKIN D. 1988: Significant new records of Vespertilionid Bats (Chiroptera: Vespertilionidae) from Israel. *Mammalia* **52**: 593–596.

HARRISON D. L. & BATES P. J. J. 1991: *The mammals of Arabia. Second Edition.* Sevenoaks: Harrison Zoological Museum, 354 pp.

HAYMAN R. W. & HILL J. E. 1971: Part 2, Order Chiroptera. Pp.: 1–73. In: MEESTER J. & SETZER H. W. (eds.): *The Mammals of Africa: an Identifical Manual.* Washington: Smithsonian Inst. Press.

HELVERSEN O. v. 1989a: Bestimmungsschlüssel für die europäischen Fledermäuse nach äusseren Merkmalen. *Myotis* **27**: 41–60.

HELVERSEN O. v. 1989b: New records of bats (Chiroptera) from Turkey. *Zool. Middle East* **3**: 5–18.

HORÁČEK I. 1984: Remarks on the causality of population decline in European bats. *Myotis* **21–22**: 138–147.

HORÁČEK I. 1991: Enigma of Otonycteris: ecology, relationships, classification. *Myotis* **29**: 17–30.

HORÁČEK I., ČERVENÝ J., TAUŠL A. & VÍTEK D. 1974: Notes on the mammals fauna of Bulgaria (Insectivora, Chiroptera, Rodentia). *Věst. Čs. Společ. Zool.* **38**: 19–31.

HORÁČEK I. & HANÁK V. 1984: Comments on the systematics and phylogeny of Myotis nattereri (Kuhl, 1818). *Myotis* **21–22**: 20–29.

HORÁČEK I. & HANÁK V. 1986: Generic status of Pipistrellus savii and comments on classification of the genus Pipistrellus (Chiroptera: Vespertilionidae). *Myotis* **23–24**: 9–16.

HORÁČEK I. & ZIMA J. 1996: Evolutionary divergence in the lesser horseshoe bat. *Bat Res. News* **37**(2–3): 67–68.

HORÁČEK I., HANÁK V. & BENDA P. 1998: Bats (Chiroptera) of the Eastern Mediterranean: a biogeographic summary. *Ztschr. Säugetierk.* **63**, Sonderheft: 26.

HORÁČEK I., BOGDANOWCZ W. & DULIČ B. in press: Plecotus austriacus (Fischer, 1829) – Graues Langohr. In: NIETHAMMER J. & KRAPP F. (eds.): *Handbuch der Säugetiere Europas. Band 4.* Wiesbaden: Aula Verlag.

HŮRKA K. 1972: Basilia mongolensis nudior subsp. n. nebst Bemerkungen zur Nycteribien- und Streblidenfauna Thrakiens (Diptera: Pupipara). *Ann. Naturhistor. Mus. Wien* **76**: 709–713.

IBAÑEZ C. & FERNANDÉZ R. 1985: Systematic Status of the Long-eared Bat Plecotus teneriffae Barret-Hamilton, 1907 (Chiroptera; Vespertilonidae). *Säugetierk. Mitt.* **32**:143–149.

ILIOPOULOU-GEORGUDAKI J. G. 1984: Intraspecific and interpopulation morphologic variation in the sharp-eared bat, Myotis blythii (Tomes, 1857) (Chiroptera: VEspertilionidae), from Greece. *Bonn. Zool. Beitr.* **35**: 15–24.

ILYIN V. YU., STRELKOV P. P. & SMIRNOV D. G. 1998: New records of bats from a central part of the Northern Caucasus. *Plecotus et al.* **1**: 55–60.

IVANOVA T. 1998: First data on bats of Central Balkan Mts. (Bulgaria). *Vespertilio* **3**: in press.
JONES G. & PARIJS S. M. v. 1993: Bimodal echolocation in pipistrelle bats: are cryptic species present? *Proc. Roy. Soc. Lond.* **251**: 119–125.
KAHMANN H. 1962: Neue Ergebnisse in der Säugetierforschung in der Türkei. *Säugetierk. Mitt.* **10**: 112–116.
KAHMANN H. & ÇAGLAR M. 1960: Beitraege zur Saeugetierkunde der Türkei. I – Fledermäuse aus der Landschaft Hatay. *Istanbul Üniv. Fen Fak. Mec. Seri B* **25**: 1–21.
KAMENEVA S. P. & PANJUTIN K. K. 1960: [About migration of some species of bats]. *Ohrana Prirody i Ozelenenie, Moskva* **3** (In Russian).
KINZELBACH R. 1986: New records of the Egyptian Fruit Bat, Rousettus aegyptiacus, in Turkey. *Zool. Middle East* **1**: 20–21.
KOCK D. 1969: Die Fledermaus-Fauna des Sudan (Mammalia, Chiroptera). *Abh. Senckenberg. Naturforsch. Ges.* **521**: 1–238.
KOCK D. 1974: Pupipare Dipteren von Säugetieren des nordöstlichen Mittelmeerraumens (Ins.: Diptera). *Senckenbergiana Biol.* **55**: 87–104.
KOCK D. 1989: Fledermaus-Fliegen aus der E-Mediterranis (Diptera: Nycteribiidae). *Entomol. Ztschr.* **99**(5): 56–58.
KOCK D. 1996: Fledermäuse aus Nepal (Mammalia: Chiroptera). *Senckenbergiana Biol.* **75**: 15–21.
KOCK D., MALEC F. & STORCH G. 1972: Rezente und subfossile Kleinsäuger aus dem Vilayet Elazig, Ostanatolien. *Ztschr. Säugetierk.* **37**: 204–229.
KOCK D. & NADER I. A. 1984: Tadarida teniotis (Rafinesque, 1814) in the W-Palearctic and a lectotype for Dysopes rupelii Temminck, 1826 (Chiroptera: Molossidae). *Ztschr. Säugetierk.* **49**: 129–135.
KOOPMAN K. F. 1993: Order Chiroptera. Pp.: 137–241. In: WILSON D. E. & REEDER D. M. (eds.): *Mammal Species of the World. A taxonomic and geographic reference. Second edition*. Washington and London: Smithsonian Inst. Press, 1206.
KOOPMAN K. F. 1994: *Chiroptera: Systematics. Handbook of Zoology, Volume VIII Mammalia, Part 60.* Berlin-New York: Walter de Gruyter, 217 pp.
KRUSKOP S. V. & BORISSENKO A. V. 1996: A new subspecies of Myotis mystacinus (Vespertilionidae, Chiroptera) from East Asia. *Acta Theriol.* **41**: 331–335.
KRYŠTUFEK B. 1993: Geographic variation in the Greater horseshoe bat Rhinolophus ferrumequinum in south-eastern Europe. *Acta Theriol.* **38**: 67–79.
KUMERLOEVE H. 1975: Die Säugetiere (Mammalia) der Türkei. *Veröff. Zool. Staatsam. München* **18**: 69–158.
KUSJAKIN A. P. 1935: Neue Angaben über Systematik und Verbreitung der Fledermäuse der U. d. S. S. R. *Bull. Soc. Natur. Moscou, S. Biol.* **44**(7–8): 428–438 (in Russian, Germ. summary).
KUZJAKIN A. P. 1934: The bats from Tashkent and systematical remarks on some Chiroptera from Caucasus, Bucharia and Turkmenia. *Bull. Soc. Natur. Moscou, S. Biol.* **43**(2): 316–330 (in Russian, Engl. summary).
KUZJAKIN A. P. 1950: *Letučije myši (Sistematika, obraz žizni i pol'za dlja selskogo i lesnogo hozjajstva)* [*Bats (Systematics, survey of biology and importance for agricultural and forest economy)*]. Moskva: Sovetskaja Nauka, 444 pp (in Russian).
KVARTIRNIKOV M. 1957: [Bats of Bulgaria. Two new species for our fauna]. *Priroda, Sofija* **6**: 63–64 (in Bulgarian).
LAY D. M. 1967: A study of the mammals of Iran resulting from the Street Expedition of 1962–63. *Fieldiana: Zool.* **54**: 1–282.
LEHMANN E. v. 1966: Taxonomische Bemerkungen zur Säugerausbeute der Kumerloeveschen Orientreisen 1953–1965. *Zool. Beitr. (N. F.), Berlin* **12**: 251–317.
LEHMANN E. v. 1969: Eine neue Säugetieraufsammlung aus der Türkei im Museum Koenig (Kumerloeve-Reise 1968). *Zool. Beitr. (N. F.), Berlin* **15**: 299–327.
MITCHELL-JONES A. J., AMORI G., BOGDANOWICZ W., KRYŠTUFEK B., REIJNDERS P. J. H., SPITZENBERGER F., THISSEN J. B. M., VOHRALÍK V. & ZIMA J. in press: *Atlas of European Mammals*. London: Academic Press.
NADACHOWSKI A., SMIELOWSKI J., RZEBIK-KOWALSKA B. & DAOUD A. 1990: Mammals from the Near East in Polish collections. *Acta Zool. Cracov.* **33**: 91–120.
NADER I. A. 1975: On the bats (Chiroptera) of the Kingdom of Saudi Arabia. *J. Zool. Lond.* **176**: 331–340.
NADER I. A. & KOCK D. 1983: Notes on some bats from the Near East (Mammalia: Chiroptera). *Ztschr. Säugetierk.* **48**: 1–9.
NADER I. A. & KOCK D. 1987: First record of Miniopterus schreibersi (Kuhl 1819) (Mammalia: Chiroptera) from North Yemen with zoogeographical relationship evidenced by wing mites (Acarina: Spinturnicidae). *Senckenbergiana Biol.* **70**: 1–13.
NADER I. A. & KOCK D. 1990: Eptesicus (Eptesicus) bottae (Peters, 1869) in Saudi Arabia with notes on its subspecies and distribution (Mammalia: Chiroptera, Vespertilionidae). *Senckenbergiana Biol.***70**: 1–13.
NEUHAUSER H. N. & DEBLASE A. F. 1971: The status of Pipistrellus aladdin Thomas from Central Asia. *Mammalia* **35**: 273–282.

NIAZI A. D. 1976: On the Mediterranean Horseshoe bat from Iraq. *Bull. Natur. Histor. Res. Center* (Baghdad) **7**(1): 167–176.
OBUCH J. 1994: On the food of Eagle owl (Bubo bubo) and Tawny owl (Strix aluco) in the Eastern part of Turkey. *Tichodroma, Bratislava* **7**: 7–16 (in Slovak, Engl. summ.).
OSBORN D. J. 1963: New distributional records of bats from Turkey. *Mammalia* **27**: 210–217.
PALMEIRIM J. M. 1991: A morphometric assessment of the systematic position of the Nyctalus from Azores and Madeira (Mammalia: Chiroptera). *Mammalia* **55**: 381–388.
PANDURSKA R. S. & BESHKOV V. A. 1998: Species diversity of bats in underground roosts of Western Stara Planina Mts. (Bulgaria). *Vespertilio* **3**: in press.
PANJUTIN K. K. 1980: [Bats]. Pp.: 23–46. In: KUČERUK V. V. (ed.): *Voprosy teriologii. Itogi mečenija mlekopitajuščih.* [*Questions in theriology. Results of marking of mammals*]. Moskva: Nauka, 298 pp. (in Russian).
PAVLINOV I. Ja., BORISENKO A. V., KRUSKOP S. V. & JAHONTOV E. L. 1995: [Mammals of Euroasia. II. Non-Rodentia: Systematic-geographical review]. *Arch. Zool. Mus. Moscow State Univ.* **33**: 1–336 (in Russian).
PETERSON B. V., MARTIN R. L. & MAURER F. W. Jr. 1976: A record of some bat flies (Diptera: Nycteribiidae) from Turkey. *Entomol. News* **87**: 239–242.
PEUS F. 1976: Flöhe aus Anatolien und anderen Ländern des Nahen Ostens (Insecta: Siphonaptera). *Abh. Zool.-Bot. Ges. Wien* **20**: 1–111.
PEUS F. 1978a: Flöhe aus dem Mittelmeergebiet (Insecta, Siphonaptera). IX. Thrakien. *Folia Parasitol. (Praha)* **25**: 49–60.
PEUS F. 1978b: Flöhe aus Anatolien und dem Iran. *Ann. Naturhistor. Mus. Wien* **81**: 507–516.
QUMSIYEH M. B. 1985: The bats of Egypt. *Spec. Publ. Mus. Texas Tech. Univ.* **23**: 7–102.
QUMSIYEH M. B. 1996: *Mammals of the Holy Land.* Lubbock: Texas Tech. Univ. Press, 360 pp.
QUMSIYEH M. B., SCHLITTER D. A. & DISI A. M. 1986: New records and karyotypes of small mammals from Jordan. *Ztschr. Säugetierk.* **51**: 139–146.
RAKHMATULINA I. K. 1989: The peculiarity of the bat fauna of Azerbaijan. Pp.: 409–414. In: HANÁK V., HORÁČEK I. & GAISLER J. (eds.): *European Bat Research 1987.* Praha: Charles Univ. Press, 720 pp.
RAKHMATULINA I. K. 1996: On the history of study and tendency of changes of the Eastern Transcaucasian bat fauna. *Myotis* **34**: 59–70.
RYBIN S. N., HORÁČEK I. & ČERVENÝ J. 1989: Bats of Southern Kirghizia: Distribution and Faunal status. Pp.: 421–441. In: HANÁK V., HORÁČEK I. & GAISLER J. (eds.): *European Bat Research 1987.* Praha: Charles Univ. Press, 720 pp.
RZEBIK-KOWALSKA B., WOLOSZYN W. & NADACHOWSKI A. 1978: A new bat, Myotis nattereri (Kuhl, 1818) (Vespertilionidae), in the Fauna of Iraq. *Acta Theriol.* **23**: 541–550.
ŞADOGLU P. 1953: Meyva Yiyen Yarasalarin Beslenmesi. *Biyoloji* **3**: 12–17 (in Turkish).
SAINT-GIRONS M. C. & CAUBERE B. 1966: Notes sur les mammifères de France. V. – Sur le repartition de Rhinolophus hipposideros hipposideros et Rhinolophus hipposideros minimus Heuglin, 1861. *Mammalia* **30**: 308–326.
SATUNIN K. 1913: Über die zoogeographischen Grenzen des Kaukasusgebietes. Vorläufige Mitteilung. *Mitt. Kaukas. Mus. Tiflis* **7**: 56–106.
SPITZENBERGER F. 1979: Die Säugetierfauna Zyperns. Teil II: Chiroptera, Lagomorpha, Carnivora und Artiodactyla. *Ann. Naturhistor. Mus. Wien* **82**: 439–465.
SPITZENBERGER F. 1994: The genus Eptesicus (Mammalia, Chiroptera) in Southern Anatolia. *Folia Zool.* **43**: 437–454.
SPITZENBERGER F. 1996: Distribution and subspecific variation of Myotis blythi and Myotis myotis in Turkey (Mamm., Vespertilionidae). *Ann. Naturhistor. Mus. Wien* **98B** Suppl.: 9–23.
STEINER H. M. & GAISLER J. 1994: On a collection of bats (Chiroptera) from NE Turkey and N Iran. *Acta Sci. Natur. Brno* **28**(1): 1–37.
STRELKOV P. P. 1969: Migratory and stationary bats (Chiroptera) of the European part of the Soviet Union. *Acta Zool. Cracov.* **16**: 393–440.
STRELKOV P. P. 1971: Sedentary and migratory species of bats (Chiroptera) in the European part of the USSR. Communication 2. *Bjul. Moskov. Obščest. Izpyt. Prir., Otd. Biol.* **76**(5): 5–21 (In Russian, Engl. summ.).
STRELKOV P. P. 1972: Myotis blythi (Tomes, 1857): distribution, geographical variability and differences from Myotis myotis (Borkhausen, 1797). *Acta Theriol.* **17**: 355–380 (in Russian, Engl. abstract).
STRELKOV P. P. 1983a: Myotis mystacinus and Moytis brandti in the USSR and interrelations of these species. Part 2. *Zool. Žurnal* **62**: 259–270 (in Russian, Engl. summary).
STRELKOV P. P. 1983b: [Record localities of Myotis brandti Eversmann, 1845 and Myotis mystacinus Kuhl, 1819 (Chiroptera, Vespertilionidae) based on collections from museums of the USSR]. *Trudy Zool. Inst. AN SSSR* **119**: 38–42 (in Russian).
STRELKOV P. P. 1988: Brown (Plecotus auritus) and Grey (P. austriacus) [long-eared] bats (Chiroptera, Vespertilionidae) in the USSR. Communication 1. *Zool. Žurnal* **67**: 90–101 (in Russian, Engl. summary).

STRELKOV P. P. 1997a: Breeding area and its position in range of migratory bats species (Chiroptera, Vespertilionidae) in East Europe and adjacent territories. Communication 1. *Zool. Žurnal* **76**: 1073–1082 (in Russian, Engl. summary).
STRELKOV P. P. 1997b: Breeding area and its position in range of migratory bats species (Chiroptera, Vespertilionidae) in East Europe and adjacent territories. Communication 2. *Zool. Žurnal* **76**: 1381–1390 (in Russian, Engl. summary).
STRELKOV P. P., SOSNOVTZEVA V. P. & BABAEV H. B. 1978: The bats of Turkmenia. *Trudy Zool. Inst. AN SSSR* **78**: 3–71 (in Russian, Engl. title).
STRELKOV P. P. & ŠAJMARDANOV R. T. 1983: [New data on the distribution of bats (Chiroptera) in Kazakhstan]. *Trudy Zool. Inst. AN SSSR* **119**: 3–37 (in Russian).
STRELKOV P. P. & IL'IN V. J. 1990: The bats of South of middle and lower Volga provinces. *Trudy Zool. Inst. AN SSSR* **225**: 42–166 (in Russian, Engl. summary).
STRINATI P. 1959: Mission Coiffait-Strinati en Macédonie, Grèce et Turquie (Avril – May 1955): Chiroptera. *Mammalia* **23**: 72–76.
STUBBE M. & CHOTOLCHU N. 1968: Zur Säugetierfauna Mongolei. Ergebnisse der Mongolisch-Deutschen Biologischen Expeditionen seit 1962, Nr. 30. *Mitt. Zool. Mus. Berlin* **44**(1): 5–121.
THEODOR O. 1967: *An illustrated catalogue of the Rothschild collection of Nycteribidae (Diptera) in the British Museum (Natural History).* London: Trust Brit. Mus. (Nat. Hist.), Publ. 655, 506 pp.
TOPÁL G. 1958: Morphological studies on the os penis of bats in the Carpathian basin. *Ann. Histor.-Natur. Mus. Natn. Hungar.* **50**: 331–342.
TOPÁL G. 1971: The taxonomic position of Myotis dobsoni (Trouessart, 1879), and some statistical data to the subspecific examination of Myotis blythi (Tomes, 1857). *Ann. Histor.-Natur. Mus. Natn. Hungar., Pars Zool.* **63**: 383–399.
TOPÁL G. in press: Myotis emarginatus (Geoffroy, 1806) – Wimperfledermaus. In: NIETHAMMER J. & KRAPP F. (eds.): *Handbuch der Säugetiere Europas. Band 4.* Wiesbaden: Aula Verlag.
TSYTSULINA E. A. 1998: Some unknown in literature records of the giant noctule, Nyctalus lasiopterus (Schreber, 1780) in Caucasus. *Plecotus et al.* **1**: 61–64.
VAN CAKENBERGHE V. & DE VREE F. 1994: A revision of the Rhinopomatidae Dobson 1872, with the description of a new species (Mammalia: Chiroptera). *Senckenbergiana Biol.* **73**: 1–24.
VAN WINDEN A. C. J. 1988: Observations of bats in Turkey. Pp.: 212–213. In: VAN DER HAVE T. M., VAN DER BERK V. M., CRONAU J. P. & LANGEVELD M. J. (eds.): *South Turkey Project. A survey of waders and waterfowl in the Çukurova deltas, spring 1987. WIWO – report Nr 22.* Zeist, The Netherlands: Dutch Society for the protection of Birds.
VEREŠČAGIN N. K. 1959: *Mlekopitajuščie Kavkaza. Istorija formirovanija fauny* [*Mammals of the Caucasus Mts. History of fauna forming*]. Moskva-Leningrad: Izdatel'stvo AN SSSR, 703 pp. (in Russian).
VOLLETH M. 1987: Differences in the location of nucleolus organizer regions in European vespertilionid bats. *Cytogenet. Cell Genet.* **44**: 186–197.
WETTSTEIN O. v. 1913: Die Chiropterenausbeute. Wissenschaftliche Ergebnisse der Expedition nach Mesopotamien, 1910. *Ann. Keis. Kön. Naturhistor. Hofmus. Wien* **27**: 465–471.
WETTSTEIN O. 1926: Beiträge zur Säugetierkunde Europas. I. *Arch. Naturgeschichte, Berlin* **91A**: 139–163.
ZIMA J., ČERVENÝ J., HORÁČEK I., ČERVENÁ A., PRŮCHA K., MACHOLÁN M. & RYBIN S. N. 1991: Standard karyology of eighteen species of bats (Rhinolophidae, Vespertilionidae, Molossidae) from Eurasia. *Myotis* **29**: 31–34.
ZIMA J., VOLLETH M., HORÁČEK I., ČERVENÝ J., ČERVENÁ A., PRŮCHA K. & MACHOLÁN M. 1992: Comparative karyology of rhinolophid bats (Chiroptera: Rhinolophidae). Pp.: 229–236. In: HORÁČEK I. & VOHRALÍK V. (eds.): *Prague Studies in Mammalogy.* Praha: Charles Univ. Press, 246 pp.
ZOHARY M. 1973: *Geobotanical Foundations of the Middle East. Vol. 1.* Stuttgart-Amsterdam: Gustav Fischer Verlag, Swets & Zeitlinger, 340 pp.

APPENDIX – GAZETTEER

1 Edirne, more localities in town and neigbourhood (Edirne) (41° 39' N, 26° 33' E). – **2** Sarpdere (Kirklareli), Dupnisa magarasi cave (41° 51' N, 27° 33' E) and Kiz magarasi cave (41° 50' N, 27° 34' E). – **3** Igneada, Longoz (Kirklareli) (41° 52' N, 27° 56' E). – **4** Kiyiköy (Kirklareli) (41° 37' N, 28° 5' E). – **5** Safe suyu spring (3 km NW Sergen) (Kirklareli) (41° 42' N, 27° 41' E). – **6** Velika Köprüsü bridge (n. Demirköy) (Kirklareli) (41° 45' N, 27° 44' E). – **7** Istanbul, near hippodrome (Istanbul) (41° 1' N, 28° 57' E). – **8** Gökçeada Island (Çanakkale) (40° 10' N, 25° 52' E). – **9** Yalova (Çanakkale) (40° 15' N, 26° 24' E). – **10** Bergama (Izmir) (39° 7' N, 27° 11' E). – **11** Uludag (Bursa) (40° 4' N, 29° 10' E). – **12** Yalova (Termal) Kaplica (Istanbul) (40° 37' N, 29° 13' E). – **13** Simila (Istanbul) (40° 40' N, 29° 21' E) and Yalova (Istanbul) (40° 39' N, 29° 16' E). – **14** Altinova (Kocaeli)

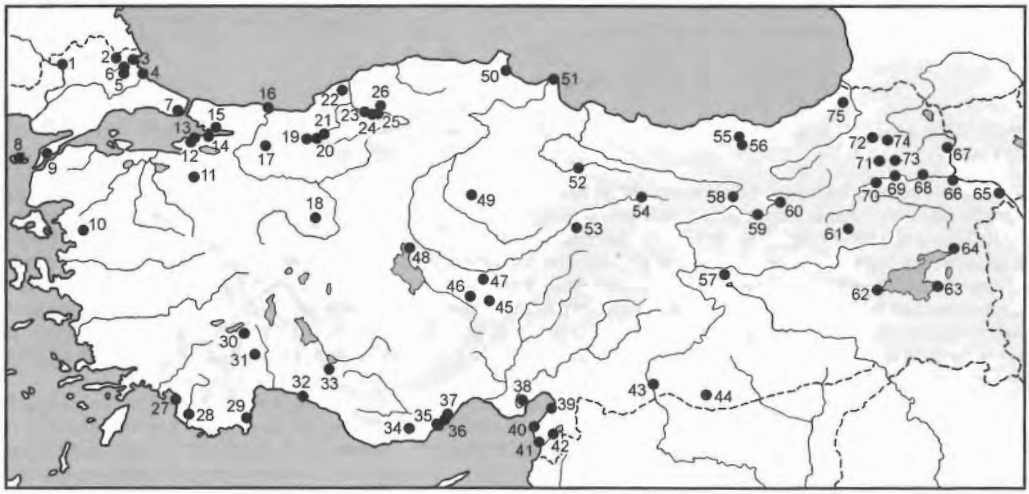

Fig. 31. Original record localities mentioned in the text; for locality numbers see gazetteer.

(40° 42' N, 29° 32' E) and Fevziye (n. Altinova) (Kocaeli) (40° 40' N, 29° 31' E). – **15** Hereke (Kocaeli) (40° 46' N, 29° 37' E). – **16** Denizköy (Sakarya) (41° 8' N, 30° 35' E). – **17** Hanyatak (Sakarya) (40° 33' N, 30° 38' E). – **18** a rocky massiff 10 km NE of Sivrihisar (Eskişehir) (39° 31' N, 31° 39' E). – **19** Abant Gölü lake (Bolu) (40° 38' N, 31° 16' E). – **20** Çepni (Bolu) (40° 39' N, 31° 31' E). – **21** Bolu (Bolu) (40° 45' N, 31° 37' E). – **22** Çayir, Çayirköy magarasi cave (Zonguldak) (41° 27' N, 32° 0' E). – **23** Yenice (Zonguldak), village (41° 11' N, 32° 19' E) and a large cave n. railway (41° 13' N, 32° 20' E). – **24** Yalnizca (Zonguldak) (41° 9' N, 32° 33' E). – **25** Karabük (Zonguldak) (41° 12' N, 32° 38' E). – **26** Safranbolu, Mencilar (= Mencilis) magarasi cave (Zonguldak) (41° 17' N, 32° 41' E). – **27** Kaya (n. Fethiye) (Mugla) (36° 35' N, 29° 5' E). – **28** Kinik (Antalya) (36° 21' N, 29° 20' E). – **29** Olympos (Antalya) (36° 25' N, 30° 29' E). – **30** Taşkapi, Insuyu magarasi cave (Burdur) (37° 41' N, 30° 24' E). – **31** Bucak, Susuz Han (Burdur) (37° 24' N, 30° 33' E). – **32** Sahil (Antalya) (36° 47' N, 31° 25' E). – **33** Tinaztepe magarasi caves (n. Bozkir) (Konya) (37° 14' N, 32° 01' E). – **34** Bozagaç, Yalan Dünya magarasi cave (Içel) (36° 18' N, 33° 25' E). – **35** Silifke, Castle of Silifke (Içel) (36° 24' N, 33° 57' E). – **36** Narlikuyu (Içel) (36° 27' N, 34° 7' E). – **37** Narlikuyu, Cennet and Cehennem caves (Içel) (36° 29' N, 34° 8' E). – **38** Deveciuşagi (Adana) (36° 47' N, 35° 38' E). – **39** Iskenderun (Hatay) (36° 36' N, 36° 10' E). – **40** Konacik (Hatay) (36° 19' N, 35° 49' E). – **41** Çevlik (Hatay) (36° 9' N, 35° 56' E). – **42** Antakya (Hatay) (36° 15' N, 36° 08' E). – **43** Birecik (Şanli Urfa) (37° 3' N, 37° 59' E). – **44** Harran (= Altinbaşak) (Şanli Urfa) (36° 51' N, 39° 2' E). – **45** Akköy (Kayseri) (38° 22' N, 35° 04' E). – **46** Herala, Nargölü (Nigde) (38° 23' N, 34° 29' E). – **47** Göreme (Nevşehir) (38° 40' N, 34° 50' E). – **48** Kurutlutepe (Ankara) (38° 34' N, 33° 27' E). – **49** Hattuşaş (Çorum) (40° 1' N, 34° 38' E) – **50** Yaliköy–Kabali (Sinop) (41° 52' N, 35° 6' E). – **51** Kürtler (Samsun) (41° 42' N, 36° 1' E). – **52** Castle of Tokat (Tokat) (40° 19' N, 36° 33' E). – **53** Gücük (n. Şarkişla) (Sivas) (39° 27' N, 36° 33' E). – **54** Zara, Demiryurt (Sivas) (39° 55' N, 37° 45' E). – **55** a cave 6 km SW Maçka (Trabzon) (40° 47' N, 39° 35' E). – **56** Sumelas (Trabzon) (40° 42' N, 39° 40' E). – **57** Harput, Buzluk magarasi cave (Elazig) (38° 43' N, 39° 16' E). – **58** Güzyurdu, a mountain pass 2300 m (Gümüşhane) (39° 54' N, 39° 34' E). – **59** blind tunnel n. Derebük (Tunceli) (39° 35' N, 39° 55' E). – **60** Tercan (Erzincan) (39°17' N, 40° 22' E). – **61** Hinis (Erzurum) (39° 21' N, 41° 42' E). – **62** Alaman Han (Bitlis) (38° 28' N, 42° 12' E). – **63** Castle of Van (Van) (38° 30' N, 43° 20' E). – **64** Muradiye cave (Van) (39° 2' N, 43° 44' E). – **65** Aralik (Kars) (39° 52' N, 44° 31' E). – **66** Tuzluca (Kars) (40° 3' N, 43° 40' E). – **67** Ani, ruins of Armenian town (Kars) (40° 31' N, 43° 34' E). – **68** Kagizman (Kars) (40° 10' N, 43° 08' E). – **69** Bogakale (Kars) (40° 8' N, 42° 29' E). – **70** Horasan (Erzurum) (40° 3' N, 42° 10' E). – **71** tunnel 5 km N of Sirbasan (Kars) (40° 19' N, 42° 20' E). – **72** ruins of a castle near Köprübaşi (Erzurum) (40° 42' N, 42° 11' E). – **73** tunnel 5 km W of Sarikamiş (Kars) (40° 19' N, 42° 33' E). – **74** canyon 10 km SW of Aydogdu (Erzurum) (40° 40' N, 42° 25' E). – **75** Murgul, Damar village (Artvin) (41° 15' N, 41° 35' E).