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Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 15. The fauna of bats and bat ectoparasites of Albania with a catalogue of bats from the western Balkans in the collection of the National Museum, Prague

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Abstract. A complete list of bat records available from Albania was compiled from the literature and from new records, based mainly on field studies and examination of several museum specimens. The record review is complemented with distribution maps, summaries of distributional status of the particular species, notes on field data, and records of arthropod ectoparasites. From the territory of Albania, at least 1,243 records of 33 bat species belonging to four families are known; viz. *Rhinolophus ferrumequinum* (Schreber, 1774) (164 record sites), *R. hipposideros* (Borkhausen, 1797) (120), *R. euryale* Blasius, 1853 (32), *R. mehelyi* Matschie, 1901 (2), *R. blasii* Peters, 1866 (22), *Myotis myotis* (Borkhausen, 1797) (56), *M. blythii* (Tomes, 1857) (53), *M. bechsteinii* (Kuhl, 1817) (13), *M. nattereri* (Kuhl, 1817) (12), *M. emarginatus* (Geoffroy, 1806) (22), *M. davidii* (Peters, 1869) (35), *M. brandtii* (Eversmann, 1845) (2), *M. alcathoe* von Helversen et Heller, 2001 (1), *M. daubentonii* (Kuhl, 1817) (13), *M. capaccinii* (Bonaparte, 1837) (48), *Vespertilio murinus* Linnaeus, 1758 (13), *Eptesicus serotinus* (Schreber, 1774) (62), cf. *E. nilssonii* (von Keyserling et Blasius, 1839) (2), *Hypsugo savii* (Bonaparte, 1837) (104), *Pipistrellus pipistrellus* (Schreber, 1774) (74), *P. pygmaeus* (Leach, 1825) (45), *P. nathusii* (von Keyserling et Blasius, 1839) (20), *P. kuhlii* (Kuhl, 1817) (71), *Nyctalus noctula* (Schreber, 1774) (34), *N. lasiopterus* (Schreber, 1780) (7), *N. leisleri* (Kuhl, 1817) (53), *Barbastella barbastellus* (Schreber, 1774) (3), *Plecotus auritus* (Linnaeus, 1758) (7), *P. macrobullaris* Kuzâkin, 1965 (3), *P. austriacus* (Fischer, 1829) (7), *P. kolombatovici* Đulić, 1980 (15), *Miniopterus schreibersii* (Kuhl, 1817) (71), and *Tadarida teniotis* (Rafinesque, 1814) (55). The records of *Eptesicus nilssonii* are uncertain, based on the echolocation call recordings only. Arthropod ectoparasites were newly collected from three species of bats in Albania. From 24 other species, data on ectoparasites are available in literature; of them from 18 species, additional parasites were collected. At least 45 species of ectoparasites belonging to nine families were recorded from Albania in total and the following 17 taxa of seven families are here reported from the country for the first time: *Araeopsylla gestroi* (Rothschild, 1906) (from *Tadarida teniotis*), *Ischnopsyllus intermedius* (Rothschild, 1898) (from *Eptesicus serotinus*), *I. simplex* Rothschild, 1906 (from *Myotis davidii*), *Nycteridopsylla trigona balcanica* Hůrka, 1965 (from *Myotis myotis* and *Eptesicus serotinus*), *Basilia mongolensis nudior* Hůrka, 1972 (from *Myotis davidii*), *B. nattereri* Kolenati, 1857 (from an unspecified host), *Argas vespertilionis* (Latreille, 1796) (from *Pipistrellus pipistrellus*, *P. kuhlii*, and *Tadarida teniotis*), *Paraperiglischrus rhinolophinus* (Koch, 1844) (from *Rhinolophus ferrumequinum*), *Leptotrombidium russicum* (Oudemans, 1902) (from *Eptesicus serotinus*), *Oudemansidium musca* (Oudemans, 1906) (from *Vespertilio murinus*, *Eptesicus serotinus*, *Hypsugo savii*, and

Tadarida teniotis), *Willmannium cavus* Kudrâšova, 1992 (two subspecies; from *Vespertilio murinus*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, and *Tadarida teniotis*), *Macronyssus flavus* (Kolenati, 1856) (from *Pipistrellus pygmaeus*), *M. granulosus* (Kolenati, 1856) (from *Myotis blythii*, *M. emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii*), *Ornithonyssus* Sambon, 1928 sp. (from *Plecotus macrobullaris*), *Parasteatonyssus hoogstraali* (Keegan, 1956) (from *Tadarida teniotis*), *Steatonyssus periblepharus* Kolenati, 1858 (from *Myotis blythii*, *M. davidii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii*), and *Notoedres chiropteralis* (Trouessart, 1896) (from *Pipistrellus pygmaeus*).

Key words. Distribution, ectoparasites, Rhinolophidae, Vespertilionidae, Miniopteridae, Molossidae, Ischnopsyllidae, Streblidae, Nycteribiidae, Ixodidae, Argasidae, Spinturnicidae, Trombiculidae, Macronyssidae, Sarcoptidae, Albania, Balkans, Mediterranean, Palaearctic.

CONTENTS

INTRODUCTION

The territory of Albania (28,748 km^2, see Fig. 1) represents a small section of the Balkan Peninsula and the Mediterranean Basin as well. Despite its small size, the country is geomorphologically extremely diversified, the landscape lifts up from the shores of the Adriatic and Ionian Seas in the west to mountains in the centre, north and east of the country. More than a half of the area of Albania is covered by high mountains, with some 25 peaks exceeding 2,500 m a. s. l., Mount Korab being the highest point (2,764 m). The mountains in the northern part of the country (Albanian Alps) represent the south-easternmost reaches of the Dinarides, while those in the central and southern parts of Albania belong to the system of Hellenides. The area of the country covers parts of three big lakes, Shkodra, Ohrit, and Prespë e Madhe, the largest lakes of the Balkan Peninsula. Albania possesses several small sea islands, of them only the Sazani island is of a noticeable size (>1 km^2), with an area of 5.7 km^2.

Most of the Albanian territory belongs to the thermo- and meso-Mediterranean zones (Blondel & Aronson 1999), the original vegetation is represented mostly by a mosaic of the evergreen oak forests and shrublands (*Quercus ilex*, *Q. coccifera*, *Pinus halepensis*; low altitudes), Mediterranean deciduous forests (*Quercus pubescens*, *Q. cerris*, *Carpinus orientalis*, *Fraxinus ornus*, *Ostrya carpinifolia*; medium altitudes), and only a small area in the north-eastern part of the country falls into the Central European mixed forest zone (Horvat et al. 1974, Eastwood 2004). The vegetation of Albania represents a connection between the Dalmatian and west-Greek sections of the west-Balkan narrow belt of the evergreen and deciduous Mediterranean woodlands (Horvat et al. 1974).

The biodiversity of Albania remained largely understudied till the end of the twentieth century. Even nowadays, the vertebrate fauna of this country is known rather poorly and in some groups the evidence is just fragmentary (see e.g. Sachanowicz et al. 2008, Szabolcs et al. 2017). The inventory of mammals of Albania remains an unfinished task and the composition of the fauna of small terrestrial mammals (insectivores, rodents) is a still unclosed chapter. The occurrence of several species of small mammals has been discovered in the country only recently (Bego et al. 2008, 2014, 2018, Stolarik & Jablonski 2017, Stolarik et al. 2017) and some potential members of the Albanian mammal fauna still wait to be detected (Bego et al. 2018). On the other hand, the Albanian fauna of bats seems to be almost completely known now, and moreover, in most of the bat species the local data on their biology are available at a level comparable with (or even higher than in) other countries of the Balkan Peninsula.

However, this relatively advanced knowledge of bats is a result of a very recent research activity, combining efforts of several groups of zoologists (Table 1). Nevertheless, the modern research of bats in Albania started already in the period 1959–1961, when a series of records of bats and their insect parasites were made, most of them in caves (Hanak et al. 1961, Friese & Königsmann 1962, Hůrka 1962, 1963a, b, c, Hanák 1964). This first stage of specialised bat research activities resulted in the evidence of 13 bat species in the country. Before this period, only few records of bats are known to be made in Albania, being documented by specimens scattered in several museum collections; although these records were published (Dulic & Felten 1964, Hanák 1964, Gaisler 1970, Felten et al. 1977, Spitzenberger et al. 2001, 2006), only few of them appeared in faunal reviews, while most of them remained overlooked for a long time.

Several bat records, made during the 1960s, were added by Lamani (1970); at that time, the known number of bat species increased to 16 (or to 17 under the current taxonomy, see Table 1). This number of species as well as the number of records remained without any change until the beginning of the 1990s, when no data on bats appeared for more than twenty years, see Bego & Griffiths (1994). Interestingly, in his list of Albanian mammals, Prigioni (1996) mentioned 20 bat

species, although he referred to only two papers containing data on the Albanian bats (Hanak et al. 1961, Lamani 1970) and did not report any other data sources.

Another period of bat research in Albania, for the first time employing also netting and detection of echolocation calls as the research methods, took place in the 1990s, when several research trips were made by foreign and Albanian workers. Results of three of these trips were published by Chytil & Vlašín (1994) and Uhrin et al. (1996). The latter authors also reviewed all then available data on bats from the country and summarised 91 records of 23 (24) species (Table 1). These rather low numbers represent complete evidence on bats from Albania accessible at the beginning of the 21st century.

A new chapter of the bat studies in Albania was opened in 2003, when a group of Polish researchers started to travel to the country and extensively studied bats and bat ecology at a level of effort which was incomparable with that underwent before. They made eight field trips in 2003–2012 (incl.) and published a series of papers, describing new records of bats and bat mites (Sachanowicz & Ciechanowski 2006, Sachanowicz et al. 2006a, 2014, 2016). This research effort resulted in confirmation of 32 species of bats in Albania (Sachanowicz et al. 2016), the number conforming to the situation known from the surrounding Balkan countries. The complete evidence of the data on bats gathered during these trips has been published just recently (Sachanowicz & Ciechanowski 2018). However, this comprehensive monograph summarises only the data recorded until the end of 2012 and/or published until the end of 2013 (see Table 1) and unfortunately omits the available data published later. Thus, the data summarised by Sachanowicz & Ciechanowski (2018) come only from certain parts of a year, mostly from the spring and late summer/autumn seasons, while data originating from e.g. the hibernation period are missing.

In 2011–2016, an extensive research of bats was conducted by Albanian scientists and university students for the first time. This effort brought enormous data on bat distribution and bat parasites, but also on bat ecology; the particular records are dispersed in numerous papers and theses (Papadatou et al. 2011, Scheffler et al. 2013, Theou & Bego 2013, 2014, Bego & Théou 2014, Çera 2014, Théou 2014, 2015, 2016a, b, Rapaj 2015, Théou & Đurović 2015a, b, Theou et al. 2015a, b, Szentiványi et al. 2016a, 2018, Théou & Loce 2017). With the exceptions of two early papers by Papadatou et al. (2011) and Scheffler et al. (2013), none of them were excerpted by Sachanowicz & Ciechanowski (2018). The bat distribution data that resulted from this massive effort were only briefly summarised in a form of a simplified map atlas of Albanian bats (Théou & Bego 2018), without any synthesis of ecological data and mainly, without any review of particular records.

In the last four years (2015–2018), the authors of this volume made six trips to Albania as a part of a long-time project focused on the documentation of bats and bat ectoparasites of the Balkan Peninsula. These trips covered different seasons, they were made mostly in the early summer, but also in spring, early autumn, and in winter. They brought some 320 records of at least 25 species of bats, originating from more than a hundred of localities (see List of sites and Fig. 1) and aside from the data on distribution of bats and their ectoparasites, also data on bat biology, namely their reproduction, foraging activity, and roosting ecology, including hibernation. These data as a whole are presented here and we use this opportunity also for the presentation of a complete summary of all available facts on bats of Albania.

Thus, this review gathers, besides our new records, the data summarised by Sachanowicz & Ciechanowski (2018) and the data published by the Albanians specialists in their numerous papers (Bego & Théou and collaborators, see above); additionally, several other records were included, both published and unpublished, that were unavailable or overlooked before (e.g. Dulic & Felten 1964, Dundarova 2016, Miteva & Thomassen 2016). The whole dataset of bats from Albania comprises more than 1,200 records (species/site) – this means that in the last twenty years, the

Table 1. Composition of the bat fauna of Albania and the number of records of particular species according to subsequent reviews; 1970 = summary of the data reported by Hanak et al. (1961), Hanák (1964), Hůrka (1962, 1963a, c), and Lamani (1970), and reviewed by Bego & Griffiths (1994); 1996 = summary of the data reported and/or reviewed by Chytil & Vlašín (1994) and Uhrin et al. (1996); 2012 = summary of the data reported or reviewed by Sachanowicz & Ciechanowski (2018); 2019 = this review. Numbers of cases with inaccurate species identification are given in parentheses

species	1970	1996	2012	2019
Rhinolophus ferrumequinum	8	16	106	164
Rhinolophus hipposideros	–	4	62	120
Rhinolophus euryale	5	5	23	33
Rhinolophus mehelyi	–	–	2	2
Rhinolophus blasii	3	6	16	22
Myotis myotis	6	10	31	56
Myotis blythii	3	6	38	54
Myotis bechsteinii	–	1	7	13
Myotis nattereri	–	1	7	12
Myotis emarginatus	1	1	12	22
Myotis davidii	–	[1]	29	35
Myotis brandtii	–	–	1	2
Myotis alcathoe	–	–	1	1
Myotis daubentonii	–	2	5	13
Myotis capaccinii	1	6	21	48
Vespertilio murinus	–	1	9	13
Eptesicus serotinus	1	5	43	62
cf. *Eptesicus nilssonii*	–	–	1	2
Hypsugo savii	1	4	71	104
Pipistrellus pipistrellus	–	[1]	46	74
Pipistrellus pygmaeus	–	–	36	45
Pipistrellus nathusii	1	1	16	20
Pipistrellus kuhlii	1	2	42	71
Nyctalus noctula	3	3	29	34
Nyctalus lasiopterus	–	–	6	7
Nyctalus leisleri	1	1	37	53
Barbastella barbastellus	–	–	3	3
Plecotus auritus	–	–	6	7
Plecotus macrobullaris	–	–	3	3
Plecotus austriacus	1	1	5	7
Plecotus kolombatovici	[1]	[1]	6	15
Miniopterus schreibersii	5	9	49	71
Tadarida teniotis	1	3	39	55
number of records	43	91	808	1243
number of species	17	24	32–33	32–33
records per species	2.5	3.8	24.5	37.7

number of records increased more than 13 times and the number of known species about 1.3 times (Table 1). Even in comparison to the numbers presented by Sachanowicz & Ciechanowski (2018), the number of bat records increased more than 1.5 times, although the number of bat species remains unchanged (Table 1).

This review also brings a list of arthropod parasites (as complete as possible) collected from bats in Albania; it consists of more than forty species of ectoparasites collected from 27 species of bats, and more than one third of these parasite species were newly discovered in the country. So far, the published evidence of the Albanian bat ectoparasites has been rather limited and focused on several parasite groups only (Friese & Königsmann 1962, Hůrka 1962, 1963a, b, c, 1964,

Scheffler et al. 2013, Sachanowicz et al. 2014, 2017, Boshamer 2016, Szentiványi et al. 2016a, 2018, Sachanowicz & Ciechanowski 2018). The host-parasite species associations have been known for 24 bat species and 28 parasite taxa of the country; now the number of these associations documented from Albania increased almost twice, see below.

As an appendix, we complement the review of Albanian bats with a catalogue of bat specimens from Albania housed in the collection of the National Museum, Prague, Czech Republic (NMP). Although the collection of Albanian bats in this museum is not too large, containing only 263 specimens, it is most probably the largest known aggregation stored in any institution. In other collections, including the Albanian ones, the Albanian bats are extremely rare items, for example, in the Vienna museum only one specimen is available, in Frankfurt two, in Geneve three, or in Budapest two, and in the collections of the Berlin and Bonn museums such items are absent. Most of the Prague collection of Albanian bats originates from the 1960s (cf. Hanák 1964), when the modern research of bats started in Albania, and it was occasionally enlarged by additional specimens. Since the NMP collection contains some specimens representing unknown records also from other parts of the western Balkans, the appendix is complemented by the data on all NMP specimens from this part of Europe, i.e. from Greece, North Macedonia, Kosovo, Serbia, Montenegro, Bosnia and Herzegovina, and Croatia, of which only some parts or no information was published.

MATERIAL AND METHODS

Distribution

The lists of records (arranged in alphabetical and/or chronological orders) include, for each item, the following information: name of the locality (each record is primarily listed by the name of the prefecture (qark), name of the nearest settlement or notable physical feature) [in brackets, serial number of the locality is given as indicated in the map], and/or description of the record site, date, number of recorded bats with indication of their sex, age, and physiological condition (for details see Abbreviations below), and a reference to museum collection, where applicable.

Original records come from the localities briefly described in List of sites below (see also Fig. 1). At these sites, bats were observed in their roosts (64 localities) or were netted and/or their calls detected at their foraging grounds (55 localities). Acoustic recordings were made using a portable ultrasound detector D-240x (Pettersson Elektronik AB, Uppsala, Sweden) set on the time-expansion mode connected to Edirol R-09HR recorder (Roland Corp., Japan). The analysed bat calls were recorded in free flight under natural conditions.

The words bunker, bunkers in the lists of original records are used to designate any abandoned military or paramilitary facility (mostly underground), where the bats were documented to roost. Such structures are of various shapes, sometimes a simple gallery cut in a rock, sometimes a concrete underground or semi-aboveground building, with several rooms and corridors, most frequently a combination of both types, and they are in a variable stage of (ongoing) desolation.

In quotations of the published records, the spelling of the locality name and the characterisation of the artificial roost (military structure) are mentioned as given in the source (bunker, tunnel, adit, etc.).

For the description and evaluation of the geographical distribution of the particular bat species in Albania, the traditional division of the Albanian territory into four physiogeographical regions was used; the Northern Mountain Range, Central Mountain Range, Southern Mountain Range, and the Western Lowlands. For the purpose of this volume, these regions were defined as follows: the Northern Mountain Range, the area north of the line between 41° 51' N / 19° 29' E and 42° 19' N / 20° 21' E; the Western Lowlands, the area west of, and the Central Mountain Range, the area east of the line between 42° 05' N / 19° 53' 30" E and 40° 31' 30" N / 20° 01' 30" E; the Southern Mountain Range, the area south of the line demarcated by these points: 50° 19' N / 19° 22' 30" E, 40° 31' 30" N / 20° 01' 30" E, and 40° 11' 30" N / 20° 41' E. For the description of the south-north gradient in the occurrence of the particular bat species, the territory of Albania was divided into three zones, along 40° 40' N and 41° 25' N, to south, centre, and north (see Table 4 and Fig. 119).

Ectoparasites

Arthropod ectoparasites were collected directly from the captured bats and preserved in alcohol. Additional parasite individuals were gathered during examination of the alcohol preparations of the host specimens deposited in the National Museum, Prague. Parasite individuals of the families Streblidae, Nycteribiidae, and Ixodidae were simply examined using light microscope, individuals of the families Ischnopsyllidae, Argasidae, Macronyssidae, Spinturnicidae, Trombiculidae, and Sarcoptidae were mounted in the 'Liquid de Swan' to permanent microscopic slides and examined with the microscope

in detail. The parasites were determined with the help of identification keys (Hopkins & Rothschild 1956, Fain 1959, Sonenshine et al. 1962, Dusbábek 1964a, b, 1970, Till & Evans 1964, Hůrka 1965, Filippova 1966, 1977, Evans 1968, Deunff 1977, Uchikawa & Dusbábek 1978, Micherdziński 1980, Peribáñez-López et al. 1989, Kudrâšova 1991, 1992, 1998, Klompen 1992, Pocora et al. 2013).

The lists of ectoparasite records (arranged in taxonomical, alphabetical and/or chronological orders) include, for each item, the following information: name of the family, species name, number and stage/sex of the specimens recorded, number and sex of hosts, name of the site, date of collection, and collector/s name/s; according to these data the record is detectable in the Records [of bats] paragraph, where other circumstances of the finding are available. Taxonomy and nomenclature of ectoparasites follow Ioff et al. (1953), Hopkins & Rothschild (1956), Rudnick (1960), Hůrka (1965), Maa (1965, 1975), Vercammen-Grandjean (1965), Radovsky (1967, 2010), Vercammen-Grandjean & Langston (1967), Deunff (1977), Deunff et al. (1986, 1990), Micherdziński (1980), Kudrâšova & Rybin (1983), Kudrâšova (1991, 1992, 1998), Klompen (1992), Stekol'nikov (2001), and Guglielmone et al. (2010). The images were taken with the Olympus XC30 digital camera, fixed on the Nikon E600 light microscope. As techniques, the bright-field and interference contrasts (Nomarsky DIC) were applied. For processing the photos, analySIS Docu v. 5.1 and Corel Photopaint X5 were employed.

LIST OF SITES

The following list presents (in alphabetical order) the sites where bats were recorded in Albania during six research trips made by the authors in the period 2015–2018, their brief characteristics, and the bat species recorded. Numbers in brackets [] correspond with numbers in the map in Fig. 1. For details concerning particular records see under particular species.

Apollonia (Fier Pref.), bunkers [1]; 40° 43' N / 19° 28' E, 68 m a. s. l.; summer 2016; inspection of an underground system of concrete corridors and small rooms (in a web of ca. 120×60 m) on the top of the former acropolis; *Rhinolophus ferrumequinum*, *Myotis myotis*;

Arrëz, Miraka bridge (Elbasan Pref.), bunker [2] (Fig. 76); 41° 11' N / 20° 17' E, 238 m a. s. l.; winter, spring & summer 2016; inspections of two small underground concrete bunkers; *Rhinolophus ferrumequinum*, *Hypsugo savii*;

Bashtovë (Tiranë Pref.), ruined castle [3] (Fig. 86); 41° 03' N / 19° 30' E, 17 m a. s. l.; summer 2015; detectoring (& netting) in the castle ruins; *Pipistrellus kuhlii*;

Beduqas (Gjirokastër Pref.), Dishnica river valley [4] (Fig. 87); 40° 20' N / 20° 11' E, 188 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Hypsugo savii*, *Pipistrellus kuhlii*;

Belistan (Fier Pref.), bunkers [5]; 40° 39' N / 19° 40' E, 100 m a. s. l.; summer 2016; inspection of seven underground simple spacious concrete bunkers; *Myotis myotis*, *Pipistrellus kuhlii*;

Bënjë-Novoselë (Gjirokastër Pref.), Lengarica river canyon with bunkers [6] (Fig. 107); 40° 15' N / 20° 26' E, 335 m a. s. l.; winter & spring 2016, summer 2019; netting above the river and at bunker entrances, inspections of bunkers of various construction and size, both underground and aboveground; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. bechsteinii*, *M. emarginatus*, *M. cappaccinii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *Plecotus kolombatovici*, *Miniopterus schreibersii*, *Tadarida teniotis*;

Berat (Berat Pref.), castle [7] (Fig. 114); 40° 42' N / 19° 57' E, 215 m a. s. l.; winter & summer 2016, summer 2018; inspections of freely accessible undeground spaces of the castle, netting & detectoring in yard of the central part of the castle (citadel); *Rhinolophus hipposideros*, *Myotis myotis*, *M. blythii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Miniopterus schreibersii*;

Borsh (Vlorë Pref.), Borshi river valley [8] (Fig. 78); 40° 04' N / 19° 52' E, 65 m a. s. l.; spring & summer 2016; netting above the river & detectoring in the valley; *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*;

Brar (Tiranë Pref.), Tirana river valley [9]; 41° 23' N / 19° 53' E, 185 m a. s. l.; summer 2018; detectoring at the river; *Pipistrellus kuhlii*;

Brest i Sipërm (Dibër Pref.), small pond [10]; 41° 43' N / 20° 22' E, 528 m a. s. l.; summer 2018; detectoring at a small pond near the northern margin of the village; *Pipistrellus pygmaeus*, *P. kuhlii*;

Brojë (Shkodër Pref.), Cemi river valley, cave [11]; 42° 26' N / 19° 32' E, 198 m a. s. l.; summer 2018; inspection of a small cave near road; *Rhinolophus ferrumequinum*;

Butrint (Vlorë Pref.), bunker [12] (Fig. 23); 39° 45' N / 20° 01' E, 26 m a. s. l.; winter 2016; inspection of an underground system of concrete bunkers and connecting corridors with three entrances, situated in the hill slope above the archaeological site; *Rhinolophus ferrumequinum*;

Çorovodë (Berat Pref.), Çorovoda river valley ca. 1 km east of the town [13]; 40° 31' N / 20° 15' E, 329 m a. s. l.; summer 2018; netting above the river & detectoring in the surrounding parts of the valley; *Myotis blythii*, *Pipistrellus pipistrellus*, *P. nathusii*, *P. kuhlii*;

Dërmënas (Fier Pref.), bunker [14]; 40° 45' N / 19° 29' E, 13 m a. s. l.; summer 2016; inspection of a simple small concrete aboveground bunker; *Myotis blythii*;

Dhorës (Berat Pref.), Osumi river canyon [15] (Fig. 82); 40° 26' N / 20° 17' E, 348 m a. s. l.; summer 2016; detectoring above and at the river; *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*;

Divjakë (Fier Pref.), Gjiri i Karavastasë, wetlands and pine forests at Plazhi i Divjakës [16] (Fig. 88); 40° 58' N / 19° 29' E, 3 m a. s. l.; summer 2018; detectoring in the wetlands and forests; *Pipistrellus kuhlii*;

Dragobi (Kukës Pref.), old beech forest in the Valbona river valley [17] (Fig. 44); 42° 26' N / 19° 59' E, 576 m a. s. l.; summer 2018; netting & detectoring in the forest; *Rhinolophus hipposideros*, *Myotis bechsteinii*;

Dukat (Vlorë Pref.), Dukati river valley [18] (Fig. 54); 40° 15' N / 19° 33' E, 283 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis davidii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus leisleri*, *Tadarida teniotis*;

Durrës (Durrës Pref.), downtown [19]; 41° 19' N / 19° 27' E, 14 m a. s. l.; summer 2015; detectoring in several parts of the downtown; *Pipistrellus kuhlii*;

Durrës (Durrës Pref.), beach resort [20]; 41° 19' N / 19° 29' E, 1 m a. s. l.; summer 2015; detectoring along the corniche of the beach resort part of the town; *Pipistrellus kuhlii*;

Dushk (Elbasan Pref.), Rimoni lake [21]; 40° 57' N / 19° 56' E, 135 m a. s. l.; summer 2018; detectoring at the lake bank; *Myotis capaccinii*, *Tadarida teniotis*;

Fier (Fier Pref.), bunkers [22]; 40° 42' N / 19° 32' E, 65 m a. s. l.; summer 2018; inspection of a series of spacious underground bunkers cut in rock of a hill at the southern margin of the town; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *Plecotus kolombatovici*;

Fshat (Dibër Pref.), a river valley west of the village [23]; 41° 29' N / 20° 05' E, 297 m a. s. l.; summer 2018; netting & detectoring in the river valley; *Myotis emarginatus*, *Pipistrellus pipistrellus*, *P. kuhlii*;

Fushë Okol (Shkodër Pref.), valley, watering place [24] (Fig. 66); 42° 24' N / 19° 42' E, 1186 m a. s. l.; summer 2018 & summer 2019; netting above the watering place & detectoring in the valley; *Vespertilio murinus*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. nathusii*, *Nyctalus leisleri*;

Fushë Studë (Elbasan Pref.), an artificial lake and surrounding forest [25] (Fig. 100); 41° 19' N / 20° 25' E, 1142 m a. s. l.; summer 2018; netting in the forest at the lake shore & detectoring at the lake bank and at surrounding meadows; *Myotis* cf. *daubentonii*, *Plecotus auritus*;

Gerhot (Gjirokastër Pref.), Viroi spring, bunker [26] (Fig. 32); 40° 06' N / 20° 07' E, 172 m a. s. l.; winter & summer 2016; inspections of a short undergound system of concrete bunkers with two entrances; *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. capaccinii*;

Gjirokastër (Gjirokastër Pref.), castle [27] (Figs. 39, 40); 40° 04' N / 20° 08' E, 360 m a. s. l.; summer 2015, winter, spring & summer 2016; inspections of freely accessible under- & aboveground rooms of the castle; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis blythii*, *M. emarginatus*, *M. capaccinii*, *Miniopterus schreibersii*;

Golaj (Kukës Pref.), Vlahëna river valley ca. 1.5 km south of the village [28]; 42° 14' N / 20° 24' E, 437 m a. s. l.; summer 2018; netting above the river & detectoring in the valley; *Myotis myotis*;

Gollomboç (Korçë Pref.), Hermit cave [29]; 40° 51' N / 20° 58' E, 853 m a. s. l.; winter 2016; inspection of the cave; *Rhinolophus ferrumequinum*, *R. hipposideros*;

Gomsiqe (Shkodër Pref.), Gomsiqe river valley [30]; 42° 01' N / 19° 41' E, 98 m a. s. l.; summer 2018; detectoring in the river valley; *Pipistrellus pipistrellus*;

Goranxi (Gjirokastër Pref.), bunker [31] (Figs. 112, 113); 40° 01' N / 20° 11' E, 275 m a. s. l.; spring 2016; inspection of a large underground concrete bunker & netting at the bunker entrance; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis* sp., *Pipistrellus pipistrellus*, *P. kuhlii*, *Plecotus kolombatovici*, *Miniopterus schreibersii*;

Goranxi (Gjirokastër Pref.), cave [32]; 40° 00' N / 20° 10' E, 670 m a. s. l.; spring 2016; inspection of a small cave; *Rhinolophus hipposideros*;

Goranxi (Gjirokastër Pref.), monastery [33]; 40° 00' N / 20° 10' E, 705 m a. s. l.; spring 2016; inspection of the aboveground rooms of the monastery; *Rhinolophus hipposideros*, *Plecotus* sp.;

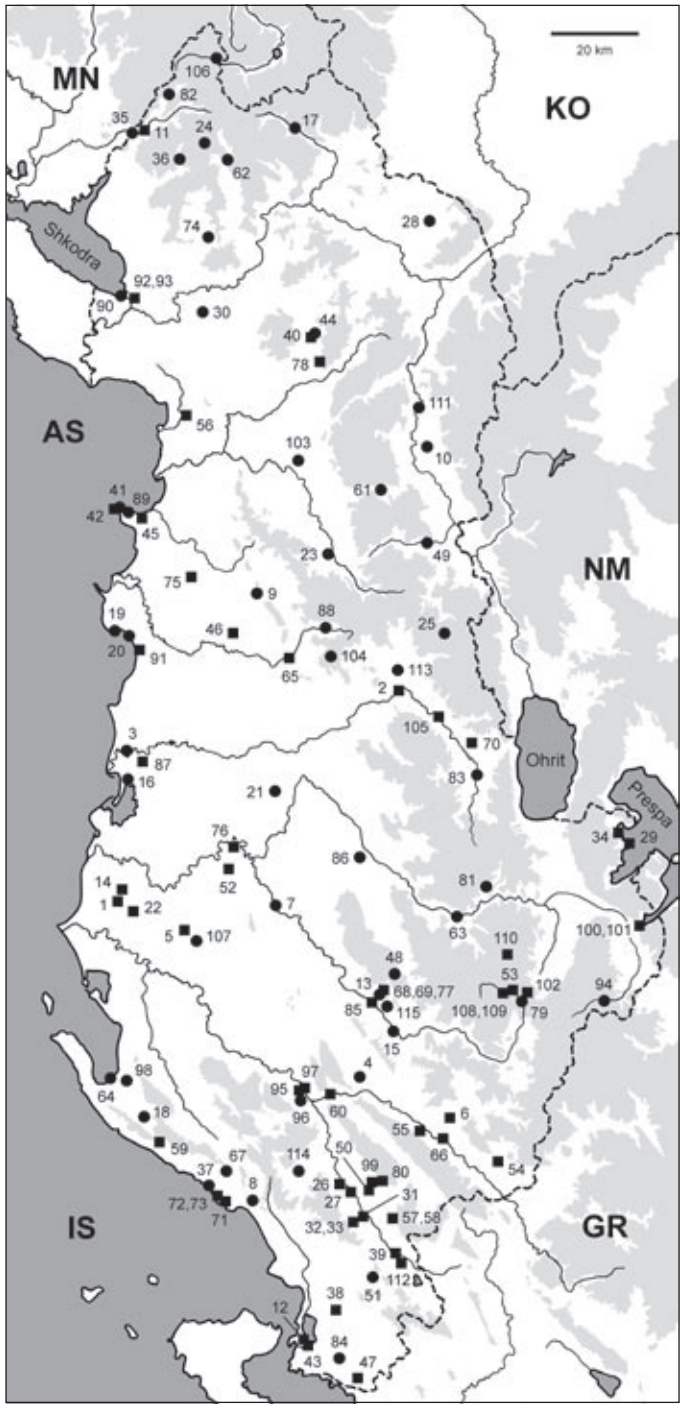
Goricë e Vogël (Korçë Pref.), Zaveri cave [34]; 40° 52' N / 20° 56' E, 836 m a. s. l.; winter & summer 2016; inspections of the cave; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis blythii*, *M. capaccinii*;

Grabom (Shkodër Pref.), Cemi river valley [35] (Fig. 71); 42° 25' N / 19° 30' E, 181 m a. s. l.; summer 2018; detectoring in the valley; *Eptesicus serotinus*, *Pipistrellus pipistrellus*;

Grykë Lugje (Shkodër Pref.), Thatë stream valley, watering place [36] (Fig. 74); 42° 22' N / 19° 38' E, 847 m a. s. l.; summer 2018; netting above the watering place & detectoring in the valley; *Myotis blythii*, *Vespertilio murinus*, cf. *Eptesicus nilssonii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *Nyctalus leisleri*;

Himarë (Vlorë Pref.), beach [37]; 40° 06' N / 19° 45' E, 1 m a. s. l.; summer 2018; detectoring on the sea shore and in the village; *Pipistrellus kuhlii*;

Fig. 1. Map of Albania showing the sites where bats were recorded during six research trips made by the authors in the period 2015–2018. Numbers at symbols correspond with the numbers in List of sites; squares = roosts, circles = other sites; pale grey = area above 1,000 m a. s. l.; AS = Adriatic Sea, IS = Ionian Sea, GR = Greece, KO = Kosovo, MN = Montenegro, NM = North Macedonia.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Jermë (Vlorë Pref.), bunkers [38] (Fig. 25); 39° 50' N / 20° 07' E, 56 m a. s. l.; winter & summer 2016; inspections of an underground system of concrete bunkers connected by rock cut corridors with six entrances; *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis blythii*, *Miniopterus schreibersii*;

Jorgucat (Gjirokastër Pref.), old church [39]; 39° 55' N / 20° 15' E, 765 m a. s. l.; spring 2016; inspection of the church nave; *Rhinolophus hipposideros*;

Kalivare (Shkodër Pref.), bunker, ca. 2 km east of the village [40]; 41° 58' N / 20° 01' E, 415 m a. s. l.; summer 2018; inspection of an underground system of rock cut corridors; *Rhinolophus ferrumequinum*;

Kepi i Rodonit (Durrës Pref.), meadows & sea shore at Kisha e Shën Antonit [41]; 41° 35' N / 19° 28' E, 15 m a. s. l.; summer 2018; detectoring among the meadows & at the sea shore; *Eptesicus serotinus*, *Pipistrellus kuhlii*;

Kepi i Rodonit (Durrës Pref.), bunker 1 km west by road of Kisha e Shën Antonit [42] (Fig. 118); 41° 35' N / 19° 27' E, 53 m a. s. l.; summer 2018; inspections of four large concrete bunkers near the tip of peninsula; *Rhinolophus ferrumequinum*;

Kështjella Trekëndore (Vlorë Pref.), ruined Venetian castle [43] (Fig. 42); 39° 45' N / 20° 01' E, 2 m a. s. l.; summer 2015; inspection of the castle rooms; *Myotis blythii*;

Kimëz (Shkodër Pref.), a river valley ca. 2 km west of the village [42] (Fig. 45); 41° 59' N / 20° 02' E, 433 m a. s. l.; summer 2018; netting above the river & detectoring in the valley; *Myotis bechsteinii*, *Hypsugo savii*, *Pipistrellus kuhlii*;

Kodër (Durrës Pref.), bunker at the road 1 km west of the village [45]; 41° 33' N / 19° 32' E, 138 m a. s. l.; summer 2018; inspections of four small underground concrete bunkers in a forest near road; *Rhinolophus ferrumequinum*;

Kodra e Diellit (Tiranë Pref.), bunkers [46]; 41° 18' N / 19° 48' E, 249 m a. s. l.; winter 2017; inspection of a series of underground concrete bunkers; *Rhinolophus ferrumequinum*, *R. hipposideros*;

Konispol (Vlorë Pref.), Dera e Shpellës Konispol cave [47] (Fig. 5); 39° 41' N / 20° 11' E, 525 m a. s. l.; winter 2016; inspection of the cave; *Rhinolophus ferrumequinum*;

Koritë (Berat Pref.), watering place in a mountain pass [48]; 40° 33' N / 20° 17' E, 1368 m a. s. l.; summer 2018; netting above the watering place & detectoring in the surrounding areas of the mountain pass; *Myotis myotis*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. nathusii*, *Nyctalus leisleri*, *Tadarida teniotis*;

Krajkë (Dibër Pref.), Zerdjani river valley [49]; 41° 31' N / 20° 23' E, 524 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis davidii*, *Hypsugo savii*, *Pipistrellus kuhlii*;

Krinë (Gjirokastër Pref.) [50], bunker, 40° 06' N / 20° 12' E, 468 m a. s. l.; winter 2016; inspection of an underground bunker (simple narrow corridor); *Rhinolophus ferrumequinum*, *R. hipposideros*;

Krongj (Vlorë Pref.), Vris stream valley [51] (Fig. 50); 39° 55' N / 20° 11' E, 163 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Rhinolophus ferrumequinum*, *Myotis blythii*, *M. emarginatus*, *Nyctalus leisleri*, *Miniopterus schreibersii*;

Kutalli (Berat Pref.), bunker [52]; 40° 47' N / 19° 48' E, 41 m a. s. l.; summer 2018; inspection of a large concrete bunker at the eastern margin of the village; *Rhinolophus hipposideros*;

Leshnjë (Korçë Pref.), bunkers [53] (Fig. 33); 40° 32' N / 20° 37–38' E, 1075–1100 m a. s. l.; spring & summer 2016; inspections of six simple underground concrete bunkers; *Myotis myotis*, *M. blythii*, *Hypsugo savii*, *Pipistrellus pipistrellus*;

Leskovik (Korçë Pref.), cave [54]; 40° 09' N / 20° 34' E, 670 m a. s. l.; spring 2016; inspection of a small cave at the road to the village; *Rhinolophus hipposideros*;

Leusë (Gjirokastër Pref.), church [55]; 40° 13' N / 20° 21' E, 415 m a. s. l.; spring 2016; inspection of the church rooms; *Rhinolophus ferrumequinum*;

Lezhë (Lezhë Pref.), bunkers [56] (Fig. 11); 41° 47' N / 19° 39' E, 140 m a. s. l.; spring 2016; inspection of several large underground concrete bunkers; *Rhinolophus ferrumequinum*;

Libohovë (Gjirokastër Pref.), bunker [57]; 40° 02' N / 20° 15' E, 285 m a. s. l.; spring 2016; inspection of aboverground concrete bunkers; *Rhinolophus hipposideros*, *Myotis myotis*;

Libohovë (Gjirokastër Pref.), ruined castle [58]; 40° 02' N / 20° 16' E, 466 m a. s. l.; summer 2015; inspection of the aboveground castle rooms; *Rhinolophus ferrumequinum*;

Llogara pass (Vlorë Pref.), bunker [59]; 40° 11' N / 19° 36' E, 630 m a. s. l.; summer 2016; inspection of an underground bunker (long and narrow concrete corridor with two entrances); *Rhinolophus ferrumequinum*;

Mezhgoran (Gjirokastër Pref.), Mezhgorani cave [60] (Fig. 2); 40° 18' N / 20° 06' E, 243 m a. s. l.; winter 2016; inspection of the cave; *Rhinolophus blasii*;

Murrë (Dibër Pref.), a river valley ca. 2 km east of the village [61] (Fig. 12); 41° 38' N / 20° 15' E, 727 m a. s. l.; summer 2018; netting & detectoring in the river valley; *Rhinolophus ferrumequinum*, *Hypsugo savii*;

Ndërlysaj (Shkodër Pref.), Thethi river valley [62] (Fig. 75); 42° 21' N / 19° 47' E, 510 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Rhinolophus ferrumequinum*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*;

Nikollarë (Korçë Pref.), Devolli river valley [63]; 40° 41' N / 20° 28' E, 553 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis blythii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*;

Orikum (Vlorë Pref.), sea shore [64]; 40° 20' N / 19° 27' E, 1 m a. s. l.; summer 2019; detectoring on the sea shore; *Pipistrellus kuhlii*, *Tadarida teniotis*;

Pëllumbas (Tiranë Pref.), Pëllumbasi cave (= Shpella e Zezë) [65]; 41° 15' N / 19° 58' E, 420 m a. s. l.; spring 2016; inspection of the cave; *Rhinolophus hipposideros*, *Miniopterus schreibersii*;

Petran (Gjirokastër Pref.), bunker [66] (Fig. 115); 40° 12' N / 20° 25' E, 263 m a. s. l.; summer 2015, winter & spring 2016; inspections of an underground system of rock-cut corridors; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *Miniopterus schreibersii*;

Pilur (Vlorë Pref.), watering place [67] (Fig. 94); 40° 08' N / 19° 47' E, 702 m a. s. l.; summer 2018; detectoring at a watering place in the ridge above the sea shore; *Pipistrellus pygmaeus*, *P. nathusii*, *Nyctalus lasiopterus*, *Tadarida teniotis*;

Pirogosh (Berat Pref.), bunker in the Çorovoda river canyon [68] (Fig. 17); 40° 31' N / 20° 15' E, 375 m a. s. l.; summer 2018; inspection of two large underground bunkers in the rocky canyon beneath the village; *Rhinolophus ferrumequinum*, *R. hipposideros*;

Pirogosh (Berat Pref.), Pirogoshi cave [69]; 40° 31' N / 20° 15' E, 555 m a. s. l.; summer 2018; inspection of the cave; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *Miniopterus schreibersii*;

Pishkash-Veri (Elbasan Pref.), bunker [70]; 41° 05' N / 20° 29' E, 525 m a. s. l.; spring 2016; inspection of a bunker; *Rhinolophus ferrumequinum*, *Myotis myotis*;

Porto Palermo (Vlorë Pref.), Ali Pasha fortress [71] (Fig. 106); 40° 04' N / 19° 47' E, 10 m a. s. l.; spring & summer 2016, summer 2018; inspections of aboveground rooms of the fortress; *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Plecotus kolombatovici*;

Porto Palermo (Vlorë Pref.), bunker [72]; 40° 04' N / 19° 46' E, 110 m a. s. l.; summer 2018; inspection of a large underground concrete bunker situated on the top of the ridge in the peninsula NW of the Ali Pasha fortress; *Rhinolophus ferrumequinum*;

Porto Palermo (Vlorë Pref.), tunnel [73]; 40° 04' N / 19° 46' E, 0 m a. s. l.; summer 2018; inspection of a large concrete marine tunnel (originally serving as a shelter for military submarines) through the small peninsula NW of the Ali Pasha fortress; *Miniopterus schreibersii*;

Fig. 2. Entrance to the famous Mezhgorani cave near Tepelenë (Gjirokastër Pref.); during sixty years of bat research in Albania, many species of bats and bat parasites were collected in this cave; the following bats were found to roost inside it: *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. bechsteinii*, *M. capaccinii*, and *Miniopterus schreibersii*. Photo by M. Uhrin (June 2015).

Prekal (Shkodër Pref.), Kiri river valley ca. 1.5 km north of the village [74] (Fig. 53); 42° 12' N / 19° 43' E, 224 m a. s. l.; summer 2018; netting above the river; *Myotis davidii*;

Prezë (Tiranë Pref.), castle [75]; 41° 26' N / 19° 40' E, 261 m a. s. l.; summer 2015; inspection of the castle rooms and surrounding abandoned buildings; *Rhinolophus ferrumequinum*;

Qamic (Berat Pref.), bunker [76]; 40° 50' N / 19° 49' E, 31 m a. s. l.; summer 2018; inspection of a large underground bunker serving as a straw store; *Rhinolophus ferrumequinum*;

Radesh (Berat Pref.), bunker [77] (Fig. 4); 40° 32' N / 20° 16' E, 726 m a. s. l.; summer 2018; inspection of a large underground bunker in a rock wall ca. 1 km SE of the village; *Rhinolophus ferrumequinum*;

Reps (Lezhë Pref.), mines [78]; 41° 54–55' N / 20° 03' E, 510–720 m a. s. l.; spring 2016; inspection of three mine galleries; *Rhinolophus ferrumequinum*, *R. hipposideros*;

Roshanj (Korçë Pref.), Dëshnica river valley [79] (Fig. 57); 40° 30' N / 20° 39' E, 1044 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis myotis*, *M. davidii*, *M. daubentonii*, *Vespertilio murinus*, *Eptesicus serotinus*, *Hypsugo savii*, *Nyctalus leisleri*, *Tadarida teniotis*;

Saranqinisht (Gjirokastër Pref.), bunker [80] (Fig. 13); 40° 06' N / 20° 14' E, 751 m a. s. l.; winter 2016; inspection of two short underground rock cut corridors; *Rhinolophus hipposideros*;

Selcë (Korçë Pref.), Selca river valley [81]; 40° 45' N / 20° 33' E, 764 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Myotis emarginatus*, *M. davidii*, *M. daubentonii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*;

Selcë (Shkodër Pref.), Cemi river valley [82] (Fig. 117); 42° 30' N / 19° 36' E, 410 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis capaccinii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus kuhlii*, *Tadarida teniotis*;

Selishtë (Korçë Pref.), Dunica river valley at an old Turkish bridge [83] (Fig. 48); 41° 01' N / 20° 31' E, 473 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Myotis myotis*, *M. nattereri*, *M. daubentonii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus noctula*;

Shalës (Vlorë Pref.), Pavllo river valley [84]; 39° 44' N / 20° 08' E, 44 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Rhinolophus ferrumequinum*, *Myotis blythii*;

Sharovë (Berat Pref.), bunker [85]; 40° 30' N / 20° 13' E, 315 m a. s. l.; autumn 2015; inspection of an underground bunker; *Rhinolophus ferrumequinum*;

Shëmrizë (Elbasan Pref.), small river valley [86]; 40° 50' N / 20° 10' E, 280 m a. s. l.; summer 2016; detectoring in a small river valley; *Pipistrellus pipistrellus*;

Shënepremte (Fier Pref.), bunker [87]; 41° 02' N / 19° 32' E, 12 m a. s. l.; summer 2018; inspection of four bunkers on the western margin of the village; *Myotis myotis*;

Shëngjin i Madh (Tiranë Pref.), Erzeni river valley [88]; 41° 19' N / 20° 04' E, 566 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis daubentonii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. kuhlii*, *Nyctalus leisleri*;

Shetaj (Durrës Pref.), village [89]; 41° 34' N / 19° 29' E, 40 m a. s. l.; summer 2018; detectoring in the village; *Hypsugo savii*, *Pipistrellus kuhlii*;

Shirokë (Shkodër Pref.), southern shore of the Shkodra lake [90]; 42° 03' N / 19° 28' E, 10 m a. s. l.; summer 2019; detectoring at the lake shore and inspection of an abandoned building; *Hypsugo savii*, *Tadarida teniotis*;

Shkallnur, Shkëmbi i Kavajës (Durrës Pref.), bunkers [91]; 41° 17' N / 19° 31' E, 4 m a. s. l.; winter 2016; inspection of an underground system of concrete bunkers connected by rock cut corridors with four entrances; *Rhinolophus ferrumequinum*, *Myotis capaccinii*, *Miniopterus schreibersii*;

Shkodër (Shkodër Pref.), bunker [92] (Fig. 34); 42° 03' N / 19° 30' E, 17 m a. s. l.; spring & summer 2016, summer 2018; inspections of an underground concrete system of bunkers with three large chambers and two entrances; *Myotis myotis*, *M. capaccinii*, *Miniopterus schreibersii*;

Shkodër (Shkodër Pref.), Rozafa castle [93] (Fig. 111); 42° 03' N / 19° 30' E, 85 m a. s. l.; spring & summer 2016; inspections of the under- & aboveground rooms of the partly ruined castle; *Myotis myotis*, *M. blythii*, *Pipistrellus kuhlii*;

Sinicë (Korçë Pref.), Devolli river valley [94] (Fig. 99); 40° 30' N / 20° 52' E, 1042 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *Nyctalus leisleri*;

Tepelenë (Gjirokastër Pref.), bunker [95] (Fig. 30); 40° 18' N / 20° 01' E, 185 m a. s. l.; spring 2016; inspection of large undeground bunkers; *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Miniopterus schreibersii*;

Tepelenë (Gjirokastër Pref.), Bënça river valley [96] (Fig. 69); 40° 17' N / 20° 01' E, 155 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Eptesicus serotinus*, *Pipistrellus kuhlii*;

Tepelenë (Gjirokastër Pref.), castle [97]; 40° 18' N / 20° 01' E, 193 m a. s. l.; summer 2015; inspections of vaulted rooms of the city walls; *Myotis nattereri*;

Tragjas (Vlorë Pref.), Izvori river spring & surrounding areas [98] (Fig. 81); 40° 19' N / 19° 31' E, 18 m a. s. l.; summer 2018; detectoring at a spring of the river and in the adjacent village; *Rhinolophus ferrumequinum*, *Myotis capaccinii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*;

Tranoshisht (Gjirokastër Pref.), bunker [99]; 40° 06' N / 20° 13' E, 547 m a. s. l.; winter 2016; inspection of a short underground rock cut corridor; *Myotis myotis*;

Tren (Korçë Pref.), Treni cave [100] (Fig. 61); 40° 40' N / 20° 59' E, 866 m a. s. l.; summer 2015, winter & summer 2016; inspections of the cave; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. daubentonii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*;

Tren (Korçë Pref.), Treni cave II [101]; 40° 40' N / 20° 59' E, 863 m a. s. l.; winter & summer 2016; inspections of the cave; *Rhinolophus hipposideros*, *R. blasii*;

Ujëbardhë (Korçë Pref.), bunker [102]; 40° 31' N / 20° 40' E, 1130 m a. s. l.; spring & summer 2016; inspections of an underground concrete bunker corridor; *Rhinolophus ferrumequinum*;

Urakë (Dibër Pref.), Tarini river valley [103] (Fig. 116); 41° 42' N / 19° 59' E, 145 m a. s. l.; summer 2018; netting & detectoring in the river valley; *Myotis blythii*, *M. capaccinii*, *Hypsugo savii*, *Pipistrellus kuhlii*, *Tadarida teniotis*;

Vakumonë (Elbasan Pref.), artificial lakes ca. 2 km east of the village [104] (Fig. 91); 41° 16' N / 20° 05' E, 1150 m a. s. l.; summer 2018; detectoring (& netting) at the lake shore; *Rhinolophus blasii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, *Nyctalus noctula*;

Vehçan (Elbasan Pref.), abandoned railway tunnel [105] (Fig. 19); 41° 08' N / 20° 24' E, 351 m a. s. l.; summer 2015 & winter 2016; inspections of a very spacious disused railway tunnel; *Rhinolophus hipposideros*, *Myotis* sp.;

Velan (Shkodër Pref.), Vermoshi river valley [106] (Fig. 63); 42° 35' N / 19° 45' E, 1005 m a. s. l.; summer 2018; detectoring (& netting) in the river valley; *Myotis capaccinii*, *Pipistrellus pipistrellus*;

Visokë (Fier Pref.), Gjanica river valley [107] (Fig. 43); 40° 38' N / 19° 41' E, 101 m a. s. l.; summer 2016; netting above the river & detectoring in the valley; *Myotis blythii*, *Hypsugo savii*, *Pipistrellus kuhlii*;

Vithkuq (Korçë Pref.), bunker [108] (Fig. 16); 40° 32' N / 20° 36' E, 1135 m a. s. l.; spring & summer 2016; inspections of two underground concrete bunkers connected by a rock-cut corridor; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *Miniopterus schreibersii*;

Vithkuq (Korçë Pref.), church & chapel [109] (Fig. 15); 40° 32' N / 20° 36' E, 1225 m a. s. l.; spring & summer 2016; inspections of the church and chapel including the chapel crypt; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Hypsugo savii*;

Fig. 3. Plane tree grove at Syri i Kaltër (Blue Eye), the spring of the Bistrica river (Vlorë Pref.); site of the first record of *Myotis bechsteinii* in Albania (Uhrin 1995), foraging habitat also of *Myotis capaccinii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus noctula*, and *N. leisleri* (Sachanowicz & Ciechanowski 2018). Photo by E. Weiß (July 2015).

Voskopojë (Korçë Pref.), mine [110]; 40° 38' N / 20° 36' E, 1180 m a. s. l.; spring 2016; inspection of the mine; *Myotis myotis*, *M. nattereri*;

Zall-Dardhë (Dibër Pref.), old aspen grove in the Drini i Zi river valley [111]; 41° 48' N / 20° 21' E, 365 m a. s. l.; summer 2018; netting in the grove & detectoring in the river valley; *Rhinolophus ferrumequinum*, *Myotis myotis*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus kuhlii*;

Zervat (Gjirokastër Pref.), old church [112]; 39° 54' N / 20° 15' E, 810 m a. s. l.; spring 2016; inspection of the church nave; *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*;

Zgosht (Elbasan Pref.), a valley at confluence of the Zalli i Shëmilit and Zalli i Lurikut rivers [113]; 41° 14' N / 20° 18' E, 278 m a. s. l.; summer 2016; netting above the Zalli i Lurikut river & detectoring in the river valley; *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus kuhlii*;

Zhulat (Gjirokastër Pref.), Kardhiqi river valley [114] (Fig. 92); 40° 07' N / 19° 59' E, 347 m a. s. l.; summer 2015; netting above the river & detectoring in the valley; *Myotis bechsteinii*, *M. nattereri*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus noctula*, *N. leisleri*;

Zogas (Berat Pref.), small pond in the mountain slope above the village [115]; 40° 30' N / 20° 16' E, 590 m a. s. l.; summer 2018; netting above the pond & detectoring on the pond banks; *Myotis capaccinii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *Tadarida teniotis*.

ABBREVIATIONS

Collections

BMNH = Natural History Museum, London, United Kingdom; – CMŠ = Martin Ševčík private collection, Nitra, Slovakia; – HNHM = Hungarian Natural History Museum, Budapest, Hungary; – NMP = National Museum (Natural History), Prague, Czech Republic; – NMW = Natural History Museum, Vienna, Austria; – NUU = National University of Uzbekistan, Toshkent, Uzbekistan; – SMF = Senckenberg Museum and Research Institute, Frankfurt am Main, Germany; – ZIN = Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; – ZMMU = Zoological Museum of the Moscow State University, Moscow, Russia.

Measurements

External dimensions. LAt = forearm length; – LPol = thumb length (without claw).

Cranial dimensions. LCr = greatest length of skull (incl. the praemaxilla in *Rhinolophus*); – LOc = occipito-canine length; – LCb = condylobasal length of skull; – LCc = condylo-canine length of skull; – LaZ = zygomatic width; – LaI = width of interorbital constriction; – LaP = width of postorbital constriction; – LaInf = infraorbital width; – LaN = neurocranium width; LaM = mastoidal width; – AN = neurocranium height; – LBT = largest horizontal length of tympanic bulla; – CC = rostral width between canines (incl.); – M^3M^3 = rostral width between third upper molars (incl.); – CM^3 = length of upper tooth-row between CM^3 (incl.); – LMd = condylar length of mandible; – ACo = height of coronoid process; – CM_3 = length of lower tooth-row between CM_3 (incl.).

Others

a = adult; – A = alcoholic preparation; – coll. = collected; – det. = identified using a bat detector; – f = female; – G = pregnant; – j = juvenile; – m = male; – M = mean; – max., min. = dimension range margins; – net. = netted; – obs. = observed; – P = mounted (parasite) preparation; – rec. = recorded; – s = subadult; – SD = standard deviation.

LIST OF SPECIES

Rhinolophus ferrumequinum (Schreber, 1774)

Records. **Original data**: B e r a t: Pirogosh, bunker in the Çorovoda river canyon [1] (Fig. 17), 22 September 2018: obs. 3 inds. torpid; – Pirogosh, Pirogoshi cave [2], 23 September 2018: obs. a colony of ca. 150 inds.; – Qamic, bunker [3], 20 September 2018: obs. 1 ind. torpid; – Radesh, bunker [4] (Fig. 4), 22 September 2018: obs. 1 ind. torpid; – Sharovë, bunker [5], 10 October 2015: obs. 2 inds. torpid. – D i b ë r: Murrë, a river valley ca. 2 km east of the village [6] (Fig. 12), 3 July 2018: det. calls of 1 foraging ind.; – Zall-Dardhë, old aspen grove in the Drini i Zi river valley [7], 30 June 2018: net. 1 fa. – D u r r ë s: Kepi i Rodonit, bunker [8] (Fig. 118), 19 September 2018: obs. 4 inds. torpid; – Kodër, bunker at the road 1 km west of the village [9], 19 September 2018: obs. 1 ind. torpid; – Kruje [10], 25 June 1996: coll. 2 fa, NMP (leg. M. Vlašín); – Shkallnur, Shkëmbi i Kavajës, bunkers [11], 29 January 2016: obs. 5 inds. torpid. – E l b a s a n: Arrëz, Miraka bridge, bunker [12] (Fig. 76), 10 May 2016: obs. 1 ind. torpid, 6 July 2016: obs. 2 inds. active; – Pishkash-Veri, bunker [13], 9 May 2016: obs. 1 ind. torpid. – F i e r: Apollonia, bunkers [14], 3 July 2016: obs. a colony of ca. 250 inds. ad. (mostly females with juvs. adjacent on the brest); – Fier, bunker [15], 1 October 2018: obs. 8 inds. torpid. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [16] (Fig. 107), bunker, 27 January 2016: obs. 1 ind. torpid;

above the Lengarica river at thermal baths, 28 June 2019: net. 1 faL, 29 June 2019: net. 1 faL (leg. R. Lučan); at three entrances to bunkers, 29 June 2019: net. 2 ma, 5 faL, 4 fs (leg. R. Lučan); – Gerhot, Viroi spring, bunker [17] (Fig. 32), 1 July 2016: obs. 2 inds. active; – Gjirokastër, castle [18] (Figs. 39, 40), 2 July 2015: obs. a maternity colony of ca. 600 inds. (ad.+juv.), 27 January 2016: obs. 3 inds. torpid in a ceiling hole, 3 May 2016: obs. 1 ind. torpid, 1 July 2016: obs. 2 inds. torpid in a ceiling hole; – Goranxi, bunker [19] (Figs. 112, 113), 3 May 2016: obs. 24 inds. torpid, net. 1 ma, 1 fa; – Krinë, bunker [20], 27 January 2016: obs. 1 ind. torpid; – Leusë, church [21], 7 May 2016: obs. 6 inds. torpid; – Libohovë, ruined castle [22], a dark room used as a stable, 4 July 2015: obs. 1 ind. active; – Petran, bunker [23] (Fig. 115), 6 July 2015: obs. 1 ind. active, 6 May 2016: obs. 1 ind. torpid; – Tepelenë, bunker [24] (Fig. 30), 6 May 2016: obs. 3 inds. torpid; – Zervat, old church above the village [25], 4 May 2016: obs. 1 ind. torpid. – K o r ç ë: Gollomboç, Hermit cave [26], 25 January 2016: obs. 1 ind. torpid; – Goricë e Vogël, Zaveri cave [27], 25 January 2016: obs. 6 inds. torpid, 28 June 2016: obs. a nursery colony of ca. 200 inds. ad. (mostly females with juvs. adjacent on the brest); – Tren, Treni cave [28] (Fig. 61), 7 July 2015: obs. 1 ind. ad. torpid, 25 January 2016: obs. 2 inds. torpid; – Ujëbardhë, bunker [29], 9 May 2016: obs. 1 ind. torpid, 27 June 2016: obs. 1 ind. active; – Vithkuq, bunker [30] (Fig. 16), 9 May 2016: obs. 18 inds. torpid, 27 June 2016: obs. a colony of ca. 15 inds. ad. (mostly females with juvs. adjacent on the brest); – Vithkuq, chapel [31] (Fig. 15), crypt, 27 June 2016: obs. 1 ind. active. – L e z h ë: Lezhë, bunker [32] (Fig. 11), 13 May 2016: obs. 5 inds. torpid; – Reps, three mines [33], 12 May 2016: obs. 2 inds. torpid, 13 May 2016: obs. 1 ind. torpid. – S h k o d ë r: Brojë, Cemi river valley, cave [34], 15 September 2018: obs. 1 ind. torpid; – Kalivare, bunker ca. 2 km east of the village [35], 27 June 2018: obs. two active inds.; – Ndërlysaj, Thethi river valley [36] (Fig. 75), above the river, 8 July 2016: net. 1 faL. – T i r a n ë: Kodra e Diellit, bunker [37], 4 March 2017: obs. ca. 130 inds. (incl. three clusters of 22, 36, and 40 inds.) torpid; – Prezë, bunker of an abandoned villa next to castle [38], 11 July 2015: obs. (& exam.) 1 ma active. – V l o r ë: Butrint, bunker [39] (Fig. 23), 28 January 2016: obs. 1 ind. torpid; – Jermë, bunkers [40] (Fig. 25), 28 January 2016: obs. 4 inds. torpid, 1 July 2016: obs. 5 inds. active; – Konispol, Dera e Shpellës Konispol cave [41] (Fig. 5), 28 January 2016: obs. (& exam.) 1 fs torpid; – Krongj, Vris stream valley [42] (Fig. 50), above the stream, 3 July 2015: net. 1 faL, det. & rec. calls of 1 foraging ind.; – Llogara pass, bunker [43], 2 July 2016: obs. 1 ind. active; – Porto Palermo, Ali Pasha fortress [44] (Fig. 106), 28 April 2016: obs. 1 ind. torpid, 26 September 2018: obs. 1 ind. torpid; – Porto Palermo, bunker

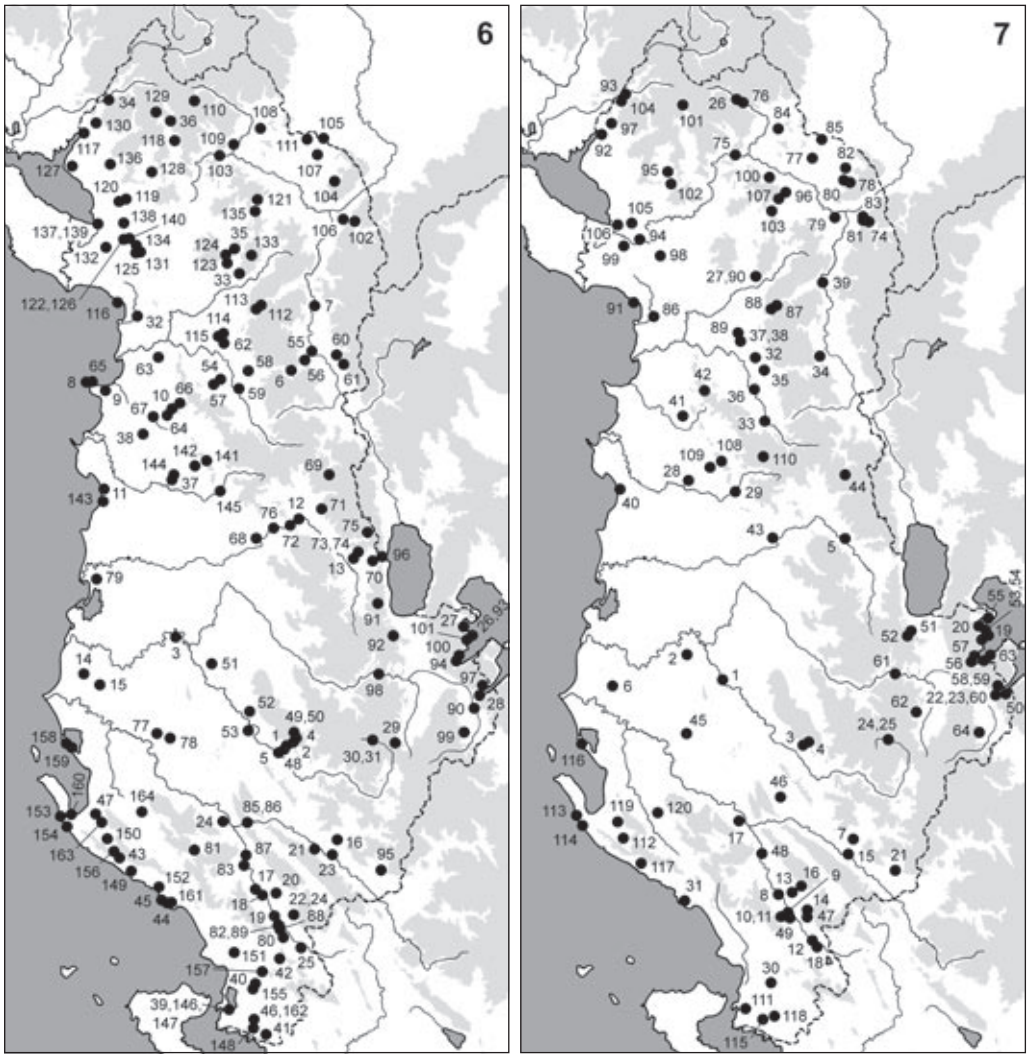
Fig. 4. Bunker near Radesh (Berat Pref.); summer roost of *Rhinolophus ferrumequinum*. Photo by P. Tájek (September 2018).

[45], 26 September 2018: obs. 1 ind. torpid; – Shalës, Pavllo river valley [46], at the river, 4 July 2015: det. & rec. calls of several foraging inds.; – Tragjas, at the Izvori river spring [47] (Fig. 81), 30 September 2018: det. & rec. calls of 1 foraging ind. – **Published data**: B e r a t: Çorovodë, Çorovodës river, limestone gorge [48], 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Shpella e Koritës [49], 9 June 1961: obs. inds. (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a colony (Hanák 1964); – Koritë, adit connected with limestone cave [50], 9 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Lapardha, bunker [51], 30 April 2004: remains of 1 ind. (Sachanowicz & Ciechanowski 2018); – Poliçan, ventilation shaft of abandoned underground factory [52], 8 May 2010: obs. guano of single inds. (Sachanowicz & Ciechanowski 2018); – Valë, two water tanks in pine wood [53], 7 May 2010: obs. a breeding colony of ca. 100 inds. + a colony of ca. 300 inds. mixed with *Rhinolophus euryale* and *Myotis emarginatus*; opening of the water tank, 7 May 2010: net. 3 ma, 10 fa, 5 faG; Voskopojës river, 7 May 2010: net. 1 faG (Sachanowicz & Ciechanowski 2018). – D i b ë r: Burrel, two tunnels [54], 13 September 2012: obs. 1 ind. + 1 ind. juv. (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, adit [55], 22 September 2005: obs. 4 inds. (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, tunnel near a quarry [56], 23 September 2005: obs. 3 inds., the tunnel entrances, 23 September 2005: net. 1 ma, 2 fa (Sachanowicz & Ciechanowski 2018); – Komsi, tunnel and small cave [57], 13 September 2012: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Lis, military tunnel [58], 30 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Suç, six military tunnels [59], 25 September 2005: obs. 3 inds. + 1 ind. + 2 inds. + 1 ind. + 4 inds. + 1 ind., 1 July 2011: 1 ind. + 1 ind.; military tunnels entrances, 25 September 2005: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Tren, four bunkers [60], 23 September 2005: obs. 1 ind. + 2 inds. + 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Trepçë, bunker [61], 24 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Urakë, Keputes cave [62], 12 December 2013: obs. 1 ind. (Théou et al. 2015b). – D u r r ë s: Delbinisht, adit [63], 24 April 2010: obs. 1 ind.; vertical cave with water, 24 April 2010: obs. & det. calls of emerging inds. (Sachanowicz & Ciechanowski 2018); – Halil, three tunnels and olive grove [64], at a restaurant and in a quarry, 3 October 2005: obs. 70 inds. (incl. a colony of 65 inds. ad+juv), 25 April 2010: obs. 1 ind. + 2 inds.; olive grove, 25 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Kepi i Rodonit, tunnel [65], 14 September 2012: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Kepi i Rodonit, military tunnel [8], 14 September 2012: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Nojë, two galleries in limestone slopes and two tunnels [66] (one with meal tank), 14 Septenber 2012: obs. 2 inds. + 5 inds. + 3 inds. + 10 inds. (incl. 1 fa) (Sachanowicz & Ciechanowski 2018); – Shpella e Fushë-Krujës [67], 16 October 1960: obs. a colony of ca. 20–30 inds., exam. 4 ma, 6 fa, 3 fs, 1 f (Hanak et al. 1961); Höhle bei Fush-Kruje, 16 October 1960: obs. a colony (Hůrka 1962); Shpella e Fush-Krujës bei Kruja, 16 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Fush-Kruje, 16 October 1960: 6 ma, 2 ms, 9 fa, 6 fs (Hanák 1964). – E l b a s a n: Arrez, railway tunnel [12], 8 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Elbasan, two bunkers [68], 28 September 2005: obs. 1 ind. + 2 inds.; military tunnel connected with a cave, 28 September 2005: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Fushë Studë, abandoned buildings and bunkers [69], 28 July – 7 August 2015: obs. roosting inds. (van der Tempel 2016); – Shpella e Kishës [70], April 1995: obs. 1 ind. (Uhrin 1995); Kishes cave, Fushe Gropa e Perrenjasit Mts., 5 km W from Ochrid lake, 19 April 1995: obs. 1 ma torpid (Uhrin et al. 1996); – Librazhd Katund, bunker [71], 4 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Mirakë, railway tunnel [72], 8 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shpella e Pishkashit [73], 5 October 1960: 7 inds., exam. 3 ma, 3 fa (Hanak et al. 1961); Höhle "Sphela di Igor" bei Pischkasch, 5 October 1960: obs. a colony (Hůrka 1962); Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960: coll. parasites (Hůrka 1963a); Igors Höhle bei Pishkash, 5 October 1960: coll. 3 ma, 1 ms, 1 fa, 1 fs (Hanák 1964); Pishkash, 4 inds. (Kryštufek 1993); – Pishkash, military tunnel in limestone gorge and gallery in limestone slope [74], 5 July 2011: obs. 1 ind. + 1 ind.; the military tunnel entrance, 28 September 2005: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Skenderbej [75], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Xibrake, tunnel [76], 8 July 2011: obs. a colony of ca. 700 inds. ad+juv, mixed with *Rhinolophus euryale*, *Myotis emarginatus*, and *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018). – F i e r: Apolonia, underground spaces in ancient excavations [14], 5 October 1992: obs. 1 ind. (Uhrin et al. 1996); Apollonia, military tunnels, 12 July 2011: obs. a breeding colony of ca. 200 inds. ad. + juv. mixed with single inds. of *Rhinolophus euryale* (Sachanowicz & Ciechanowski 2018); – Byllis, ruins of ancient Illyrian town [77], 15 September 2012: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Damës, two tunnels [78] (with metal tanks, concrete rooms), 10 July 2011: obs. 1 ind. + 7 inds., incl. 1 fa+juv. (Sachanowicz & Ciechanowski 2018); – Divjakë, road in old coastal pine forest [79], 27 April 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Frashtan, cave [80], above the village, 23 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Gjirokastër, castle undergrounds [18], 21 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Goranxi, two military tunnels [19], 21 April 2004: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Gusmar, military tunnel [81], 16 September 2012: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Haskova and Dhuvjani, Gjere Mts., system of abandoned military tunnels [82], 24 April 1995: obs./det. 20 inds. (Uhrin et al. 1996); – Humelicë, two adits [83], near a church, 20 April 2004: obs. 1 ind. + 7 inds.; entrance of adit, 20 April 2004: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Libohovë, castle ruins [22], 22 April 2004: obs. 2 inds.; rubbish dump at a road, 16 September 2012: det. calls of single foraging inds. (Sachanowicz & Ciechanowski 2018); – Libohovë, bunker [84], 23 April 2004: obs. 1 ind (Sachanowicz & Ciechanowski 2018); – Shpella e Mezhgoranit [85], 11 October 1960: obs. a colony, exam. 1 ms, 2 m, 2 fa,

1 fs, 4 f (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); South Albania – Tepelene, 11 October 1960: coll. parasites (Hůrka 1963c); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 3 ma, 7 fa (Hanák 1964); Tepelene, 9 inds. (Kryštufek 1993); Shpella e Mezhgorani, April 1995: net. 4 inds. (Uhrin 1995); Mezhgoranit cave, 10 km E Tepelene town, 22 April 1995: obs. a colony mixed with *Miniopterus schreibersii*, *Myotis capaccinii*, and *Rhinolophus blasii*, net. 3 m, 1 f (Uhrin et al. 1996); Mezhgoran, Mezhgoran cave, 22 August 2006: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Mezhgoran, small cave at a road [86], 19 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shtëpëz, bunker [87], 20 April 2004: obs. 1 fa (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnel [88], 22 April 2004: obs. a colony of ca. 23 inds. (Sachanowicz & Ciechanowski 2018); – Shpella e Vanishtës [89], 12 October 1960: obs. a group of males, exam. 1 ma, 1 ms (Hanak et al. 1961); Höhle bei Vanischta, 12 October 1960: obs. a colony (Hůrka 1962); Shpella e Vanishtës, 12 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Vanista, 12 October 1960: 5 inds. (Hanák 1964); Vanister cave, at the cave entrance, 22 April 2004: det. calls of single bats, 16 September 2012: det. calls of single bats (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Bilisht, Devoll river [90], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Shpella Çervenakut [91], 4 Ocober 1960: 4 mj, exam. 1 ms, 4 fa (Hanak et al. 1961); Höhle bei Czerveniak, 4 October 1960: obs. inds. (Hůrka 1962); Shpella Çervenakut nordwestl. Pogradeci, 4 October 1960: coll. parasites (Hůrka 1963a); East Albania – Çervnakut at Ochrid Sea, 4 October 1960: coll. parasites (Hůrka 1963c); Höhle bei Cervenak, 4 October 1960: coll. 1 ms, 4 fs (Hanák 1964); Červenaka, 2 inds. (Kryštufek 1993); – Dardhas, adit [92], in the village, 30 September 2005: obs. 4 inds. (Sachanowicz & Ciechanowski 2018); – Gollomboç, two caves [26, 93], 22 February 2014: obs. 1 ind. (cave I), 24 November 2012: obs. 1 ind. (cave II) (Théou et al. 2015b); – Gorica e Vogël, cave [27], 12 November 2014: obs. 9 inds. (Théou et al. 2015b); – Lajthizë, tunnel [94], 23 February 2014: obs. 6 inds., 13 November 2014: obs. 6 inds. (Théou et al. 2015b); – Leskovik, two military tunnels [95], 17 August 2006: obs. 1 ind. + 2 inds.; military tunnel entrances, 17 August 2006: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Lin, bunker [96], 30 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shuec tunnels [97], autumn 2010: obs. few inds. (Papadatou et al. 2011); – Mikropre-spanská j. [= Treni cave] [28], April 1995: net. 3 inds. (Uhrin 1995); Micro Prespa cave (870 m a. s. l.), cave entrance, 21 April 1995: net. 2 m, 1 f (Uhrin et al. 1996); Treni cave, 1998, 2007, 2008, 2010: obs. inds., October 2010: obs. 1 fa (Papadatou et al. 2011); Tren, Treni cave, 1 February 2013: obs. 4 inds., 21 February 2014: obs. 1 ind., 13 November 2014: obs. 4 inds. (Théou et al. 2015b); Micro Prespa cave, the cave entrance, 10 August 2006: det. calls (Sachanowicz

Fig. 5. Dera e Shpellës Konispol, the Konispoli cave, a famous archeological site and the southernmost locality of bat occurrence in Albania (Vlorë Pref.); a hibernaculum of *Rhinolophus ferrumequinum*. Photo by M. Uhrin (January 2016).

& Ciechanowski 2018); – Tresovë, three adits in rocky gorge [98], 12 August 2006: obs. 3 inds. + 2 inds. + 1 ind.; adit entrance, 12 August 2006: net. 1 ma, 1 fa; an adit, 6 July 2011: obs. & det. calls of single emarging inds.; Devoll river, 6 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel and small cave [30], 14 August 2006: obs. 5 inds.; the tunnel entrances, 14 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Ziçisht, cave [99], 13 November 2014: obs. 2 inds. (Théou et al. 2015b); – National Park of Prespa Lakes, two tunnels and five caves [26–28, 93, 94, 100, 101], 24 September 2012 – 23 April 2015: obs. inds. (maximum 52 inds. in total per one check) (Theou et al. 2015a). – K u k ë s: Belje, Jezim cave [102], 13 December 2014: obs. 304 inds. (Théou et al. 2015b); – Breglum, cave [103], 12 December 2014: obs. 1 ind. (Théou et al. 2015b); – Kishaj, Bat cave [104], 12 December 2014: obs. 18 inds. (Théou et al. 2015b); – Letaj, military tunnel [105], 5 August 2007: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Përbreg, two caves [106], 21 September 2005: obs. 2 ma + 2 inds. (Sachanowicz & Ciechanowski 2018); – Qarr, bunker [107], 4 August 2007: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Rreze-Mali, adit connected with working mine [108], 6 August 2007: obs. 7 inds. (Sachanowicz & Ciechanowski 2018); – Selimaj, two military tunnels [109], 8 August 2007: obs. a colony of ca. 30 inds. ad+juv + 1 ind. (Sachanowicz & Ciechanowski 2018); – Valbonë, stream in old beech-spruce mountain forest [110], 7 August 2007: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Zogaj, abandoned mine [111], 5 August 2007: obs. 4 inds. (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mërkurth, cave [112], 11 December 2014: obs. 9 inds. (Théou et al. 2015b); – Mërkurth, cave [113], 11 December 2014: obs. 33 inds. (Théou et al. 2015b); – Lezhë, four military tunnels [32] (Fig. 11), 24 April 2010: obs. 2 inds. + 1 ind. + 1 ind. + 75 inds. torpid (large amount of guano, possible nursery roost) (Sachanowicz & Ciechanowski 2018); – Ndreaj, adit [114], 27 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Perlat, tunnel with metal tank [115], 26 June 2011: obs. a colony of ca. 100 inds. ad+juv, mixed with *Rhinolophus euryale*, *R. blasii*, and *Myotis emarginatus*; tunnel entrance, 26 June 2011: net. 1 ma, 1 fa, 2 faL (Sachanowicz & Ciechanowski 2018); – Reps, mine [33], 10 December 2014: obs. 1 ind., tunnel, 10 December 2014: obs. 2 inds. (Théou et al. 2015b); – [Shëngjin], bunker [116], 26 June 2014: obs. 200 inds. (Théou & Đurović 2015a). – S h k o d ë r: Bajzë, Zef Toma cave [117], 29 January 2015: obs. 12 inds. (Théou et al. 2015b); Shpella e Zef Toma, 22 June 2014: obs. 1 ind., 12 January 2015: obs. 12 inds., 7 June 2015: obs. 2 inds. (Théou & Đurović 2015a); – Breg-Lumi, ruined building [118], 9 September 2012: obs. 1 ind. ad. (Sachanowicz & Ciechanowski 2018); – Drisht, adit [119], 14 August 2003: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Drisht, tunnel with metal tank [120], 12 September 2012: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Fletë, adit [121], 18 September 2005: obs. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – [Ganjollë], bunker [122], 9 June 2015: obs. 9 inds. (Théou & Đurović 2015a); – Gjegjan, bunker [123], 9 December 2014: obs. 2 inds. (Théou et al. 2015b); – Gojan, building [124], 9 December 2014: obs. 1 ind. (Théou et al. 2015b); – Hajmel, military tunnel with metal tank [125], 21 April 2010: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Juban, Shpella e Ali Dedës [126], 20 October 1960: obs. a colony of ca. 100 inds., exam. 1 ma (Hanak et al. 1961); Höhle "Shpella Alidedo" bei der Gemeinde Juban, 20 October 1960: obs. a colony of ca. 100 inds. (Hůrka 1962); Shpella e Ali Dedës bei Juban östl. Shkodra, 20 October 1960: coll. parasites (Hůrka 1963a); Northern Albania – Jubanit, 20 October 1960: coll. parasites (Hůrka 1963c); Juban, Ali Dedes cave, 27 January 2015: obs. 7 inds. (Théou et al. 2015b); Shpella e Ali Dedes, 27 January 2015: obs. 7 inds., 9 June 2015: obs. 40 inds. (Théou & Đurović 2015a); – Jubicë, two bunkers [127], 7 September 2012: obs. 1 ind. ad. + 1 ind. juv. (Sachanowicz & Ciechanowski 2018); – Kir, adit [128], 11 August 2007: obs. 1 ind.; the adit entrance, 11 September 2012: det. calls of a single ind. (Sachanowicz & Ciechanowski 2018); – Liqeni i Thores, sub-alpine meadows [129], 7 September 2012: det. calls of foraging inds. (Sachanowicz & Ciechanowski 2018); – Lukaj, Muriqit cave [130], 28 January 2015: obs. 1 ind. (Théou et al. 2015b); Shpella e Muriqit, 28 January 2015: obs. 1 ind. (Théou & Đurović 2015a); – Maraç, military tunnel and small limestone cave [131], 21–22 April 2010: obs. 2 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Melgushë, two tunnels [132], 25 June 2011: obs. 1 ind. + 2 inds. (Sachanowicz & Ciechanowski 2018); – Berge Munella, Höhle [133], [1939:] 2 inds.[fa], SMF (Dulic & Felten 1964); Berg Munella, 2 inds., SMF (Felten et al. 1977); – Naraç, two adits [134], 22 April 2010: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [36], mountain valley, 9 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit [135], road in mixed mountain forest, 8 August 2003: det. calls; three adits, 8 August 2003: obs. 1 ind. + 1 ind., 18 September 2005: obs. 7 inds. + 3 inds., 9 August 2007: obs. 1 ind.; adit entrance, 9 August 2003: net. 1 ma; mountain stream, 10 August 2003: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Qafe Gradë, Gurrës cave [136], 30 January 2015: obs. 1 ind. (Théou et al. 2015b); Shpella e Gurrës, 30 January 2015: obs. 1 ind., 7 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Renc, military tunnel [137], 26 June 2011: obs. a colony of ca. 80 inds. (Sachanowicz & Ciechanowski 2018); – Rragam, adit [138], 26 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shkodra Castle [= Shkodër, Rozafa castle] [139], 8 June 2015: obs. 1 ind. (Théou & Đurović 2015a); Shkodër, cellars and corridors of the Rozafa castle, 23 April 2010: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, entrance of adit in limestone wall [140], on a dam, 13 August 2003: net. 2 mj, 1 fa (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Dajti NP, Dajti Mts., gallery [141], 6 June 1991: obs. 1 ind. (Chytil & Vlašín 1994); – Linza, Dajti Mts., abandoned military tunnel [142], 9 April 1995: obs. 1 ind. torpid (Uhrin et al. 1996); – Robit Mts., two military tunnels [143], 27 April 1995: obs. 1 ind. torpid, 2 ma active (Uhrin et al. 1996); Mali i Robit, two military tunnels, 18 April 2004: obs. 3 inds. + 4 inds. (Sachanowicz & Ciechanowski 2018); – Tiranë, city park Parku i Madh [144], 26 April 2010: det. calls (Sachanowicz & Cie-



Figs. 6, 7. Records of particular bat species in Albania. 6 – *Rhinolophus ferrumequinum* (Schreber, 1774). 7 – *Rhinolophus hipposideros* (Borkhausen, 1797).

chanowski 2018); – tunnels and bunkers around Tirana [37], 21–22 September 2012: exam. 17 inds. (Scheffler et al. 2013); Tiranë, eight bunkers and tunnels, February 2013: obs. 1 ind. + 22 inds. + 2 inds. + 1 ind. + 2 inds. + 3 inds. + 3 inds. + 2 inds., four bunkers, April 2013: obs. 4 inds. + 20 inds. + 28 inds. + 1 ind., three bunkers and tunnels, December 2013: obs. 1 ind. + 3 inds. + 5 inds., three bunkers and tunnels, June 2014: obs. 2 inds. + 50 ins. + 1 ind. (Çera 2014); south of Tirana, 37 man-made bunkers and tunnels, 13 March 2012 – 1 June 2014: obs. inds. (Theou & Bego 2014); Tirana, eight bunkers, 16 February 2013: obs. 22 inds. + 1 ind. + 1 ind. + 7 inds. + 2 inds. + 1 ind. + 2 inds. + 3 inds., three bunkers, 7 December 2013: obs. 2 inds. + 2 inds. + 5 inds. (Théou et al. 2015b); – Shpella e Zezä [= Pëllumbasi cave] [145], April 1995: obs. 5000 inds., net. 3 inds. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: obs.

a colony of ca. 5000 inds., net. 1 m, 2 f (Uhrin et al. 1996); Shpella Pëllumbasit, 22 September 2012: exam. 10 inds. (Scheffler et al. 2013); Zëze cave, cave, 3 July 2011: obs. 5 inds. (Sachanowicz & Ciechanowski 2018). – V l o r ë: Butrinti ancient town, cellar [146], 25 April 1995: obs. 1 ind. torpid (Uhrin et al. 1996); – Butrint, military tunnels connected with cave [39], near the hill top, 24 April 2004: obs. a colony of ca. 31 inds. mixed with the inds. of *Rhinolophus euryale* and *Myotis emarginatus*, 6 May 2010: obs. a colony of ca. 30 inds. mixed with inds. of *R. euryale*; entrance of military tunnels, 24 April 2004: net. 5 ma, 9 fa, 5 May 2010: net. 3 ma, 1 faG (Sachanowicz & Ciechanowski 2018); – Butrint, Ali Pasha fortress ruins [= Kështjella Trekëndore] [147], 26 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Çiflik, tunnel [148], 2 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Dhërmi, adit [149], 28 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Dukat, adit entrance [150], 29 April 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Finiq, military tunnel [151], 27 April 2004: obs. a colony ca. 150 inds. mixed with *Rhinolophus euryale*; 5 May 2010: obs. 3 inds. (Sachanowicz & Ciechanowski 2018); – Halo, military tunnels [40], 17 September 2012 (Sachanowicz et al. 2014); Jermë, military tunnels in olive grove, 27 April 2004: obs. 10 inds., 3 May 2010: obs. 5 inds., 17 September 2012: obs. 10 inds.; entrance of tunnels, 27 April 2004: net. 3 ma, 3 May 2010: net. 1 ma, 17 September 2012: net. 1 ma; two military tunnels above the olive grove, 4 May 2010: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Himara cave [152], Cikes Mts., 25 April 1995: obs. 1 ind. (Uhrin et al. 1996); – Karaburun National Park, bunker on Duk Gjonit cave trail [153], 30 April 2016: obs. 1 ind. (Théou & Loce 2017); – Karaburun National Park, Shpella Duk Gjonit [154], cave, 30 April 2016: obs. 4 inds. (Théou & Loce 2017); – Kulluricë, military tunnel [155], 26 April 2004: obs. a colony of ca. 80 inds. mixed with *Rhinolophus euryale*, 3 May 2010: obs. a colony of ca. 100 inds. mixed with *R. euryale*; military tunnel entrance, 26 April 2004: net. 1 fa; two bunkers, 27 April 2004: obs. 1 ind. + 3 inds. (Sachanowicz & Ciechanowski 2018); – Llogara National Park, glade in mountain mixed forest [156], 29 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Memoraq, limestone cave [157], 4 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Narta Lagoon Protected Area, coastal tunnel [158], 3 July 2015: net. 10 inds., 27 July 2016: obs. 2 inds. (Théou & Loce 2017, cf. Rapaj 2015); – Narta Lagoon Protected Area, isolated bunker [159], 3 July 2015: net. 1 ind., 24 February 2016: obs. 1 ind., 27 July 2016: obs. 1 ind. (Théou & Loce 2017, cf. Rapaj 2015); – [Orikum], tunnel in the back of the military port [160], 26 April 2013: obs. 1 ind. (Théou & Loce 2017);

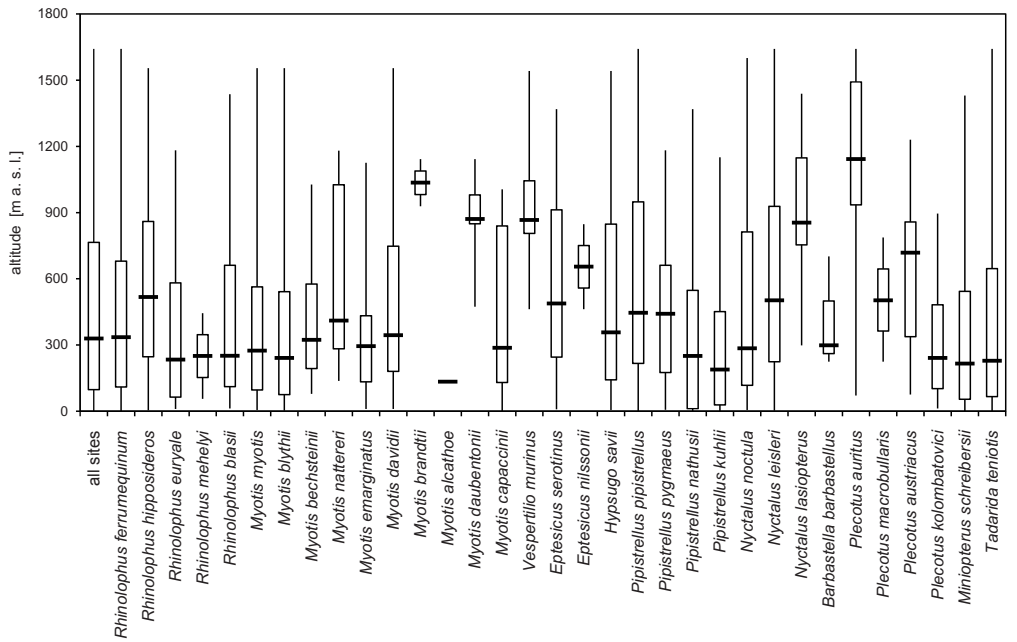


Fig. 8. Altitudinal distribution of particular bat species in Albania (see also Table 2); the boxes represent the range of the first and third quartiles; the vertical lines represent the range of minimum and maximum values; horizontal bold lines represent medians.

Table 2. Altitudinal distribution of particular bat species in Albania

species	n	min	max	range	mean	median
Rhinolophus ferrumequinum	164	0	1642	1642	424.7	335.0
Rhinolophus hipposideros	120	4	1554	1550	539.2	517.0
Rhinolophus euryale	33	10	1182	1172	356.3	233.5
Rhinolophus mehelyi	2	56	444	388	250.0	250.0
Rhinolophus blasii	22	12	1436	1424	422.7	250.5
Myotis myotis	56	5	1554	1549	436.2	274.0
Myotis blythii	54	2	1554	1552	385.2	241.0
Myotis bechsteinii	13	78	1027	949	420.9	323.0
Myotis nattereri	12	137	1180	1043	596.2	410.0
Myotis emarginatus	22	10	1125	1115	345.3	294.0
Myotis davidii	35	10	1554	1544	471.7	344.0
Myotis brandtii	2	928	1142	214	1035.0	1035.0
Myotis alcathoe	1					133.0
Myotis daubentonii	13	473	1142	669	869.5	870.0
Myotis capaccinii	48	1	1005	1004	400.9	286.5
Vespertilio murinus	13	462	1541	1079	942.5	866.0
Eptesicus serotinus	62	8	1368	1360	566.2	487.5
Eptesicus nilssonii	2	462	847	385	654.5	654.5
Hypsugo savii	104	5	1541	1536	501.3	356.5
Pipistrellus pipistrellus	74	1	1642	1641	572.5	445.0
Pipistrellus pygmaeus	45	6	1182	1176	449.8	441.0
Pipistrellus nathusii	20	1	1368	1367	365.3	249.5
Pipistrellus kuhlii	71	1	1150	1149	294.4	188.0
Nyctalus noctula	34	5	1600	1595	461.9	284.5
Nyctalus lasiopterus	7	298	1438	1140	913.4	854.0
Nyctalus leisleri	53	2	1642	1640	582.7	502.0
Barbastella barbastellus	3	224	701	477	407.7	298.0
Plecotus auritus	7	50	1642	1571	1101.3	1142.0
Plecotus macrobullaris	3	224	787	563	504.3	502.0
Plecotus austriacus	7	75	1230	1155	630.4	718.0
Plecotus kolombatovici	15	12	895	883	332.2	241.0
Miniopterus schreibersii	71	0	1430	1430	360.3	215.0
Tadarida teniotis	55	1	1642	1641	387.7	228.0
all sites	352	0	1642	1642	442.5	329.0

– Palasë, military tunnel [43], 29 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Porto Palermo, cellars of the Ali Pasha fortress [44], 28 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Porto Palermo, military tunnel [161], 28 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shalës, four adits [162], 26 April 2004: obs. 1 ind. + 2 inds. + 3 inds. + 3 inds., 2 May 2010: obs. 1 ind., 3 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Tragjas i vjeter, small stony cellar and small cave in ruined village [163], 29 April 2010: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Spella e Velçës [= Velça cave] [164], 5 October 1960: obs. a colony of ca. 100 inds., exam. 2 ms, 1 fa, 2 fs, 9 October 1960: obs. a colony of ca. 100 inds., exam. 4 ma, 5 ms, 5 fa, 11 fs (Hanak et al. 1961); Höhle bei Velcza, 9 October 1960: obs. a large colony (Hůrka 1962); Shpella e Velçës östl. Vlora, 9 October 1960: coll. parasites (Hůrka 1963a); South-west Albania – Velcös near Vlorë, 9 October 1960: coll. parasites (Hůrka 1963c); Höhle bei Velca, 9 October 1960: coll. 5 ma, 8 ms, 8 fa, 16 fs (Hanák 1964); Vlora, Velce, 21 inds. (Kryštufek 1993); Velçë cave, in the cave, 26 August 2006: obs. 2 inds.; small cave entrance, 26 August 2006: net. 1 mj, 1 fj (Sachanowicz & Ciechanowski 2018).

Distribution. *Rhinolophus ferrumequinum* represents an extremely frequent bat species in Albania, it has been documented from 164 localities (Fig. 6) and is the most common bat of the country (Table 1). The number of its sites and its particular records (265) is larger by one third than these

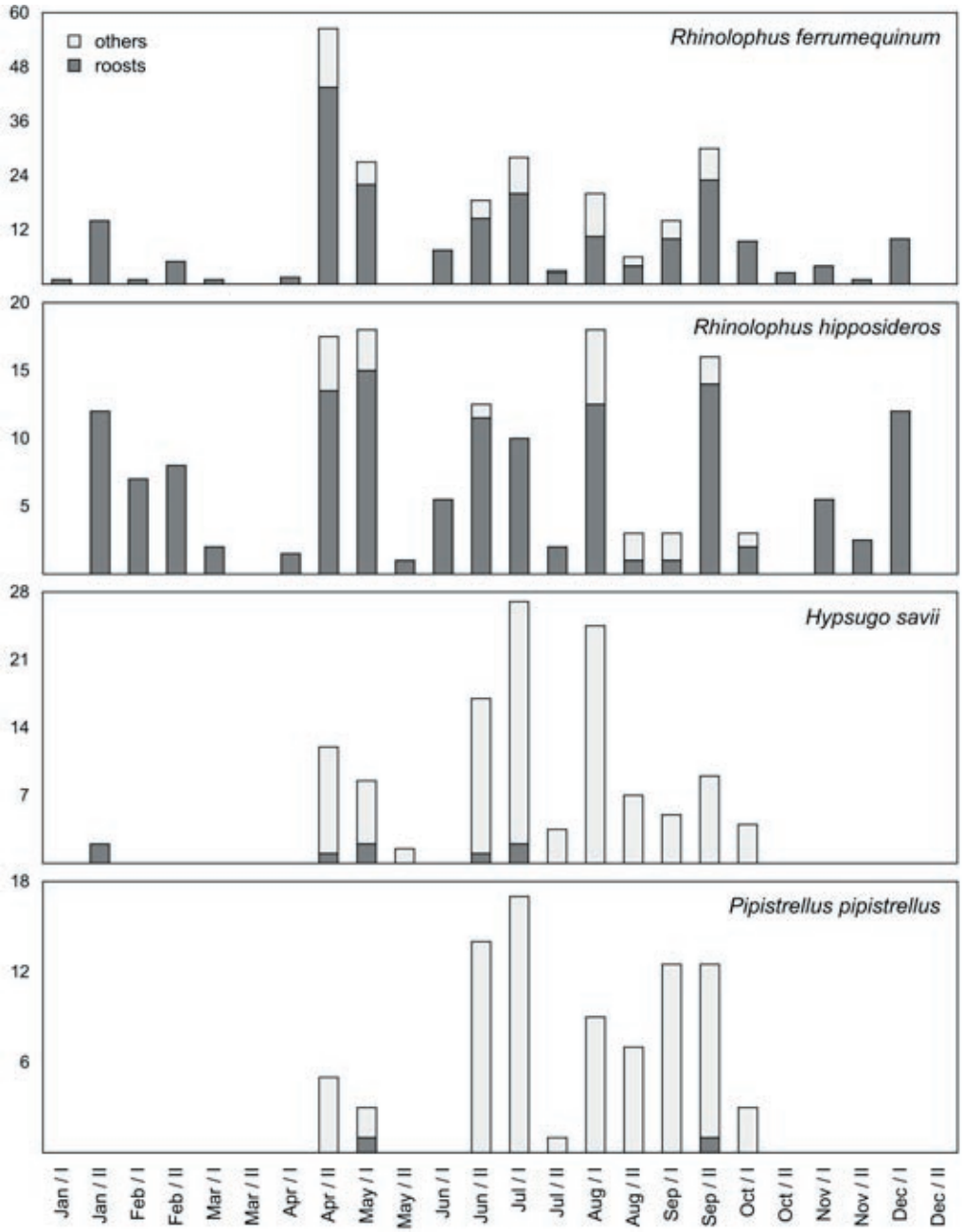


Fig. 9. Annual distribution of particular records in some of the most frequent bat species in Albania with respect to the type of record: roost findings vs. all other findings.

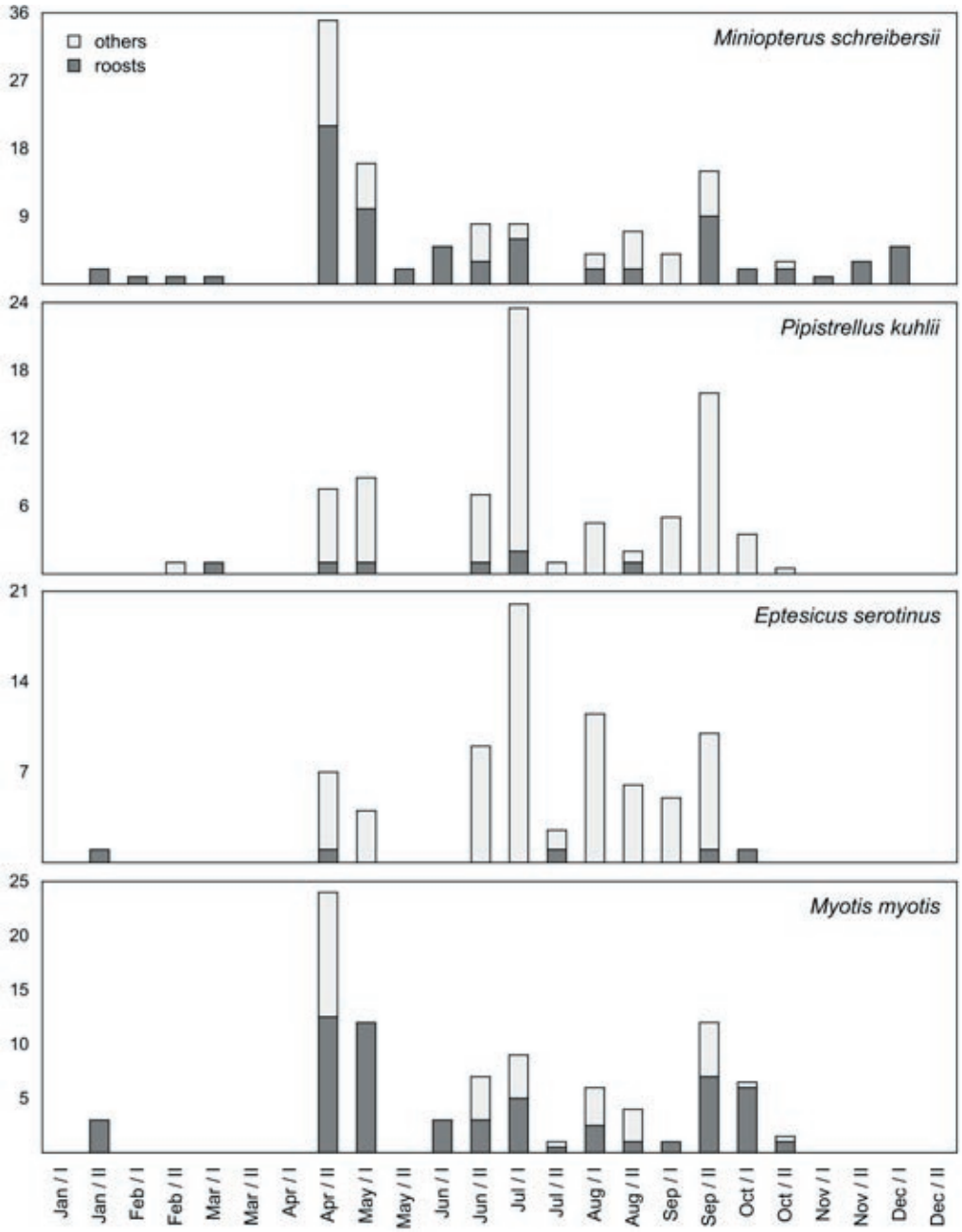


Fig. 9. (continued).

Fig. 10. An individual of *Rhinolophus ferrumequinum* roosting in a bunker at Lezhë (Lezhë Pref.; Fig. 11), 24 April 2010. Photo by K. Sachanowicz.

numbers in the second most common bat, *Rhinolophus hipposideros* (120 localities, 160 records; Fig. 6, Table 1). The Albanian range of *R. ferrumequinum* is a part of the continuous and dense occurrence of this bat in the Balkans and the Mediterranean Basin as well (Dietz et al. 2016). The high number of its records in Albania conforms to the situation in other countries of the Balkan Peninsula, including many islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, Micevski et al. 2014, Murariu et al. 2016, Paunović 2016, Benda & Uhrin 2017, Tvrtković 2017, etc.). The species occurrence covers all parts of Albania; in all four geographical regions of the country *R. ferrumequinum* is the most frequently documented bat species. The findings come from a very wide altitude span (0–1,642 m a. s. l.; Table 2) and the value of the altitude median (335.0 m; Fig. 8) indicates the preference for low to medium altitudes of the country.

This bat was discovered in Albania in 1939 as the third bat species, after *Plecotus auritus* (1914) and *Pipistrellus kuhlii* (1931); two females were collected from a cave in Mount Munellë, northern Albania, and deposited in the SMF collection (Dulic & Felten 1964). However, despite its relatively early discovery and the common occurrence in the country, *R. ferrumequinum* is known from only 19 sites (11.6%) and 22 records (8.3%) made in the twentieth century (1939, 1960–1961, 1991–1998).

Field notes. The findings of *Rhinolophus ferrumequinum* in Albania are available from all parts of a year (Fig. 9) and the prevailing majority of the records (80.0%) were made in roosts. The

highest concentration of particular records in a short period (31.5% of all records) was registered during less than four weeks of the early spring, between 18 April and 13 May (incl.) (Fig. 9).

Hibernation of *R. ferrumequinum* was documented at least in 28 sites in the country, in the period between early November and early March (Çera 2014, Théou & Đurović 2015a, Théou et al. 2015b, Théou & Loce 2017, own data); these findings represent 14.0% of particular records of this bat from Albania (Fig. 9) and 17.1% of the occurrence sites, although in some roosts it was found also in other seasons. Sixteen hibernacula (57.1%) were in natural caves, twelve in artificial spaces – mostly in bunkers, also in a gallery, a mine, a house, and in an aboveground corridor of the Gjirokastër castle (Fig. 40). The cave hibernacula of *R. ferrumequinum* were situated in a wide range of 70–1,104 m a. s. l., but most frequently at relatively high altitudes, as shown by the values of the altitude median (758.0 m) and mean (641.4 m). The hibernacula in the artificial spaces were found in a similarly wide range of 4–1,070 m a. s. l., with the altitude median of 347.5 m and mean 335.1 m, i.e. mostly in the areas situated much lower than those of the cave roosts (Table 5). Mostly single individuals or small numbers (less than 10 bats) were recorded in the particular hibernacula, among five exceptions where more bats were found (12–304 individuals, mean 75.9 bats), four were caves and one a bunker (Théou et al. 2015b, own data). The numbers of bats found in all other hibernacula were in the range of 1–9 individuals, with the mean of 2.8 bats per hibernaculum per check. A noticeable difference was found between the numbers of bats hibernating in the caves (range 1–304 bats, mean 25.2 bats) and in the artificial roosts, where they were on average twice smaller (range 1–130 bats, mean 8.5 bats).

The non-hibernation roosts of *R. ferrumequinum* were found in 128 localities (77.1% of the sites), although eleven of them served also as hibernacula during the winter season. Majority of the

Fig. 11. Bunkers at Lezhë (Lezhë Pref.); summer roosts of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis blythii*, and *Plecotus kolombatovici*. Photo by P. Tájek (May 2016).

roosts (78.9%) were artificial spaces, mostly abandoned underground military facilities (86.4%; bunkers, bunker series, tunnels, galleries), in three cases the bats were present in mines, and also in various types of aboveground shelters: old castles, churches, abandoned houses, a chapel and an abandoned factory building. Albeit in caves *R. ferrumequinum* was recorded less frequently than in artificial shelters, in caves (32 sites) it was present in higher numbers than in artificial shelters. On average, 107.5 individuals (range 1–5,000 bats) were found in a cave, while only 5.7 individuals (range 1–150 bats) in an artificial roost, i.e. more than ten times less. When the only large cave colony of 5,000 individuals was removed from the statistics, there still were larger mean numbers of *R. ferrumequinum* found in a cave, 26.4 individuals (range 1–200 bats), than in an artificial shelter. Large aggregations of this bat, larger than 50 bats, were found relatively more frequently in caves (19.2%, range 100–5,000 bats, n=5) than in the artificial roosts (7.7%, range 70–700 bats, n=14). The sites of the artificial roost spaces were situated in a wide altitudinal range of 0–1,225 m a. s. l. (n=104); however, most used were the artificial shelters in the rather low situated areas, as shown by the values of altitude median (260.5 m) and mean (355.9 m). On the other hand, although the cave roosts (n=32) were situated in a similar range of altitudes, 20–1,295 m a. s. l., the values of the altitude median (444.5 m) and mean (537.2 m) of these localities indicate a preferred usage of caves in medium altitudes (Table 5).

Maternity aggregations of *R. ferrumequinum* were observed at least in eight sites in Albania (Sachanowicz & Ciechanowski 2018, own data); in one cave (Zaveri), one castle (Gjirokastër), and in six military structures. The size of these colonies, observed between 7 May and 8 August (incl.), was found to be from 15 to 700 bats (mean 243.9 bats). However, a half of these aggregations (solely those in various bunkers), including the largest colony of 700 bats found in the Xibrakë tunnel (Sachanowicz & Ciechanowski 2018) were mixed with other species and the numbers of *R. ferrumequinum* were only roughly estimated. In all cases the colonies were mixed with *Rhinolophus euryale*, three times also with *Myotis emarginatus*, once with *Rhinolophus blasii* and once with *Miniopterus schreibersii*. In some other cases, the roosts of maternity colonies of *R. ferrumequinum* were shared with other species (e.g. in the Gjirokastër castle with the colony of *Myotis emarginatus*), but the particular aggregations were separated from each other and not mixed, and thus, they enabled more or less accurate counts of their numbers. Large aggregations of *R. ferrumequinum* in which the reproduction was presumed but not observed, were documented at seven other sites between late April and late June (Hanák 1964, Uhrin et al. 1996, Sachanowicz & Ciechanowski 2018); in three caves and four bunkers, some of them checked several times in the study period, *R. ferrumequinum* was present in numbers of up to 5,000 individuals. In four of these roosts (one cave and three bunkers), the aggregations were mixed with other bat species, namely *Rhinolophus euryale* (three times), *R. blasii*, *Myotis emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii* (once each). Vertical distribution of the maternity roosts of *R. ferrumequinum*, including those of the potential maternity aggregations, was in the range of 26–1,295 m a. s. l. (n=15), with the altitude median of 267.0 m and mean of 381.8 m; the cave roosts were situated in higher altitudes (range 243–1,295 m a. s. l., n=4, median 689.0 m, mean 729.0 m) than the artificial roosts (range 26–1,135 m a. s. l., n=11, median 192.0 m, mean 255.5 m).

Direct temporal evidence of reproduction of *R. ferrumequinum* in Albania was documented several times (Sachanowicz & Ciechanowski 2018, own data); pregnant females were netted on 5 and 7 May, lactating females were found on 26–29 June, 2, 3, 8, and 12 July, juveniles of the year in roosts were observed on 26–28 June, 2, 3, 8, and 12 July, 8 August, 7 September, and 4 October, volant juveniles were netted on 10 July, 13 and 26 August, and 13 September.

Six aggregations of *R. ferrumequinum* were observed outside the reproduction season, namely in September and October (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018). Their size was smaller than at the time of existence of maternity colonies, in the range of 20–150 bats

(mean 89.0 bats). These aggregations were found mostly in caves, with only one exception of the finding in a tunnel at Halil; all these aggregations were reported to be without admixture of other bat species.

At the entrances to 25 underground spaces (incl. five natural caves), individuals of *R. ferrumequinum* were documented in the period between 20 April and 28 September (incl.); bats were netted at 25 sessions, their calls detected at five other sessions (Uhrin et al. 1996, Théou & Loce 2017, Sachanowicz & Ciechanowski 2018, own data). In seven of these spaces, large groups of this bat were found to roost at various occasions. Altogether 98 individuals were caught at these sites, the sex ratio was unbalanced (37 ♂♂ : 50 ♀♀) in the total catch.

Foraging individuals of *R. ferrumequinum* were recorded at 21 sites; however, mostly only echolocation calls were detected on these foraging grounds, while only at six sites the bats were netted, one adult male, seven adult females in the total catch (van der Tempel 2016, Sachanowicz & Ciechanowski 2018, own data). The foraging bats were recorded most frequently (59.1% of the foraging records) at water bodies, mainly at streams or rivers, once at a small pool. The second most frequent environment type were anthropogenic habitats (22.7%), i.e. areas in villages and towns, less frequently also in farmland. The least used habitat, considering the available data, are forests without streams, forest clearings and meadows, where this bat was encountered four times. The foraging habitats of *R. ferrumequinum* were distributed across a very wide altitude range of 12–1,642 m a. s. l. (median 451.0 m, mean 548.8 m).

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Rhinolophopsylla unipectinata*: 1 ma (CMŠ [P]) from 1 fa (NMP 96603), Zall-Dardhë (Dibër Pref.), 30 June 2018, leg. P. Benda. – N y c t e r i b i i d a e: *Phthiridium biarticulatum*: 2 fa (CMŠ [A]) from 1 fa (NMP 96498), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 1 fa (CMŠ [A]) from 1 fa (NMP 96603), Zall-Dardhë (Dibër Pref.), 30 June 2018, leg. P. Benda.

Fig. 12. River valley near Murrë (Dibër Pref.); foraging grounds of *Rhinolophus ferrumequinum* and *Hypsugo savii*. Photo by Z. Bendová (July 2018).

– I x o d i d a e: *Ixodes vespertilionis*: 1 nymph (CMŠ [A]) from 1 ind., Butrint (Vlorë Pref.), 5 May 2010, leg. M. Ciechanowski, M. Piskorski & K. Sachanowicz; 1 fa, 1 nymph (CMŠ [A]) from 1 ma, Dukat (Vlorë Pref.), 29 April 2010, leg. M. Ciechanowski, M. Piskorski & K. Sachanowicz. – S p i n t u r n i c i d a e: *Eyndhovenia euryalis euryalis*: 4 ma, 1 deutonymph (CMŠ [P]) from 1 fa (NMP 96498), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – *Eyndhovenia euryalis oudemansi*: 9 ma, 8 fa, 2 protonymphs (CMŠ [A]) from 1 fa (NMP 96592), Ndërlysaj (Shkodër Pref.), 8 July 2016, leg. P. Benda; 5 ma, 4 fa, 2 protonymphs (CMŠ [P]) from 1 fa (NMP 96603), Zall-Dardhë (Dibër Pref.), 30 June 2018, leg. P. Benda. – *Paraperiglischrus rhinolophinus*: 1 fa (CMŠ [P]) from 1 ma (NMP 96530), Prezë (Tiranë Pref.), 11 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: I s c h n o p s y l l i d a e: *Rhinolophopsylla unipectinata*: 1 fa, Northern Albania – Jubanit, 20 October 1960, leg. V. Hanák (Hůrka 1963c); 1 fa, East Albania – Çervenakut at Orchid Sea, 4 October 1960, leg. V. Hanák (Hůrka 1963c); 1 ma, 4 fa, South-west Albania – Velcös near Vlorë, 9 October 1960, leg. V. Hanák (Hůrka 1963c); 1 ma, South Albania – Tepelene, 11 October 1960, leg. V. Hanák (Hůrka 1963c); 1 ind., tunnels and bunkers around Tirana, 21–22 September 2012 (Scheffler et al. 2013). – S t r e b l i d a e: *Brachytarsina flavipennis*: 1 ma, 2 fa, Shpella e Mezhgoranit östl. Tepelene, 11 October 1960 (Hůrka 1962, 1963a [as *Nycteribosca kollari*]); 1 ma, 2 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 3 ma, 3 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 1 fa, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – *Nycteribia latreillii*: 1 ma, Shpella e Fush Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962 [as *Nycteribia latreillei*], 1963a). – *Nycteribia schmidlii*: 1 ma, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]). – *Phthiridium biarticulatum*: 9 ma, 13 fa, Shpella e Ali Dedës bei Juban östl. Shkodra, 20 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 3 ma, 7 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 6 ma, 1 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 2 ma, 2 fa, Shpella e Fush-Krüjes, bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 1 ma, 1 fa, Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 14 ma, 12 fa, Shpella e Velçës östl. Vlora, 9 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 2 ma, 2 fa, Shpella Çervenakut nordwestl. Pogradeci, 4 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 10 inds., tunnels and bunkers around Tirana, 21–22 September 2012 (Scheffler et al. 2013 [as *P. biarticulata*]). – *Penicillidia dufourii*: 1 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 1 ma, Shpella e Ali Dedës bei Jubani östl. Shkorda, 20 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]). – *Penicillidia conspicua*: 2 fa, Shpella e Ali Dedës bei Juban östl. Shkodra, 20 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – I x o d i d a e: *Ixodes vespertilionis*: 1 ind., bunker near Tirana, 21–22 September 2012 (Scheffler et al. 2013). – S p i n t u r n i c i d a e: *Eyndhovenia euryalis euryalis*: 1 ma, 2 fa, Halo, 17 September 2012 (Sachanowicz et al. 2014). – *Eyndhovenia euryalis oudemansi*: 11 inds., tunels and bunkers around Tirana, 21–22 September 2012 (Scheffler et al. 2013); [unspecified number, sex and stage], Shpella Pëllumbasit, 22 September 2012, Treni's cave, 24–25 September 2012 (Scheffler et al. 2013). – T r o m b i c u l i d a e: *Trombicula* sp.: 1 ind., Shpella Pëllumbasit, 22 September 2012 (Scheffler et al. 2013).

Comments on ectoparasites. In total, twelve arthropod parasite species were collected from *Rhinolophus ferrumequinum* in Albania. It is the second largest diversity of parasites documented from any bat species in the country, after *Myotis myotis* (see below); it is also by far the largest parasite diversity among the bats of the family Rhinolophidae. One parasite species found in *R. ferrumequinum* in Albania, *Paraperiglischrus rhinolophinus* (Koch, 1844), is here reported from the country for the first time.

The bat flea *Rhinolophopsylla unipectinata* (Taschenberg, 1880) is a parasite of the cave-dwelling bats and the genus *Rhinolophus* represents its principal host taxon (Hůrka 1963c). However, it was collected also from several other cave bats – in Albania it was documented also from *Myotis emarginatus* and *Miniopterus schreibersii* (Hůrka 1963c, Scheffler et al. 2013, own data; see below). The Albanian populations belong to the nominotypical form, *R. u. unipectinata*, distributed in southern and central Europe, Transcaucasia, and Central Asia (Hopkins & Rothschild 1956, Smit 1960, Hůrka 1963c).

The bat fly *Brachytarsina flavipennis* Macquart, 1851 is the only streblid fly occurring in the Mediterranean, besides there it was found only in Central Asia (Aellen 1959, Hůrka 1962, 1984). It is a parasite of the cave-dwelling bats, the medium-sized *Rhinolophus* species are its principal host group, but it was found also in bats of the families Vespertilionidae, Miniopteridae, Rhino-

pomatidae, and Hipposideridae (Lanza 1999). From Albania, it was documented solely from this ecological group of bats, besides *R. ferrumequinum* also from *Rhinolophus euryale*, *R. blasii*, *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a). Although Hůrka (1962) expected this bat fly to reach the distribution limits in Europe along the January isotherm of 8–10 °C, the record from south-western Bulgaria (mean January temperature below –1 °C) suggests that the limits rather follow the range of the principal host bat species (Ivanova et al. 1995).

Altogether six species of the nycteribiid bat flies were found in *R. ferrumequinum* in Albania, *Nycteribia pedicularia* Latreille, 1805, *N. latreillii* (Leach, 1817), *N. schmidlii* Schiner, 1853, *Phthiridium biarticulatum* Hermann, 1804, *Penicillidia dufourii* (Westwood, 1834), and *P. conspicua* Speiser, 1901. All collected species of bat flies belong to the group of parasites of the cave-dwelling bats and are common also in *R. ferrumequinum* (Hůrka 1964, Szentiványi et al. 2016b). Of this group, only *P. biarticulatum* is a typical parasite of bats of the genus *Rhinolophus*, although it was documented also from other cave-dwelling bats (Hůrka 1964); from Albania it was documented to parasitise also *Rhinolophus euryale*, *R. blasii*, *Myotis myotis*, *M. blythii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data). This parasite has the south-Palaearctic type of distribution, its range reaches from the Mediterranean to Central Asia (Aellen 1959, Hůrka 1964, 1976b). *P. dufourii* and *N. latreillii* are parasites preferring the bats of the *Myotis myotis* complex (Hůrka 1964). In Albania *P. dufourii* was collected also from *Myotis myotis*, *M. blythii*, *M. daubentonii*, *M. capaccinii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, Boshamer 2016, own data), *N. latreillii* from *Rhinolophus euryale*, *Myotis myotis*, *M. blythii*, and *M. capaccinii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data). Two bat flies, *N. schmidlii* and *P. conspicua* are parasites preferring *Miniopterus schreibersii*; in Albania the former parasite was collected also from *Rhinolophus euryale*, *Myotis myotis*, *M. blythii*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data), the latter one from *Myotis myotis* and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018). *N. pedicularia* is a primary parasite of *Myotis capaccinii* (Hůrka 1964), frequently found in secondary hosts, in Albania in a wide range of bat species, some of them not belonging among the cave-dwelling forms, viz. *Rhinolophus hipposideros*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data).

The polyxenic hard tick *Ixodes vespertilionis* Koch, 1844 parasitises the cave-dwelling bat species, in the western Palaearctic range mainly the bats of the genus *Rhinolophus* (Arthur 1956, Filippova 1977, Walter & Kock 1985). *R. ferrumequinum* is its frequently used host (Lanza 1999), although from Albania it was collected also from *Rhinolophus euryale* (own data). The distribution range of *I. vespertilionis* covers Europe, Africa, Middle East, southern and eastern Asia, and some of the Pacific islands (Kolonin 2007).

The bat mite *Paraperiglischrus rhinolophinus*, newly discovered in Albania and found there only in *R. ferrumequinum*, is a member of the subfamily Periglischrinae, which is associated mostly with bats of the New World. However, the genus *Paraperiglischrus* was reported from bats of the Old World superfamily Rhinolophoidea (Dusbábek 1969). The distribution range of *P. rhinolophinus* is very wide and includes the Palaearctic, Afrotropical, Oriental, and Australasian regions (Rudnick 1960, Baker & Delfinado 1964, Uchikawa 1979).

Based on fine morphological differences, Uchikawa & Dusbábek (1978) recognised two subspecies of the bat mite *Eyndhovenia euryalis* (Canestrini, 1884), the nominotypical form and *E. e. oudemansi* (Eyndhoven, 1941), to occur in Europe. Both forms were known to parasitise *R. ferrumequinum* in Albania (Scheffler et al. 2013, Sachanowicz et al. 2014) and were here confirmed from this host again. The nominotypical subspecies *E. e. euryalis* is most probably

best adapted to occur on *Rhinolophus euryale*, and the known distribution range of this parasite corresponds with the range of this host, covering southern and central Europe, Maghreb, and Transcaucasia (Uchikawa & Dusbábek 1978, Peribañez-Lopez et al. 1989, Estrada-Peña et al. 1990, Stanyukovich 1997, Imaz et al. 1999); in Albania it was found also in *Rhinolophus hipposideros*, *R. euryale*, *R. mehelyi*, and *R. blasii* (Scheffler at al. 2013, Sachanowicz et al. 2014), i.e. from all *Rhinolophus* species. Another subspecies, *E. e. oudemansi*, prefers to parasitise *R. ferrumequinum*, and in Albania it was collected only from this bat and ca. twice more frequently than the former subspecies (Scheffler et al. 2013, own data). However, this mite ranks among the polyxenic species and is known to be collected from a wide range of Palaearctic hosts, viz. *Rhinolophus mehelyi*, *R. blasii*, *Myotis blythii*, *M. emarginatus, Plecotus gaisleri*, *Barbastella caspica*, and *Miniopterus schreibersii* (Beron & Kolebinova 1964, Deunff 1977, Rybin et al. 1989, Krištofík & Danko 2012, Bendjeddou et al. 2017).

Scheffler et al. (2013) reported also a specimen of *Trombicula* sp. among the ectoparasites collected from *R. ferrumequinum* in Albania. However, this genus does not belong to the typical chigger mites of bats (see Yunker & Jones 1961, Daniel & Stekol'nikov 2003, Shatrov & Kudryashova 2006, Kalúz & Ševčík 2015). From the Balkans, species of the genus *Trombicula* were originally reported from several host species of bats (Dusbábek 1964a), but later the generic identification of these parasites was revised and assigned to the genera *Oudemansidium* Vercammen-Grandjean et André 1966 and *Leptotrombidium* Nagayo, Miyagawa, Mitamura et Imamura, 1916 (see Kolebinova & Beron 1965, Vercammen-Grandjean & André 1966, Vercammen-Grandjean & Langston 1976, Kudrâšova 1991). The latter two genera were found in at least four other species of Albanian bats (see below).

Rhinolophus hipposideros (Borkhausen, 1797)

Records. **Original data**: B e r a t: Berat, castle [1], 29 January 2016: obs. 1 ind. torpid, 4 July 2016: obs. 1 ind. torpid; – Kutalli, bunker [2], 24 September 2018: obs. 1 ind. torpid; – Pirogosh, bunker in the Çorovoda river canyon [3] (Fig. 17), 22 September 2018: obs. 2 inds. torpid; – Pirogosh, Pirogoshi cave [4], 23 September 2018: obs. a colony of ca. 30 inds. – E l b a s a n: Vehçan, abandoned railway tunnel [5] (Fig. 19), 9 July 2015: obs. 1 ind. torpid. – F i e r: Fier, bunker [6], 1 October 2018: obs. 3 inds. torpid. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon, bunker [7] (Fig. 107), 27 January 2016: obs. 2 inds. torpid, 6 May 2016: obs. 4 inds. torpid; – Gjirokastër, castle [8] (Figs. 39, 40), 27 January 2016: obs. 3 inds. torpid (exam. 1 ma); – Goranxi, bunker [9] (Figs. 112, 113), 3 May 2016: obs. 1 ind. torpid; – Goranxi, cave [10], 5 May 2016: obs. 2 inds. torpid; – Goranxi, monastery [11], 5 May 2016: obs. 6 inds. torpid; – Jorgucat, old church above the village [12], 1 May 2016: obs. 2 inds. torpid; – Krinë, bunker [13], 27 January 2016: obs. 1 ind. torpid; – Libohovë, bunker [14], 2 May 2016: obs. 1 ind. torpid; – Petran, bunker [15] (Fig. 115), 27 January 2016: obs. 1 ind. torpid, 6 May 2016: obs. 1 ind. torpid; – Saranqinisht, bunker [16] (Fig. 13), 27 January 2016: obs. 3 inds. torpid; – Tepelenë, bunker [17] (Fig. 30), 6 May 2016: obs. 1 ind. torpid; – Zervat, old church above the village [18], 4 May 2016: obs. 4 inds. torpid. – K o r ç ë: Gollomboç, Hermit cave [19], 25 January 2016: obs. 4 inds. torpid (exam. 1 ma); – Goricë e Vogël, Zaveri cave [20], 25 January 2016: obs. 1 ind. torpid; – Leskovik, small cave [21], 7 May 2016: obs. 1 ind. torpid; – Tren, Treni cave [22] (Fig. 61), 25 January 2016: obs. 9 inds. torpid (exam. 1 ma), 28 June 2016: obs. 5 inds. active; – Tren, Treni cave II [23], 28 June 2016: obs. 3 inds. active; – Vithkuq, bunker [24] (Fig. 16), 9 May 2016: obs. 5 inds. torpid; – Vithkuq, chapel [25] (Fig. 15), 9 May 2016: obs. 1 ind. torpid in a crypt, 1 ind. roosting in a nave, 27 June 2016: obs. (& exam.) 1 ma active in a crypt. – K u k ë s: Dragobi, old beech forest in the Valbona river valley [26] (Fig. 44), 28 June 2018: det. & rec. calls of 1 foraging ind. – L e z h ë: Reps, mine [27], 12 May 2016: obs. 1 ind. torpid. – T i r a n ë: Kodra e Diellit, bunker [28], 4 March 2017: obs. 2 inds. torpid; – Pëllumbas, Pëllumbasi cave [29], 11 May 2016: obs. several hundreds of inds. torpid. – V l o r ë: Jermë, bunkers [30] (Fig. 25), 28 January 2016: obs. 7 inds. torpid; – Porto Palermo, Ali Pasha fortress [31] (Fig. 106), 2 July 2016: obs. 1 ind. active. – **Published data**: D i b ë r: Barbullej, rocky shelter and small cave [32], 30 June 2011: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Fshat, military tunnel [33], 1 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, cave partially destroyed by a working quarry [34], 23 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Lis, small concrete vault [35], 30 June 2011: obs. a breeding colony of 10 inds. ad, incl. 2 fa+j (Sachanowicz & Ciechanowski 2018); – Suç, military tunnel [36], 1 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Urakë, Blazi cave [37], 12 December 2013: obs. 2 inds., 11 December 2014: obs. 2 inds. (Théou et al. 2015b); – Urakë, Keputes cave [38],

12 December 2013: obs. 1 ind. (Théou et al. 2015b); – Zall Reç, Drinit i Zi river in limestone canyon [39], 21 September 2005: det. calls (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Golem, Shkëmbi i Kavajës [40], bunker, 3 February 2014: obs. 2 inds. (Théou et al. 2015b); – Halil, two tunnels [41], at the restaurant and in a working quarry, 3 October 2005: obs. 5 inds., 25 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Mali i Skendereut Mts., small cave [42], 3 October 1992: net. 1 fa (Uhrin et al. 1996). – E l b a s a n: Elbasan, two military tunnels [43] (one connected with a cave), 28 September 2005: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Fushë Studë, abandoned buildings and bunkers [44], 28 July – 7 August 2015: obs. roosting inds., net. 2 m (van der Tempel 2016). – F i e r: Damës, tank [45], space above the concrete tunnel, 10 July 2011: obs. 1 ind., 1 fa+j (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Bënjë-Novoselë, military tunnel [7], 16 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Goricë, Dishnicës river [46], farmland landscape, 18 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Libohovë, bunker [47], 23 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shtëpëz, two bunkers [48], 20 April 2004: obs. 1 ind. + 1 ind. dead (Sachanowicz & Ciechanowski 2018); – Vanister cave [49], cave entrance, 22 April 2004: det. calls of 1 ind., 16 September 2012: det. calls of 2 inds. (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Buzëlliqen (Zagradeç), old house [50], obs. (Papadatou et al. 2011); – Dardhas, bunker [51], 30 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Dardhas, adit in the village [52], 30 September 2005: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Gollombaçi, cave 2 km south of the village [53], April 1995: obs. 2 inds. (Uhrin 1995); Gollombaci, Macro Prespa lake, small cave 1 km E of the village, 20 April 1995: obs. 1 ms, 1 fs torpid (Uhrin et al. 1996); Gollomboc cave 1 & 2 (Papadatou et al. 2011); Gollomboç, five caves, 24 November 2012: obs. 2 inds., 2 February 2013: obs. 1 ind. + 4 inds., 2 February 2013: obs. 4 inds., 22 February 2014: obs. 4 inds. + 2 inds. + 2 inds. (Théou et al. 2015b); – Gollomboç, small cavity (ca 1 m) in limestone cliff [54], Macro Prespa lake shore, 8 August 2006: obs. & net. 1 fj (Sachanowicz & Ciechanowski 2018); – Gollomboc cave 3 [= Hermit cave] [19] (Papadatou et al. 2011); – Kallamas, cave [55], 12 November 2014: obs. 1 ind. (Théou et al. 2015b); – Lajthizë, tunnel [56], 23 February 2014: obs. 5 inds., 13 November 2014: obs. 3 inds. (Théou et al. 2015b); – Liqenas, tunnel [57], 3 March 2013: obs. 1 ind., 22 February 2014: obs. 1 ind. (Théou et al. 2015b); – Shuec pumping station [58] (Papadatou et al. 2011); – Shueç, tunnel [59], 3 February 2013: obs. 1 ind. (Théou et al. 2015b); – Mikro Prespa lake, a large cave about 50 m from the west end of the

Fig. 13. A simple, mine-like bunker at Saranqinisht (Gjirokastër Pref.); a hibernaculum of *Rhinolophus hipposideros*. Photo by M. Uhrin (January 2016).

Fig. 14. An individual of *Rhinolophus hipposideros* roosting in the nave of the church of Shen Pjetri, Vithkuq (Korçë Pref.; Fig. 15), 9 May 2016. Photo by P. Tájek.

lake [= Treni cave] [22], 30 May 1991: obs. 1 ind. (Chytil & Vlašín 1994); Treni cave, late autumn 2007, 2008, 2010, winter 2011: obs. inds. (Papadatou et al. 2011); Tren, Treni cave, 24 November 2012: obs. 7 inds., 1 February 2013: obs. 2 inds., 21 February 2014: obs. 5 inds., 13 November 2014: obs. 4 inds. (Théou et al. 2015b); Micro Prespa cave, in the cave, 10 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Micro Prespa, adit [60], Micro Prespa lake shore, 10 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Tresovë, entrance of adit [61], 12 August 2006: det. calls of 1 ind.; adit, 6 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel [24], 14 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Voskop, tunnel [62], 14 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Zaroshkë, Zaroshka Cave [63], November 2010 and February 2011: obs. several torpid inds. (Papadatou et al. 2011); Zaroshkë, two caves, 3 February 2013: obs. 1 ind., 22 February 2014: obs. 2+1 inds., 11 November 2014: obs. 4 inds. (Théou et al. 2015b); – Ziçisht, cave [64], 13 November 2014: obs. 6 inds. (Théou et al. 2015b); – National Park of Prespa Lakes, three tunnels and fifteen caves [19, 20, 22, 53, 55–57, 59, 63, 65–73], 24 September 2012 – 23 April 2015: obs. inds. (maximum 35 inds. in total per one check) (Theou et al. 2015a). – K u k ë s: Belje, Jezim cave [74], 13 December 2014: obs. 2 inds. (Théou et al. 2015b); – Breglum, cave [75], 12 December 2014: obs. 6 inds. (Théou et al. 2015b); – Dragobi, Valbonës river [76], in limestone gorge, 6 August 2007: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Kam-Fshat, adit [77], 6 August 2007: obs. 4 inds. (Sachanowicz & Ciechanowski 2018); – Kishaj, Bat cave [78], 12 December 2014: obs. 4 inds. (Théou et al. 2015b); – Kolsh, bunker [79], 8 August 2003: obs. a breeding colony of 12 inds., net. 1 ma, 1 mj, 1 faL, 1 fj (Sachanowicz & Ciechanowski 2018); – Krumë, three bunkers [80], 4 August 2007: obs. a nursery colony of 7 inds. + 1 fa+j + 1 ind. (Sachanowicz & Ciechanowski 2018); – Lume, three bunkers [81], 3 August 2007: obs. 1 ind. + 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Nikoliq, water pool in river bed [82], 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Përbreg, two small caves [83], 21 September 2005: obs. 1 ma + 2 inds. (Sachanowicz & Ciechanowski 2018); – Rreze-Mali, adit connected with working mine [84], 6 August 2007: obs. 5 inds. (Sachanowicz & Ciechanowski 2018); – Zogaj, abandoned mine [85], 5 August 2007: obs. 1 ind. emerging (Sachanowicz & Ciechanowski 2018). – L e z h ë: Lezhë, military tunnels [86], 24 April 2010: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Mërkurth, cave [87], 11 December 2014: obs. 3 inds. (Théou et al. 2015b); – Mërkurth, cave [88], 11 December 2014: obs. 20 inds. (Théou et al. 2015b); – Perlat, tunnel [89], 26 June 2011: det. calls of 1 emerging ind. (Sachanowicz & Ciechanowski 2018); – Reps, cave [90], 10 December 2014: obs. 1 ind.

(Théou et al. 2015b); – [Shëngjin], bunker [91], 26 June 2014: obs. 20 inds. (Théou & Đurović 2015a). – S h k o d ë r: Bajzë, Zef Toma cave [92], 29 January 2015: obs. 1 ind. (Théou et al. 2015b); Shpella e Zef Toma, 29 January 2015: obs. 1 ind., 7 June 2015: obs. 2 inds. (Théou & Đurović 2015a); – Brojë, three small caves and rocky shelter [93], 24 June 2011: obs. a breeding colony of 19 inds. ad + 1 ind. juv + 1 ind. + 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – [Ganjollë], bunker [94], 9 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Kir, entrance of an adit [95], 11 September 2012: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Kulumri, two bunkers and a concrete barrack [96], 19 September 2005: obs. 1 ind. + 1 ind., det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Lukaj, Muriqit cave [97], 28 January 2015: obs. 4 inds. (Théou et al. 2015b); Shpella e Muriqit, 28 January 2015: obs. 4 inds. (Théou & Đurović 2015a); – Maraç [98], military tunnel, 21 April 2010: obs. 6 inds.; small cave, in rocky cliff, 22 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Melgushë, four tunnels [99], 25 June 2011: obs. 2 inds. + 4 inds. + 3 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Mezi, two bunkers [100], 20 September 2005: obs. 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [101], 10 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – [Prekal], Shpella e Xhyla [102], 9 June 2015: obs. 2 inds. (Théou & Đurović 2015a); Prekal, in the cave, 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, two adits [103], 11 August 2003: obs. 1 ind., 18 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Rahovic, cave entrance [104], 21 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Renc, adit [105], 26 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Shkodra Castle [= Shkodër, Rozafa castle] [106], 8 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Xath, bunker [107], 18 September 2005: obs. 1 fj (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Dajti NP, Dajti Mts., gallery [108], 6 June 1991: obs. 8 inds. (Chytil & Vlašín 1994); – Linza, Dajti Mts., abandoned military tunnels [109], 9 April 1995: obs. 2 inds. torpid (Uhrin et al. 1996); – Shëngjergj, entrance of tunnel [110], 1 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – tunnels and bunkers around Tirana [28], 21–22 September 2012: exam. 4 inds. (Scheffler et al. 2013); Tiranë, eight bunkers and tunnels, February 2013: obs. 1 ind. + 1 ind. + 1 ind. + 1 ind. + 1 ind. + 5 inds. + 2 inds. + 2 inds., seven bunkers and tunnels, April 2013: obs. 1 ind. + 7 inds. + 3 inds. + 1 ind. + 1 ind. + 1 ind. + 2 inds., ten bunkers and tunnels, December 2013: obs. 1 ind. + 1 ind. + 1 ind. + 3 inds. + 1 ind. + 1 ind. + 1 ind. + 1 ind. + 3 inds. + 2 inds., seven bunkers and tunnels, June 2014: obs. 3 inds. + 1 ind. + 4 inds. + 1 ind. + 1 ind. + 1 ind. + 1 ind. (Çera 2014); south of Tirana, 37 man-made bunkers and tunnels, 13 March 2012 – 1 Ju-

Fig. 15. Church of Shen Pjetri, Vithkuq, ca. 1,225 m a. s. l. (Korçë Pref.); in the nave of the church and in an adjacent chapel (including the chapel crypt), summer roosts of the individuals of *Rhinolophus ferrumequinum*, *R. hipposideros*, and *Hypsugo savii* were discovered. Photo by P. Tájek (May 2016).

Fig. 16. Entrance of a bunker at Vithkuq at 1,135 m a. s. l., in the hill beneath the church of Vithkuq (Korçë Pref.); in two concrete rooms connected by a rock-cut corridor and between the concrete inbuilts and rock walls, summer roosts of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. blythii*, and *Miniopterus schreibersii* were detected. Photo by P. Tájek (May 2016).

ne 2014: obs. inds. (Theou & Bego 2014); Tirana, six bunkers, 16 February 2013: obs. 1 ind. + 2 inds. + 2 inds. + 1 ind. + 4 inds. + 1 ind., five bunkers, 7 December 2013: obs. 1 ind. + 1 ind. + 3 inds. + 1 ind. + 3 inds. (Théou et al. 2015b); Tirana, two tunnels, 16 February 2013: obs. 2+1 inds., three tunnels, 7 December 2013: obs. 1 ind. + 1 ind. + 3 inds. (Théou et al. 2015b); – Zëze cave [= Pëllumbasi cave] [29], in the cave, 3 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018). – V l o r ë: Butrint, military tunnels connected with a cave [111], near the hill top, 24 April 2004: obs. 3 inds., 6 May 2010: obs. 10 inds.; entrance of military tunnels, 24 April 2004: net. 2 ma, 1 fa, 5 May 2010: 1 fa (Sachanowicz & Ciechanowski 2018); – Dukat, adit [112], 29 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Jermë, military tunnels in olive grove [30], 27 April 2004: obs. 4 inds., 3 May 2010: obs. 3 inds., 17 September 2012: obs. 5 inds.; entrance of tunnels, 3 May 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Karaburun National Park, bunker on Duk Gjonit cave trail [113], 30 April 2016: obs. 12 inds. (Théou & Loce 2017); – Karaburun National Park, Shpella Duk Gjonit [114], cave, 30 April 2016: obs. 3 inds. (Théou & Loce 2017); – Mursi, grove at the lake shore [115], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Narta Lagoon Protected Area, coastal tunnel [116], 3 July 2015: obs. 15 inds. (maternity colony with 2 inds. juv), 27 July 2016: obs. 10 inds. (Théou & Loce 2017, cf. Rapaj 2015); – Palasë, olive plantation [117], 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Shalës, two adits [118], 26 April 2004: obs. 4 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Tragjas i vjeter, ruined village of stony buildings [119], 28 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Velce, Velce cave [120], 6 December 2014: obs. 1 ind. (Théou et al. 2015b); Velçë cave, at a small cave, 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Rhinolophus hipposideros* is a very common bat in Albania, 120 localities are available from the country (Fig. 7, Table 1). The Albanian range is a part of the continuous and

dense occurrence of this bat in the Balkans and the Mediterranean Basin as well (Dietz et al. 2016). In Albania, *R. hipposideros* is the second most frequent bat, the high number of its records in Albania conforms to the situation in other countries of the Balkan Peninsula, including some islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, 2016, 2017, Micevski et al. 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). The occurrence of *R. hipposideros* covers all parts of Albania (Fig. 7), the findings come from a very wide altitude span (4–1,554 m a. s. l.; Table 2) and the value of the altitude median (517.0 m; Fig. 8) indicates the preference for medium high areas of the country. Although *R. hipposideros* is a very common species in Albania, it was discovered in the country as late as in 1991 (Chytil & Vlašín 1994) and only five findings (3.1% of the particular records) were made in the twentieth century (1991–1995; Chytil & Vlašín 1994, Uhrin et al. 1996), all other records come from the period 2003–2018.

Field notes. The findings of *Rhinolophus hipposideros* in Albania are available from all parts of a year (Fig. 9), a highly prevailing majority of the records (89.1%) were made in roosts. The highest concentration of particular records in a short period (22.2% of all records) was registered during three weeks of the early spring, between 20 April and 12 May (incl.) (Fig. 9); in this period, the roost findings also dominated the evidence (80.3%).

Hibernation of *R. hipposideros* was documented at least in 32 sites in the country, in the period between early November and early March (Papadatou et al. 2011, Çera 2014, Theou & Bego 2014, Théou & Đurović 2015a , Théou et al. 2015b, own data); these findings represent 30.6% of particular records of this bat from Albania (Fig. 9) and 26.7% of the occurrence sites, although in some roosts it was found also in other seasons. *R. hipposideros* was the most frequently documented bat

Fig. 17. Series of bunkers in the Çorovoda river canyon at Pirogosh (Berat Pref.); summer roosts of *Rhinolophus ferrumequinum* and *R. hipposideros*. Photo by P. Tájek (September 2018).

Fig. 18. An individual of *Rhinolophus hipposideros* roosting in a bunker at Dardhas (Korçë: Pref.), 30 September 2005. Photo by K. Sachanowicz.

in the country during the hibernation period, both relatively and absolutely. Most of the hibernacula (59.4%) were in natural caves, eleven hibernacula (34.4%) were in abandoned military structures (bunkers and bunker series, galleries), and two were in old castles (an aboveground room of the Berat castle and an underground chamber of the Gjirokastër castle). The cave hibernacula of *R. hipposideros* were situated in a wide range of 70–1,104 m a. s. l., but most frequently at relatively high altitudes, as shown by the values of the altitude median (860.0 m) and mean (732.7 m), being highest among the Albanian bats found frequently in hibernacula. The hibernacula in the artificial spaces (other than castles) were found in the range of 4–1,070 m a. s. l., with the altitude median of 414.0 m and mean 486.5 m, i.e. situated mostly in the areas much lower than those of the cave roosts (Table 5). Mostly single individuals or small numbers less than ten bats were recorded in the particular hibernacula, the only exception was the small colony of 20 bats found in a cave at Mërkurth on 11 December 2014 (Théou et al. 2015b). The numbers of bats found in all other hibernacula were in the range of 1–9 individuals, with the mean of 2.3 bats per hibernaculum and check. A noticeable difference was found between the numbers of bats hibernating in caves (range 1–20 bats, mean 4.2 bats) and in artificial roosts, where on average almost only a half of the cave numbers were documented (range 1–7 bats, mean 2.4 bats).

The non-hibernation roosts of *R. hipposideros* were found at least in 75 localities (62.5% of the sites), although seven of them served also as hibernacula during the winter season. Majority of the

roosts (78.7%) were artificial spaces, mostly abandoned underground military facilities (galleries, bunkers, bunker series), in several cases also mines or abandoned railway tunnels. However, in nine cases (15.3% of the artificial roosts) also various dark or semi-dark parts of old buildings, such as castles and churches; the bats were found in a monastery, a chapel, a crypt, an old house, and also in a pumping station. Albeit *R. hipposideros* was recorded less frequently in caves than in artificial shelters, in caves it was present in higher numbers than in artificial shelters. Only in a cave, a large colony of several hundred bats was found, in the Pëllumbasi cave on 11 May (all bats were in torpor, so they perhaps did not represent a maternity aggregation). Besides the latter roost, on average 3.8 individuals (range 1–30 bats) were found in a cave, while 2.6 individuals (range 1–20 bats) in an artificial shelter. The artificial roost spaces (n=60) were situated in a wide altitudinal range of 4–1,225 m a. s. l., but shelters in medium to low altitudes were preferred, as shown by the value of altitude median, 342.5 m (mean 449.8 m). On the other hand, the cave roosts (n=16) were situated in a smaller range of altitudes, 50–1,100 m a. s. l., the values of the altitude median (595.5 m) and mean (577.3 m) of these localities show a preference for medium to high altitudes (Table 5).

Maternity colonies of *R. hipposideros* were observed at least in five sites in Albania (Théou & Loce 2017, Sachanowicz & Ciechanowski 2018); in one cave (Brojë), a vaulted crypt (Lis), and three bunkers (Kolsh, Krumë, Narta). The reported sizes of these aggregations, observed between 24 June and 8 August (incl.), were small, in the range of 10–20 bats (mean 13.4 bats). All contained both adults and juveniles and were composed only of *R. hipposideros*. Other aggregations of *R. hipposideros* larger than ten bats (besides the above mentioned big aggregation in the Pëllumbasi cave) in which the reproduction was presumed but not observed, were documented at three sites, in a cave and two bunkers, two in late June, one in late September (Théou & Đurović 2015a, Théou & Loce 2017, own data). Vertical distribution of the maternity roosts including those of the potential maternity aggregations was in the range of 5–636 m a. s. l. (median 357.0 m, mean

Fig. 19. Disused spacious railway tunnel at Vehçan (Elbasan Pref.); a summer roost of *Rhinolophus hipposideros* and *Myotis myotis* or *M. blythii*. Photo by M. Uhrin (July 2015).

315.0 m, n=8). This clearly shows that the bats prefer lower altitudes for maternity roosts than for all other roosts.

Direct temporal evidence of reproduction of *R. hipposideros* in Albania was documented several times (Sachanowicz & Ciechanowski 2018, Théou & Loce 2017); a lactating female was netted on 8 August, juveniles of the year in roosts were documented on 24 and 30 June, 3 July, 4 August, and 18 September, volant juveniles were netted on 8 August and 11 September, while pregnant females were not examined/reported.

At the entrances to 14 underground spaces (nine artificial vs. five natural ones), individuals of *R. hipposideros* were netted or their calls detected, in the period between 22 April and 3 October (incl.). Only in one of these spaces (Kolsh bunker) a roosting group of this bat was found. Altogether 15 individuals were caught at these sites, the sex ratio was almost balanced (3 ♂♂ : 4 ♀♀) in the total catch.

Foraging individuals of *R. hipposideros* were documented at ten sites (Sachanowicz & Ciechanowski 2018, own data); however, only at one site a bat was netted (an adult female). The foraging bats were recorded most frequently (50.0% of the foraging sites) at various water bodies, at streams, lakes, and pools. The second most frequent habitat type (30.0%) were anthropogenic habitats, abandoned houses, a ruined village, or an olive grove. The least used habitat, considering the available data, are forests without streams, where this bat was encountered twice. The foraging habitats of *R. hipposideros* were distributed across the altitude range of 25–874 m a. s. l., the values of the altitude median (387.5 m) and mean (434.0 m) indicate preferred use of the medium high areas for foraging in Albania.

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 ma (CMŠ [A]) from 1 ma (NMP 96541), Gjirokastër (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – T r o m b i c u l i d a e: Trombiculidae sp.: 1 larva (damaged) (CMŠ [P]) from 1 ma (NMP 96551), Vithkuq (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin. – **Published data**: S p i n t u r n i c i d a e: *Eyndhovenia euryalis euryalis*: 1 ind., Stollen und Bunker in der Umgebung von Tirana, 21– 22 September 2012 (Scheffler et al. 2013 [as *Eyndhovenia e. euryale*]). – M a c r o n y s s i d a e: *Macronyssus* sp.: [unspecified number, sex and stage], Fushë Studë, 5 August 2015 (Boshamer 2016).

Comments on ectoparasites. In total, four arthropod parasite species were collected from *Rhinolophus hipposideros* in Albania.

The bat fly *Nycteribia pedicularia* Latreille, 1805 is a parasite of the cave-dwelling bats, among them *Myotis capaccinii* is its principal host (Hůrka 1984). However, it is frequently documented also on other cave bats, in Albania it was collected from a wide range of hosts, besides *R. hipposideros* also from *Rhinolophus ferrumequinum*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). This bat fly is a Mediterranean species, occurring in the southern part of Europe, in the Maghreb and Middle East (Hůrka 1984).

The nominotypical form of *Eyndhovenia euryalis* (Canestrini, 1884) prefers to parasitise *Rhinolophus euryale* (Uchikawa & Dusbábek 1978) and in Albania it was collected additionally from other *Rhinolophus* bats, *R. ferrumequinum*, *R. euryale*, *R. mehelyi*, and *R. blasii* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see above and below). Within the Mediterranean range, *E. e. euryalis* was already reported from *R. hipposideros* (Lanza 1999, Krištofík & Danko 2012).

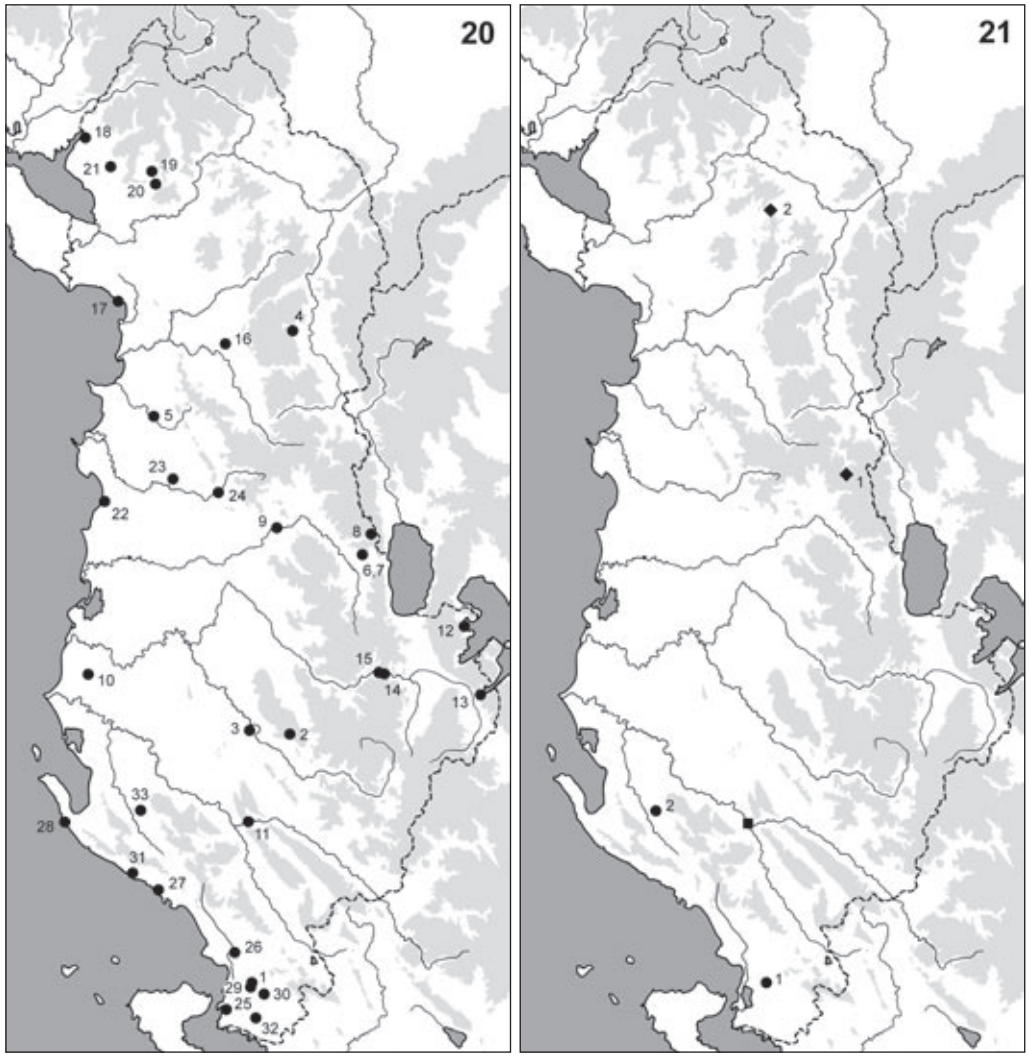
Boshamer (2016) mentioned a record of a macronyssid mite of the genus *Macronyssus* from *R. hipposideros*. In the distribution range of this bat, only a few records of these mites from the *Rhinolophus* bats are available, see e.g. Radovsky (1967). *Macronyssus rhinolophi* (Oudemans,

1902) was collected from *R. hipposideros* in Great Britain, France and Germany (Turk & Turk 1952, Radovsky 1967).

An unidentified species of the chigger mite of the family Trombiculidae was collected from *R. hipposideros* (own data). In the central and eastern parts of the Mediterranean, the largest species diversity of trombiculid mites is known just from this bat, viz. *Hirsutiella creta* (Kolebinova et Vercammen-Grandjean, 1971), *Leptotrombidium russicum* (Oudemans, 1902), *Microtrombicula balcanica* Kolebinova, 1982, *Neotrombicula rhinolophi* Kolebinova, 1968, *Riedlinia europaea* Kolebinova et Beron, 1965, *Sasatrombicula bureschi* Kolebinova et Beron, 1965, *S. cherrata* (Taufflieb, 1960), *S. hexasternalis* (Vercammen-Grandjean, 1963), and *S. mediterranea* Kolebinova et Vercammen-Grandjean, 1971 (Kolebinova 1968, 1970, 1982, Kolebinova & Beron 1965, Kolebinova & Vercammen-Grandjean 1971, Daniel & Heneberg 1972). Such a variety is in contrast with the evidence from Albania, where only one specimen is available. From the country, three species of chigger mites were collected from six host species (see below), *Leptotrombidium russicum*, *Oudemansidium musca* (Oudemans, 1906), and *Willmannium cavus* Kudrâšova, 1992.

Rhinolophus euryale Blasius, 1853

Records. **Original data**: V l o r ë: Jermë, bunkers [1] (Fig. 25), 20 September 2014: coll. 1 ma (leg. G. Csorba; HNHM 2014.25.6.). – **Published data**: B e r a t: Shpella e Koritës [2], 9 June 1961: obs. a colony (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a nursery colony (Hanák 1964); – Valë, metal water tank [3], in pine wood, 7 May 2010: obs. a colony of ca. 300 inds. mixed with *Rhinolophus ferrumequinum* and *Myotis emarginatus*; at the opening of the water tank, 7 May 2010: net. 3 fa (Sachanowicz & Ciechanowski 2018). – D i b ë r: Sopanik Cave, maternity colony [4] (Dundarova 2016). – D u r r ë s: Shpella e Fushë-Krujës [5], 16 October 1960: obs. a group, exam. 2 ma, 1 ms, 4 fa, 1 fs (Hanak et al. 1961); Höhle bei Fush-Kruje, 16 October 1960: obs. a colony (Hůrka 1962); Shpella e Fush-Krujës bei Kruja, 16 October 1960: coll. parasites (Hůrka 1963a). – E l b a s a n: Shpella e Pishkashit [6], 5 October 1960: a colony of ca. 50 inds. mixed with *R. blasii*, exam. 1 ms, 1 fs (Hanak et al. 1961); Höhle "Sphela di Igor" bei Pischkasch, 5 October 1960: obs. a colony mixed with *R. blasii* (Hůrka 1962); Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960: coll. parasites (Hůrka 1963a); Igors Höhle bei Pishkash, 5 October 1960: coll. 1 ma, 1 fa (Hanák 1964); – Pishkash, at the entrance of military tunnels [7], in limestone gorge, 28 September 2005: det. calls of 2 inds. (Sachanowicz & Ciechanowski 2018); – Skenderbej [8], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Xibrake, tunnel [9], 8 July 2011: obs. a breeding colony of ca. 300 inds. ad+juv, mixed with *Rhinolophus ferrumequinum*, *Myotis emarginatus* and *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018). – F i e r: Apollonia, military tunnels [10], 12 July 2011: obs. 1 ind. ad. in a breeding colony of *Rhinolophus ferrumequinum* of ca. 200 inds. (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Shpella e Mezhgoranit [11], 11 October 1960: obs. a colony, exam. 6 ma, 3 ms, 1 fa (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 13 m, 7 f (Hanák 1964); Luadh, cave, 18 November 2014: obs. 1 ind. (Théou et al. 2015b). – K o r ç ë: Gorica e Vogël, cave [12], 23 February 2014: obs. 65 inds., 12 November 2014: obs. 261 inds. (Théou et al. 2015b); – Treni cave [13], October 2010: net. 1 fs (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. 3 inds. (Scheffler et al. 2013); – Tresovë, entrance of mining adit [14], in rocky gorge, 12 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Tresovë, entrance of an adit [15], 6 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Perlat, entrance of concrete tunnels [16], 26 June 2011 (Sachanowicz et al. 2014); Perlat, tunnel with metal tank inside, 26 June 2011: obs. a breeding colony of ca. 15 inds. (incl. 1 fa+juv) mixed with *Rhinolophus blasii*, *R. ferrumequinum* and *Myotis emarginatus*; tunnel entrance, 26 June 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018); – [Shëngjin], bunker [17], 8 June 2015: obs. 3 inds. (Théou & Đurović 2015a). – S h k o d ë r: [Bajzë], Shpella e Zef Toma [18], 7 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Kir, adit in the Kir river gorge [19], 11 September 2012: obs. 3 inds.; the adit entrance, 11 September 2012: net. 3 ma (Sachanowicz & Ciechanowski 2018); – Prekal, at the cave entrance [20], 11 September 2012: det. calls of single bats (Sachanowicz & Ciechanowski 2018); – [Qafë Gradë], Shpella e Pellumbave [21], 6 June 2015: obs. 1 ind. (Théou & Đurović 2015a). – T i r a n ë: Robit Mts., two military tunnels [22], 27 April 1995: obs. ca. 20 inds. active, exam. 1 fa (Uhrin et al. 1996); – south of Tirana, 37 man-made bunkers and tunnels [23], 13 March 2012 – 1 June 2014: obs. inds. (Theou & Bego 2014); Tirana, bunker, 7 December 2013: obs. 1 ind. (Théou et al. 2015b); – Zëze cave [= Pëllumbasi cave] [24], in the cave, 3 July 2011: obs. 1 fa+juv (Sachanowicz & Ciechanowski 2018). – V l o r ë: Butrint, military tunnels connected with a cave [25], near the top of a hill, 24 April 2004: obs. a colony of ca. 20 inds. mixed with *Rhinolophus ferrumequinum* and *Myotis emarginatus*, 6 May 2010: obs. a colony of ca. 50 inds. mixed with



Figs. 20, 21. Records of particular bat species in Albania. 20 – *Rhinolophus euryale* Blasius, 1853. 21 – *Rhinolophus mehelyi* Matschie, 1901 (circles), *Myotis brandtii* (Eversmann, 1845) (diamonds), and *M. alcathoe* von Helversen et Heller, 2001 (square).

R. ferrumequinum and *M. emarginatus*; entrance of military tunnels, 24 April 2004: net. 1 ma, 5 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Finiq, military tunnels [26], 27 April 2004: obs. a colony of ca. 5 inds. mixed with *Rhinolophus ferrumequinum*, 5 May 2010: obs. a colony of ca. 25 inds. (Sachanowicz & Ciechanowski 2018); – Halo, military tunnells [1], 17 September 2012 (Sachanowicz et al. 2014); Jermë, abandoned military tunnels, 3 May 2010: obs. a colony (Sachanowicz et al. 2016); Jermë, military tunnels in olive grove, 27 April 2004: obs. a colony of ca. 80 inds. mixed with *Rhinolophus blasii*, 3 May 2010: obs. a colony of ca. 200 inds. mixed with *Rhinolophus mehelyi* and *R. blasii*, 17 September 2012: obs. a colony of ca. 250 inds. mixed with *R. blasii*, *R. mehelyi*, and *Miniopterus schreibersii*; entrance

and inside of tunnels, 27 April 2004: net. 1 ma, 4 fa, 3 faG, 3 May 2010: net. 3 ma, 3 fa, 17 September 2012: net. 2 mj, 1 fa, 1 fj (Sachanowicz & Ciechanowski 2018); – Shpellat e Hymarës [27], 13 October 1960: obs. 1 ind. (Hanak et al. 1961); – Karaburun National Park, Shpella Duk Gjonit [28], cave, 30 April 2016: obs. 250 inds. (Théou & Loce 2017); – Kulluricë, military tunnels [29], 26 April 2004: obs. a colony of ca. 5 inds. mixed with *Rhinolophus ferrumequinum*, 3 May 2010: obs. a colony of ca. 100 inds. mixed with *R. ferrumequinum* (Sachanowicz & Ciechanowski 2018); – Llazat, stream with old *Platanus* trees along banks [30], 4 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Shpella e Parashqevise [31], cave, 29 April 2016: obs. 80 inds., 26 July 2016: obs. 10 inds. (Théou & Loce 2017); – Shalës, two adits [32], 26 April 2004: obs. 2 inds. torpid (incl. 1 fa) + 2 inds. torpid (Sachanowicz & Ciechanowski 2018); – Velçë, entrance of a small cave [33], 26 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018).

Distribution. *Rhinolopus euryale* belongs among rather uncommon bats in Albania with 33 localities known from the country (Fig. 20, Table 1). Despite the limited number of the records, this bat is spread over the whole country with the exception of high mountains (altitude range 10–1,182 m a. s. l., median 233.5 m; Fig. 8). The statistics of the altitude distribution (Table 2) indicate *R. euryale* as one of the most lowland-associated species among the Albanian bats. This figure of occurrence conforms to the distribution pattern in the central and southern parts of the Balkans where *R. euryale* is a widespread and rather common bat species (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, Buys 2006, Presetnik et al. 2009, 2014, Pavlinić et al. 2010, Uhrin et al. 2012, Micevski et al. 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.).

Field notes. *Rhinolophus euryale* was documented from Albania in all seasons, from late February to early December. The largest concentration of records (37.5%) comes from two weeks of the early spring, between 24 April and 7 May. The majority of the records are findings of bats in their roosts (78.1% of the sites and 64.6% of particular records) or at entrances to their roosts (29.2% of particular records), only three times foraging bats were recorded.

Hibernation of *R. euryale* was documented four times at three sites in the country (Théou et al. 2015b), in the period between mid-November and late February (8.3% of particular records). Two hibernacula were situated in natural caves (Mezhgorani cave, Zaveri cave), one in an artificial space – a bunker south of Tirana. The hibernacula lied at medium altitudes, in the range of 243–836 m a. s. l. (mean 443.0 m). In two sites, the bunker and the Mezhgorani cave, only single individuals were found, while in the Zaveri cave, 261 bats were counted (Théou et al. 2015b).

The non-hibernation roosts of *R. euryale* were found in 22 localities (68.8% of the sites and 56.3% of particular records), one of them, the Mezhgorani cave (Fig. 2), served also as a hibernaculum during the winter season. A slight majority of the roosts (54.5%) were artificial spaces, mostly abandoned underground military facilities (tunnels, bunkers), once also water tank. In the artificial roosts, aggregations of *R. euryale* (larger than four bats) were found more frequently and these aggregations were larger than those found in natural caves. Aggregations of 5–250 individuals (mean 35.4 bats) were found in seven artificial shelters, while aggregations of 10–250 bats (mean 41.7 individuals) in three caves only; however, no data on the group size are available from three caves. The average numbers of bats in aggregations in the artificial and natural roosts are similar, showing no differences in the roost type preference. However, in most cases the roosts or even the groups contained other bat species and the numbers of *R. euryale* could be only roughly estimated.

The artificial non-hibernation roost spaces (n=12) were situated in lowland parts of Albania, in the range of 10–298 m a. s. l. (median 76.0 m); the altitudinal statistics for the artificial roosts of aggregations (n=8) are very similar (range 12–291 m, median 85.5 m). On the other hand, the cave roosts (n=11) were situated in medium altitudes, lying in the range of 20–1,125 m a. s. l., although the altitude median of these localities (243.0 m) again shows the preference for rather low altitudes (Table 5).

Maternity colonies of *R. euryale* or just females nursing their young were observed at least in five sites in Albania (Hanák 1964, Sachanowicz & Ciechanowski 2018); in three bunkers (Jermë, Perlat, Xibrakë) and two caves (Korita cave, Pëllumbasi cave). The size of these aggregations, observed between late April and early July, was reported to be between 80 and 300 individuals, while in the Pëllumbasi cave only a female with a new-born juvenile was found, and in the Korita cave the number of bats was not specified. However, with the exception of the latter two cave records, the maternity aggregations of *R. euryale* were mixed with colonies or individuals

Fig. 22. An individual of *Rhinolophus euryale* roosting in a bunker at Jermë (Vlorë Pref.; Fig. 25), 3 May 2010. Photo by K. Sachanowicz.

Fig. 23. Entrance to a bunker in a slope above the ancient city (archaeological site) of Butrint (Vlorë Pref.); a hibernaculum of *Rhinolophus ferrumequinum*, summer roost of colonies of *Rhinolophus ferrumequinum*, *R. euryale* and *Myotis emarginatus*, and individuals of *Rhinolophus hipposideros*, *Myotis blythii*, *Hypsugo savii*, and *Miniopterus schreibersii*. Flying individuals of *Rhinolophus blasii*, *Myotis davidii*, *M. capaccinii*, *Eptesicus serotinus*, and *Tadarida teniotis* were documented at this entrance. Photo by M. Uhrin (January 2016).

of other bat species, namely with *Rhinolophus blasii* (in two cases) and once with *Rhinolophus ferrumequinum*, *Myotis emarginatus*, and *Miniopterus schreibersii*. Aggregations of *R. euryale* in which the reproduction could be presumed but was not observed, were documented at seven other sites between late April and early May (Uhrin et al. 1996, Théou & Loce 2017, Sachanowicz & Ciechanowski 2018), i.e. in the period when pregnancy of the females could be expected. In four of these roosts (all bunkers), the aggregations were mixed with other bat species, namely *Rhinolophus ferrumequinum* (4 cases) and *Myotis emarginatus* (2). Vertical distribution of the maternity roosts including those of the potential reproduction aggregations was in the range of 12–1,125 m a. s. l. (n=12), with the altitude median of 115.0 m (mean 241.3 m).

The timing of reproduction of *R. euryale* in Albania was documented at several sites (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018); three pregnant females were netted on 27 April, a lactating female on 26 June, and juveniles of the year on 26 June, 3 and 8 July, 17 September, and 5, 11, and 16 October.

Four aggregations of *R. euryale* were observed also outside the reproduction season, namely in September and October. Their size was reported only for two cases, 50 and 250 bats, respectively (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018), i.e. similar to the aggregations in the season of reproduction. In this autumn period, two colonies of *R. euryale* were found to be mixed with other species, with *Rhinolophus blasii* in the Pishkashi cave, and with *R. blasii*, *R. mehelyi*, and *Miniopterus schreibersii* in the Jermë bunker (Fig. 25).

Individuals of *R. euryale* were netted and/or their calls detected at the entrances to ten underground spaces (31.3% of the sites), seven bunkers and three natural caves, in the period between April and October (incl.). In five of these sites (all bunkers), groups or single individuals of this bat were found to roost. Altogether 32 individuals were caught at these entrances, the females slightly overnumbered males in the total catch (sex ratio 13 ♂♂ : 17 ♀♀).

Foraging individuals of *R. euryale* were documented at three sites only (9.4% of the sites and 6.3% of particular records), and only at one site a bat was netted, above a stream at Llazat (Sachanowicz & Ciechanowski 2018). All records of foraging bats come from natural habitats, valleys with streams with a various level of vegetation cover. The foraging habitats of *R. euryale* were distributed across a large altitude range of 81–1,182 m a. s. l. (mean 654.7 m, median 701.0 m).

Records of ectoparasites. **Original data**: I x o d i d a e: *Ixodes vespertilionis*: 2 nymphs (CMŠ [A]) from 2 inds., Jermë (Vlorë Pref.), 3–4 May 2010, leg. M. Ciechanowicz, M. Piskorski & K. Sachanowicz. – **Published data**: S t r e b l i d a e: *Brachytarsina flavipennis*: 1 ma, Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Nycteribia latreillii*: 1 ma, Shpella e Fush Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962 [as *N. latreillei*], 1963a). – *Nycteribia schmidlii*: 1 ma, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]); 2 ma, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]). – *Phthiridium biarticulatum*: [unspecified number and sex], Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 2 ma, 2 fa, Shpella e Fush-Krüjes, bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 1 ma, 1 fa, Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 3 inds., Höhle bei Tren (Treni's cave), 24–25 September 2012 (Scheffler et al. 2013 [as *Phtiridium biarticulata*]). – S p i n t u r n i c i d a e: *Eyndhovenia euryalis*: 4 inds., Höhle bei Tren (Treni's cave), 24–25 September 2012 (Scheffler at al. 2013 [as *Eyndhovenia euryale*]); 2 ma, Perlat, 26 June 2011; 1 ma, 1 fa, Halo, 17 September 2012 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, six arthropod parasite species were collected from *Rhinolophus euryale* in Albania.

The bat fly *Brachytarsina flavipennis* Macquart, 1851 is a parasite of the cave-dwelling bats, it prefers the medium-sized species of the genus *Rhinolophus* (Lanza 1999). From Albania, it was documented solely from this ecological group of bats, besides *R. euryale* also from *Rhinolophus ferrumequinum*, *R. blasii*, *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii*; Hůrka 1962, 1963a). It is a Mediterranean faunal element whose range reaches eastward to Central Asia (Aellen 1959, Hůrka 1962, 1984).

Three species of nycteribiid bat flies adapted to parasitise the cave-dwelling bats were collected from *R. euryale* in Albania, *Nycteribia latreillii* (Leach, 1817), *N. schmidlii* Schiner, 1853, and *Phthiridium biarticulatum* Hermann, 1804. The latter species is a parasite preferring bats of the genus *Rhinolophus*, although it was documented also from other cave-dwelling bats (Hůrka 1964); from Albania it was recorded to parasitise also *Rhinolophus ferrumequinum*, *R. blasii*, *Myotis myotis*, *M. blythii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The distribution range of *P. biarticulatum* in the Palaearctic conforms to the range of the principal host genus (Hůrka 1964). *N. latreillii* is a bat fly adapted to parasitise mainly bats of the *Myotis myotis* complex (Hůrka 1964), but in Albania it was collected besides *R. euryale* also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, and *M. capaccinii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The distribution range of this parasite covers the Mediterranean and Central Asian range of the host bat complex (Hůrka 1964, 1969). *N. schmidlii* is principally a parasite of the *Miniopterus* bats, its distribution range conforms to the distribution of this bat genus in the western Palaearctic (Hůrka 1964). In Albania, this bat fly was collected also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below).

The hard tick *Ixodes vespertilionis* Koch, 1844 is a troglobiont polyxenic parasite of the cave--dwelling bat species, in the western Palaearctic range mainly of the bats of the genus *Rhinolophus* (Arthur 1956, Filippova 1977, Walter & Kock 1985). The distribution range of this tick covers Europe, Africa, Middle East, southern and eastern Asia, and some of the Pacific islands (Kolonin 2007); from Albania it was previously collected from *Rhinolophus ferrumequinum* (Scheffler et al. 2013). *R. euryale* is a frequently used host by *I. vespertilionis* (Lanza 1999), this host-parasite relationship was documented in southern and central Europe (Dusbábek 1963, Lamontellerie 1965, Beaucornu 1966, Ševčík et al. 2010).

R. euryale is a principal host of the nominotypical subspecies of *Eyndhovenia euryalis* (Canestrini, 1884) (Uchikawa & Dusbábek 1978, Imaz et al. 1999) and in Albania it was collected additionally from all other *Rhinolophus* species, *R. ferrumequinum*, *R. hipposideros*, *R. mehelyi*, and *R. blasii* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see above and below). The known distribution range of this subspecies conforms to the range of *R. euryale* (Uchikawa & Dusbábek 1978, Stanyukovich 1997, Imaz et al. 1999).

Rhinolophus mehelyi Matschie, 1901

Records. **Published data**: V l o r ë: Jermë, abandoned military tunnels [1], 3 May 2010: obs. 5–10 inds., net. 1 ma, 1 faG (Sachanowicz et al. 2016); Jermë, military tunnels, 17 September 2012: obs. a colony of ca. 80 inds. (exam. 1 ma, 1 mj)

Fig. 24. An adult male of *Rhinolophus mehelyi* roosting in a bunker at Jermë (Vlorë Pref.; Fig. 25), 18 September 2012. Photo by K. Sachanowicz.

mixed with ca. 150 inds. *Rhinolophus euryale*, *R. blasii* and *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018); – Velçë cave [2], near the cave entrance, 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Comments. *Rhinolophus mehelyi* is a very rare bat in Albania, only two localities are available from the south-western part of the country (Fig. 21, Table 1). *R. mehelyi* is distributed only in the southern and eastern parts of the Balkans, its occurrence in southern Albania creates the north--western margin of the range in south-eastern Europe. Its records are absent from Montenegro, Croatia as well as Bosnia and Herzegovina (Karapandža et al. 2014, Presetnik et al. 2014, Tvrtković 2017); on the other hand, it is widely but not commonly distributed in Greece, Bulgaria and Turkish Thrace (Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b), marginally reaching south-eastern and south-western Romania and eastern Serbia (Murariu et al. 2016, Paunović et al. 1998, 2018), and two records are known from North Macedonia (Kryštufek et al. 1992). In all Balkan countries where it occurs, *R. mehelyi* represents the rarest bat of the genus *Rhinolophus*; this is valid also for Albania. However, due to exceptional similarity to its sibling species, *R. euryale*, it could be easily overlooked at sites where it is not expected (Sachanowicz & Ciechanowski 2018).

The Albanian records of *R. mehelyi* come from sites situated in the Mediterranean patchy agricultural landscape at rather low altitudes of 56 m and 444 m a. s. l. (mean 250.0 m; Table 2, Fig. 8). In one case, an unspecified number of call sequences of *R. mehelyi* was recorded near the entrance to the Velça cave (Sachanowicz & Ciechanowski 2018); the calls in this area could originate from foraging bats or from bats leaving/approaching a roost. Two subsequent findings of

Fig. 25. Two of six entrances to the extensive bunker system at Jermë (Vlorë Pref.); the bunker system serves as a summer roost of *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *R. mehelyi*, *R. blasii*, *Myotis blythii*, and *Miniopterus schreibersii*, and as a hibernaculum of *Rhinolophus ferrumequinum*, *R. hipposideros*, and *R. blasii*. Photo by M. Uhrin (July 2016).

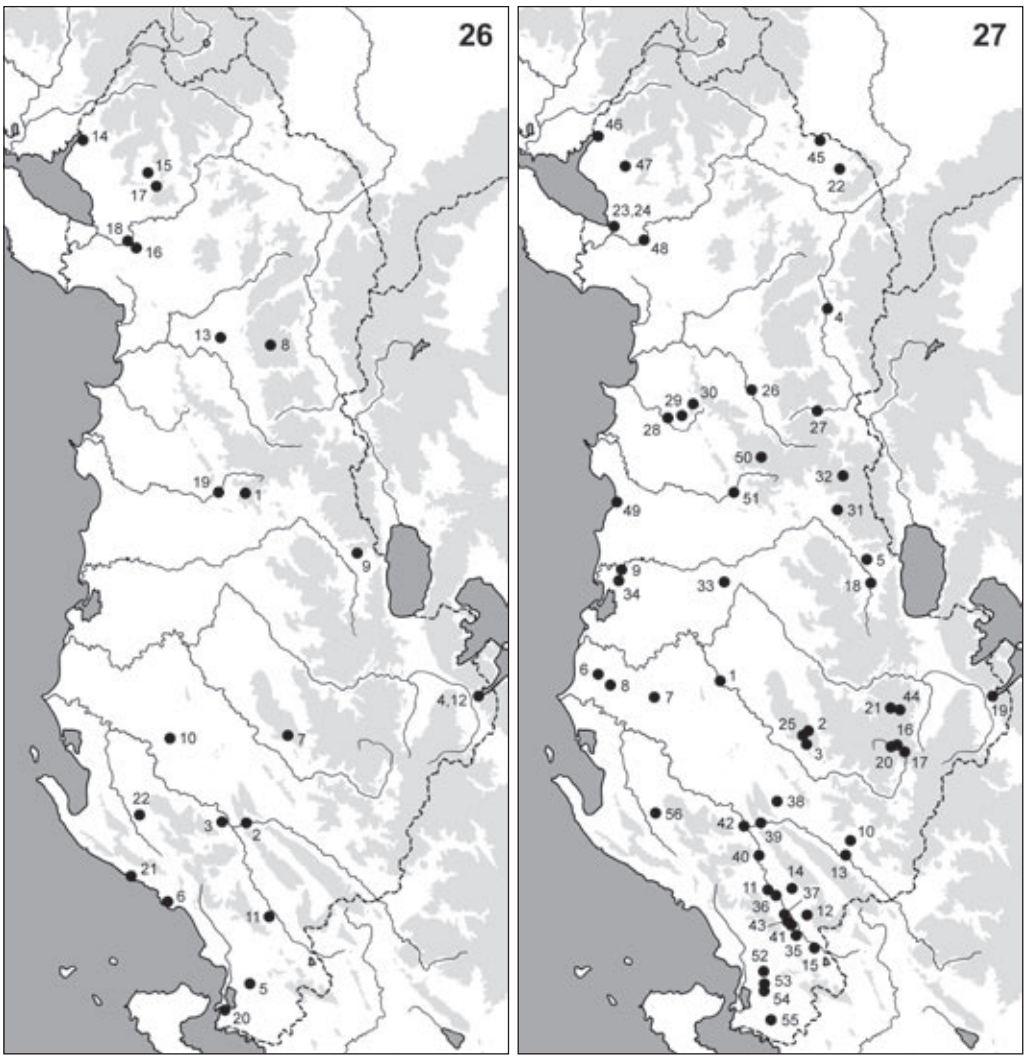
R. mehelyi are available from a roost at Jermë (Fig. 25), a system of seven concrete underground bunkers interconnected by rock-cut galleries and exceeding to rock-cut domes (Sachanowicz et al. 2016, Sachanowicz & Ciechanowski 2018). A small group was found there on 3 May 2010, when an adult male and a pregnant female were examined from an aggregation (representing thus a maternity colony), and a colony of some 80 individuals was found in the system on 17 September 2012, when two males (an adult and a juvenile) were examined. *Rhinolophus euryale*, *R. blasii*, and *Miniopterus schreibersii* were found in the bunker system on both occasions and *Myotis blythii* during the latter one. However, during other visits of the system, on 27 April 2004, 20 September 2014, 28 January 2016, and 1 July 2016, *R. mehelyi* was not found in these spaces, while many other species were documented there (*Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *R. blasii*, *Myotis myotis*, *M. blythii*, *Miniopterus schreibersii*). These observations indicate that *R. mehelyi* uses also other roosts, for both hibernation and nursing of the youngs, and the Jermë bunker system is most probably not the only roost of this bat in Albania.

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Eyndhovenia euryalis euryalis*: 3 m from 1 m, [Jermë], 17 September 2012 (Sachanowicz & Ciechanowski 2018).

Comments on ectoparasites. One arthropod parasite species was collected from *Rhinolophus mehelyi* in Albania. The principal host species of the nominotypical subspecies of *Eyndhovenia euryalis* is *Rhinolophus euryale* (Uchikawa & Dusbábek 1978, Imaz et al. 1999). However, in Albania this parasite was recorded to parasitise all *Rhinolophus* species (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see above and below).

Rhinolophus blasii Peters, 1866

Records. **Original data**: E l b a s a n: Vakumonë, at two artificial lakes ca. 2 km east of the village [1] (Fig. 91), 5 July 2018: det. calls of 1 foraging ind. – G j i r o k a s t ë r: Mezhgoran, Mezhgorani cave [2] (Fig. 2), 26 January 2016: obs. (& exam.) 1 ma torpid; – Tepelenë, bunker [3] (Fig. 30), 6 May 2016: obs. 1 ind. torpid. – K o r ç ë: Tren, Treni cave II [4], 25 January 2016: obs. 6 inds. torpid (exam. 1 fs). – V l o r ë: Jermë, bunkers [5] (Fig. 25), 20 September 2014: coll. 1 ma (leg. G. Csorba; HNHM 2014.25.5.), 28 January 2016: obs. 106 inds. torpid (exam. 2 ma, 1 ms, 1 fa); – Porto Palermo, Ali Pasha fortress [6] (Fig. 106), 2 July 2016: obs. & rec. 1 ind. active. – **Published data**: B e r a t: Shpella e Koritës [7], 28 December 1960: coll. 1 ind., 9 June 1961: obs. a colony (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a nursery colony (Hanák 1964). – D i b ë r: Lura, road in old beech forest on mountain slopes [8], 28 June 2011: det. calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Shpella e Pishkashit [9], 5 October 1960: a colony of ca. 50 inds. mixed with *Rhinolophus euryale*, exam. 1 ma, 1 ms, 1 fa (Hanak et al. 1961); Höhle "Sphela di Igor" bei Pischkasch, 5 October 1960: obs. a colony mixed with *R. euryale* (Hůrka 1962); Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960: coll. parasites (Hůrka 1963a); Igors Höhle bei Pishkash, 5 October 1960: coll. 2 m, 1 fa (Hanák 1964); Pishkash, Igors cave, 5 October 1960: 1 f, NMP (Benda & Gaisler 2015). – F i e r: Damës, rocky gorge of the Povlës river [10], 18 April 2004: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Shpella e Mezhgoranit [2], 11 October 1960: obs. a colony, exam. 2 ma, 4 ms, 5 fa, 8 fs, 4 December 1960: obs. a colony, exam. 1 ma, 1 ms, 3 m, 2 fa, 1 fs, 2 f (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelene, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 6 m, 14 f (Hanák 1964); Shpella e Mezhgorani, April 1995: net. 9 inds. (Uhrin 1995); Mezhgoranit cave near Tepelene, 22 April 1995: net. 1 m, 8 f (Uhrin et al. 1996); Mezhgoran, Mezhgorani cave, 11 October 1960: 3 m, 5 f, NMP (Benda & Gaisler 2015); – [Shpella e Vanishtës südl. Gjirokastra, 12 October 1960: coll. parasites (Hůrka 1962, 1963a [an error!])]; Vanister cave [11], the cave entrance 22 April 2004: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Mikroprespanská j. [= Treni cave] [12], April 1995: net. 2 inds. (Uhrin 1995); Micro Prespa cave, 21 April 1995: net. 1 m, 1 f (Uhrin et al. 1996); Treni cave, October 2010: net. 2 m, 1 f (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. 6 inds. (Scheffler et al. 2013); Micro Prespa cave, the cave entrance, 10 August 2006: net. 1 fj (Sachanowicz & Ciechanowski 2018). – L e z h ë: Perlat, tunnel [13], with metal tank inside, 26 June 2011: obs. & det. calls of single inds. in a colony mixed with *Rhinolophus ferrumequinum*, *R. euryale*, and *Myotis emarginatus* (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: [Bajzë], Shpella e Zef Toma [14], 7 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Kir, entrance of an adit [15], Kir river gorge, 11 September 2012: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Naraç, mining adit [16], 22 April 2010: obs. 2 inds. (Sachanowicz



Figs. 26, 27. Records of particular bat species in Albania. 26 – *Rhinolophus blasii* Peters, 1866. 27 – *Myotis myotis* (Borkhausen, 1797).

& Ciechanowski 2018); – Prekal, the cave entrance [17], 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, entrances of a gallery in limestone wall [18], 22 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shpella e Zezä [= Pëllumbasi cave] [19], April 1995: obs. 1000 inds., net. 1 ind. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: obs. a colony of 700–1000 inds., net. 1 m (Uhrin et al. 1996); Zëze cave, in the cave, 3 July 2011: obs. & det. calls of single inds. (Sachanowicz & Ciechanowski 2018). – V l o r ë: Butrint, entrance of military tunnels connected with a cave [20], near the hill top, 5 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Jermë, abandoned military tunnels connected with a small cave [5], in olive grove, 27 April 2004: obs. a colony of ca. 80 inds. mixed with *Rhinolophus euryale*, 3 May 2010: obs. 3 inds. in a colony of torpid *R. euryale*, 17 September

2012: obs. 5 inds. in a colony of ca. 250 inds. mixed of *R. euryale*, *R. mehelyi*, and *Miniopterus schreibersii*; entrance of tunnels, 27 April 2004: net. 1 ma, 2 fa, (Sachanowicz & Ciechanowski 2018); – Shpella e Parashqevise [21], cave, 29 April 2016: obs. & det. 150 inds., 26 July 2016: obs. 200 inds. (Théou & Loce 2017); – Shpella e Maçit [= Velça cave] [22], April 1995: obs. 2000 inds., net. 1 ind. (Uhrin 1995); Velce, Macit cave, 26 April 1995: obs. a colony of 2000 inds., exam. 1 m (Uhrin et al. 1996); Velce, Velce cave, 6 December 2014: obs. 254 inds. (Théou et al. 2015b); Velçë cave, entrance of a small cave, 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Rhinolophus blasii* represents an uncommon bat in Albania, it is known from 22 localities in the country (Table 1). Despite their small number, the records are regularly scattered over the whole country, namely in low and medium high areas (Fig. 26). Although the altitude range of the localities is rather wide (12–1,436 m a. s. l.; Table 2), most of the records come from the patchy agricultural landscape at the altitudes below 700 m. The altitude median of 250.5 m (Fig. 8) also indicates a preference for low to medium high areas of Albania in this bat.

R. blasii is distributed in Europe only in the Balkans and some adjacent areas including certain islands, while in the central Mediterranean parts of its species range (Italy, Slovenia), it is considered extinct (Kryštufek & Đulić 2001, Presetnik et al. 2009, Lanza 2012). In the southern Balkans, in the mainland of Greece and Greek islands, it is the most frequent (or even only) species among the three medium-sized horseshoe bats (Hanák et al. 2001, Benda et al. 2009, Benda & Uhrin 2017). On the other hand, in the northern parts of the Peninsula, *R. blasii* is a rather rare and accessory faunal element, occurring in two separate ranges; the western, adjacent to the eastern coast of the Adriadic Sea of Croatia and Bosnia and Herzegovina (Kryštufek & Đulić 2001, Tvrtković 2017), and the eastern, covering eastern Serbia, north-western Bulgaria and western Romania (Paunović & Stamenković 1998, Benda et al. 2003b, Paunović 2016, Jére et al. 2017). In the countries of the central latitudes of the Balkans, in Bulgaria, North Macedonia, Albania, and southern Montenegro, *R. blasii* is widely distributed but less common than *R. euryale* (Kryštufek et al. 1992, Paunović

Fig. 28. A part of the colony of *Rhinolophus blasii* hibernating in a bunker at Jermë (Vlorë Pref.; Fig. 25), 28 January 2016. Photo by M. Uhrin.

Fig. 29. An adult male of *Rhinolophus blasii* netted at Kir (Shkodër Pref.), 11 September 2012. Photo by K. Sachanowicz.

& Stamenković 1998, Benda et a. 2003b, Presetnik et al. 2014, this review); only two sites are known from Kosovo (Paunović 2016, Appendix).

Albania thus belongs to the northern part of the continuous Balkan range of *R. blasii* that stretches across the Peninsula. Moreover, although fully within the range of *R. blasii*, the territory of Albania represents an area with apparently decreasing abundance of this bat in the south-north gradient (Fig. 26). From the southern third of the country, a similar number of localities is known as from the central and northern thirds of Albania together (Table 4).

Field notes. *Rhinolophus blasii* was documented from Albania in all seasons, from mid-January to late December. The largest concentration of particular records (38.5%) comes from three weeks between 18 April and 6 May. The prevailing majority of records are findings of bats in their roosts (61.5% of particular records) or at entrances to their roosts (30.8%), only few times foraging bats were recorded (7.7%).

R. blasii is the only medium-sized *Rhinolophus* species, documented from Albania in the core hibernation period between mid-December and mid-February. On the other hand, in other parts of the year, when hibernation or transition from or to a hibernation roost could also be expected (February, March, November), no record is available. Altogether six records of *R. blasii* were made from five hibernacula in Albania, four caves and a bunker system (Hanak et al. 1961, Théou et al. 2015b, own data). The only artificial hibernaculum is the extensive bunker system at Jermë (see under *Rhinolophus mehelyi* for a brief description; Fig. 25) where *R. blasii* was documented four times in various parts of the year other than the hibernation period (April, May, September). In caves, *R. blasii* hibernated in single individuals (Korita cave, December 1960; Mezhgorani cave, January 2016), in small groups (Treni cave II, 6 inds.; January 2016), and in large aggregations (Mezhgorani cave, December 1960; Velça cave, December 2014; Jermë bunkers, January 2016). The hibernacula of *R. blasii* were spread over a medium wide range of altitudes (58–1,125 m a. s. l.), with the preference for medium altitudes (median 444.0 m, mean 546.6 m).

The non-hibernation roosts of *R. blasii* in Albania comprised seven caves and five artificial shelters (including four spaces serving as hibernacula during winter). In the artificial roosts (bunkers, mines, old fortress), single individuals or small groups were observed, only the Jermë bunkers contained several tens of *R. blasii* in colonies mixed with other species (Sachanowicz & Ciechanowski 2018, own data). On the other hand, very large aggregations were found in most of the caves, but the Zef Toma cave, where only a single bat was observed in June 2015 (Théou & Đurović 2015a); mostly colonies of several tens to several hundreds were found in the caves, the extreme exceptions were (in case that there really were monospecific aggregations; Uhrin et al. 1996) the colonies of 700–1,000 bats in the Pëllumbasi cave and of 2,000 bats in the Velça cave, both found in April 1995. Altitude characteristics of the roosts (range 12–1,125 m a. s. l., median 243.0 m; n=12) suggest a preference for low to medium high areas in Albania. At least in four roosts, *R. blasii* was found in colonies mixed with other bat species – one to six (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018), in all cases with *Rhinolophus euryale*. With the latter species, *R. blasii* was found mixed three times in the Jermë bunkers, where *Rhinolophus mehelyi* and *Miniopterus schreibersii* were also once found; in the Mezhgorani cave (Fig. 2) it was mixed additionally with *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, and *Miniopterus schreibersii* (Hanak et al. 1961; according to Hanák 1964 only with *M. capaccinii* and *M. schreibersii*); in the Perlat tunnel additionally with *Rhinolophus ferrumequinum* and *Myotis emarginatus*. In the report by Hanak et al. (1961) concerning the finding in the Korita cave it is

Fig. 30. Entrance of a bunker at Tepelenë (Gjirokastër Pref.); the bunker serves as a summer roost of *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, and *Miniopterus schreibersii*. Photo by P. Tájek (May 2016).

not clear whether six other species (*Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, *M. blythii*, *M. emarginatus*, *Miniopterus schreibersii*) were found in one colony with *R. blasii* or just in the same cave as the latter bat.

At ten sites, flying individuals of *R. blasii* were documented at the entrances to underground spaces (six caves and four artificial shelters), both to confirmed and to potential roosts (Uhrin et al. 1996, Papadatou et al. 2011, Scheffler et al. 2013, Sachanowicz & Ciechanowski 2018); these records were made over the whole non-hibernation period, from late April to October. At six sites (four caves and two bunkers), 28 individuals were netted in total (of them, 9 males and 13 females) and at the remaining sites, the echolocation calls of passing *R. blasii* were recorded. These sites are spread over low to medium altitudes, in the range of 50–866 m a. s. l. (median 235.5 m).

Foraging individuals of *R. blasii* were documented at three sites only, by recordings of their echolocation calls (Sachanowicz & Ciechanowski 2018, own data). Only one of them could be regarded as a typical locality of this bat, the xerotherm rocky gorge of the Povlla river near Damës at 258 m a. s. l. within the Western Lowlands of Albania; other two sites represent montane patchy landscapes of forests and pastures at the altitudes above 1,000 m, two artificial lakes east of Vakumonë at 1,150 m (Fig. 91) and a beech forest in the Lura National Park at 1,436 m. Sachanowicz & Ciechanowski (2018) referred the latter site to be the highest within the European range of *R. blasii*; this is perhaps valid for the mainland of Europe, since in Crete the highest locality of this bat was at the altitude of 1,500 m a. s. l. (Benda et al. 2009).

Perhaps the only direct evidence of *R. blasii* reproduction in Albania is the finding of a colony in the Korita cave near Çorovodë on 9 June, reported by Hanak et al. (1961); however, these autors did not give any information on the size and composition of the colony other than the species identification of the observed bats (see above). Indirect evidence of reproduction roost of *R. blasii* was mentioned by Sachanowicz & Ciechanowski (2018), who netted a juvenile female at the entrance to the Treni cave on 10 August, and Papadatou et al. (2011), who reported youngs of the year netted at the same site in October.

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 fa (CMŠ [A]) from 1 ma (NMP 96537), Mezhgoran, Mezhgorani cave (Gjirokastër Pref.), 26 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – *Phthiridium biarticulatum*: 1 ma, 2 fa (CMŠ [A]) from 1 fs (NMP 96535), Tren, Treni II cave (Korçë Pref.), 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – **Published data**: S t r e b l i d a e: *Brachytarsina flavipennis*: 1 ma, Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]); 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]); [3 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]), an error, this record belongs to a different host (? *Miniopterus schreibersii*)]. – N y c t e r i b i i d a e: *Phthiridium biarticulatum*: 2 ma, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); [1 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]), an error, this record belongs to a different host (? *Miniopterus schreibersii*)]; 2 ma, 1 fa, Shpella di Igor bei Pishkashi westl. Ohrida-See, 5 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 3 inds., Treni's cave, 24–25 September 2012 (Scheffler et al. 2013 [as *P. biarticulata*]). – S p i n t u r n i c i d a e: *Eyndhovenia euryalis euryalis*: 5 inds., Treni's cave, 24–25 September 2012 (Scheffler et al. 2013 [as *Eyndhovenia e. euryale*]).

Comments on ectoparasites. In total, four arthropod parasite species were collected from *Rhinolophus blasii* in Albania.

The bat fly *Brachytarsina flavipennis* Macquart, 1851 is a parasite of the cave-dwelling bats, the medium-sized *Rhinolophus* species are its principal host group (Lanza 1999). Its distribution range covers the Mediterranean and Central Asia (Aellen 1959, Hůrka 1962, 1984), in Albania it reaches its northern limits (Hůrka 1962, Ivanova et al. 1995). From this country, it was documented besides *R. blasii* also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a; see above and below). From *R. blasii* this bat fly was collected previously, besides Europe (Hůrka 1962, 1984, Ivanova et al.

1995) also from the Maghreb (Bendjeddou et al. 2017) and Middle East (Theodor & Moscona 1954, Amr & Qumsiyeh 1993, Benda et al. 2012, Ševčík et al. 2013).

Two nycteribiid bat fly species adapted to parasitise the cave-dwelling bats were collected from *R. blasii* in Albania, *Nycteribia pedicularia* Latreille, 1805 and *Phthiridium biarticulatum* Hermann, 1804. The former bat fly species is a parasite of the cave-dwelling bats, among them *Myotis capaccinii* is its principal host (Hůrka 1984). However, *N. pedicularia* is frequently documented also on other cave bats, in Albania it was collected from a wide range of hosts, besides *R. blasii* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. blythii*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). This bat fly is a Mediterranean species, occurring in the southern part of Europe, in the Maghreb and Middle East (Hůrka 1984). *P. biarticulatum* is a parasite preferring bats of the genus *Rhinolophus*, although it was documented also from other cave-dwelling bats (Hůrka 1962, 1964); in Albania it was recorded to parasitise also *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, *M. blythii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The distribution range of *P. biarticulatum* in the Palaearctic conforms to the range of the principal host genus (Aellen 1959, Hůrka 1964, 1976b).

The principal host species of the nominotypical subspecies of *Eyndhovenia euryalis* is *Rhinolophus euryale* (Uchikawa & Dusbábek 1978, Imaz et al. 1999). However, in Albania this parasite was recorded to parasitise all *Rhinolophus* species (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see above). From *R. blasii* it was already reported from Europe and the Maghreb (Beron & Kolebinova 1964, Bendjeddou et al. 2017, Khelfaoui et al. 2018).

Rhinolophus sp.; medium-sized

Records. **Published data**: D i b ë r: Urakë, Blazi cave, 12 December 2013: obs. 2 inds., 11 December 2014: obs. 617 inds. (Théou et al. 2015b); – Urakë, Keputes cave, 12 December 2013: obs. 563 inds., 11 December 2014: obs. 460 inds. (Théou et al. 2015b). – D u r r ë s: Golem, Shkëmbi i Kavajës, bunker, 3 February 2014: obs. 28 inds. (Théou et al. 2015b). – G j i r o k a s t ë r: Benjë, cave, 19 November 2014: obs. 88 inds. (Théou et al. 2015b); – Haskova-Dhuvjani, Gjere Mts., system of abandoned military tunnels, 24 April 1995: obs./det. 2 inds. (Uhrin et al. 1996); – Ibë, Black cave, 19 February 2012: obs. 79 inds., 26 January 2014: obs. 49 inds. (Théou et al. 2015b). – K o r ç ë: Gollomboç, cave, 22 February 2014: obs. 1 ind. (Théou et al. 2015b); – Lajthizë, tunnel, 23 February 2014: obs. 8 inds., 13 November 2014: obs. 13 inds. (Théou et al. 2015b); – Tren, Treni cave, 24 November 2012: obs. 7 inds., 21 February 2014: obs. 1 ind. (Théou et al. 2015b); – National Park of Prespa Lakes, one tunnel and four caves, 24 September 2012 – 23 April 2015: obs. inds. (maximum 274 inds. in total per one check) (Theou et al. 2015a). – S h k o d ë r: [Ganjollë], bunker, 9 June 2015: obs. 1 ind. (Théou & Đurović 2015a). – T i r a n ë: Tiranë, four bunkers, February 2013: obs. 1 ind. + 1 ind. + 1 ind. + 1 ind., bunker and tunnel, December 2013: obs. 1 ind. + 1 ind., bunker, June 2014: obs. 1 ind. (Çera 2014); Tirana, bunker, 16 February 2013: obs. 1 ind. (Théou et al. 2015b). – V l o r ë: Butrinti ancient town, cellar, 25 April 1995: obs. 1 ind. active (Uhrin et al. 1996); – Karaburun National Park, Shpella Duk Gjonit, cave, 29 September 2015: obs. 300 inds., 25 January 2016: obs. 49 inds. (Théou & Loce 2017); – Narta Lagoon Protected Area, coastal tunnel, 3 July 2015: obs. 5 inds. (Théou & Loce 2017, cf. Rapaj 2015); – Shpella e Parashqevise, cave, 29 September 2016: obs. 500 inds. (Théou & Loce 2017); – Velçë cave, 2014: obs. 200 inds. (Théou 2015).

Myotis myotis (Borkhausen, 1797)

Records. **Original data**: B e r a t: Berat, castle [1], at a cistern (Fig. 114), 4 July 2016: net. 1 faL; in the cistern, 21 September 2018: obs. a colony of ca. 70 inds. (mixed with a colony of *M. blythii*); – Koritë, above a watering place in a mountain pass [2], 21 September 2018: net. 1 ma; – Pirogosh, Pirogoshi cave [3], 23 September 2018: obs. 4 inds. – D i b ë r: Zall-Dardhë, old aspen grove in the Drini i Zi river valley [4], 30 June 2018: net. 1 ma. – E l b a s a n: Pishkash-Veri, bunker [5], ceiling fissure, 9 May 2016: obs. 1 ind. torpid. – F i e r: Apollonia, bunker [6], 3 July 2016: obs. 1 ind. active; – Belistan, two bunkers [7], ceiling fissures, 30 June 2016: obs. 2+1 inds.; – Fier, bunker [8], 1 October 2018: obs. 3 inds. torpid; – Shënepremte, bunker [9], ceiling fissure, 20 September 2018: obs. 1 ind. – G j i r o k a s t ë r: Bënjë-

-Novoselë, Lengarica river canyon [10] (Fig. 107), at an entrance to a bunker, 29 June 2019: net. 1 faL (leg. R. Lučan); – Gerhot, Viroi spring, bunker [11] (Fig. 32), 27 January 2016: obs. 3 inds. torpid (exam. 1 fa), 1 July 2016: obs. 4 inds. active; – Libohovë, bunker [12], ceiling fissure, 2 May 2016: obs. 1 ind. torpid; – Petran, bunker [13] (Fig. 115), wall holes and fissures, 6 May 2016: obs. 10 inds. torpid; – Tranoshisht, bunker [14], 27 January 2016: obs. 2 inds. torpid; – Zervat, old church above the village [15], 4 May 2016: obs. 1 ind. torpid. – K o r ç ë: Leshnjë, three bunkers [16] (Fig. 33), cellar fissures, 8 May 2016: obs. 28 inds. torpid, 9 May 2016: obs. 9 inds. torpid, a bunker, 27 June 2016: obs. 2 inds. torpid; – Roshanj, Dëshnica river valley [17] (Fig. 57), above the river, 27 June 2016: net. 1 faL; – Selishtë, Dunica river valley [18] (Fig. 48), above the river beneath a Turkish bridge, 9 July 2015: net. 1 ma; – Tren, Treni cave [19] (Fig. 61), 25 January 2016: obs. (& exam.) 1 ma torpid; – Vithkuq, bunker [20] (Fig. 16), 9 May 2016: obs. 11 inds. torpid; – Voskopojë, mine [21], ceiling fissure, 9 May 2016: obs. 1 ind. torpid. – K u k ë s: Golaj, above the Vlahëna river [22], ca. 1.5 km south of the village, 29 June 2018: net. 1 ma. – S h k o d ë r: Shkodër, Rozafa castle [23] (Fig. 111), fissure in ceiling vault of a cellar, 13 May 2016: obs. 1 ind. torpid; – Shkodër, bunker [24] (Fig. 34), 13 May 2016: obs. a colony of ca. 600 inds. (some clusters of mixed composition, with *Myotis capaccinii* and/or *Miniopterus schreibersii*), 10 July 2016: obs. a colony of ca. 1,200 inds. (mixed composition, with *Myotis capaccinii* and *Miniopterus schreibersii*), 26 June 2018: obs. a colony of ca. 600 inds. (without an admixture of other species), 18 September 2018: obs. several hundreds of inds. – **Published data**: B e r a t: Shpella e Koritës [25], 9 June 1961: obs. a colony (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a colony (Hanák 1964). – D i b ë r: Suç, military tunnels [26], 25 September 2005 (Sachanowicz et al. 2014); Suç, military tunnel, 25 September 2005: obs. 1 ind.; entrance of military tunnel, 25 September 2005: net. 3 ma, 2 mj, 2 fa (Sachanowicz & Ciechanowski 2018); – Valikardhë, bunker [27], 25 September 2005: obs. 1 ma (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Shpella e Fush-Krujës [28], 16 October 1960: obs. a colony of ca. 100 inds., 2 ma, 4 fa, 1 fs (Hanak et al. 1961); Höhle bei Fush-Kruje, 16 October 1960: obs. a colony (Hůrka 1962); Shpella e Fush-Krujës bei Kruja, 16 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Fush-Kruje, 16 October 1960: 1 ma, 1 ms, 2 fa, 2 fs (Hanák 1964); – Halil, tunnels in forested limestone slope [29], 3 October 2005: obs. 13 inds. in groups of 2–4 inds. (exam. 1 ma), incl. copulating pairs (Sachanowicz & Ciechanowski 2018); – Nojë, gallery in limestone slope [30], 14 September 2012: obs. 2 inds. ad, 1 ind. juv (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Librazhd Katund, bunker [31], 4 July 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Fushë Studë, bunkers and tunnels [32], 28 July – 7 August 2015: obs. roosting inds., net. 3 m (van der Tempel 2016); – Shalës [33], April 1959: obs. 4 inds., exam. 1 m (Hanak et al. 1961). – F i e r: Divjakë, school [34], 25 April 1961: exam. 1 ind. (Hanak et al. 1961). – G j i r o k a s t ë r: Frashtan, bunker [35], 23 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Gjirocaster castle [36], dark corridors, 23 April 1995: obs. a colony mixed with *Myotis blythii*, *M. capaccinii*, and *Miniopterus schreibersii* of 800 inds., net. 4 fa (Uhrin et al. 1996); Gjirokastër, citadel, 26 September 2012: net. 10 inds. (Scheffler et al. 2013); Gjirokastër, castle undergrounds, 21 April 2004: obs. 858 inds. torpid (exam. 5 inds.), mixed with *Myotis blythii*, 11 July 2011: obs. a colony of 5000–7000 inds. mixed with *M. blythii* (Sachanowicz & Ciechanowski 2018); – Goranxi, military tunnels [37], 21 April 2004: obs. 1 ind.; adit entrance, 21 April 2004: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Goricë, Dishnicës river [38], farmland landscape, 18 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Shpella e Mezhgoranit [39], 11 October 1960: obs. a colony, exam. 4 ms, 1 fa, 6 fs (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 1 ma, 4 ms, 2 fa, 6 fs (Hanák 1964); Mezhgoranit cave (Tepelene), 4 m, 7 f [NMP] (Benda & Horáček 1995); Shpella e Mezhgorani, April 1995: net. 4 inds. (Uhrin 1995); Mezhgoranit cave near Tepelene, 22 April 1995: net. 3 fa (Uhrin et al. 1996); Tepelene, Mezhgoranit Cave, 11 October 1960: 4 m, 7 f, NMP (Benda et al. 2006); Mezhgoran, entrance of the Mezhgoran cave, 22 August 2006: net. 2 mj, 1 fj (Sachanowicz & Ciechanowski 2018); – Shtëpëz, three bunkers [40], 20 April 2004: obs. 1 ma + 2 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnel [41], 22 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Tepelene, over a river in old floodplain forest [42], 10 July 2011 (Sachanowicz et al. 2014); Tepelenë, branch of a river in riparian forest of old oriental planes and poplars, Vjosës river valley, 10 July 2011: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Shpella e Vanishtës [43], 12 October 1960: obs. a group, exam. 3 ma, 1 fs (Hanak et al. 1961); Höhle bei Vanischta, 12 October 1960: obs. a colony (Hůrka 1962); Shpella e Vanishtës, 12 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Dorfe Vanista, 12 October 1960: 2 ma, 1 fs (Hanák 1964); Vanista (Gjirokaster), 3 m, 1 f, [NMP] (Benda & Horáček 1995); Vanishter, cave, April 1995: net. 9 inds. (Uhrin 1995); Vanishter cave, 23 April 1995: net. 1 m, 8 f (Uhrin et al. 1996); Vanista, Gjirokastra, cave, 12 October 1960: 3 m, 1 f, NMP (Benda et al. 2006); Vanister, cave, 27 September 2012: exam. 37 inds. (Scheffler et al. 2013); Vanister cave, the cave entrance, 22 April 2004: net. 3 fa; in the cave, 16 September 2012: obs. 1 ind. (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Lavdar, bunker [44], 13 August 2006: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Mikroprespanská j. [= Treni cave] [19], April 1995: net. 5 inds. (Uhrin 1995); Micro Prespa cave, 21 April 1995: net. 2 m, 3 f (Uhrin et al. 1996); Treni cave, autumn 2008: obs. 1 ind., October 2010: obs. a number of inds. roosting, net. 4 ma, 2 fa (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. 32 inds. (Scheffler et al. 2013); Micro Prespa cave, entrance of the cave, 10 August 2006: net. 11 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel [20], 14 August 2006: obs. 1 ind.; the tunnel entrance, 14 August 2006: net. 1 ma (Sachanowicz & Ciechanowski

2018). – K u k ë s: Zogaj, entrance of an abandoned mine [45], 5 August 2007: net. 2 fj (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: [Bajzë], Shpella e Zef Toma [46], 7 June 2015: obs. 4 inds. (Théou & Đurović 2015a); – [Qafë Gradë], Shpella e Pellumbave [47], 6 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Vau i Dejës, entrance of a gallery in limestone wall [48], 22 April 2010: net. 5 ma (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Robit Mts., two military tunnels [49], 27 April 1995: obs. 2 ma torpid (Uhrin et al. 1996); – Shëngjergj, entrance of tunnel [50], 1 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Shpella e Zezä [= Pëllumbasi cave] [51], April 1995: net. 15 inds. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: net. 15 inds. (Uhrin et al. 1996). – V l o r ë: Fitore, two bunkers [52], 27 April 2004: obs. 2 inds. + 4 inds. (Sachanowicz & Ciechanowski 2018); – Halo, military tunnels [53], 27 April 2004 (Sachanowicz et al. 2014); Jermë, entrance of military tunnels in olive grove, 27 April 2004: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Kulluricë, military tunnels [54], 26 April 2004: obs. ca. 30 inds. in a colony mixed with *Myotis blythii*, 3 May 2010: obs. a colony of ca. 300 inds. mixed with *M. blythii* (exam. 1 ind.); entrance of military tunnels, 26 April 2004: net. 3 ma, 6 fa (Sachanowicz & Ciechanowski 2018); – Shalës, two adits [55], 26 April 2004: obs. 1 ind., 2 May 2010: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Shpella e Maçit [= Velça cave] [56], April 1995: obs. 6000 inds., net. 19 inds. (Uhrin 1995); Velca, Macit cave, 26 April 1995: obs. a large colony mixed with *Myotis blythii* of 5000–7000 inds., net. 19 inds. (Uhrin et al. 1996); Velçë cave, in the cave, 26 August 2006: obs. 1 ind.; small cave entrance, 26 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018).

Distribution. *Myotis myotis* belongs to rather common bats in Albania with 56 localities available from the country (Fig. 27, Table 1). The Albanian range is a part of the continuous and dense occurrence of this bat in the Balkans and the temperate zone of Europe as well (Dietz et al. 2016). The number of *M. myotis* records in Albania conforms to the situation in other countries of the Balkan Peninsula (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, Presetnik et al. 2009, 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). The occurrence of *M. myotis* covers all parts of Albania, the records are more or less equally distributed across all main lowland and mountainous parts of the country. The findings come from

Fig. 31. A mixed group of *Myotis myotis* and *M. capaccinii* hibernating in a bunker at the Viroi spring near Gerhot (Gjirokastër Pref.; Fig. 32), 27 January 2016. Photo by M. Uhrin.

Fig. 32. Entrance of a bunker at the Viroi spring near Gerhot (Gjirokastër Pref.); the bunker serves as a hibernaculum of *Myotis myotis* and *M. capaccinii*, and a summer roost of *Rhinolophus ferrumequinum*. Photo by M. Uhrin (January 2016).

a very wide altitude span (5–1,554 m a. s. l.; Table 2); however, the small value of the altitude median (274.0 m; Fig. 8) indicates the preference for low situated areas of the country. Fifteen findings (16.7%) of *M. myotis* in Albania were made in the twentieth century (1959–1995), all other records come from the period 2004–2019.

Field notes. Besides 56 identified records of *Myotis myotis* from Albania, there are 41 further findings from 37 sites, identified only roughly as of a large species of the genus *Myotis* or as *M. myotis* s.l., in fact representing one of the pair of sibling species – *M. myotis* or *M. blythii* – or a mixture of both in the cases of group findings (see below). However, none of these specifically unaffiliated records are considered in this review.

The confirmed findings of *M. myotis* in Albania are available from all seasons (Fig. 9), although only 3.3% of the particular records come from the hibernation period. Almost two thirds of the particular records of this bat in Albania (63.3%) were made in roosts (76.8% of the sites), only a very small proportion of the records (7.7% of the particular records, 12.5% of the sites) is related to the bats recorded on their foraging grounds. The highest concentration of particular records in a short period (40.0%) was registered during three weeks of the early spring, between 20 April and 13 May (incl.), another rather high concentration of records of this bat (23.3%) was made in four weeks of autumn between 14 September and 12 October (incl.; Fig. 9).

Hibernation of *M. myotis* was documented at three sites in the country, within one week of January (own data); no data on hibernation are available from other parts of the hibernation sea-

son between November and early March (Fig. 9). One hibernaculum was in a natural cave (Treni cave; Fig. 61), two were in artificial spaces (bunker at the Viroi spring in Gerhot, bunker/gallery at Tranoshisht). These roosts were situated at low and medium altitudes, in the range of 172–866 m a. s. l. (mean 528.3 m). No wintering colony of *M. myotis* was documented, while once a single individual, once a pair and once a group of three bats were found.

The non-hibernation roosts of *M. myotis* were found in 42 localities (75.0% of the sites), although two of them served also as hibernacula during the winter season. Majority of the roosts (78.6%) were artificial spaces, mostly abandoned underground military facilities (tunnels, bunkers), in three cases also various dark and semi-dark parts of old castles (corridors, cisterns), additionally also a church and a school building. Although in caves *M. myotis* was recorded less frequently than in artificial shelters, it formed large aggregations relatively more frequently in caves than in artificial shelters. Aggregations were found in five caves, representing almost a half (44.4%) of the cave records, while only in four artificial spaces (two bunkers, two castles), which make up 12.1% of the records in this roost type. Only two reports providing details on the size of the cave aggregation are available, Hanak et al. (1961) observed a colony of some 100 bats (most probably mixed with *Miniopterus schreibersii*) in a cave near Fush-Krujës on 16 October and Uhrin et al. (1996) a colony of some 5,000–7,000 individuals of *M. myotis* and *M. blythii* in the Velça cave on 26 April. In the artificial roosts, aggregations of 30–7,000 individuals were observed (mean 1,042 bats). The largest aggregation in an artificial roost, estimated at 5,000–7,000 bats, was observed in dark corridors of the Gjirokastër castle on 11 July (Sachanowicz & Ciechanowski 2018); other groups found in the artificial shelters did not exceed 1,200 bats. All these colonies of *M. myotis* were mixed with other bat species, twice with *M. blythii*, once with *Myotis capaccinii* and *Miniopterus schreibersii* and once with *Myotis blythii*, *M. capaccinii*, and *Miniopterus schreibersii*. Hence, a pure aggregation of *M. myotis* without admixture of other species was not observed in Albania. The underground artificial roost spaces (other than in aboveground buildings, n=31) were

Fig. 33. Entrances to a series of bunkers at Leshnjë (Korçë Pref.); the bunkers serve as summer roosts of *Myotis myotis*, *M. blythii*, *Hypsugo savii*, and *Pipistrellus pipistrellus*. Photo by M. Uhrin (June 2016).

Fig. 34. One of large corridors of a bunker in Shkodër, a roost of a large mixed maternity colony of *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii* (Shkodër Pref.; Fig. 35), 13 May 2016. Photo by P. Tájek.

situated in the altitudinal range of 12–1,237 m a. s. l.; however, the artificial shelters in lowlands were apparently preferred, as shown by the very low value of altitude median, 212.0 m (mean 371.2 m). On the other hand, although the cave roosts (n=9) were situated in a similar range of altitudes, 30–1,125 m a. s. l., the altitude median of these localities (395.0 m) shows a preference for medium altitudes (Table 5).

No maternity aggregations of *M. myotis* were observed and/or reported from Albania. On the other hand, five of the above mentioned aggregations could theoretically represent maternity colonies (Gjirokastër castle, Korita cave, Kulluricë bunker, Shkodër bunker, Velça cave), considering their sizes and dates of finding (23 April – 11 July; Hanak et al. 1961, Uhrin et al. 1996, Sachanowicz & Ciechanowski 2018, own data). Vertical distribution of these presumed maternity roosts was in the range of 17–1,368 m a. s. l. (n=5), with the altitude median of 360.0 m, mean 450.6 m.

Direct temporal evidence of reproduction of *M. myotis* in Albania was documented several times (Hanak et al. 1961, Hanák 1964, Sachanowicz & Ciechanowski 2018, own data); lactating females were netted on three occasions, 27 and 29 June, and 4 July, juveniles of the year were documented on 10 July, 5, 18, 22, and 26 August, 14 and 25 September, and 11, 12, and 16 October, while pregnant females were not examined/reported.

At the entrances to or inside 17 underground spaces (twelve artificial vs. four natural ones), individuals of *M. myotis* were netted on 25 occasions in the period between late April and October

(incl.); in seven of these spaces large groups of this bat were found to roost. Altogether 191 individuals were caught at these sites, the sex ratio was equally balanced (39 ♂♂ : 39 ♀♀) in the total catch.

Foraging individuals of *M. myotis* were documented at seven sites, one bat was netted at each site, five males and two females in total (Sachanowicz & Ciechanowski 2018, own data). The bats were recorded most frequently in habitats containing water bodies, in valleys with streams, in riparian vegetation and at a watering place (85.7% of the foraging records); once this bat was caught in a farmland. The foraging grounds of *M. myotis* were distributed across a large altitude range of 133–1,368 m a. s. l.; however, the altitude statistics (median 437.0 m, mean 385.2 m) indicate a preference for rather medium altitudes by foraging *M. myotis* in Albania, similarly as the preference for natural roosts.

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Ischnopsyllus simplex* complex: 1 fa (CMŠ [P]) from 1 fa (NMP 96538), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – *Nycteridopsylla trigona balcanica*: 1 ma (CMŠ [P]) from 1 fa (NMP 96538), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – N y c t e r i b i i d a e: *Nycteribia vexata*: 1 ma, 1 fa (CMŠ [A]) from 1 fa (NMP 96583), Berat, castle (Berat Pref.), 4 July 2016, leg. F. Bego, P. Benda & M. Uhrin; 3 ma, 3 fa (CMŠ [A]) from 1 fa (NMP 96552), Roshajn (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin. – *Penicillidia dufourii*: 2 ma (CMŠ [A]) from 1 fa (NMP 96583), Berat, castle (Berat Pref.), 4 July 2016, leg. F. Bego, P. Benda & M. Uhrin; 1 ma, 2 fa (CMŠ [A]) from 1 fa (NMP 96538), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; 1 ma (CMŠ [A]) from 1 ma (NMP 96602), Golaj (Kukës Pref.), 29 June 2018, leg. P. Benda. – S p i n t u r n i c i d a e: *Spinturnix myoti*: 4 ma, 2 deutonymphs m, 1 deutonymph f, 1 protonymph (CMŠ [P]) from 1 fa (NMP 96583), Berat,

Fig. 35. A mixed cluster of *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii*, a part of a mixed maternity colony of these species roosting in a larger bunker in Shkodër (Shkodër Pref.; Fig. 34), 13 May 2016. Photo by P. Tájek.

castle (Berat Pref.), 4 July 2016, leg. F. Bego, P. Benda & M. Uhrin; 1 ma (CMŠ [A]) from 1 fa (NMP 96552), Roshanj (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin. – **Published data**: S t r e b l i d a e: *Brychytarsina flavipennis*: 1 ma, 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]); 1 ma, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 ma, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 3 ma, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 6 inds., Treni's cave and/or the cave near Vanister, 24–25 September and/or 27 September 2012 (Scheffler et al. 2013). – *Nycteribia latreillii*: 12 ma, 6 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962 [as *N. latreillei*], 1963a); 2 ma, 2 fa, Shpella e Fush Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962 [as *N. latreillei*], 1963a); 1 ma, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962 [as *N. latreillei*], 1963a); 1 ind., Treni's Cave, Citadel of Gjirokäster or the cave near Vanister, 24–27 September 2012 (Scheffler et al. 2013). – *Nycteribia schmidlii*: 2 fa, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]). – *Nycteribia vexata*: 5 ma, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 12 inds., Treni's cave and/or the cave near Vanister, 24–25 September and/ or 27 September 2012 (Scheffler et al. 2013). – *Phthiridium biarticulatum*: 1 ma, 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]). – *Penicillidia dufourii*: 6 ma, 4 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 2 ma, 2 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 1 ma, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 123 inds., Treni's Cave, Citadel of Gjirokäster and/or the cave near Vanister, 24–27 September 2012 (Scheffler et al. 2013); [unspecified number, sex and stage], Fushë Studë, 29 July 2015 & 1 August 2015 (Boshamer 2016). – *Penicillidia conspicua*: 1 fa, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – S p i n t u r n i c i d a e: *Spinturnix myoti*: 135 inds., Treni's Cave, Citadel of Gjirokäster and/or the cave near Vanister, 24–27 September 2012 (Scheffler et al. 2013); 1 ma, 5 fa, 1 nymph, Halo, 27 April 2004; 2 fa, Suç, 25 September 2005 (Sachanowicz et al. 2014); 1 ma, 3 fa, 1 nymph, Tepelene, 10 July 2011 (Sachanowicz et al. 2014); [unspecified number, sex and stage], Fushë Studë, 29 July 2015 (Boshamer 2016); 13 inds., [details unlisted] (Sachanowicz et al. 2017). – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 1 ind., Treni's Cave or Citadel of Gjirokäster, 24–26 September 2012 (Scheffler et al. 2013 [as *Ichronychus scutatus*]). – S a r c o p t i d a e: *Nycteridocoptes poppei*: 2 inds., Treni's Cave, 24–25 September 2012 (Scheffler et al. 2013).

Comments on ectoparasites. In total, 13 arthropod parasite species were collected from *Myotis myotis* in Albania. It is the largest diversity of parasites documented from any bat species in the country.

Two bat flea taxa were found in one individual of this bat collected from a hibernaculum, *Nycteridopsylla trigona balcanica* Hůrka, 1965 and an unidentified female of the *Ischnopsyllus simplex* complex. Both forms were found in Albania for the first time. The subspecies *N. t. balcanica* was previously recorded only in Serbia and Bulgaria, parasitising *Eptesicus serotinus*, *Pipistrellus pipistrellus*, and *Plecotus austriacus* (Hůrka 1965). The record from *M. myotis* thus represents an evidence of a new host species for this flea; in Albania it was collected also from *E. serotinus* (own data; see below for details on morphology). The bat flea of the *Ischnopsyllus simplex* complex is not identified to the species level, since the undoubted identification of a female is a complicated task (see Hůrka 1976a, Benda et al. 2016c). Despite the fact that from Albania the only collected identified species is *I. simplex* s.str. (from *Myotis davidii*, see below), a possibility of *I. mysticus* Jordan, 1942 still remains (see Hůrka 1976a) and thus, we keep the exact species identification open.

The bat fly *Brachytarsina flavipennis* Macquart, 1851 is a parasite of the cave-dwelling bats, the medium-sized *Rhinolophus* bats are its principal host group (Lanza 1999). From Albania, it was documented solely from this ecological group of bats, besides *Myotis myotis* also from *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis capaccinii*, and *Miniopterus schreibersii*; Hůrka 1962, 1963a; see above and below). The distribution range of this bat fly covers just the thermo-Mediterranean zone of the western Palaearctic, the records from Albania represent a part of its range limits in Europe (Hůrka 1962, 1984, Ivanova et al. 1995).

Seven species of the nycteribiid bat flies were collected from *M. myotis* in Albania, the largest diversity in any bat host in the country: *Nycteribia pedicularia* Latreille, 1805, *N. latreillii* (Le-

ach, 1817), *N. schmidlii* Schiner, 1853, *N. vexata* Westwood, 1835, *Phthiridium biarticulatum* Hermann, 1804, *Penicillidia dufourii* (Westwood, 1834), and *P. conspicua* Speiser, 1901. All collected species of bat flies belong to the group of parasites of the cave-dwelling bats and are common also in *M. myotis* (Hůrka 1964, Szentiványi et al. 2016b). Of these seven species, the *Myotis myotis* complex is the principal host group only of three bat flies, *N. latreillii*, *N. vexata*, and *P. dufourii* (Hůrka 1962, 1984, Lanza 1999). In Albania, *N. latreillii* was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis blythii*, and *M. capaccinii* (Hůrka 1962, 1963a, own data; see above and below). The distribution range of this parasite covers the Mediterranean and Central Asian range of the host bat complex (Hůrka 1964, 1969). *N. vexata* was collected also from *Myotis blythii*, *M. emarginatus*, *M. capaccinii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, and *Tadarida teniotis* in Albania (Hůrka 1962, 1963a, own data; see below). The nominotypical form of this species is distributed over the continental part of Europe and in the African and Asian parts of the Mediterranean Basin (Hůrka 1964). *P. dufourii* was collected also from *Rhinolophus ferrumequinum*, *Myotis blythii*, *M. daubentonii*, *M. capaccinii*, and *Miniopterus schreibersii* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, Boshamer 2016, Szentiványi et al. 2018, own data; see above and below). The nominotypical western subspecies of *P. dufourii* occurs in the Mediterranean and in Central Asia eastwards to eastern Kazakhstan and the western Himalayas (Hůrka 1969, Medvedev & Polkanov 1997). The principal host of *N. pedicularia* is *Myotis capaccinii*, but it is frequently documented also on other cave bats and in Albania it was collected from a wide range of hosts, besides *M. myotis* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis blythii*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). This bat fly is a Mediterranean species, occurring in the southern part of Europe, in the Maghreb and Middle East (Hůrka 1984). Two bat flies, *N. schmidlii* and *P. conspicua* are principally parasites of the *Miniopterus* bats and their distribution ranges conform to the distribution of this bat genus in the western Palaearctic (Hůrka 1964). In Albania, the former bat fly was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis blythii*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). *P. conspicua* was documented also from *Rhinolophus ferrumequinum* and *Miniopterus schreibersii* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018; see above and below). *P. biarticulatum* is a parasite preferring bats of the genus *Rhinolophus*, although it was documented also from other cave-dwelling bats (Hůrka 1962, 1964); from Albania it was documented to parasitise also *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis blythii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The distribution range of *P. biarticulatum* in the Palaearctic conforms to the range of the principal host genus (Aellen 1959, Hůrka 1964, 1976b).

The obligatory oligoxenic mite *Spinturnix myoti* (Kolenati, 1856) is a parasite of bats of the genus *Myotis* (Deunff et al. 1977, 2004). From Albania, it was collected also from *Myotis blythii* and *M. nattereri* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see below), in other range parts its records are known also from *M. capaccinii* (Deunff et al. 2004). This mite has a wide distribution range stretching across the whole Palaearctic (Rudnick 1960, Dusbábek 1962, Uchikawa & Wada 1979, Stanyukovich 1997).

Dusbábek (1972) considered the macronyssid mite *Ichoronyssus scutatus* (Kolenati, 1856) to be a monoxenic parasite specialised on *M. myotis* and more recent views (Stanyukovich 1997, Orlova et al. 2015) suggested its exclusive preference for *Miniopterus schreibersii*. However, it is most probably a polyxenic mite parasitising bats of the genera *Myotis*, *Vespertilio*, *Rhinolophus*, and *Miniopterus* (Beron 1969, Radovsky 1967). It is a species distributed across the Old World, including Europe, Africa, Middle East, and Japan (Radovsky 1967, Stanyukovich 1997).

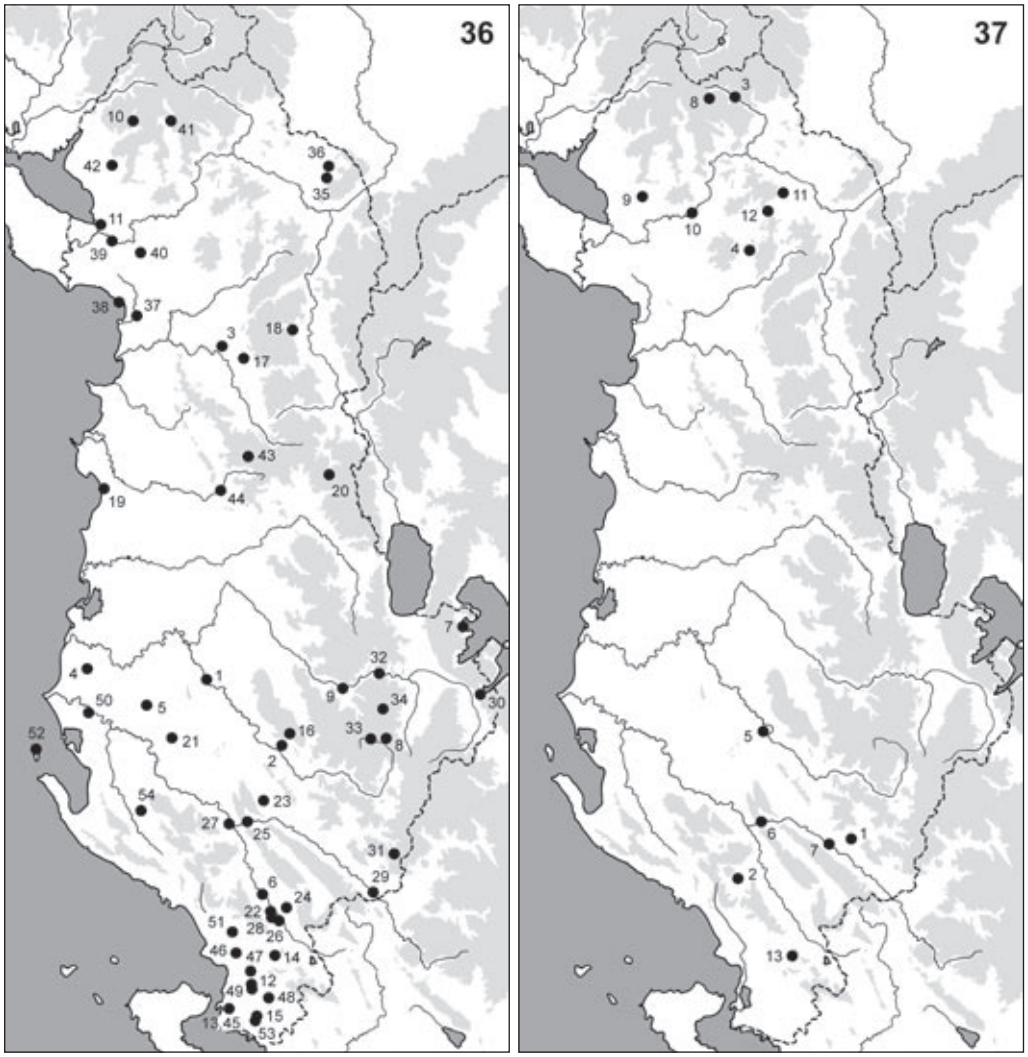
In Albania it was documented additionally from *Myotis blythii*, *M. emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii* (Scheffler et al. 2013, own data; see below).

The psoric mite *Nycteridocoptes poppei* Oudemans, 1897 was reported from Albania only once, two individuals were collected from *M. myotis* (Scheffler et al. 2013). Although only this limited number of specimens was documented, the parasite usually attacks bats invasively when a large number of females injur the skin tissue of ears or wing membranes (Fain & Aellen 1961, Lukoschus 1962). This mite parasitises many vespertilionid bat species throughout Europe, but mainly *Myotis myotis* and *M. daubentonii* (Fain & Aellen 1961, Lukoschus 1962, Dusbábek 1963, Beron 1970, Klompen 1992).

Myotis blythii (Tomes, 1857)

Records. **Original data**: B e r a t: Berat, castle [1], at a cistern (Fig. 114), 4 July 2016: net. 1 mj; in the cistern, 21 September 2018: obs. a colony of ca. 70 inds. (mixed with a colony of *M. myotis*); – Çorovodë, Çorovoda river valley ca. 1 km east of the town [2], above the river, 22 September 2018: net. 1 ma. – D i b ë r: Urakë, above the Tarini river [3] (Fig. 116), 2 July 2018: net. 1 mj; – F i e r: Dërmënas, bunker [4], 3 July 2016: obs. 1 ind.; – Visokë, Gjanica river valley [5] (Fig. 43), above the river, 3 July 2016: net. 1 ma, obs. 2 inds. emerging from a bridge fissure. – G j i r o k a s t ë r: Gjirokastër, castle [6] (Figs. 39, 40), 2 July 2015: obs. a maternity colony of ca. 2500 inds. (ad.+juv.) + 12 solitary inds. in displey (exam. 2 ma), 3 May 2016: obs. a torpid colony of ca. 1000 inds. in one cluster + ca. 50 inds. separately in small clusters or solitarily (some clusters of mixed composition, with *Myotis capaccinii* and/or *Miniopterus schreibersii*), 1 July 2016: obs. a colony of ca. 2000 inds.; – K o r ç ë: Goricë e Vogël, Zaveri cave [7], 28 June 2016: obs. 2 inds. in the ceiling fissures; – Leshnjë, five bunkers [8] (Fig. 33), cellar fissures, 27 June 2016: obs. 18 inds. torpid; – Nikollarë, Devolli river valley [9], above the river, 26 June 2016: net. 1 ma. – S h k o d ë r: Grykë Lugje, above a watering place [10] (Fig. 74), 17 September 2018: net. 2 ma; – Shkodër, Rozafa castle [11] (Fig. 111), fissure in ceiling vault of a corridor, 10 July 2016: obs. 1 ind. active. – V l o r ë: Jermë, bunkers [12] (Fig. 25), 1 July 2016: obs. a colony of ca. 500 inds. (exam. 1 ma, 2 mj); – Kështjella Trekëndore, ruined Venetian castle [13] (Fig. 42), fissure between vault stones, 3 July 2015: obs. (& exam.) 1 ma; – Krongj, Vris stream valley [14] (Fig. 50), above the stream, 3 July 2015: net. 2 ms, 6 faL; – Shalës, Pavllo river valley [15], above the river, 4 July 2015: net. 1 faL. – **Published data***: B e r a t: Shpella e Koritës [16], 9 June 1961: obs. a colony (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a colony (Hanák 1964). – D i b ë r: Barbullej [17], over a river, 30 June 2011 (Sachanowicz et al. 2014); Barbullej, over a river, 30 June 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018); – Sopanik Cave [18] (Dundarova 2016). – D u r r ë s: Shkëmbi e Kavajës [19], gallery, 28 April 1961: exam. 2 ma (Hanak et al. 1961). – E l b a s a n: Fushë Studë, bunkers [20], 28 July – 7 August 2015: obs. roosting inds., net. 3 m (van der Tempel 2016). – F i e r: Damës, under a bridge over the Povlës river [21], 18 April 2004: net. 1 ma (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Gjirokaster, old castle [6], cellar, 31 May 1991: 1 m (Chytil & Vlašín 1994); Gjirocaster castle, dark corridors, 23 April 1995: [obs. a colony mixed with *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii* of 800 inds.], net. 5 f (Uhrin et al. 1996); Gjirokastër, citadel, 26 September 2012: net. 1 ind. (Scheffler et al. 2013); Gjirokastër, castle undergrounds, 21 April 2004: obs. 6 inds. & obs. 858 inds. mainly torpid, 11 July 2011: obs. 10 inds. & obs. a colony of 5000–7000 inds. mixed with *Myotis myotis* and two other species (Sachanowicz & Ciechanowski 2018); – Goranxi, tunnel entrance [22], 21 April 2004: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Goricë, Dishnicës river [23], 18 August 2006: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Libohovë, four bunkers [24], 23 April 2004: obs. 2 inds. + 2 inds. + 3 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Shpella e Mezhgoranit [25], 11 October 1960: obs. a colony, exam. 3 ms, 1 fa, 8 fs (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 6 m, 9 f (Hanák 1964); Mezhgoranit cave (Tepelene), 2 m, 5 f [NMP] (Benda & Horáček 1995); Shpella e Mezhgorani, April 1995: net. 2 inds. (Uhrin 1995); Mezhgoranit cave near Tepelene, 22 April 1995: net. 2 f (Uhrin et al. 1996); Tepelene, Mezhgoranit Cave, 11 October 1960: 1 m, 5 f, NMP (Benda et al. 2006); Mezhgoran, entrance of the Mezhgoran cave, 22 August 2006: net. 3 ma, 2 fa, 1 fj (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnel [26], 22 April 2004: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Tepelene, over a river in an old floodplain forest [27], 10 July 2011 (Sachanowicz et al. 2014); Tepelenë, Vjosës river tributary, floodplain forest, 23 August 2006: net. 1 fj, 10 July 2011: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Vanishter, cave [28], April 1995: net. 8 inds. (Uhrin 1995); Vanishter cave, 23 April 1995: net. 5 m, 5 f (Uhrin et al. 1996); Vanister, cave, 27 September 2012: exam. 16 inds. (Scheffler et al. 2013); Vanister cave, cave entrance, 22 April 2004 and 16 September 2012 (Sachanowicz

* some of the data were published under the name *Myotis oxygnathus* (Monticelli, 1885), here considered a name of the European subspecies of *M. blythii* (sensu e.g. Topál & Ruedi 2001, Ruedi, in press).



Figs. 36, 37. Records of particular bat species in Albania. 36 – *Myotis blythii* (Tomes, 1857). 37 – *Myotis bechsteinii* (Kuhl, 1817).

et al. 2014); Vanistër cave, the cave entrance, 22 April 2004: 3 ma, 15 fa, 16 September 2012: 4 ma (Sachanowicz & Ciechanowski 2018); – Vllaho-Psiloterë, dried tributary of the Vjosës river [29], 15 August 2006: net. 1 fj (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Micro Prespa cave [= Treni cave] [30], the cave entrance, 10 August 2006: net. 1 ma, 1 mj, 4 fa, 2 fj (Sachanowicz & Ciechanowski 2018); – Radanj, bunker [31], 15 August 2006: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Tresovë, two adits [32], 12 August 2006: obs. 1 ind. + 1 ind.; adit entrance, 12 August 2006: net. 1 ind. (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel [33], 14 August 2006: obs. 3 inds. (exam. 1 fa); the tunnel entrance, 14 August 2006: net. 9 ma, 1 mj, 4 fa (Sachanowicz & Ciechanowski 2018); – Voskopojë, old stony bridge over the Devoll river tributary [34], 13 August 2006: net. & obs. 5 ma emerging from the bridge crevices (Sachanowicz & Ciechanowski 2018). – K u k ë s: Krumë, bunker [35], 4 August 2007: obs. 4 inds.; bunker entrance, 4 August

2007: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Nikoliq, over a river [36], 4 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018). – L e z h ë: Lezhë, military tunnel [37], 24 April 2010: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – [Shëngjin], bunker [38], 8 June 2015: obs. 1 ind. (Théou & Đurović 2015a). – S h k o d ë r: Ashtë, four bunkers [39], 1 May 2004: obs. 1 ind. + 1 ind. + 2 inds. + 1 ind., 27 August 2006: obs. 3 inds. + 1 ind. + 4 inds. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Maraç, tunnel [40], 21 April 2010: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [41], mountain valley, 9 September 2012: net. 1 ma (Sachanowicz & Ciechanowski 2018); – [Qafë Gradë], Shpella e Pellumbave [42], 6 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Shkodër, Rozafa castle [11], underground corridors and small cellars, 23 April 2010: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shëngjergj, tunnel entrance [43], 1 July 2011: net. 6 ma (Sachanowicz & Ciechanowski 2018); – Shpella e Zezä [= Pëllumbasi cave] [44], April 1995: net. 5 inds. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: net. 5 f (Uhrin et al. 1996). – V l o r ë: Butrint, military tunnels at the hill top [45], 24 April 2004: obs. 1 ind. torpid, 6 May 2010: obs. 5 inds. torpid; tunnels entrance, 24 April 2004: net. 5 ma, 1 fa, 5 May 2010: net. 3 ma (Sachanowicz & Ciechanowski 2018); – Butrint, Ali Pasha fortress ruins [= Kështjella Trekëndore] [13], 26 April 2004: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Finiq, military tunnel [46], 5 May 2010: obs. 7 inds. (Sachanowicz & Ciechanowski 2018); – Fitore, bunker [47], 27 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Jermë, military tunnel in olive plantation [12], 17 September 2012: obs. 30 inds.; tunnels entrance, 27 April 2004: net. 1 ma, 3 May 2010: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Komat, bunker [48], 3 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Kulluricë, military tunnels [49], 26 April 2004: obs. 5 inds. in a colony of 65 inds. mixed with *Myotis myotis*; tunnels entrance, 26 April 2004: net. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Mifol, bunker [50], 30 April 2004: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Palavi, bunker [51], 5 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Sazan Island, school [52], open space, 10 August 2016: net. 1 ind. (Théou & Loce 2017); – Shalës, three adits [53], 26 April 2004: obs. 2 inds. torpid + 2 inds. + 6 inds. (Sachanowicz & Ciechanowski 2018); – Shpella e Maçit [= Velça cave] [54], April 1995: net. 3 inds. (Uhrin 1995); Velca, Macit cave, 26 April 1995: obs. a large mixed colony [with *Myotis myotis* of 5000–7000 inds.], net. 3 inds. (Uhrin et al. 1996); Velçë cave, small cave entrance, 26 August 2006: net. 1 mj, 1 fa, 1 fj; in the cave, 26 August 2006: obs. 1 ind. & a colony of ca. 750 inds., mainly *M. blythii* [mixed with *M. myotis*] (Sachanowicz & Ciechanowski 2018).

Distribution. *Myotis blythii* is a rather common bat in Albania, 54 localities are known in the country (Fig. 36, Table 1). The Albanian range is a part of the continuous and dense occurrence of this bat in the Balkans and the Mediterranean Basin as well (Dietz et al. 2016). The relatively high number of its records in Albania conforms to the situation in other countries of the Balkan Peninsula, including some islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). The occurrence of *M. blythii* covers all parts of Albania and although almost no records are available from high elevations (only 15.1% of sites lie above 1,000 m a. s. l.), most findings come from areas of medium altitudes adjacent to high mountain ranges (Fig. 36). The findings come from a wide altitude span (2–1,554 m a. s. l.; Table 2); however, the value of the altitude median (241.0 m), one of the lowest among the Albanian bats, clearly indicates the preference for rather lowland parts of the country (Fig. 8). Although *M. blythii* ranks among rather common bats of Albania, commonly met in various underground roosts, only 12.8% of the records were made in the twentieth century (1960–1995), all other records come from the period 2004–2018.

Field notes. Besides 54 identified records of *Myotis blythii* from Albania, there are 41 further findings from 37 sites, identified only roughly as of a large species of the genus *Myotis* or as *M. myotis* s.l., in fact representing one of the pair of sibling species – *M. myotis* or *M. blythii* – or a mixture of both in the cases of group findings (see below). However, none of these specifically unaffiliated records are considered in this review.

The confirmed findings of *M. blythii* in Albania were made between mid-April and mid-October, no records are available from the hibernation season (although some of the four records of the large species of *Myotis* reported by Théou et al. [2015b, see below] could in fact represent *M. blythii*). Majority of the records (54.1% of particular findings) were made in roosts and almost a third of the records (28.2%) were related to bats caught at roosts or at potential roosts; the smal-

lest portion of records (17.6%) are the findings of bats on their foraging grounds; however, the proportion of records of foraging *M. blythii* is more than twice higher than in *M. myotis* (7.9%, see above). The highest concentration of particular records of *M. blythii* (38.8% of all records) was registered during the period of less than three weeks in the spring, between 18 April and 6 May (incl.). Other dense records were registered in two weeks at the turn of June and July (21.2%) and three weeks of August (23.5%).

The roosts of *M. blythii* were found in 34 localities (64.2% of the sites); prevailing majority of the roosts (82.4%) were artificial spaces, mostly abandoned underground military facilities (tunnels, bunkers), in three cases also semi-dark parts of old castles (Gjirokastër, Kështjella Trekëndore, Rozafa), and twice crevices in the bodies of bridges over streams. Only six roost records were made in caves (17.6% of the particular roost records, 11.3% of all localities).

Although in caves *M. blythii* was recorded less frequently than in artificial shelters, in caves it formed large aggregations more frequently – 71.4% of cave records were related to colonies (although only in one cave, the size of the aggregations was reported [from two checks], viz. 5,000–7,000 and 750 bats, respectively). Aggregations in artificial roosts were present only in four cases (14.3% of the artificial roost sites and 23.1% of particular records in the artificial roosts); the size of these agregations was in the range of 65–6,000 bats (mean 1,446.1 bats per a check). The artificial roost spaces (other than castles, n=25) were situated in a very wide altitudinal range of 4–1,554 m a. s. l., however, rather the artificial shelters at low and medium altitudes were used,

Fig. 38. Part of a maternity colony of *Myotis blythii* roosting in a bunker at Jermë (Vlorë Pref.; Fig. 25), 1 July 2016. Photo by M. Uhrin.

Figs. 39, 40. The castle of Gjirokastër (Gjirokastër Pref.); vaulted under- and aboveground rooms of various size and in various parts of the castle serve as roosts of colonies of *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii*, sometimes very large, and of individuals of *Rhinolophus ferrumequinum R. hipposideros*, *Myotis capaccinii*, and *Miniopterus schreibersii.* Photo by Z. Bendová & P. Tájek.

as shown by the low value of altitude median, 197.0 m (mean 425.9 m). The cave roosts (n=6) were situated in a smaller range of altitudes, 243–1,125 m a. s. l., and the altitude median of these localities (479.5 m) shows a preference for medium altitudes (Table 5).

Maternity aggregations of *M. blythii* were documented at two sites in Albania (Sachanowicz & Ciechanowski 2018, own data), both in artificial roosts (Gjirokastër castle, Jermë bunker). At four other sites these colonies could be expected considering the data reported (Berat castle, Mezhgorani cave, Korita cave, Treni cave, Velça cave). The colony roosting in the Jermë bunker (Fig. 25) was observed just once and contained some 500 bats, while in the Gjirokastër castle (Figs. 39–41), the colony was much larger (800–7,000 bats, five checks between late April and early July), but mixed with one to three other bat species, *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii*. Vertical distribution of the maternity roosts including those of the potential maternity aggregations was in the range of 58–1,125 m a. s. l. (n=7), with the altitude median of 360.0 m and mean of 473.0 m.

Direct temporal evidence of reproduction of *M. blythii* in Albania was documented several times (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018, own data); lactating females were netted on 30 June, 3 and 4 July, juveniles of the year were documented on 1, 2, 4, and 10 July, 4, 10, 14, 15, 18, 22, 23, and 26 August, and 11 October, while pregnant females were not examined/reported.

Four aggregations of *M. blythii* were observed also outside the reproduction season, in late summer and in autumn, between late August and mid-October (Hanak et al. 1961, Sachanowicz & Ciechanowski 2018). Where they occupied the same roost also in the reproduction period, the non-reproductive colony was smaller than at the time of existence of maternity colonies, mostly several tens or hundreds of bats (30–750 individuals, mean 283.3 bats). Moreover, two of these colonies were of mixed composition, *Myotis blythii* with *M. myotis*.

Fig. 41. A colony of about one thousand *Myotis blythii* roosting in a dark vaulted room of the castle of Gjirokastër (Fig. 40; Gjirokastër Pref.), 3 May 2016. Photo by P. Tájek.

Fig. 42. Ruined Venetian castle of Kështjella Trekëndore (Vlorë Pref.); in the rooms of the castle, roosting individuals of *Rhinolophus ferrumequinum*, *Myotis blythii*, and *M. capaccinii* were discovered. Photo by M. Uhrin (July 2015).

At the entrances to or inside 16 underground spaces (eleven artificial vs. five natural ones), individuals of *M. blythii* were netted in the period between April and September (incl.); at least in seven of these spaces (43.8%) colonies of this bat were documented to roost. Altogether 108 individuals were caught at these sites, the sex ratio was almost equally balanced (49 ♂♂ : 54 ♀♀) in the total catch.

Foraging individuals of *M. blythii* were documented at 15 sites (Théou & Loce 2017, Sachanowicz & Ciechanowski 2018, own data), where 24 bats were netted in total; again, the sex ratio was almost equally balanced (12 ♂♂ : 11 ♀♀) in the total catch. The foraging bats were netted mainly above water bodies (93.8% of all foraging records), most often above streams in valleys, exceptionally above small lakes. The only exception represents anthropogenic habitats on the island of Sazani (Théou & Loce 2017). The foraging habitats of *M. blythii* were distributed across the altitude range of 15–847 m a. s. l., with the altitude median of 258.0 m and mean of 293.3 m. These values indicate the preferred use of low altitudes for foraging in Albania.

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia latreillii*: 1 ma (CMŠ [A]) from 1 fj (NMP 96606), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – *Nycteribia vexata*: 1 ma (CMŠ [A]) from 1 ma (NMP 96496), Gjirokastër (Gjirokastër Pref.), 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 2 ma (CMŠ [A]) from 1 ma (NMP 96548), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin; 1 ma (CMŠ [A]) from 1 ma (NMP 96582), Visokë (Fier Pref.), 3 July 2016, leg. P. Benda & M. Uhrin; 1 ma, 6 fa (CMŠ [A]) from 1 fj (NMP 96606), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – S p i n t u r n i c i d a e: *Spinturnix myoti*: 4 ma, 3 fa, 1 deutonymph m (CMŠ [P]) from 2 ma (NMP 96495, 96496), Gjirokastër (Gjirokastër Pref.), 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 1 ma (CMŠ [A]) from 1 ma (NMP 96561), Jermë (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin; 5 ma (CMŠ [A]) from 2 fa (NMP 96499, 96500), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 3 ma, 1 fa (CMŠ [A]) from 1 fa (NMP 96507), Shalës (Vlorë Pref.), 4 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 4 ma, 1 fa, 1 deutonymph m, 1 deutonymph f, 1 protonymph (CMŠ [A, P]) from 1 fj (NMP 96606), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 1 ma, 1 fa (CMŠ [P]) from 1 fj, Goricë (Gjirokastër Pref.), 18 August 2006, leg. M. Ciechanowski, A. Rachwald & K. Sachanowicz;

2 fa (CMŠ [P]) from 1 ma (NMP 96506), Kështjella Trekëndore (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – *Macronyssus granulosus*: 1 fa, 1 protonymph (CMŠ [P]) from 2 ma (NMP 96495, 96496), Gjirokastër (Gjirokastër Pref.), 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 1 protonymph (CMŠ [P]) from 1 ma (NMP 96548), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin; 6 protonymphs (CMŠ [P]) from 1 fj (NMP 96606), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – *Steatonyssus periblepharus*: 4 protonymphs (CMŠ [P]) from 1 ma (NMP 96548), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin. – **Published data**: N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 ma, 2 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – *Nycteribia latreillii*: 13 ma, 7 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – *Nycteribia schmidlii*: 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]). – *Nycteribia vexata*: 3 ma, 2 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960 (Hůrka 1962, 1963a); 2 inds., cave near Vanister, 27 September 2012 (Scheffler et al. 2013). – *Phthiridium biarticulatum*: 2 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]). – *Penicillidia dufourii*: 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 7 inds., Citadel of Gjirokäster and/or the cave near Vanister, 26–27 September 2012 (Scheffler et al. 2013); [unspecified number, sex and stage], Fushë Studë, 30 July 2015 (Boshamer 2016). – S p i n t u r n i c i d a e: *Spinturnix myoti*: 10 inds., Citadel of Gjirokäster and/or the cave near Vanister, 26–27 September 2012 (Scheffler et al. 2013); 1 fa, Vanister, 22 April 2004, 1 fa, Vanister, 16 September 2012 (Sachanowicz et al. 2014); 1 ma, 6 nymphs, Barbullej, 30 June 2011 (Sachanowicz et al. 2014); 1 ma, 1 fa, 3 nymphs, Tepelene, 10 July 2011 (Sachanowicz et al. 2014); 4 inds., [details unlisted] (Sachanowicz et al. 2017). – M a c r o n y s s i d a e: *Macronyssus* sp.: [unspecified number, sex and stage], Fushë Studë, 2 August 2015 (Boshamer 2016).

Comments on ectoparasites. In total, at least ten arthropod parasite species were collected from *Myotis blythii* in Albania, one parasite species is here reported from Albania for the first time.

Six species of the nycteribiid bat flies were collected from *M. blythii* in Albania: *Nycteribia pedicularia* Latreille, 1805, *N. latreillii* (Leach, 1817), *N. schmidlii* Schiner, 1853, *N. vexata*

Fig. 43. Gjanica river valley near Visokë (Fier Pref.); foraging habitats of *Myotis blythii*, *Hypsugo savii*, and *Pipistrellus kuhlii*; from a fissure between concrete girders of the bridge in the background, two emerging individuals of *M. blythii* were observed. Photo by Z. Bendová (July 2016).

Westwood, 1835, *Phthiridium biarticulatum* Hermann, 1804, and *Penicillidia dufourii* (Westwood, 1834). All collected species of bat flies belong to the group of parasites of the cave-dwelling bats and are common also in *M. blythii* (Hůrka 1964, Szentiványi et al. 2016b). Of these six species, the *Myotis myotis* complex (including *M. blythii*) is the principal host group only of three bat flies, *N. latreillii*, *N. vexata*, and *P. dufourii* (Hůrka 1962, 1984, Lanza 1999). In Albania, *N. latreillii* was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, and *M. capaccinii* (Hůrka 1962, 1963a, Scheffler et al. 2013; see above and below). The distribution range of this parasite covers the Mediterranean and Central Asian range of the host bat complex (Hůrka 1964, 1969). *N. vexata* was collected also from *Myotis myotis*, *M. emarginatus*, *M. capaccinii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, and *Tadarida teniotis* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The nominotypical form of this species is distributed over the continental part of Europe and in the African and Asian parts of the Mediterranean Basin (Hůrka 1964). *P. dufourii* was collected also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. daubentonii*, *M. capaccinii*, and *M. schreibersii* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, Boshamer 2016, Szentiványi et al. 2018, own data; see above and below). This western (nominotypical) subspecies of *P. dufourii* occurs in the Mediterranean and in Central Asia eastwards to eastern Kazakhstan and western Himalayas (Hůrka 1969, Medvedev & Polkanov 1997). *N. schmidlii* is a principal parasite of the *Miniopterus* bats and its distribution range conforms to the distribution of this bat genus in the western Palaearctic (Hůrka 1964). In Albania, this bat fly was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). The principal host of *N. pedicularia* is *Myotis capaccinii*, but it is frequently documented also on other cave bats and in Albania it was collected from a wide range of hosts, besides *M. myotis* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis myotis*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). This bat fly is a Mediterranean species, occurring in the southern part of Europe, in the Maghreb and Middle East (Hůrka 1984). *P. biarticulatum* is a parasite preferring bats of the genus *Rhinolophus*, although it was documented also from other cave-dwelling bats (Hůrka 1962, 1964); from Albania it was documented to parasitise also *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The distribution range of *P. biarticulatum* in the Palaearctic conforms to the range of the principal host genus (Aellen 1959, Hůrka 1964, 1976b).

The obligatory oligoxenic mite *Spinturnix myoti* (Kolenati, 1856) is a parasite of bats of the genus *Myotis* (Deunff et al. 1977, 2004). From Albania, it was collected also from *Myotis myotis* and *M. nattereri* (Scheffler et al. 2013, Sachanowicz et al. 2014, Boshamer 2016, own data; see above and below). This mite has a wide distribution range stretching across the whole Palaearctic (Rudnick 1960, Dusbábek 1962, Uchikawa & Wada 1979, Stanyukovich 1997).

Three macronyssid mite species, *Ichoronyssus scutatus* (Kolenati, 1856), *Macronyssus granulosus* (Kolenati, 1856), and *Steatonyssus periblepharus* Kolenati, 1858, were documented from *M. blythii* in Albania; the latter two mites for the first time in the country. *I. scutatus* is considered by some authors to be a monoxenic parasite feeding exclusively on *Myotis myotis* or *Miniopterus schreibersii* (Dusbábek 1972, Stanyukovich 1997, Orlova et al. 2015). However, it is most probably a polyxenic mite parasitising regularly bats of the genera *Myotis*, *Vespertilio*, *Rhinolophus*, and *Miniopterus* (Beron 1969, Radovsky 1967). It is a species distributed across the Old World, including Europe, Africa, Middle East, and Japan (Radovsky 1967, Stanyukovich 1997). In Albania it was documented additionally from *Myotis myotis*, *M. emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii* (Scheffler et al. 2013, own data; see below). *M. granulosus* is one of the

geographically most widespread macronyssid mites, its records come from a large part of the Old World (Radovsky 1967). It is a polyxenic species, parasitising different cave-dwelling bats; in Europe and the Middle East it was collected from a variety of hosts, e.g. *Rousettus aegyptiacus*, *Rhinolophus euryale*, *Myotis myotis*, *M. blythii*, *M. daubentonii*, *Nyctalus leisleri*, *Barbastella barbastellus*, or *Miniopterus schreibersii* (Kolenati 1856, Radovsky 1967, Pinčuk 1971, Beron 1971). Our numerous collections of the protonymph stages in early July (similarly also in *M. emarginatus*) correspond with the observation by Estrada-Peña & Serra-Cobo (1991) who found an increment of these stages in *Miniopterus schreibersii* in Spain "just before summer". From Albania this parasite was collected also from *Myotis emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii* (own data; see above and below). Boshamer (2016) reported a record of *Macronyssus* sp. from *M. blythii* in Albania in middle summer; the respective specimen/s probably belong also to *M. granulosus*, the only confirmed species of the genus from Albania. *S. periblepharus* is a typical parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999); despite this preference, it is a polyxenic species parasitising also other species of the Vespertilionidae and Rhinolophidae families across the whole Palaearctic (Till & Evans 1964, Teng 1980, Rybin et al. 1989, Stanyukovich 1997, Lanza 1999). Besides *M. blythii* it was collected also from *Myotis davidii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii* in Albania (own data; see below).

Myotis myotis and/or *M. blythii*

Records. **Original data**: E l b a s a n: Vehçan, abandoned railway tunnel (Fig. 19), 9 July 2015: obs. 1 ind. ad. – G j i r o k a s t ë r: Goranxi, bunker (Figs. 112, 113), in a wall hole, 3 May 2016: obs. 1 ind. torpid. – **Published data**: B e r a t: Berat, underground water cistern, 8 May 2010: obs. a colony of ca. 300 inds. mixed with *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018); – Çorovodë, Çorovodës river limestone gorge, 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – D i b ë r: Fushë-Muhurr, partially destroyed cave in working quarry, 23 September 2005: guano of a former large colony (Sachanowicz & Ciechanowski 2018); – Trepçë, bunker, 24 September 2005: obs. 2 inds. (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Nojë, gallery in limestone slope, 14 September 2012: obs. 5 inds. (Sachanowicz & Ciechanowski 2018); – Suç, military tunnel, 1 July 2011: obs. 3 inds. (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Gjirokastër, castle, July 2014: obs. 3500 inds. (Théou 2015); – Goranxi, tunnel, 21 April 2004: obs. 3 inds. torpid (Sachanowicz & Ciechanowski 2018); – Libohovë, over rubbish dump at a road, 16 September 2012: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnel, 22 April 2004: obs. 17 inds. (Sachanowicz & Ciechanowski 2018); – Vanister cave, in the cave, 22 April 2004: obs. 15 inds. torpid, 16 September 2012: obs. a colony mixed with *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Mirakë, three tunnels, 8 July 2011: obs. 1 ind. + 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Lajthizë, tunnel, 13 November 2014: obs. 1 ind. (Théou et al. 2015b); – Lavdar, three bunkers, 13 August 2006: obs. 1 ind. + 1 ind. + 1 ind. (Sachanowicz & Ciechanowski 2018); – Lin, bunker, 30 September 2005: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Mali Grad Island (Papadatou et al. 2011); – Treni cave (Papadatou et al. 2011); Micro Prespa cave, in the cave, 10 August 2006: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel, 14 August 2006: obs. 25 inds. (Sachanowicz & Ciechanowski 2018); – National Park of Prespa Lakes, one tunnel and three caves, 24 September 2012 – 23 April 2015: obs. numerous inds. (maximum 23 inds. in total per one check) (Theou et al. 2015a). – K u k ë s: Belje, Jezim cave, 13 December 2014: obs. 1 ind. (Théou et al. 2015b). – L e z h ë: Lezhë, military tunnel, 24 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Bajzë, Zef Toma cave, 29 January 2015: obs. 1 ind. (Théou et al. 2015b); Shpella e Zef Toma, 29 January 2015: obs. 1 ind. (Théou & Đurović 2015a); – Jubicë, bunker, 25 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – [Prekal], Shpella e Xhyla, 9 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – [Qafë Gradë], Shpella e Pellumbave, 6 June 2015: obs. 200 inds. (Théou & Đurović 2015a); – Renc, bunker and military tunnel, 26 June 2011: obs. 1 ind. + 5 inds. (Sachanowicz & Ciechanowski 2018); – Shkodër, Rozafa castle, underground corridors and small cellars, 23 April 2010: obs. 4 inds. torpid (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, gallery in limestone wall, 14 August 2003: obs. 1 ind. (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Zëze cave, in the cave, 3 July 2011: obs. a colony of ca. 900 inds. mixed with *Myotis capaccinii* and *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018). – V l o r ë: Jermë, military tunnel in olive plantation, 3 May 2010: obs. 10 inds. torpid (Sachanowicz & Ciechanowski 2018); – Shpella e Haxhi Alisë, cave, 29 September 2004: obs. 1 ind. (Théou & Loce 2017); – Kopaçez, bunker, 5 May 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Karaburun National

Park, Shpella Duk Gjonit, cave, 30 April 2016: obs. 1 ind. (Théou & Loce 2017); – Kulluricë, military tunnels, 3 May 2010: obs. a colony of ca. 300 inds. mixed with *Myotis myotis* (Sachanowicz & Ciechanowski 2018); – Velce, Velce cave, 6 December 2014: obs. 1 ind. (Théou et al. 2015b); Velçë cave, May 2014: ca. 3000 inds. (Théou 2015); Velçë cave, in the cave, 26 August 2006: obs. a colony of ca. 750 inds. (Sachanowicz & Ciechanowski 2018).

Myotis bechsteinii (Kuhl, 1817)

Records. **Original data**: G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [1] (Fig. 107), above the Lengarica river at thermal baths, 28 June 2019: net. 1 fa (leg. R. Lučan); at three entrances to bunkers, 29 June 2019: net. 2 faL, 1 fa (leg. R. Lučan); – Zhulat, Kardhiqi river valley [2] (Fig. 92), above the river, 5 July 2015: net. 1 ma. – K u k ë s: Dragobi, old beech forest in the Valbona river valley [3] (Fig. 44), 28 June 2018: net. 1 fa. – S h k o d ë r: Kimëz, above a river ca. 2 km west of the village [4] (Fig. 45), 27 June 2018: net. 1 faL. – **Published data**: B e r a t: Valë, Voskopojës river [5], 7 May 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Benjë, Lengarica river canyon [1], 19 July 2014: obs. 2 ma resting on rocks (Theou & Đurović 2015b); – Mezhgoran, Mezhgorani cave [6], 14 June 2014: obs. a cluster of 16 inds. (Theou & Đurović 2015b); – Përmet, cave [7], 4 June 2015 (Szentiványi et al. 2016a). – K u k ë s: Valbonë, stream in old beech-spruce mountain forest [8], 7 August 2007: net. 1 faL (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Drisht, mining adit in mountain slope [9], 14 August 2003: obs. 5 inds. (exam. 1 fs); adit entrance, 15 August 2003: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Koman, under a bridge over Drini i Bardhë river tributary [10], 12 August 2003: net. 1 ind. (Sachanowicz & Ciechanowski 2018); – Kulumri, concrete barrack [11], 19 September 2005: obs. 1 ind. resting on a swallow nest; barrack entrance, 19 September 2005: net. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, small pool in bed of a mountain stream [12], 10 August 2003: net. 1 ma (Sachanowicz & Ciechanowski 2018). – V l o r ë: Syri i Kalter [13] (Fig. 3), April 1995: net. 1 ind. (Uhrin 1995); Blue Eyes (Syri i kalter) spring, Gjere and Stugares Mts., Bistrices valley, plane forest, 24 April 1995: net. 1 ma (Uhrin et al. 1996).

Distribution. *Myotis bechsteinii* represents a rather rare bat in Albania, only 13 localities are available from the country (Fig. 37, Table 1). Its findings were made at rather low and medium elevations in two widely separated areas of the country, where the numbers of records are almost equally represented. Seven findings of *M. bechsteinii* are concentrated to the north-Albanian mountains and adjacent valleys, the Albanian Alps and Munellë massif. Other six records of this bat were made at rather low altitudes of the Southern Mountain Range (Fig. 37). The findings come from a medium wide range of altitudes (78–1,027 m a. s. l.; Table 2) and mainly from the medium altitudes (median 323.0 m). All localities are associated with a presence of forests, although with various density and height of their tree cover (Figs. 44, 45).

Compared with the distribution of records in other Balkan countries, the density of records of *M. bechsteinii* in Albania is rather high. This bat still remains unknown from Kosovo (Presetnik et al. 2018) and Montenegro (Presetnik et al. 2014; [the only Montenegrin record of *M. bechsteinii* reported by Theou & Đurović (2015b) was re-identified as of *Myotis emarginatus* by Radonjić & Théou (2016)]); and a single record is available from North Macedonia (Budinski 2017), from a valley in the Korab range, 4 km of the Albanian and 5.5 km of Kosovar state borders, respectively. Among the Albania-bordering countries, *M. bechsteinii* is frequently recorded bat only in Greece, although the number of its localities remains smaller than from Albania; anyway, the Greek range of this bat covers most of mainland Greece including the northern Peloponnese (von Helversen & Weid 1990, Hanák et al. 2001, Gremillet et al. 2010, Papadatou et al. 2011, Petrov & von Helversen 2011). More common records of *M. bechsteinii* are available from the north-Balkan countries, namely from Bulgaria (Petrov 2006, Petrov & von Helversen 2011, Noort 2014, Petrov et al. 2014, Dundarova 2018), Serbia (Paunović 2016) and Croatia (Tvrtković 2017); on the other hand, only several records are known from Bosnia and Herzegovina (Karapandža 2014, Presetnik et al. 2016, Hodžić et al. 2017, Lobbová et al. 2018). The occurrence of *M. bechsteinii* in Albania thus represents a significant section of the Balkan distribution range of this bat. Moreover, its distribution patterns in Albania, Croatia, Bulgaria and northern Greece suggest a more common occurrence of this bat in all forested regions of the Balkans, including those where this species has not yet been found, including e.g. the Central Mountain Range of Albania.

Field notes. The records of *Myotis bechsteinii* in Albania were made between late April and mid-September, no records are available from the hibernation and autumn transient seasons. More than two-thirds of the records were made in the two-month period from 14 June to 15 August (incl.), i.e. in the period of presumable existence of maternity colonies. However, no direct observation of a reproduction aggregation is available from Albania, although the group of 16 individuals found in the Mezhgorani cave on 14 June (Theou & Đurović 2015b) could represent such a colony; unfortunately, the authors did not specify circumstances of this finding. The reproduction of *M. bechsteinii* in Albania is thus confirmed by three findings of females in the lactation stage, netted during their foraging activity and/or approaching their roost on 27 and 28 June and 7 August, respectively (Sachanowicz & Ciechanowski 2018, own data).

Most of the records of *M. bechsteinii* from Albania represent the bats on wings, while at four sites the bats were found in their roosts. Findings in natural caves were made twice, both in the early summer period; besides the unspecified record from a cave at Përmet made on 4 June (Szentiványi et al. 2016a), the above mentioned record of a group of 16 bats was made in the Mezhgorani cave (Theou & Đurović 2015b). Sachanowicz & Ciechanowski (2018) reported on two findings of *M. bechsteinii* in man-made structures, once a group of five bats (including one subadult female) was discovered in a mine on 14 August, in the other case an individual was found resting on a swallow nest inside an above-ground concrete barrack on 19 September. At the entrances to both latter roosts, individuals of *M. bechsteinii* were netted during the same

Fig. 44. Beech forest in the Valbona river valley at Dragobi (Kukës Pref.); foraging grounds of *Rhinolophus hipposideros* and *Myotis bechsteinii*. Photo by P. Benda (June 2018).

Fig. 45. River valley west of Kimëz (Shkodër Pref.); foraging habitat of *Myotis bechsteinii*, *Hypsugo savii*, and *Pipistrellus kuhlii*. Photo by Z. Bendová (June 2018).

visits; an adult male and an adult female, and a female in the post-lactation stage, respectively. The roosts of *M. bechsteinii* were found within the altitude range of 193–874 m a. s. l. (median 261.5 m; mean 397.5 m).

An unusual finding of resting (?) individuals of *M. bechsteinii* was reported from the rocky canyon of the Lengarica river near Benjë (Fig. 107); Theou & Đurović (2015b: 188) described it as follows: "we spotted two males on 19th July 2014, alive but resting on the surface of rocks at shining daylight in the canyon."

At eight sites, foraging individuals of *M. bechsteinii* were netted, in all cases into nets installed above a water body, mostly with a running water (rivers or streams), once above a spring (Uhrin et al. 1996, Sachanowicz & Ciechanowski 2018, own data). The altitude range of the foraging grounds (78–1,027 m a. s. l.) conforms to the range of all localities of this bat in Albania (Table 2); however, the preferred altitudes of these grounds are higher than those for roosting (median 390.0 m; mean 444.9 m). Only single bats were documented during foraging, a male was netted three times and a female four times (in one case the sex of the captured bat was not identified).

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Basilia nana*: 1 fa (CMŠ [A]) from 1 fa (NMP 96601), Dragobi (Kukës Pref.), 28 June 2018, leg. P. Benda. – **Published data**: N y c t e r i b i i d a e: *Basilia nana*: 2 ma, 1 fa, Përmet, 4 June 2015 (Szentiványi et al. 2016a).

Comments on ectoparasites. One arthropod parasite species was collected from *Myotis bechsteinii* in Albania, the bat fly *Basilia nana* Theodor et Moscona, 1954 (Szentiványi et al. 2016a, own data). This bat species is regarded the primary host of this parasite, although it is regularly found also in bats of the *M. nattereri* complex (Hůrka 1964). This parasite is distributed across

the arboreal zone of the western Palaearctic, in accordance with the ranges of these two host taxa, from Sweden to the Levant and northern Iran (Hůrka 1984, Benda et al. 2012).

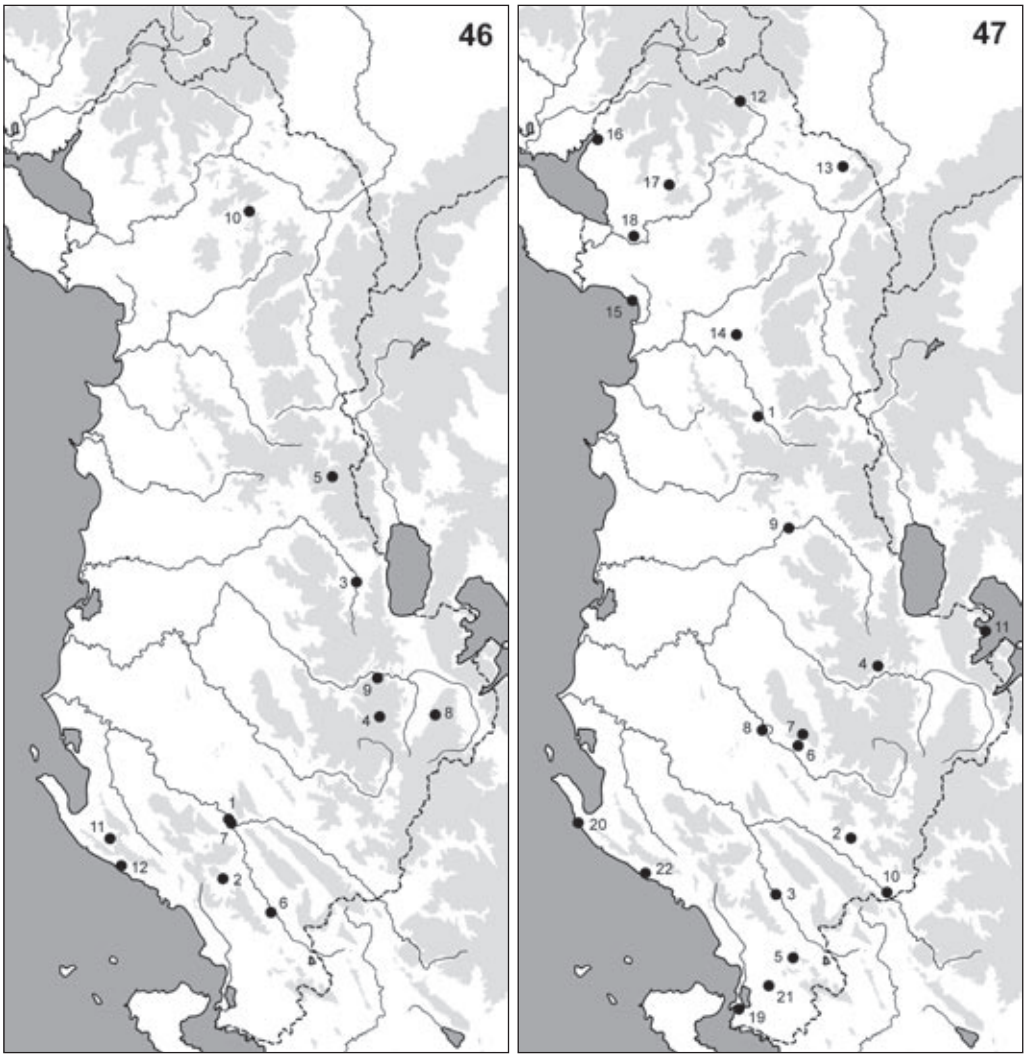
Myotis nattereri (Kuhl, 1817)

Records. **Original data**: G j i r o k a s t ë r: Tepelenë, castle [1], fissure between vault stones of a gate, 5 July 2015: obs. (& exam.) 1 ma; – Zhulat, Kardhiqi river valley [2] (Fig. 92), above the river, 5 July 2015: net. 1 ma. – K o r ç ë: Selishtë, Dunica river valley [3] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: obs. 1 foraging ind., det. & rec. calls of 1 foraging ind.; – Voskopojë, mine [4], ceiling fissure, 9 May 2016: obs. 1 ind. torpid. – **Published data**: E l b a s a n: Fushë Studë [5], 29 July 2015: net. 1 m, 1 August 2015: net. 1 m (van der Tempel 2016). – G j i r o k a s t ë r: Goranxi, entrance of a gallery [6], 21 April 2004 (Sachanowicz et al. 2014); Goranxi, entrance of a gallery in rocky limestone wall, 21 April 2004: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Tepelenë [7], riparian forest of old oriental planes and poplars, Vjosës river valley, 20 August 2006: net. 1 fa (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Barca, Moravë Mts., abandoned gallery [8], 29 May 1991: obs. 1 m (Chytil & Vlašín 1994); – Tresovë, entrance and inside of an adit [9], 12 August 2006 and 7 July 2011 (Sachanowicz et al. 2014); Tresovë, mining adit in rocky gorge, 6–7 July 2011: obs. a clustering colony of ca. 20 inds. (incl. 8 fa) on ceiling; adit entrance, 12 August 2006: net. 2 fa, 1 fj (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Qafa e Malit [10], mining adit in a mountain slope, 18 September 2005: obs. 1 ind. in ceiling crevice; adit entrance, 9 August 2003: net. 1 ma, 17 September 2005: net. 2 fa; small pool in bed of a mountain stream, 18 September 2005: net. 1 fa (Sachanowicz & Ciechanowski 2018). – V l o r ë: Dukat, under concrete bridge over a river [11], 29 April 2010: obs. 1 ind. in crevice (Sachanowicz & Ciechanowski 2018); – Palasë, olive plantation [12], 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Myotis nattereri* belongs among rather rare bats in Albania with only twelve localities known from the country (Fig. 46, Table 1). The records come from a medium-wide range of altitudes (137–1,180 m a. s. l., Table 2) of uplands in the southern and eastern parts of the country (altitude median 410.0 m), no records were made in the lowlands and high mountains (Fig. 8). Although rather rarely found, *M. nattereri* ranks among widespread bats in the Balkans, it was repeatedly recorded throughout all countries that surround Albania; in Montenegro (Noblet 1986, Presetnik et al. 2014, Mostert 2016, Radonjić & Théou 2016), Kosovo (Presetnik et al. 2018, Appendix), North Macedonia (Kruštufek et al. 1998, Buys 2006, Obuch 2012, Budinski 2017), and mainland Greece including the Peloponnese (von Helversen & Weid 1990, Hanák et al. 2001, Gremillet et al. 2010, Petrov & von Helversen 2011, Papadatou et al. 2013, 2015). *M. nattereri* is also widely recorded in Croatia (Tvrtković 2017) and Bulgaria (Benda et al. 2003b, Schunger et al. 2004, Petrov & von Helversen 2011, Petrov et al. 2014, Pandourski et al. 2017, Dundarova 2018), and several times it was also found in Serbia and Bosnia and Herzegovina (Červený & Kryštufek 1988, Paunović 2016, Presetnik 2017, Rnjak et al. 2017, Lobbová et al. 2018, Presetnik et al. 2019). In all these countries, the records of *M. nattereri* are distributed over a wide range of altitudes, in a mosaic of the Mediterranean woodland and agricultural landscapes. The distribution pattern in Albania thus conforms to that in other parts of the Balkan Peninsula.

Field notes. The findings of *Myotis nattereri* in Albania were made between late April and mid-September; in this interval of five months, the bats were recorded both in their roosts and on wings. Equal numbers (six and six) of particular records of *M. nattereri* represent foraging bats and roosting bats, respectively; at three sites the bats were netted at the entrances to underground sites, i.e. perhaps approaching/leaving their roosts. No records are available from the hibernation season and from the autumn transition period.

Almost all findings of *M. nattereri* in roosts were related to single individuals, representing only males in the cases when the discovered bats were examined for sex. The only exception is a finding of an aggregation of bats clustering in a ceiling niche of a mine at 1,018 m a. s. l. on 6 July (Sachanowicz & Ciechanowski 2018); eight examined bats from this aggregation were females showing no apparent signs of lactation or pregnancy. However, pregnancy in these bats



Figs. 46, 47. Records of particular bat species in Albania. 46 – *Myotis nattereri* (Kuhl, 1817). 47 – *Myotis emarginatus* (Geoffroy, 1806).

is well presumable, since a female in the post-lactation stage accompanied by a juvenile female were netted at this site on 12 August, five years before the finding of the aggregation. The aggregation could thus represent a maternity colony in the period before the parturitions when the foeti are still not perceptible. Anyway, the record of the adult post-lactation female with the juvenile represents the only evidence of reproduction in *M. nattereri* in the country. All documented roosts of this bat in Albania were artificial structures, in four cases mine galleries, while twice *M. nattereri* was found in a fissure – in the vault of a concrete bridge above the Dukati river and in

a vault of the southern (main) gate of the city wall of the Tepelenë old town (Chytil & Vlašín 1994, Sachanowicz & Ciechanowski 2018, own data). Although the range of altitudes of the roost sites (193–1,180 m a. s. l.; n=6) conforms to the whole altitude range of this bat in Albania, the median and mean values (902.5 m; 755.2 m) indicate rather high elevations to be preferred by *M. nattereri* for roosting in the country.

The foraging individuals of *M. nattereri* were recorded mostly at or above streams in valleys of various size and with a various level of the vegetation cover, from open gravel river beds to densely vegetated riparian habitats; once the echolocation calls were recorded in an olive plantation (Sachanowicz & Ciechanowski 2018). Both sexes were documented among the netted bats, three males vs. two females. The altitude range of the foraging habitats (137–1,142 m a. s. l.; n=6) conforms almost identically to the whole altitude range of this bat in Albania; however, the altitude median and mean values (410.0 m; 519.8 m) indicate medium high positions of the foraging grounds, in significantly lower areas than recorded for the roost sites (see above).

One male and five females (including one juvenile) of *M. nattereri* were netted at the entrances to artificial underground spaces – mine adits and a gallery (Sachanowicz & Ciechanowski 2018). As additional visits confirmed, two of these underground spaces served as roosts, once of a single bat and once of an aggregation of twenty bats (see above).

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Spinturnix myoti*: 1 ma, 2 fa, 2 nymphs, Goranxi, 21 April 2004 (Sachanowicz et al. 2014); 1 ma, 3 fa, Qafa e Malit, 17 September 2005 (Sachanowicz et al. 2014); 2 ma, 4 fa, 1 nymph, Tresovë, 12 August 2006 (Sachanowicz et al. 2014); 3 ma, 1 nymph, Tresovë, 7 July 2011 (Sachanowicz et al. 2014); 16 inds., [details unlisted] (Sachanowicz et al. 2017).

Fig. 48. Turkish bridge over the Dunica river valley near Selishtë (Korçë Pref.); foraging habitats of *Myotis myotis*, *M. nattereri*, *M. daubentonii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, and *Nyctalus noctula*. Photo by M. Uhrin (July 2015).

Comments on ectoparasites. One arthropod parasite species was collected from *Myotis nattereri* in Albania (Sachanowicz et al. 2014). The obligatory oligoxenic mite *Spinturnix myoti* (Kolenati, 1856) is a parasite of bats of the genus *Myotis* (Deunff et al. 1977, 2004), in its whole range it was recorded only from four species of this genus, *M. myotis*, *M. blythii*, *M. nattereri*, and *M. capaccinii* (Deunff et al. 2004). From Albania, it was collected also from the former two species, besides *M. natereri* (Scheffler et al. 2013, Sachanowicz et al. 2014, Boshamer 2016, own data; see above). This mite has a wide distribution range stretching across the whole Palaearctic (Rudnick 1960, Dusbábek 1962, Uchikawa & Wada 1979, Stanyukovich 1997).

Myotis emarginatus (Geoffroy, 1806)

Records. **Original data**: D i b ë r: Fshat, above a river in the valley west of the village [1], 1 July 2018: net. 1 fa. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [2] (Fig. 107), above the Lengarica river at thermal baths, 28 June 2019: net. 1 fj, 29 June 2019: net. 1 faL, 1 fj (leg. R. Lučan); at three entrances to bunkers, 29 June 2019: net. 1 mj, 14 faL, 2 fa, 1 fs, 2 fj (leg. R. Lučan); – Gjirokastër, castle [3] (Figs. 39, 40), 2 July 2015: obs. a maternity colony of ca. 60 inds. ad. + juv. (exam. 1 faL). – K o r ç ë: Selcë, Selca river valley [4], above the river, 8 July 2015: net. 1 ma. – V l o r ë: Krongj, Vris stream valley [5] (Fig. 50), above the stream, 3 July 2015: net. 1 mj, 2 faL. – **Published data**: B e r a t: Çorovodë, over Çorovodë river [6], 8 July 2011 (Sachanowicz et al. 2014); Çorovodë, rocky gorge of the Çorovodës river, 8 July 2011: net. 2 faL (Sachanowicz & Ciechanowski 2018); – Shpella e Koritës [7], 9 June 1961: obs. a colony, exam. 10 f (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a nursery colony, coll. 10 fa (Hanák 1964); – Valë, metal water tank [8], in pine wood, 7 May 2010: obs. a colony of ca. 300 inds. mixed with *Rhinolophus ferrumequinum* and *R. euryale*; entrance of water tank, 7 May 2010: net. 16 fa (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Xibrake, tunnel [9], 8 July 2011: obs. a breeding colony of ca. 1500 inds. ad+juv. mixed with *Rhinolophus ferrumequinum*, *R. euryale*, and *Miniopterus schreibersii* (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Vllaho-Psiloterë, dried tributary of the Vjosës river [10], grove of old planes, 15 August 2006: net. 1 ma, 1 fj (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Gollomboç, cave entrance [11], 8 August 2006 (Sachanowicz et al. 2014); Gollomboç, entrance of a small cave in the cliff, Macro Prespa lake shore, 8 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, rocky gorge of the Valbonë river [12], 6 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Nikoliq, water pool on a river [13], 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Perlat, tunnel with a metal tank inside [14], 26 June 2011: obs. a colony of ca. 5 inds. ad mixed with *Rhinolophus ferrumequinum*, *R. blasii*, and *R. euryale* (Sachanowicz & Ciechanowski 2018); – [Shëngjin], bunker [15], 26 June 2014: obs. 400 inds., 8 June 2015: obs. 200 inds. (Théou & Đurović 2015a). – S h k o d ë r: [Bajzë], Shpella e Zef Toma [16], 7 June 2015: obs. 2 inds. (Théou & Đurović 2015a); – Prekal, in the cave [17], 11 September 2012: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – [Ganjollë], Shpella e Larecit [18], 9 June 2015: obs. 1 ind. (Théou & Đurović 2015a). – V l o r ë: Butrint, military tunnels connected with a cave [19], near the top of a hill, 24 April 2004: obs. a colony of ca. 30 inds. (incl. 1 fa), mixed with *Rhinolophus ferrumequinum* and *R. euryale*, 6 May 2010: obs. a colony of ca. 50 inds.; entrance of military tunnels, 5 May 2010: net. 2 fa (Sachanowicz & Ciechanowski 2018); – Karaburun National Park, Shpella Duk Gjonit [20], cave, 30 April 2016: obs. 5 inds. (Théou & Loce 2017); – Kulluricë, military tunnels [21], 3 May 2010: obs. a colony of ca. 300 inds. (Sachanowicz & Ciechanowski 2018); – Shpella e Parashqevise, cave [22], 29 April 2016: obs. 50 inds. (Théou & Loce 2017).

Distribution. *Myotis emarginatus* represents an uncommon bat in Albania, it is known from 22 localities in the country (Fig. 47, Table 1). Despite relative scarcity of the records, this bat is spread over the whole country, mainly in the low and medium altitudes, and is absent only from high mountains (altitude range 10–1,125 m a. s. l., median 294.0 m; Table 2, Fig. 8). This figure of occurrence conforms to the distribution pattern in the whole Balkans where *M. emarginatus* is a widespread but uncommon bat species (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Buys 2006, Pavlinić et al. 2010, Micevski et al. 2014, Presetnik et al. 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). Although this bat is not quite rare in Albania, for a long time it remained known in the country from a single finding made in 1961 (Hanak et al. 1961) and another record was obtained first in April 2004 (Sachanowicz & Ciechanowski 2018).

Field notes. The records of *Myotis emarginatus* in Albania were made between late April and early September, no records are available from the hibernation and autumn transient seasons. Majority of the records (52.2%) come from the period of existence of maternity colonies, between late May and July (incl.).

Thirteen records (54.2%) of *M. emarginatus* in Albania were made in roosts; seven of them represented artificial underground spaces, abandoned military bunkers and tunnels, metal water tanks, and an old castle, the remaining number includes natural caves. However, large aggregations (50–1,500 bats, mean 400.0 bats) were found in all artificial roosts, while in two caves only (50 individuals and an unknown number of bats). In three roosts, the colony of *M. emarginatus*

Fig. 49. A mixed maternity colony of *Rhinolophus euryale* and *Myotis emarginatus* roosting in a bunker at Xibrakë (Elbasan Pref.), 8 July 2011. Photo by K. Sachanowicz.

was mixed with those of *Rhinolophus ferrumequinum* and *R. euryale*, in one with *R. ferrumequinum*, *R. blasii*, and *R. euryale*, and in one with *Rhinolophus ferrumequinum*, *R. euryale*, and *Miniopterus schreibersii*; all these mixed colonies were found solely in the artificial shelters (Sachanowicz & Ciechanowski 2018).

In another roost, the Gjirokastër castle (Figs. 39, 40), several other bat species were found to roost along with *M. emarginatus* (*Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, *Miniopterus schreibersii*), but not in a mixed colony. The roost localities of *M. emarginatus* in Albania were situated in the altitude range of 10–1,125 m a. s. l., with the median 192.0 m (mean 252.2 m), i.e. with the focus on areas lower by ca. 100 m than the whole distribution of this bat in the country, although both ranges are identical (see also Table 5).

In four sites, individuals of *M. emarginatus* were netted at the entrances to underground spaces; in two cases, roosting colonies of this species were found inside these (artificial) spaces, in one case an adult male was caught at the entrance to a small cave on the bank of the Prespë e Madhe (Greater Prespa) lake (Sachanowicz & Ciechanowski 2018), and in one case a group of twenty bats undoubtedly represented a part of nursery colony emerging from its roost, a bunker.

At eight sites (33.3%), solely in river valleys, foraging *M. emarginatus* were documented; most of them were broad alluvia covered by riparian vegetation, in two cases the bats were caught above running water in rocky gorges. Although the altitude range of the foraging grounds is small and situated low, to 163–764 m a. s. l., the altitude median value (445.0 m) indicates preference for higher altitudes for the foraging than for roosting. In most sites the foraging bats were netted, once the echolocation calls were detected; females dominated among the caught bats (four males vs. nine females).

Maternity colonies of *M. emarginatus*, composed of adult females and their young, were observed at three sites; in the Korita cave near Çorovodë an unknown number of pregnant females and females with young were found on 6 June (ca. 1,125 m a. s. l.; Hanak et al. 1961), in the unused tunnel at Xibrakë some 1,500 bats on 8 July (291 m a. s. l.; Sachanowicz & Ciechanowski 2018), and in the Gjirokäster castle about 60 bats on 2 July (360 m a. s. l.; own data). At four other sites large aggregations of up to 300 bats (with no obvious presence of juveniles) were observed in late May and June, when an existence of maternity colonies could be expected. At one site, at a bunker entrance near Bënjë-Novoselë, a part of a colony composed of 14 lactating females and three juveniles was netted, perhaps at its roost, on 29 June (own data).

All these sites lie in the wide altitude range of 10–1,125 m (conforming to the range of all sites), with the median of 267.0 m. At four sites, females in the lactation stage accompanied with volant juveniles were netted on their foraging grounds between 28 June and 8 July (incl.), only volant juvenile was caught on 15 August on another site.

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Rhinolophopsylla unipectinata*: 1 fa (CMŠ [P]) from 1 fa (NMP 96605), Fshat (Dibër Prof.), 1 July 2018, leg. P. Benda. – N y c t e r i b i i d a e: *Nycteribia vexata*: 1 fa with a puparium (CMŠ [A]) from 1 ma (NMP 96524), Selcë (Korçë Pref.), 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – S p i n t u r n i c i d a e: *Spinturnix emarginata*: 2 fa (CMŠ [A]) from 1 fa (NMP 96605), Fshat (Dibër Prof.), 1 July 2018, leg. P. Benda; 15 ma, 7 fa, 5 deutonymph m, 1 deutonymph f, 5 deutonymphs, 11 protonymphs (CMŠ [P]) from 1 fa (NMP 96497), Gjirokastër (Gjirokastër Pref.), 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 1 fa, 1 deutonymph m, 2 protonymphs, 2 nymphal inds. (CMŠ [P]) from 2 fa (NMP 96501, 96502), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 1 ma (CMŠ [P]) from 2 fa (96501, 96502), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – *Macronyssus granulosus*: 1 protonymph (CMŠ [A]) from 1 fa (NMP 96605), Fshat (Dibër Prof.), 1 July 2018, leg. P. Benda; 19 protonymphs (CMŠ [P]) from 2 faL (NMP 96501, 96502), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: S p i n t u r n i c i d a e: *Spinturnix emarginata*: 1 fa, Gollomboç, 8 August 2006 (Sachanowicz et al. 2014); 2 ma, 4 fa, 3 nymphs, Çorovodë, 8 July 2011 (Sachanowicz et al. 2014).

Fig. 50. Vris stream valley at Krongj (Vlorë Pref.); above the stream, individuals of *Rhinolophus ferrumequinum*, *Myotis blythii*, *M. emarginatus*, and *Nyctalus leisleri* were netted, and the echolocation calls of *Miniopterus schreibersii* were detected. Photo by E. Weiß (June 2015).

Comments on ectoparasites. In total, five arthropod parasite species were collected from *Myotis emarginatus* in Albania, one of them for the first time from the country.

The bat flea *Rhinolophopsylla unipectinata* (Taschenberg, 1880) belongs to the parasites of the cave-dwelling bats, *M. emarginatus* as a member of this ecological group represents a rare and secondary host of this flea (Hůrka 1963c), while the horseshoe bats (*Rhinolophus*) are its principal hosts. From *M. emarginatus* this parasite was previously collected in the Czech Republic and Slovakia (Hůrka 1963c). In Albania, it was collected also from *Rhinolophus ferrumequinum* and *Miniopterus schreibersii* (Hůrka 1963c, Scheffler et al. 2013, own data; see above and below).

The bat fly *Nycteribia vexata* Westwood, 1835 is a parasite of the cave-dwelling bats, its primary hosts are the species of the *Myotis myotis* complex (Hůrka 1962, 1984, Lanza 1999). The record of one female from *M. emarginatus* represents the first evidence of this host-parasite relationship (Szentiványi et al. 2016b), although other nycteribiid bat flies were documented in this bat, viz. *Nycteribia latreillii*, *N. pedicularia*, *Phthiridium biarticulatum*, and *Penicillidia dufourii* (Theodor & Moscona 1954, Theodor 1967, Krištofík 1982, Imaz et al. 1999). In Albania, *N. vexata* was collected also from *Myotis myotis*, *M. blythii*, *M. capaccinii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below).

The bat mite *Spinturnix emarginata* (Kolenati, 1856) is a permanent monoxenic parasite adapted to *M. emarginatus*. Its distribution range conforms to the range of its principal host, covering central

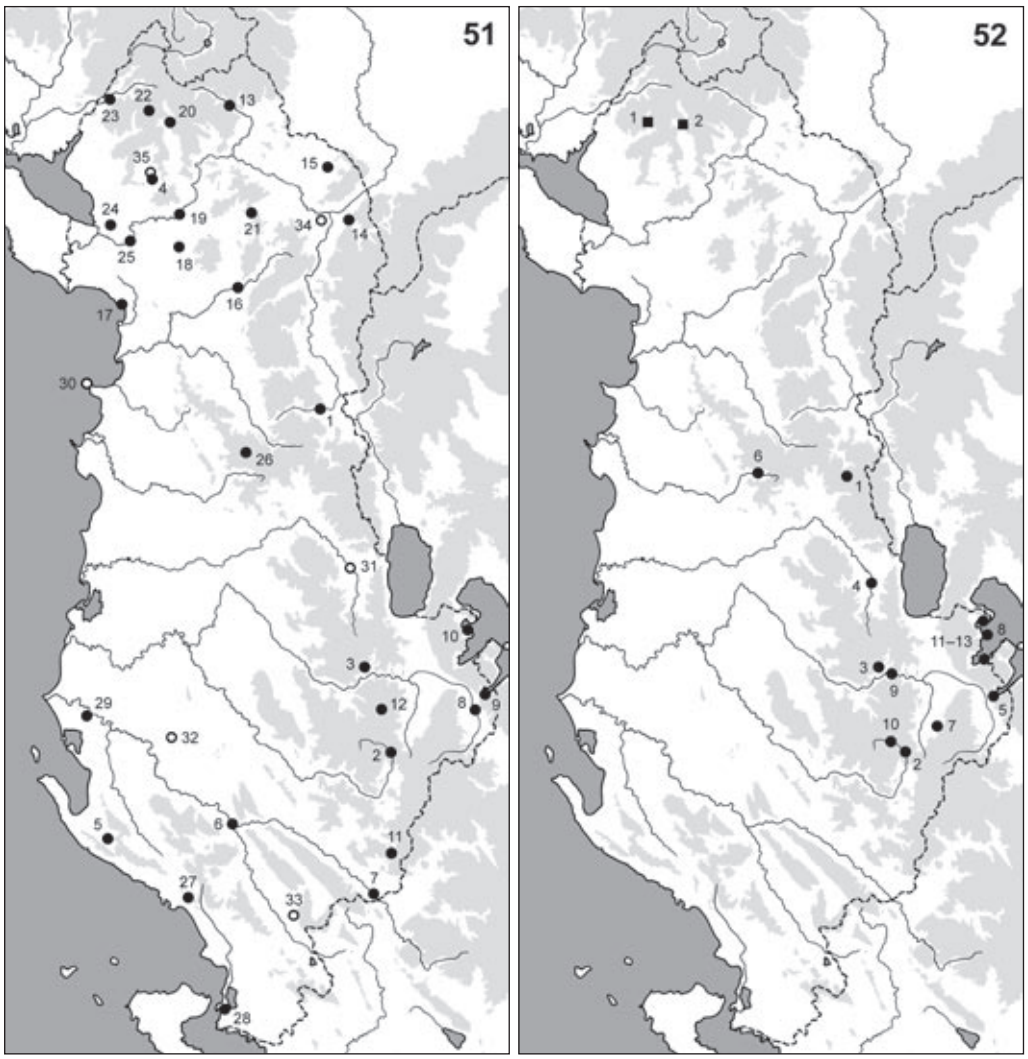
and southern Europe and central Asia (Dusbábek 1964a, Beron 1965, Deunff 1977, Peribáñez-Lopez et al. 1989, Stanyukovich 1997, Bruyndonckx et al. 2009, Krištofík et al. 2012).

Two macronyssid mite species were collected from *M. emarginatus* in Albania, *Ichoronyssus scutatus* (Kolenati, 1856) and *Macronyssus granulosus* (Kolenati, 1856), the latter species for the first time in the country. Although *I. scutatus* parasitises primarily the bats of the genus *Myotis*, it was found also on the genera *Vespertilio*, *Miniopterus*, and *Rhinolophus* (Dusbábek 1964b, Beron 1969, Radovsky 1967). In Albania it was documented additionally from *Myotis myotis*, *M. blythii*, *M. capaccinii*, and *Miniopterus schreibersii* (Scheffler et al. 2013, own data; see above and below). It is a species distributed across the Old World, including Europe, Africa, Middle East, and Japan (Radovsky 1967, Stanyukovich 1997). The host range of *M. granulosus* is wide and composed of the cave-dwelling bats, its occurrence is known from a large part of the Old World (Radovsky 1967). Our numerous collections of the protonymph stages from *M. emarginatus* in early July are similar to the record from *M. blythii* and correspond with the observations elsewhere (Estrada-Peña & Serra-Cobo 1991, see under *M. blythii* above). From Albania this parasite was collected also from *Myotis blythii*, *M. capaccinii*, and *Miniopterus schreibersii* (own data; see above and below).

Myotis davidii (Peters, 1869)

Records. **Original data**: D i b ë r: Krajkë, Zerdjani river valley [1], above the river, 7 July 2016: net. 1 ma, 1 faL. – K o r ç ë: Roshanj, Dëshnica river valley [2] (Fig. 57), above the river, 27 June 2016: net. 1 faG; – Selcë, Selca river valley [3], above the river, 8 July 2015: net. 1 ma, 1 faL. – S h k o d ë r: Prekal, above the Kiri river, ca. 1.5 km north of the village [4] (Fig. 53), 25 June 2018: net. 1 faL. – V l o r ë: Dukat, Dukati river valley [5] (Fig. 54), above the river, 2 July 2016: net. 1 ma. – **Published data***: G j i r o k a s t ë r: Tepelenë, a riparian forest in the Vjoses valley about 1 km south [6], net. inds. (Niermann et al. 2007); Tepelenë, river in riparian forest of old oriental planes and poplars, Vjosës river valley, 20 August 2006: net. 3 fa, 2 fj (Sachanowicz & Ciechanowski 2018); – Vllaho-Psiloterë, dried tributary of the Vjosës river with old plane tree [7], 15 August 2006: net. 2 fa, 1 mj (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Bilisht, Devoll river [8], farmland landscape, 9 August 2006: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Buzelliqen road [9] (Papadatou et al. 2011); – Gollomboç, rocky cliff [10], Macro Prespa lake shore, 8 August 2006: net. 1 fa emerging from a cavity (Sachanowicz & Ciechanowski 2018); – Radanj, bunker [11], in crevice, 15 August 2006: obs. 1 ma (Sachanowicz & Ciechanowski 2018); – Voskopojë, old stony bridge over the Devoll river tributary [12], 13 August 2006: net. 1 ma, 1 fa emerging from crevices (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, Valbonë river [13], rocky gorge, 6 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Lume, Lumës river [14], rocky gorge, 2 August 2007: net. 1 ma, 1 fj (Sachanowicz & Ciechanowski 2018); – Nikoliq, river, near a bridge [15], 4 August 2007: net. 1 fa (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mashtërkor, small pool in the valley of the Fani i Vogël river [16], 9 August 2007: net. 1 fa (Sachanowicz & Ciechanowski 2018); – [Shëngjin], bunker [17], 8 June 2015: obs. 1 ind. (Théou & Đurović 2015a); Shëngjin, unused military bunkers, 8 June 2015 (Szentiványi et al. 2016a). – S h k o d ë r: Gomsiqe e Epërme, over a river in a rocky gorge [18], 5 August 2003: net. 1 mj (Sachanowicz et al. 2016a); – Koman, over Drin river tributary [19], 12 August 2003 (Sachanowicz et al. 2014); Koman, concrete bridge over the Drini i Bardhë river tributary, 12 August 2003: net. 1 faL under the bridge, obs. a colony of ca. 10 inds. (exam. 2 faL) emerging from a crevice, net. 1 faL (Sachanowicz & Ciechanowski 2018); – Nderlysë, under a bridge over the Shalës river [20], mountain valley, 9 September 2012: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, pool in bed of a mountain streem [21], 18 September 2005: net. 1 ma, 8 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Qafa e Thores, artificial pond for livestock [22], 12 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Rahovic, over Cemit river [23], 22 June 2011 (Sachanowicz et al. 2014); Rahovic, Cemit river, rocky gorge, 22 June 2011: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Renc, military tunnel [24], 26 June 2011: obs. & exam. 1 faL (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, entrance of gallery in rocky cliff [25], 22 April 2010: net. 2 ma (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shëngjergj, entrance of tunnel [26], 1 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018). – V l o r ë: Borsh, stream in rocky gorge with old trees [27], 1 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Butrint, entrance of military tunnels connected with a cave [28], at the hill top, 25 April 2004: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Mifol, bunker, in crevice [29], 30 April 2004: obs. 1 ma (Sachanowicz & Ciechanowski 2018).

* the data were published mostly under the names *Myotis mystacinus* (Kuhl, 1817) and *M. aurascens* Kuzâkin, 1935, but see Distribution.



Figs. 51, 52. Records of particular bat species in Albania. 51 – *Myotis davidii* (Peters, 1869), confirmed records (full circles) and presumable records (open circles). 52 – *Myotis daubentonii* (Kuhl, 1817) (circles) and cf. *Eptesicus nilssonii* (von Keyserling et Blasius, 1839) (squares).

Myotis mystacinus group, cf. *M. davidii*

Published data: D i b ë r: Krajkë, river, farmland landscape [1], 24 September 2005: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Kepi i Rodonit, entrance of military tunnel [30], 14 September 2012: det. calls of 1 foraging ind. (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Karkavec, Shkumbinit river [31], farmland landscape, 29 September 2005: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018). – F i e r: Damës, bridge over the Povlës river [32], rocky gorge, 18 April 2004: obs. 1 ind. emerging from crevice (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Libohove, a larger cave [33], 6 October 1992: net. 1 ms (Uhrin et al. 1996).

– K u k ë s: Kolsh, stream [34], Drini i Bardhë river tributary, 7 August 2003: det. calls of 2 foraging inds. (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Kir, near a mining adit in rocky gorge [35], 11 September 2012: det. calls of 1 foraging ind. (Sachanowicz & Ciechanowski 2018).

Distribution. *Myotis davidii* belongs among rather uncommon bats in Albania, when also the records assigned to *M.* cf. *davidii* are included (see above) and 35 localities are considered from the country (Fig. 51, Table 1). Otherwise, with only 29 confirmed records, *M. davidii* represents a moderately frequent bat species of Albania.

The Albanian populations of the *Myotis mystacinus* group belong to the widespread Balkan form, now referred to *M. davidii* (cf. Benda et al. 2012, 2016a, Dundarova et al. 2017), formerly called *M. aurascens* Kuzâkin, 1935 (sensu Benda & Tsytsulina 2000) or *M. mystacinus bulgaricus* Heinrich, 1936 (sensu Mayer et al. 2007), the latter names now represent junior synonyms of the former name (Benda et al. 2016a). All newly collected specimens from Albania (n=7; see Appendix) bear the characters typical for *M. davidii* (cf. Benda et al. 2016a, c), namely the large body size (forearm length 35.4–36.3 mm, mean [M] 35.7 mm; greatest length of skull [LCr] 13.9–14.6 mm, M 14.36 mm) and a relatively short rostrum (length of upper tooth-row [CM^3] 5.1–5.5 mm, M 5.30 mm; mandible length 10.0–10.3 mm, M 10.13 mm; relative length of upper tooth-row [CM^3/LCr] 0.356–0.374, M 0.369). These data conform to the *davidii* morphotype sensu Benda et al. (2016a, c).

Sachanowicz & Ciechanowski (2018) referred their 22 records of examined bats of the *M. mystacinus* group also to this taxon (under *M. aurascens*); moreover, these authors reported 20 bats from 18 sites identified with the help of genetic markers as *M. davidii*. Of course, there still remains a possibility of misidentification of some individuals, namely those reported by Uhrin et al. (1996), Papadatou et al. (2011), Théou & Đurović (2015a), and Szentiványi et al. (2016a); however, these records represent only a very small segment (8.6%) of the whole amount of records assigned to *M. davidii*. Anyway, while all examined bats of the group belong to *M. davidii*, no confirmed record of *M. mystacinus* s.str. is available from Albania so far.

The distribution range of *M. davidii* in Europe was roughly delineated by Benda & Tsytsulina (2000) and Benda (2004b), it covers the southern Balkans including Dalmatia, North Macedonia, Greece and Bulgaria, and eastward it extends to Moldavia, southern Ukraine and the Caucasus. Since the northern margin of the range in the western Balkans stretches from southern Dalmatia through northern Montenegro, western Kosovo, and northern North Macedonia to northern Bulgaria, the territory of Albania completely falls within this range. At least three verified records of *M. davidii* are known from Montenegro – Risan, Stabna, and Vusanje – and one record from Kosovo – Pejë (Benda 2004a, Appendix), i.e. from areas very close to the northern Albanian border. The sites Lumë and Nikoliq in north-eastern Albania (Sachanowicz & Ciechanowski 2018) could be regarded as a part of the finely demarcated northern margin of the species range in Europe, connecting Pejë in western Kosovo and the Korab Mts. north of Ničpur in north-western North Macedonia (Budinski 2017). On the other hand, in Albania and North Macedonia *M. davidii* is a widespread bat, and the territories of both countries belong to the regular range of this bat, similarly as those of Greece or Bulgaria (Kryštufek et al. 1992, 1998 [in the sense of Benda & Tsytsulina 2000], Hanák et al. 2001, Benda et al. 2003b).

In Albania *M. davidii* is distributed almost equally in all parts of the country (Fig. 51), the records from forested mountains are slightly more numerous. The altitudinal distribution of *M. davidii* records follows almost identically the altitudinal distribution of all bat localities in Albania (altitude range 10–1,554 m a. s. l., median 344.0 m; Table 2, Fig. 8) which indicates no preference for specific altitudes. This can be regarded surprising in the country on the northern margin of the species distribution range, where the preference for rather low situated localities could be expec-

ted. However, this picture conforms to the distribution pattern of *M. davidii* in North Macedonia and Greece (Benda & Tsytsulina 2000, Hanák et al. 2001). In Bulgaria, at the similar latitude as in Albania, *M. davidii* is known mainly from elevated areas (30–1,900 m a. s. l., mean 695.0 m, median 505.0 m, n=22; cf. Benda et al. 2003b).

Field notes. The records of *Myotis davidii* in Albania were made between mid-April and early October, no hibernation record is available. Majority of the records come from late summer, August and September (58.8%), while only ten findings (29.4%) were made at the time of expected existence of maternity aggregations between mid-May and late July.

Majority of the records of *M. davidii* in Albania represent findings of foraging bats – they come from 22 sites (64.7%), four of them were recorded by a bat detector and are assigned to *M. davidii* only temporarily (considering the frequencies of particular species of the *Myotis mystacinus* group in Albania) (Uhrin et al. 1996, Sachanowicz & Ciechanowski 2018). Most of the foraging bats were documented in the valleys and gorges with running water, 90.9% of foraging bats were netted above water surface – above rivers and streams (68.2%), above pools in river beds (9.1%), and above a watering place for livestock. In two cases *M. davidii* was netted in an alluvial forest adjacent to a river bed, once detected in a farmland and once detected near a small mine in a rocky gorge. Although some of these bats were probably documented during drinking and not searching for prey, the dominant foraging habitats of *M. davidii* in Albania are certainly the surfaces of water bodies and associated vegetation. This could suggest that *M. davidii* is an ecological counterpart of the trawling *Myotis* bats in the areas where they do not occur or occur in

Fig. 53. Kiri river valley near Prekal, Albanian Alps (Shkodër Pref.); foraging habitat of *Myotis davidii*. Photo by Z. Bendová (June 2018).

Fig. 54. Dukati river valley near Dukat (Vlorë Pref.); foraging grounds of a varied bat community, where the individuals of *Myotis davidii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus leisleri*, and *Tadarida teniotis* were netted. Photo by M. Uhrin (July 2016).

a limited extent, such as the south-east European steppes and Crimea, and/or in adjacent regions of the Balkans or Caucasus (see also Dietz et al. 2016, Sachanowicz & Ciechanowski 2018).

Roosts of *M. davidii* were found at eight sites (23.5%) in Albania; however, only one roost was discovered in natural conditions, when an individual was found to leave a cavity (inhabited also by one *Rhinolophus hipposideros*) in a rocky cliff on the bank of the Prespë e Madhe (Greater Prespa) lake (Sachanowicz & Ciechanowski 2018). Four times single individuals (mostly males) were found in abandoned underground military structures (Théou & Đurović 2015a, Sachanowicz & Ciechanowski 2018); three times the bats (1, 2, and 10 individuals) were observed leaving their roosts in crevices in bridge bodies across rivers (Sachanowicz & Ciechanowski 2018). In five sites (14.7%), individuals of *M. davidii* were netted at the entrances to their possible roosts; artificial underground spaces (abandoned military tunnels and mines) in four cases and once at a large natural cave. Altitudinal range of the confirmed roost localities is smaller than that of all sites, 10–1,195 m a. s. l., median is substantially smaller, 168.5 m (n=8). When also potential roosts where bats were just netted are included, the range corresponds to that of all sites (Table 5), however, the median is even smaller, 107.0 m a. s. l. (n=13). These data indicate a clear preference for low situated areas as roosting habitats in *M. davidii* in Albania, or a preference for high altitudes for foraging in this bat, respectively.

A maternity colony of *M. davidii* was found only once in Albania, an aggregation of some ten individuals was observed emerging from a crevice of a concrete bridge over a stream at Koman (78 m a. s. l.; Sachanowicz & Ciechanowski 2018) on 12 August; two lactating females were examined from the colony, two others netted under the bridge. A pregnant female was also

once documented, it was netted above the Dëshnica river near Roshanj (1,044 m a. s. l.; Fig. 57) on 27 June and contained a developed foetus of the crown-rump length of 17.6 mm (own data). Lactating females (besides those observed in the colony at Koman) were documented at four sites situated at the altitude range of 41–764 m a. s. l. (median 374.0 m) between 25 June and 8 July (Sachanowicz & Ciechanowski 2018, own data). Juvenile individuals were netted at four other sites within the altitude range of 137–359 m a. s. l. (median 339.5 m) on 2–15 August (Sachanowicz & Ciechanowski 2018).

Note on morphology. Sachanowicz & Ciechanowski (2018) demonstrated morphological differences among populations of *Myotis davidii* across the altitudinal gradient in Albania; while below 600 m a. s. l., bats of a wide size range occur (forearm length [LAt] 33.7–37.8 mm, mean [M] 35.6 mm, n=25), at the altitudes above 600 m a. s. l. only small bats were found (LAt 33.9–35.8 mm, M 34.7 mm, n=9). The newly recorded bats do not fully conform with this division, three bats from higher altitudes (764–1,044 m a. s. l.) are almost of the same size (LAt 35.6–36.1 mm, M 35.7 mm; greatest length of skull [LCr] 13.91–14.61 mm, M 14.31 mm) as four bats from lower altitudes (224–524 m a. s. l.; LAt 35.4–36.3 mm, M 35.7 mm; LCr 14.14–14.53 mm, M 14.40 mm).

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Ischnopsyllus simplex*: 1 ma, 2 fa (CMŠ [P]) from 1 ma, 1 fa (NMP 96587, 96588), Krajkë (Dibër Pref.), 7 July 2016, leg. P. Benda. – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 ma (CMŠ [A]) from 1 ma (NMP 96587), Krajkë (Dibër Pref.), 7 July 2016, leg. P. Benda. – *Basilia mongolensis nudior*: 2 fa (CMŠ [A]) from 1 ma (NMP 96570), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin. – S p i n t u r n i c i d a e: *Spinturnix mystacina*: 1 ma, 1 deutonymph m (CMŠ [P]) from 1 fa (NMP 96553), Roshanj (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin. – M a c r o n y s s i d a e: *Steatonyssus periblepharus*: 2 protonymphs (CMŠ [P]) from 1 ma, 1 fa (NMP 96587, 96588), Krajkë (Dibër Pref.), 7 July 2016, leg. P. Benda; 1 ma (CMŠ [P]) from 1 fa (NMP 96525), Selcë (Korçë Pref.), 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: N y c t e r i b i i d a e: *Basilia italica*: 2 ma, 1 fa, Shëngjin, 8 June 2015, leg. L. Clément & E. Genzoni (Szentiványi et al. 2016a). – S p i n t u r n i c i d a e: *Spinturnix mystacina*: 1 ma, 3 fa, Koman, 12 August 2003 (Sachanowicz et al. 2014); 1 ma, Rahovic, 22 June 2011 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, six arthropod parasite species were collected from *Myotis davidii* in Albania, three of them for the first time in the country.

Three specimens of the bat flea *Ischnopsyllus simplex* Rothschild, 1906 were collected from two bats; fortunately, one male among them enabled to identify the flea species undoubtedly, despite the complicated taxonomy of the *I. simplex* complex (Hůrka 1976a, Benda et al. 2016c). This record is interesting since the principal host of *I. simplex* s.str. is *Myotis nattereri*, while the bats of the *M. mystacinus* group are primary hosts of another flea species of the complex, *I. mysticus* Jordan, 1942. The former flea species is here reported from Albania for the first time (another record of a flea from the *I. simplex* complex, although unidentified to species, was made from *Myotis myotis*, see above).

Three species of bat flies were found to parasitise *M. davidii* in Albania, *Basilia mongolensis nudior* Hůrka, 1972, *B. italica* Theodor, 1954, and *Nycteribia pedicularia* Latreille, 1805 (Szentiványi et al. 2016a, own data). The distribution of *Basilia m. nudior* is concentrated to the eastern Mediterranean from Dalmatia to eastern Anatolia, where it seems to parasitise primarily *M. davidii* (see Benda & Tsytsulina 2000, Ševčík et al. 2013, Benda et al. 2016c). This fly was collected rarely also in Central Europe, though from its secondary hosts (Kock 1984, Heddergott 2009); *B. m. nudior* is here reported from Albania for the first time. Bats of the *M. mystacinus* group are considered the primary hosts also of *B. italica* (Aellen 1955, Hůrka 1964). The distribution range of this bat fly is only poorly documented, its records are available mainly from Central Europe (Szentiványi et al. 2016b), while its records in southern Europe are rare (Theodor 1954, Beaucournu & Noblet 1996). The finding of *B. italica* from Albania represents a significant prolongation

of its range to the south-east. The principal host of *N. pedicularia* is *Myotis capaccinii*, but this bat fly is adapted to parasitise also other cave-dwelling bat species (Szentiványi et al. 2016b). Since in the Mediterranean this bat fly is a very common parasite, it was collected from ten bat species in Albania, besides *M. davidii* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). From a bat of the *M. mystacinus* group, *N. pedicularia* was collected already in western Europe (see Theodor & Moscona 1954).

The bat mite *Spinturnix mystacina* (Kolenati, 1857) is a gamasoid polyxenic parasite adapted to the hosts from the *M. mystacinus* group (Deunff 1977). Besides the species of this morpho-group (*M. mystacinus*, *M. davidii*, *M. alcathoe*, *M. brandtii*, *M. sibiricus*), it was collected also from *Myotis myotis*, *Vespertilio murinus*, *Eptesicus serotinus*, *Nyctalus noctula*, and *Plecotus auritus* (Stanyukovich 1997, Danko et. al. 2010, Zaharov et al. 2016). In Albania, it was collected also from *Myotis brandtii* (Sachanowicz & Ciechanowski 2018; see below). The distribution range of this mite conforms to the ranges of the preferred bat group, covering the whole temperate zone of Eurasia from Great Britain to Japan (Dusbábek 1962, Deunff 1977, Uchikawa & Wada 1979, Stanyukovich 1997, Naglov & Tkač 2002, Zaharov et al. 2016); the records from Albania lie at the southern limits of this range.

The macronyssid mite *Steatonyssus periblepharus* Kolenati, 1858 is here reported from Albania for the first time, although besides *M. davidii* it was collected also from *Myotis blythii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii* (own data; see above and below). It is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999). From the bats of the *M. mystacinus* group it was previously documented in other countries of Europe (Till & Evans 1964, Beron 1969, Stanûkovič 1990, Baker & Craven 2003).

Myotis brandtii (Eversmann, 1845)

Records. **Published data**: E l b a s a n: Fushë Studë [1], 28 July 2015: net. 1 m (van der Tempel 2016). – S h k o d ë r: Qafa e Malit, over a road in a mountain mixed forest [2], 8 August 2003: net. 1 fa (Sachanowicz et al. 2016).

Comments. *Myotis brandtii* is a very rare bat in Albania with only two localities known from the country (Fig. 21, Table 1). Both sites are situated in high mountain positions, in mixed forests at the altitudes of 928 m and 1,142 m a. s. l., respectively. With such altitudinal characters this species represents the second most montane bat of the Albanian fauna (Fig. 8).

The Albanian records of *M. brandtii* constitute a part of the southern margin of its distribution range in south-eastern Europe, where it is confined to spots isolated in particular mountain massifs. This bat finds its southernmost records in the Balkans in the Prespa region of north-western Greece (40° 50’ N; Mayer et al. 2007, Gremillet et al. 2010, Papadatou et al. 2011) and then, almost parallelly, in eastern Albania (41° 19’ N; van der Tempel 2016) and in southern Bulgaria, in the Western Rhodopes Mts. (41° 37’ N; Benda et al. 2003b, Dundarova 2018). Several records are also available from the Stara Planina (Balkan) Mts. in central Bulgaria (42° 50’ N; Benda et al. 2003b, Schunger et al. 2004). *M. brandtii* was rarely documented also in Montenegro and in Bosnia and Herzegovina, where two records are known in each country (Petrov 1967, Strelkov 1983, Benda 2004a, Mulaomerović 2013, Lobbová et al. 2018). On the other hand, in northern Croatia and central Serbia as well as in Romania, this bat is much more frequent (Uhrin et al. 2014, Paunović 2016, Tvrtković 2017). The records of *M. brandtii* from the southern Balkans are confined solely to forested mountain positions. With the exception of one Montenegrin site (Stabna,

770 m a. s. l.; Benda 2004a), all come from the altitudes above 900 m a. s. l. (Benda et al. 2003b, Papadatou et al. 2011, Mulaomerović 2013, Sachanowicz et al. 2016, van der Tempel 2016) with the highest finding from almost 1,900 m a. s. l. (Čakor pass; Petrov 1967). In all southern spots of occurrence in the Balkans, the reproduction of *M. brandtii* was confirmed. While in Albania and Greece just individual records of volant juveniles or lactating females are available (Papadatou et al. 2011, Sachanowicz et al. 2016), in Bulgaria a maternity colony was also documented (Murgaš hut, 1,400 m a. s. l.; Ivanova 1998).

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Spinturnix mystacina*: 1 m, 2 f from 1 fa, [Qafë e Malit, 8 August 2003] (Sachanowicz & Ciechanowski 2018).

Comments on ectoparasites. One arthropod parasite species was collected from *Myotis brandtii* in Albania, the bat mite *Spinturnix mystacina* (Kolenati, 1857). It is a gamasoid polyxenic parasite adapted to bats of the *M. mystacinus* group (Deunff 1977). From Albania, it was collected also from *Myotis davidii* (Sachanowicz et al. 2014, own data; see above). Besides species of this morpho-group, it was collected also from several other vespertilionid species, see under *M. davidii*.

Myotis alcathoe von Helversen et Heller, 2001

Record. **Published data**: G j i r o k a s t ë r: Tepelenë, Vjosë valley ca. 1 km south, 20 August 2006: net. 1 ms (Niermann et al. 2007).

Fig. 55. Plane and poplar tree groves in the Vjosa river valley south of Tepelenë (Gjirokastër Pref.); the only locality of *Myotis alcathoe* in Albania, foraging habitats of *Myotis myotis*, *M. blythii*, *M. nattereri*, *M. davidii*, *M. capaccinii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pygmaeus*, *P. kuhlii*, and *Miniopterus schreibersii* (Sachanowicz & Cziechanowski 2018). Photo by E. Weiß (July 2015).

Comments. *Myotis alcathoe* is an extremely rare bat in Albania, it is the only species known from a single individual from the country (Fig. 21). A male was netted in an old plane riparian forest in the Vjosa river valley between the Shëndëlli and Tresenik Mts. (Fig. 55) at a quite lowland altitude of 133 m a. s. l. (Niermann et al. 2007, Sachanowicz & Ciechanowski 2018).

Although *M. alcathoe* has been described only recently (von Helversen et al. 2001), its distribution range is already sufficiently well defined – it covers most of the zones of Mediterranean and mixed forests of Europe from Spain and England to Turkey and southern Sweden and also the western Caucasus and Transcaucasia (Niermann et al. 2007, Benda et al. 2016a). In the Balkans, this bat was recorded widely though still rather rarely, numerous records are available only from Greece and Bulgaria (von Helversen 2004, Schunger et al. 2004, Niermann et al. 2007, Gremillet et al. 2010). In the western part of the Balkan Peninsula, *M. alcathoe* was scarcely found in all countries (Benda et al. 2012, 2016a, Pavlinić et al. 2012, Tvrtković 2017, Babić et al. 2018, Micevski et al. 2018), except of Serbia, where ten records were made (Paunović 2016). Prevailing majority of the Balkan records were made in the habitats similar to that in Albania, they comprise bats foraging in alluvia covered by deciduous or mixed forests at various altitudes; only a minority of the findings represent bats swarming at cave entrances (e.g. Schunger et al. 2004, Dundarova 2018).

Myotis daubentonii (Kuhl, 1817)

Records. **Original data**: E l b a s a n: Fushë Studë, at an artificial lake [1] (Fig. 100), 4 July 2018: det. calls of several foraging inds. of *M.* cf. *daubentonii*. – K o r ç ë: Roshanj, Dëshnica river valley [2] (Fig. 57), above the river, 27 June 2016: net. 2 ma; – Selcë, Selca river valley [3], above the river, 8 July 2015: net. 1 ma; – Selishtë, Dunica river valley [4] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of several foraging inds.; – Tren, Treni cave [5] (Fig. 61), 28 June 2016: obs. an aggregation of 17 inds. – T i r a n ë: Shëngjin i Madh, Erzeni river valley [6], 5 July 2016: obs. & det. calls of numerous foraging inds. – **Published data**: E l b a s a n: Fushë Studë [1], 5 August 2015: net. 1 m (van der Tempel 2016). – K o r ç ë: Boboshticë, over a village pond [7], 5 July 2011: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018); – Gollombaçi, cave 2 km south of the village [8], April 1995: net. 2 inds. (Uhrin 1995); Gollombaçi, Macro Prespa lake, small cave 1 km E of the village, 20 April 1995: net. 2 fa (Uhrin et al. 1996); Gollomboc Cave 2 (Papadatou et al. 2011); Gollomboç, small cave in the cliff, Macro Prespa lake shore, 1 October 2005: obs. 3 inds. in the ceiling crevice; cave entrance, 1 October 2005: net. 5 mj, 1 fj, 8 August 2006: net. 2 ma, 3 mj, 2 fa, 4 fj (Sachanowicz & Ciechanowski 2018); – Mikroprespanská j. [= Treni cave] [5], April 1995: net. 12 inds. (Uhrin 1995); Micro Prespa cave, 21 April 1995: net. 12 m (Uhrin et al. 1996); Treni cave, summer 2009: net. 2 ma, autumn 2010: net. 2 ma (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. 4 inds. (Scheffler et al. 2013); Micro Prespa cave, cave entrance, 10 August 2006: net. 8 ma, 1 mj (Sachanowicz & Ciechanowski 2018); – Tresovë, Devoll river [9], 6 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Vithkuq, Dëshnicës river [10], near old stony bridge, 14 August 2006: net. 5 ma (Sachanowicz & Ciechanowski 2018); – National Park of Prespa Lakes, five caves [5, 8, 11–13], 24 September 2012 – 23 April 2015: obs. inds. (maximum 105 inds. in total per one check) (Theou et al. 2015a).

Distribution. *Myotis daubentonii* represents a rather rare bat in Albania, only 13 localities are available from the country (Fig. 52, Table 1). All these sites are concentrated to mountains in wide surroundings of the great lakes of the Albanian-North Macedonian-Greek border area, similar aggregation of records is known also from the Greek side of the region (von Helversen & Weid 1990, Gremillet et al. 2010, Papadatou et al. 2011). Surprisingly, only one confirmed record of this bat is available from North Macedonia, from Trpejca, at the Ohrit lake bank (Bogdanowicz 1990), while later research did not prove it there (Buys 2006, Micevski et al. 2014, Presetnik 2015a).

The presence of *M. daubentonii* in the region of the Prespa lakes in the three country border area represents the southernmost large spot of common occurrence of this bat in south-eastern Europe. This species does not occur further south in the most of Greece (Hanák et al. 2001); and in the rest of the Balkan Peninsula south of ca. 44° N, *M. daubentonii* is a very rare bat (with the exception of the Danube lowland in northern Bulgaria, see Benda et al. 2003b). Only one site of

occurrence is known from Montenegro (Biogradsko jezero lake; Presetnik et al. 2014) and two sites in northern Bosnia (Krupa na Vrbasu, Doboj; Pašić & Presetnik 2013, 2014) and in Kosovo (Théou et al. 2019). Very few records are dispersed over eastern Greece, Turkish Thrace, and south-western Bulgaria (Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b). On the other hand, *M. daubentonii* is not a rare bat in northern Croatia and central and northern Serbia (Paunović 2016, Tvrtković 2017).

The Albanian records of *Myotis daubentonii* come from the altitudes between 473 m and 1,142 m a. s. l. (median 870.0 m; Table 2, Fig. 8), showing its clear preference for high positions of the country adjacent to the great lakes, the water levels of the Ohrit and Prespa lakes lie roughly at the altitudes of 690 m and 850 m a. s. l., respectively. Of the thirteen sites recorded, five are associated with the Prespa lakes, one with an artificial mountain lake in the Shebenik-Jabllanica National Park (the highest site in the country; Fig. 100) and the remaining with the large river valleys of central (Erzeni) and south-eastern Albania (Dëshnica, Devolli, Dunica) (Fig. 52).

Field notes. At a majority of the Albanian sites of *M. daubentonii* (61.5%), foraging individuals were documented, in summer months only (June, July, August). At five sites the bats were caught into nets installed above rivers or small streams (1–5 inds., mean 2 inds., all bats were males), at four sites echolocation calls of bats foraging above various water bodies were detected and/or foraging bats were observed (lake, pond, rivers). The altitudinal range of the foraging sites follows

Fig. 56. An individual of *Myotis daubentonii* netted at the entrance of a small cave in the cliff east of Gollomboç (Korçë: Pref.), 1 October 2005. Photo by K. Sachanowicz.

Fig. 57. Dëshnica river valley near Roshanj, area at ca. 1,050 m a. s. l. (Korçë Pref.); foraging habitat of a rich bat community, individuals of *Myotis myotis*, *M. davidii*, *M. daubentonii*, and *Vespertilio murinus* were netted above the river, and the echolocation calls of *Eptesicus serotinus*, *Hypsugo savii*, *Nyctalus leisleri*, and *Tadarida teniotis* were detected in the valley. Photo by M. Uhrin (June 2016).

the whole range of distribution of *M. daubentonii* in Albania (Table 2), although the value of the altitude median is higher, 962.5 m a. s. l. This value again indicates the clear preference for high altitudes in this bat, at least in the regions of its common occurrence in the Balkans.

Only a minority of the records (22.7%) of *M. daubentonii* in Albania represent findings of individuals in their roosts. All the roosts documented were natural caves situated on the banks of the Prespa lakes, roughly at 850 m a. s. l. (Theou et al. 2015a, Sachanowicz & Ciechanowski 2018, own data). The bats were observed there in the spring, summer and autumn months (April, June, August, October), while no data are available from the hibernation period. Variable numbers of *M. daubentonii* were observed in these roosts, in the range of 3–100 individuals, but the sex of the roosting bats was not examined. At the entrances to two of these caves (Treni cave, Gollomboç cave), *M. daubentonii* was caught at least eight times into nets installed there in April, August, September, and October; the numbers of netted individuals varied between two and twelve (mean 5.9 inds.), 79% of the caught individuals with identified sex were males.

No maternity roost of *M. daubentonii* was discovered in Albania, although volant juvenile individuals were netted at the entrances to the two caves at Prespa lakes in August. However, these bats could originate from the maternity colony discovered on the Greek side of the Prespa region, roosting in the Cape Roti cave (Papadatou et al. 2011). The cave entrances more probably serve as swarming sites for the Prespa populations in late summer and in autumn (Sachanowicz & Ciechanowski 2018).

Note on morphology. The individuals from the populations of *Myotis daubentonii* of the south-western Balkans associated by their distribution with the Ohrit and Prespa lakes were reported to be larger in their body dimensions than the bats of other Balkan populations or populations of

Central Europe (Bogdanowicz 1990, von Helversen & Weid 1990). Two adult males from Albania (Roshanj, Selcë) examined here conform in their dimensions to the bats from North Macedonian and north-western Greek parts of the considered area: forearm lengths 38.5 mm and 38.1 mm (mean [M] 38.3 mm, vs. M 36.9±0.96 mm by von Helversen & Weid 1990; M 37.7±0.7 mm, Sachanowicz & Ciechanowski 2018), condylobasal lengths of skull 13.47 mm and 14.03 mm (M 13.75 mm, vs. M 13.9 mm by Bogdanowicz 1990). The nature of this size variation has not been fully discussed yet (see Bogdanowicz 1990); however, it seems to be linked to the relatively harsh climate and relative isolation of the occurrence area of the Ohrit/Prespa populations.

Records of ectoparasites. **Original data**: S p i n t u r n i c i d a e: *Spinturnix andegavina*: 1 ma, 1 fa, 1 deutonymph, 1 protonymph (CMŠ [P]) from 1 ma (NMP 96554), Roshanj (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin; 1 deutonymph m, 1 deutonymph f (CMŠ [P]) from 1 ma (NMP 96527), Selcë (Korçë Pref.), 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: N y c t e r i b i i d a e: *Penicillidia dufourii*: 1 ind., Treni's cave, 24–25 September 2012 (Scheffler et al. 2013). – S p i n t u r n i c i d a e: *Spinturnix andegavina*: 1 ind., Treni's cave, 24–25 September 2012 (Scheffler et al. 2013 [as *S. andegavinus*]); [unspecified number, sex and stage], Fushë Studë, 5 August 2015 (Boshamer 2016 [as *S. andegavinus*]).

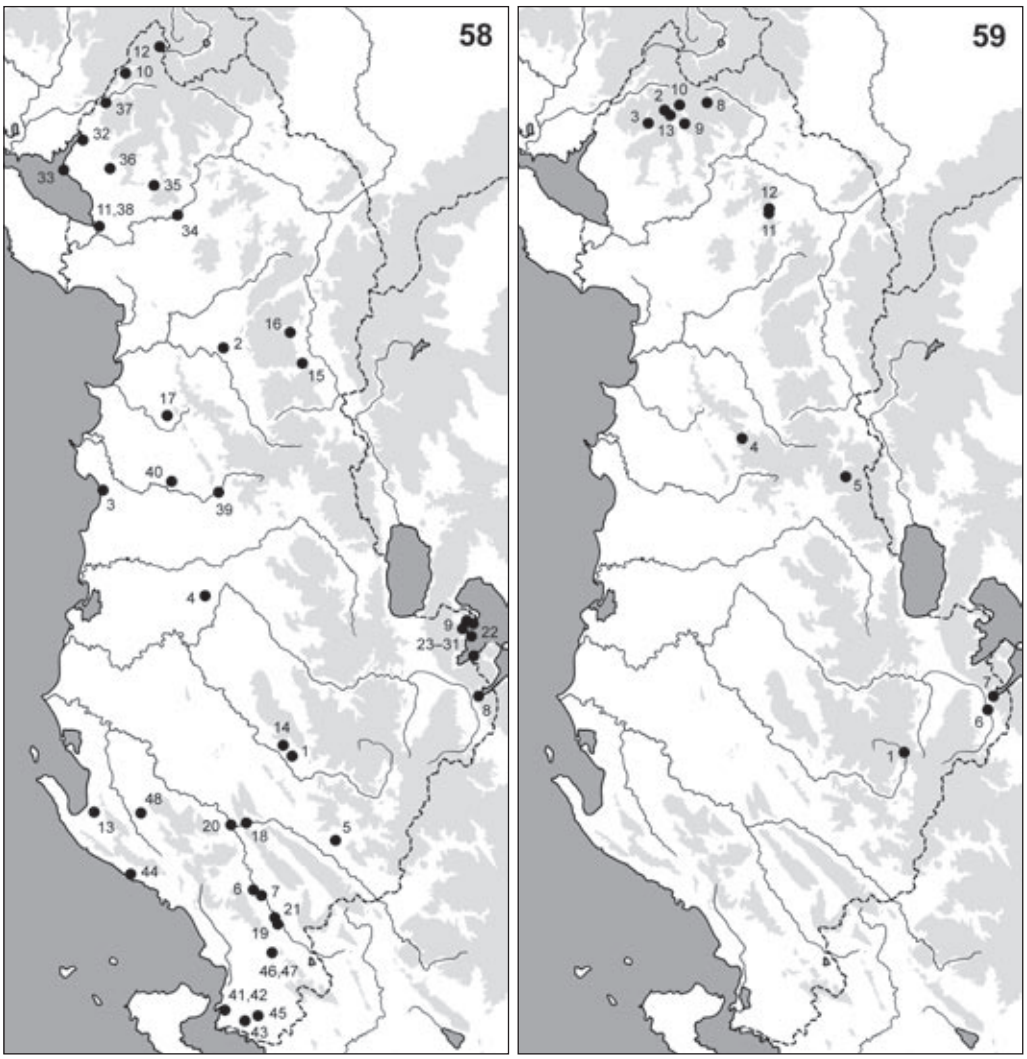
Comments on ectoparasites. In total, two arthropod parasite species were collected from *Myotis daubentonii* in Albania.

The bat fly *Penicillidia dufourii* (Westwood, 1834) is not a common parasite of *M. daubentonii*; nevertheless, several records of this fly-host association are available from western and central Europe (Aellen 1963, Szentiványi et al. 2016b). In Albania, this fly was collected from six bat hosts, besides *M. daubentonii* also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a, Scheffler et al. 2013, Boshamer 2016; see above and below).

The bat mite *Spinturnix andegavina* Deunff, 1977 is a parasite strictly adapted to *M. daubentonii* (Deunff 1977, Pocora et al. 2013). The distribution range of this mite corresponds with the range of its principal host, it covers Europe from France and Scandinavia to northern Russia and the Caucasus (Pocora et al. 2013). However, the species status of *S. andegavina* is not accepted universally, several authors considered it to be rather a part of another species, *S. myoti* (Kolenati, 1856), see e.g. Lanza (1999) and Orlova et al. (2015). The records of *S. andegavina* thus could be more numerous and its range more extensive than really reported, though hidden under different names.

Myotis capaccinii (Bonaparte, 1837)

Records. **Original data**: B e r a t: Zogas, above a small pond [1], 23 September 2018: net. 1 ma. – D i b ë r: Urakë, above the Tarini river [2] (Fig. 116), 2 July 2018: net. 1 mj. – D u r r ë s: Shkallnur, Shkëmbi i Kavajës [3], bunkers, 29 January 2016: obs. 6 inds. torpid. – E l b a s a n: Dushk, Rimoni lake [4], at the lake bank, 1 October 2018: det. calls of several foraging inds. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [5] (Fig. 107), above the Lengarica river at thermal baths, 28 June 2019: net. 2 faL, 1 fj, 29 June 2019: net. 1 ma, 1 faL, 1 fa (leg. R. Lučan); at an entrance to a bunker, 29 June 2019: net. 1 ma (leg. R. Lučan); – Gerhot, Viroi spring, bunker [6] (Fig. 32), 27 January 2016: obs. 4 inds. torpid (exam. 2 ma); – Gjirokastër, castle [7] (Figs. 39, 40), 27 January 2016: obs. 12 inds. torpid (exam. 1 fs), 3 May 2016: obs. a colony of ca. 200 inds. torpid (mixed with *Myotis blythii*). – K o r ç ë: Tren, Treni cave [8] (Fig. 61), 7 July 2015: obs. a colony of ca. 500 inds. (mixed with *Miniopterus schreibersii*), 25 January 2016: obs. an aggregation of ca. 35 inds. torpid (Fig. 60) (exam. 1 ma), 28 June 2016: obs. a colony of ca. 100 inds.; – Goricë e Vogël, Zaveri cave [9], 28 June 2016: obs. a nursery colony of ca. 1,500 inds. – S h k o d ë r: Selcë, Cemi river valley [10] (Fig. 117), above the river, 9 July 2016: net. 1 ma, det. calls of several foraging inds.; – Shkodër, bunker [11] (Fig. 34), 13 May 2016: obs. a colony of ca. 1200 inds. (ad. + juv.; some clusters of mixed composition, with *Myotis myotis* and/or *Miniopterus schreibersii*), 10 July 2016: obs. a colony of ca. 1,200 inds. (mixed composition, with *Myotis myotis* and *Miniopterus schreibersii*), 18 September 2018: obs. several inds.; – Velan, Vermoshi river valley [12] (Fig. 63), 24 June 2018: det. & rec. calls of several foraging inds. – V l o r ë: Tragjas, at the Izvori river spring [13] (Fig. 81), 30 September 2018: obs. & det. calls of 1 foraging ind. – **Published data**: B e r a t: Çorovodë, over Çorovodë river [14], 8 July 2011 (Sachanowicz et al.



Figs. 58, 59. Records of particular bat species in Albania. 58 – *Myotis capaccinii* (Bonaparte, 1837). 59 – *Vespertilio murinus* Linnaeus, 1758.

2014); Çorovodë, Çorovodës river, rocky gorge, 8 July 2011: net. 1 ma, 1 fj (Sachanowicz & Ciechanowski 2018). – D i b ë r: Fushë-Muhurr, tunnel entrance [15], rocky gorge, 23 September 2005: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Sopanik Cave [16] (Dundarova 2016). – D u r r ë s: Golem, Shkëmbi i Kavajës [3], bunker, 3 February 2014: obs. 2 inds. (Théou et al. 2015b); – Halil, tunnel [17], forested rocky slope, 26 April 2010: obs. (& exam. 1 ma) torpid (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Benjë, cave [5], 19 November 2014: obs. 5 inds. (Théou et al. 2015b); – Gjirocaster castle [7], dark corridors, 23 April 1995: obs. a colony [mixed with *Myotis myotis*, *M. capaccinii*, and *Miniopterus schreibersii* of 800 inds.], net. 6 m, 3 f (Uhrin et al. 1996); Gjirokastër, citadel, 26 September 2012: net. 8 inds. (Scheffler et al. 2013); Gjirokastër, castle undergrounds, 21 April 2004: obs. a breeding colony of ca. 750 inds.

& 31 inds. torpid, 11 July 2011: obs. a colony of ca. 1000–2000 inds. mixed with *Miniopterus schreibersii*, *Myotis myotis*, and *M. blythii* (Sachanowicz & Ciechanowski 2018); – Shpella e Mezhgoranit [18], 11 October 1960: obs. a colony, 28 m, 4 f (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 27 m, 5 f (Hanák 1964); Shpella e Mezhgorani, April 1995: net. 1 ind. (Uhrin 1995); Mezhgoranit cave near Tepelene, 22 April 1995: net. 1 f (Uhrin et al. 1996); "Mazhgoranit" cave near Tepelene, 11 October 1960: 1 f, NUU (Kaškarov & Mitropol'skaâ 2004); Mezhgoran, Mezhgoran cave, 22 August 2006: obs. a colony of several hundred inds. mixed with *Miniopterus schreibersii*, *Myotis myotis*, and *M. blythii*, net. 1 fa at the cave entrance (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnels [19], 22 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Tepelene, over a river in old floodplain forest [20], 10 July 2011 (Sachanowicz et al. 2014); Tepelenë, branch of a river in riparian forest of planes and poplars, Vjosës valley, 10 July 2011: net. 2 mj (Sachanowicz & Ciechanowski 2018); – Vanishter, cave [21], April 1995: net. 34 inds. (Uhrin 1995); Vanishter cave, 23 April 1995: net. 10 m, 24 f (Uhrin et al. 1996); Vanister, cave, 27 September 2012: exam. 2 inds. (Scheffler et al. 2013). – K o r ç ë: Gollombaçi, cave 2 km south of the village [22], April 1995: net. 2 inds. (Uhrin 1995); Gollombaçi, Macro Prespa lake, small cave 1 km E of the village, 20 April 1995: net. 1 ma, 1 fa (Uhrin et al. 1996); Gollomboc Cave 2 (Papadatou et al. 2011); Gollomboç, cave, 22 February 2014: obs. 1 ind. (Théou et al. 2015b); Gollomboç, entrance of a small cave in the cliff, Macro Prespa lake shore, 1 October 2005: net. 3 fa, 8 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Mikro Prespa lake, a large cave about 50 m from the west end of the lake [= Treni cave] [8], 30 May 1991: obs. a colony of about 10,000 inds. (Chytil & Vlašín 1994); Mikroprespanská j., April 1995: obs. 1000 inds., net. 53 inds. (Uhrin 1995); Micro Prespa cave, 21 April 1995: obs. a colony of ca. 1000 inds., net. 17 m, 37 f (Uhrin et al. 1996); Treni cave, 1998, 2007, 2008, 2009: obs. inds., October 2010: net. several inds., February 2011: obs. several hundred inds. (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. numerous inds., exam. 55 inds. (Scheffler et al. 2013); Tren, Treni cave, 24 November 2012: obs. 1 ind., 21 February 2014: obs. 100 inds., 13 November 2014: obs. 8 inds. (Théou et al. 2015b); Treni cave, August 2014: 4000 inds. (Théou 2015); Micro Prespa cave, 10 August 2006: obs. 4 inds. in the cave, net. 7 ma, 4 mj, 8 fa, 3 fj at the cave entrance (Sachanowicz & Ciechanowski 2018); – National Park of Prespa Lakes, 12 sites [8, 9, 22–31], 24 September 2012 – 23 April 2015: obs. numerous inds. (maximum 5052 inds. in total per one check) (Theou et al. 2015a). – S h k o d ë r: [Bajzë], Shpella e Zef Toma [32], 7 June 2015: obs. 4 inds. (Théou & Đurović 2015a); – Kamicë Flakë, over the Shkodër lake [33], 6 September 2012: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018); – Koman, over Drin river tributary [34], 12 August 2003 (Sachanowicz et al. 2014); Koman, Drini i Bardhë river tributary, rocky gorge, 12 August 2003: net. 1 fa (Sachanowicz & Ciechanowski 2018); – [Prekal], Shpella e Xhyla [35], 9 June 2015: obs. 2 inds. (Théou & Đurović 2015a); – [Qafë Gradë], Shpella e Pellumbave [36], 6 June 2015: obs. 1000 inds. (Théou & Đurović 2015a); – Rahovic, Cemit river [37], limestone gorge, 22 June 2011: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018); – Shkodër, small cellar of the Rozafa castle [38], 23 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shpella e Zezä [= Pëllumbasi cave] [39], April 1995: net. 6 inds. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: net. 1 m, 6 f (Uhrin et al. 1996); Zëze cave, in the cave, 3 July 2011: obs. a breeding colony of ca. 5000 inds. mixed with *Miniopterus schreibersii* and other 50 inds. in a separate cluster (Sachanowicz & Ciechanowski 2018); – [south of] Tiranë, tunnel [40], February 2013: obs. 1 ind. (Çera 2014 [as *M. daubentonii*]); south of Tirana, 37 man-made bunkers and tunnels, 13 March 2012 – 1 June 2014: obs. inds. (Theou & Bego 2014); Tirana, tunnel, 16 February 2013: obs. 2 inds. (Théou et al. 2015b). – V l o r ë: Butrint, entrance of military tunnels connected with a cave [41], near a hill top, 24 April 2004: net. 1 ma, 1 fa, 1 faG, 5 May 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Butrint, Ali Pasha fortress [= Kështjella Trekëndore] undergrounds [42], 26 April 2004: obs. 1 fa, 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Mursi, over the lake [43], limestone foothills nearby, 2 May 2010: det. calls of numerous foraging inds. (Sachanowicz & Ciechanowski 2018); – Shpella e Parashqevise [44], cave, 29 April 2016: obs. 150 inds. (Théou & Loce 2017); – Shalës, adit [45], in rocky slope, 26 April 2004: obs. 5 inds. torpid; adit entrance, 2 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, Bistricës spring [46], old plane forest, 23 April 2004: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, Bistricës river, forested valley with old *Platanus* trees [47], 24 August 2006: net. 1 ma, 5 mj (Sachanowicz & Ciechanowski 2018); – Velce [48], Velce cave, 6 December 2014: obs. 15 inds. (Théou et al. 2015b).

Distribution. *Myotis capaccinii* is a medium frequent bat in Albania, 48 localities are known from the country (Table 1). The records come from low and medium altitudes (range 1–1,005 m a. s. l., median 286.5 m) and were made mainly in the Western Lowlands, Southern Mountain Range, and the Prespa region (Fig. 58). The Albanian range is a part of the continuous occurrence of *M. capaccinii* in the Balkans and the Mediterranean Basin (Dietz et al. 2016). The relatively high number of its records in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkan Peninsula, including some islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Karataş et al. 2003, Presetnik et

Fig. 60. A group of *Myotis capaccinii* hibernating in the Treni cave (Korçë Pref.; Fig. 61), 25 January 2016. Photo by M. Uhrin.

al. 2009, 2014, Micevski et al. 2014, Paunović 2016, Tvrtković 2017, etc.). The pattern of the geographical and altitudinal distribution of *M. capaccinii* and *M. daubentonii* suggest a vicariant occurrence of these two trawling bats in the central parts of the Balkans including Albania (Figs. 8, 52, 58), although in certain areas they live in sympatry. Only nine particular findings (12.6%) of *M. capaccinii* in Albania were made in the twentieth century (1960–1998), all other records come from the period 2003–2019.

Field notes. *Myotis capaccinii* was recorded in Albania in all parts of a year, including the hibernation season. The largest time gap between records is a two-month period of the winter-spring transition between late February and late April; on the other hand, the largest number of records come from the following spring season, 28.6% of the particular records were made just within two weeks between 20 April and 5 May (incl.). Majority of the records of *M. capaccinii* in Albania (54.3%) represents the findings of bats in their roosts, the remaining number is related to the records of bats on wings, although only a fifth of the particular records represents foraging bats.

The largest number of records from one site (19, more than a quarter) was made in or at the Treni cave on the south-western bank of the Prespë e Vogël (Lesser Prespa) lake (Fig. 61), where a colony of 10,000 *M. capaccinii* was discovered in May 1991 (Chytil & Vlašín 1994), and was checked again in April 1995, when only some thousand bats were counted (Uhrin et al. 1996), and then, many times in various seasons between 1998 and 2016 (incl.); about ten checks belong to the hibernation period. Théou (2015) found 4,000 bats in the Treni cave in August 2014, while

just about a hundred individuals were documented there during the last visit in June 2016 (own data). These oscillations of the numbers of *M. capaccinii* individuals encountered in the Treni cave seem to be connected rather with a dynamic switching of the roosts among various parts of the Prespa region than with a decrease of the population (cf. Papadatou et al. 2011). However, the division of the region of the great lakes among three countries makes an evaluation of real population trends somewhat difficult.

Hibernating individuals of *M. capaccinii* were found at fourteen sites between 13 November and 22 February (incl.), in ten natural caves of various size and in four artificial shelters – two small bunkers, one larger bunker system (Shkëmbi i Kavajës) and in dark rooms of a medieval castle (Gjirokastër; Figs. 39, 40). In all hibernacula but the Treni cave, only single bats or small groups were recorded and these small numbers were also found during most of the checks of the Treni cave. Papadatou et al. (2011) reported a colony of several hundred individuals found in this cave in February 2011, Théou et al. (2015b) observed about a hundred bats there in February 2014; during the last winter check of this cave in January 2016, an aggregation of at least 35 bats was found in a ceiling fissure (Fig. 60). Theou et al. (2015a) reported a number of 5,052 individuals of *M. capaccinii* counted during one check of nine unspecified hibernacula of the Prespa region; most probably, a large portion of this number was found again in the Treni cave. The known hi-

Fig. 61. Area at the entrance to the famous Treni cave at the westernmost extent of the Prespë e Vogël (Lesser Prespa) lake (Korçë Pref.); the cave serves as a hibernaculum of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. capaccinii*, *Eptesicus serotinus*, and *Miniopterus schreibersii*, and a summer roost of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis daubentonii*, *M. capaccinii*, and *Miniopterus schreibersii*, the latter two species forming large colonies there; additionally, *Rhinolophus euryale*, *R. blasii*, *Myotis blythii*, *Vespertilio murinus*, *Hypsugo savii*, *Plecotus austriacus*, and *P. kolombatovici*, were netted at the cave entrance. Photo by M. Uhrin (July 2015).

Fig. 62. Part of a mixed colony of *Myotis capaccinii* and *Miniopterus schreibersii* roosting in a dark vaulted room of the castle of Gjirokastër (Gjirokastër Pref.; Figs. 39, 40), 3 May 2016. Photo by P. Tájek.

bernacula are situated in the altitude range of 4–866 m a. s. l. (median 856.5 m), i.e. between the sea level and the level of the Prespa lakes; at the latter level the largest number of hibernacula was documented. Similarly as in other cave-dwelling bat species of Albania (Table 5), *M. capaccinii* hibernates in the caves situated mainly at medium altitudes (range 323–866 m a. s. l., median 860.0 m), while in artificial shelters at low altitudes (range 4–360 m a. s. l., median 211.0 m).

In the non-hibernation period, *M. capaccinii* was recorded 25 times in 16 roosts, in nine natural caves and seven artificial roosts, among them, only the Treni cave and the Gjirokastër castle served also as hibernacula. The documented caves were rather long and spacious, the artificial shelters were represented by a small mine/bunker, two small concrete military bunkers, one very large bunker composed of several underground halls, and three medieval castles/fortresses (Gjirokastër, Kështjella Trekëndore, Rozafa). In the majority of cave roosts (75.0%), large aggregations of *M. capacinni* were found, while only in a minority of artificial roosts (28.6%); otherwise only single bats or small groups of less than ten bats were found. In the artificial shelters, numbers in the large colonies were estimated between 750 and 2,000 bats. The smallest colony found in a cave (Parashqevisë cave) comprised some 150 bats, while other cave aggregations were composed of several hundreds to several thousands of individuals (up to 10,000 bats in the Treni cave, see above). The

roosts were situated at low to medium altitutes in the range of 1–866 m a. s. l. (median 212.0 m), the cave roosts were found rather at medium altitudes (range 70–866 m a. s. l., median 395.0 m), while the artifical roosts in lowland elevations (range 1–360 m a. s. l., median 88.0 m).

At least 62.3% of the large aggregations of *M. capaccinii* (including one winter colony) were composed of more than one bat species (Sachanowicz & Ciechanowski 2018, own data); *M. capaccinii* colonies were found mixed twice with *Myotis blythii*, twice with *Miniopterus schreibersii*, twice with *Myotis myotis* and *Miniopterus schreibersii*, and twice with *Miniopterus schreibersii*, *Myotis myotis*, and *M. blythii*.

At ten sites – five caves, four bunkers/tunnels, one castle – altogether nineteen times (26.7% of particular records), individuals of *M. capaccinii* were netted at the entrances to or in underground spaces, seven of them were documented to serve also as a roost of this bat (the only exception was the bunker at Butrint; Fig. 23). Nine netting sessions (47.4%) were carried out in late April and early May and other nine sessions in August to October, one netting in the late June; four times netting was performed at the Treni cave, three times at the Gollomboç cave, twice *M. capaccinii* bats were netted at four sites. Altogether, about 210 individuals were netted, of them 50 identified males and 91 females (i.e. in a rough ratio 1:2).

Foraging individuals of *M. capaccinii* were recorded at fifteen sites, the bats were netted at nine of them. Males highly outnumbered females among the netted bats (2:1). All localities included water bodies with open water surface, although a big part of the habitats were represented by running water in a valley or gorge (46.7%), rather still water of a lake or pond was recorded at 26.7% of the sites, springs and small streams surrounded by a rather dense riparian forest represented 26.7% of the foraging grounds of *M. capaccinii*. The foraging sites were spread across

Fig. 63. Vermoshi river valley near Velan at ca. 1,000 m a. s. l., the northernmost locality of bat occurrence in Albania (Shkodër Pref.); foraging habitat of *Myotis capaccinii* and *Pipistrellus pipistrellus*. Photo by Z. Bendová (June 2018).

the whole altitude span of the species in Albania (8–1,005 m a. s. l.), although the low value of the altitude median (145.0 m) clearly indicates the dominant use of lowland areas by this bat for foraging in Albania.

Various stages of *M. capaccinii* reproduction were documented at many sites in Albania throughout a large part of the non-hibernation period. Maternity colonies were reported from four sites, two caves (Pëllumbasi cave, Zaveri cave), a bunker (Shkodër) and a castle (Gjirokastër), between late April and early July; these colonies were composed of 750–5,000 individuals, in one case the colony was mixed with other species. However, large aggregations representing most probably also maternity colonies (containing 150–10,000 bats) were found in other four caves in the period between late April and August. All these colony roosts come from the altitude range of 17–866 m a. s. l. (median 377.5 m), i.e. mostly from the medium high positions. A pregnant female was netted at one site, at the Butrint bunker on 24 April. Three lactating females were netted at one site on 28 and 29 June; volant juveniles of the year (19 individuals, mostly males) were documented at seven localities between the end of June and the end of September.

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia pedicularia*: 8 ma, 17 fa (CMŠ [A]) from 2 ma (NMP 96539, 96540), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; 1 ma, 1 fa (CMŠ [A]) from 1 fs (NMP 96542), Gjirokastër (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; 2 ma, 2 fa from (CMŠ [A]) from 1 ma (NMP 96594), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda & M. Uhrin. – *Penicillidia dufourii*: 4 ma, 10 fa (CMŠ [A]) from 2 ma (NMP 96539, 96540), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – S p i n t u r n i c i d a e: *Spinturnix psi*: 2 fa (CMŠ [P]) from 2 ma (NMP 96539, 96540), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; 1 protonymph (CMŠ [P]) from 1 ma (NMP 96594), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 3 fa (CMŠ [P]) from 2 mj, Tepelenë (Gjirokastër Pref.), 10 July 2010, leg. M. Ciechanowski, M. Piskorski & K. Sachanowicz; 4 fa (CMŠ [P]) from 1 fj (NMP 96607), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – *Macronyssus granulosus*: 2 fa, 1 protonymph (CMŠ [P]) from 1 ma (NMP 96539), Gerhot, Viroi spring (Gjirokastër Pref.), 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; 3 protonymphs (CMŠ [P]) from 1 fj (NMP 96607), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – **Published data**: S t r e b l i d a e: *Brachytarsina flavipennis*: 1 ma, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 76 ma, 66 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 36 inds., Treni's cave, 24–25 September 2012 & cave near Vanister, 27 September 2012 (Scheffler et al. 2013). – *Nycteribia latreillii*: 2 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962 [as *N. latreillei*], 1963a). – *Nycteribia vexata*: 1 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a). – *Penicillidia dufourii*: 5 ma, 9 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *P. dufouri*]); 16 inds., Treni's cave, Citadel of Gjirokaster & cave near Vanister, 24–27 September 2012 (Scheffler et al. 2013). – S p i n t u r n i c i d a e: *Spinturnix psi*: 43 inds., Treni's cave, Citadel of Gjirokaster & cave near Vanister, 24–27 September 2012 (Scheffler et al. 2013); 1 ma, 2 fa, 1 nymph, Koman, 12 August 2003 (Sachanowicz et al. 2014); 1 ma, 2 fa, Çorovodë, 8 July 2011 (Sachanowicz et al. 2014); 4 ma, 1 fa, 1 nymph, Tepelene, 10 July 2011 (Sachanowicz et al. 2014); 2 ma, Çorovodë, 8 July 2011 (Sachanowicz et al. 2014); 2 inds., [details unlisted] (Sachanowicz et al. 2017). – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 1 ind., Treni's cave / Citadel of Gjirokaster, 24–26 September 2012 (Scheffler et al. 2013 [as *Ichronychus scutatus*]).

Comments on ectoparasites. In total, eight arthropod parasite species were collected from *Myotis capaccinii* in Albania, one of them is here reported from the country for the first time.

The streblid bat fly *Brachytarsina flavipennis* Macquart, 1851 is a parasite of the cave-dwelling bats, the medium-sized *Rhinolophus* bats are its principal host group (Lanza 1999, Szentiványi et al. 2016b). From Albania, it was documented solely from this ecological group of bats, besides *M. capaccinii* also from *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, and *Miniopterus schreibersii* (Hůrka 1962, 1963a; see above and below). The distribution range of this bat fly covers just the thermo-Mediterranean zone of the western Palaearctic, the records from Albania represent a part of its range limits in Europe (Hůrka 1962, 1984, Ivanova et al. 1995).

Four nycteribiid species were collected from *M. capaccinii* in Albania, *Nycteribia pedicularia* Latreille, 1805, *N. latreillii* (Leach, 1817), *N. vexata* Westwood, 1835, and *Penicillidia dufourii*

(Westwood, 1834). All collected species of bat flies belong to the group of parasites of the cave--dwelling bats and are common also in *M. capaccinii* (Hůrka 1964, Szentiványi et al. 2016b). Of these species, *M. capaccinii* is the principal host only of one bat fly species, *N. pedicularia* (Hůrka 1964). It is a Mediterranean species, occurring in the southern part of Europe, in the Maghreb and Middle East (Maa 1968, Hůrka 1984, Szentiványi et al. 2016b). This bat fly was frequently documented also from other cave bats, in Albania it was collected from ten host species, besides *M. capaccinii* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. davidii*, *Eptesicus serotinus*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below). The principal host group of the three remaining bat flies, *N. latreillii*, *N. vexata*, and *P. dufourii*, are bats of the *Myotis myotis* complex (Hůrka 1962, 1984, Lanza 1999, Szentiványi et al. 2016b). In Albania, *N. latreillii* was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, and *M. blythii* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above). The distribution range of this parasite covers the Mediterranean and Central Asian range of the host bat complex (Hůrka 1964, 1969). *N. vexata* was collected also from *Myotis myotis*, *M. blythii*, *M. emarginatus*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, and *Tadarida teniotis* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). The nominotypical form of this species is distributed over the continental part of Europe and in the African and Asian parts of the Mediterranean Basin (Hůrka 1964). *P. dufourii* was collected also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. daubentonii*, and *M. schreibersii* in Albania (Hůrka 1962, 1963a, Scheffler et al. 2013, Boshamer 2016, Szentiványi et al. 2018; see above and below). The nominotypical western subspecies of *P. dufourii* occurs in the Mediterranean and in Central Asia eastwards to eastern Kazakhstan and the western Himalayas (Hůrka 1969, Medvedev & Polkanov 1997).

The bat mite *Spinturnix psi* (Kolenati, 1856) is an exclusive permanent parasite of the *Miniopterus* bats (Uchikawa et al. 1994), its distribution conforms to the range of the family Miniopteridae in the Palaearctic, Oriental and Australasian realms (Rudnick 1960, Dusbábek 1962, Uchikawa et al. 1994). In the distribution range of *M. capaccinii*, this bat is also regarded the primary host of *S. psi*, namely in the case of a mixed colony with *Miniopterus* or in case of shared cave roost by these two bat taxa (Deunff et al. 2004). From Albania, it was documented also from *Eptesicus serotinus* and *Miniopterus schreibersii* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see below).

Two macronyssid polyxenic troglophilic mite species were documented from *M. capaccinii* in Albania, *Ichoronyssus scutatus* (Kolenati, 1856) and *Macronyssus granulosus* (Kolenati, 1856); the latter species for the first time in the country. Although *I. scutatus* parasitises primarily the bats of the genus *Myotis*, it was found also on the genera *Vespertilio*, *Miniopterus*, and *Rhinolophus* (Dusbábek 1964b, Beron 1969, Radovsky 1967). In Albania it was documented additionally from *Myotis myotis*, *M. blythii*, *M. emarginatus*, and *Miniopterus schreibersii* (Scheffler et al. 2013, own data; see above and below). It is a species distributed across the Old World, including Europe, Africa, Middle East, and Japan (Radovsky 1967, Stanyukovich 1997). The host range of *M. granulosus* is wide and composed of cave-dwelling bats, its occurrence is known from a large part of the Old World (Radovsky 1967). Our numerous collections of the protonymph stages from *M. capaccinii* in early July are similar to the record from *M. blythii* and correspond with the observations elsewhere (Estrada-Peña & Serra-Cobo 1991, see under *M. blythii* above). From Albania this parasite was collected also from *Myotis blythii*, *M. emarginatus*, and *Miniopterus schreibersii* (own data; see above and below). The distribution range of *M. granulosus* covers a large part of the Old World (Radovsky 1967).

Vespertilio murinus Linnaeus, 1758

Records. **Original data**: K o r ç ë: Roshanj, Dëshnica river valley [1] (Fig. 57), above the river, 27 June 2016: net. 1 ma. – S h k o d ë r: Fushë Okol, above a watering place [2] (Fig. 66), 16 September 2018: net. 1 ma; – Grykë Lugje, above a watering place [3] (Fig. 74), 17 September 2018: net. 4 ma, det. & rec. calls of 1 foraging ind. – **Published data**: D u r r ë s: Mali i Skendereut, NE of Tirana, road km 22 [4], 3 October [1992]: det. calls of 1 ind. (Uhrin et al. 1996). – E l b a s a n: Fushë Studë [5], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – K o r ç ë: Billisht, Devoll river [6], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Micro Prespa cave [= Treni cave] [7], the cave entrance, 10 August 2006: net. 1 fa (Sachanowicz & Ciechanowski 2018). – K u k ë s: Valbonë, edge of mountain beech-spruce forest with small stream [8], 7 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Nderlysë, Shalës river [9], under a bridge, 9 September 2012: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [10], old beech forest nearby, 8 September 2012: net. 31 ma, 22 fa (Sachanowicz & Ciechanowski 2018); – Qafa e Malit [11], small pool in bed of a mountain stream, 18 September 2005: det. advertisement calls, 8 August 2007: net. 1 ma, det. advertisement calls; mountain beech forest, 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain beech forest [12], 18 September 2005: det. advertisement calls (Sachanowicz & Ciechanowski 2018); – Qafa e Thores, mountain beech forest [13], limestone rocks, 11 August 2007: det. advertisement calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Vespertilio murinus* belongs among rather rare bats in Albania, only 13 localities are available from the country (Fig. 59, Table 1). Most of the record sites (61.5%) are concentrated to the north-Albanian mountains, Albanian Alps and Munellë massif, the remaining records were made in central and south-eastern Albania. All the records come from rather high mountains of the country, this species clearly belongs among the bats preferring high altitudes. The median of the altitude distribution of *V. murinus* in Albania is 866.0 m a. s. l. (range 462–1,541 m), making this bat the fourth most montane species (see Fig. 8, Table 2).

The Albanian localities of *V. murinus* create a part of the south-western and southern margins of the species distribution range in the Balkans and Europe as well (Dietz et al. 2016). The male netted above the Dëshnica river at Roshanj (Korçë Pref.; Fig. 57) represents the second southernmost record of *V. murinus* in Europe, situated only 46 km north of the absolutely southernmost site, at Prionia, Olympos Mts., Greece (Hanák et al. 2001). In the Balkans, *V. murinus* is one of the rarest bats with scarce records distributed irregularly over the Peninsula, except of the southern and central parts of Greece, where its records are completely absent (Hanák et al. 2001, Kryštufek & Petkovski 2003, Ciechanowski et al. 2005, Presetnik et al. 2014, Dietz et al. 2016, Paunović 2016, Tvrtković 2017, Rachwald et al. 2019, etc.). More abundant occurrence of this bat (and perhaps permanent for a part of the population) was evidenced only in the mountains of south-western Bulgaria and north-eastern Greece, where more than twenty localities are available (Weid 1988, Hanák et al. 2001, Benda et al. 2003b, Petrov & von Helversen 2011). The relatively abundant records of *V. murinus* in the Albanian Alps indicate another area of more dense occurrence in the Balkans along with the Bulgarian-Greek mountainous borderland.

Field notes. The records of *Vespertilio murinus* in Albania were made only in the summer and autumn seasons, between late June and early October (Fig. 64); however, more than a half of the records (53.3%) come from the late summer/autumn period between 8 September and 3 October (incl.) – 59 bats were netted in these four weeks. Six records were made in the full summer between 28 July and 11 August (with two netted bats) and one male was netted on 27 June, the earliest record within a year.

All findings of *Vespertilio murinus* in Albania represent the bats on wings, no roost of this bat was revealed. Individuals were netted at seven sites (53.8%), the remaining findings are based on recordings of the echolocation or social calls. Among the netted bats only adult individuals were reported, males dominated over females, both in the number of individuals (19:12) and in the number of sites (5:3; Fig. 64). The sites are situated mostly in mountain valleys, frequently

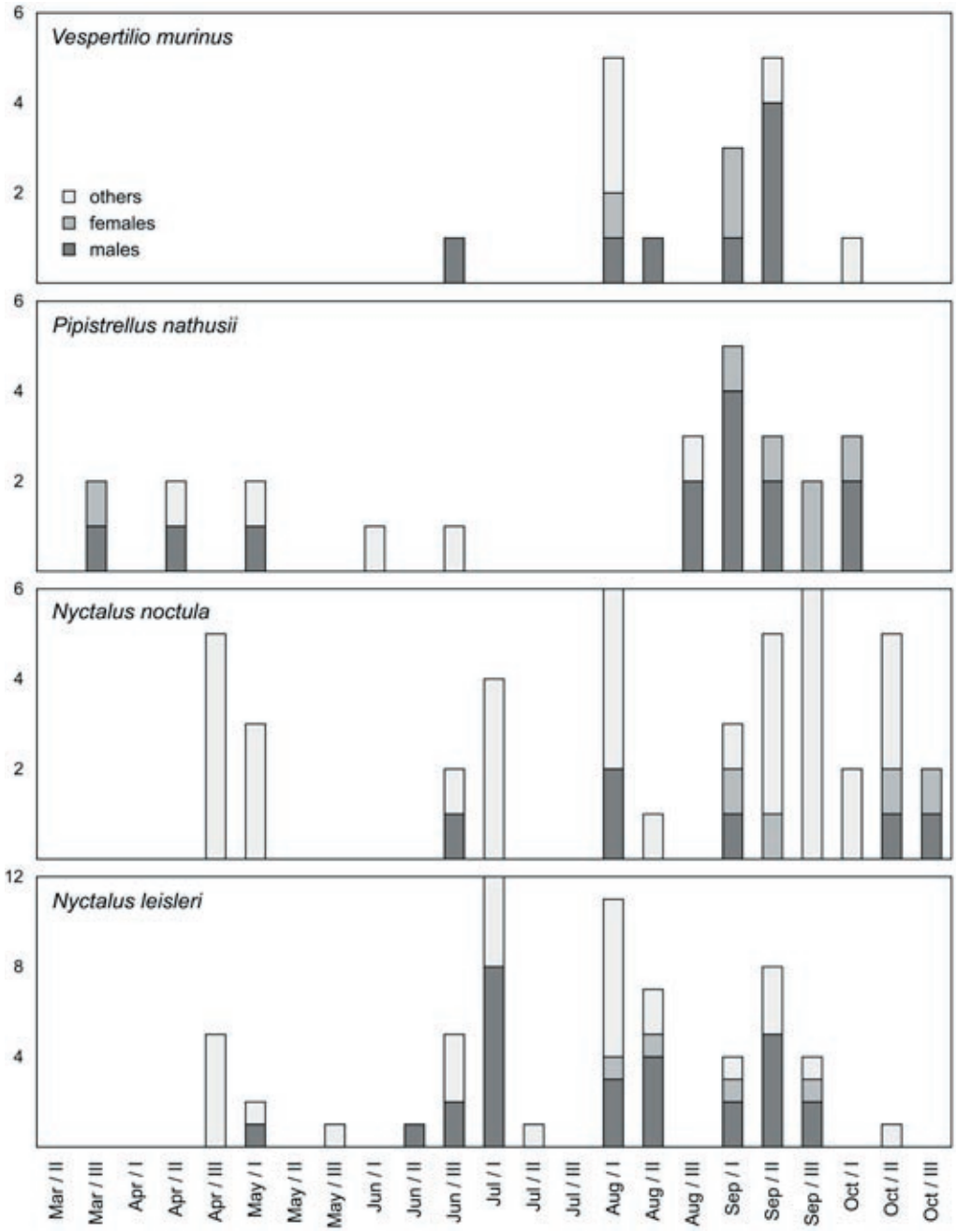


Fig. 64. Annual distribution of particular records in four migratory bat species in Albania with respect to the sex of the individuals recorded.

with streams or watering places. Most sites are adjacent to rocky areas, in two cases the call of *V. murinus* was detected in a mountain forest, in one case an individual was caught at a cave entrance near a large lake.

A prevailing majority of the records could be associated with autumn migrations from central and north-eastern Europe to the Balkans, between the summer and winter roosts (cf. Strelkov 1971, 1997, 2001, Hutterer et al. 2005); namely the rich netting session on 8 September at Nikgjonaj when 53 individuals were caught (Sachanowicz & Ciechanowski 2018), but also other findings made in the period from August till October (incl.). The almost complete absence of females in the summer period (only one female was netted on 10 August, while the others on 8 and 9 September) suggests an absence of maternity colonies in Albania (and the Balkans as well, see Strelkov 1999, 2001, Hanák et al. 2001, Benda et al. 2003b). On the other hand, the occurrence of adult males during the summer period may indicate a presence of permanent male populations (cf. Strelkov 1999) or even a formation of summer male colonies, typical for this species (Baagøe 2001); a similar situation was demonstrated also in Bulgaria, where, moreover, two such colonies were found (Benda et al. 2003b). Anyway, the Balkan populations (presumably both their migrating and sedentary parts concerning males) mate during and after the autumn migration period (Weid 1988), and this is most probably valid also for the Albanian bats (see the records of male advertisement calls above).

Records of ectoparasites. **Original data**: T r o m b i c u l i d a e: *Oudemansidium musca*: 7 larvae (CMŠ [P]) from 1 ma (NMP 96556), Roshanj (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin, det. S. Kalúz. – *Willmannium cavus moldaviensis*: 1 larva (CMŠ [P]) from 1 ma (NMP 96556), Roshanj (Korçë Pref.), 27 June 2016, leg. P. Benda & M. Uhrin, det. S. Kalúz.

Comments on ectoparasites. In total, two arthropod parasite species were collected from *Vespertilio murinus* in Albania, both are here reported from the country for the first time.

Fig. 65. An adult male of *Vespertilio murinus* netted at Qafë e Malit (Shkodër Pref.), 8 August 2007. Photo by K. Sachanowicz.

Fig. 66. Watering place in a valley at Fushë Okol, Albanian Alps (Shkodër Pref.), ca. 1,200 m a. s. l.; above this pool, individuals of *Vespertilio murinus*, *Hypsugo savii*, and *Nyctalus leisleri* were netted, while the echolocation calls of *Eptesicus serotinus*, *Pipistrellus pipistrellus*, and *P. nathusii* were detected in the surroundings. Photo by P. Tájek (September 2018).

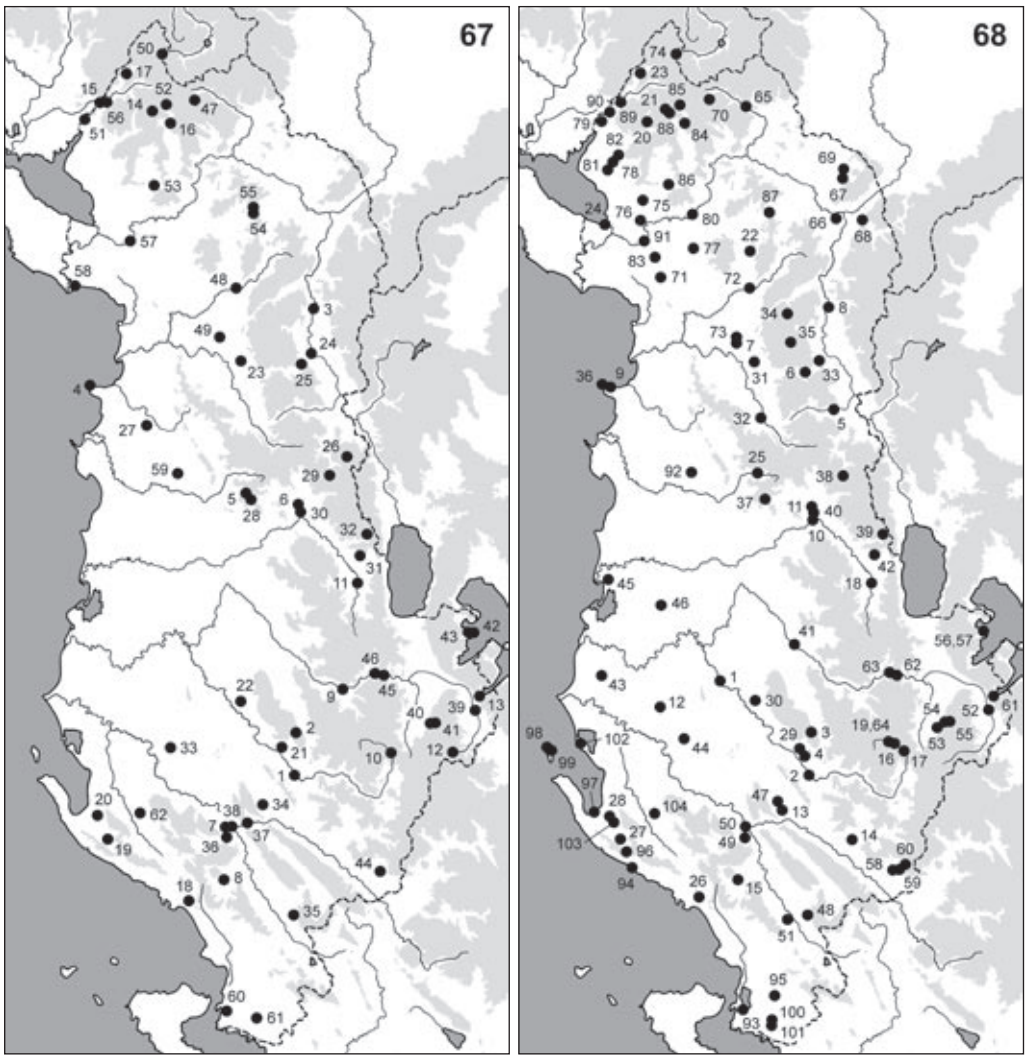
Two species of the chigger mites were collected from a single examined individual of *V. murinus* from south-eastern Albania. *Oudemansidium musca* (Oudemans, 1906) is a species known from a large part of Europe between the Netherlands and Crimea, and from Transcaucasia and Central Asia (Oudemans 1912, Dusbábek 1970, Vercammen-Grandjean & Langston 1976, Kudrâšova 1991). In this range, this mite was documented to parasitise a variety of bat hosts, including those of the genera *Rhinolophus*, *Rhinopoma*, *Myotis*, *Vespertilio*, *Eptesicus*, *Hypsugo*, *Pipistrellus*, *Nyctalus*, *Scotophilus*, *Plecotus*, and *Miniopterus* (Lanza 1999). In Albania, it was collected also from *Eptesicus serotinus*, *Hypsugo savii*, and *Tadarida teniotis* (own data; see below).

Willmannium cavus moldaviensis Kudrâšova, 1992 is a mite described from Moldavia, based on the material collected from *Nyctalus noctula* and *Eptesicus serotinus* (Kudrâšova 1992, 2004). Its Albanian record from *V. murinus* represents the first finding from this host species as well as outside the country of description. In Albania it was additionally collected from *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, and *Tadarida teniotis* (own data; see below).

Eptesicus serotinus (Schreber, 1774)

Records. **Original data**: B e r a t: Dhorës, Osumi river canyon [1] (Fig. 82), in the canyon, 29 June 2016: det. calls of 1 foraging ind.; – Koritë, above a watering place in a mountain pass [2], 21 September 2018: det. & rec. calls of 1–2 fo-

raging inds. – D i b ë r: Zall-Dardhë, old aspen grove in the Drini i Zi river valley [3], 30 June 2018: det. & rec. calls of 1 foraging ind. – D u r r ë s: Kepi i Rodonit, Kisha e Shën Antonit [4], above meadows and at the sea shore, 18 September 2018: det. calls of 1 foraging ind. – E l b a s a n: Vakumonë, at two artificial lakes ca. 2 km east of the village [5] (Fig. 91), 5 July 2018: det. & rec. calls of 1 foraging ind.; – Zgosht, at confluence of the Zalli i Shëmilit and Zalli i Lurikut rivers [6], above the Zalli i Lurikut river, 6 July 2016: net. 1 faL, det. calls of several foraging inds. – G j i r o k a s t ë r: Tepelenë, Bënça river valley [7] (Fig. 69), above the river, 30 June 2016: net. 1 ma, det. calls of several foraging inds.; – Zhulat, Kardhiqi river valley [8] (Fig. 92), above the river, 5 July 2015: net. 1 ma, det. & rec. calls of 1 foraging ind. – K o r ç ë: Nikollarë, Devolli river valley [9], at the valley slope, 26 June 2016: net. 1 fa, 1 fs; – Roshanj, Dëshnica river valley [10] (Fig. 57), at the river, 27 June 2016: det. calls of 1 foraging ind.; – Selishtë, Dunica river valley [11] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of 1–2 foraging inds.; – Sinicë, Devolli river valley [12] (Fig. 99), at the river, 7 July 2015: det. & rec. calls of several foraging inds.; – Tren, Treni cave [13] (Fig. 61), 25 January 2016: obs. 2 inds. torpid (exam. 1 ma). – S h k o d ë r: Fushë Okol, at a watering place in mountain valley [14] (Fig. 66), 16 September 2018: det. & rec. calls of 1–2 foraging inds.; – Grabom, Cemi river valley [15] (Fig. 71), 15 September 2018: det. & rec. calls of 1 foraging ind.; – Ndërlysaj, Thethi river valley [16] (Fig. 75), above the river, 8 July 2016: net. 1 ma; – Selcë, Cemi river valley [17] (Fig. 117), at the river, 9 July 2016: det. calls of 1 foraging ind. – V l o r ë: Borsh, Borshi river valley [18] (Fig. 78), above the river, 1 July 2016: net. 5 faL, det. calls of numerous foraging inds.; – Dukat, Dukati river valley [19] (Fig. 54), above the river, 2 July 2016: net. 1 ms; – Tragjas, at the Izvori river spring [20] (Fig. 81), 30 September 2018: det. & rec. calls of 1–2 foraging inds. – **Published data**: B e r a t: Çorovodë, stream in limestone gorge [21], 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, Tomorrit mountain stream surrounded by farmland [22], 9 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018). – D i b ë r: Barbullej, over a river [23], village nearby, 30 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, pool on a stream [24], in a village, 22 September 2005: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, rocky slopes with quarries [25], 23 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Klenje [26], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – D u r r ë s: Ahmetaq, Gjola river in farmland landscape [27], 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Benë, pond on pasture [28], near beech forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë Studë [29], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Gizavesh, over a river [30], 3 July 2011 (Sachanowicz et al. 2014); Gizavesh, small branch of the Koponit river, 3 July 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018); – Pishkash, karstic rocky gorge [31], near caves, 4 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Skenderbej [32], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – F i e r: Damës, Povlës river [33], rocky gorge, 18 April 2004: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Goricë, Dishnicës river [34], farmland landscape, 18 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Libohove, a larger cave [35], 6 October 1992: obs. 1 ind. (Uhrin et al. 1996); – Luzat, oriental plane forest in rocky valley of Fani i Vogël river [36], 11 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Mezhgoranit cave near Tepelene [37], 22 April 1995: det. calls of several inds. (Uhrin et al. 1996); Mezhgoran, entrance of the Mezhgoran cave, 22 August 2006: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Tepelenë, riparian forest of old oriental planes and poplars [38], Vjosës river valley, 20–21 August 2006: net. 3 ma, 3 fa, 10 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Billisht, Devoll river [39], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, river gorge [40], near a village, 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, coppice at ruined mine buildings [41], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gollombaçi, cave 2 km south of the village [42], April 1995: net. 2 inds. (Uhrin 1995); Gollombaci, Macro Prespa lake, small cave 1 km E of the village, 20 April 1995: net. 2 ma (Uhrin et al. 1996); Gollomboc Cave 2 (Papadatou et al. 2011); – Gollomboç, village surrounded by rocky hills on the shore of Macro Prespa lake [43], 8 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Leskovik, in the town [44], near streetlights, 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Mikroprespanská j. [= Treni cave] [13], April 1995: net. 1 ind. (Uhrin 1995); Micro Prespa cave, 21 April 1995: net. 1 ma (Uhrin et al. 1996); Treni Cave (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: net. 1 ind. (Scheffler et al. 2013, Theou et al. 2015a); – Tresovë, Devoll river with old willows and pastures [45], 11 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë, Devoll river with old willows and pastures [46], 6 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Valbonë, edge of mountain beech-spruce forest with a small stream [47], 7 August 2007: det. calls of 3 foraging inds. (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mashtërkor, small pool in the valley of Fani i Vogël river [48], 9 August 2007: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Perlat, over a river [49], 26 June 2011 (Sachanowicz et al. 2014); Perlat, over a river, farmland landscape, 26 June 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Bashkimi, stream in beech forest [50], 23 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Grykë, small water pool for livestock [51], in a limestone valley, 16 August 2003: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [16], mountain valley, 9 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, over a pool on a stream [52], 10 September 2012 (Sachanowicz et al. 2014); Nikgjonaj, stream in mountain valley of the Shalës river, old beech forest, 8 September 2012: net. 1 mj, 10 September 2012: net. 2 fa (Sachanowicz & Ciechanowski 2018); – Prekal, in a karstic cave [53], village nearby, 10 August 2007: net. 1 fj, 11 September 2012: net. 1 ma (Sachanowicz & Cie-



Figs. 67, 68. Records of particular bat species in Albania. 67 – *Eptesicus serotinus* (Schreber, 1774). 68 – *Hypsugo savii* (Bonaparte, 1837).

chanowski 2018); – Qafa e Malit, forest road in old mountain mixed forest [54], 8 August 2003: det. calls of several foraging inds.; road and mountain slope, black pine forest, 17 September 2005: det. calls, 8 August 2007: det. calls; pool in a bed of a mountain stream, 10 August 2003 & 8 August 2007: net. 1 ma, 1 mj, 3 fa (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain beech forest [55], 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Thores, over a mountain pond [14], 12 July 2011 (Sachanowicz et al. 2014); Qafa e Thores, artificial pond for livestock on montane pasture, 12 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Rahovic, near a cave entrance [56], limestone mountain valley, 21 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës [57], 22 April 2010: obs. a colony of 10–15 ind. emerging from crevice in a limestone wall; entrance of gallery in limes-

tone cliff, 22 April 2010: net. 1 ma, 5 fa (Sachanowicz & Ciechanowski 2018); – Velipojë, riparian forest and the village [58], 19 April 2010: det. calls of several foraging inds. (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Tirana, centre [59], under roof of a two-floor building, 30 September 1960: obs. a large colony of ca. 100 inds. (Hanák 1964, Lamani 1970); Tiranë, in corridor of a flat, 20 July 1967: 1 m (Lamani 1970). – V l o r ë: Borsh, river in rocky limestone gorge with old trees [18], 1 May 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Butrint, entrance of military tunnels [60], 5 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Shalës, limestone river gorge [61], near the entrance of adits, 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Velçë, limestone cliffs near the village and the entrance of karstic caves [62], 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Eptesicus serotinus* represents a common bat in Albania, 62 localities are known from the country (Fig. 67, Table 1). The occurrence of this bat was documented from all parts of Albania, namely from mountains, while in some parts of the Western Lowlands the records of this bat are missing. The sites are situated in a rather wide altitude range of 8–1,368 m a. s. l. (Table 2); however, most records were made at medium altitudes between 200 m and 950 m a. s. l. (median 487.5 m; Fig. 8). The altitudes preferred by *E. serotinus* in Albania (and the Balkans as well) are somewhat higher than those in the Central European latitudes, where this bat is a typical lowland species; the maximum altitudes known from some Mediterranean countries reach or even exceed 1,500 m a. s. l., see e.g. Benda et al. (2003b, 2009, 2016c) and the review by Boshamer & Bekker (2006).

E. serotinus is a bat widespread across the Balkan Peninsula, including some offshore islands and Crete (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, 2018, Paunović 2016, Tvrtković 2017, etc.). The distribution in Albania is a regular part of its continuous range in south-eastern Europe.

Sachanowicz & Ciechanowski (2018) doubted the first record of *E. serotinus* in Albania made in Tiranë and first reported by Vladimír Hanák (see Hanák 1964: 82) and later mentioned again in almost identical words by Lamani (1970: 145). The former authors suggested this finding to

Fig. 69. Bënça river valley near Tepelenë (Gjirokastër Pref.); foraging grounds of *Eptesicus serotinus* and *Pipistrellus kuhlii*. Photo by M. Uhrin (June 2016).

Fig. 70. An adult male of *Eptesicus serotinus* roosting in a karst cave at Prekal (Shkodër Pref.), 11 September 2012. Photo by K. Sachanowicz.

be attributed rather to *Nyctalus noctula* according to the observation circumstances (see below). However, we regard the original species identification correct, considering the fact that during the same visit of Tiranë in autumn 1960, V. Hanák observed three colonies of *N. noctula* under similar conditions as the colony of *E. serotinus* (see below) and thus, he had a good opportunity to distinguish between these two species and identify them correctly.

Field notes. With the exception of one winter record from late January, all findings of *Eptesicus serotinus* in Albania were made in the non-hibernation period, between mid-April and early October (Fig. 9). The largest concentration of records from a short period (38.7% of all particular records) comes from three weeks between 21 June and 12 July. The prevailing majority of findings (84.0%) is represented by foraging bats and only few records were made in roosts (Fig. 9); several times the bats were netted at the entrances to underground spaces (9.3% of records).

The only hibernation record of *E. serotinus* in Albania was made in the Treni cave on 25 January (Fig. 61; own data); two individuals (one examined bat was an adult male) in deep torpor were hidden in a ceiling fissure of the entrance dome of this large cave. Another roosting individual was found in a large cave near Libohovë on 6 October (Uhrin et al. 1996); the cave perhaps served as a pre-hibernation roost for the bat. Sachanowicz & Ciechanowski (2018) observed a colony of 10–15 bats emerging from a crevice in a limestone wall at Vau i Dejës at dusk on 22 April. The same evening they netted individuals from this colony at the entrance to a gallery in a cliff beneath the wall, one male and five females – these bats perhaps created a pre-reproduction aggregation roosting in the wall cavities.

Hanák (1964: 82) mentioned a record of a large roosting group of *E. serotinus* in urban conditions; he described his observation as follows: “Eine grosse Kolonie dieser Art (etwa 100 Stücke) besiedelte einen ganz unzugänglichen isolierten Raum unter dem flachen Dache eines zweistöckigen Gebäudes im Zentrum der Stadt Tirana. Das Gezeter der Tiere wurde schon ab

15 Uhr gut hörbar, der Jagdflug begann am 30. 9. 1960 schon um 17,20 Uhr. Die Fledermäuse flogen allmählich aus kleinen rundlichen Öffnungen aus, durch die der Raum mit Aussenwelt in Verbindung stand." Later, Lamani (1970) reported on a finding of a male *E. serotinus* in a corridor of a flat in Tiranë in early morning of 20 July. However, there is a question whether the flat was a real roost of the bat or whether the bat appeared there accidentally while foraging.

While the only hibernation roost of *E. serotinus* in Albania was found at a rather high altitude of 866 m a. s. l., the non-hibernation roosts were situated in lowland areas only, in the altitude range of 50–285 m a. s. l. (median 115.0 m; n=4).

At the entrances to five underground sites, four caves and one gallery, *E. serotinus* was netted seven times (Uhrin et al. 1996, Scheffler et al. 2013, Theou et al. 2015a, Sachanowicz & Ciechanowski 2018). These netting sessions were carried out in the spring (late April) and late summer (August, September) periods, at sites in the altitude span of 50–866 m a. s. l. (mean 449.4 m), i.e. at rather medium altitudes. With the exception of the gallery, where a part of a colony roosting nearby was netted (see above), only single indviduals were caught; four males, two females and one bat with sex undetermined.

Foraging individuals of *E. serotinus* were recorded at 53 localities (63 particular records) in the period between mid-April and late September. One third of these records (21) represents bats netted at their foraging grounds, the remaining number goes to recorded echolocation calls. Altogether, 37 bats were netted in an almost balanced sex ratio (17 ♂♂ : 20 ♀♀). A half of the records of foraging bats were documented at or above streams in valleys (49.2%), several other records

Fig. 71. Cemi river valley at Grabom, Albanian Alps (Shkodër Pref.); foraging habitats of *Eptesicus serotinus* and *Pipistrellus pipistrellus*. Photo by P. Tájek (September 2018).

were made at lakes, watering places or at the sea shore (12.7%), at rocks and in other dry habitats (11.1%), in forests (9.5%), in urban habitats (7.9%) and in various types of farmland (6.3%). The altitude range of foraging grounds is identical with the range of all sites of *E. serotinus* known from Albania (Table 2); however, other values are slightly shifted up, namely the altitude median (506.0 m) and mean (584.3 m).

No maternity colony of *E. serotinus* was observed in Albania; however, the direct evidence of reproduction in this species are the females in the lactation stage netted at four sites in the period between 26 June and 6 July (incl.; Sachanowicz & Ciechanowski 2018, own data). In three cases, only a single lactating female was caught, while in the gorge-like Borshi river valley at Borsh (Fig. 78), a group of five females were netted on 1 July; these apparently were a part of a maternity colony, roosting perhaps in cavities of the limestone walls of the gorge. Volant juveniles of the year were netted at five sites, in the period between 8 August and 8 September (incl.); only one juvenile bat was caught at each site, three males and two females (Sachanowicz & Ciechanowski 2018). Observations of reproduction aggregations of *E. serotinus* are scarce across the Balkans, although it is sure that the species reproduces in the region, according to the indirect evidence, such as in Albania or in Greece (see Hanák et al. 2001). These colonies were only rarely found in Bulgaria and Croatia (Benda et al. 2003b, Pavlinić et al. 2011).

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Ischnopsyllus intermedius*: 1 fa (CMŠ [P]) from 1 fa (NMP 96586), Zgosht (Elbasan Pref.), 6 July 2016, leg. P. Benda & M. Uhrin. – *Nycteridopsylla trigona balcanica*: 1 fa (CMŠ [P] from 1 ma (NMP 96534), Tren, Treni cave (Korçë Pref.), 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 ma (CMŠ [A]) from 1 ma (NMP 96593), Ndërlysaj (Shkodër Pref.), 8 July 2016, leg. P. Benda; 1 ma (CMŠ [A]) from 1 ma (NMP 96534), Tren, Treni cave (Korçë Pref.), 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – *Nycteribia vexata*: 2 fa (CMŠ [P]) from 1 fa (NMP 96549), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin. – S p i n t u r n i c i d a e: *Spinturnix kolenatii*: 2 ma, 1 fa, 1 nymph (CMŠ [P]) from 2 fa (NMP 96562, 96563), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin; 2 fa, 1 protonymph from 1 ma (NMP 96571), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 3 ma (CMŠ [P]) from 1 fa, 1 fs (NMP 96549, 96550), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin; 2 fa, 2 nymphs (CMŠ [P]) from 1 fa (6303), Zgosht (Elbasan Pref.), 6 July 2016, leg. P. Benda & M. Uhrin. – M a c r o n y s s i d a e: *Steatonyssus periblepharus*: 3 protonymphs (CMŠ [P]) from 2 fa (NMP 96562, 96563), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin. – T r o m b i c u l i d a e: *Leptotrombidium russicum*: 1 larva (CMŠ [P]) from 1 ma (NMP 96593), Ndërlysaj (Shkodër Pref.), 8 July 2016, leg. P. Benda; 1 larva (CMŠ [P]) from 1 ma (NMP 96534), Tren, Treni cave (Korçë Pref.), 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin. – *Oudemansidium musca*: 43 larvae (CMŠ [P]) from 1 ma (NMP 96593), Ndërlysaj (Shkodër Pref.), 8 July 2016, leg. P. Benda, det. S. Kalúz; 5 larvae (CMŠ [P]) from 1 fa, 1 fs (NMP 96549, 96550), Nikollarë (Korçë Pref.), 26 June 2016, leg. P. Benda & M. Uhrin. – *Willmannium cavus cavus*: 1 larva (CMŠ [P]) from 1 ma (NMP 96593), Ndërlysaj (Shkodër Pref.), 8 July 2016, leg. P. Benda, det. S. Kalúz. – **Published data**: S p i n t u r n i c i d a e: *Spinturnix kolenatii*: 1 ind., Treni's cave, 24–25 September 2012 (Scheffler et al 2013); 4 ma, 1 fa, Perlat, 26 June 2011 (Sachanowicz et al. 2014); 2 ma, Gizavesh, 3 July 2011 (Sachanowicz et al. 2014); 1 ma, 4 fa, 1 nymph, Qafa e Thores, 12 July 2011 (Sachanowicz et al. 2014); 7 ma, 8 fa, Nikgjonaj, 10 September 2012 (Sachanowicz et al. 2014). – *Spinturnix psi*: 1 ind., Treni's cave, 24–25 September 2012 (Scheffler et al. 2013).

Comments on ectoparasites. In total, ten arthropod parasite species were collected from *Eptesicus serotinus* in Albania. Five of them are here reported from Albania for the first time.

Two bat flea species were collected from *E. serotinus* in Albania, both for the first time in the country, *Ischnopsyllus intermedius* (Rothschild, 1898) and *Nycteridopsylla trigona balcanica* Hůrka, 1965. The former flea is a parasite preferring to feed on *E. serotinus*, this bat is regarded to be a primary host of this bat flea in its whole distribution range. In Albania, *I. intermedius* was found parasitising only *E. serotinus*, although in other parts of its distribution range it was collected also from other species of the family Vespertilionidae (Hůrka 1963b, Lanza 1999). This parasite occurs widely across the western Palaearctic from the Maghreb and Scandinavia to Transcaucasia and Central Asia (Hůrka 1963b, Dubovchenko 1965, Beaucournu & Kowalski 1985, Medvedev & Masing 1987, Ghasemi et al. 2016, Bendjeddou et al. 2017).

The bat flea subspecies *N. t. balcanica* Hůrka, 1965 was previously recorded only in Serbia and Bulgaria, parasitising *Eptesicus serotinus*, *Pipistrellus pipistrellus*, and *Plecotus austriacus* there (Hůrka 1965); in Albania it was collected also from *Myotis myotis* (own data; see above). The nominotypical form of *N. trigona* Ioff et Labunets, 1953 was described from Turkmenistan (Ioff et al. 1953) and the subspecies *N. t. balcanica* represents the western form of the species. It was differentiated from the nominotypical form by the shape of sternum and the number of bristles in sternum of a female and by the number of spinelets; Hůrka (1965: 498) described these characters as follows: "in female of the ssp. *balcanica* the posterior margin of sternum VII [is] with more deep sinus and rounded ventral angle (straight in the typical form), on the surface sternum 3 bristles in ssp. *balcanica*, 4 in *trigona trigona*; bulga of spermatheca more oval in ssp. *balcanica*. In both sexes the number of spinelets in combs of metanotum and abdominal tergite I and II is higher in the typical form (6–8 in *trigona trigona*, 4–6 *trigona balcanica*)." However, the name *Nycteridopsylla trigona balcanica* is perhaps a junior synonym of *Nycteridopsylla levantina* Jordan, 1942. The latter name was described from Cyprus, based on a single female bat flea collected from *Pipistrellus kuhlii* (Jordan 1942), its respective characters conform to those described by Hůrka (1965) for *N. t. balcanica*. However, examinations of two specimens collected in Albania (adult ♂ from *Myotis myotis*, adult ♀ from *E. serotinus*) do not allow a responsible revision of this taxonomic question and therefore, we continue to use the name *N. t. balcanica* to affiliate the bat fleas collected in Albania. The description associated with the latter name is clear, while that of *N. levantina* is insufficient – description of a female is too brief, description of a male is not available. Here we present additional descriptive notes (differential diagnosis) on the collected female as compared with the descriptions of *N. t. trigona* by Labunec & Bogdanov (1959) and of *N. t. balcanica* by Hůrka (1965): the posterior margin of the sternum VII with a deep sinus and without any rounded ventral angle (Fig. 72A), the bulga of spermatheca is broad, rounded, approximately of the same length as the curved hilla (Fig. 72B); the shape of the bulga corresponds with that in the specimens of the nominotypical subspecies as described by Labunec & Bogdanov (1959).

Two species of bat flies, *Nycteribia pedicularia* Latreille, 1805 and *N. vexata* Westwood, 1835, were collected from *E. serotinus*. The principal host of *N. pedicularia* is *Myotis capaccinii*,

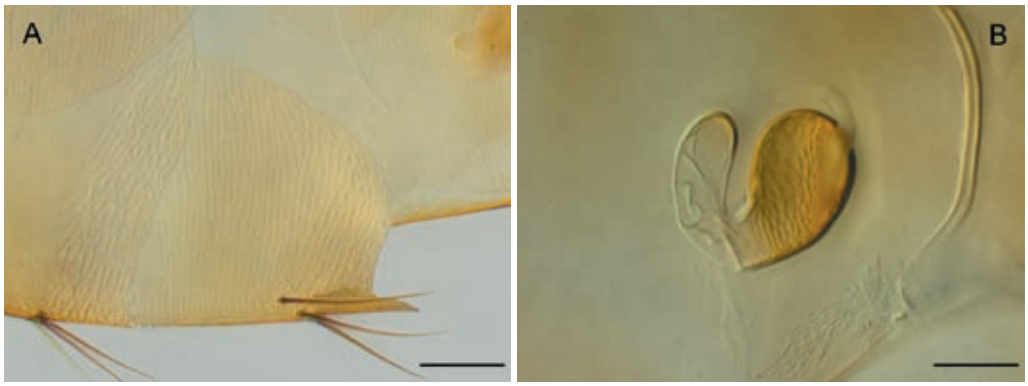


Fig. 72. Morphology of female *Nycteridopsylla trigona balcanica* Hůrka, 1965 collected from *Eptesicus serotinus* (Schreber, 1774) at Tren (Korçë Pref.) on 25 January 2016. Photo by W. Lechthaler. A – a part of the sternum VII. B – spermatheca. Scale bars = 100 µm (A), 50 µm (B).

although records from *E. serotinus* are also known (Scott 1936, Theodor 1954, Hůrka 1970). In Albania, this bat fly was documented from a wide range of hosts, besides *E. serotinus* also from *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. davidii*, *M. capaccinii*, *Miniopterus schreibersii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). *N. vexata* is an obligatory parasite of bats of the *Myotis myotis* group, additionally its secondary hosts are other cave-dwelling bat species (Hůrka 1964). Although *E. serotinus* is a bat occasionally using caves as its roosts and the transfer of this parasite from other hosts could be expected, *N. vexata* is here reported from this host species for the first time. On the other hand, in Albania this bat fly was collected also from *Myotis myotis*, *M. blythii*, *M. emarginatus*, *M. capaccinii*, *Pipistrellus kuhlii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below).

Two bat mite species of the genus *Spinturnix* were collected from *E. serotinus* in Albania, *S. kolenatii* Oudemans, 1910 and *S. psi* (Kolenati, 1856). *S. kolenati* is a permanent parasite of *E. serotinus* and *E. nilssonii*, although it was documented also from other bats of the family Vespertilionidae (Stanyukovich 1997, Lanza 1999). In Albania, it was found only in *E. serotinus*, but very frequently, in eight sites (Sachanowicz et al. 2014, own data; see above). This mite is distributed widely in the Palaearctic (Rudnick 1960, Dusbábek 1966, 1970, Uchikawa & Wada 1979, Stanyukovich 1997, Lanza 1999). *S. psi* is almost exclusive permanent parasite of the *Miniopterus* bats (Uchikawa et al. 1994), and it frequently parasitises also *Myotis capaccinii*, namely in the cases of shared roosts with *Miniopterus schreibersii* (Deunff et al. 2004). In the latter two species, *S. psi* was found in Albania besides in *E. serotinus* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data). The distribution range of this mite conforms to the range of the family Miniopteridae in the Palaearctic, Oriental and Australasian realms (Rudnick 1960, Dusbábek 1962, Uchikawa et al. 1994).

Three species of the chigger mites were collected from *E. serotinus* in Albania; *Leptotrombidium russicum* (Oudemans, 1902), *Oudemansidium musca* (Oudemans, 1906), and *Willmannium cavus cavus* Kudrâšova, 1992; all these taxa are here reported from Albania for the first time. *L. russicum* is a parasite with a broad distribution across the western Palaearctic, it parasitises a variety of host bat species of the genera *Rhinolophus*, *Myotis*, *Vespertilio*, *Eptesicus*, *Pipistrellus*, *Nyctalus*, *Plecotus*, *Barbastella*, and *Miniopterus*; in *E. serotinus* it was already documented from Europe (Vercammen-Grandjean & Langston 1976, Lanza 1999). *O. musca* occurs across the Palaearctic and parasitises various hosts from the families Rhinolophidae and Vespertilionidae, from *E. serotinus* it was collected previously (Vercammen-Grandjean & Langston 1976, Kudrâšova 1991, Lanza 1999). In Albania, it was collected from four bat species, besides *E. serotinus* also from *Vespertilio murinus*, *Hypsugo savii*, and *Tadarida teniotis* (own data; see above and below). *W. cavus cavus* is a mite described from Kirghizstan (Kudrâšova 1992), its type series was collected from a heterogenous group of host species, containing *Rhinolophus ferrumequinum*, *Myotis blythii*, *Eptesicus serotinus*, and *Barbastella caspica* (Kudrâšova 2004). In contrast to another form of this species, *W. c. moldaviensis* Kudrâšova, 1992, which was documented in several bat hosts in Albania (*Vespertilio murinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Tadarida teniotis*; own data; see above and below), *W. c. cavus* was documented only from *E. serotinus*. This finding represents its first record in Europe and first record outside the country of its discovery as well.

The macronyssid mite *Steatonyssus periblepharus* Kolenati, 1858 is here reported from Albania for the first time, although besides *E. serotinus* it was collected also from *Myotis blythii*, *M. davidii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii* (own data; see above and below). It is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus*

(Radovsky 1967, Dusbábek 1973, Lanza 1999); from *E. serotinus* it was documented in most of its range (Till & Evans 1964, Radovsky 1967).

Eptesicus nilssonii (von Keyserling et Blasius, 1839)

Records. **Original data**: S h k o d ë r: Grykë Lugje, at a watering place [1] (Fig. 74), 17 September 2018: det. & rec. calls of 1 foraging ind. of cf. *Eptesicus nilssonii*. – **Published data**: S h k o d ë r: Nderlysë, limestone valley of the Shalë river with low shrubs and pastures [2], 9 September 2012: det. calls of cf. *Eptesicus nilssonii* (Sachanowicz & Ciechanowski 2018).

Comments. *Eptesicus nilssonii* is a very rare bat in Albania, only two possible records are available from the country (Table 1). Both records are represented by echolocation call recordings made in the Albanian Alps in late summer, at two sites situated 12.1 km from each other in different mountain valleys (Fig. 52). Sachanowicz & Ciechanowski (2018) described the call sequence they recorded at Ndërlysaj (Fig. 75) as composed of 14 calls, with the maximum energy of 25.8–29.2 kHz (median 27.3 kHz) and call durations 10.4–15.3 ms (mean 13.6 ms). The newly recorded sequence from Grykë Lugje (Fig. 74) was composed of eight calls with the maximum energy of 29.3–31.1 kHz and call duration 5.1–7.9 ms (see Table 3, Fig. 73). The recorded data roughly conform to the published characteristics of the echolocation calls of *E. nilssonii* from Central Europe (Skiba 1999, Obrist et al. 2004, Barataud 2015, etc.). Anyway, the occurrence of *E. nilssonii* in Albania requires confirmation by an evidence of a specimen.

In Europe, *E. nilssonii* is distributed more densely only in the central and northern latitudes of the continent (Hanák & Horáček 1986, Gerell & Rydell 2001), the southern margins of its regular distribution lie in the southern ranges of the Alps in France, Italy and Slovenia and in the Southern Carpathians of Romania (Presetnik et al. 2009, Toffoli et al. 2016, Jére et al. 2018). In the Balkans this species belongs among the rarest bats, up to now, *E. nilssonii* is known from three localities in Croatia (Lanza 1957, Pavlinić & Tvrtković 2003) and from one site in Bulgaria (Hanák & Horáček

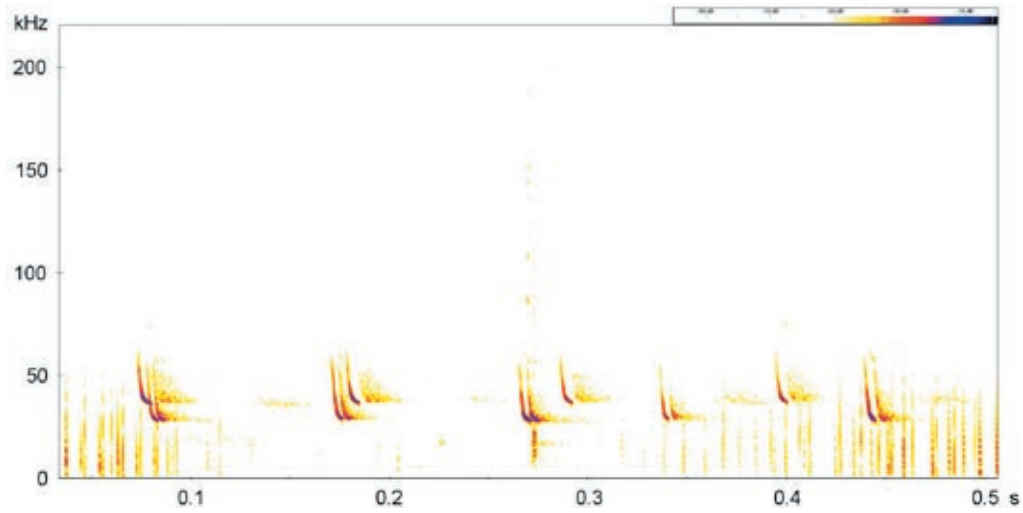


Fig. 73. Spectrogram of echolocation calls of cf. *Eptesicus nilssonii* (von Keyserling et Blasius, 1839) recorded at Grykë Lugje (Shkodër Pref.; Fig; 74) on 17 September 2018.

Table 3. Descriptive parameters of echolocation calls of two bat species from Albania; cf. *Eptesicus nilssonii* (von Keyserling et Blasius. 1839) and *Nyctalus lasiopterus* (Schreber. 1780); for details see Field notes under particular species

	cf. *Eptesicus nilssonii*					*Nyctalus lasiopterus*				
	n	min	max	M	SD	n	min	max	M	SD
maximum frequency [kHz]	8	29.3	31.1	30.15	0.61	10	15.0	16.9	15.51	0.65
start frequency [kHz]	7	32.8	43.6	38.47	4.10	8	19.7	26.0	22.04	2.22
end frequency [kHz]	7	28.1	29.8	28.87	0.64	8	11.9	13.9	13.25	0.64
call duration [ms]	8	5.1	7.9	6.70	0.83	8	8.5	13.3	11.60	1.74
interpulse interval [ms]	7	64.3	98.1	85.64	11.12	5	70.9	190.9	123.28	46.08

1986), from Herzegovina it is known from a subfossil cave deposit (Karapandža et al. 2014). No find is available from Montenegro, Serbia, Kosovo, North Macedonia, and Greece. The tentative records from northern Albania, if they really belong to this bat, represent a part of the southern delimitation of the species distribution range in Europe, at a very similar latitude (42° 21–22' N) as the southernmost European locality in Bulgaria (42° 07' N; Ribni ezera hut).

The distribution range of *E. nilssonii* in the Balkans is patchy and confined to high altitudes. Besides the geographically dubious record from Spalato [= Split, Dalmatine coast] made in 1872

Fig. 74. Watering place in the Thatë stream valley at Grykë Lugje, Albanian Alps (Shkodër Pref.), ca. 850 m a. s. l.; above the pool, individuals of *Myotis blythii*, *Vespertilio murinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *Nyctalus leisleri* were netted, and the echolocation calls of cf. *Eptesicus nilssonii* were detected. Photo by P. Tájek (September 2018).

and reported by Lanza (1957), all Balkan findings come from high mountains. The Croatian and Bulgarian records were made in mountain plateaus, at the altitudes of 1,058 m and 1,351 m a. s. l. in the Velebit Mts. (Croatia) and of 2,230 m a. s. l. in the Rila Mts. (Bulgaria), respectively. The two possible Albanian records come from somewhat medium-high sites, at 462 m and 847 m a. s. l.; however, they lie at bottoms of deep valleys of the Albanian Alps, surrounded by steep forested slopes and peaks exceeding 2,000 m a. s. l. (Figs. 74, 75).

Hypsugo savii (Bonaparte, 1837)

Records. **Original data**: B e r a t: Berat, castle [1], castle yard, 4 July 2016: det. calls of several foraging inds.; – Dhorës, Osumi river canyon [2] (Fig. 82), in the canyon, 29 June 2016: det. calls of 1–2 foraging inds.; – Koritë, above a watering place in a mountain pass [3], 21 September 2018: net. 1 fa, det. & rec. calls of 1–2 foraging inds.; – Zogas, at a small pond [4], 23 September 2018: det. & rec. calls of 1–2 foraging inds. – D i b ë r: Krajkë, Zerdjani river valley [5], above the river, 7 July 2016: net. 6 ma, 1 faG; – Murrë, river valley ca. 2 km east of the village [6] (Fig. 12), 3 July 2018: net. 2 ma, det. & rec. calls of several foraging inds.; – Urakë, Tarini river valley [7] (Fig. 116), 2 July 2018: det. & rec. calls of 1 foraging ind.; – Zall-Dardhë, old aspen grove in the Drini i Zi river valley [8], 30 June 2018: det. & rec. calls of 1–2 foraging inds. – D u r r ë s: Shetaj, village [9], 6 July 2018: det. & rec. calls of 1 foraging ind. – E l b a s a n: Arrëz, Miraka bridge, bunker [10] (Fig. 76), 29 January 2016: obs. (& exam.) 1 ma torpid; – Zgosht, at confluence of the Zalli i Shëmilit and Zalli i Lurikut rivers [11], 6 July 2016: det. calls of several foraging inds. – F i e r: Visokë, Gjanica river valley [12] (Fig. 43), at the river, 3 July 2016: det. calls of 1–2 foraging inds. – G j i r o k a s t ë r: Beduqas, Dishnica river valley [13] (Fig. 87), above the river, 6 July 2015: net. 1 ma, det. & rec. calls of 1 foraging ind.; – Bënjë-Novoselë, Lengarica river canyon [14] (Fig. 107), at entrances to two bunkers, 29 June 2019: net. 2 faG (leg. R. Lučan); – Zhulat, Kardhiqi river valley [15] (Fig. 92), above the river, 5 July 2015: net. 4 ma, 4 faL, det. & rec. calls of foraging inds. – K o r ç ë: Leshnjë, bunker [16] (Fig. 33), fissure between concrete blocks, 9 May 2016: obs. 2 inds. torpid; – Roshanj, Dëshnica river valley [17] (Fig. 57), above the river, 27 June 2016: det. calls of 1–2 foraging inds.; – Selishtë, Dunica river valley [18] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of several foraging inds.; – Vithkuq, church [19] (Fig. 15), fissure in the nave ceiling, 9 May 2016: obs. 1 ind. torpid. – S h k o d ë r: Grykë Lugje, above a watering place [20] (Fig. 74), 17 September 2018: net. 23 ma, 11 fa, 1 fj, det. & rec. calls of sevral foraging inds.; – Fushë Okol, above a watering place [21] (Fig. 66), 16 September 2018: net. 5 ma, det. & rec. calls of numerous foraging inds., 24 June 2019: obs. & det. calls. of ca. 5 foraging inds. (leg. R. Lučan); – Kimëz, valley ca. 2 km west of the village [22] (Fig. 45), 27 June 2018: det. & rec. calls of 2 foraging inds.; – Selcë, Cemi river valley [23] (Fig. 117), above the river, 9 July 2016: net. 17 ma, det. calls of numerous foraging inds.; – Shirokë, abandoned building at at the southern shore of the Shkodra lake near cemetery [24], 23 June 2019: obs. (& exam.) 1 faG (leg. R. Lučan). – T i r a n ë: Shëngjin i Madh, Erzeni river valley [25], 5 July 2016: det. calls of 1 foraging ind. – V l o r ë: Borsh, Borshi river valley [26] (Fig. 78), above the river, 29 April 2016: net. 1 ma, 1 July 2016: net. 1 ma, 2 mj, 15 faL, det. calls of numerous foraging inds.; – Dukat, Dukati river valley [27] (Fig. 54), above the river, 2 July 2016: net. 7 ma, 3 faG, det. calls of numerous foraging inds.; – Tragjas, at the Izvori river spring [28] (Fig. 81), 30 September 2018: det. & rec. calls of 1 foraging ind. – **Published data**: B e r a t: Çorovodë, old stony Ottoman bridge over the Osojës river [29], 8 July 2011: net. 2 ma emerging from crevices (Sachanowicz & Ciechanowski 2018); – Drenovë, Tomorrit mountain stream [30], surrounded by farmland, 9 July 2011: net. 6 ma, 1 faL (Sachanowicz & Ciechanowski 2018). – D i b ë r: Barbullej, river [31], village nearby, 30 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fshat, bunker [32], 1 July 2011: obs. 1 ind. in ceiling crevice (Sachanowicz & Ciechanowski 2018); – Fushë-Muhurr, entrance of a concrete tunnel [33], 23 September 2005 (Sachanowicz et al. 2014); Fushë-Muhurr, tunnel entrance, rocky slopes with qarries, 23 September 2005: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Lura, mountain lake surrounded by old beech-pine forest [34], 27 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Lura, water pool across a road in old beech forest [35], 29 June 2011: det. calls (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Kepi i Rodonit, coastal slopes with maquis [36], near a tunnel and sandstone cliffs, 14 September 2012: det. calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Benë, pond on pasture [37], near beach forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë Studë [38], 28 July – 7 August 2015: net. 1 m, det. calls (van der Tempel 2016); – Skenderbej [39], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Gizavesh, over a river [40], 3 July 2011 (Sachanowicz et al. 2014); Gizavesh, small branch of the Koponit river, 3 July 2011: net. 2 ma, 1 faL (Sachanowicz & Ciechanowski 2018); – Mashan, branch of the Devoll river [41], farmland, 7 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Pishkash, karstic rocky gorge [42], 28 September 2005: det. calls, 4 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – F i e r: Apolonia, at a monastery [43], 4 October 1992: det. calls of 1–2 inds. (Uhrin et al. 1996); – Damës, Povlës river [44], rocky gorge, 18 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Divjakë, road in old coastal pine forest [45], 27 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Lushnjë, city center [46], near tall buildings, 8 May 2010: det. calls

(Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Goricë, Dishnicës river [47], farmland landscape, 18 August 2006: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Libohove, a larger cave [48], 6 October 1992: obs. & det. calls of 4 inds. (Uhrin et al. 1996); – Luzat, [two sites in an] oriental plane forest in rocky valley of a stream [49], 11 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Tepelenë, river in riparian forest of oriental planes and poplars [50], Vjosës valley, 20 August 2006: net. 1 faG, 10 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Vanister cave, karstic rocky gorge near the cave [51], 22 April 2004: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Bilisht, Devoll river [52], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Boboshticë, village pond [53], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, rocky river gorge, near a village [54], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, coppice at ruined mine buildings [55], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gollombaçi [56], cave 2 km south of the village, April 1995: net. 2 inds. (Uhrin 1995); Gollombaci, Macro Prespa lake, small cave 1 km E of the village, 20 April 1995: net. 2 m (Uhrin et al. 1996); Gollomboc Cave 2 (Papadatou et al. 2011); Gollomboç, entrance of small limestone cave in cliff, Macro Prespa lake shore, 1 October 2005: net. 5 ma, 8 August 2006: net. 2 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Gollomboç, rocky cliffs of the Macro Prespa lake shore [57], village nearby, 8 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Leskovik, entrance of military tunnels [58], 17 August 2006: net. 1 ma, 2 fa, 1 faG, 1 fj (Sachanowicz & Ciechanowski 2018); – Leskovik, ca. 5 km E of Leskovik, at a road [59], 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Sheleguri, *Pinus nigra* forest [60], roadside, 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Treni cave [61], May 2013: net. 1 ind. (Theou et al. 2015a); Micro Prespa cave, the cave entrance, in limestone cliffs, 10 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Tresovë, Devoll river with old willows and pastures [62], 11 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë, Devoll river

Fig. 75. Thethi river valley at Ndërlysaj, Albanian Alps (Shkodër Pref.); foraging habitats of an extremely rich bat community, including *Rhinolophus ferrumequinum*, *Myotis blythii*, *M. davidii*, *Vespertilio murinus*, *Eptesicus serotinus*, cf. *E. nilssonii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. nathusii*, *P. kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii*. Photo by Z. Bendová (July 2016).

with old willows and pastures [63], 6 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel entrance [64], 14 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, limestone canyon of the Valbonë river [65], 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Kolsh, Drini i Bardhë river tributary [66], 7 August 2003: net. 1 ma, 1 faL (Sachanowicz & Ciechanowski 2018); – Krumë, entrance of a bunker [67], 3 August 2007 (Sachanowicz et al. 2014); Krumë, entrance of bunker, 3 August 2007: net. 1 fa, 2 fj (Sachanowicz & Ciechanowski 2018); – Lume, rocky gorge of the Lumës river [68], 2 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Nikoliq, pool on small river [69], 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Valbonë, edge of mountain beech-spruce forest with small stream [70], 7 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Fishte, bridge over small river [71], farmland, 20 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Mashtërkor, small pool in the valley of Fani i Vogël river [72], 9 August 2007: net. 1 ma, 1 mj, 2 fa (Sachanowicz & Ciechanowski 2018); – Perlat, river [73], farmland landscape, 26 June 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Bashkimi, stream in beech forest [74], 23 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drisht, entrance of an adit in mountain slope [75], 15 August 2003: net. 2 ma (Sachanowicz & Ciechanowski 2018); – Gjoqi, shore of the Vau i Dejës reservoir [76], 25 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gomsiqe e Epërme, Gomsiqe river in rocky gorge [77], 5 August 2003: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Gradec, village surrounded by dry grassland [78], 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Grykë, small water pool for livestock [79], in limestone valley, 16 August 2003: net. 4 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Koman, under a bridge over the Drini i Bardhë river tributary [80], 12 August 2003: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Köplik i Sipërm, football pitch with lamps [81], surrounded by dry grassland, 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Lohja, bunker [82], 28 January 2015: obs. 1 ind. (Théou et al. 2015b); Bunker, 28 January 2015: obs. 1 ind. (Théou & Đurović 2015a); – Maraç, limestone cliffs with military tunnels [83], 21 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Nderlysë, over the Shalë river [84], 9 September 2012 (Sachanowicz et al. 2014); Nderlysë, Shalës river, mountain valley, 9 September 2012: net. 2 ma, 3 fa (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, over a pool on a stream [85], 8 September 2012 (Sachanowicz et al. 2014); Nikgjonaj, stream in mountain valley of the Shalës river, 8 September 2012: net. 4 ma, 5 fa, 1 fj (Sachanowicz & Ciechanowski 2018); – Prekal, in a karstic cave [86], village nearby, 10 August 2007: net. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, pool in bed of a mountain stream [87], 10 August 2003: net. 2 ma; mountain slope, black pine forest, 17 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Thores, mountain beech forest [88], limestone walls, 11 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Thores, pond for livestock on montane pasture [21], limestone valley, 12 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Rahovic, limestone mountain valley [89], cave entrances, 21 June 2011: det. calls; Cemit river, limestone gorge, 22 June 2011: net. 7 ma (Sachanowicz & Ciechanowski 2018); – Rrapsh, rocky gorge and village [90], 1 May 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, entrance of an adit in limestone cliffs [91], at dam on the Drinit river, 13 August 2003: net. 1 ma; entrance of gallery in limestone cliffs at the Drinit river bank, 22 April 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Tirana [92], September 1957: 1 ind., ZMMU (Hanák 1964); Tiranë, diga i liqenit, October 2013: det. calls (Çera 2014). – V l o r ë: Borsh, river, rocky limestone gorge with old trees [26], 1 May 2010: net. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Butrint, entrance of a military tunnel [93], 25 April 2004 and 23 September 2005 (Sachanowicz et al. 2014); Butrint, entrance of military tunnels, 25 April 2004: net. 1 fa emerging from crevice (Sachanowicz & Ciechanowski 2018); – Drimades beach [94], open space, 23 July 2014: det. calls of 1 ind. (Théou & Loce 2017); – Dukat, rocky gorge of a stream [27], village nearby, 29 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Llazat, stream with old plane trees [95], 4 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Llogara National Park, meadow in the middle of the forest [96], open space, 25 July 2016: det. calls of 1 ind. (Théou & Loce 2017); – Orikum Lagoon [97], open space, 25 April 2013: det. calls of 1 ind. (Théou & Loce 2017); – Sazan Island, bunker with water [98], 5 September 2012: det. calls of 1 ind., 28 May 2013: det. calls of 1 ind., 9 August 2016: det. calls of 1 ind. (Théou & Loce 2017); – Sazan Island, port [99], 9 August 2016: det. calls of 1 ind. (Théou & Loce 2017); – Shalës, limestone river gorge [100], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Shkallë, limestone cliffs [101], roadside, 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Svërnec Island [102], open space, 27 July 2016: det. calls of 1 ind. (Théou & Loce 2017); – Tragjas i vjetër, ruins of stony village [103], limestone outcrops, 28 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Velçë, small cave entrance in limestone cliffs [104], 26 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018).

Distribution. *Hypsugo savii* is a very common bat in Albania, 104 recorded localities are available from the country (Fig. 68). Although this species is the third most frequent bat of Albania, the number of its records represents less than two thirds of the number of the most common bat, *Rhinolophus ferrumequinum* (63.4%; Table 1). The records of *H. savii* are regularly scattered over the whole country and in the Northern Mountain Range, this bat is the second most frequently documented species (Fig. 68). The findings come from a very wide altitude range of 5–1,541 m

a. s. l. (Table 2), the value of the altitude median (356.5 m) indicates the preference for low to medium situated areas of the country (Fig. 8).

The territory of Albania belongs to the original continuous range of *H. savii* in the Mediterranean Basin, as it remained almost until the end of the twentieth century (see Horáček & Benda 2004), although currently this bat occurs densely also in Central Europe after the spreading of the range northwards in the last 30–35 years (Spitzenberger 1997, Horáček & Benda 2004, Uhrin et al. 2016). The high number of its records in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkans and the Mediterranean Basin as well, including many islands (Kryštufek et al. 1992, 1998, Stojanovski 1994, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, Micevski et al. 2014, Paunović et al. 2015, Paunović 2016, Uhrin et al. 2016, Benda & Uhrin 2017, Tvrtković 2017, etc.).

Although *H. savii* is the fourth bat species documented from Albania, for the first time collected in Tiranë in September 1957 (Hanák 1964), only four findings (3.3% of all particular records) were made in the twentieth century (Hanák 1964, Uhrin et al. 1996), while 117 new records from 98 sites were obtained in the period 2003–2019.

Field notes. The findings of *Hypsugo savii* in Albania are available from most parts of a year (Fig. 9). However, only two hibernation findings are available, both from January, and no other records are known from other parts of the hibernation period between November and March (incl.). A prevailing number of the findings (79.3% of the particular records) were made on foraging grounds, only a minority of the records are findings of bats in their roosts (5.0%). The highest concentration of particular records in a short period (36.4% of all records) was registered during three weeks of the early summer, between 21 June and 12 July (incl.; Fig. 9).

Fig. 76. Entrance of a small concrete bunker at Arrëz above the Miraka bridge (Elbasan Pref.); a hibernaculum of *Rhinolophus ferrumequinum* and *Hypsugo savii*. Photo by M. Uhrin (January 2016).

Fig. 77. An adult female of *Hypsugo savii* netted above the Tomorri mountain stream at Drenovë (Berat Pref.), 9 July 2011. Photo by K. Sachanowicz.

The roosts of *H. savii* were found in eight localities (7.7% of the sites), all being artificial structures (Théou et al. 2015b, Sachanowicz & Ciechanowski 2018, own data). In all shelters only single bats or pairs were documented, no aggregation was found. Five roosts were in bunkers, one in an abandoned house, once a bat was found in the navy of a small stone church and once two bats were observed/netted when emerging from an old stone bridge. In all cases, the bats used fissures between stones or concrete blocks, or cracks in the boulders/blocks for roosting. Twice, on 28 and 29 January, *H. savii* was found hibernating in a fissure of a bunker (Théou et al. 2015b, own data), other roost findings come from the non-hibernation period. The roosts of *H. savii* were situated in a wide altitude range of 10–1,225 m a. s. l. (median 505.0 m, mean 602.6 m), indicating the preference for medium to high altitudes for roosting in Albania.

At twelve localities (11.5% of the sites, 14.0% of the particular records), individuals of *H. savii* were netted at entrances to roosts or potential roosts (Uhrin et al. 1996, Papadatou et al. 2011, Theou et al. 2015a, Sachanowicz & Ciechanowski 2018, own data). Most of these spaces (61.5%) were abandoned military bunkers, the rest were natural caves with rather small entrance openings. In all these spaces, the bats could certainly find numerous roosting opportunities, such as fissures and cracks. Altogether 35 individuals were caught at these sites, the sex ratio was al-

most balanced (3 ♂♂ : 2 ♀♀) in the total catch. At three bunker entrances, volant juveniles and a pregnant female were caught, this suggests possible roosting of a maternity aggregation in these spaces. The potential and real roosts of *H. savii* were situated in the altitude range of 10–1,225 m a. s. l. (median 505.0 m, mean 556.3 m, n=20).

Although no maternity aggregation of *H. savii* was found in a roost in Albania, the netting of 15 lactating females and two volant juveniles above the Borshi river in the canyon-like rocky valley at Borsh on 1 July clearly indicated the existence of a maternity roost close to the netting site, most probably in a rock fissure of the limestone wall of the canyon (Fig. 78). Direct temporal evidence of reproduction of *H. savii* in Albania was found many times (Sachanowicz & Ciechanowski 2018, own data); pregnant females were documented on 23 and 29 June, 2 and 7 July, and on 17 August; lactating females were netted on 26 June, 1, 3, 5, and 9 July, and 7 August; volant juveniles of the year were netted on 1 July, 3, 9, 17, and 26 August, and 8 and 17 September. The time intervals in which the particular reproduction stages were found (pregnancy 56 days, lactation 43 days) indicate an extremely extended reproduction period in this bat, much longer than in other bat species. Impregnations in *H. savii* seems to occur between early May and late July, parturitions between early June and mid-August. One pregnant female examined on 2 July contained two foeti of the crown rump length of 18.2 mm, the female examined on 7 July two foeti 16.8 mm long.

Foraging individuals of *H. savii* were documented at 84 sites; of them, at 26 sites (31.0% of the foraging records) the bats were netted (van der Tempel 2016, Sachanowicz & Ciechanowski 2018, own data), at the remaining sites only the calls were detected. In total, 160 bats were netted at the foraging grounds, and their sex ratio was unbalanced (21 ♂♂ : 11 ♀♀) in the total catch.

Fig. 78. Borshi river valley near Borsh (Vlorë Pref.); foraging grounds of a varied bat community, individuals of *Myotis davidii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*, and *Nyctalus leisleri* were netted there, and the echolocation calls of *Pipistrellus pygmaeus* and *Tadarida teniotis* detected. Photo by M. Uhrin (July 2016).

Foraging individuals of *H. savii* were recorded most frequently (70.2% of the foraging records) at various water bodies, at/above streams and rivers in vegetated or rocky valleys, at small/large lakes, at small pools, but also at the sea shore. The second most frequently used type of foraging areas (17.9%) were anthropogenic habitats in villages and towns, including the areas of the ancient ruins, city parks, etc. The least used habitats, considering the available data, are dry rocky habitats (7.1%), and forests without streams (4.8%). The foraging habitats of *H. savii* were distributed across a very wide altitude range of 5–1,541 m a. s. l. (median 344.0 m, mean 489.1 m, n=84).

Records of ectoparasites. **Original data**: S p i n t u r n i c i d a e: *Spinturnix nobleti*: 2 fa, 1 protonymph (CMŠ [P]) from 1 fa (NMP 96573), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin. – M a c r o n y s s i d a e: *Macronyssus* sp.: 1 fa (CMŠ [P]) from 1 fa, Butrint (Vlorë Pref.), 25 April 2004, leg. M. Ciechanowski, A. Rachwald & K. Sachanowicz. – *Steatonyssus* sp.: 1 protonymph (CMŠ [P]) from 1 ma (NMP 96595), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – T r o m b i c u l i d a e: *Leptotrombidium* cf. *russicum*: 3 larvae (CMŠ [P]) from 2 ma (NMP 96595, 96596), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda, det. S. Kalúz. – *Oudemansidium musca*: 2 larvae (CMŠ [P]) from 1 ma (NMP 96564), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin; 11 larvae (CMŠ [P]) from 1 ma, 1 fa (NMP 96589, 96590), Krajkë (Dibër Pref.), 7 July 2016, leg. P. Benda; 7 larvae (CMŠ [P]) from 2 ma (NMP 96609, 96610), Murrë (Dibër Pref.), 3 July 2018, leg. P. Benda, det. S. Kalúz; 47 larvae (CMŠ [P]) from 2 ma (NMP 96595, 96596), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – *Oudemansidium* cf. *musca*: 2 larvae (damaged) (CMŠ [P]) from 2 ma (NMP 96609, 96610), Murrë (Dibër Pref.), 3 July 2018, leg. P. Benda, det. S. Kalúz. – *Willmannium cavus moldaviensis*: 2 larvae (CMŠ [P]) from 1 ma (NMP 96564), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin; 3 larvae (CMŠ [P]) from 1 ma, 1 fa (NMP 96589, 96590), Krajkë (Dibër Pref.), 7 July 2016, leg. P. Benda; 4 larvae (CMŠ [P]) from 2 ma (NMP 96609, 96610), Murrë (Dibër Pref.), 3 July 2018, leg. P. Benda, det. S. Kalúz; 3 larvae (CMŠ [P]) from 2 ma (NMP 96595, 96596), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – **Published data**: S p i n t u r n i c i d a e: *Spinturnix nobleti*: 1 ma, 2 fa, Butrint, 25 April 2004 (Sachanowicz et al. 2014); 1 ma, Fushë-Muhurr, 23 September 2005 (Sachanowicz et al. 2014); 1 ma, Krumë, 3 August 2007 (Sachanowicz et al. 2014); 1 ma, 2 fa, Gizavesh, 3 July 2011 (Sachanowicz et al. 2014); 4 ma, 1 fa, Nikgjonaj, 8 September 2012 (Sachanowicz et al. 2014); 1 ma, 3 fa, Nderlysë, 9 September 2012 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, six arthropod parasite taxa were collected from *Hypsugo savii* in Albania. At least three of them are here reported from Albania for the first time.

The bat mite *Spinturnix nobleti* Deunff, Volleth, Keller et Aellen, 1990 is a parasite preferring to feed on bats of the *Hypsugo savii* group (Deunff et al. 1990, Scheffler et al. 2012), it was found to be a common, though exclusive parasite of *H. savii* in Albania (Sachanowicz et al. 2014, own data).

Three forms of the chigger mites were collected from *H. savii* in Albania; *Leptotrombidium* cf. *russicum* (Oudemans, 1902), *Oudemansidium musca* (Oudemans, 1906), and *Willmannium cavus moldaviensis* Kudrâšova, 1992; all these taxa are here reported from Albania for the first time. The specimens of *Leptotrombidium* are only roughly identified to the species level, due to the partial damage of the material. According to the available characters, we suppose them to belong to *L. russicum*, a species collected in Albania also from *Eptesicus serotinus* and identified without doubts (see above). *O. musca* occurs across the Palaearctic and parasitises a variety of hosts from the families Rhinolophidae and Vespertilionidae (Kudrâšova 1991), from *H. savii* it was collected previously also in southern Europe (Lanza 1999, Willemsen & Resoort 2012). In Albania, it was collected from four bat species, besides *H. savii* also from *Vespertilio murinus*, *Eptesicus serotinus*, and *Tadarida teniotis* (own data; see above and below). The record of *W. cavus moldaviensis* from *H. savii* represents the first finding of this parasite from this host species; previously, this subspecies was described from the material collected only from *Nyctalus noctula* and *Eptesicus serotinus* in Moldavia (Kudrâšova 1992, 2004) and in Albania it was additionally collected from *Vespertilio murinus*, *Pipistrellus pipistrellus*, *P. pygmaeus*, and *Tadarida teniotis* (own data; see above and below).

Two specimens of the macronyssid mites unidentified to the species level were collected from *H. savii*; an adult female of *Macronyssus* sp. and a protonymph of *Steatonyssus* sp. The record

of *Macronyssus* sp. represents the first evidence of this genus in this host bat species – the only available finding in the *H. savii* group is known from *H. alashanicus* (Bobrinskoj, 1926), a sister species living in the eastern Palaearctic, from which *Macronyssus coreanus* (Ah, 1964) was collected in Korea (Ah 1964). Mites of the genus *Steatonyssus* are already known from *H. savii*, two species were collected from this host in Europe, *Steatonyssus periblepharus* Kolenati, 1858 and *S. spinosus* Willmann, 1936 (Lanza 1999). Both these species are common throughout the Palaearctic (Dusbábek 1964b, Till & Evans 1964, Radovsky 1967, Stanûkovič 1990), moreover, the former species was collected from seven bat species in Albania.

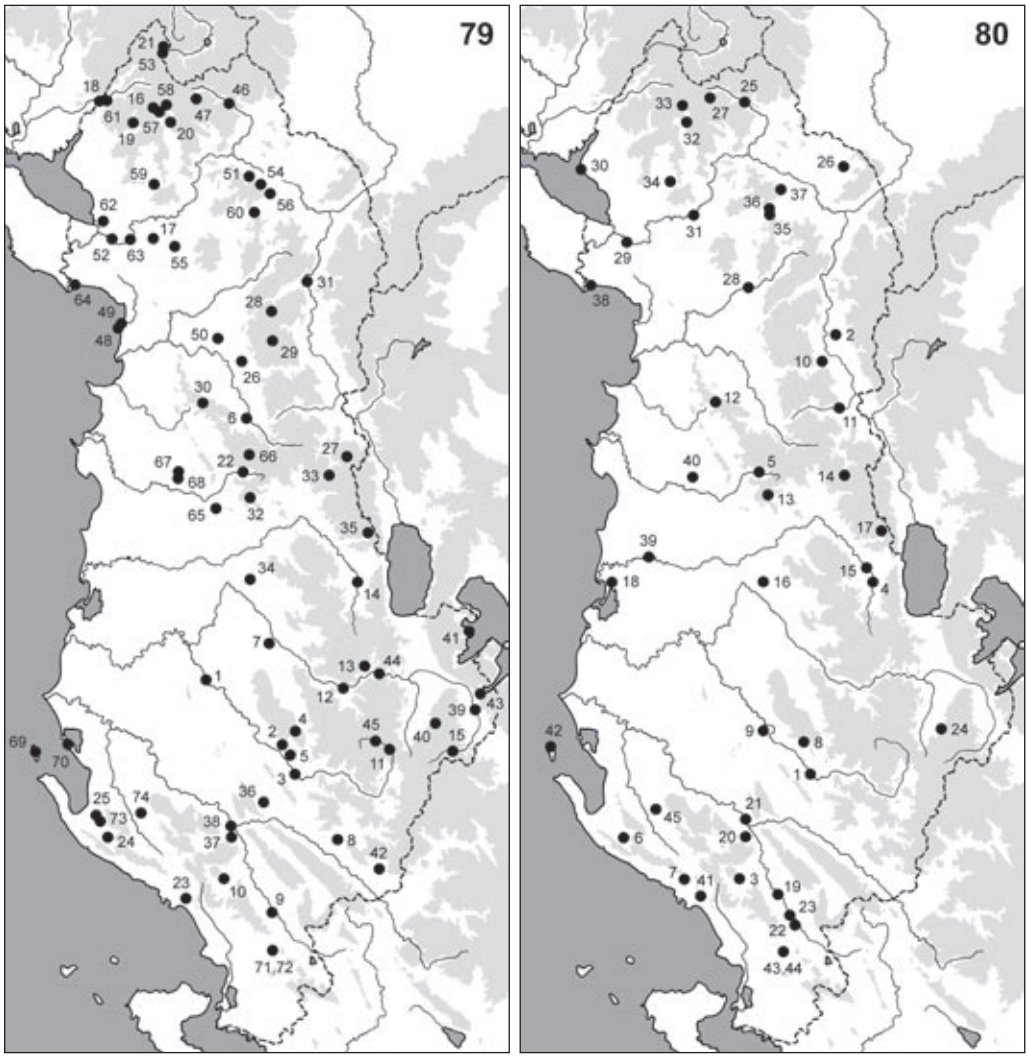
Pipistrellus pipistrellus (Schreber, 1774)

Records. **Original data**: B e r a t: Berat, castle [1], castle yard, 4 July 2016: det. calls of several foraging inds.; – Çorovodë, Çorovoda river valley ca. 1 km east of the town [2], above the river, 22 September 2018: net. 1 ma, 1 fa, det. & rec. calls of 1 foraging ind.; – Dhorës, Osumi river canyon [3] (Fig. 82), in the canyon, 29 June 2016: det. calls of several foraging inds.; – Koritë, above a watering place in a mountain pass [4], 21 September 2018: det. & rec. calls of several foraging inds.; – Zogas, at a small pond [5], 23 September 2018: det. & rec. calls of 1–2 foraging inds. – D i b ë r: Fshat, river valley west of the village [6], 1 July 2018: det. & rec. calls of 1 foraging ind. – E l b a s a n: Shëmrizë, small valley [7], 28 June 2016: det. calls of 1–2 foraging inds. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [8] (Fig. 107), at two entrances to bunkers, 29 June 2019: net. 2 ma (leg. R. Lučan); – Goranxi, bunker [9] (Figs. 112, 113), at a bunker entrance, 3 May 2016: net. 1 fa; – Zhulat, Kardhiqi river valley [10] (Fig. 92), above the river, 5 July 2015: net. 2 faL, det. & rec. calls of 1 foraging ind. – K o r ç ë: Leshnjë, bunker [11] (Fig. 33), fissure between concrete blocks, 9 May 2016: obs. 1 ind. torpid; – Nikollarë, Devolli river valley [12], at the river, 26 June 2016: det. calls of several foraging inds.; – Selcë, Selca river valley [13], above the river, 8 July 2015: net. 1 ma; – Selishtë, Dunica river valley [14] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of several foraging inds.; – Sinicë, Devolli river valley [15] (Fig. 99), at the river, 7 July 2015: det. & rec. calls of 2 foraging inds. – S h k o d ë r: Fushë Okol, above a watering place [16] (Fig. 66), 24 June 2019: det. calls. of ca. 5 foraging inds. (leg. R. Lučan); – Gomsiqe, Gomsiqe river valley [17], 26 June 2018: det. & rec. calls of several foraging inds.; – Grabom, Cemi river valley [18] (Fig. 71), 15 September 2018: det. & rec. calls of several foraging inds.; – Grykë Lugje, above a watering place [19] (Fig. 74), 17 September 2018: net. 3 ma, 4 fa, det. & rec. calls of 1 foraging ind.; – Ndërlysaj, Thethi river valley [20] (Fig. 75), at the river, 8 July 2016: det. calls of several foraging inds.; – Velan, Vermoshi river valley [21] (Fig. 63), 24 June 2018: det. & rec. calls of several foraging inds. – T i r a n ë: Shëngjin i Madh, Erzeni river valley [22], 5 July 2016: det. calls of several foraging inds. – V l o r ë: Borsh, Borshi river valley [23] (Fig. 78), above the river, 1 July 2016: net. 1 faL; – Dukat, Dukati river valley [24] (Fig. 54), above the river, 2 July 2016: net. 1 faL, det. calls of numerous foraging inds.; – Tragjas, at the Izvori river spring [25] (Fig. 81), 30 September 2018: det. & rec. calls of 1 foraging ind. – **Published data**: B e r a t: Çorovodë, stream [2], in limestone gorge, 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – D i b ë r: Barbullej, river [26], village nearby, 30 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Klenje [27], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Lura, mountain lake surrounded by old beech-pine forest [28], 27 June 2011: det. calls of foraging inds. (Sachanowicz & Ciechanowski 2018); – Lura, water pool across a road in old beech forest [29], 28 June 2011: net. 1 ma, det. calls (Sachanowicz & Ciechanowski 2018); – Qafë Shtamë, stream and glade in pine-beech forest on mountain slope [30], 13 September 2012: det. calls of foraging inds. (Sachanowicz & Ciechanowski 2018); – Zall-Reç, bridge on the Drinit i Zi river in limestone canyon [31], village nearby, 21 September 2005: det. calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Benë, pond on pasture [32], near beech forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë Studë [32], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Muçan, stream, farmland landscape [34], 2 October 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Skenderbej [35], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – G j i r o k a s t ë r: Goricë, Dishnicës river [36], farmland landscape, 18 August 2006: net. 1 mj (Sachanowicz & Ciechanowski 2018); – Luzat, oriental plane forest in rocky valley of a stream [37], 11 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Tepelene, riparian forest of old oriental planes and poplars [38], Vjosës river valley, 19 August 2006: net. 1 fj, 20 August 2006 & 10 July 2011: net. 1 mj, 2 fa, det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Billisht, Devoll river [39], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, coppice at ruined mine buildings [40], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gollomboç, village surrounded by rocky hills on the Macro Prespa lake shore [41], 1 October 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Leskovik, near buildings [42], in the town, 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Mikro Prespa cave [= Treni cave] [43], limestone cliffs and the lake shore, 10 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë, sandstone gorge with stream near the mine entrance [44], 12 August 2006: det. calls; Devoll river with old willows and pastures, 6 July 2011: net. 1 faL; adit entrance, Devoll river valley with old willows and pastures, 6 July 2011: det. calls

(Sachanowicz & Ciechanowski 2018); – Vithkuq, Dëshnicës river [45], near old stony bridge, 14 August 2006: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, limestone canyon of Valbonë river [46], 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Valbonë, stream in old beech-spruce mountain forest [47], 7 August 2007: net. 1 fa, det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Kune-Vain-Tale Reserve, glade in old pine forest with buildings [48], Vain lagoon, 12 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Kune-Vain-Tale Reserve, dike among reed beds, surrounded by brackish lagoon [49], 17 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Perlat, river in farmland landscape [50], 26 June 2011: det. calls of foraging inds. (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Arst, valley slope with limestone outcrops [51], village nearby, 20 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Ashtë, pastures and shrubs near the village [52], 27 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Bashkimi, stream and road in beech forest [53], 23 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Dardhe, valley slope with limestone outcrops [54], 20 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Gomsiqe e Epërme, over a river in a rocky gorge [55], 6 August 2003: net. 1 fa (Sachanowicz et al. 2016); – Kulumri, entrance of an abandoned concrete barrack [56], 19 September 2005: net. 1 mj, det. advertisement calls (Sachanowicz & Ciechanowski 2018); – Liqeni i Thores, small alpine lake [57], pastures and limestone slopes nearby, 7 September 2012: det. calls of many foraging inds. (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [20], mountain valley, 9 September 2012: net. 2 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [58], old beach forest nearby, 8 September 2012: net. 1 ma, 10 September 2012: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Prekal, in a karstic cave [59], village nearby, 10 August 2007: net. 2 fa; near buildings in the village, limestone river canyon, 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, small pool in bed of a mountain stream [60], 8 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Rahovic, limestone mountain valley [61], near cave entrances, 21 June 2011: det. calls of 1 ind.; Cemit river, in a rocky gorge, 22 June 2011: net. 1 ma, 1 faL (Sachanowicz & Ciechanowski 2018); – Shkodër, Sheshi Perrucë square in city center [62], 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, limestone cliff at the river bank [63], 22 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Velipojë, riparian forest and the village [64], 19 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Krrabë, forested stream valley [65], old *Platanus* trees, 27 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Shëngjergj, entrance of tunnel [66], 1 July 2011: net. 3 ma (Sachanowicz & Ciechanowski 2018); – Tirana, in a flat [67], 17 September 1994: 1 m (Uhrin et al. 1996); – Tiranë, diga i liqenit [68], September & October 2013: det. calls (Çera 2014). – V l o r ë: Borsh, river in rocky limestone gorge with old trees [23], 1 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Dukat, rocky gorge of a stream [24], village nearby, 29 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – île de Sazani [69], September 2012: det. calls (Theou & Bego 2013); Sazan Island, bunker with water, 5 September 2012: det. calls of 4 inds. (Théou & Loce 2017); – Svërnec Island [70], open space, 27 July 2016: det. calls of 1 ind. (Théou & Loce 2017); – Syri i Kalter, over a karstic spring surrounded by a riparian woodland with oriental plane [71], 23 April 2004: det. calls of foraging ind./inds. (Sachanowicz et al. 2016); – Syri i Kalter, Bistricës river lined by oriental plane trees [72], surrounded by pasture, 24 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tragjas i vjeter, ruins of stony village with old plane trees [73], 28 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Velçë, limestone cliffs near the village and the entrance of karstic caves [74], 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Pipistrellus pipistrellus* represents a common bat in Albania, 74 localities are known from the country (Fig. 79, Table 1). The Albanian range is a part of the continuous and dense occurrence of this bat in the Balkans and the temperate zone of Europe as well (Dietz et al. 2016). In Albania, *P. pipistrellus* is the fourth most frequent bat; however, the number of its records is less than a half of that of the most common bat, *Rhinolophus ferrumequinum* (45.1%) and just about two thirds of the third most common bat, *Hypsugo savii* (71.2%; Table 1).

The high number of *P. pipistrellus* records in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkan Peninsula, including some islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, Presetnik et al. 2009, 2014, Micevski et al. 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). Its occurrence covers most parts of Albania, although most records (87.8% of the sites) are concentrated to the Mountain Ranges and only few findings come from the Western Lowlands (Fig. 79). The findings are available from a very wide altitude span (1–1,642 m a. s. l.; Table 2) and the value of the altitude median (445.0 m) indicates the preference for medium high areas of the country (Fig. 8). The distribution of *P. pipistrellus* records suggests a vicariant occurrence with *Pipistrellus kuhlii* (see below), an ecologically similar species strongly preferring the low altitudes of Albania



Figs. 79, 80. Records of particular bat species in Albania. 79 – *Pipistrellus pipistrellus* (Schreber, 1774). 80 – *Pipistrellus pygmaeus* (Leach, 1825).

and almost missing in the Northern Mountain Range (see Figs. 8, 84). Although nowadays the records show *P. pipistrellus* to be a common bat of Albania, it was only once reported from the country during the twentieth century, from Tiranë in 1994 (Uhrin et al. 1996); all other records come from the period 2003–2019. Moreover, this first record could theoretically pertain to *Pipistrellus pygmaeus*, a species not yet recognised in the 1990s (see Sachanowicz & Ciechanowski 2018).

Field notes. The findings of *Pipistrellus pipistrellus* in Albania were made between mid-April and early October, no records are available from the hibernation season (Fig. 9) and a prevailing

majority of the records (92.9% of the particular records) is related to foraging bats. The highest concentration of particular records (37.6% of all records) was registered during three weeks of the early summer (Fig. 9), between 21 June and 13 July (incl.); most of the remaining records (54.1%) were made in ten weeks of the late summer and of autumn, between 27 July and 2 October (incl.).

Roosts or possible roosts of *P. pipistrellus* were found only in two localities of Albania (2.7% of the sites; Fig. 9), in both cases they were artificial spaces. Uhrin et al. (1996) reported a finding of a male having flown into a flat in Tiranë (ca. 130 m a. s. l.) on 17 September; it is not clear from the description whether the bat entered the house to roost there or just accidentally during its night foraging. Another finding clearly represents a bat resting in a day roost, an individual was found torpid in a fissure between concrete blocks of a bunker at Leshnjë (1,088 m a. s. l.) on 9 May (Fig. 33; own data).

Maternity or other aggregations of *P. pipistrellus* were not documented from Albania. However, direct temporal evidence of reproduction was obtained several times in this bat, solely by netting of foraging individuals (Sachanowicz & Ciechanowski 2018, own data); lactating females were netted on 22 June, 1, 2, 5, and 6 July, volant juveniles of the year on 18–20 August and 19 September, while pregnant females were not examined/reported. Male advertisement calls were detected twice, on 19 and 20 September (Sachanowicz & Ciechanowski 2018).

At five sites, individuals of *P. pipistrellus* were netted at the entrances to possible roosts, at one cave and four artificial spaces, abandoned military bunkers and a concrete barrack. Fissures in rocks, between stones or between concrete blocks inside these structures could serve as roosting

Fig. 81. Izvori river spring near the village of Tragjas (Vlorë Pref.); foraging area of *Rhinolophus ferrumequinum*, *Myotis capaccinii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *P. kuhlii*. Photo by P. Tájek (September 2018).

places for individuals or groups. Altogether nine bats were caught at these sites, the sex ratio was unbalanced (6 ♂♂ : 3 ♀♀) in the total catch. The possible roost sites together with confirmed roost sites were distributed across a wide altitude range of 115–1,554 m a. s. l. (median 604.5 m, mean 706.8 m, n=7).

Foraging individuals of *P. pipistrellus* were documented at 69 sites (93.2% of the sites); of them, at 17 sites the bats were netted (25.3% of the foraging records; Sachanowicz & Ciechanowski 2018, own data), at the remaining sites only the calls were detected. In total, 31 bats were netted at the foraging grounds, and their sex ratio in the total catch was unbalanced again, but in the opposite way (13 ♂♂ : 18 ♀♀).

Foraging individuals of *P. pipistrellus* were recorded most frequently (72.1% of the foraging records) at water bodies, at/above streams in a valley, at small/large lakes, at small pools, springs and watering places, but also at the sea shore. The second most frequently used type of foraging areas (19.1%) were anthropogenic habitats in villages and towns, including the areas of the ancient ruins, city parks, etc. The least used habitats, considering the available data, are dry rocks areas and valleys without streams (5.9%), and agricultural landscapes without open water (2.9%). The foraging habitats of *P. pipistrellus* were distributed across the altitude range of 1–1,642 m a. s. l. (median 445.0 m, mean 560.6 m).

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Ischnopsyllus octactenus*: 3 fa (CMŠ [P]) from 1 fa (NMP 96575), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 1 ma, 3 fa (CMŠ [P]) from 2 fa (NMP 96513, 96514), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – A r g a s i d a e: *Argas vespertilionis*: 6 larvae (CMŠ [P]) from 1 fa (NMP 96567), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin. – T r o m b i c u l i d a e: *Willmannium cavus moldaviensis*: 1 larva (CMŠ[P]) from 1 fa (NMP 96567), Borsh (Vlorë Pref.), 1 July 2016, leg. P. Benda & M. Uhrin. – Trombiculidae sp.: 1 larva (damaged) (CMŠ [P]) from 1 fa (NMP 96513), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – M a c r o n y s s i d a e: *Steatonyssus periblepharus*: 3 protonymphs (CMŠ [P]) from 1 ma (NMP 96528), Selcë (Korçë Pref.), 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 3 protonymphs (CMŠ [P]) from 2 fa (NMP 96513, 96514), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – *Steatonyssus* sp.: 2 protonymphs (damaged) (CMŠ [P]) from 2 fa (NMP 96513, 96514), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.

Comments on ectoparasites. In total, at least four arthropod parasite species were collected from *Pipistrellus pipistrellus* in Albania. Three of them are here reported from Albania for the first time.

The bat flea *Ischnopsyllus octactenus* (Kolenati, 1856) is a frequent parasite of bats of the genus *Pipistrellus* and *Hypsugo*, *P. pipistrellus* s.l. is considered its principal host (Hůrka 1963b). It is distributed across the western Palaearctic, from Europe and north-western Africa to West Turkestan and Afghanistan (Medvedev 1992, Lanza 1999). In Albania, it was collected also from *Pipistrellus pygmaeus* (Scheffler et al. 2013; see below).

The bat soft tick *Argas vespertilionis* (Latreille, 1796) is here reported for the first time from Albania, where it was collected from three bat species, besides *P. pipistrellus* also from *Pipistrellus kuhlii* and *Tadarida teniotis* (own data; see below). It occurs over most of the Old World south of 60° N, including southern Africa and Australia, and parasitises a variety of hosts (Kolonin 2007). Bats of the genus *Pipistrellus* represent the principal host group of this tick species (Dusbábek 1972).

The macronyssid mite *Steatonyssus periblepharus* Kolenati, 1858 is here reported from Albania for the first time, although besides *P. pipistrellus* it was collected also from *Myotis blythii*, *M. davidii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, *Nyctalus leisleri*, and *Miniopterus schreibersii* (own data; see above and below). It is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999); from *P. pipistrellus* it was documen-

ted in most of its range between western Europe and Central Asia (Till & Evans 1964, Radovsky 1967, Rybin et al. 1989).

The chigger mite *Willmannium cavus moldaviensis* Kudrâšova, 1992 is here reported from Albania for the first time, although it was found from five bat species, including *Vespertilio murinus*, *Hypsugo savii*, *Pipistrellus pygmaeus*, and *Tadarida teniotis* (own data; see above and below). The record of this chigger mite from *P. pipistrellus* represents the first confirmed finding of this parasite from this host species; previously, this subspecies was described from the material collected only from *Nyctalus noctula* and *Eptesicus serotinus* in Moldavia (Kudrâšova 1992, 2004). A damaged larva of a chigger mite (Trombiculidae sp.) was collected from *P. pipistrellus*. Besides *Willmannium cavus*, several other chigger mites were reported from this host in the Balkans (Dusbábek 1964, Kolebinova & Beron 1965) and could be found also in Albania, viz. *Leptotrombidium myoticulum* Feider, 1960, *L. russicum* (Oudemans, 1902), *Oudemansidium komareki* (Daniel et Dusbábek, 1959), *Pentagonaspis trajani* (Dusbábek, 1964), and *Willmannium bulgaricum* (Dusbábek, 1964).

Pipistrellus pygmaeus (Leach, 1825)

Records. **Original data**: B e r a t: Dhorës, Osumi river canyon [1] (Fig. 82), in the canyon, 29 June 2016: det. calls of 1–2 foraging inds. – D i b ë r: Brest i Sipërm, at a small pond [2], 3 October 2018: det. & rec. calls of 1 foraging ind. – G j i r o k a s t ë r: Zhulat, Kardhiqi river valley [3] (Fig. 92), above the river, 5 July 2015: net. 1 faG. – K o r ç ë: Selishtë, Dunica river valley [4] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of 1 foraging ind. – T i r a n ë: Shëngjin i Madh, Erzeni river valley [5], 5 July 2016: det. calls of 1 foraging ind. – V l o r ë: Dukat, Dukati river valley [6] (Fig. 54), above the river, 2 July 2016: net. 1 ma; – Pilur, at a watering place [7] (Fig. 94), 27 September 2018: det. & rec. calls of 1–2 foraging inds. – **Published data**: B e r a t: Çorovodë, stream in limestone gorge [8], 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Valë, near a village [9], river valley, 6 May 2010: det. calls; Voskopojës river valley, pine grove, 7 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – D i b ë r: Fushë-Muhurr, rocky slopes with quarries [10], 23 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Krajkë, river [11], farmland landscape, 24 September 2005: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Qafë Shtamë, stream and glade in pine-beech forest [12], 13 September 2012: net. 1 ma, det. social calls, obs. several foraging inds. (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Benë, pond on pasture [13], near beech forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë Studë [14], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Karkavec, Shkumbinit river [15], farmland area, 29 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Muçan, stream [16], farmland landscape, 2 October 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Skenderbej [17], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – F i e r: Divjakë, road in coastal old pine forest [18], 27 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Gjirokastër, citadel [19], 26 September 2012: net. 1 ind. (Scheffler et al. 2013); – Luzat, oriental plane forest in rocky valley of a stream [20], 11 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Tepelenë, Vjosë valley ca. 1 km south [21], 19 April 2004: obs. & det. calls of several inds. (Sachanowicz et al. 2006a); Tepelene, river in riparian forest of old oriental planes and poplars, Vjosës river valley, 19 August 2006: net. 1 ma, det. calls of several foraging inds., 20–21 August 2006: net. 5 ma, det. calls (Sachanowicz & Ciechanowski 2018); – Terihat, near buildings and streetlights in the village [22], 16 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Vanister cave [23], near the cave entrance, 22 April 2004: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Boboshticë, village pond surrounded by trees [24], 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, limestone canyon of the Valbonë river [25], 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Nikoliq, water pool in river bed [26], 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Valbonë, stream in old beech-spruce mountain forest [27], 7 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mashtërkor, small pool in valley of the Fani i Vogël river [28], 9 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Ashtë, pastures near the village [29], 27 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Kamicë-Flakë, Shkodër lake shore with riparian vegetation [30], 24 June 2011: det. social calls, 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Koman, under a bridge [31], Drini i Bardhë river tributary, 12 August 2003: net. 1 ma, obs. several foraging inds. (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [32], mountain valley, 9 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [33], old beech forest nearby, 8 September 2012 & 10 September 2012: net. 5 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Prekal, near buildings [34], rocky river canyon, 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafëmal, over a small artificial pool [35], 10 August 2003: net. 2 ma (Sachanowicz et al. 2006a); Qafa e Malit, forest road in old

mountain mixed forest, 8 August 2003: det. calls of several foraging inds.; pool in bed of a mountain stream, 8 August 2003: net. 3 ma; black pine forest on mountain slopes, 9 August 2003: det. advertisement calls of several foraging inds., 18 September 2005: det. advertisement calls of several foraging inds. (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain beech forest [36], 18 September 2005: det. advertisement calls (Sachanowicz & Ciechanowski 2018); – Trun, mountain valley slopes [37], 20 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Velipojë, riparian forest and the village [38], 19 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Rrogozhinë, near buildings [39], farmland landscape, 17 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Tiranë, diga i liqenit [40], September & October 2013: det. calls (Çera 2014); Tiranë, Parku i Madh city park, 26 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – V l o r ë: Borsh, river in rocky limestone gorge with old trees [41], 1 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Dukat, rocky gorge of a stream [6], near a village, 29 April 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Sazan Island, bunker with water [42], 4 September 2012: det. calls of 1 ind. (Théou & Loce 2017); – Syri i Kalter, karstic spring surrounded by riparian woodland with old oriental planes [43], 23 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, pastures, forested Bistricës river valley [44], 16 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Velçë, limestone cliffs near the village and the entrance of karstic caves [45], 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Pipistrellus pygmaeus* represents a medium frequent bat in Albania with 45 localities available from the country (Fig. 80, Table 1). The Albanian range is a part of the continuous occurrence of this bat in the Balkans and the temperate zone of Europe as well (Dietz et al. 2016). The distribution pattern of *P. pygmaeus* in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkan Peninsula (Mayer & von Helversen 2001, Hanák et al. 2001, Benda et al. 2003a, Buys 2006, Presetnik et al. 2009, 2014, Micevski et al. 2014, Murariu et al. 2016, Paunović 2016, Tvrtković 2017, etc.). The occurrence of this bat covers most parts of Albania, the findings come from the altitude span of 6–1,182 m a. s. l.; the altitude statistics (median 441.0 m, mean 449.8 m; Table 2, Fig. 8) indicate the preference for medium high areas of the country. The highest Albanian record from Skënderbej in the Jabllanica Mts. (van der Tempel 2016) most probably represents also the highest altitude record of *P. pygmaeus* from

Fig. 82. Osumi river canyon at Dhorës (Berat Pref.); foraging area of *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *P. pygmaeus*. Photo by M. Uhrin (June 2016).

the Balkans. The finding of this bat in the sea island of Sazani could be regarded rather unusual, this bat does not occur frequently in small Mediterranean islands (Hanák et al. 2001, Benda et al. 2017, Tvrtković 2017) and its occurrence there is reported quite exceptionally (cf. Gaisler 2006). In Albania, *P. pygmaeus* was for the first time recorded in August 2003, when several bats were netted and their calls recorded in the northern part of the country (Sachanowicz et al. 2006a).

Field notes. The findings of *Pipistrellus pygmaeus* in Albania are available from most parts of a year from mid-April to early October, just with the exception of the hibernation period. All records represent the findings of bats on wings in their foraging habitats, no roost of this species was found in Albania. Almost two thirds of the particular records (61.8%) were made in a two--month period of the late summer and autumn, between early August and early October. The prevailing number of records in this period suggests the migratory behaviour at least in a part of the Albanian populations of this species (Sachanowicz & Ciechanowski 2018, cf. Dietz et al. 2016), when some bats arrive in southern Europe in late summer and autumn for mating and wintering, but give birth and nurse the young in central and northern parts of the continent. However, this hypothesis still needs confirmation.

Most of the records of *P. pygmaeus* at the foraging grounds are evidences of echolocation calls, while bats were netted only in eleven cases (20.0% of the particular records). In total, 23 individuals were caught, the sex ratio was highly unbalanced (19 ♂♂ : 3 ♀♀; Sachanowicz & Ciechanowski 2018, own data).

In Albania, *P. pygmaeus* was most frequently documented at various water bodies (55.6% of the sites), often at streams in valleys, at lakes or pools of various size, including the giant Shkodra lake. The environment with the second biggest number of records (21.8%) were anthropogenic habitats, i.e. villages and towns, including parks and other urban vegetation and less frequently also farmland. The third most frequently used habitat type were dry rocks and rocky valleys (11.1%) and the least used habitat were forests without streams, where this bat was documented three times (6.7% of the sites). Foraging bats were netted most frequently above water bodies (81.8% of the netting sites), less frequently in the anthropogenic habitats.

No maternity aggregation of *P. pygmaeus* was observed in Albania, the only direct evidence of reproduction in this species in the country is represented by the pregnant female netted above the Kardhiqi river at Zhulat on 5 July (Fig. 92). The female contained one highly developed foetus with the crown-rump length of 16.9 mm, suggesting the parturition term in the first ten-day period of July. Although no lactating females or juveniles of the year were registered, the record of the pregnant female suggests the existence of maternity colonies of *P. pygmaeus* at least in central latitudes of the Balkan Peninsula. Furthermore, almost a fifth (18.8%) of the particular records of this bat from Albania come from the period of presumed existence of maternity aggregations, from the last ten-day period of June and first ten-day period of July. The late summer mating behaviour of *P. pygmaeus* was registered due to recordings of social and advertisement calls, five times at several sites between 9 August and 18 September (incl.).

Records of ectoparasites. **Original data**: T r o m b i c u l i d a e: *Willmannium cavus moldaviensis*: 1 larva (CMŠ [P]) from 1 fa (NMP 96515), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß, det. S. Kalúz. – M a c r o n y s s i d a e: *Macronyssus flavus*: 1 protonymph (CMŠ [P]) from 1 fa (NMP 96515), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – S a r c o p t i d a e: *Notoedres chiropteralis*: 1 fa, 1 nymph, eggs (CMŠ [P]) from 1 fa (NMP 96515), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: I s c h n o p s y l l i d a e: *Ischnopsyllus octactenus*: 1 ind., Citadel of Gjirokastër, 26 September 2012 (Scheffler et al. 2013).

Comments on ectoparasites. In total, four arthropod parasite species were collected from *Pipistrellus pygmaeus* in Albania. Three of them are here reported from Albania for the first time.

The bat flea *Ischnopsyllus octactenus* (Kolenati, 1856) is a frequent parasite of bats of the genus *Pipistrellus* and *Hypsugo*, *P. pipistrellus* s.l. is considered its principal host (Hůrka 1963b); in Albania it was collected also from *P. pipistrellus* s.str. (own data; see above). Considering the relatively short time of taxonomic separation of *P. pygmaeus* from *P. pipistrellus*, additional parasite species considered to be specialised on the latter bat species could be frequent in *P. pygmaeus*, including *I. octactenus*.

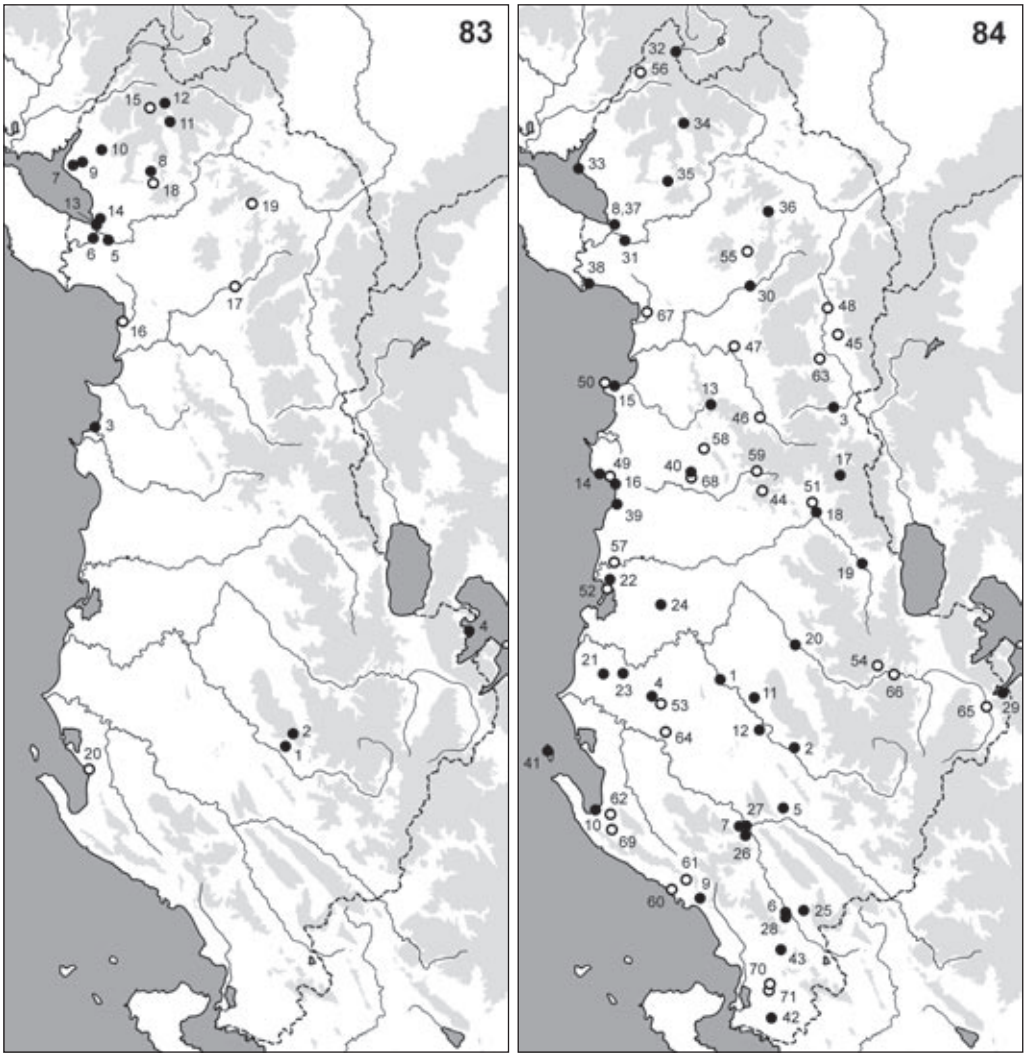
The chigger mite *Willmannium cavus moldaviensis* Kudrâšova, 1992 is here reported from Albania for the first time, although it was found from five bat species, including *Vespertilio murinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *Tadarida teniotis* (own data; see above and below). This subspecies was described from the material collected in Moldavia from *Nyctalus noctula* and *Eptesicus serotinus* (Kudrâšova 1992, 2004) and the record from *P. pygmaeus* represents the first confirmed finding of this chigger mite from this host species.

The macronyssid mite *Macronyssus flavus* (Kolenati, 1856) is here reported from Albania for the first time and for the first time it is confirmed to parasitise *P. pygmaeus*. Kolenati (1856) reported this mite from Bohemia and Moravia, i.e. the current territory of the Czech Republic, from *Pipistrellus pipistrellus* [s.l.]; thus, again, earlier collections from *P. pygmaeus* cannot be excluded. This mite is an oligoxenous parasite, its primary records come from bats of the genus *Nyctalus*, secondary records are known from other species of the family Vespertilionidae, e.g. *Myotis myotis*, *M. mystacinus*, *M. daubentonii*, *Vespertilio murinus*, *Pipistrellus nathusii*, and *Eptesicus nilssonii* (Radovsky 1967). Besides bats, its primary host group, it was found to parasitise also humans (Zumpt & Graf 1950). The distribution range of *M. flavus* covers the whole Palaearctic (Dusbábek 1964b, 1966, Radovsky 1967, Gu & Wang 1985).

The sarcoptid mite *Notoedres chiropteralis* (Trouessart, 1896) is here reported from Albania for the first time and for the first time it is confirmed to parasitise *P. pygmaeus*. Records of this mite are available from a variety of bat host species of the family Vespertilionidae occurring in the Palaearctic and Oriental regions (Fain & Lukoschus 1969, Klompen 1992). In Europe, it was collected from *Nyctalus noctula* and *Eptesicus serotinus* (van Eyndhoven 1947, Fain & Lukoschus 1969), and also from *Pipistrellus pipistrellus* [s.l.] – in Germany (Fain 1959, Fain & Lukoschus 1969) and Hungary (Beron 1965) – where these old records theoretically could cover also *P. pygmaeus*.

Pipistrellus nathusii (von Keyserling et Blasius, 1839)

Records. **Original data**: B e r a t: Çorovodë, Çorovoda river valley ca. 1 km east of the town [1], above the river, 22 September 2018: net. 2 fa; – Koritë, above a watering place in a mountain pass [2], 21 September 2018: net. 1 fa, det. & rec. calls of several foraging inds. – **Published data**: D u r r ë s: Rrushkull, seaside hunting lodge [3], 22 March 1961: obs. a colony of ca. 10 inds., exam. 3 f, 4 inds. (Hanak et al. 1961); Rrushkull, 22 March 1961: obs. a colony of ca. 10 inds., coll. 4 m, 3 f (Hanák 1964). – K o r ç ë: Gollomboç, entrance of a small cave in cliff [4], Macro Prespa lake shore, 1 October 2005: net. 5 ma, 1 fa; village, 1 October 2005: det. social calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Ashtë, four bunkers [5], 1 May 2004: obs. 2 inds. (exam. 1 fa) + 3 inds. (exam. 2 ma) + 3 inds. + 2 inds., 27 August 2006: obs. 3 inds. (exam. 1 ma) + 1 ma + 5 inds. + 8 inds.; near bunker entrance, 27 August 2006: net. 2 ma, det. social calls (Sachanowicz & Ciechanowski 2018); – Bërdicë, two bunkers [6], 20 April 2010: obs. 2 inds. + 2 inds., exam. 3 ma (Sachanowicz & Ciechanowski 2018); – Jubicë, bunker [7], 25 June 2011: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Kir, rocky gorge of the Kirit river [8], 11 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Lashaj, three bunkers [9], 17 September 2005: obs. 6 inds. (exam. 1 ma, 1 fa) + 1 ma + 3 inds. (exam. 1 ma, 1 fa) (Sachanowicz & Ciechanowski 2018); – [Lohja,] bunker [10], 6 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – Nderlysë, Shalës river [11], in mountain valley, 9 September 2012: net. 2 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [12], old beech forest nearby, 8 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Shkodër, Bunë river bank with trees and buildings [13], limestone hills, 6 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Shkodër, Sheshi Perrucë square in city center [14], 6 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018).



Figs. 83, 84. Records of particular bat species in Albania. 83 – *Pipistrellus nathusii* (Keyserling et Blasius, 1839), confirmed records (full circles) and presumable records (open circles). 84 – *Pipistrellus kuhlii* (Kuhl, 1817), confirmed records (full circles) and presumable records (open circles).

Pipistrellus cf. *nathusii*

Records. **Original data**: S h k o d ë r: Fushë Okol, at a watering place in mountain valley [15] (Fig. 66), 16 September 2018: det. & rec. calls of numerous foraging inds. – **Published data**: L e z h ë: Kune-Vain-Tale Reserve, brackish lagoon and canals [16], coastal marshes, 17 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]); – Mashtërkor, small pool in the valley of Fani i Vogël river [17], 9 August 2007: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]). – S h k o d ë r: Kir, rocky gorge of the Kir river [8], 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]); – Nikgjonaj, stream in mountain valley of the Shalë river [12], old beech forest nearby, 8 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]); – Prekal, near the entrance

of a karstic cave [18], village nearby, 10 August 2007: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]); – Qafa e Malit, mountain beech forest [19], 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]). – V l o r ë: Vlorë, street in the city [20], 17 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P.* cf. *nathusii*]).

Distribution. *Pipistrellus nathusii* ranks among uncommon bats in Albania, when also the records assigned to *P*. cf. *nathusii* are considered (see above) and only 20 localities are known from the country (Fig. 83, Table 1). Otherwise, with only 14 confirmed records, *P. nathusii* represents a rather rare bat species of Albania. Its localities are concentrated mostly to the western part of the Albanian Alps and the Shkodra basin where more than two thirds of them lie (71.4%); most of the unconfirmed sites of *P. nathusii* are also situated to northern Albania (Fig. 83). Four remaining confirmed localities are dispersed to three quite different parts of the country, to the Prespa region, the sea shore and to the Tomorri mountains in southern central Albania. The single occurrence recorded at the Great Prespa lake continues in more abundant findings in the Greek and North Macedonian parts of the region (Papadatou et al. 2011, Presetnik 2015b).

Despite some records in mountain positions and a relatively wide altitude range of the whole occurrence (Table 2), *P. nathusii* is a rather lowland species in Albania, most records come from the altitudes below 550 m a. s. l. (median 249.5 m, when also unconfirmed records are taken into consideration, n=20; and 187.5 m when only the confirmed records are included, n=14). Similar preferences are indicated by the records of *P. nathusii* from neighbouring Montenegro, mainly from the Shkodra/Skadar basin and adjacent areas, where the altitude characteristics show even smaller values than in Albania (range 1–640 m a. s. l., median 26.5 m, mean 123.7 m; cf. Presetnik et al. 2014).

The distribution of records suggests northern Albania to be a regular part of the range of *P. nathusii* in south-eastern Europe, where this bat perhaps could be seasonally abundant (see below), while in other parts of Albania it is rather accidentally present. The whole Balkan Peninsula, including some offshore islands and Crete, belongs to the distribution range of *P. nathusii* (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2014, Presetnik 2015b, Paunović 2016, Tvrtković 2017). However, *P. nathusii* is a migratory species that reproduces in the northern parts of its range (central and north-eastern Europe), while hibernates and mates in the southern parts of its range, including the Balkans (Strelkov 1971, 1997, 1999). It seasonally migrates between these two separate areas. In the Balkans, its records originate mainly from autumn, winter and spring (hibernation was documented in northern Greece and Montenegro; von Helversen & Weid 1990, Presetnik et al. 2014); the migration routes from the northern areas (Germany, Latvia, Russia) to south-eastern Europe (Slovenia, Croatia, Greece, Bulgaria, European Turkey) were proved by re-captures of marked individuals (Strelkov 1971, Pētersons 2004, Hutterer et al. 2005). Concerning the Balkans, this evidence is the most complete compared to the other European migratory bat species (*Vespertilio murinus*, *Nyctalus noctula*, and *N. leisleri*).

Perhaps due to this migratory behaviour, *P. nathusii* is more regularly recorded in the northern and central latitudes of the Balkan Peninsula, including Albania, North Macedonia and northern Greece (see von Helversen & Weid 1990, Hanák et al. 2001, Presetnik 2015b), than in the southern regions of the Balkans (southern Greece, Crete), where it is only seldom encountered and where its findings are rather associated with irregular migrants or even stray individuals (cf. Benda et al. 2009). Also within the territory of Albania, a north-south gradient of decreasing occurrence of *P. nathusii* is apparent (Fig. 83); in the northern third of the country, 10–15 localities are known, in the central third two records were made, and 2–3 sites are available from the southern third of Albania. Such a type of distribution in Albania is evident in two other migratory bat species, *Vespertilio murinus* and *Nyctalus noctula* (see Figs. 59, 89, Table 4).

Although *P. nathusii* is a rather rare bat in Albania, it was discovered in the country already in 1961, when a small group was found roosting in a shooting lodge (Hanak et al. 1961). The second record from the country followed only in May 2004 (Sachanowicz & Ciechanowski 2018).

Field notes. *Pipistrellus nathusii* was found in Albania between late March and early October, no winter and late autumn records are available; however, no findings were made also in full summer, in July and most of August, while one record was made in early June and in late June, respectively (Fig. 64). The majority of particular records (70.6%) is concentrated to the late summer/early autumn period, between 27 August and 1 October (incl.). The largest portion of the records (47.0%) represents foraging bats, only a slightly smaller number (41.2%) represents findings of bats in roosts, and the remaining two records go to netting at entrances to potential roosts. The foraging bats were recorded only in autumn (September, October), while the roost findings dominated in other seasons.

Both males and females of *P. nathusii* were recorded in Albania in both spring and late summer/autumn periods (when also social calls are included), i.e in almost identical time intervals within a year (Fig. 64). Among 34 examined bats, males dominated over females more than twice (12:5). However, in central and southern Albania (see 1–4 in Fig. 83), the females were frequent in 100% of the records, while males only in 50% (on the other hand, the males slightly outnumbered females in absolute values, 9:7).

Roosting individuals of *P. nathusii* were found in artificial shelters only, in a wooden cottage and in concrete bunkers. Hanak et al. (1961: 136) described the former finding as follows: "In the seashore Rrushkull region, a colony of ten bats was found hidden in a door fissure in a shooting lodge in Rrushkull on 22 March 1961. The roost seemed to be used only temporarily since we did not find any droppings." (translated from Albanian). This group perhaps represented a transient aggregation in a period between hibernation and migration. At five sites, individuals of *P.*

Fig. 85. An adult male of *Pipistrellus nathusii* found in a bunker at Ashtë (Shkodër Pref.), 27 August 2006. Photo by K. Sachanowicz.

nathusii were discovered in bunkers in late April, early May, early and late June, late August and mid-September (Théou & Đurović 2015a, Sachanowicz & Ciechanowski 2018). The bats mostly roosted in fissures between concrete blocks; at three sites, series of bunkers composed of two to four bunkers were occupied by this bat. Altogether, eleven particular bunkers were documented to be used by 1–8 bats, in total by 43 bats (mean 2.9 bats per a bunker, several bunkers were checked more than once). Among thirteen examined bats, two adult females were found in two separate bunkers of one bunker series on 17 September; the other examined individuals were adult males. Unfortunately, sex and age are not available for two bats found in two bunkers on 6 and 25 June (Théou & Đurović 2015a, Sachanowicz & Ciechanowski 2018); these two findings indicate presence of *P. nathusii* population in Albania in the reproduction season, although it could be composed only of males, similarly as in other migratory bat species (Strelkov 1997, 1999). On 27 August, an aggregation of some 40 bats mixed of *P. nathusii* and *P. kuhlii* was found in a bunker at Ashtë (Sachanowicz & Ciechanowski 2018). The altitude range of the roost sites (2–394 m a. s. l.; median 36.5 m) indicates strict preference for very low areas in *P. nathusii* roosting in Albania regardless of season.

Individuals of *P. nathusii* were netted at the entrances to two spaces (Sachanowicz & Ciechanowski 2018). At the bunker near Ashtë, where a mixed group of two *Pipistrellus* species was discovered, two males of *P. nathusii* (Fig. 85) and nine individuals of *P. kuhlii* were caught. Five adult males and one adult female were netted at the entrance to a small cave in a cliff above the Prespë e Madhe (Greater Prespa) lake, east of Gollomboç, on 1 October. Sachanowicz & Ciechanowski (2018) suggested the cave and/or the crevices in rocks around the cave entrance to be a mating roost.

Foraging individuals of *P. nathusii* were documented at nine sites, at three of them, the bats were netted (two males and four females), at six sites male social calls were recorded and the species identification is considered as sure; at six other localities echolocation calls were recorded which were most probably also produced by *P. nathusii* although a certain possibility of misidentification of *P. kuhlii* remains in these cases. Most frequently, foraging *P. nathusii* were recorded in valleys with running streams, above pools and watering places, and in wetlands (60.0%), several times it was recorded in urban habitats, both of large towns and smaller settlements (33.3%), and one record comes from a mountain broad-leaves forest. The altitude range of the foraging grounds of *P. nathusii* covers medium high positions (9–1,368 m a. s. l., median 329.5 m); it is very similar when also unconfirmed records are included (1–1,368 m a. s. l., median 298.0 m).

Reproduction of *P. nathusii* in Albania was not documented and considering the migratory nature of this bat, it is not expected. Mating behaviour in the autumn season is indicated by recordings of the male advertisement calls at six sites between 6 September and 1 October (incl.). As noted above, presence of single individuals during the reproduction season (mid-May to late June) could suggest a population of the species staying in the Balkans year-round, or alternatively an exceptional reproduction. Records of *P. nathusii* from the early summer are available from Bulgaria (male, 20 June; Hanák & Josifov 1959) and Greece (pregnant female, 17 June; Hanák et al. 2001); the latter finding could suggest possible reproduction in the Balkans, although it may just document more diffuse terms of migration in some individuals/populations (see also Ancillotto & Russo 2015).

Pipistrellus kuhlii (Kuhl, 1817)

Records. **Original data**: B e r a t: Berat, castle [1], castle yard, 4 July 2016: net. 1 ma, det. calls of several foraging inds.; – Çorovodë, Çorovoda river valley ca. 1 km east of the town [2], above the river, 22 September 2018: net. 1 fa. – D i b ë r: Krajkë, Zerdjani river valley [3], above the river, 7 July 2016: net. 1 faL, det. calls of numerous foraging inds. – F i e r:

Belistan, bunker [4], ceiling fissure, 30 June 2016: obs. (& exam.) 1 ma. – G j i r o k a s t ë r: Beduqas, Dishnica river valley [5] (Fig. 87), above the river, 6 July 2015: net. 1 faL, det. & rec. call. of several foraging inds.; – Goranxi, bunker [6] (Figs. 112, 113), at the bunker entrance, 3 May 2016: net. 2 ma; – Tepelenë, Bënça river valley [7] (Fig. 69), above the river, 30 June 2016: net. 1 ma, 1 faL, det. calls of several foraging inds. – S h k o d ë r: Shkodër, Rozafa castle [8] (Fig. 111), fissure in ceiling vault of a corridor, 10 July 2016: obs. 1 ind. torpid. – V l o r ë: Borsh, Borshi river valley [9] (Fig. 78), above the river, 1 July 2016: net. 1 faL; – Orikum, sea shore [10], 26 June 2019: obs. & det. calls of 3 foraging inds. (leg. R. Lučan). – **Published data**: B e r a t: Çorovodë, Osojës river [2], 8 July 2011: det. social calls (Sachanowicz & Ciechanowski 2018); – Drenovë [11], 9 July 2011: 1 fa (Sachanowicz et al. 2017); Drenovë, small pool on a mountain stream, near a village, 9 July 2011: net. 3 ma, 9 faL (Sachanowicz & Ciechanowski 2018); – Valë, Voskopojës river [12], 7 May 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018). – D i b ë r: Qafë Shtamë, glade in mountain pine-beech forest [13], 13 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Durazzo [= Durrës] [14], 8 April – 6 May 1931: 1 f, BMNH (Gaisler 1970, cf. Ticehurst & Whistler 1932); Durrës, city center, near the Palace of Sports, 8 May 2010: det. social calls (Sachanowicz & Ciechanowski 2018); – Shetaj, above a ditch near the Adriatic coast [15], 29 September 2012: net. 1 ind. (Scheffler et al. 2013); – Shkallnur, water channel [16], near buildings, 8 May 2010: det. social calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Fushë Studë [17], 28 July – 7 August 2015: det. social calls (van der Tempel 2016); – Gizavesh [18], 3 July 2011: 1 fa (Sachanowicz et al. 2017); Gizavesh, small branch of the Koponit river, 3 July 2011: net. 2 ma, 1 fa, 3 faL (Sachanowicz & Ciechanowski 2018); – Karkavec, Shkumbinit river [19], farmland, 29 September 2005: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Mashan, small branch of the Devoll river in wide valley [20], farmland, 7 July 2011: net. 1 faL (Sachanowicz & Ciechanowski 2018). – F i e r: Apollonia, ancient ruins [21], crevice between stones, 12 July 2011: obs. 2 inds. (Sachanowicz & Ciechanowski 2018); – Divjakë [22], 27 April 2010: 1 fa (Sachanowicz et al. 2017); Divjakë, road in coastal old pine forest, 27 April 2010: net. 5 fa, det. social calls (Sachanowicz & Ciechanowski 2018); – Fier, city center [23], old plane trees, low houses, 17 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Lushnjë, city center [24], park and near buildings, 8 May 2010: det. social calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Libohove, garbage dump at a road [25], buildings nearby, 16 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Luzat, *Platanus* forest in rocky valley of a stream [26], 11 July 2011: det. social calls (Sachanowicz & Ciechanowski 2018); – Tepelenë, riparian forest in the Vjosë river valley [27], 19 April 2004: net. 1 ma, 10 July 2011: det. social calls (Sachanowicz & Ciechanowski 2018); – Vanister cave, rocky gorge near the cave entrance [28], village nearby, 16 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Buzëlliqen (Zagradeç), reedbeds at the shore of the Prespa lake [29], July 2009: 1 faL (Papadatou et al. 2011). – L e z h ë: Mashtërkor [30], 9 August 2007: 1 ma (Sachanowicz et al. 2017); Mashtërkor, small pool in the valley of Fani i Vogël river, 9 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Ashtë [31], 27 August 2006: 2 fa (Sachanowicz et al. 2017); Ashtë, three bunkers, 1 May 2004: obs. 1 ma + 8 inds. + 6 inds. (exam. 1 fa), 27 August 2006: obs. a breeding colony of ca. 40 inds. (exam. 1 fj), net. 1 ma, 3 fa, 5 fj (Sachanowicz & Ciechanowski 2018); – Bashkimi, road and stream in mountain beech forest [32], 23 June 2011: det. social calls (Sachanowicz & Ciechanowski 2018); – Kamicë Flakë, Shkodër lake shore with riparian vegetation [33], 24 June 2011: det. social calls (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [34], mountain valley, 9 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Prekal, near buildings in the village [35], 11 September

Fig. 86. Ruined castle of Bashtovë surrounded with agricultural landscape (Tiranë Pref.), foraging grounds of *Pipistrellus kuhlii*. Photo by M. Uhrin (July 2015).

2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, small pool in bed of a mountain stream [36], 10 August 2003: net. 1 ma, 1 mj (Sachanowicz & Ciechanowski 2018); – Shkodër, Sheshi Perrucë square in city center [37], 6 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018); – Velipojë [38], guard's lodge, 18 April 2010: obs. several bats emerging from under the roof, det. social calls; near buildings in the village, 19 April 2010: det. social calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Mali i Robit, woodlot edge at a road [39], 8 May 2010: det. social calls (Sachanowicz & Ciechanowski 2018); – Tiranë, a flat in a city centre [40], 10 March 1961: 1 ind.; Tiranë, at an artificial lake, February 1961: shot 3 inds. (Hanak et al. 1961); Umgebung von Tirana, date undef.: 1 ind., 10 March 1961: 1 m (Hanák 1964); Tiranë, Parku i Madh city park, 26 April 2010: det. social calls (Sachanowicz & Ciechanowski 2018). – V l o r ë: île de Sazani [41], September 2012: coll. 1 skull from owl pellets, det. calls of ca. 4 inds. (Theou & Bego 2013); Sazan Island, near port, 5 September 2012: coll. 1 ind. from owl pellets (Théou & Loce 2017); – Shalës, Pavlës river [42], 2 May 2010: det. social calls (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, pastures [43], forested Bistricës river valley, 16 September 2012: det. social calls (Sachanowicz & Ciechanowski 2018).

Pipistrellus cf. *kuhlii*

Records. **Original data**: E l b a s a n: Vakumonë, at two artificial lakes ca. 2 km east of the village [44] (Fig. 91), 5 July 2018: det. & rec. calls of 1 foraging ind. – D i b ë r: Brest i Sipërm, at a small pond [45], 3 October 2018: det. & rec. calls of several foraging inds.; – Fshat, river valley west of the village [46], 1 July 2018: det. & rec. calls of 1 foraging ind.; – Urakë, Tarini river valley [47] (Fig. 116), 2 July 2018: det. & rec. calls of several foraging inds.; – Zall-Dardhë, old aspen grove in the Drini i Zi river valley [48], 30 June 2018: det. & rec. calls of 1 foraging ind. – D u r r ë s: Durrës, beach resort corniche [49], 10 July 2015: det. & rec. calls of numerous foraging inds.; – Durrës, downtown [14], 10 July 2015: det. & rec. calls of numerous foraging inds.; – Kepi i Rodonit, Kisha e Shën Antonit [50], above meadows and at the sea shore, 18 September 2018: det. & rec. calls of numerous foraging inds.; – Shetaj, village [15], 6 July 2018: det. & rec. calls of numerous foraging inds. – E l b a s a n: Zgosht, at confluence of the Zalli i Shëmilit and Zalli i Lurikut rivers [51], 6 July 2016: det. calls of several foraging inds. – F i e r: Divjakë, Gjiri i Karavastasë [52], wetlands and pine forests at Plazhi i Divjakës (Fig. 88), 19 September 2018: det. & rec. calls of numerous foraging inds.; – Visokë, Gjanica river valley [53] (Fig. 43), at the river, 3 July 2016: det. calls of numerous foraging inds. – K o r ç ë: Selcë, Selca river valley [54], at the river, 8 July 2015: det. & rec. calls of several foraging inds. – S h k o d ë r: Kimëz, valley ca. 2 km west of the village [55] (Fig. 45), 27 June 2018: det. & rec. calls of several foraging inds.; – Selcë, Cemi river valley [56] (Fig. 117), above the river, 9 July 2016: det. calls of 1–2 foraging inds. – T i r a n ë: Bashtovë, ruined castle [57] (Fig. 86), castle yard, 9 July 2015: det. & rec. calls of several foraging inds.; – Brar, in the Tirana river valley [58], 2 October 2018: det. & rec. calls of several foraging inds.; – Shëngjin i Madh, Erzeni river valley [59], 5 July 2016: det. calls of several foraging inds. – V l o r ë: Himarë, above a beach [60], 26 September 2018: det. & rec. calls of numerous foraging inds.; – Pilur, at a watering place [61] (Fig. 94), 27 September 2018: det. & rec. calls of several foraging inds.; – Tragjas, at the Izvori river spring [62] (Fig. 81), 30 September 2018: det. & rec. calls of numerous foraging inds. – **Published data**: D i b ë r: Fushë-Muhurr, slopes with quarries [63], 23 September 2005: det. calls (Sachanowicz & Ciechanowski 2018). – F i e r: Byllis, ruins of ancient Illyrian town [64], 15 September 2012: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Libohove, near buildings [25], 16 September 2012: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Billisht, Devoll river [65], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë [66], Devoll river with old willows and pastures, 11 August 2006: det. calls; sandstone gorge with a stream, 12 August 2006: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Leske, swampy meadows and shore of a lake [67], 1 October 1992: obs. & det calls of ca. 13 foraging inds. (Uhrin et al. 1996 [as *P. kuhli*]). – T i r a n ë: Tirana, a street in the diplomatic quarter [40], 30 September 1992: det. calls of 1 ind. (Uhrin et al. 1996 [as *P. kuhli*]); – Tiranë, diga i liqenit [68], October 2013: det. calls (Çera 2014 [as *P. kuhlii*]). – V l o r ë: Dukat i Ri, limestone slopes with dwarf cypress scrubs [69], 18 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Jermë, olive groves [70], 27 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Kulluricë, farmland with olive groves and settlements [71], 26 April 2004: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Pipistrellus kuhlii* represents a common bat in Albania, when also the records assigned to *P*. cf. *kuhlii* (in fact, representing *P. kuhlii* with most probability) are considered (see above) and 71 localities are available from the country in total (Fig. 84, Table 1). Otherwise, with 42 confirmed records, *P. kuhlii* still remains a rather common bat species of Albania. However, in the following review both the above record types are regarded, assigned to *P. kuhlii* and *P*. cf. *kuhlii*.

Considering this complete evidence, *P. kuhlii* is the sixth most frequent bat in Albania, its occurrence covers all parts of the country. The records are regularly scattered over the Western Lowlands, and Southern and Central Mountain Ranges, the portions of records in these regions range between 23.9% and 32.4%, while in the Northern Mountain Range only 12.7% of records

are distributed (Fig. 84). The findings come from a moderately wide altitude range of 1–1,150 m a. s. l. (Table 2); however, the very small value of the altitude median (188.0 m), the lowest among all Albanian bats (Fig. 8), clearly indicates the strong preference for lowland areas of the country. The distribution of *P. kuhlii* records in Albania suggests a vicariant occurrence with *Pipistrellus pipistrellus* (see above), an ecologically similar species preferring rather medium-high altitudes and almost missing in the Western Lowlands (see Figs. 8, 79).

The territory of Albania belongs to the original continuous range of *P. kuhlii* in the Mediterranean Basin, as it remained until the end of the twentieth century (see Bogdanowicz 2004), although currently this bat occurs densely also in other parts of Europe after spreading of the range in the last 30–50 years (Strelkov et al. 1985, Bauer 1996, Sachanowicz et al. 2006b, Murariu et al. 2016, etc.). The high number of its records in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkan Peninsula, including many islands (Kryštufek et al. 1992, 1998, Stojanovski 1994, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2009, Presetnik et al. 2009, 2014, Micevski et al. 2014, Paunović 2016, Tvrtković 2017, etc.).

Although *P. kuhlii* is the second documented bat species from Albania (after *Plecotus auritus*, see below), for the first time collected in Durrës already in the spring 1931 (Gaisler 1970; see Ticehurst & Whistler 1932, Sachanowicz & Ciechanowski 2018), only five findings (6.2% of all particular records) were made in the twentieth century (Hanak et al. 1961, Hanák 1964, Gaisler 1970, Uhrin et al. 1996).

Fig. 87. Dishnica river valley at Beduqas (Gjirokastër Pref.); netting site of *Hypsugo savii* and *Pipistrellus kuhlii*. Photo by M. Uhrin (July 2015).

Fig. 88. Wetlands and pine forests at Plazhi i Divjakës near Divjakë (Fier Pref.); foraging grounds of *Pipistrellus kuhlii*. Photo by P. Tájek (September 2018).

Field notes. The findings of *Pipistrellus kuhlii* in Albania are available from most parts of a year (Fig. 9); however, no hibernation finding is available and only one record (of foraging bats) comes from the hibernation period (November to February). A prevailing number of the records (86.9%) were made on foraging grounds, only few records represent findings of bats in roosts (8.3%). The highest concentration of particular records (37.5% of all records) was registered during three weeks of the early summer, between 23 June and 12 July (incl.; see Fig. 9).

The roosts of *P. kuhlii* were found in six localities (8.5% of the sites), all being artificial spaces. These roosts were situated in different types of man-made structures, viz. abandoned military bunkers, a castle ruin, an ancient ruin, a town house, and a lodge. In all these shelters for which data are available, *P. kuhlii* occupied crevices between stones, concrete blocks or under the roof. The record from a flat in a town house of Tiranë could represent roosting or just an accidental arrival during foraging. The roosts of *P. kuhlii* were situated in a very narrow altitudinal range of 7–115 m a. s. l. (median 81.0 m, mean 69.3 m) indicating again the strong preference for the lowland parts of Albania. In most of the roosts, only single individuals were documented, exceptions were found twice (Sachanowicz & Ciechanowski 2018). Several individuals of *P. kuhlii*, identified according to their social calls, were observed emerging from a narrow space under a roof of a lodge at Velipojë (7 m a. s. l.) on 18 April; this finding could represent a newly established maternity aggregation. Another aggregation was documented in the bunker at Ashtë (32 m a. s. l.), where some forty bats were found on 27 August; three adult and five volant juvenile females were examined from this group, which thus represented remains of the only maternity colony known from Albania. However, the date of the finding comes from the period long after the parturitions and thus, the roost of the group could be secondary as it can be changed several times since the juveniles are fully volant, i.e., during about a month in this case.

Direct temporal evidence of reproduction of *P. kuhlii* in Albania was documented several times (Papadatou et al. 2011, Sachanowicz & Ciechanowski 2018, own data); lactating females were netted on 30 June, 1, 3, 6, 7, and 9 July, volant juveniles of the year were documented on 10 and 27 August, while pregnant females were not examined/reported.

At two sites, individuals of *P. kuhlii* were netted at the entrances to roosts; one of them was the above mentioned bunker at Ashtë, where a colony of this bat roosted and a part of it was later netted, another site was a bunker at Goranxi (Fig. 112). Altogether eleven individuals were caught at these sites, the sex ratio was unbalanced (3 ♂♂ : 8 ♀♀) in the total catch.

Foraging individuals of *P. kuhlii* were documented at 65 sites; of them, at 16 sites the bats were netted (Scheffler et al. 2013, Sachanowicz & Ciechanowski 2018, own data), plus at another one the bats were shot when on wings (Hanak et al. 1961); at the remaining sites only their calls were detected. In total, 41 bats were documented from the foraging grounds, and their sex ratio was unbalanced again (11 ♂♂ : 26 ♀♀) in the total catch.

Foraging individuals of *P. kuhlii* were recorded most frequently (60.3% of the foraging records) at water bodies, at/above streams in a valley, at small/large lakes, at small pools, but also at the sea shore. The second most frequently used type of foraging areas (29.4%) were anthropogenic habitats in villages and towns, including the areas of the ancient ruins, city parks, etc. The least used habitats, considering the available data, are forests without streams (5.9%), and dry rocky habitats (4.4%). The foraging habitats of *P. kuhlii* were distributed across the altitude range of 1–1,150 m a. s. l. (median 192.0 m, mean 299.7 m, n=65).

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia vexata*: 1 ma (CMŠ [A]) from 1 fa (NMP 96560), Tepelenë (Gjirokastër Pref.), 30 June 2016, leg. P. Benda & M. Uhrin. – A r g a s i d a e: *Argas vespertilionis*: 17 larvae (CMŠ [A]) from 1 fa (NMP 96520), Beduqas (Gjirokastër Pref.), 6 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 1 larva (CMŠ [P]) from 1 fa (NMP 96560), Tepelenë (Gjirokastër Pref.), 30 June 2016, leg. P. Benda & M. Uhrin. – M a c r o n y s s i d a e: *Steatonyssus periblepharus*: 4 protonymphs (CMŠ [P]) from 1 ma (NMP 96584), Berat Castle (Berat Pref.), 4 July 2016, leg. P. Benda & M. Uhrin; 1 fa, 17 protonymphs (CMŠ [P]) from 1 ma, 1 fa (NMP 96559, 96560), Tepelenë (Gjirokastër Pref.), 30 June 2016, leg. P. Benda & M. Uhrin. – **Published data**: M a c r o n y s s i d a e: Macronyssidae ? sp.: 3 larvae from 1 ind., Adriaküste bei Shetaj, 29 September 2012 (Scheffler et al. 2013).

Comments on ectoparasites. In total, four arthropod parasite species were collected from *Pipistrellus kuhlii* in Albania. Two of them are here reported from Albania for the first time.

The bat fly *Nycteribia vexata* Westwood, 1835 is a parasite of the cave-dwelling bats, its primary hosts are the species of the *Myotis myotis* complex (Hůrka 1962, Lanza 1999). The record of one individual from *P. kuhlii* could be considered accidental, although from this bat it was already reported from Turkey (Aktaş & Hasbenli 1994, Hasbenli 1997). In Albania, *N. vexata* was collected also from *Myotis myotis*, *M. blythii*, *M. emarginatus*, *M. capaccinii*, *Eptesicus serotinus*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below).

The bat soft tick *Argas vespertilionis* (Latreille, 1796) occurs over most of the Old World south of 60° N, including southern Africa and Australia, and parasitises a variety of hosts (Kolonin 2007); *P. kuhlii* ranks among the principal hosts of this tick species (Dusbábek 1972). From Albania, *A. vespertilionis* is here reported for the first time, it was collected also from *Pipistrellus pipistrellus* and *Tadarida teniotis*.

The macronyssid mite *Steatonyssus periblepharus* Kolenati, 1858 is here reported from Albania for the first time, although besides *P. kuhlii* it was collected also from *Myotis blythii*, *M. davidii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *Nyctalus leisleri*, and *Miniopterus schreibersii*. It is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999); in *P. kuhlii* it was previously documented in North Africa and the Middle East, namely in Algeria, Libya, Egypt, Lebanon, Jordan, Iraq, and Iran (Keegan 1956, Till & Evans 1964, Radovsky 1967, Abul-Hab & Shihab 1989, Benda et al. 2010, 2012, 2014).

Scheffler et al. (2013) reported three closely unidentified larvae of cf. macronyssid mites in the stage "3L" from *P. kuhlii*. In this host, we can expect several species of parasites preferring to feed on this bat family. A relatively small-sized mite species is *Macronyssus kolenati* (Oudemans, 1902), parasitising bats of the genus *Pipistrellus* (Radovsky 1967); from *P. kuhlii* it was documented in Egypt (Radovsky 1967). Another macronyssid mite species that was collected from *P. kuhlii* is *Ornithonyssus hoogstraali* Keegan, 1956, its record was reported from Jordan (Benda et al. 2010).

Pipistrellus sp.

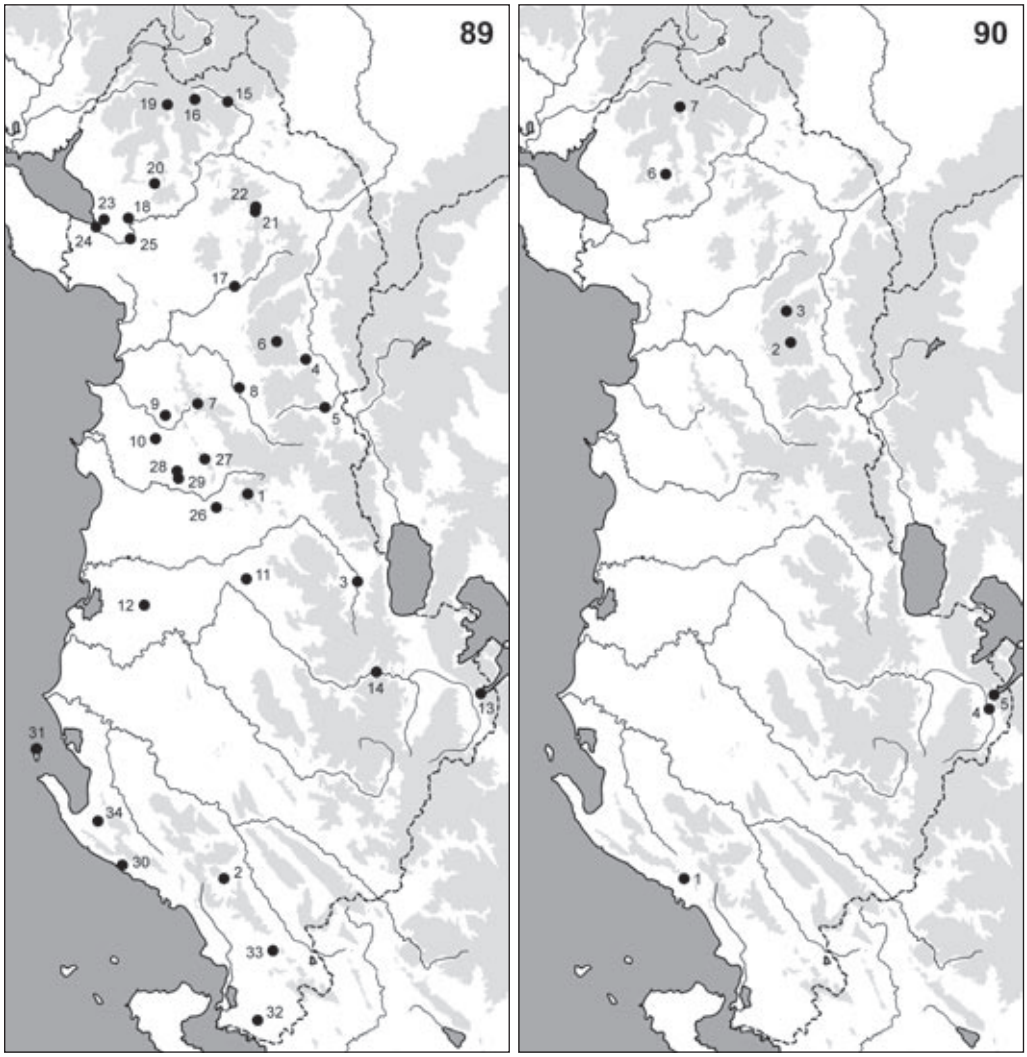
Records. **Published data**: D i b ë r: Barbullej, river, village nearby, 30 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Zall-Reç, Drinit i Zi limestone river canyon, village nearby, 21 September 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – D u r r ë s: Kepi i Rodonit, coastal slope with maquis, 14 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – E l b a s a n: Benë, pond on pasture, near beech forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Muçan, stream, farmland landscape, 2 October 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Pishkash, karstic rocky gorge, 28 September 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – F i e r: Kasthbardhë, water channel near a settlement, 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – G j i r o k a s t ë r: Drinos valley, 1 ind. from owl pellets (Paspali et al. 2013 [as *Pipistrellus* sp.]); – Goricë, Dishnicës river, farmland landscape, 18 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Libohove, garbage dump at a road & street in the town, 16 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Tepelenë, riparian forest in the Vjosë river valley, 19 April 2004: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – K o r ç ë: Boboshticë, pond surrounded by poplars, in the village, 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Drenovë, line of poplars at a road, street lamps in the village, old mulberry trees near the village, rocky river gorge near the village, 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Gollomboç, village on the Macro Prespa lake shore, 8 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Leskovik, town, near streetlights, 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Mikro Prespa cave [= Treni cave], limestone cliffs at the lake shore, 10 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – K u k ë s: Dragobi, limestone canyon of the Valbonë river, 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Nikoliq, pool on a river, 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – L e z h ë: Fishte, small river in farmland, meadows, 20 April 2010: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Kune-Vain-Tale Reserve, glade in coastal old pine forest with buildings, 12 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Perlat, river, farmland landscape, 26 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – S h k o d ë r: Gjoqi, shore of the Vau i Dejës reservoir, 25 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Gradec, village surrounded by dry grassland, 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Juban, bunker, 27 January 2015: obs. 70 inds. (Théou et al. 2015b [as *Pipistrellus* sp.]); – Kamicë Flakë, dry river bed in the village, 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Köplik i Sipërm, football pitch with lamps, dry grassland, 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Liqeni i Thores, small alpine lake, pastures, 7 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Lohja, bunker, 28 January 2015: obs. 70 inds. (Théou et al. 2015b [as *Pipistrellus* sp.]); Bunker, 28 January 2015: obs. 70 inds., 9 June 2015: obs. 2 inds. (Théou & Đurović 2015a [as *Pipistrellus* sp.]); – Qafa e Malit, mountain black pine forest, 17 September 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Rahovic, limestone mountain river valley, 21 June 2011: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Shkodër, Bunë river in the city, 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]). – T i r a n ë: Krrabë, forested stream valley, old *Platanus* trees, 27 September 2005: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Tiranë, diga i liqenit, September 2013: det. calls (Çera 2014). – V l o r ë: Çiflik, village, roadside petrol station, 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Drimades beach, open space, 23 July 2014: det. calls of 1 ind., 24 July 2014: det. calls of 1 ind. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – Llogara National Park, meadow in the middle of the forest, open space, 25 July 2016: det. calls of 1 ind. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – [Orikum], olive trees near national road, open space, 25 April 2013: det. calls of 1 ind. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – Orikum Lagoon, open space, 25 April 2013: det. calls of 1 ind. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – Palasë, olive plantation on coastal slopes, 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Sazan Island, bunker with water, 5 Sep-

tember 2012: det. calls of 5 inds. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – Sazan Island, port, 28 May 2013: det. calls of 5 inds., 29 May 2013: det. calls of 5 inds., 9 August 2016: det. calls of 1 ind. (Théou & Loce 2017 [as *P. kuhlii/P. nathusii*]); – Syri i Kalter, forested valley of the Bistricës river, 23 April 2004: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Syri i Kalter, pastures, forested Bistricës river valley, 24 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – Velçë, limestone cliffs near the village, 26 August 2006: det. calls (Sachanowicz & Ciechanowski 2018 [as *P. kuhlii/P. nathusii*]); – [Vlorë], parking building, 2 September 2012: obs. 20 inds. (Théou & Loce 2017 [as *Pipistrellus* sp.]).

Nyctalus noctula (Schreber, 1774)

Records. **Original data**: E l b a s a n: Vakumonë, at two artificial lakes ca. 2 km east of the village [1] (Fig. 91), 5 July 2018: det. calls of several foraging inds. – G j i r o k a s t ë r: Zhulat, Kardhiqi river valley [2] (Fig. 92), above the river, 5 July 2015: det. & rec. calls of 1 foraging ind. – K o r ç ë: Selishtë, Dunica river valley [3] (Fig. 48), at the river near a Turkish bridge, 9 July 2015: det. & rec. calls of 1 foraging ind. – **Published data**: D i b ë r: Fushë-Muhurr, rocky river gorge [4], 23 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Krajkë, river in farmland landscape [5], 24 September 2005: det. calls of several inds. (Sachanowicz & Ciechanowski 2018); – Lura, water pool across a road in old beech forest on mountain slopes [6], 28 June 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Qafë Shtamë, black pine and beech forest on mountain slopes [7], 13 September 2012: obs. & det. calls of several inds. emerging from hollow pine tree (Sachanowicz & Ciechanowski 2018); – Suç, forested stream valley [8], 25 September 2005: det. calls (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Halil, over a road in pine wood [9], 3 October 2005: det. calls of 4 inds. (Sachanowicz & Ciechanowski 2018); – Qerekë, over pastures [10], near the Rinas airport, 26 September 2005: det. calls of several inds. (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Muçan, over a stream [11], farmland landscape, 2 October 2005: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018). – F i e r: Lushnjë, city center [12], near tall buildings, 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Mikro Prespa cave [= Treni cave] [13], limestone cliffs and the lake shore, 10 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë, forested Devoll river valley [14], 6 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, limestone canyon of Valbonë river [15], 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Valbonë, mountain beech-spruce forest with a small stream [16], 7 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mashtërkor, small pool in the valley of Fani i Vogël river [17], 9 August 2007: net. 2 ma (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Gjoqi, shore of the Vau i Dejës reservoir [18], 25 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, over a pool on a stream [19], 8 September 2012 (Sachanowicz et al. 2014); Nikgjonaj, pool on a stream in mountain valley of the Shalës river, 8 September 2012: net. 4 ma, 2 fa (Sachanowicz & Ciechanowski 2018); – Prekal, over the village [20], 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain mixed forest with old beech and fir trees [21], 11 August 2003: det. calls; over a road and mountain slope, 17 September 2005: det. calls of several inds.; small pool in bed of a mountain stream, 10 August 2003: net. 6 ma, 18 September 2005: net. 1 fj (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain mixed forest with old beech and fir trees [22], 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Shkodër [23], hotel Turizmit, behind a window shutter, 21 October 1960: a colony of 5 m, 4 f (Hanak et al. 1961); Shkodra, 20 October 1960: 5 m, 4 f (Hanák 1964); Shkodër, 20 October 1960: 4 m, 3 f, NMP (Benda & Gaisler 2015); – Shkodër, over the Bunës river [24], 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, limestone cliff at the river bank [25], 22 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Krrabë, forested stream valley [26], old *Platanus* trees, 27 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Malin e Dajtit [27], 1,600 m, 20 October 1960: obs. 1 foraging ind. (Hanak et al. 1961); – Tiranë, city centre [28], October 1960: obs. a colony behind an eaves (Hanak et al. 1961); Tirana, buildings in the city centre, 19 October 1960: obs. three colonies, coll. 11 m, 2 f (Hanák 1964); Tirana, 26 April – 6 May 1990: obs. few foraging inds. (Chytil & Vlašín 1994); Tiranë, 19 October 1960: 6 m, 1 f, NMP (Benda & Gaisler 2015); – Tiranë, city centre [29], October 1960: obs. a colony in a wall hole (exam. 11 m, 2 f, mostly adult), obs. a colony in the fissure of the roof of a stairways of the Qemal Stafa stadium (Hanak et al. 1961); Tirana, at a pond, 29 September 1960: obs. many foraging inds. (Hanák 1964); Tiranë, diga i liqenit, September & October 2013: det. calls (Çera 2014). – V l o r ë: Palasë, over an olive plantation [30], 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Sazan Island, port [31], 9 August 2016: det. calls of 1 ind. (Théou & Loce 2017); – Shalës, limestone river gorge with shrubs [32], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, riparian woodland with old oriental planes [33], 23 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Tragjas i Vjetër, over ruins of the village [34], 28 April 2010: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Nyctalus noctula* is a rather uncommon bat in Albania with 34 localities known from the country (Fig. 89, Table 1). More than a third of the records are concentrated to the Western Lowlands (35.3%), some records are also available from the mountains, mainly the Central



Figs. 89, 90. Records of particular bat species in Albania. 89 – *Nyctalus noctula* (Schreber, 1774). 90 – *Nyctalus lasiopterus* (Schreber, 1780).

Mountain Range. The localities are spread over a large altitude range (5–1,600 m a. s. l.; Table 2); however, a large majority of the records (70.6%) was made at the altitudes below 530 m a. s. l., and the value of the altitude median (284.5 m) clearly indicates a preference for lowland areas (Fig. 8). *N. noctula* was documented also from the Sazani island (Théou & Loce 2017), although the occurrence of this bat in sea islands is not quite usual; in the Balkans it was found just in Thassos (Greece; Hanák et al. 2001) or in Krk, Cres, and Palagruža (Croatia; Tvrtković 2017). In general, the territory of Albania belongs to the zone of relatively common occurrence of *N.*

noctula in the Balkans, covering the central and northern latitudes of the Peninsula (Kryštufek et al. 1992, Benda & Horáček 1998, Benda et al. 2003b, Tilova et al. 2008, Petrov & von Helversen 2011, Micevski et al. 2014, Presetnik et al. 2014, 2018, Presetnik 2015a, Paunović 2016, Tvrtković 2017, etc.). The species is less common, but still regularly recorded in the forested parts of mainland Greece including the Peloponnese (Hanák et al. 2001, Gremillet et al. 2010, Petrov & von Helversen 2011, Papadatou et al. 2015).

Similarly as in *Pipistrellus nathusii*, another migratory species, the Albanian section of the distribution range of *N. noctula* represents a part of the Balkan Peninsula where a north-south gradient of decreasing occurrence can be demonstrated (Fig. 89); while in the northern third of the country, 17 localities were recorded, in the central third eleven records were made, and only six sites are available from the southern third of Albania (although southern Albania is perhaps the most investigated part of the country concerning bats, see Fig. 1, or Sachanowicz & Ciechanowski 2018: 71, Fig. 7). For example, in *Nyctalus leisleri*, a migratory bat more common in Albania, this numbering is rather balanced, 20-12-21 (N-C-S), see Fig. 96.

Field notes. *Nyctalus noctula* was documented in Albania between late April and late October; no winter or early spring records are available (Fig. 64). Almost two thirds of the records were made in the migration periods; the largest concentration of the records (41.0%) was made during four weeks between 6 September and 3 October, the second largest concentration (18.0%) in two weeks between 22 April and 8 May.

Females of *N. noctula* were registered in Albania only in autumn (September, October), while males also in summer (June, August) besides the autumn months (Fig. 64). These findings support the traditional opinion about the migratory behaviour in this bat, whose populations nurse their young in central and north-eastern Europe, from where they migrate to southern Europe including the Balkans to mate and hibernate (Strelkov 1971, 1997, 2002, Hutterer et al. 2005). Although some maternity colonies were found exceptionally also in southern Europe (Strelkov 1997, Ruedi et al. 1998, Dietz et al. 2016) and this means a year-round presence of some females in these nursing areas, such colonies were not found in the western Balkans, including Albania. On the other hand, parts of male populations of *N. noctula* are expected to live year-round in southern Europe (Strelkov 1999, Gebhard & Bogdanowicz 2004, Dietz et al. 2016), and this was demonstrated to be true also for Albania.

A large majority (87.8%) of the particular records of *N. noctula* from Albania represents foraging bats, while roosts were found only five times. Four of these roost findings were made in two large lowland towns in autumn (and are the first records of the species in the country, other followed 30 years later). Hanak et al. (1961: 135) described these finds as follows: "In Tiranë in October 1960, a small colony roosting behind an eaves of a building in the city centre was found; another colony in a wall hole of a house at the town outskirts (11 males and 2 females, mostly adult individuals); another one in a roof fissure of a stairway in the Qemal Stafa Stadium [= a football stadium in Tiranë, largest in the country]. All three sites should be considered as temporary roosts, since they seem to be used only in the periods of spring and autumn migrations. // In Shkodër on 21 October 1960, behind a shutter of the hotel Turizmi building in the city centre, a colony of four females and five males of *Nyctalus noctula* were found. According to the small amount of droppings, we can conclude that this roost was not used during the whole summer, but served as a temporary shelter in the period of autumn movements." (translated from Albanian). Later on, Hanák (1964: 86) newly reported and summarised the records from Tiranë as follows: "In der Mitte der Stadt Tirana habe ich bei einem Abendspaziergang nach dem Gehör drei Kolonien von *Nyctalus noctula* in Wandspalten und hinter den Dachrinnen (also ebenfalls in provisorischen Unterkünften) festgestellt. Nach der Menge des Kotes wurde diese Quartiere nur kurze Zeit bewohnt.

Auf Grund dieser Feststellungen kann man schliessen, dass auf dem Gebiete Albaniens im Herbst regelmässige Massenzüge dieser Art vorkommen, man kann aber nicht beurteilen, ob es sich um einheimische Tiere handelt (von Waldgebieten nach Städten), oder um Wanderungen nördlicher Populationen, […].” Hanak et al. (1961: 135) summarised their opinion concerning the strategy of *N. noctula* to roost in these artificial shelters as follows: “As the data from the Balkans show, in most cases this bat finds its roosts in human dwellings, which is a rare habit in this bat in Central Europe. We suppose that such adaptation is a result of the lack of suitable [tree hollow] roosts in some Balkan countries.” (translated from Albanian). These roosts in city buildings are situated in lowland altitudes, at 15 m and 120 m a. s. l.

The only natural roost of *N. noctula* in Albania was discovered in a mountain forest mixed of black pine and beech, at 1,134 m a. s. l. near Qafë Shtamë in mid-September; several bats were observed at dusk shortly after emergence from a hollow of a pine tree (Sachanowicz & Ciechanowski 2018). Although this roost was in natural conditions and in an elevated area, it was situated close to the lowland cities of western Albania where the above mentioned autumn aggregations were found (see Fig. 89).

All roosts of *N. noctula* found in Albania are associated with the autumn migration period; the groups found in the artificial roosts in late October most probably represented pre-hibernation aggregations composed of the indviduals that arrived to spent winter in the Western Lowlands of Albania, the group observed to leave the tree hollow in mountains were perhaps bats on the way from summer areas to the south. Hibernation of *N. noctula* was not documented in most of the Balkan countries, however, wintering individuals were found in North Macedonia (Kryštufek et al. 1992) and hibernation colonies in Bulgaria (Benda et al. 2003b, Tilova et al. 2008), situated in the same latitude as Albania. The hibernation of this bat in Albania is thus very probable, considering all the above indirect indications.

Fig. 91. Artificial lake east of Vakumonë at ca. 1,150 m a. s. l. (Elbasan Pref.); foraging habitats of *Rhinolophus blasii*, *Eptesicus serotinus*, *Pipistrellus kuhlii*, and *Nyctalus noctula*. Photo by Z. Bendová (July 2018).

Fig. 92. Kardhiqi river valley near Zhulat (Gjirokastër Pref.); foraging habitats of *Myotis bechsteinii*, *M. nattereri*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus noctula*, and *N. leisleri*. Photo by M. Uhrin (July 2015).

Foraging individuals of *N. noctula* were recorded in 32 sites in Albania, the bats were netted five times at four sites (13.8% of particular records) and the remaining 31 records represent recordings of echolocation calls. One to six bats were netted per a site, on average 3.2 individuals per a catch and four bats per a site, respectively; males dominated over females, 13:3 (Sachanowicz & Ciechanowski 2018). The altitude characteristics of foraging sites are identical with those of the whole amount of findings (Table 2), only the value of altitude mean is slightly lower (454.8 m). More than a half of the records of foraging *N. noctula* (55.6%) were made at or above water bodies, most frequently in valleys with streams, but also at lakes and ponds. A significant part of the foraging data (25%) were recorded in urban habitats or in the agricultural landscape without water surfaces. The lowest number of foraging grounds (19.4%) represented forest habitats.

As already stressed, reproduction of *N. noctula* was not documented in Albania. Sachanowicz & Ciechanowski (2018) reported a netting of a juvenile female on 18 September; however, the second half of September falls into a period of autumn migrations and the birthplace of this juvenile bat thus could lie far from the Albanian territory.

Records of ectoparasites. **Published data**: I s c h n o p s y l l i d a e: *Ischnopsyllus elongatus*: 9 ma, 28 fa, Albania (Shkodra, Tirana), 19 October 1960 (Hůrka 1963b). – S p i n t u r n i c i d a e: *Spinturnix acuminata*: 3 ma, 2 fa, Nikgjonaj, 8 September 2012 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, two arthropod parasite species were collected from *Nyctalus noctula* in Albania.

The bat flea *Ischnopsyllus elongatus* (Curtis, 1832) is a parasite preferring to feed on *N. noctula* and it is known in Albania only from this host, although it was collected also from other tree-

-dwelling bats in other countries; its records are available from *Myotis myotis*, *M. daubentonii*, *Vespertilio murinus*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. nathusii*, and *Barbastella barbastellus* (Hůrka 1963b). The distribution range of this flea corresponds with the range of the genus *Nyctalus* in the Palaearctic, from the Azores to Japan (Hůrka 1963b, Medvedev 1992, Lanza 1999).

The bat mite *Spinturnix acuminata* (Koch, 1836) is a permanent parasite of *N. noctula*, less frequently it parasitises other species of the genus *Nyctalus* and bats of the genus *Pipistrellus* (Uchikawa et al. 1994, Lanza 1999). Its distribution range conforms to the range of the genus *Nyctalus* in the Palaearctic and Oriental regions, from Morocco to Japan and Java (Lanza 1999).

Nyctalus lasiopterus (Schreber, 1780)

Records. **Original data**: V l o r ë: Pilur, at a watering place [1] (Fig. 94), 27 September 2018: det. & rec. calls of 1–2 foraging inds. (Fig. 93). – **Published data**: D i b ë r: Lura National Park, over a road in an old mountain beech forest [2], 28 June 2011: net. 1 ma (Sachanowicz et al. 2016); – Lura, Liqeni i Rasave lake [3], old mountain beech and mixed forest, 27 June 2011: det. calls (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Bilisht, Devoll river [4], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Micro Prespa cave [= Treni cave] [5], over the Micro Prespa lake, 10 August 2006: det. calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Kir, rocky gorge of the Kirit river [6], 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [7], old beech forest nearby, 8 September 2012: obs. 1 ind. flying at evening with several inds. of *Nyctalus noctula*, det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Nyctalus lasiopterus* is a rare bat in Albania, it was documented from only seven localities in the country (Fig. 90, Table 1). However, this bat could be considered a rare species in its entire distribution range, covering the southern and middle latitudes of the western Palaearctic (Ibáñez et al. 2004). In the Balkans, the records of *N. lasiopterus* are concentrated into two separated regions, western and southern/eastern (Ibáñez et al. 2004, Dietz et al. 2016), now

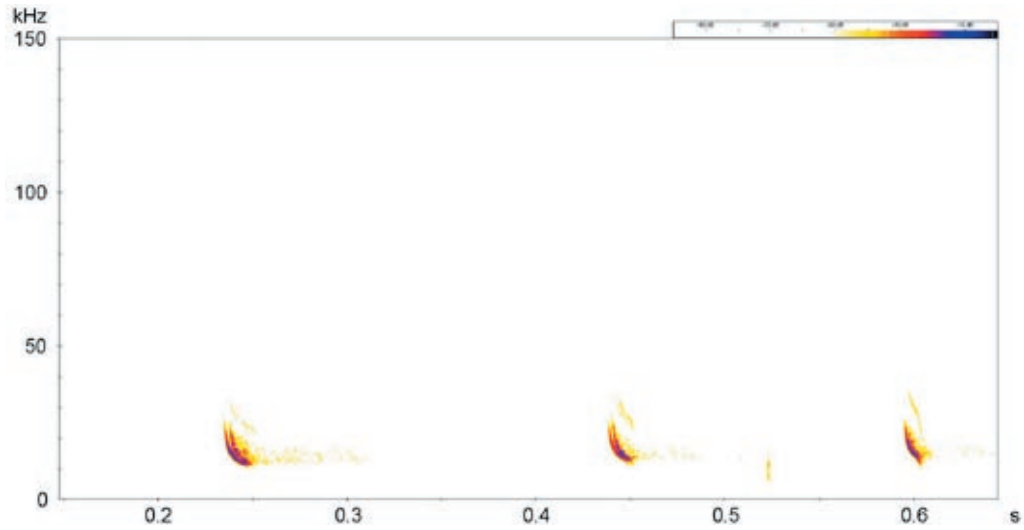


Fig. 93. Spectrogram of echolocation calls of *Nyctalus lasiopterus* (Schreber, 1780) recorded at Pilur (Vlorë Pref.; Fig. 94) on 27 September 2018.

slightly connected by the findings from Albania. The western region of *N. lasiopterus* occurrence in the Balkans comprises rather scarce records in the Mediterranean parts of Slovenia and Croatia, including two Dalmatine islands (Kovač et al. 2011, Presetnik & Knapič 2015, Tvrtković 2017). The southern and eastern Balkan occurrence areas comprise relatively numerous records in central and eastern Greece (von Helversen & Weid 1990, Hanák et al. 2001, Petrov & von Helversen 2011) and southern Bulgaria (Benda et al. 2003b, Tilova et al. 2005), individual records are known also from the Peloponnese (Papadatou et al. 2015), North Macedonia (Stojanov et al. 2019), and Turkish Thrace (Paksuz & Özkan 2011). On the other hand, no record of *N. lasiopterus* is available from Bosnia and Herzegovina, Montenegro, Serbia and Kosovo.

Six Albanian localities of *N. lasiopterus* come from three separate mountain regions in the northern and eastern parts of the country (Albanian Alps, Lura Mts., Prespa region), one additional record was made in the coastal range of the Ceraunian Mts. in southern Albania (Fig. 90). All records come from forested areas or the sites adjacent to forested areas, respectively.

Field notes. The Albanian findings of *Nyctalus lasiopterus* were made during the summer period, between late June and late September. Such timing conforms to that of more numerous records from Greece, made in the whole vegetation period between late May and October (von Helversen & Weid 1990, Hanák et al. 2001), and suggests a permanent year-round existence of a reproducing population of this presumably migratory bat in the southern Balkans (including Albania, Greece, Bulgaria and Turkish Thrace), similarly as it is suggested for other Mediterranean regions, such as Spain, Cyrenaica or Cyprus (e.g. Ibáñez et al. 2004, Benda et al. 2007, 2014).

All findings of *N. lasiopterus* available from the country comprise foraging bats on wings; with the exception of one record on the bottom of a deep mountain valley of the Albanian Alps at ca. 300 m a. s. l., all come from medium and high mountain altitudes above 700 m a. s. l. (median

Fig. 94. Watering place near Pilur at ca. 700 m a. s. l. (Vlorë Pref.); foraging area of *Pipistrellus pygmaeus*, *P. nathusii*, *Nyctalus lasiopterus*, and *Tadarida teniotis*. Photo by P. Tájek (September 2018).

Fig. 95. Adult males of *Nyctalus lasiopterus* and *N. leisleri* netted above a road in an old mountain beech forest in the Lura National Park (Dibër Pref.), 28 June 2011. Photo by K. Sachanowicz.

altitude 854.0 m). In all cases but one, the bats were documented at water bodies of various size (including a small pool of remaining water in a forest road and a great lake).

Only once an individual of *N. lasiopterus* was documented in Albania, a male netted in an old beech forest at the upper position of the Lura Mts. at 1,438 m a. s. l. (Sachanowicz et al. 2016); this finding represents the highest altitude record of *N. lasiopterus* in the Balkans (Sachanowicz & Ciechanowski 2018). The remaining evidence of this bat from Albania is based solely on recordings of echolocation calls (in one case, the recording of calls was accompanied with a close visual observation of a flying individual); see Table 3, and Fig. 93 concerning data on the newly presented record from Pilur, Ceraunian Mts. (Fig. 94). These data correspond to the published characteristics of *N. lasiopterus* calls (Skiba 2003, Barataud 2015).

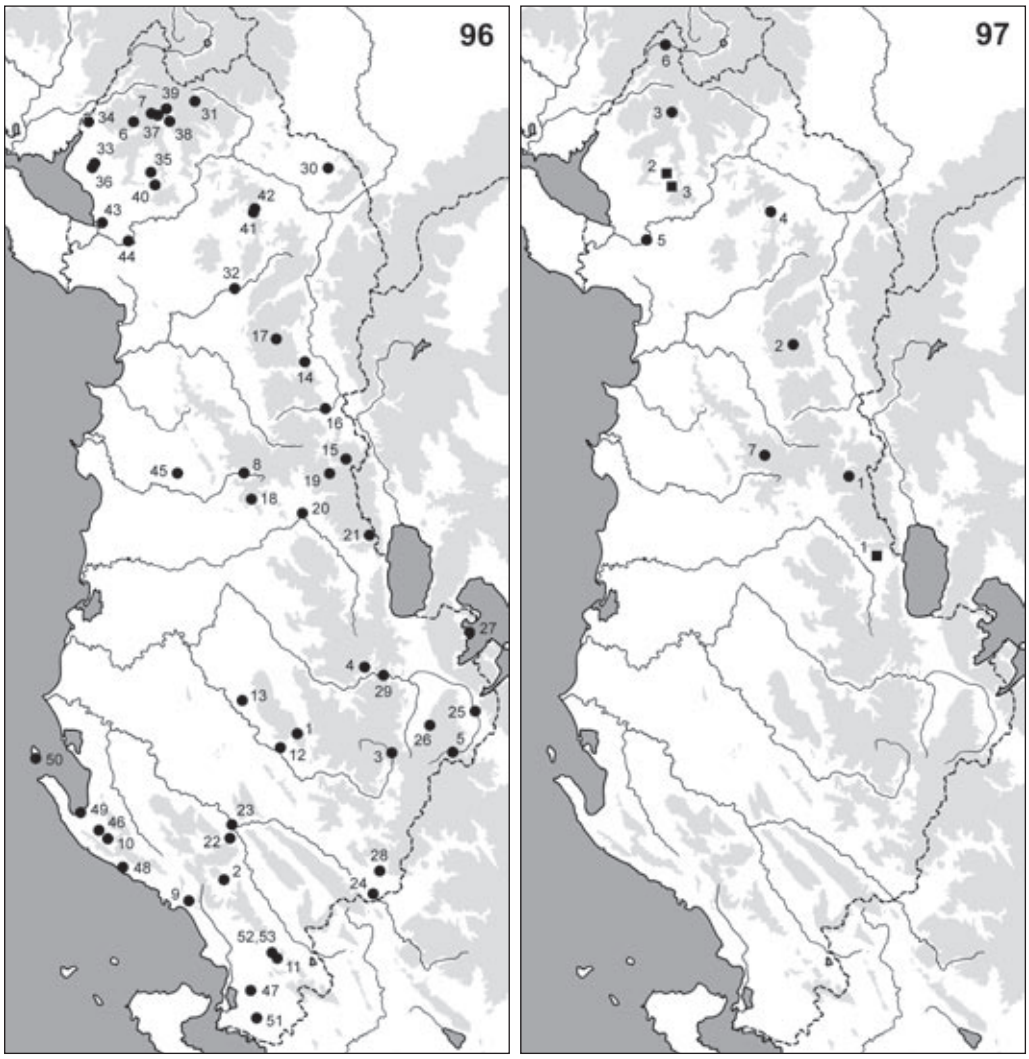
Although no roost record was made in Albania, Sachanowicz & Ciechanowski (2018) suggested possible roosting of *N. lasiopterus* in cavities of old beech trees observed in the Lura Mts. The only examined bat reported was an adult male with signs of sexual activity, suggesting it to be at a possible beginning of the mating period (Sachanowicz & Ciechanowski 2018). Anyway, a direct observation of reproduction of *N. lasiopterus* in the southern Balkans has not yet been reported (contra Hanák et al. 2001, Benda et al. 2003b).

Nyctalus leisleri (Kuhl, 1817)

Records. **Original data**: B e r a t: Koritë, above a watering place in a mountain pass [1], 21 September 2018: net. 2 ma. – G j i r o k a s t ë r: Zhulat, Kardhiqi river valley [2] (Fig. 92), above the river, 5 July 2015: net. 1 ma (cf. Benda & Gaisler 2015). – K o r ç ë: Roshanj, Dëshnica river valley [3] (Fig. 57), at the river, 27 June 2016: det. calls of 1 foraging ind.; – Selcë, Selca river valley [4], at the river, 8 July 2015: det. & rec. calls of 1 foraging ind.; – Sinicë, Devolli river valley [5] (Fig. 99), above the river, 7 July 2015: net. 1 ma (cf. Benda & Gaisler 2015). – S h k o d ë r: Grykë Lugje, above a watering place [6] (Fig. 74), 17 September 2018: net. 4 ma; – Fushë Okol, above a watering place [7] (Fig. 66), 16 September

2018: net. 1 ma, det. & rec. calls of several foraging inds. – T i r a n ë: Shëngjin i Madh, Erzeni river valley [8], above the river, 5 July 2016: net. 1 ma. – V l o r ë: Borsh, Borshi river valley [9] (Fig. 78), above the river, 1 July 2016: net. 1 ma; – Dukat, Dukati river valley [10] (Fig. 54), above the river, 2 July 2016: net. 10 ma, det. calls of numerous foraging inds.; – Krongj, Vris stream valley [11] (Fig. 50), above the stream, 3 July 2015: net. 3 ma (cf. Benda & Gaisler 2015). – **Published data**: B e r a t: Çorovodë, stream in limestone gorge [12], 8 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, Tomorrit mountain stream [13], surounded by farmland, 9 July 2011: net. 2 ma (Sachanowicz & Ciechanowski 2018). – D i b ë r: Fushë-Muhurr, rocky slopes with quarries [14], 23 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Klenje [15], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Krajkë [16], river in farmland landscape, 24 September 2005: net. 1 ma, 1 fa (Sachanowicz & Ciechanowski 2018); – Lura, water pool across a road in old beech forest [17], 28–29 June 2011: net. 3 ma (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Benë, pond on pasture [18], near the beech forest, 2 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Fushë Studë [19], 1 August 2015: net. 1 m, 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Gizavesh, small branch of the Koponit river [20], 3 July 2011: net. 5 ma (Sachanowicz & Ciechanowski 2018); – Skenderbej [21], 28 July – 7 August 2015: det. calls (van der Tempel 2016). – G j i r o k a s t ë r: Luzat, oriental plane forest in rocky valley of a stream [22], 11 July 2011: det. calls of several inds. (Sachanowicz & Ciechanowski 2018); – Tepelene, river in riparian forest of old oriental planes and poplars [23], Vjosës river valley, 20–21 August 2006: net. 3 ma, 1 mj, 1 fa, 10 July 2011: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Vllaho-Psiloterë, dried tributary of the Vjosës river [24], with old *Platanus* trees along banks, 15 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Billisht, Devoll river [25], farmland landscape, 9 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Drenovë, old mulberry trees [26], near a village, 5 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gollomboç, village surrounded by rocky hills on the Macro Prespa lake shore [27], 8 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Leskovik, near streetlights in the town [28], 17 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Tresovë, Devoll river with old willows and pastures [29], 11 August 2006: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Nikoliq, water pool in river bed [30], 4 August 2007: net. 1 ind. (Sachanowicz & Ciechanowski 2018); – Valbonë, edge of mountain beech-spruce forest with a small stream [31], 7 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018). – L e z h ë: Mashtërkor, small pool in the valley of Fani i Vogël river [32], 9 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Gradec, village surrounded by flat dry grassland [33], 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Grykë, small water pool for livestock [34], in limestone valley, 16 August 2003: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Kir, rocky gorge of the Kirit river [35], 11 September 2012: det. advertisement calls of a male from hollow concrete utility pole and in flight (Sachanowicz & Ciechanowski 2018); – Köplik i Sipërm, football pitch with lamps [36], surrounded by flat dry grassland, 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Liqeni i Thores, small alpine lake [37], pastures and limestone slopes nearby, 7 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Nderlysë, Shalës river [38], mountain valley, 9 September 2012: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Nikgjonaj, stream in mountain valley of the Shalës river [39], old beech forest nearby, 8 & 10 September 2012: net. 2 ma, 5 fa (Sachanowicz & Ciechanowski 2018); – Prekal, village [40], limestone river canyon, 10 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, over a pool on a stream [41], 18 September 2005 (Sachanowicz et al. 2014); Qafa e Malit, pool in bed of a mountain stream, 10 August 2003: net. 10 ma, 18 September 2005: 1 mj, 8 August 2007: 7 fa; forest road in old mountain mixed forest, 11 August 2003: net. 1 ma; road in black pine forest, 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain beech forest [42], 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Shkodrë, periferi [43], 22 October 1960: obs. 1 ind. after sunset (Lamani 1970); – Vau i Dejës, limestone cliff at a river bank [44], 22 April 2010: det. calls (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Tiranë, a room in a house [45], 15 June 1966: coll. 1 m (Lamani 1970). – V l o r ë: Borsh, stream in rocky gorge with old trees [9], 1 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Dukat i Ri, limestone slopes with dwarf cypress scrubs [46], 18 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Kulluricë, farmland with olive groves and settlements [47], 26 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Palasë, olive plantation on a coastal slope [48], 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Orikum Lagoon [49], open space, 25 April 2013: det. calls of 1 ind. (Théou & Loce 2017); – Sazan Island, at a bunker on top of hill [50], 28 May 2013: det. calls of 1 ind. (Théou & Loce 2017); – Shalës, limestone river gorge [51], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, karstic spring surrounded by riparian woodland with old oriental planes [52], 23 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Syri i Kalter, pastures in the forested Bistricës river valley [53], 16 September 2012: det. advertisement calls of males from concrete utility poles and in flight (Sachanowicz & Ciechanowski 2018).

Distribution. *Nyctalus leisleri* belongs among rather common bats in Albania, 53 localities are available from the country (Fig. 96, Table 1). It is the most frequent species of the genus *Nyctalus*, similarly as in other parts of the western Balkans, where a sufficient bat survey was made, such as in Greece or the Mediterranean part of Croatia (Hanák et al. 2001, Benda et al. 2009,



Figs. 96, 97. Records of particular bat species in Albania. 96 – *Nyctalus leisleri* (Kuhl, 1817). 97 – *Barbastella barbastellus* (Schreber, 1774) (squares) and *Plecotus auritus* (Linnaeus, 1758) (circles).

Tvrtković 2017). This bat seems to be a typical species of the woodland landscape in the thermo--Mediterranean zone of the Balkans. On the other hand, in the inland countries of the Balkans, *N. leisleri* is a rather rare bat; only few records are available from Montenegro and Bosnia and Herzegovina (Mirić & Paunović 1997, Pašić & Presetnik 2013, Presetnik et al. 2014, 2015, Rachwald et al. 2019), and this bat was found rather scarcely in North Macedonia (Kryštufek et al. 1992, Buys 2006, Micevski et al. 2014, Presetnik 2015a, Budinski 2017), Serbia (Paunović

2016), Bulgaria (Benda et al. 2003b, Pandurski 2004, Stoycheva et al. 2014), and Turkish Thrace (Benda & Horáček 1998).

In Albania, *N. leisleri* is distributed more or less equally across the whole territory with the exceptions of the most inhabited and/or mostly deforested low areas of the central parts of the country and the central and northern sections of the sea coast (Fig. 96). The records come from a very wide altitude range of 2–1,642 m a. s. l. (Table 2); most of the records, however, were made in the medium altitudes roughly between 200 m and 950 m a. s. l., with the overall altitude median 502.0 m (Fig. 8).

The prevailing majority of the Albanian findings of *N. leisleri* (96.2%) were obtained in the last fifteen years, only two records are older and come from the 1960s (Lamani 1970). However, one of the latter old records, reported as of a (?flying) individual observed after sunset at the Shkodrë periphery, was doubted justifiably by Sachanowicz & Ciechanowski (2018: 36) as insufficiently described for an acceptance of a real finding of this species.

Field notes. The records of *Nyctalus leisleri* in Albania were made only between late April and late September; no winter, early spring or late autumn records are available. The findings were

Fig. 98. An individual of *Nyctalus leisleri* netted in a plane and poplar forest in the Vjosa river valley near Tepelenë (see Fig. 55; Gjirokastër Pref.), 21 August 2006. Photo by K. Sachanowicz.

Fig. 99. Devolli river valley near Sinicë at ca. 1,050 m a. s. l. (Korçë Pref.); foraging habitat of *Eptesicus serotinus*, *Pipistrellus pipistrellus*, and *Nyctalus leisleri*. Photo by M. Uhrin (July 2015).

made mainly in four periods of a year (Fig. 64); 26 April – 2 May (12.1% of records), 24 June – 11 July (31.0%), 28 July – 20 August (29.3%), and 7–24 September (24.1%). Males were found in all these periods, while females only in the late summer (August, September). However, frequency of the findings of males in the late summer was higher than that of females (Fig. 64); among the examined individuals, the number of males was more than twice higher than the number of females (12:5) in the late summer, and even much higher (9:2) in a whole year. As already reviewed by Sachanowicz & Ciechanowski (2018), the evidence of *N. leisleri* records in the three above specified periods, falling into spring and late summer (April–May, late July–September) are most probably associated with the seasonal migrants (among them all females documented could be included), while the evidence in the early summer (late June–early July) suggests a presence of a resident population of males of this bat in Albania. Such a phenomenon – presence of a big population segment composed solely of males in southern Europe against the reproduction populations in central and northern Europe – was observed/suggested in other migratory bats (*Nyctalus noctula*, *Vespertilio murinus*, *Pipistrellus nathusii*; see Strelkov 1971, 1997, 1999), here it is indicated also for *N. leisleri*.

The prevailing majority of the records (94.8%) of *N. leisleri* in Albania represents evidence of foraging bats, while only twice (on 11 and 16 September) a bat was found in a roost; males were found producing advertisment calls from their roosts, in both cases from a hollow concrete utility pole (at 175 m and 298 m a. s. l., respectively; Sachanowicz & Ciechanowski 2018). The authors speculated that (p. 37) "The use of such man-made structures as mating perches (or even roosts) may be much more widespread in Albania, acting as replacement for old trees in strongly deforested areas." Once a male *N. leisleri* was found in a room of a living house in Tiranë on 15 June (Lamani

1970), however, no information indicating the finding circumstances is available – whether it was a roosting bat in its shelter or a foraging bat that accidentally entered the room.

Foraging of *N. leisleri* was recorded in fifty sites, at almost a half of these sites (47.4%) the bats were netted, while in most of the sites the echolocation calls were detected. The altitude characteristics of the netting sites (range 62–1,430 m a. s. l., median 514.0 m, n=22) roughly correspond to the values from all distribution records, the same is valid for the sites of call detections (range 2–1,642 m a. s. l., median 510.0 m, n=29). Various water bodies were most frequently documented as the foraging habitats of *N. leisleri* in Albania (68.0% of the sites), mainly streams in valleys, and both broad alluvia covered by riparian vegetation and non-vegetated rocky canyons. In nine cases the bats were documented at small water pools, including small lakes, ponds, temporary pools, watering places for livestock etc. In some cases the echolocation calls were detected in urban habitats, in an open farmland, or in dense forests.

No direct evidence of reproduction of *N. leisleri* is available from Albania (see above). On the other hand, records of sexually active males throughout the summer season (July–September) and advertisement calls recorded in September indicate mating behaviour in Albania (Sachanowicz & Ciechanowski 2018). Young of the year were exceptionally netted in late August and in September; however, these records most probably concern migratory bats that arrived from the nursery regions situated north of Albania (Sachanowicz & Ciechanowski 2018).

Records of ectoparasites. **Original data**: M a c r o n y s s i d a e: *Steatonyssus periblepharus*: 18 protonymphs (CMŠ [P]) from 3 ma (NMP 96503–96505), Krongj (Vlorë Pref.), 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; 11 protonymphs (CMŠ [P]) from 1 ma (NMP 96512), Zhulat (Gjirokastër Pref.), 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: S p i n t u r n i c i d a e: *Spinturnix helvetiae*: 4 ma, 1 fa, Qafa e Malit, 18 September 2005 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, two arthropod parasite species were collected from *Nyctalus leisleri* in Albania. One of them is here reported for the first time from the country as well as for the first time from this host.

The bat mite *Spinturnix helvetiae* Deunff, Keller et Aellen, 1986 (formerly referred to *S. acuminata*) is a parasite preferring to feed on *N. leisleri* and its distribution range conforms to the range of this primary host. The records are known mainly from Central Europe (Beron 1965, Deunff et al. 1986, Uchikawa et al. 1994, Stanyukovich 1997, Ferenc & Mysłajek 2003, Kaňuch et al. 2005) and marginally also from south-eastern Europe, besides Albania also from Croatia and Moldavia (Pinčuk 1971, Ševčík & Lučan 2012).

The macronyssid mite *Steatonyssus periblepharus* Kolenati, 1858 is here reported from Albania for the first time – nevertheless, it was recorded in the country from six other bat species (*Myotis blythii*, *M. davidii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Miniopterus schreibersii*; see above and below). It is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999); its occurrence in *N. leisleri* is thus a natural consequence of this habit, although from this host it has not yet been reported.

Barbastella barbastellus (Schreber, 1774)

Records. **Published data**: E l b a s a n: Pishkash, at entrance of a small cave [1], 28 September 2005: net. 4 ma (Sachanowicz et al. 2016). – S h k o d ë r: Kir, near an adit in rocky slopes [2], Kir river gorge, 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Prekal, at a karstic cave [3], 11 September 2012: det. calls (Sachanowicz & Ciechanowski 2018).

Comments. *Barbastella barbastellus* represents a very rare bat in Albania, only three localities are known in the country (Sachanowicz & Ciechanowski 2018; see Table 1). The records are associa-

ted with mountain ridges of the Albanian Alps and Jabllanica massif (Fig. 97); however, they are situated in rather medium altitudes roughly between 200–700 m a. s. l. (median 298.0 m; Table 2, Fig. 8; Sachanowicz & Ciechanowski 2018), although adjacent to forested mountain slopes.

All records of *B. barbastellus* in Albania represent evidence of bats on wings, most probably foraging; in one case (netting of four individuals at Pishkash) they were perhaps bats approaching their roost (small cave in a gorge). All localities are situated in limestone valleys with small streams, presumably rather rich in karst phenomena, and vegetated to various extent but not forested by tall trees. All findings of *B. barbastellus* in Albania were made in September, among four males netted at the cave near Pishkash only one was found sexually active.

Paunovic et al. (2003) reviewed the distribution of *B. barbastellus* in the Balkans; besides the countries in the north (Slovenia, Romania), they reported only 20 records from the Peninsula and of them, none from Albania, Bosnia and Herzegovina, Montenegro, Kosovo, and Turkish Thrace. Within such a picture, the new Albanian records (Sachanowicz et al. 2016, Sachanowicz & Ciechanowski 2018) could represent a significant extension of the distribution range of the species in south-eastern Europe. However, the present state of knowledge of the distribution of *B. barbastellus* in the Balkans differs significantly from that summarised by Paunovic et al. (2003); at least four times more records are now available from the Peninsula and the lowest numbers of records are known just from Albania and from North Macedonia (cf. Kryštufek & Petkovski 2003). At present, this bat is known from the whole Balkan Peninsula except Kosovo, but including the far south; it is distributed in all main parts of Greece, including the Peloponnese and Thrace (von Helversen & Weid 1990, Petrov & von Helversen 2011, Papadatou et al. 2015), many records are available from Bulgaria (Benda et al. 2003b, Petrov et al. 2014, Stoycheva et al. 2014, Pandourski et al. 2017) and from Croatia (Tvrtković 2017). On the other hand, few record sites only (<15) are known from Bosnia and Herzegovina and from Serbia (Paunovic et al. 2003, Karapandža & Paunović 2009, Milanolo et al. 2009, Karapandža 2014, Karapandža et al. 2014, Paunović 2016, Presetnik et al. 2016, 2017, 2019, Hodžić et al. 2017, Mulaomerović et al. 2018, etc.), and only one from Turkish Thrace (Benda & Horáček 1998, Karataş et al. 2004).

Only recently *B. barbastellus* has been shown to be a widespread bat in Montenegro, where altogether thirteen records were reported, including the areas closely adjacent to the Albanian territory (Pašić & Mulaomerović 2018, Rachwald et al. 2019). Most of these new findings were made with the help of ultrasound detectors; this method seems to be well effective to encounter this bat species in patchy environments of the Balkans. Thus, a similar abundance of *B. barbastellus* as in Montenegro could be expected in forested parts of northern and eastern Albania.

Plecotus auritus (Linnaeus, 1758)

Records. **Original data**: E l b a s a n: Fushë Studë [1] (Fig. 100), in the beech forest on shore of an artificial lake, 4 July 2018: net. 1 ma. – **Published data**: D i b ë r: Lura National Park, over a forest road in a mountain old beech forest [2], 29 June 2011 (Sachanowicz et al. 2014); Lura, water pool across road in old beech forest, 29 June 2011: net. 1 fa (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Fushë Studë [1], 28 July – 7 August 2015: net. 1 m (van der Tempel 2016). – S h k o d ë r: Liqeni i Thores, over a mountain pond [3], 7 September 2012 (Sachanowicz et al. 2014); Liqeni i Thores, small mountain pond, 7 September 2012: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Qafëmal [4], at entrance of a small adit, 9–10 August 2003: net. 2 fa (Sachanowicz & Ciechanowski 2006); Qafa e Malit, mining adit in mountain slope, entrance of the mining adit, 8 August 2003: net. 1 fa, 11 August 2007: obs. 1 ind. in ceiling crevice; road in mountain mixed forest with old beech and fir trees, 11 August 2003: net. 1 fa, 1 fj; small pool in bed of a mountain stream, 10 August 2003: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Vau i Dejës [5], entrance of an adit at dam on the Drinit river, 13 August 2003: net. 1 ma; gallery in limestone wall, 14 August 2003: obs. 1 ind. in the ceiling crevice (Sachanowicz & Ciechanowski 2018); – Vermosha valley [at Vermosh] [6], [1 June] 1914: 1 f, NMW (Spitzenberger et al. 2001, 2006). – T i r a n ë: Shëngjergj, entrance of tunnel [7], 1 July 2011: net. 1 ma (Sachanowicz & Ciechanowski

2018); – [Tiranë, building in the city centre, 1954: coll. 1 m (Lamani 1970); according to the description, this record was assigned to *P. kolombatovici*, see below].

Distribution. *Plecotus auritus* is a rare bat in Albania, only seven localities are available from the country (Table 1), from the Albanian Alps and adjacent areas, and from the northern part of the Central Mountain Range (Fig. 97). With the exception of one site (Vau i Dejës), all records of *P. auritus* from Albania are associated with forests and largely forested regions. The records come from a very wide range of altitudes (50–1,642 m a. s. l.; Table 2); however, most of the findings were made in high mountains, at the altitudes between 800 m and 1,600 m a. s. l. (Fig. 8). With the altitude median of 1142 m and mean 1101.3 m, *P. auritus* is the most montane bat of Albania (Table 2, Fig. 8).

Since the taxonomy of the genus *Plecotus* has been recently revised and the appropriate identification of old records doubted (Kiefer et al. 2002, Spitzenberger et al. 2002, 2003, 2006), the distribution range of *P. auritus* in south-eastern Europe, a zone of sympatry of four *Plecotus* bats, remains only patchily known. The faunal status of the particular *Plecotus* species was fully revised only in countries of the northern Balkans, in Bulgaria, Turkish Thrace, Serbia, Croatia, and Slovenia (Benda & Ivanova 2003, Pavlinić & Tvrtković 2004, Kryštufek & Režek Donev 2005, Tvrtković et al. 2005, Presetnik et al. 2009, Paunović 2016); in all these countries, *P. auritus* is a relatively common and widespread bat when compared to other species of the genus. In the southern Balkans, *P. auritus* remains known from just a few of findings; two records are available from Montenegro (Presetnik et al. 2014), three from North Macedonia (Bekker & Boshamer 2007, Micevski et al. 2014), and some findings were made also in Bosnia and Herzegovina and

Fig. 100. Artificial lake and forests at Fushë Studë (Elbasan Pref.), about 1,150 m a. s. l.; foraging area of *Myotis nattereri*, *M. brandtii*, *M. daubentonii*, *Vespertilio murinus*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. kuhlii*, *Nyctalus leisleri*, *Plecotus auritus*, and *Miniopterus schreibersii*. Photo by Z. Bendová (July 2018).

in Kosovo (Karapandža 2014, Karapandža et al. 2014, Presetnik et al. 2016, 2018, Paunović 2016). Several indisputable records come from the western part of mainland Greece (von Helversen & Weid 1990, Hanák et al. 2001, Gremillet et al. 2010); a record of a series of *P. auritus* specimens collected in the northern Peloponnese was reported by Iliopoulou-Georgudaki (1977), however, there still remains a possibility of misidentification with *P. kolombatovici*, a species more likely to be found in this area (contra Hanák et al. 2001 and Horáček & Đulić 2004). The Albanian localities of *P. auritus* apparently represent the western margin of the distribution range in the Balkans that continues south-eastwards to the Galičica mountains in North Macedonia and the Pindos mountains in Greece.

P. auritus is a bat recorded as the first individual and species from the current territory of Albania, a female was collected in the Vermoshi valley near Vermosh in June 1914 by Arnold Penther (1865–1931), during his Nordalbanien-Expedition (as the only bat, see Penther 1914: 1142), eight weeks before the First World War started in the western Balkans. The specimen was deposited in the Natural History Museum of Vienna (NMW 29881) and its correct identification was approved by the analyses by Spitzenberger et al. (2001, 2006). Another record of a bat from Albania followed 17 years later and other verified records of *P. auritus* almost 90 years later (Sachanowicz & Ciechanowski 2006, 2016).

Field notes. The findings of *Plecotus auritus* from Albania were made between early June and early September, although most of the particular records (58.3%) come from the first half of August (van der Tempel 2016, Sachanowicz & Ciechanowski 2006, 2018).

The prevailing majority of the records of *P. auritus* in Albania (81.8–83.3%) represent bats on wings, only twice an individual was found in a roost. Both roosts were mines digged in rocks (at 91 m and 787 m a. s. l.), the bats were observed to rest in ceiling crevices during day visits in the first half of August (Sachanowicz & Ciechanowski 2018). At the entrances to three artificial undeground spaces (including one of the roosts), bats were netted during summer (1 July – 13 August), one individual at each, two adult males and an adult female. Foraging bats were netted at four sites, at two of them repeatedly; mostly above a water surface (water pool across a forest road, an artificial lake in a forest, pool in bed of a stream) and once above a forest road. At most occasions, one bat was caught (four males and one female) but in one case, when two females were netted above the forest road in Qafë e Malit (Sachanowicz & Ciechanowski 2018). Foraging bats were documented in very elevated areas of Albania, at the altitude range of 928–1,642 m a. s. l. (median 1,286.0 m).

Reproduction of *P. auritus* was proved only indirectly in Albania, no maternity aggregation was found. Sachanowicz & Ciechanowski (2018) reported on netting of a post-lactating female on 29 June and two post-lactating females in early August, one of the latter females was accompanied by a volant juvenile. At a similar level of documentation, the reproduction of this bat was registered also in Bulgaria (Benda et al. 2003b) and Greece (Gremillet et al. 2010).

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Spinturnix plecotina*: 1 nymph, Lura National Park, 29 June 2011 (Sachanowicz et al. 2014); 3 ma, 3 nymphs, Liqeni i Thores, 7 September 2012 (Sachanowicz et al. 2014).

Comments on ectoparasites. One arthropod parasite species was collected from *Plecotus auritus* in Albania. The bat mite *Spinturnix plecotina* (Koch, 1839) is a permanent parasite of bats of the genus *Plecotus* (Rudnick 1960, Estrada-Peña et al. 1990, Uchikawa et al. 1994, Stanyukovich 1997), in Albania it was collected also from all other *Plecotus* species (Sachanowicz et al. 2014, Boshamer 2016; see below). Although the frequency of records of this mite is rather low, its distribution range is wide and conforms to the Palaearctic distribution of the genus *Plecotus*,

including Europe, North Africa, Transcaucasia, Central Asia and Far East (Rudnick 1960, Dusbábek 1962, Deunff 1977, Uchikawa & Wada 1979, Estrada-Peña et al. 1990, Haitlinger & Walter 1997, Stanyukovich 1997).

Plecotus macrobullaris Kuzâkin, 1965

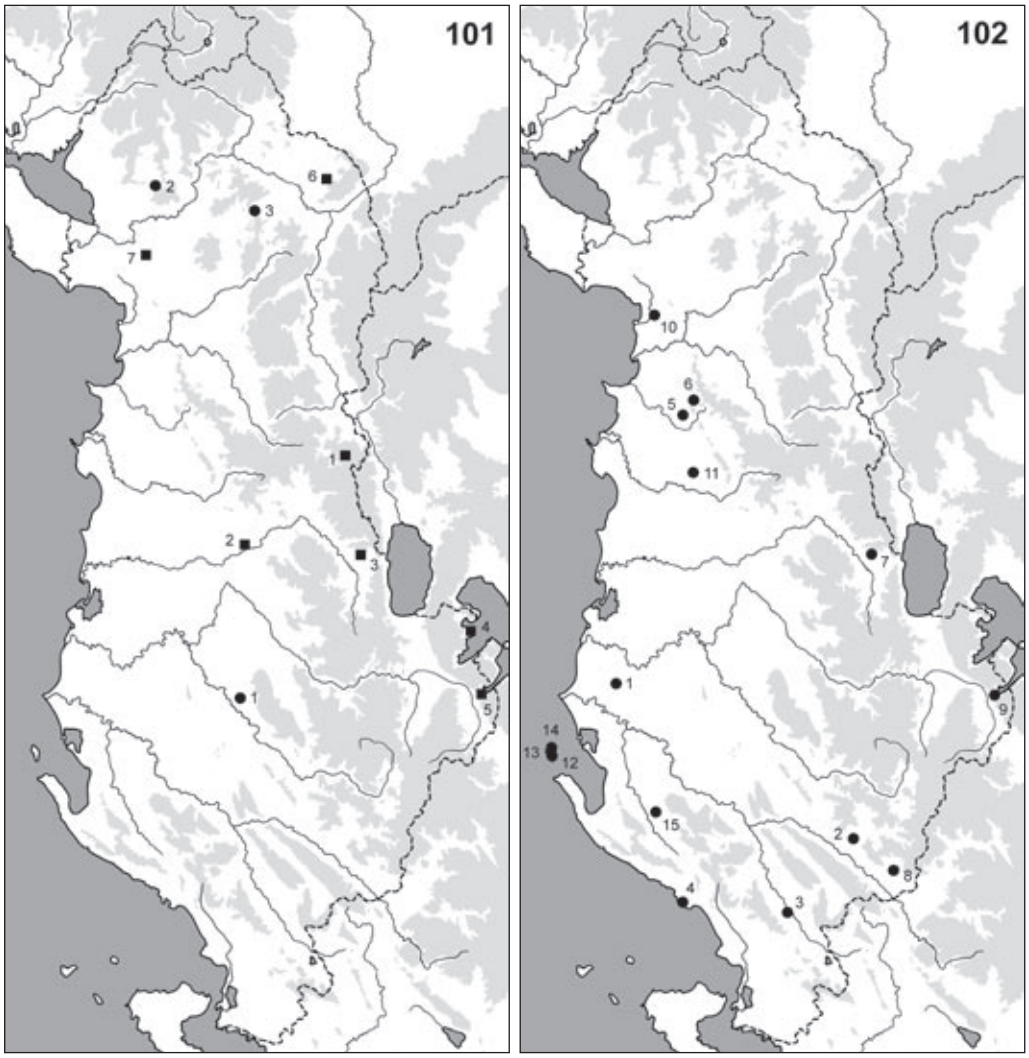
Records. **Published data**: B e r a t: Drenovë, mountain stream [1], 9 July 2011: net. 1 fa (Sachanowicz & Ciechanowski 2018, cf. Alberdi et al. 2013). – S h k o d ë r: Prekal, karstic cave entrance [2], village nearby, 10 August 2007: net. 1 mj, 1 fj (Sachanowicz & Ciechanowski 2018, cf. Alberdi et al. 2013); – Qafëmal, at entrance of a small adit [3], 9–10 August 2003: net. 1 ma, 2 mj, 1 fa, 1 faL, 2 fj (Sachanowicz & Ciechanowski 2006); Qafa e Malit, entrance of an adit, 9 August 2003 (Sachanowicz et al. 2014); Qafa e Malit, entrance of a mining adit in rocky slope, 18 September 2005: net. 1 ma (Sachanowicz & Ciechanowski 2018).

Comments. *Plecotus macrobullaris* is a very rare bat in Albania with only three localities known from the country (Fig. 101, Table 1), it represents the rarest species of the genus *Plecotus*. However, such a small number of records certainly does not reflect real abundance of this bat in the country – in the neighbouring coastal countries *P. macrobullaris* belongs among the most common species of the genus. The Albanian spots of occurrence pertain to the narrow belt of mountainous zone between the Alps and western Greece (incl.) along the Adriatic and Ionian Seas, which constitutes the eastern part of the European continental range of this bat (Alberdi & Aizpurua 2018). *P. macrobullaris* is not scarcely distributed in these west-Balkan countries, in Croatia about 30 localities are known (Pavlinić & Tvrtković 2004, Tvrtković 2017), five sites were reported from Montenegro (Presetnik et al. 2014, Rachwald et al. 2019) and about ten sites are available from the continental Greece (Kiefer & von Helversen 2004a, Alberdi et al. 2013). On the other hand, only one record of *P. macrobullaris* was reported from each of two inland countries of the western Balkans, Serbia and North Macedonia (Bekker & Boshamer 2007, Budinski et al. 2016), and only few findings are known from Bosnia and Herzegovina (Tvrtković et al. 2005, Husanović et al. 2017, Presetnik et al. 2019, etc.). The latter three countries lie on the northern and eastern limits of the distribution range of this bat; one of the Albanian localities (Qafë e Malit) also creates a part of the eastern margin of the European range of the species, lying in an almost straight line between Milošev Do in south-western Serbia (Budinski et al. 2016) and Resen in south-western North Macedonia (Bekker & Boshamer 2007).

The Albanian localities of *P. macrobullaris* are situated at rather low altitudes roughly in the range of 200–800 m a. s. l. (median 502.0 m, mean 504.3 m; Table 2), comparing the situation known from other parts of the speces distribution (Alberdi et al. 2013: 457, Fig. 4); in Croatia the records come from the range ca. 60–1,720 m a. s. l. (mean ~750 m, n=28; Pavlinić & Tvrtković 2004), in Montenegro 645–1,745 m a. s. l. (mean 1,020 m, n=3; Presetnik et al. 2014), in Greece ca. 800–1,950 m a. s. l. (mean ~1,600 m, n=9; Alberdi et al. 2013), and at 1,335 m a. s. l. in south-western Serbia (Budinski et al. 2016). These values could indicate a possible area of more frequent occurrence of *P. macrobullaris* in Albania at rather high elevations around and above 1,000 m a. s. l. (or even above the tree line), where, however, only a limited research effort was made.

All available records of *P. macrobullaris* in Albania represent netted individuals (Sachanowicz & Ciechanowski 2018); in two sites at the entrances to underground spaces (a large cave and a mine), the bats were perhaps approaching/leaving their roosts, and in one site a bat foraged above a mountain stream. No roost or maternity aggregation of *P. macrobullaris* were discovered in Albania. Post-lactating females and volant juveniles were netted at two sites in northern Albania on 9 and 10 August, at 224 m and 787 m a. s. l., respectively.

Records of ectoparasites. **Original data**: M a c r o n y s s i d a e: *Ornithonyssus* sp.: 1 protonymph (CMŠ [P]) from 1 fa, Qafë e Malit (Shkodër Pref.), 9 August 2003, leg. M. Ciechanowicz & K. Sachanowicz. – **Published data**:



Figs. 101, 102. Records of particular bat species in Albania. 101 – *Plecotus macrobullaris* Kuzâkin, 1965 (circles) and *P. austriacus* (Fischer, 1829) (squares). 102 – *Plecotus kolombatovici* Đulić, 1980.

S p i n t u r n i c i d a e: *Spinturnix plecotina*: 4 ma, 1 fa, 1 nymph, Qafa e Malit, 9 August 2003 (Sachanowicz et al. 2014).

Comments on ectoparasites. In total, two arthropod parasite taxa were collected from *Plecotus macrobullaris* in Albania. The record of the macronyssid mite of the genus *Ornithonyssus* Sambon, 1928 represents its first evidence from Albania as well as its first evidence from *P. macrobullaris*. Three species of this genus occur in the western Palaearctic (Lanza 1999), *O. flexus* (Radovsky, 1967), *O. hoogstraali* Keegan, 1956, and *O. pipistrelli* (Oudemans, 1904). Only the latter two

Fig. 103. An adult female of *Plecotus macrobullaris* netted above a mountain stream at Drenovë (Berat Pref.), 9 July 2011. Photo by K. Sachanowicz.

species were collected also in bats of the genus *Plecotus*, viz. *P. auritus*, *P. austriacus*, and *P. teneriffae* Barrett-Hamilton, 1907 (Evans & Till 1966, Estrada-Peña et al. 1991, Baker & Craven 2003). The number, size and arrangement of setae on the pygidial shield of the *Ornithonyssus* specimen collected in Albania (i.e. five setae pairs; four pairs on the lateral and posterior margins are large and strong; one pair situated on the anterior margin is small; Fig. 104) correspond with

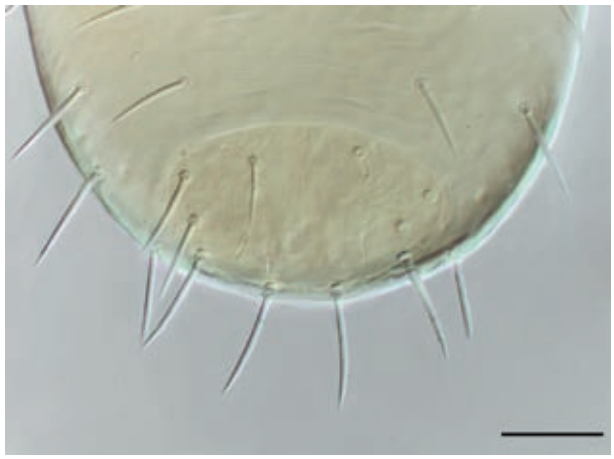


Fig. 104. The pygidial shield of the protonymph of *Ornithonyssus* Sambon, 1928 sp. collected from *Plecotus macrobullaris* Kuzâkin, 1965 at Qafë e Malit (Shkodër Pref.) on 9 August 2003. Scale bar = 50 µm. Photo by W. Lechthaler.

those of the protonymph of *Steatonyssus mongolicus* Dusbábek, 1966. However, Dusbábek (1970) regarded this mite a representative of the genus *Cryptonyssus*, currently *Ornithonyssus*, sensu Micherdziński (1980). An identical number and arrangement of the setae on the pygidial shield as in the Albanian specimen was reported for *Ornithonyssus flexus* (Radovsky, 1967), which was originally considered a Neoartic species parasitising *Myotis lucifugus* (Le Conte, 1831) (Radovsky 1967, Micherdziński 1980). However, Stanyukovich (1997) and Orlova et al. (2015) reported findings of *O. flexus* also from the Palaearctic: it was collected from bats of the *Myotis mystacinus* group in Crimea, southern Ural region, Tajikistan, and Mongolia. Chaetotaxy and the length of the setae in the pygidial shield as described for *Ornithonyssus mongolicus* by Dusbábek (1966) and for *O. flexus* by Radovsky (1967) seem to be identical with the Albanian *Ornithonyssus* protonymph, but the shape of the anterior margin of the pygidial shield in the Albanian protonymph is more oval than in the above descriptions. Since we recorded only a single protonymph and have no comparative material available, we identify here the specimen only to the genus level.

The bat mite *Spinturnix plecotina* (Koch, 1839) is a permanent parasite of bats of the genus *Plecotus* (Rudnick 1960, Estrada-Peña et al. 1990, Uchikawa et al. 1994, Stanyukovich 1997), in Albania it was collected also from all other *Plecotus* species (Sachanowicz et al. 2014, Boshamer 2016; ; see above and below)

Plecotus austriacus (Fischer, 1829)

Records. **Published data**: D i b ë r: Klenje [1], 30 July 2015: net. 1 f (van der Tempel 2016). – D u r r ë s: [Nojë, inside a gallery, 14 September 2012 (Sachanowicz et al. 2014; re-identified as *P. kolombatovici* by Sachanowicz & Ciechanowski 2018)]. – E l b a s a n: Elbasan [2], coll. 1 m (Lamani 1970 [as *P. a. austriacus*]); – Pishkash, at entrance of a small cave [3], 28 September 2005: net. 1 ma (Sachanowicz et al. 2016); Pishkash, entrance of military tunnels, limestone gorge, 28 September 2005: net. 1 ma (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Gollomboç, entrance of a cave at the Macro Prespa lake shore [4], in cliff, 8 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Treni's Cave [= Treni cave] [5], 24–25 September 2012: net. 2 inds. (Scheffler et al. 2013, Theou et al. 2015a). – K u k ë s: Krumë, entrance of bunker [6], 3 August 2007: net. 1 ma (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Maraç, military tunnels [7], 21 April 2010: obs. 1 ind. torpid, entrance of military tunnels, 21 April 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018).

Comments. *Plecotus austriacus* belongs among rare bats in Albania, only seven localities are available from the country (Fig. 101, Table 1). Besides the new findings made after 2004 when the new taxonomic view of the genus *Plecotus* in Europe was proposed (Kiefer et al. 2002, Spitzenberger et al. 2002, 2003), and the respective bats identified under this arrangement, also the old record by Lamani (1970) from Elbasan identified as *P. austriacus austriacus* is included among the records of *P. austriacus* from Albania. Lamani (1970: 149) complemented his report by a description of the bat, which – along with the habitat of the record – clearly shows that his identification was correct in the sense of the current taxonomy (forearm length 41.5 mm, thumb length 5.6 mm, thumb claw length 1.4 mm, greyish dorsal colouration).

The records of *P. austriacus* come from a rather wide altitudinal range (75–1,230 m a. s. l.; Table 2), but mainly from the medium altitudes of more forested eastern and northern parts of Albania, with the altitude median 718.0 m a. s. l. (Fig. 8). These values indicate that *P. austriacus* is not a predominantly lowland species in Albania, contrary to the situation reported from the northern latitudes of the Balkans, e.g. in Bulgaria, Serbia, Croatia or Slovenia (Benda et al. 2003b, Pavlinić & Tvrtković 2004, Presetnik et al. 2009, Paunović 2016). Although *P. austriacus* was found in rather elevated areas of Albania where high forests are more frequently present, its localities are situated mostly in deforested rocky habitats (Sachanowicz & Ciechanowski 2018), rather resembling the Central European patchy cultural landscape, a habitat of abundant occurrence of this bat (cf. Dietz et al. 2016).

Due to the former universal misidentifications and confusions with *P. macrobullaris* or *P. kolombatovici*, the Balkan range of *P. austriacus* is only partially known, its records and distribution have been only incompletely revised so far (cf. Benda & Ivanova 2003, Kryštufek & Režek Donev 2005, Tvrtković & Pavlinić 2005, Paunović 2016). As a result, only one confirmed record of this bat is available from Montenegro and two from Bosnia and Herzegovina, respectively (Presetnik et al. 2014, 2019, Napotnik & Pašić 2016). Anyway, *P. austriacus* seems to be absent from the inshore regions of the western Balkans and its Albanian records create a part of the south-western margin of the species distribution range in the region, running through the central belt ranges of the Dinaric mountains from Istria to northern Albania (cf. Tvrtković 2017) and through Albania to north-western Greece. The southernmost verified record from the Balkans is known from Meteora, northern Thessaly (Kock 1969, Hanák et al. 2001), at the same latitudinal level as the southernmost areas of Albania.

All records of *P. austriacus* in Albania are evidences of single individuals, no colonies or small aggregations were found. Most of the findings were made in late summer, between the end of July and late September (85.7%), one record was made in the second half of April; no records are available from early summer (late May – late July), when the reproduction colonies are aggregated, and from the winter period.

Only one individual of *P. austriacus* was recorded in a roost in Albania, a torpid male was found in a military tunnel in the daytime on 21 April and later the same day it was netted at the tunnel entrance (Sachanowicz & Ciechanowski 2018). All other records represent netted bats, and where the circumstances of the capture were specified, solely at the entrances to underground spaces (three natural caves and two abandoned military structures). These findings could be associated with roost arrival/departure but also with the swarming behaviour at the respective entrances, considering the season of the records.

No trace of reproduction was detected in *P. austriacus* in Albania.

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Spinturnix plecotina*: [unspecified number, sex and stage], Klenje, 30 July 2015 (Boshamer 2016 [as *S. plecotinus*]).

Comments on ectoparasites. One arthropod parasite species was collected from *Plecotus austriacus* in Albania. The bat mite *Spinturnix plecotina* (Koch, 1839) is a permanent parasite of bats of the genus *Plecotus* (Rudnick 1960, Estrada-Peña et al. 1990, Uchikawa et al. 1994, Stanyukovich 1997), in Albania it was collected also from all other *Plecotus* species (Sachanowicz et al. 2014; see above and below).

Plecotus kolombatovici Đulić, 1980

Records. **Original data**: F i e r: Fier, bunker [1], 1 October 2018: obs. 1 ind. torpid. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [2] (Fig. 107), at an entrance to bunker, 29 June 2019: net. 1 ma (leg. R. Lučan); – Goranxi, bunker [3] (Figs. 112, 113), at the bunker entrance, 3 May 2016: net. 1 ma. – V l o r ë: Porto Palermo, Ali Pasha fortress [4] (Fig. 106), ceiling fissure, 28 April 2016: obs. 1 ind. torpid; 26 September 2018: obs. 1 ind. – **Published data**: D u r r ë s: Halil, tunnels [5], limestone slopes with dry pine forest, 3 October 2005: obs. 1 fa (Sachanowicz & Ciechanowski 2018); – Nojë, inside a gallery [6], 14 September 2012 (Sachanowicz et al. 2014 [as *P. austriacus*], Sachanowicz & Ciechanowski 2018); Nojë, gallery in limestone slope, 14 September 2012: obs. a cluster of ca. 16 inds. ad+juv, 4 inds. torpid and 1 fa on ceiling (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Pishkash, at entrance of a small cave [7], 28 September 2005: net. 1 ma (Sachanowicz et al. 2016). – K o r ç ë: Leskovik, entrance of military tunnels [8], 17 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Treni's Cave [= Treni cave] [9], 24–25 September 2012: net. 1 ind. (Scheffler et al. 2013, Theou et al. 2015a). – L e z h ë: Lezhë, military tunnel [10], 24 April 2010: obs. 1 ma torpid, in ceiling crevice (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Tiranë, building in the city centre [11], 1954: coll. 1 m (Hanak et al. 1961, Lamani 1970 [as *P. auritus*]). – V l o r ë: île de Sazani, un bunker du centre de l'ile [12], September 2012: exam. 1 ind. (Theou & Bego 2013); Sazan Island, bunker on top of hill & bunker near road for southern part, 2 September 2012:

obs. 3 inds. (Théou & Loce 2017); – Sazan Island, bunker near hospital [13], 2 September 2012: obs. 3 inds., 27 May 2013: exam. 1 ind., 9 August 2016: exam. 1 ind. (Théou & Loce 2017); – Sazan Island, bunker near cross-road [14], 10 August 2016: capt. 1 ind. (Théou & Loce 2017); – Velçë, entrance of a small cave in limestone slope [15], 26 August 2006: net. 1 ma (Sachanowicz & Ciechanowski 2018).

Distribution. *Plecotus kolombatovici* is a rather rare bat in Albania, only 15 localities are known from the country (Fig. 102, Table 1). In agreement with Sachanowicz & Ciechanowski (2018), we include also the finding from Tiranë made in 1954 and reported by Hanak et al. (1961) and Lamani (1970) among the records of *P. kolombatovici*; it was originally identified as *P. a. auritus* (under the taxonomic arrangement after e.g. Ellerman & Morrison-Scott 1951), but according to the characters mentioned by Lamani (1970) – dimensions of the wing (forearm length 36.5 mm, thumb length 5.9 mm, thumb claw length 2.1 mm; comp. Table 19) and brownish dorsal colouration, it clearly represents *P. kolombatovici* under the current conception of the genus (contra e.g. Horáček & Đulić 2004).

Despite its relative rarity, *P. kolombatovici* is the most common species of the genus *Plecotus* in Albania, similarly as in other countries along the eastern Adriatic and Ionian coasts where the occurrence of this bat was confirmed. *P. kolombatovici* is a rather common bat in Croatia, namely in its Dalmatine part, where more than 40 records are available (Tvrtković 2017), including the confirmed presence at least in ten Dalmatine islands (Tvrtković et al. 2005). Around ten findings are known from the western part of mainland Greece (Benda et al. 2004b, Dietz et al. 2016, Grubač 2017), plus other findings from at least seven Greek islands (Benda et al. 2004b, 2009, Benda & Uhrin 2017). From the inland countries of the western Balkans, only three records were reported from Bosnia and Herzegovina (Đulić 1980, Červený & Kryštufek 1988, Presetnik 2017), while from Serbia, Kosovo, and North Macedonia this bat remains unknown and most probably, it does not occur there (at least in two former countries), see Dietz et al. (2016: 371). Surprisingly, no record of *P. kolombatovici* is available from Montenegro so far, although it certainly should be distributed in this country, at least in its narrow Mediterranean zone along the sea coast (however, only a limited research effort was made in this zone, see Presetnik et al. 2014: 133). The relatively numerous records of *P. kolombatovici* from across the territory of Albania thus now represent a significant part of the distribution range of this bat in mainland Europe that stretches through the Mediterranean belt of the western Balkans from the Istria peninsula in western Croatia to the Peloponnese and Chalkidiki peninsulae in Greece (cf. Dietz et al. 2016, Grubač 2017).

Although the number of *P. kolombatovici* records in Albania is not large, these findings are spread over most of low parts of the country except for the north and north-east (Fig. 102), but including the only Albanian larger sea island, Sazani, where this bat was found to be a common faunal element (Théou & Loce 2017). This conforms to the situation in other islands of the eastern Mediterranean, where *P. kolombatovici* is one of the most frequent bat species (see Benda & Uhrin 2017). The records of *P. kolombatovici* in Albania originate from a rather small altitude range of 12–895 m a. s. l. (median 241.0 m; Table 2). On the other hand, the altitude span of *P. kolombatovici* sites in Albania is more than twice larger than of more frequent records in Croatia (0–400 m a. s. l., n=20; Pavlinić & Tvrtković 2004), but slightly smaller than in mainland Greece (20–950 m a. s. l., n=8; Hanák et al. 2001), and much smaller than in Crete (15–1,490 m a. s. l., n=13; Benda et al. 2009). These data suggest a north-south clinal increase of the altitudinal span of the use of the Mediterranean habitats in this bat. In Albania, the records of *P. kolombatovici* are missing not only in the mountains above 900 m a. s. l., but also in most of the low inland areas enclosed by or adjacent to high mountain ranges (Fig. 102). This indicates that this bat thus occurs in a certain ecological allo- or parapatry with other *Plecotus* species in Albania (see Figs. 8, 97, 101, 102), the difference is given mainly by the altitudes preferred (see also above under other *Plecotus* species).

Field notes. The records of *Plecotus kolombatovici* in Albania were made between the end of April and early October, no hibernation record is available. Majority of the records come from late summer of August and September (62.5%), while only two findings were made at the time of supposed existence of maternity aggregations between mid-May and the end of July (27 May & 29 June).

No maternity colony of *P. kolombatovici* nor females in the lactation stage were documented from Albania. Juveniles of the year were found once, in a cluster of 16 torpid bats on a ceiling of a mine at Nojë on 14 September (see Sachanowicz & Ciechanowski 2018: 123). Most probably, this aggregation was a remain of a maternity colony; however, its roost could be secondary as it can be changed several times since the time when the juveniles are fully volant, i.e., for about a month in this case.

All records of *P. kolombatovici* in Albania are associated to roosts or potential roosts, no record of a foraging bat is available from the country. The roosts included artificial underground and semi--underground structures, abandoned military bunkers and tunnels, a mine, a fortress and a house in town. They were situated in the Mediterranean patchy xerophilous landscape in a very small altitude range of 12–520 m a. s. l. (median 115.0 m; n=9). Except for the aggregation of 16+5 bats found in the mine at Nojë (see above) and two findings in bunkers in the Sazani island when three and two bats were observed, respectively (Théou & Loce 2017), only single individuals were found in the particular roosts. At six sites, single individuals of *P. kolombatovici* (mostly adult males) were netted at the entrances to underground spaces, three of them were natural caves (including the spacious Treni cave; Fig. 61), one military tunnel and two bunkers. These sites were situated much higher than the sites of the confirmed roosts, in the altitude range of 275–895 m a. s. l.

Fig. 105. An adult male of *Plecotus kolombatovici* netted at the entrance of a small cave near Pishkash (Elbasan Pref.), 28 September 2005. Photo by K. Sachanowicz.

Fig. 106. Ali Pasha fortress at Porto Palermo on the Adriatic sea shore (Vlorë Pref.); dark aboveground rooms of the fortress serve as summer roosts of *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, and *Plecotus kolombatovici*. Photo by P. Tájek (April 2016).

(median 572.5 m), suggesting a rather temporal use of these sites during the transient seasons than a year-round occurrence, which would include also a reproduction there.

Records of ectoparasites. **Published data**: S p i n t u r n i c i d a e: *Spinturnix plecotina*: 1 fa, Nojë, 14 September 2012 (Sachanowicz et al. 2014).

Comments on ectoparasites. One arthropod parasite species was collected from *Plecotus kolombatovici* in Albania. The bat mite *Spinturnix plecotina* (Koch, 1839) is a permanent parasite of bats of the genus *Plecotus* (Rudnick 1960, Estrada-Peña et al. 1990, Uchikawa et al. 1994, Stanyukovich 1997), in Albania it was collected also from all other *Plecotus* species (Sachanowicz et al. 2014, Boshamer 2016; see above).

Plecotus sp.

Records. **Original data**: G j i r o k a s t ë r: Goranxi, monastery, church dome, 5 May 2016: obs. 1 ind. of *Plecotus* sp. hidden in a fissure between stones. – **Published data**: K o r ç ë: Treni cave, October 2010: 1 ind., winter 2011: 1 ind. torpid (Papadatou et al. 2011 [as *Plecotus* sp.]). – V l o r ë: Sazan Island, bunker with water, 2 September 2012: det. calls of 1 ind. (Théou & Loce 2017 [as *Plecotus* sp.]). – Albania (undef.), 2 inds. (Hanák 1964, 1966 [as *P. austriacus austriacus*]).

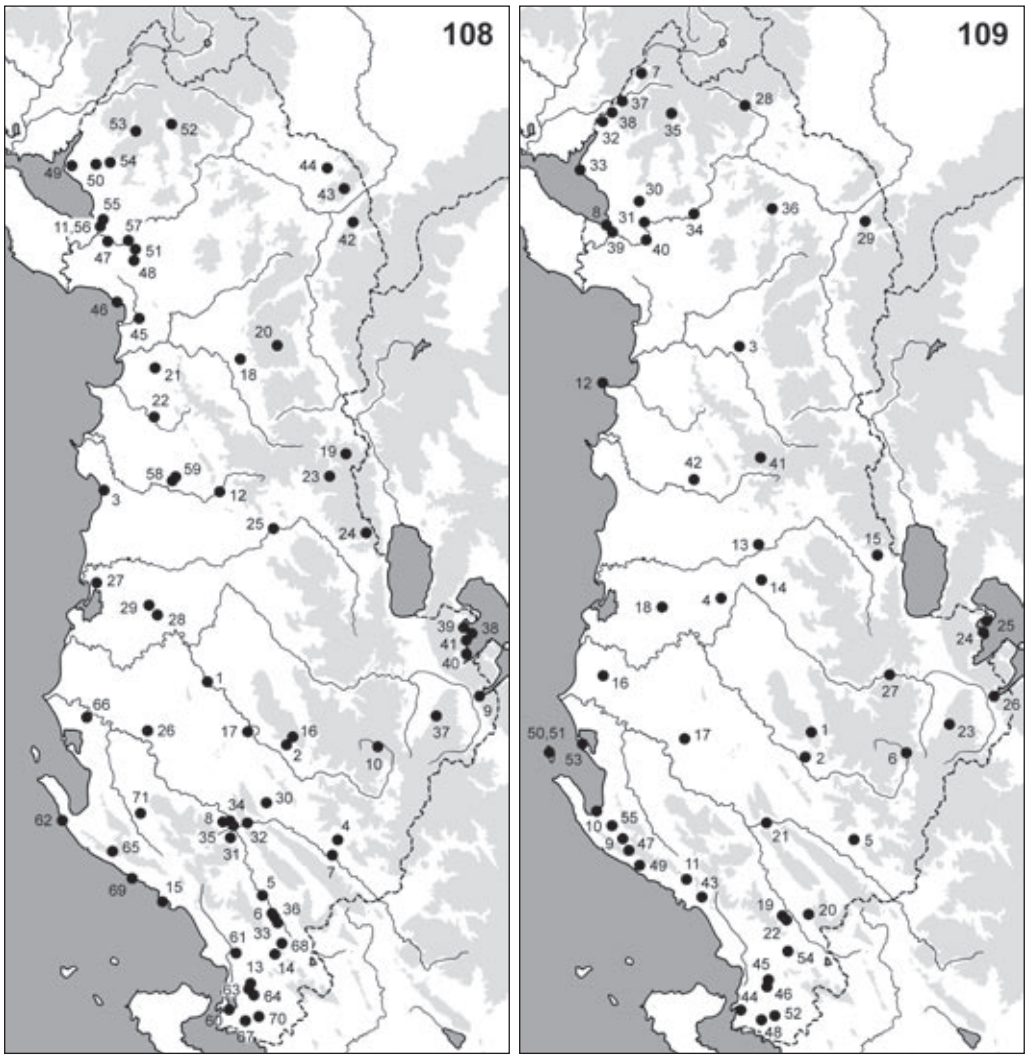
Note. Several recent records of the *Plecotus* bats from Albania were not identified to the species level for various reasons (Papadatou et al. 2011, Théou & Loce 2017, own data), some older records were not accommpanied with the data enabling identification in accordance to the modern taxonomy (see Spitzenberger et al. 2003, 2006). The only exception is the report by Lamani (1970), who mentioned records of two *Plecotus* individuals together with descriptions of their pelage colouration and basic dimensions; these bats could thus be identified with most probability as *P. austriacus* s.str. and *P. kolombatovici*, respectively (see under these species above).

Miniopterus schreibersii (Kuhl, 1817)

Records. **Original data**: B e r a t: Berat, castle [1], cistern (Fig. 114), 21 September 2018: obs. a colony of ca. 60 inds.; – Pirogosh, Pirogoshi cave [2], 23 September 2018: obs. a colony of ca. 20 inds. – D u r r ë s: Shkallnur, Shkëmbi i Kavajës, bunkers [3], 29 January 2016: obs. 29 inds. torpid; – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [4] (Fig. 107), at three entrances to bunkers, 29 June 2019: net. 3 ma, 6 faL, 4 fs (leg. R. Lučan); – Gjirokastër, castle [5] (Figs. 39, 40), 27 January 2016: obs. 1 ind. torpid, 3 May 2016: obs. a colony of ca. 1,000 inds. torpid (mixed with *Myotis blythii*); – Goranxi, bunker [6] (Figs. 112, 113), 3 May 2016: obs. 1 ind. torpid; – Petran, bunker [7] (Fig. 115), 6 May 2016: obs. 2 inds. torpid; – Tepelenë, bunker [8] (Fig. 30), 6 May 2016: obs. 2 inds. torpid. – K o r ç ë: Tren, Treni cave [9] (Fig. 61), 7 July 2015: obs. a colony of ca. 500 inds. (mixed with *Myotis capaccinii*), exam. 1 ma, 28 June 2016: obs. 1 ind. torpid; – Vithkuq, bunker [10] (Fig. 16), 9 May 2016: obs. a dispersed colony of ca. 50 inds. torpid. – S h k o d ë r: Shkodër, bunker [11] (Fig. 34), 13 May 2016: obs. a colony of ca. 100 inds. (some clusters of mixed composition, with *Myotis myotis* and/or *M. capaccinii*), 10 July 2016: obs. a colony of ca. 1,200 inds. (mixed composition, with *Myotis myotis* and *M. capaccinii*), 26 June 2018: obs. 1 ind. torpid, 18 September 2018: obs. several hundreds of inds. – T i r a n ë: Pëllumbas, Pëllumbasi cave [12], 11 May 2016: obs. several tens of inds. torpid. – V l o r ë: Jermë, bunkers [13] (Fig. 25), 1 July 2016: obs. 2 inds. torpid; – Krongj, Vris stream valley [14] (Fig. 50), above the stream, 3 July 2015: det. & rec. calls of 1 foraging ind.; – Porto Palermo, tunnel [15], 28 September 2018: obs. 2 inds. torpid. – **Published data**: B e r a t: Berat, castle undergrounds [1], old water cistern, 8 May 2010: obs. a colony of ca. 3000 inds. mixed with *Myotis myotis* and *M. blythii* (Sachanowicz & Ciechanowski 2018); – Shpella e Koritës [16], 9 June 1961: obs. a colony (Hanak et al. 1961); Cerovoda, Höhle bei Korite, 6 June 1961: obs. a colony (Hanák 1964); – Valë, near a village [17], 6 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – D i b ë r: Barbullej, over a river [18], 30 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Klenje [19], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Lura, road in old mountain beech forest [20], 28 June 2011: det. calls (Sachanowicz & Ciechanowski 2018). – D u r r ë s: Delbinisht, adit [21], 24 April 2010: obs. 3 inds.; entrance of the adit, 24 April 2010: net. 1 fa; vertical water cave, 24 April 2010: obs. an emerging colony of ca. 10–15 inds.; tunnel, 25 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); –

Fig. 107. Lengarica river canyon at Bënjë-Novoselë (Gjirokastër Pref.), hot springs surrounded with three bunkers; the bunkers serve as hibernacula of *Rhinolophus ferrumequinum* and *R. hipposideros*, and summer roosts of *R. hipposideros*, while above the river and/or at the bunker entrances, individuals of *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. bechsteinii*, *M. emarginatus*, *M. cappaccinii*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *Plecotus kolombatovici*, *Miniopterus schreibersii*, and *Tadarida teniotis* were netted. Photo by M. Uhrin (January 2016).

Shpella e Fushë-Krujës [22], 16 October 1960: obs. a colony, exam. 3 m, 4 f, 11 March 1961: obs. a colony, exam. 6 m, 3 f (Hanak et al. 1961); Höhle bei Fush-Kruje, 16 October 1960: obs. a colony (Hůrka 1962); Shpella e Fush-Krujës bei Kruja, 16 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Fush-Kruje, 16 October 1960: 5 m, 3 f (Hanák 1964); – Shkëmbi e Kavajës, abandoned gallery [3], 28 April 1961: obs. 7 inds. torpid (Hanak et al. 1961); Golem, Shkëmbi i Kavajës, bunker, 3 February 2014: obs. 4 inds. (Théou et al. 2015b); Shkëmbi i Kavajës, April to late June 2014: maternity colony of ca. 1500 inds. (Théou 2015). – E l b a s a n: Fushë Studë [23], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Skenderbej [24], 28 July – 7 August 2015: det. calls (van der Tempel 2016); – Xibrake, tunnel [25], 8 July 2011: obs. ca. 50 inds. ad. in a large colony mixed of breeding *Rhinolophus ferrumequinum*, *R. euryale*, and *Myotis emarginatus* (Sachanowicz & Ciechanowski 2018). – F i e r: Byllis, ruins of ancient Illyrian town [26], 15 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Divjakë, road in old coastal pine forest [27], 27 April 2010: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Kasthbardhë, water channel near a village [28], 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Lushnjë, near streetlights in city center [29], 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Benjë, cave [4], 19 November 2014: obs. 32 inds. (Théou et al. 2015b); 4 June 2015: collected ectoparasites (Szentiványi et al. 2018); – Gjirocaster castle [5], dark corridors, 23 April 1995: obs. a colony mixed with *Myotis blythii*, net. 5 m, 8 f (Uhrin et al. 1996); Gjirokastër, citadel, 26 September 2012: net. 14 inds. (Scheffler et al. 2013); Gjirokastër, castle undergrounds, 21 April 2004: obs. 12 inds. (exam. 1 fa), 11 July 2011: obs. a colony of ca. 1000 inds. mixed with *Myotis capaccinii*, *M. myotis*, and *M. blythii* (Sachanowicz & Ciechanowski 2018); – Goranxi, military tunnel and adit [6], 21 April 2004: obs. 2 inds. torpid + 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Goricë, Dishnicës river [30], 18 August 2006: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Luzat, limestone river gorge with old *Platanus* trees [31], 11 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Shpella e Mezhgoranit [32], 11 October 1960: obs. a colony, exam. 11 m, 15 f (Hanak et al. 1961); Höhle "Sphella e Meczgoranit" bei Tepelene, 11 October 1960: obs. a colony (Hůrka 1962); Shpella e Mezhgoranit östl. Tepelena, 11 October 1960: coll. parasites (Hůrka 1963a); Höhle "Mezhgoranit" bei Tepelene, 11 October 1960: coll. 27 f [= 11 m, 16 f] (Hanák 1964); Shpella e Mezhgorani, April 1995: net. 14 inds. (Uhrin 1995); Mezhgoranit cave near Tepelene, 22 April 1995: obs. a colony mixed with *Rhinolophus ferrumequinum*, *R. blasii*, and *Myotis capaccinii*, net. 7 m, 7 f (Uhrin et al. 1996); Luadh, cave, 18 November 2014: obs. 2 inds. (Théou et al. 2015b); Mezhgoran, Mezhgoran cave, 22 August 2006: obs. a large breeding colony of several hundred inds. mixed with *Myotis capaccinii*, *M. myotis*, and *M. blythii*, the cave entrance, net. 3 mj, 6 fj (Sachanowicz & Ciechanowski 2018); – Sofratikë, military tunnel [33], 22 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Tepelene, national road [34], 18 September 2015: obs. 1 ind. (roadkill) (Théou 2016a); – Tepelenë, river in riparian forest of old oriental planes and poplars [35], Vjosës valley, 19 August 2006: net. 1 fa (Sachanowicz & Ciechanowski 2018); – Shpella e Vanishtës [36], 12 October 1960: obs. a group, exam. 2 f (Hanak et al. 1961); Höhle bei Vanischta, 12 October 1960: obs. a colony (Hůrka 1962); Shpella e Vanishtës, 12 October 1960: coll. parasites (Hůrka 1963a); Höhle bei Vanista, 12 October 1960: 2 f (Hanák 1964); Vanishter, cave, April 1995: net. 31 inds. (Uhrin 1995); Vanisther cave, 23 April 1995: net. 16 m, 15 f (Uhrin et al. 1996); Vanister, cave, 27 September 2012: obs. numerous inds. (Scheffler et al. 2013); Vanister cave, cave entrance, 22 April 2004 and 16 September 2012 (Sachanowicz et al. 2014); Vanister cave, the cave entrance, 22 April 2014: net. 3 ma, 10 fa, 16 September 2012: net. 6 ma, 4 fa, in the cave, 22 April 2004: obs. 29 inds. torpid, 16 September 2012: obs. a large colony (several hundred) mixed with *Myotis myotis* and *M. blythii* (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Barca, Moravë Mts., abandoned gallery [37], 29 May 1991: obs. 2 inds. (Chytil & Vlašín 1994); – Golomboc, small caves along the Lake Prespa shoreline [38], 25 September 2012: exam. 8 inds. (Scheffler et al. 2013); Gollomboç, cave, 12 September 2014: obs. 2 inds. (Théou et al. 2015b); – [Gorica e Vogël] Prespa National Park, cave [39], 12 November 2014: obs. 1 m (Theou et al. 2016b); – Mali Grad island, cave [40], September 2008: obs. a colony of 2000 inds. (Papadatou et al. 2011); – Mikro Prespa lake, a large cave about 50 m from the west end of the lake [= Treni cave] [9], 30 May 1991: obs. a colony of about 300 inds. (Chytil & Vlašín 1994); Mikroprespanská j., April 1995: obs. 1 ind., net. 8 inds. (Uhrin 1995); Micro Prespa cave, 21 April 1995: net. 5 m, 3 f (Uhrin et al. 1996); Treni cave, 1998, 2007: obs. colonies, July & September 2008: a large mixed colony of ca. 5000 inds., dominated by *M. schreibersii*, 2009, 2010, 2011: obs. colonies (Papadatou et al. 2011); Treni's Cave, 24–25 September 2012: exam. 18 inds. (Scheffler et al. 2013); Tren, Treni cave, 24 November 2012: obs. 1 ind., 21 February 2014: obs. 1 ind. (Théou et al. 2015b); Treni Cave, 16 inds. (Puechmaille et al. 2014, Bilgin et al. 2016); Micro Prespa cave, 10 August 2006: obs. 30 inds. in the cave, net. 5 ma, 1 fa at the cave entrance (Sachanowicz & Ciechanowski 2018); – Vithkuq, tunnel [10], 14 August 2006: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – National Park of Prespa Lakes, four natural caves [9, 38, 39, 41], 24 September 2012 – 23 April 2015: obs. numerous inds. (maximum 2530 inds. in total per one check) (Theou et al. 2015a). – K u k ë s: Belje, Jezim cave [42], 13 December 2014: obs. 179 inds. (Théou et al. 2015b); – Kishaj, Bat cave [43], 12 December 2014: obs. 2,409 inds. (Théou et al. 2015b); – Nikoliq, river [44], 4 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – L e z h ë: Lezhë, in the castle ruins [45], 23 April 2010: det. calls; military tunnel, 24 April 2010: obs. 8 inds. (Sachanowicz & Ciechanowski 2018); – [Shëngjin], bunker [46], 26 June 2014: obs. 10 inds. (Théou & Đurović 2015a). – S h k o d ë r: Ashtë, village [47], farmland landscape, 27 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Hajmel, military tunnel with metal tank [48], 21 April 2010: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Kamicë Flakë, in the village



Figs. 108, 109. Records of particular bat species in Albania. 108 – *Miniopterus schreibersii* (Kuhl, 1817). 109 – *Tadarida teniotis* (Rafinesque, 1814).

[49], 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Koplik i Sipërm, near streetlights and buildings [50], 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Naraç, adit [51], 22 April 2010: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Nderlysë, mountain valley of the Shalës river [52], 9 September 2012: net. 1 ma (Sachanowicz & Ciechanowski 2018); – [Prekal], Shpella e Xhyla [53], 9 June 2015: obs. 1 ind. (Théou & Đurović 2015a); – [Qafë Gradë], Shpella e Pellumbave [54], 6 June 2015: obs. 6 inds. (Théou & Đurović 2015a); 6 June 2015: collected ectoparasites (Szentiványi et al. 2018); – Shkodër, Sheshi Perrucë square in city center [55], 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Shkodër, small cellars of the Rozafa castle [56], 23 April 2010: obs. 8 inds. torpid (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, entrance of gallery in limestone cliff [57], 22 April 2010: net.

1 ind. ad. (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shpella e Zezä [= Pëllumbasi cave] [12], April 1995: obs. 15 inds., net. 48 inds. (Uhrin 1995); Pellumbasi, Dajti Mts., Zezä cave, 28 April 1995: obs. ca. 15 inds. torpid, net. 31 m, 16 f (Uhrin et al. 1996); Shpella Pëllumbasit, 22 September 2012: net. numerous inds., exam. 10 inds. (Scheffler et al. 2013); Zëze cave, in the cave, 3 July 2011: obs. a breeding colony of ca. 5000 inds. of ad+juv mixed with *Myotis capaccinii* (Sachanowicz & Ciechanowski 2018); 5 June 2015: collected ectoparasites (Szentiványi et al. 2018); – [south of] Tiranë, bunker [58], December 2013: obs. 1 ind. (Çera 2014); south of Tirana, 37 man-made bunkers and tunnels, 13 March 2012 – 1 June 2014: obs. inds. (Theou & Bego 2014); Tirana, tunnel, 7 December 2013: obs. 1 ind. (Théou et al. 2015b); – Tiranë, diga i liqenit [59], September & October 2013: det. calls (Çera 2014). – V l o r ë: Butrint, entrance of a military tunnel [60], 24 April 2004 (Sachanowicz et al. 2014); Butrint, military tunnels at the hill top, 24 April 2004: obs. 2 inds. torpid; entrance of military tunnels, 24 April 2004: net. 2 fa, 5 May 2010: net. 1 ma (Sachanowicz & Ciechanowski 2018); – Finiq, military tunnel [61], 27 April 2004: obs. 1 ind. (Sachanowicz & Ciechanowski 2018); – Jermë, military tunnels in olive grove [13], 27 April 2004: net. 4 ma, 3 fa, 3 May 2010: obs. 2 inds., 17 September 2012: obs. a group of ca. 50 inds. (exam. 1 fa) in a colony of ca. 250 inds. mixed of *Rhinolophus blasii*, *R. euryale*, and *R. mehelyi* (Sachanowicz & Ciechanowski 2018); – Karaburun National Park, Shpella Duk Gjonit, cave [62], 30 April 2016: obs. 40 inds. (Théou & Loce 2017); – Kulluricë, entrance of military tunnels [63], 26 April 2004: net. 3 fa; military tunnels, 26 April 2004: obs. 6 inds., 3 May 2010: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Livadhja [64], near streetlights in the village, vineyards at a road, farmland, 3 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Llogara National Park, old mixed mountain forest [65], 29 April 2004: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Mifol, bunker [66], 30 April 2004: obs. 1 ind. torpid (Sachanowicz & Ciechanowski 2018); – Mursi, over a lake [67], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Muzinë, near a petrol station lights [68], limestone slopes, 16 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Shpella e Parashqevise, cave [69], 29 April 2016: obs. 30 inds., 25 September 2016: obs. 20 inds. (Théou & Loce 2017); – Shalës, limestone river valley [70], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Shpella e Maçit [= Velça cave] [71], April 1995: obs. 1000 inds., net. 8 inds. (Uhrin 1995); Velca, Macit cave, 26 April 1995: obs. a colony of 2000 inds., net. 2 m, 6 f (Uhrin et al. 1996); Velçë cave, 2014: 2000 inds. (Théou 2015); Velce, Velce cave, 6 December 2014: obs. 42 inds. (Théou et al. 2015b); Velçë cave, in the cave, 26 August 2006: obs. a colony of ca. 100 inds. mixed with *Myotis myotis* and *M. blythii*; entrance of a small cave, 26 August 2006: net. 1 ma, 2 mj, 2 fj (Sachanowicz & Ciechanowski 2018).

Distribution. *Miniopterus schreibersii* is a common bat in Albania, 71 localities are available from the country (Fig. 108, Table 1). The Albanian range is a part of the continuous and dense occurrence of this bat in the Balkans and the Mediterranean Basin as well (Dietz et al. 2016). In Albania, *M. schreibersii* is the fifth most frequent bat, the high number of its records in Albania conforms to the situation in other countries of the southern and central latitudes of the Balkan Peninsula, including some islands (Kryštufek et al. 1992, Benda & Horáček 1998, Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2009, 2014, Paunović 2016, Tvrtković 2017, etc.). The occurrence of *M. schreibersii* covers all parts of Albania, although most records (almost three quarters) are concentrated to the Western Lowlands and Southern Mountain Range; in the latter region, it is the second most frequently found bat species. The findings come from a wide altitude span (0–1,430 m a. s. l.; Table 2); however, the very small value of the altitude median (215.0 m), second lowest among the Albanian bats (Fig. 8), indicates the preference for lowland areas of the country. Although *M. schreibersii* ranks among frequently found bats of Albania, commonly met in various underground roosts (see Records), only fourteen findings (12.4%) of this bat were made in the twentieth century (1960–1995), all other records come from the period 2004–2019.

Field notes. The findings of *Miniopterus schreibersii* in Albania are available from all parts of a year (Fig. 9), almost two thirds of the records (63.9%) were made in roosts. The highest concentration of particular records in a short period (41.8% of all records) was registered during three weeks of the early spring, between 21 April and 13 May (incl.; Fig. 9).

Hibernation of *M. schreibersii* was documented at 13 sites in the country, in the period between early November and early March (11.5% of particular records; Fig. 9). Ten hibernacula (76.9%) were in natural caves, while only three were in artificial spaces – two bunkers and an aboveground corridor of the Gjirokastër castle. The documented hibernacula of *M. schreibersii* in Albania were situated mostly at medium altitudes, in the range of 4–1,104 m a. s. l. (median 384.0 m). Mostly

Fig. 110. A pair of *Miniopterus schreibersii* roosting in a small cellar of the Rozafa castle in Shkodër (Shkodër Pref.; Fig. 111), 23 April 2010. Photo by K. Sachanowicz.

single individuals or small numbers less than 50 bats were recorded in the particular hibernacula, the exceptions were the wintering colonies in the Jezim cave at Belje and the Bat cave at Kishaj where 179 bats and 2,409 bats, respectively, were found in the winter 2014 (Théou et al. 2015b). Large numbers of wintering *M. schreibersii* were found also in four undefined caves in the Prespa region, where up to 2,530 individuals in total were found during one check (Theou et al. 2015a).

The non-hibernation roosts of *M. schreibersii* were found in 42 localities (51.9% of the sites), although seven of them served also as hibernacula during the winter season. Majority of the roosts (59.5%) represented artificial spaces, mostly abandoned underground military facilities (tunnels, bunkers), in three cases also various semi-dark parts of old castles (corridors, cisterns). Albeit in caves *M. schreibersii* was recorded less frequently than in artificial shelters, in caves it was present in higher numbers than in artificial shelters. On average, 419.2 individuals (range 1–500 bats) were found in a cave, while only 21.4 individuals (range 1–300 bats) in a bunker/tunnel/gallery, i.e. almost twenty times less. The artificial roost spaces (n=25) were situated in the altitudinal range of 0–1,135 m a. s. l., however, the artificial shelters in lowlands were apparently preferred, as shown by the very low value of altitude median, 107.0 m. On the other hand, although the cave roosts (n=17) were situated in a similar range of altitudes, 30–1,125 m a. s. l., the altitude median of these localities (419.5 m) shows a preference for medium altitudes (Table 5).

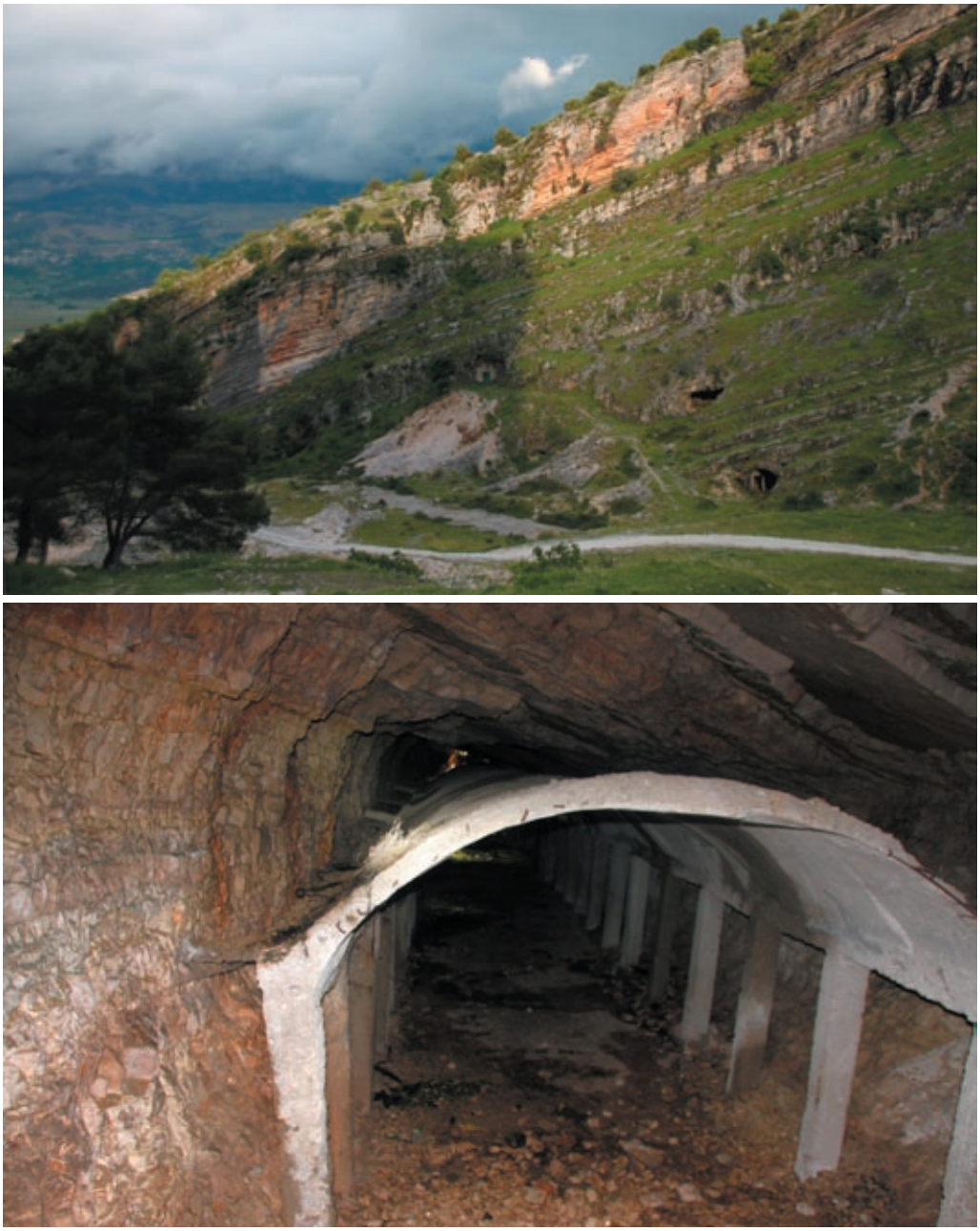
Maternity aggregations of *M. schreibersii* were observed at least in four sites in Albania (Théou 2015, Sachanowicz & Ciechanowski 2018); in three caves (Mezhgorani cave, Pëllumbasi cave,

Velça cave) and one bunker (Shkëmbi i Kavajës system). The size of these colonies, observed between June and August (incl.), was reported to be from 'several hundred' to five thousand bats. However, with the exception of the bunker colony, all maternity aggregations of *M. schreibersii* were mixed with colonies or individuals of other bat species, namely with *Myotis capaccinii*, *M. myotis*, and *M. blythii*, with *M. myotis* and *M. blythii*, or with *Myotis capaccinii*, respectively, and the numbers of *M. schreibersii* were only roughly estimated. Large aggregations of *M. schreibersii* in which the reproduction was presumed but not observed, were documented at several other sites between early May and mid-July (Hanak et al. 1961, Chytil & Vlašín 1994, Sachanowicz & Ciechanowski 2018, own data); in two caves, two castle spaces and three bunkers, some of them checked several times in the designed period, *M. schreibersii* was present in numbers of up to 3,000 individuals. In most of these roosts but one cave and one bunker, the aggregations were mixed with other bat species, namely *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, and *M. emarginatus*. Vertical distribution of the maternity roosts including those of the potential maternity aggregations was in the range of 4–1,135 m a. s. l. (n=11), with the altitude median of 360.0 m.

The timing of reproduction of *M. schreibersii* in Albania was documented from three sites only (Sachanowicz & Ciechanowski 2018, own data); six lactating females were netted on 29 June and juveniles of the year on 22 and 26 August, while pregnant females were not examined/reported.

Several aggregations of *M. schreibersii* were observed also outside the reproduction season, namely in April, September and October. Their size was generally smaller than at the time of existence of maternity colonies, mostly several tens or hundreds of bats, two exceptions are the colonies of some 2,000 individuals observed in the Velça cave in April and in a cave on the Mali

Fig. 111. Partly ruined Rozafa castle in the southern part of Shkodër (Shkodër Pref.); vaulted rooms of the castle serve as summer roosts of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, *Pipistrellus kuhlii*, and *Miniopterus schreibersii*. Photo by Z. Bendová (July 2016).



Figs. 112, 113. Entrance and interior of a large bunker at Goranxi (Gjirokastër Pref.); the bunker serves as a summer roost of *Rhinolophus ferrumequinum*, *R. hipposideros*, and *Miniopterus schreibersii*, while individuals of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis blythii*, *M. nattereri*, *Pipistrellus pipistrellus*, *P. kuhlii*, and *Plecotus kolombatovici* were netted at the bunker entrance. Photo by P. Tájek (May 2016).

Grad island (Greater Prespa lake) in September, respectively (Uhrin et al. 1996, Papadatou et al. 2011). Outside the reproduction period, the colonies of *M. schreibersii* were found to be mixed with *Rhinolophus blasii*, *R. euryale*, *R. mehelyi*, *Myotis myotis*, and *M. blythii*.

At the entrances to twelve underground spaces (seven artificial vs. five natural ones), individuals of *M. schreibersii* were netted in the period between April and September (incl.); in seven of these spaces large groups of this bat were found to roost. Altogether 193 individuals were caught at these sites, the sex ratio was almost equally balanced (95 ♂♂ : 98 ♀♀) in the total catch.

Foraging individuals of *M. schreibersii* were documented at 28 sites; however, only at four sites the bats were netted, one individual at each (one adult male, three adult females; Sachanowicz & Ciechanowski 2018), and at one site a roadkill was collected (Théou 2016a). Rather surprisingly, foraging *M. schreibersii* bats were recorded most frequently in anthropogenic habitats (42.8% of all foraging records), in villages and towns, less frequently also in agricultural habitats. The second most frequent habitat type (35.7%) are water bodies, often a stream in a valley, but also small lakes or pools. The least used habitat, considering the available data, are forests without streams, where this bat was encountered three times. The foraging habitats of *M. schreibersii* were distributed across a large altitude range of 9–1,430 m a. s. l.; however, the value of the altitude median (189.0 m) indicates preferred usage of lowland areas for foraging in Albania.

Records of ectoparasites. **Original data**: N y c t e r i b i i d a e: *Nycteribia schmidlii*: 4 ma, 4 fa (CMŠ [A]) from 1 ma (NMP 96523), Tren, Treni cave (Korçë Pref.), 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.

Fig. 114. Entrance to a ruined water tank at the top of the citadel of Berat (Berat Pref.); the tank serves as a summer roost of (sometimes mixed) colonies of *Myotis myotis*, *M. blythii*, and *Miniopterus schreibersii*, while *Hypsugo savii*, *Pipistrellus pipistrellus*, and *P. kuhlii* were documented to forage in the central part of the castle, surrounding the citadel, and *Rhinolophus hipposideros* was found to hibernate in an underground room of the castle. Photo by M. Uhrin (July 2016).

Fig. 115. Solitary limestone outcrop at Petran, containing a bunker composed of several long rock-cut corridors (Gjirokastër Pref.); a hibernaculum of *Rhinolophus hipposideros*, and a summer roost used by individuals of *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, and *Miniopterus schreibersii*. Photo by P. Tájek (May 2016).

– S p i n t u r n i c i d a e: *Spinturnix psi*: 1 ma, 1 protonymph (CMŠ [P]) from 1 ma (NMP 96523), Tren, Treni cave (Korçë Pref.), 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – M a c r o n y s s i d a e: *Ichoronyssus scutatus*: 2 fa (CMŠ [P]) from 2 fa, Butrint (Vlorë Pref.), 24 April 2004, leg. M. Ciechanowski, A. Rachwald & K. Sachanowicz. – *Macronyssus granulosus*: 4 protonymphs (CMŠ [P]) from 1 ma (NMP 96523), Tren, Treni cave (Korçë Pref.), 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – *Steatonyssus periblepharus*: 1 protonymph (CMŠ [P]) from 1 ma (NMP 96523), Tren, Treni cave (Korçë Pref.), 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß. – **Published data**: I s c h n o p s y l l i d a e: *Rhinolophopsylla unipectinata*: 1 ind., Zitadelle von Gjirokäster, 26 September 2012 (Scheffler et al. 2013). – S t r e b l i d a e: *Brachytarsina flavipennis*: 1 fa, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 2 ma from 2 inds. (Szentiványi et al. 2018). – *Nycteribia schmidlii*: 6 ma, 13 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]); 6 ma, 1 fa, Shpella e Fush-Krujës bei Kruja, 16 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]); 8 ma, 4 fa Shpella e Vanistës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *N. schmidli*]); 3 inds., Shpella Pëllumbasit, 22 September 2019 (Scheffler et al. 2013 [as *N. schmidtlii*]); 5 ma, 9 fa from 9 inds. (Szentiványi et al. 2018). – *Phthiridium biarticulatum*: 1 ma, 2 fa, Shpella e Mezgoranit östl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]); 1 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a [as *Nycteribia biarticulata*]). – *Penicillidia conspicua*: 1 ma, 1 fa, Shpella e Mezhgoranit südl. Tepelena, 11 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 1 ma, 1 fa, Shpella e Vanishtës südl. Gjirokastra, 12 October 1960, leg. V. Hanák (Hůrka 1962, 1963a); 52 inds., Shpella Pëllumbas, Treni's Cave, Cave on the shore of Lake Prespa at Golomboc & Cave near Vanister, 22–27 September 2012 (Scheffler et al. 2013); 8 ma, 7 fa from 13 inds. (Szentiványi et al. 2018). – *Penicillidia dufourii*: 2 inds., Shpella Pëllumbas, Treni's Cave or Citadel of Gjirokäster, 24, 25 & 27 September 2012 (Scheffler et al. 2013); 1 fa from 1 ind. (Szentiványi et al. 2018). – S p i n t u r n i c i d a e: *Spinturnix psi*: 49 inds., Shpella Pëllumbas, Treni's Cave, Cave on the shore of Lake Prespa at Golomboc & Cave near Vanister, 22–27 September 2012 (Scheffler et al. 2013); 4 ma, 5 fa, 1 nymph, Vanister, 22 April 2004 (Sachanowicz et al. 2014); 1 ma, 2 fa, 1 nymph, Vanister, 16 September 2012 (Sachanowicz et al. 2014); 1 fa, Butrint, 24 April 2004 (Sachanowicz et al. 2014). – M a c r o n y s s i d a e: *Ichronyssus scutatus*: 1 ind., Treni's cave or Citadel of Gjirokastër, 24 or 26 September 2012 (Scheffler et al. 2013 [as *Ichronychus scutatus*]).

Comments on ectoparasites. In total, 11 arthropod parasite species were collected from *Miniopterus schreibersii* in Albania, it is the third largest diversity of parasites documented from any bat species in the country. Two of these parasite species are here reported from Albania for the first time.

The bat flea *Rhinolophopsylla unipectinata* (Taschenberg, 1880) belongs to the parasites of cave-dwelling bats, its principal hosts are the horseshoe bats (*Rhinolophus*). From Albania, it was collected also from *Rhinolophus ferrumequinum* and *Myotis emarginatus* (Hůrka 1963c, Scheffler et al. 2013, own data; see above). Although *M. schreibersii* ranks among typical cave-dwelling bats, *R. unipectinata* is rather exceptionally found in this species. Besides Albania, the records from this host are available only from Spain, Italy, and Slovakia (Hopkins & Rothschild 1956, Aellen 1960, Rosický 1948, 1952).

The bat fly *Brachytarsina flavipennis* Macquart, 1851 is a parasite of cave-dwelling bats, the medium-sized *Rhinolophus* bats are its principal host group (Lanza 1999). From Albania, it was documented solely from this ecological group of bats (also from *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, and *M. capaccinii*; Hůrka 1962, 1963a; see above). The distribution range of this bat fly covers just the thermo-Mediterranean zone of the western Palaearctic, the records from Albania represent a part of its range limits in Europe (Hůrka 1962, 1984, Ivanova et al. 1995).

Five species of the nycteribiid bat flies were collected from *M. schreibersii* in Albania, *Nycteribia pedicularia* Latreille, 1805, *N. schmidlii* Schiner, 1853, *Phthiridium biarticulatum* Hermann, 1804, *Penicillidia conspicua* Speiser, 1901, and *P. dufourii* (Westwood, 1834). Although each of them is an exclusive parasite of a certain taxon of cave-dwelling bats, they were found in three to ten bat species, including the non-cave dwellers (Hůrka 1962, 1964, Lanza 1999). *N. schmidlii* and *P. conspicua* are bat flies parasitising principally the *Miniopterus* bats, their distribution ranges conform to the distribution of this bat genus in the western Palaearctic (Hůrka 1964). However, in Albania, *N. schmidlii* was collected also from *Rhinolophus ferrumequinum*, *R. euryale*, *Myotis myotis*, *M. blythii*, and *Tadarida teniotis* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above and below), and *P. conspicua* from *Rhinolophus ferrumequinum* and *Myotis myotis* (Hůrka 1962, 1963a; see above). The principal host of *N. pedicularia* is *Myotis capaccinii*, while *M. schreibersii* is a secondary host, similarly as a series of eight other species from which this bat fly was collected in Albania (*Rhinolophus ferrumequinum*, *R. hipposideros*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. davidii*, *Eptesicus serotinus*, and *Tadarida teniotis*; Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above and below). Likewise, *P. biarticulatum* is a typical parasite of the horseshoe bats (*Rhinolophus*) and *P. dufourii* of bats of the *Myotis myotis* complex (for details see under these host species). From Albania, *P. biarticulatum* is documented to parasitise also *Rhinolophus ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, and *M. blythii*. *P. dufourii* was collected also from *Rhinolophus ferrumequinum*, *Myotis myotis*, *M. blythii*, *M. daubentonii*, and *M. capaccinii* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above).

The bat mite *Spinturnix psi* (Kolenati, 1856) is an exclusive permanent parasite of the *Miniopterus* bats (Uchikawa et al. 1994), its distribution conforms to the range of the family Miniopteridae in the Palaearctic, Oriental and Australasian realms (Rudnick 1960, Dusbábek 1962, Uchikawa et al. 1994). From Albania, it was documented also from *Myotis capaccinii* and *Eptesicus serotinus* (Scheffler et al. 2013, Sachanowicz et al. 2014, own data; see above).

Three macronyssid mite species were documented from *M. schreibersii* in Albania; *Ichoronyssus scutatus* (Kolenati, 1856), *Macronyssus granulosus* (Kolenati, 1856), and *Steatonyssus periblepharus* Kolenati, 1858, the latter two for the first time in the country. Although *I. scutatus* parasitises primarily the bats of the genus *Myotis*, it was found also in the genera *Vespertilio* and *Rhinolophus*. In Albania it was documented additionally from *Myotis myotis*, *M. blythii*, *M. emarginatus*, and *M. capaccinii* (Scheffler et al. 2013, own data; see above). The distribution range of *M. granulosus* covers a large part of the Old World (Radovsky 1967). In Albania it was collected also from *Myotis blythii*, *M. emarginatus*, and *M. capaccinii* (own data; see above). Despite the

fact that *S. periblepharus* is a parasite of dendrophilous bats, particularly of the genus *Pipistrellus* (Radovsky 1967, Dusbábek 1973, Lanza 1999), it was recorded from seven bat species in Albania. The cave-dwelling *M. schreibersii* is a bat ecologically most distant from the primary host group of this mite, which was collected in the country also from *Myotis blythii*, *M. davidii*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. kuhlii*, and *Nyctalus leisleri* (own data; see above).

Tadarida teniotis (Rafinesque, 1814)

Records. **Original data**: B e r a t: Koritë, above a watering place in a mountain pass [1], 21 September 2018: det. calls of 1–2 foraging inds.; – Zogas, at a small pond [2], 23 September 2018: det. & rec. calls of 1 foraging ind. – D i b ë r: Urakë, above the Tarini river [3] (Fig. 116), 2 July 2018: net. 1 ma. – E l b a s a n: Dushk, Rimoni lake [4], at the lake bank, 1 October 2018: det. calls of 1–2 foraging inds. – G j i r o k a s t ë r: Bënjë-Novoselë, Lengarica river canyon [5] (Fig. 107), at an entrance to a bunker, 29 June 2019: net. 1 ma (leg. R. Lučan). – K o r ç ë: Roshanj, Dëshnica river valley [6] (Fig. 57), above the river, 27 June 2016: det. calls of 1–2 foraging inds. – S h k o d ë r: Selcë, Cemi river valley [7] (Fig. 117), above the river, 9 July 2016: net. 2 ma; – Shirokë, at the southern shore of the Shkodra lake near cemetery [8], 23 June 2019: det. calls of 1 forging ind. (leg. R. Lučan). – V l o r ë: Dukat, Dukati river valley [9] (Fig. 54), above the river, 2 July 2016: net. 2 faG, 2 fs; – Orikum, sea shore [10], 26 June 2019: obs. & det. calls of 1 foraging ind. (leg. R. Lučan); – Pilur, at a watering place [11] (Fig. 94), 27 September 2018: det. & rec. calls of 1–2 foraging inds. – **Published data**: D u r r ë s: Kepi i Rodonit, coastal slopes with maquis [12], sandstone cliffs, 14 September 2012: det. calls (Sachanowicz & Ciechanowski 2018). – E l b a s a n: Elbasan, fissure in a house wall [13], coll. 1 m, heard a small group of 2–3 inds. (Lamani 1970); – Muçan, stream [14], farmland landscape, 2 October 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Pishkash, limestone rocky gorge [15], 28 September 2005: det. calls (Sachanowicz & Ciechanowski 2018). – F i e r: Apolonia, at monastery [16], 4 October 1992: det. calls of 2 inds. (Uhrin et al. 1996); – Damës, Povlës river [17], rocky gorge, 18 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Lushnjë, city center [18], near tall buildings, 8 May 2010: det. calls (Sachanowicz & Ciechanowski 2018). – G j i r o k a s t ë r: Goranxi, rocky gorge [19], 21 April 2004: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Libohove, rocky slopes of a valley [20], 6 October 1992: det. calls of 1 ind. (Uhrin et al. 1996); – Mezhgoran, limestone cliffs near the cave entrance [21], 22 August 2006: det. calls (Sachanowicz & Ciechanowski 2018); – Vanister cave [22], rocky gorge near the cave entrance, 22 April 2004: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018). – K o r ç ë: Drenovë, coppice at ruined mine buildings [23], 5 May 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Gollomboç, village surrounded by rocky hills on

Fig. 116. Tarini river valley at Urakë (Dibër Pref.); foraging grounds of *Myotis blythii*, *M. capaccinii*, *Hypsugo savii*, *Pipistrellus kuhlii*, and *Tadarida teniotis*. Photo by Z. Bendová (July 2018).

the shore of Macro Prespa lake [24], 1 October 2005: det. calls (Sachanowicz & Ciechanowski 2018); – National Park of Prespa Lakes, at a cave [near Kallamas] [25], November 2013: obs. 7 inds., August 2014: obs. 3 inds. (Theou et al. 2015a); – Treni cave [26], October 2010: det. calls (Papadatou et al. 2011); – Tresovë, Devoll river valley with old willows and pastures [27], rocky slopes, 6 July 2011: det. calls (Sachanowicz & Ciechanowski 2018). – K u k ë s: Dragobi, limestone canyon of Valbonë river [28], 6 August 2007: det. calls (Sachanowicz & Ciechanowski 2018); – Lume, rocky gorge of the Lumës river [29], 2 August 2007: det. calls (Sachanowicz & Ciechanowski 2018). – S h k o d ë r: Drisht, rocky gorge of the Kirit river [30], 14 August 2003: det. calls (Sachanowicz & Ciechanowski 2018); – Gjoqi, shore of Vau i Dejës reservoir [31], 25 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Grykë, small water pool for livestock [32], limestone valley, 16 August 2003: det. calls (Sachanowicz & Ciechanowski 2018); – Kamicë-Flakë, Shkodër lake shore with riparian vegetation [33], 24 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Koman, rocky gorge of the Drini i Bardhë river [34], 12 August 2003: det. calls (Sachanowicz & Ciechanowski 2018); – Liqeni i Thores, small alpine lake, rocky limestone slopes [35], 7 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Qafa e Malit, mountain mixed forest [36], 18 September 2005: det. calls (Sachanowicz & Ciechanowski 2018); – Rahovic, Cemit river [37], rocky gorge, 22 June 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Rrapsh, village and limestone slopes [38], 1 May 2004: det. calls of 1 ind. (Sachanowicz & Ciechanowski 2018); – Shkodër, Bunë river surrounded by urban buildings and limestone hills [39], 6 September 2012: det. calls (Sachanowicz & Ciechanowski 2018); – Vau i Dejës, rocky gorge of the Drinit river [40], 13 August 2003: det. calls, 22 April 2010: det. calls & obs. several inds. emerging from crevices in limestone wall (Sachanowicz & Ciechanowski 2018). – T i r a n ë: Shëngjergj, limestone cliffs at entrances of tunnels [41], 1 July 2011: det. calls (Sachanowicz & Ciechanowski 2018); – Tiranë, diga i liqenit [42], September 2013: det. calls (Çera 2014). – V l o r ë: Borsh, river in rocky limestone gorge [43], 1 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Butrint, rocky limestone slope with military tunnels [44], 24 April 2004: det. calls, 5 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Jermë, olive grove [45], 27 April 2004: det. calls, 3 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Kulluricë, farmland with olive groves and sparse settlements [46], 26 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Llogara National Park, meadow in the middle of the forest [47], open space, 25 July 2016: det. calls of 1 ind. (Théou & Loce 2017); Llogara National Park, old mixed forest on mountain slopes, 29 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Mursi, over a lake and village [48], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Palasë, olive plantation on rocky slopes [49], 28 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – île de Sazani [50], May 2013: det. calls (Theou & Bego 2013); Sazan Island, school, open space, 28 May 2013: det. calls of 1 ind., 29 May 2013: det. calls of 1 ind. (Théou & Loce 2017); – Sazan Island, port [51], 9 August 2016: det. calls of 1 ind. (Théou & Loce 2017); – Shalës, limestone river gorge [52], 2 May 2010: det. calls (Sachanowicz & Ciechanowski 2018); – Svërnec Island [53], open space, 27 July 2016: det. calls of 1 ind. (Théou & Loce 2017); – Syri i Kalter, forested valley of the Bistricës river [54], 23 April 2004: det. calls (Sachanowicz & Ciechanowski 2018); – Tragjas i vjetër, ruins of the village [55], 28 April 2010: det. calls (Sachanowicz & Ciechanowski 2018).

Distribution. *Tadarida teniotis* belongs among rather common bats in Albania with 55 localities known from the country (Fig. 109, Table 1). The records are spread across the whole country, in its coastal, lowland and mountainous parts, and come from a very wide altitude range of 1–1,642 m a. s. l. (median 228.0 m; Table 2). Most of the records were obtained in the range of 50–750 m a. s. l. indicating the preference for low and medium altitudes (Fig. 8); considering the altitude statistics (Table 2), this bat is the third most lowland affiliated species among the Albanian bats, after *Pipistrellus kuhlii* and *Miniopterus schreibersii* (Fig. 8). Besides the discovery of *T. teniotis* in Albania in the 1960s (Lamani 1970), all other records of this bat were made in the last seventeen years.

The Albanian distribution of *T. teniotis* covers a part of the continuous Balkan range (cf. Dietz et al. 2016), between the Mediterranean zone of the western Balkans in Croatia (Tvrtković 2017) and Montenegro (Presetnik et al. 2014, Mostert 2016, Mulaomerović & Pašić 2019) in the west, and the whole southern part of the Balkan Peninsula, covering Greece (Hanák et al. 2001, Benda et al. 2009, Gremillet et al. 2010, Petrov & von Helversen 2011, Papadatou et al. 2015, Benda & Uhrin 2017), North Macedonia (Kryštufek et al. 1992, 1998, Buys 2006, Micevski et al. 2014) and southern Bulgaria (Benda et al. 2003b) in the south and east. Only few records of *T. teniotis* are available from the inland areas north of this range, in Bosnia and Herzegovina, Kosovo, and Serbia (Ciechanowski et al. 2005, Milanolo et al. 2017, Pejić et al. 2017, Presetnik et al. 2018), where the northern limits of the occurrence of this bat in south-eastern Europe are situated.

Field notes. The Albanian findings of *Tadarida teniotis* are available from the period between mid-April and early October, an additional unspecified record comes from November; besides the latter finding, no records are known from the winter period. Surprisingly high numbers of records were made in two rather short periods of spring and early summer – 19 records (33.9%) come from three weeks between 18 April and 8 May (incl.) and twelve records (21.4%) from two weeks between 22 June and 9 July (incl.). Twenty findings (35.7%) were made in the period of more than two months of the late summer and early autumn, between the 25 July and 6 October (incl.).

The absolutely prevailing number of records of *T. teniotis* in Albania (93.1%) represent the evidences of foraging bats; only six records from four sites are findings of bats in or at their roosts. Lamani (1970: 143) reported a finding of a male in Elbasan (at ca. 130 m a. s. l.), he described it as follows: "A single specimen was captured in Elbasan, from a fissure of a house near the castle, 2–2.5 m above the ground. Probably two or three other individuals were present in the fissure, since during the catch of our specimen the others responded by alarm calls." (translated from Albanian). Theoretically, this record could represent a maternity colony, but the author did not give any information concerning the date of the collection, the age of the collected male or the sex and age of the other observed bats. Sachanowicz & Ciechanowski (2018) observed several individuals emerging from crevices in a limestone wall of a broad rocky valley of the lower Drini

Fig. 117. Cemi river valley near Selcë, Albanian Alps (Shkodër Pref.); foraging habitat of several bat species, individuals of *Myotis capaccinii*, *Hypsugo savii*, and *Tadarida teniotis* were netted above the river, the echolocation calls of *Eptesicus serotinus*, and *Pipistrellus kuhlii* were detected in the valley. Photo by Z. Bendová (July 2016).

Fig. 118. Maquis shrubland around entrances to bunkers at the tip of the peninsula of Kepi i Rodonit (Durrës Pref.); foraging area of *Hypsugo savii*, *Pipistrellus kuhlii*, and *Tadarida teniotis*, the bunkers serve as summer roosts of *Rhinolophus ferrumequinum*. Photo by Z. Bendová (July 2018).

river at Vau i Dejës (at 91 m a. s. l.) at dusk on 22 April. Finally, Theou et al. (2015a) reported on two observations of several individuals of *T. teniotis* near Kallamas on the bank of the Prespë e Madhe (Greater Prespa) lake (at ca. 870 m a. s. l.), seven bats in November 2013 and three bats in August 2014. However, no additional data about this roost or the activity of the bats are available, just the following: "direct observation of this species have been realised in the entrance of a cave". This information is partly complemented by a photograph by Théou & Bego (2018: 117), showing a group of five bats in a narrow cavity in a rock, described as follows: "a colony of several specimens was recorded and observed in a cliff of the Prespa Lakes National Park."

The foraging individuals of *T. teniotis* were documented at 52 sites, only at three of them the bats were netted – in all cases above a river in a broad valley (Tarini river, 145 m a. s. l.; Dukati river, 283 m a. s. l.; Cemi river, 425 m a. s. l.). The echolocation calls of flying bats were detected mostly in valleys with a running stream (28.8%) and above sea shore, lakes and small pools, including the temporary ones (21.2%); a large number of these records were made also in open landscapes of farmlands and various dry rocky habitats (28.8%); a certain number of records come from urban habitats (19.2%) and only exceptionally the calls of *T. teniotis* were detected in forests (3.8%).

The reproduction of *T. teniotis* was observed once in Albania, two pregnant females were netted above the Dukati river on 2 July (Fig. 54); each contained a relatively well developed foetus of the crown-rump length of 26.2 mm and 28.0 mm, respectively.

Records of ectoparasites. **Original data**: I s c h n o p s y l l i d a e: *Araeopsylla gestroi*: 1 ma, 3 fa (CMŠ [A, P]) from 2 fa, 2 fs (NMP 96578–96581), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 1 fa (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – N y c t e r i b i i d a e: *Nycteribia pedicularia*: 1 fa (CMŠ [A]) from 2 ma (NMP 96597, 96598), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – *Nycteribia schmidlii*: 1 ma (CMŠ [A]) from 1 ma (NMP 96598), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda. – *Nycteribia vexata*: 1 fa

(CMŠ [A]) from 1 fs (NMP 96581), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin. – A r g a s i d a e: *Argas vespertilionis*: 1 larva (engorged) (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – T r o m b i c u l i d a e: *Oudemansidium musca*: 2 larvae (CMŠ [P]) from 2 fa, 2 fs (NMP 96578–96581), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 1 larva (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda, det. S. Kalúz. – *Willmannium cavus moldaviensis*: 8 larvae (CMŠ [P]) from 2 fa, 2 fs (NMP 96578–96581), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 5 larvae (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda, det. S. Kalúz. – *Willmannium* cf. *cavus*: 1 larva (damaged) (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda, det. S. Kalúz. – M a c r o n y s s i d a e: *Parasteatonyssus hoogstraali*: 1 fa, 15 protonymphs (CMŠ [P]) from 2 fa, 2 fs (NMP 96578–96581), Dukat (Vlorë Pref.), 2 July 2016, leg. P. Benda & M. Uhrin; 1 fa, 22 protonymphs (CMŠ [P]) from 2 ma (NMP 96597, 96598), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda; 14 protonymphs (CMŠ [P]) from 1 fa (NMP 96608), Urakë (Dibër Pref.), 2 July 2018, leg. P. Benda. – S a r c o p t i f o r m e s: Sarcoptiformes sp.: 5 inds. (CMŠ [A]) from 1 ma (NMP 96598), Selcë (Shkodër Pref.), 9 July 2016, leg. P. Benda.

Comments on ectoparasites. In total, nine arthropod parasite taxa were collected from *Tadarida teniotis* in Albania. All these parasites, belonging to six families, were documented from this host bat for the first time in the country. Four of these arthropods were found to parasitise *T. teniotis* for the first time and these data enlarge the known range of ectoparasites of this bat (cf. Lanza 1999).

The bat flea *Araeopsylla gestroi* (Rothschild, 1906) is here reported from Albania for the first time; *T. teniotis* represents a primary host of this species. This flea has an extensive range of distribution conforming to the range of its host, despite that only few records are available, namely from Iberia, Algeria, Balearic Islands, Italy, Libya, Egypt, Lebanon, Azerbaijan, Kazakhstan, and Kirghizstan (Hopkins & Rothschild 1956, Taskaeva 1960, Hoogstraal & Traub 1963, Lewis 1964, Medvedev 1992, Mei 1996, Quetglas et al. 2014, Benda et al. 2014, Bendjjedou et al. 2017).

Three species of bat flies were found to parasitise *T. teniotis* in Albania, *Nycteribia pedicularia* Latreille, 1805, *N. schmidlii* Schiner, 1853, and *N. vexata* Westwood, 1835. Principal hosts of these bat flies are the obligatory cave-dwelling bats and their records from *T. teniotis* should be considered as unusual, being transferred to this bat species just accidentally. The main host of *N. pedicularia* is *Myotis capaccinii*, other frequent hosts are bats of the *Myotis myotis* complex (*M. myotis* and *M. blythii*) and the genus *Rhinolophus* (Hůrka 1964). However, in Albania it was collected from ten bat species, majority of them being typical cave-dwelling species, and besides them also from *Myotis davidii* and *Eptesicus serotinus* (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above). From *T. teniotis* it was documented previously only in Palestine (Theodor & Moscona 1954). Although the principal host of *N. schmidlii* is *Miniopterus schreibersii*, in Albania it was collected from six bat species, but besides *T. teniotis* only from the obligatory cave-dwelling bats (Hůrka 1962, 1963a, Scheffler et al. 2013, own data; see above). The collection of *N. schmidlii* from *T. teniotis* was reported previously from Italy (Theodor 1967). The principal hosts of *N. vexata* are bats of the *Myotis myotis* complex. In Albania it was collected from seven bat species, besides the cave-dwelling bats also from *Eptesicus serotinus* and *Pipistrellus kuhlii* (Hůrka 1962, 1963a, Scheffler et al. 2013, Szentiványi et al. 2018, own data; see above). The occurrence of *N. vexata* in *T. teniotis* is here documented for the first time.

The bat soft tick *Argas vespertilionis* (Latreille, 1796) is here reported for the first time from Albania, where it was collected from three bat species, besides *T. teniotis* also from *Pipistrellus pipistrellus* and *P. kuhlii* (own data; see above). From *T. teniotis* it was collected previously only in Egypt (Hoogstraal 1952, 1958).

The findings of two species of the chigger mites from *T. teniotis*, *Oudemansidium musca* (Oudemans, 1906) and *Willmannium cavus moldaviensis* Kudrâšova, 1992, represent an enlargement of the number of ectoparasites of this bat host from which they were not known previously (Kudrâšova 1998). Both species are here reported from Albania for the first time; *O. musca* was

collected from four bat species, additionally also from *Vespertilio murinus*, *Eptesicus serotinus*, and *Hypsugo savii*, while *W. cavus moldaviensis* from five bats, *V. murinus*, *H. savii*, *Pipistrellus pipistrellus*, and *P. pygmaeus* (own data; see above). The chigger mites (Trombiculidae) were reported to be collected from *T. teniotis* only exceptionally. Rybin et al. (1989) mentioned a record of Trombiculidae gg. spp. from southern Kirghizstan and this material was later described as *Willmannium parvulus* Kudrâšova, 1992 (Kudrâšova 1992). Another similar record, though without a precise identification, was published from Libya* (Benda et al. 2014).

The macronyssid mite *Parasteatonyssus hoogstraali* (Keegan, 1956) is a strict parasite of *T. teniotis* (Radovsky 1967). From Albania it is here reported for the first time, however, it was collected from all examined individuals of this bat in the country. The distribution range of this mite conforms with the range of its host, the records are available from the Canary Islands, Libya, Egypt, Jordan, and Kirghizstan (Keegan 1956, Lange 1959, Rybin et al. 1989, Estrada-Peña & Sánchez 1988, Benda et al. 2010, 2014).

An additional parasite record is indicated by an examination of the museum specimen of *T. teniotis* collected at Selcë (see above), in which several skin cysts typical for the sarcoptiform mites of the families Notoedridae and/or Teinocoptidae were found (cf. Lavoipierre & Rajamanickam 1968). However, the identification remains only tentative as the histological investigation has not been made. Anyway, a trace of a sarcoptiform mite is here reported from *T. teniotis* for the first time (Lanza 1999).

Several other ectoparasites are known to feed on *T. teniotis* and could be also found in Albania when a more detailed research is made (the available number of parasites comes just from seven bats originating in three sites of the country). Besides the above mentioned three species of bat flies, Lanza (1999) reported a finding of another species, *Phthiridium biarticulatum* Hermann, 1804 from *T. teniotis*. The bat bug *Cimex pipistrelli* Jenyns, 1839 (Cimicidae) was collected from this bat in Kirghizstan (Rybin et al. 1989) and its occurrence in the Mediterranean Basin is known from other bat species (Balvín et al. 2012, Bendjeddou et al. 2017). The mite *Ewingana baekelandae* Estrada-Peña et de la Cruz, 1992 (Myobiidae) was collected from *T. teniotis* in Spain (Estrada-Peña & de la Cruz 1992); however, records beyond the type locality of this mite are not available yet.

DISCUSSION AND CONCLUSIONS

Bat fauna: status

The present review summarises at least 1,241 records of 32 bat species from the territory of Albania (Table 1). Occurrence of another species, *Eptesicus nilssonii*, is very likely in the country, two echolocation call recordings assignable to this species are available from the Albanian Alps. Nevertheless, the occurrence of *E. nilssonii* in Albania still requires confirmation. In comparison with the latest review of Albanian bats by Sachanowicz & Ciechanowski (2018), the number of species in the country has not increased. Nevertheless, the number of bat records (locality per

* Benda et al. (2014: 124–125) mentioned two larvae of Trombiculidae gen. sp. collected from *Tadarida teniotis* in Cyrenaica, Libya. The record is complemented with the following note: "Two larvae of trombiculid mites were collected from *T. teniotis* and this record represents the first evidence of this family from bats in Libya. However, for the time being the generic and specific affiliations of these specimens remain open and will be a subject of next studies." Meanwhile, the respective specimens have been examined in detail and identified as *Willmannium cavus* Kudrâšova, 1992. This finding represents the first record of this species in Africa and the family Trombiculidae in Libya (Stekolnikov 2018). However, two subspecies are known in this mite species, *W. c. cavus* described from Kirghizstan and *W. c. moldaviensis* Kudrâšova, 1992 described from Moldavia, both occurring in Albania (see above). For the time being, the detailed taxonomic affiliation of the Libyan specimens is uncertain, it could pertain to one of the two above-mentioned subspecies or to a yet undescribed form.

species) and the average number of records per species have increased more than 1.5 times in comparison with the above-mentioned review (Table 1). Considering the area of the country and the number of bat records, the bat fauna of Albania is relatively well known, compared to other countries of the western Balkans and south-eastern Europe as well (see e.g. Hanák et al. 2001, Benda et al. 2003b, 2009, Presetnik et al. 2014, 2018, Paunović 2016, Tvrtković 2017, Benda & Uhrin 2017).

On the other hand, only a third of the species can be considered as very common or just common in Albania (*Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. blythii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus leisleri*, *Miniopterus schreibersii*, *Tadarida teniotis*), they are known from more than fifty records each and the sum of their records represents more than two thirds (71.1%) of the total number of the bat records from the country (Table 1).

Only in three bat species, *Myotis daubentonii*, *M. capaccinii*, and *Plecotus kolombatovici*, the number of records increased significantly (more than twice) in comparison with the previous review (Sachanowicz & Ciechanowski 2018). In nine species (*Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. bechsteinii*, *M. nattereri*, *M. emarginatus*, *M. brandtii*, *Pipistrellus pipistrellus*, *P. kuhlii*) this number increased more than 1.5 times (Table 1). Nine species (27.3% of the whole bat fauna) are known from Albania from less than ten records, and six species (18.2%) can be considered as very rare, they are known only from three records or even less. *Myotis alcathoe* represents the rarest bat of Albania, known from only one record and one individual from the country.

In 21–22 bat species of Albania, i.e. about two thirds of the fauna, their reproduction was documented from the territory of the country. However, only in nine of them (mostly cave-dwelling bats, *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *R. mehelyi*, *Myotis blythii*, *M. emarginatus*, *M. davidii*, *M. capaccinii*, *Miniopterus schreibersii*) it was evidenced by a direct observation of a maternity colony in its roost; in the remaining species, pregnant and/or lactating females or juveniles of the year were documented outside their reproduction shelters. On the other hand, according to the available evidence, reproduction in Albania (i.e. the stages other than mating) is not expected at least in five migratory bat species, *Vespertilio murinus*, *Pipistrellus nathusii*, *Nyctalus noctula*, *N. lasiopterus*, and *N. leisleri*, although it cannot be excluded completely.

Hibernation was documented only in nine bat species of Albania (*Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *R. blasii*, *Myotis myotis*, *M. capaccinii*, *Eptesicus serotinus*, *Hypsugo savii*, *Miniopterus schreibersii*), larger hibernation aggregations in six of them. However, hibernation in Albania is expected in all species of bats except *Tadarida teniotis* (cf. Arlettaz et al. 2000b). Considering the enormous numbers of natural and artificial roost opportunities suitable for bat hibernation and accessible to research, these data show the hibernation period to be extremely understudied in the country, compared to other seasons of a year.

The composition of the bat fauna of Albania corresponds with the geographical position of the country. With the exception of *Eptesicus nilssonii*, whose occurrence in Albania is uncertain, the remaining Albanian fauna is identical with the bat fauna of mainland Greece (Hanák et al. 2001, Kiefer et al. 2002, Gremillet et al. 2010). With other exceptions of several rare species (*Rhinolophus mehelyi*, *Myotis bechsteinii*, *M. brandtii*, *Nyctalus lasiopterus*, *Plecotus kolombatovici*), the composition of the bat fauna of Albania corresponds with slightly poorer faunas of Montenegro, Serbia, and North Macedonia (Kryštufek & Petkovski 2003, Bekker & Boshamer 2007, Presetnik et al. 2014, Budinski et al. 2016, Paunović 2016, Budinski 2017, Pejić et al. 2017, Micevski et al. 2018, Stojanov et al. 2019). In other words, in the faunal conditions of the central latitudes of the Balkan Peninsula, when the occurrence of *Eptesicus nilssonii* is confirmed without doubts, the bat fauna documented from Albania is complete.

There is only one rather improbable possibility of enrichment of the bat fauna of Albania, by *Myotis dasycneme* (Boie, 1825), a bat species rarely recorded in the northern parts of the Balkans. This bat lives in a belt of lowlands stretching from northern France and southern Scandinavia to northern Kazakhstan and central Siberia (Horáček & Hanák 1989), it reaches the southern limits of its European distribution range in the south of the Pannonian lowland (Tvrtković et al. 2001, Görföl et al. 2018). Two of its southernmost record sites are available from north-eastern Bosnia and central Serbia, both situated slightly north of 44° N (Paunović 2016, Pašić & Mulaomerović 2016, Presetnik et al. 2017). Nevertheless, these Balkan localities lie still far behind the regular range of *M. dasycneme*, but in fact about 200 km north of the Albanian territory. Thus, although it cannot be excluded that this bat is once recorded in Albania, such a possibility is rather unlikely. Anyway, no other chance to enrich the bat fauna of Albania remains among the European bats.

Bat fauna: zoogeography

It may seem rather pointless to assess zoogeographical relations of the fauna of such a small country as Albania. Nevertheless, its crucial position within the Balkan peninsula and an extremely heterogeneous physiography of its territory influences also the dispersal of bats.

Based on the overall geographical range, type of occurrence in Albania, and habitat affinity, Sachanowicz & Ciechanowski (2018) sorted the particular species of the bat fauna of Albania into three basic groups; (1) Central European and Pannonian bats (10 species), *Myotis nattereri*, *M. brandtii*, *M. daubentonii*, *Vespertilio murinus*, *Pipistrellus pygmaeus*, *P. nathusii*, *Nyctalus noctula*, *N. leisleri*, *Barbastella barbastellus*, and *Plecotus auritus*; (2) Balkan and Pannonian bats (14 species), *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale*, *Myotis myotis*, *M. blythii*, *M. emarginatus*, *M. bechsteinii*, *M. alcathoe*, *Hysugo savii*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Nyctalus lasiopterus*, *Plecotus austriacus*, and *Miniopterus schreibersii*; (3) Balkan bats (7 species), *Rhinolophus mehelyi*, *R. blasii*, *Myotis davidii*, *M. capaccinii*, *Plecotus macrobullaris*, *P. kolombatovici*, and *Tadarida teniotis*. This sorting did not include *Eptesicus serotinus* and *E. nilssonii*; of them the former species clearly belongs to the group (2), while the latter to the group (1). On the other hand, considering the overall distribution pattern of a species, *Myotis nattereri*, distributed in the whole Balkan Peninsula, belongs rather to the group (2) than to the group (1), while *Myotis bechsteinii*, centered by its distribution to Central Europe, rather to the group (1) than to the group (2). The placements of *Pipistrellus pygmaeus*, *Nyctalus lasiopterus*, *N. leisleri*, and/or *Plecotus austriacus* could be also considered similarly questionable. Anyway, with the 1.5 times larger number of bat records than reported by Sachanowicz & Ciechanowski (2018), see Table 1, more than two thirds of these records (69.1%) fall to the group of the Balkan and Pannonian bats (in the sense of Sachanowicz & Ciechanowski 2018), comprising less than a half (45.5%) of the species only. This is a very similar ratio to that mentioned by Sachanowicz & Ciechanowski (2018): 66.0% vs. 45.2%. The ratios of the two remaining groups are also very similar, 16.5% vs. 30.3% for the Central European and Pannonian bats (previously 20.0% vs. 32.2%) and 14.5% vs. 21.2% for the Balkan bats (14.0% vs. 22.6%).

Certain unclarity in classification of the particular species into groups is given by the apparent gradient change of the biota within the whole Balkan Peninsula and the position of the Albanian territory in the latitudinal centre of it. As already stressed by Sachanowicz & Ciechanowski (2018), the general gradient in the geographical change of the bat fauna is present in two directions in Albania, south-north (Mediterranean to Central European) and west-east (maritime lowlands vs. continental mountains). Along the south-north gradient (Fig. 119), the numbers of records of the Mediterranean bats decrease and those of the Central European bats increase towards the north, see the maps of the particular species distribution in Albania. The group of southern species with an apparent decrease of records towards the north of Albania includes nine species, while the group

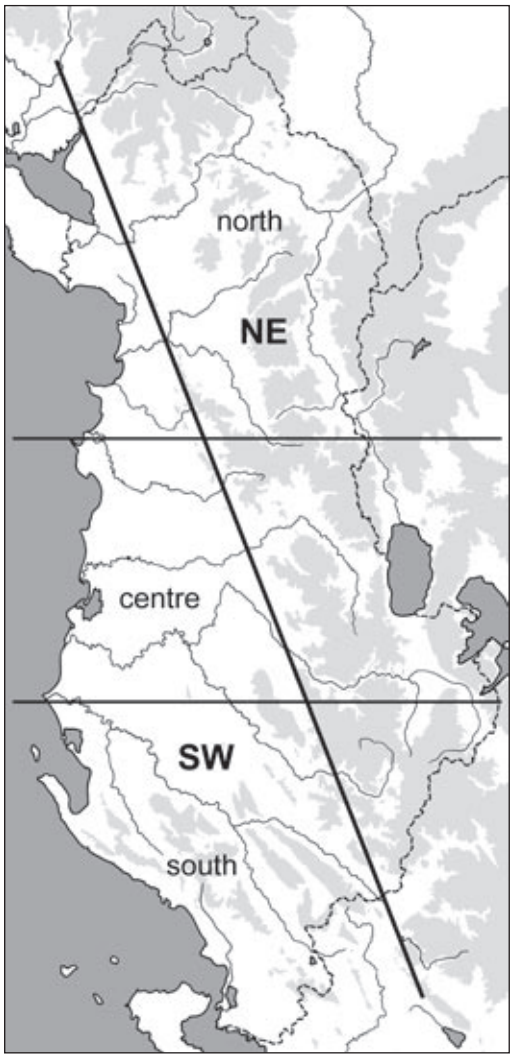


Fig. 119. Map of Albania with dividing lines drawn for the purpose of the zoogeographical evaluation; the thin lines split the territory into three areas, south, centre and north, the bold line divides the territory into south-west (SW) and north-east (NE) areas. For details see text.

of northern species, with the opposite gradient of the decrease of records, covers eleven species (Table 4). The remaining twelve species (plus *Myotis alcathoe* with a single record) are of an indifferent position, regarding their distribution along the south-north gradient in Albania. However, while the total numbers of bat records are balanced along the south-north axis, interestingly, the number of species increases along this axis (Table 4).

Sachanowicz & Ciechanowski (2018) described the zoogeographical gradient from the low xerotherm areas to the forested mountain areas to be oriented in Albania rather from the south-west to the north-east (SW-NE) than clearly in the west-east direction. When the territory of the country is schematically divided along a diagonal between 42° 21' N / 19° 25' E (at the north-western border near the northernmost extension of the Shkodra lake) and 40° 05' N / 20° 37' E (at the south--eastern border near the crossing with the Vjosa river) into halves covering a maximum of the respective habitat coverages (Fig. 119), differences in occurrence of the particular bat species are well detectable. Since these differences cannot be considered following a gradient but a step shift between two categories, a highly prevailing number of bat species follows an increasing or decreasing divison through this diagonal and only few species show a balanced occurrence in both environments (Table 4). While the number of bat records is slightly larger in the south-western part than in the north-eastern part of Albania, the numbers of recorded species of bats are in an opposite order: a higher number of species was recorded in the north-eastern part than in the south-western part (Table 4). Fifteen species of bats follow the SW-NE increase of records and represent 45.5% of species of the fauna, but only 40.6% of records (moreover, about a half of these records belong to two species, *Rhinolophus hipposideros* and *Hypsugo savii*). Thirteen species follow the SW-NE decrease of records and represent 39.4% of species, but 49.4% of records. The group of remaining species, which do not follow a marked SW-NE difference, comprises seven species, representing 15.2% of the fauna and 10.0% of the records; the largest part of this group is represented by migratory species (including one possible migrant).

Table 4. Descriptive parameters of the zoogeographical trends in the bat fauna of Albania: numbers of records of particular species along the south-north gradient and along the south-west–north-east (sw-ne) division. For details see text and Fig. 119

species	records			trend	records		trend	concord
	south	centre	north	s-n	sw	ne	sw-ne	s-n : sw-ne
Rhinolophus ferrumequinum	63	37	64	=	94	70	>	–
Rhinolophus hipposideros	35	39	46	<	47	73	<	+
Rhinolophus euryale	13	12	8	>	20	13	>	+
Rhinolophus mehelyi	2	0	0	>	2	0	>	+
Rhinolophus blasii	10	5	7	>	14	8	>	+
Myotis myotis	26	17	13	>	39	17	>	+
Myotis blythii	28	13	13	>	36	18	>	+
Myotis bechsteinii	6	0	7	=	6	7	=	+
Myotis nattereri	8	3	1	>	6	6	=	–
Myotis emarginatus	11	3	8	≥	14	8	>	±
Myotis davidii	9	8	18	<	12	23	<	+
Myotis brandtii	0	1	1	<	0	2	<	+
Myotis alcathoe	1	0	0		1	0		
Myotis daubentonii	3	10	0	=	0	13	<	–
Myotis capaccinii	18	16	14	>	27	21	≥	+
Vespertilio murinus	1	4	8	<	0	13	<	+
Eptesicus serotinus	22	18	22	=	23	39	<	–
cf. *Eptesicus nilssonii*	0	0	2	<	0	2	<	+
Hypsugo savii	38	23	43	=	41	63	<	–
Pipistrellus pipistrellus	24	19	31	=	31	43	<	–
Pipistrellus pygmaeus	17	10	18	=	23	22	=	+
Pipistrellus nathusii	3	2	15	<	11	9	=	–
Pipistrellus kuhlii	21	28	22	=	46	25	>	–
Nyctalus noctula	6	11	17	<	17	17	=	–
Nyctalus lasiopterus	1	2	4	<	1	6	<	+
Nyctalus leisleri	21	12	20	=	24	29	≤	±
Barbastella barbastellus	0	1	2	<	0	3	<	+
Plecotus auritus	0	2	5	<	0	7	<	+
Plecotus macrobullaris	0	1	2	<	1	2	<	+
Plecotus austriacus	1	4	2	=	1	6	<	–
Plecotus kolombatovici	8	4	3	>	12	3	>	+
Miniopterus schreibersii	32	18	21	>	52	19	>	+
Tadarida teniotis	26	12	17	≥	36	19	>	±
records	454	335	454	=	637	606	=	+
species	28	29	30	<	27	31	<	+

A combination of both approaches evaluating the bat occurrence patterns in Albania (Table 4), the distribution along the south-north gradient and the SW-NE division in distribution, allows to classify the species into four zoogeographical groups concerning their dispersal over the Albanian territory; (1a) southern lowland bats, the species with prevailing occurrence in the low xerotherm areas and showing the south-north gradient of decrease in records, *Rhinolophus euryale*, *R. mehelyi*, *R. blasii*, *Myotis myotis*, *M. blythii*, *M. capaccinii*, *Plecotus kolombatovici*, and *Miniopterus schreibersii*; (1b) southern indistinct bats, the species with prevailing occurrence in the low xerotherm areas, not showing any marked gradient in record numbers along the south-north axis, *Rhinolophus ferrumequinum*, *Myotis emarginatus*, *Pipistrellus kuhlii*, and *Tadarida teniotis*; (2a) northern mountain bats, the species with prevailing occurrence in the forested mountain

areas and showing the north-south gradient of decrease in records, *Rhinolophus hipposideros*, *Myotis davidii*, *M. brandtii*, *Eptesicus nilssonii*, *Barbastella barbastellus*, *Plecotus auritus*, and *P. macrobullaris*; (2b) northern indistinct bats, the species with prevailing occurrence in the forested mountain areas, not showing any marked gradient in record numbers along the south-north axis, *Myotis daubentonii*, *Eptesicus serotinus*, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *Plecotus austriacus*; (3) migratory (incl. possible migratory) bats, showing various occurrence patterns (mostly of the northern bats), *Vespertilio murinus*, *Pipistrellus pygmaeus*, *P. nathusii*, *Nyctalus noctula*, *N. lasiopterus*, and *N. leisleri*; (4) indistinct bats, without a marked trend along the SW--NE division, *Myotis bechsteinii*, *M. nattereri*, and *M. alcathoe* (the latter species due to the lack of records). The group of southern bats comprises the largest amount of bat records, covering only 36.4% of species (12), but 49.3% of records (613). The group of northern bats comprises an identical number of species (12; 36.4%), but only 34.8% of records (432). The six species (18.2%) of migratory bats comprise 13.8% of records (172). Three species of zoogeographically indistinct bats comprise only 2.1% of records (26).

This division of the bat fauna based on the distribution of records in Albania corresponds in a certain extent with the division by Sachanowicz & Ciechanowski (2018), based on several characters of the distribution of the particular species, including the overall pattern of their distribution ranges. The southern bats (group 1) belong completely to the groups of Balkan bats (5 species) and Balkan and Pannonian bats (7) sensu Sachanowicz & Ciechanowski (2018), the distribution patterns of these bats in Albania thus conform with their distribution pattern in Europe and general ecological affiliations (cf. Dietz et al. 2016).

On the other hand, the northern mountain bats (group 2a) combine all three categories defined by Sachanowicz & Ciechanowski (2018); three species of the Central European and Pannonian group, *Myotis brandtii*, *Barbastella barbastellus*, and *Plecotus auritus*, two species of the Balkan group, *Myotis davidii* and *Plecotus macrobullaris*, and one of the Balkan and Pannonian group, *Rhinolophus hipposideros* fall among the northern mountain bats. While the placement of the bats of the Central European and Pannonian group into the group of northern mountain bats could be considered as fully appropriate and corresponding to their general ecological ranking (cf. Sachanowicz & Ciechanowski 2018), the placements of *Rhinolophus hipposideros*, *Myotis davidii*, and *Plecotus macrobullaris* into this group may seem unusual. However, *Rhinolophus hipposideros* and *Plecotus macrobullaris* are bats preferring to forage in deciduous forests (Bontandina et al. 2002, Reiter 2004, Zahn et al. 2008, Rutishauser et al. 2012, Alberdi et al. 2016), which are a dominating habitat in the upper altitudes of Albania, moreover, the latter species favours roosting at high altitudes (Alberdi et al. 2015, Alberdi & Aizpurua 2018). Although *Myotis davidii* is an inhabitant of continental steppes in most of its distribution range (Benda et al. 2004b, Benda et al. 2012, 2016a), in the southern Balkans it is universally dispersed in all altitudes and habitat types, with a slight preference for forested mountains (see Hanák et al. 2001, Benda et al. 2003b, 2009). Although in Albania *Myotis davidii* and *Plecotus macrobullaris* reach the north-eastern limits of their distribution range in the western Balkans, both species occur in forested mountain habitats of this region, including Albania. In both these species, the current distribution in the Balkans is not influenced only by thier habitat preferences, but dominantly by their histories and perhaps also ecological relations to other congeneric species.

The group of northern indistinct bats (2b) combines one species of the Central European and Pannonian group (sensu Sachanowicz & Ciechanowski 2018), *Myotis daubentonii*, with three species of the Balkan and Pannonian group, *Hypsugo savii*, *Pipistrellus pipistrellus*, and *Plecotus austriacus*. *Myotis daubentonii*, finding in Albania its south-western distribution limits in the Balkans, could be considered a usual member of such a group. *Hypsugo savii*, generally a true Mediterranean faunal element of Albania, suggesting its southern affiliation, in fact prefers

high altitudes within the Mediterranean region and this is most apparent in the countries with a steep altitudinal gradient (Benda et al. 2009, 2016c); thus, it clearly ranks among the mountain bat species. *Pipistrellus pipistrellus* is broadly distributed across the south-western Palaearctic, including the zones of Mediterranean and mixed forests over most of Europe and the Middle East, and this affinity indicates a similar distribution as in other forest species, e.g. *Rhinolophus hipposideros* or *Plecotus auritus* (cf. Arlettaz et al. 2000a); moreover, its relatively low numbers in the xerotherm low parts of Albania could be explained by a certain level of competition with a similar bat, *Pipistrellus kuhlii*, and maybe also with *P. pygmaeus*. Similar ecological division of sources could be also responsible for the restriction of *Plecotus austriacus* into the higher altitudes of Albania, since the more frequent *P. kolombatovici* occurs more densely in lowland xerotherms of the country.

Due to the enormous altitudinal gradient within the rather limited area of Albania, marked between-species differences in the altitudinal distribution of bat records are apparent (Table 2, Fig. 8). Majority of the species (51.5%) were found in a wide span of altitudes from the lowland/coastal areas up to the mountains of over 1,200 m a. s. l., only six species (18.2%) did not exceed 900 m a. s. l. by their altitudinal distribution. A third of the fauna (11 species, 33.3%) are very widely distributed bats with altitudinal ranges larger than 1500 m (Fig. 8). However, despite the size of their altitudinal distribution, the particular species clearly prefer a certain section of the altitudinal range of the country for their most abundant occurrence.

Based on the median values of the altitudinal distribution, the bat fauna of Albania could be sorted into six groups of 200 m intervals of altitude. Majority of the species (51.5%) have their altitude medians in the interval of 200–400 m a. s. l. (Table 2), two thirds of these species (64.7%) belong to the group (1) of southern bats sensu the above division and three species (17.6%) to the group (2) of northern bats, *Myotis davidii*, *Hypsugo savii*, and *Barbastella barbastellus*. Only two species, *Myotis alcathoe* and *Pipistrellus kuhlii*, have their medians below the level of 200 m a. s. l. and represent the most lowland species of Albania. On the other hand, *Myotis brandtii* and *Plecotus auritus* have their altitude median (and also mean) values above 1,000 m a. s. l. and could be considered the most montane bats of the country. Three species, *Myotis daubentonii*, *Vespertilio murinus*, and *Nyctalus lasiopterus*, have their altitude median in the interval of 800–1,000 m a. s. l.; two species, *Eptesicus nilssonii* and *Plecotus austriacus*, in the interval of 600–800 m a. s. l., and seven species, *Rhinolophus hipposideros*, *Myotis nattereri*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus leisleri*, *Plecotus macrobullaris*, in the interval of 400–600 m a. s. l.

Thus, the bat fauna of Albania could be sorted into five natural groups according the clustering in particular altitude zones, based again on the median values (Fig. 8), as follows: (1) the lowland fauna, with medians distributed at 130–360 m a. s. l., is represented by 19 species (57.6% of the fauna; Table 2); (2) the fauna of the lower medium altitudes, medians at 410–520 m a. s. l., composed of seven species (21.2%), *Rhinolophus hipposideros*, *Myotis nattereri*, *Eptesicus serotinus*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *Nyctalus leisleri*, and *Plecotus macrobullaris*; the compositions of the faunas of (3) the upper medium altitudes (2 species; medians at 650–720 m), (4) the low mountains (3; 850–870 m), and (5) the high mountains (2; 1030–1150 m), correspond with the above division according to the altitude zonation intervals of 200 m.

As shown above, the altitudinal distribution of the particular species in Albania is not completely linked to their general zoogeographical affinities, in some cases it rather reflects partitioning of local sources among ecomorphologically similar and/or related species (Fig. 8). This altitude partitioning is very markedly present in the *Plecotus* species, which are separated into three groups, although their altitude ranges mostly overlap; *P. kolombatovici* is a lowland bat, *P. macrobullaris* and *P. austriacus* prefer the medium altitudes, and *P. auritus* is a bat of high mountain forests.

Analogically, the distribution of bats of the genus *Nyctalus* is apparently partitioned along the altitudinal gradient, *N. noctula* is most abundant in lowlands, *N. leisleri* in the medium altitudes, and *N. lasiopterus* in mountains. Two *Myotis* species employing the trawling foraging strategy, *M. daubentonii* and *M. capaccinii*, are altitudinally almost completely separated, which suggests their separation also in habitat preferences – the only area of their sympatric occurrence in Albania is the region of Prespa lakes. On the other hand, the pair of sibling species, *Myotis myotis* and *M. blythii*, do not differ markedly in their altitude characteristics – this is most probably caused by similar roost preferences and simultaneously, by completely different foraging habitat preferences in these species (Arlettaz et al. 1997, Arlettaz 1999), and thus, a lack of substantial competition producing an altitude separation. Among the species of the genus *Rhinolophus*, only *R. hipposideros* has a markedly shifted distribution towards the medium altitudes, while other members of the genus show the most abundant distribution in low areas of Albania, suggesting a preference for the Mediterranean xerotherms of similar altitudes in all these species. Only slight differences in the altitudinal distributions are evident also in the pipistrelle-like bats, *Hypsugo savii*, *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. nathusii*, and *P. kuhlii*; these species forage by aerial hawking and with the exception of migratory *P. nathusii*, all are typical species of the whole arboreal zone of the Mediterranean Europe. While *H. savii* and *P. pipistrellus* occur across the whole altitudinal gradient of Albania and differ only slightly from each other in their distribution, *P. pygmaeus* prefers similar altitudes as the latter two species but in a smaller altitudinal range, and *P. kuhlii* and *P. nathusii* occur mainly in lowlands.

The Albanian populations of the primarily cave-dwelling bats (*Rhinolophus* spp., *Myotis myotis*, *M. blythii*, *M. emarginatus*, *M. capaccinii*, and *Miniopterus schreibersii*) have adapted to roost regularly in the extremely numerous abandoned military facilities (bunkers, tunnels, galleries, etc.) scattered densely across Albania, in a volume incomparable to any other Mediterranean country. For roosting in the non-hibernation period and sometimes also for the hibernation, majority of these species occupy these artificial spaces more frequently than the natural caves (within the Mediterranean region, the use of artificial roosts is common in all populations of the respective species, but only in a limited extent). However, in almost all species, the numbers found in the artificial roosts are on average smaller than the numbers in natural caves, and simultaneously, in all species the artificial roosts are used mainly in low areas of the country, while natural roosts in the medium and high altitudes, athough the ranges of the altitudinal distributions of both types are similar to each other (Table 5). These differences in occupancy and altitude distribution are related most probably to the climatic conditions inside these distinct roost types. The less structured inner spaces of the artificial roosts, composed of simple corridors and frequently only with plain concrete walls, are perhaps better disposed for changes of the inner climate in accordance with the conditions of the outside air temperature and humidity. On the other hand, caves keep the stable and relatively warm climate year-round, despite their altitude. Thus, the artificial roosts are perhaps sufficiently comfortable for bats only in low altitudes, while in cold mountains they are not able to keep suitable conditions for bat roosting, contrary to caves. Nevertheless, this ecological aspect of the bat distribution in the country needs to be studied in more detail, to be able to describe the qualitative differences and bat preferences concerning the different roost types. Anyway, the pattern of bat geographical and temporal distribution in Albania is influenced by the modern history of this country, associated with the massive constructions of various underground spaces, now abandoned and suitable as roosts for many bat species.

In conlusion, although Albania has a relatively small territory situated at an extreme of the true Mediterranean zone, its bat fauna is heterogeneous and follows diverse factors in its geographical dispersal. Some of these factors are related to local habitat and altitude characteristics, others to general characteristics of the particular species distribution. Generally, the bat fauna follows the

Table 5. Altitudinal distribution of roosts of the cave-dwelling species of bats in Albania with respect to the season and nature of the roost, and the numbers of bats in the roost type; H = hibernation roosts, NH = non-hibernation roosts

	caves						artificial roosts					
	n	range	median	mean	n bats	mean	n	range	median	mean	n bats	mean
Rhinolophus ferrumequinum												
H	16	70–1104	758.0	641.4	1–304	25.2	12	4–1070	347.5	335.1	1–130	8.5
NH	32	20–1295	444.5	537.2	1–5000	107.5	104	0–1225	260.5	355.9	1–150	5.7
Rhinolophus hipposideros												
H	26	70–1104	860.0	732.7	1–20	4.2	13	4–1070	468.0	515.2	1–7	2.4
NH	16	50–1100	595.5	577.3	1–300	23.6	60	4–1225	342.5	449.8	1–20	2.6
Rhinolophus euryale												
H	2	243–836	539.5	539.5	1–261	82.0	1		250.0		1	
NH	11	20–1125	243.0	346.7	1–250	41.7	12	10–298	76.0	125.8	1–250	35.4
Rhinolophus blasii												
H	4	243–1125	653.5	668.8	1–254	67.8	1		58.0		106	
NH	7	70–1125	444.0	464.0	1–1000	184.5	5	12–267	58.0	114.2	1–80	7.2
Myotis myotis												
H	1		866.0		1		2	172–547	359.5	359.5	2–3	2.5
NH	9	30–1125	395.0	439.6	1–50	16.6	31	5–1237	212.0	371.2	1–800	42.2
Myotis blythii												
NH	6	243–1125	479.5	593.0	1–750	192.0	29	2–1195	107.0	331.6	1–860	30.1
Myotis emarginatus												
NH	6	50–1125	213.5	331.2	1–5	2.3	7	10–360	192.0	184.4	5–30	17.5
Myotis capaccinii												
H	10	323–866	860.0	764.6	1–300	33.0	4	4–360	211.0	196.5	2–12	5.5
NH	9	70–866	395.0	423.8	2–4000	424.8	7	1–360	88.0	128.7	1–780	113.6
Miniopterus schreibersii												
H	10	243–1104	444.0	601.7	1–2409	33.4	3	4–360	250.0	204.7	1–29	8.8
NH	17	30–1125	419.5	468.3	1–5000	419.2	25	0–1135	107.0	224.9	1–300	21.4

longitudinal geographical gradient and remains composed predominantly of the Mediterranean species with an important admixture of Central European faunal elements.

Ectoparasites

Along with the review of the bat fauna of Albania, we also present the review of arthropod ectoparasites of bats of the country. Altogether, at least 45 parasite species (17 of them new for the country) belonging to nine families were recorded; viz. Ischnopsyllidae, Streblidae, Nycteribiidae, Ixodidae, Argasidae, Spinturnicidae, Trombiculidae, Macronyssidae, and Sarcoptidae. Occurrence of one family, Argasidae, is here reported from bats of Albania for the first time, records of representatives of the other families were published previously (Friese & Königsmann 1962, Hůrka 1962, 1963a, b, c, Scheffler et al. 2013, Sachanowicz et al. 2014, 2017, Boshamer 2016, Szentiványi et al. 2016a, 2018, Sachanowicz & Ciechanowski 2018).

Of the insect families of bat parasites occurring in southern Europe, only the family Cimicidae has not yet been proven from the territory of Albania. In the Mediterranean Basin, two species of bat bugs are known, *Cacodmus vicinus* Horváth, 1934 and *Cimex pipistrelli* Jenyns, 1839. The former species is adapted to parasitise *Pipistrellus kuhlii* and *P. pipistrellus* (Usinger 1966, Péricart 1972, Quetglas et al. 2012), the primary host of *C. pipistrelli* is *Nyctalus noctula* (Balvín

et al. 2012), less frequently it was collected from *Pipistrellus kuhlii* and *P. pipistrellus* (Theodor & Moscona 1954, Benda et al. 2010).

Four genera and seven species of bat fleas of the family Ischnopsyllidae were found in Albania, *Araeopsylla gestroi*, *Ischnopsyllus simplex*, *I. intermedius*, *I. octactenus*, *I. elongatus*, *Rhinolophopsylla unipectinata*, and *Nycteridopsylla trigona*, of them four species were documented from the country for the first time. Occurrence of another species may be expected, *Ischnopsyllus variabilis* (Wagner, 1898), a parasite of bats of the genus *Pipistrellus*. Since the expected primary host of this flea, *P. nathusii*, is an uncommon bat in Albania, this parasite could be recorded rather from *P. kuhlii*, which is its known host in the southern parts of the distribution range, e.g. in France and Greece (Hůrka 1963b).

The family Streblidae is represented by a single species in the Mediterranean, *Brachytarsina flavipennis* (Aellen 1959, Hůrka 1962, 1984, Szentiványi et al. 2016); this bat fly was collected also in Albania, from six bat host species.

Concerning the number of species, Nycteribiidae is the largest family of insect parasites of bats known from Albania, four genera and eleven species of these bat flies were documented in total, *Nycteribia pedicularia*, *N. latreillii*, *N. vexata*, *N. schmidlii*, *Penicillidia dufourii*, *P. conspicua*, *Phthiridium biarticulatum*, *Basilia italica*, *B. nana*, *B. mongolensis*, and *B. nattereri**. The latter two species were found in the country for the first time.

Majority of the bat fly records are related to the species adapted to parasitise the cave-dwelling bats which represent a large portion of the examined bats (Friese & Königsmann 1962, Hůrka 1962, 1963a, Scheffler et al. 2013, own data); the records of ten species of obligatory cave-dwelling bats (30.3% of the fauna) represented 47.6% of all bat records in Albania. Nine species of this ecological group of bat flies are known to occur in the eastern Mediterranean, seven of them were collected in Albania, *Nycteribia pedicularia*, *N. latreillii*, *N. vexata*, *N. schmidlii*, *Penicillidia dufourii*, and *P. conspicua*. The information concerning the two remaining species is scarce, they were documented from limited ranges in the Middle East only; *Phthiridium bilobum* (Theodor et Moscona, 1954) only from the Levant and *P. integrum* (Theodor et Moscona, 1954) from Cyprus, Egypt, Levant, and Arabia (Theodor & Moscona 1954, Sanborn & Hoogstraal 1953, Amr & Qumsiyeh 1993, Kock & Nader 1979, Ševčík et al. 2013).

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*Records of ectoparasites from unspecified hosts. **Original data**: N y c t e r i b i i d a e: *Basilia nattereri*: 2 ma (CMŠ [A]) from a jar containing 32 bats (*Rhinolophus hipposideros* [1 specimen], *Myotis myotis* [1], *M. blythii* [2], *M. davidii* [2], *M. daubentonii* [2], *Vespertilio murinus* [1], *Eptesicus serotinus* [6], *Hypsugo savii* [5], *Pipistrellus pipistrellus* [2], *P. kuhlii* [4], *P. pygmaeus* [1], *Nyctalus leisleri* [3], *Tadarida teniotis* [2]). – S p i n t u r n i c i d a e: *Spinturnix myoti*: 1 ma (CMŠ [P]) from a jar containing 19 bats (*Rhinolophus ferrumequinum* [1 specimen], *Myotis myotis* [1], *M. blythii* [1], *M. davidii* [2], *M. capaccinii* [1], *Eptesicus serotinus* [2], *Hypsugo savii* [4], *Pipistrellus kuhlii* [2], *Nyctalus leisleri* [1], *Tadarida teniotis* [4]); 1 ma (CMŠ [P]) from a jar containing 16 bats (*Rhinolophus hipposideros* [3 specimens], *R. blasii* [6], *Myotis myotis* [2], *M. capaccinii* [4], *Eptesicus serotinus* [1]). – **Published data**: S t r e b l i d a e: *Brychytarsina flavipennis*: 3 ma, 10 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, from *Rhinolophus blasii*, *R. euryale*, and *R. ferrumequinum*, leg. V. Hanák (Hůrka 1963a [as *Nycteribosca kollari*]). – N y c t e r i b i i d a e: *Phthiridium biarticulatum*: 7 ma, 11 fa, Shpella e Mezhgoranit östl. Tepelena, 11 October 1960, from *Rhinolophus blasii*, *R. euryale*, and *R. ferrumequinum*, leg. V. Hanák (Hůrka 1963a [as *Nycteribia* (*Stylidia*) *biarticulata*]). – *Nycteribia pedicularia*: 5 ma, 1 fa from a mixed collection of bats, composed of *Myotis myotis*, *M. blythii* and *M. capaccinii*, Shpella e Mezhgoranit, westl. Tepelena, 31 May 1961, leg. G. Friese & J. Schulze (Hůrka 1963a, cf. Friese & Königsmann 1962). – *Nycteribia latreillii*: 7 ma, 7 fa from a mixed collection of bats, composed of *Myotis myotis*, *M. blythii* and *M. capaccinii*, Shpella e Mezhgoranit östl. Tepelena, 31 May 1961, leg. G. Friese & J. Schulze (Hůrka 1963a, cf. Friese & Königsmann 1962). – *Nycteribia schmidlii*: 1 ma from a mixed collection of bats, composed of *Myotis myotis*, *M. blythii* and *M. capaccinii*, Shpella e Mezhgoranit östl. Tepelena, 31 May 1961, leg. G. Friese & J. Schulze (Hůrka 1963a, cf. Friese & Königsmann 1962). – *Nycteribia vexata*: 6 ma, 8 fa from a mixed collection of bats, composed of *Myotis myotis*, *M. blythii* and *M. capaccinii*, Shpella e Mezhgoranit östl. Tepelena, 29–31 May 1961, leg. G. Friese & J. Schulze (Hůrka 1963a [as *Nycteribia* (*Acrocholidia*) *vexata vexata*], cf. Friese & Königsmann 1962). – *Penicillidia dufourii*: 8 ma, 8 fa from a mixed collection of bats, composed of *Myotis myotis*, *M. blythii* and *M. capaccinii*, Shpella e Mezhgoranit östl. Tepelena, 31 May 1961,

The ecological group of the nycteribiid bat flies adapted to parasitise mainly the tree-dwelling bats is represented by four species of the genus *Basilia* in Albania (see above). Two other species, *Nycteribia kolenatii* Theodor et Moscona, 1954 and *Basilia mediterranea* Hůrka, 1970, rank among the species which could potentially enrich the Albanian fauna when an additional research is made. The range of *N. kolenati* covers mainly the central and northern parts of Europe, where *Myotis daubentonii* is its principal host (Hůrka 1964), and thus, it can be collected from this bat also in Albania. However, its (secondary) occurrence is known also from other bat species (Hůrka 1964), its most extreme record was made from *Rhinolophus euryale* in eastern Turkey (Aktaş & Hasbenli 1994, Hasbenli 1997), although otherwise it remains unknown from the proper Mediterranean. Originally, *B. mediterranea* was expected to be an endemic of Mallorca (Hůrka 1970), however, its occurrence was later confirmed in a large part of the western and central Mediterranean, including continental Spain, France, Corsica, Algeria, Libya, and Italy (Hůrka 1982, Beaucournu & Noblet 1985, 1994, Kock & Quetglas 2003, Dondini et al. 2017). Its hosts are mostly bats of the *Pipistrellus pipistrellus* group, additionally also *P. nathusii*, *P. kuhlii*, *Hypsugo savii*, and *Miniopterus schreibersii*. Considering this known range and host spectrum, its presence in Albania is possible.

Of the 21 families of Acarina potentially parasitising bats in Europe (Szubert-Kruszyńska & Postawa 2008), six familes were confirmed to parasitise bats in Albania. The bat mites, Spinturnicidae, is the richest family concerning the number of species found, altogether three genera and twelve species are known from the country, *Spinturnix acuminata*, *S. andegavina*, *S. emarginata*, *S. helvetiae*, *S. kolenatii*, *S. myoti*, *S. mystacina*, *S. nobleti*, *S. plecotina*, *S. psi*, *Eydhovenia euryalis* (with two subspecies), and *Paraperiglischrus rhinolophus*. The latter species is here reported from Albania for the first time. The mites of this family are highly specialised ectoparasites which are considered to have evolved parallelly with their hosts, almost each genus or even species has evolved on its host genus and/or species (Dusbábek 1971). The available data from Albania confirm certain permanent gamasoid mite species from almost all host species. The only missing species, which may be expected to occur in the country, is *Spinturnix bechsteinii* Deunff, Walter, Bellido et Volleth, 2004, a species adapted to parasitise *Myotis bechsteinii*. However, despite examinations of the captured individuals, this mite was not discovered in this bat.

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leg. G. Friese & J. Schulze (Hůrka 1963a [as *Penicillidia dufouri*], cf. Friese & Königsmann 1962). – Nycteribiidae sp.: 51 inds., 5 species, details unlisted (Friese & Königsmann 1962). – S p i n t u r n i c i d a e: *Spinturnix* sp.: 3 inds., details unlisted (Friese & Königsmann 1962).

Comments. Several species of bat ectoparasites were collected in or reported from Albania without a direct link to its host species, only a mixture of a series of bats is available containing the actual host species. Most of these parasites were collected and/or reported from certain bat species (e.g., *Spinturnix myoti* from *Myotis myotis*, *M. blythii*, and *M. nattereri*) and comments on their evidence from Albania are present in these species, see above.

The bat fly *Basilia nattereri* (Kolenati, 1857) is here reported from Albania for the first time. Its primary host is *Myotis nattereri* and the distribution range of the parasite seems to follow the range of this host (Masson 1989). However, this bat species was not included in the bat mixture containing the host. The occurrence of this bat fly was reported also in other bat species (Aellen 1963, Masson 1989, Czuppon & Molnár 2001, Krištofik & Danko 2012), of which *Myotis davidii* and *M. daubentonii* were present in the mixture; we thus expect the origin of the bat fly from one or both of these species. The distribution range of this parasite covers various parts of Europe from Iberia to the Crimea and Urals, in the Balkans it was reported from Romania (Decu-Burghele 1962, Aellen 1963, Theodor & Moscona 1954, Masson 1989, Hůrka 1997, Imaz et al. 1999, Czuppon & Molnár 2001, Orlova & Orlov 2013).

Friese & Königsmann (1962) reported a record of three bat mite specimens of the genus *Spinturnix* of unidentifed species and from unidentified host/s. According to the combined data by Friese & Königsmann (1962) and Hůrka (1963a), the mites were collected most probably from *Myotis myotis*, *M. blythii* and/or *M. capaccinii* in the Mezhgorani cave. Mainly two mite species can be taken into consideration, *Spinturnix myoti* and/or *S. psi*. The former species is known to parasitise all three above-mentioned bat species, the latter species of mite parasitises *M. capacinii* along with *Miniopterus schreibersii*, a bat also known to occur at the locality (see Hanák et al. 1961).

Within the family of hard ticks, Ixodidae, only one species was collected from bats in Albania, *Ixodes vespertilionis*. Besides that, only one other species can be expected to be found in the country, *Ixodes simplex* Neumann, 1906, adapted to parasitise exclusively *Miniopterus schreibersii* (Arthur 1956), a common bat of Albania.

The soft ticks of the family Argasidae are represented by one species in Albania, *Argas vespertilionis*, here reported from the country for the first time. It was found feeding on *Pipistrellus pipistrellus* and *P. kuhlii*, its expected primary hosts (Dusbábek 1972), and also on *Tadarida teniotis*. Another soft tick species of the genus *Argas*, considering its specialisation on bats and its known distribution range, is *A. transgariepinus* White, 1846. It was recorded in the western and central Mediterranean, including North Africa, Sicily, Italy, and Spain (Hoogstraal 1957).

At least four genera and four species of chigger mites, family Trombiculidae, were collected from bats in Albania, *Leptotrombidium russicum*, *Willmannium cavus*, *Oudemansidium musca*, and *Trombicula* sp.; the former three species for the first time in the country. Besides the three specifically identified species, also other specimens of chigger mites were collected, however, due to damages of their bodies (gnathosoma, palpal setae, or galeala setae) the proper identification was not possible. These chigger mites come from *Rhinolophus hipposideros*, *Eptesicus serotinus*, and *Pipistrellus pipistrellus*. From the latter two bat species, the two above mentioned mites of the genera *Leptotrombidium* and *Oudemansidium* were collected and thus, it is possible that the unspecified material also belongs to these species. On the other hand, the high diversity of chigger mites known from the Balkan Peninsula (see e.g. Beron 1973, Dusbábek 1964a, Kolebinova 1968, 1970, 1982, Kolebinova & Beron 1965, Kolebinova & Vercammen-Grandjean 1971) suggests a possible higher diversity of this group – other than recorded – also in Albania, namely in the genera *Hirsutiella*, *Microtrombicula*, *Neotrombicula*, *Riedlinia*, and *Sasatrombicula*.

At least six species of mites belonging to five genera from the family Macronyssidae were collected in Albania, *Ichoronyssus scutatus*, *Macronyssus granulosus*, *M. flavus*, *Steatonyssus periblepharus*, *Parasteatonyssus hoogstraali*, and *Ornithonyssus* sp.; the latter five taxa for the first time in the country. These originally endophilic obligatory haematophagous parasites do not represent unusual records from Albania, most of the collected species are cosmopolitan parasites adapted to feed on a variety of hosts. As an exception, one species specialised on a single bat species was recorded, *P. hoogstraali* adapted only to *Tadarida teniotis*. Species affiliations of other findings, which cannot be identified for various reasons, remain questionable, i.e. *Macronyssus* sp. collected from *Rhinolophus hipposideros*, *Myotis blythii*, and *Hypsugo savii*, *Steatonyssus* sp. from *Hypsugo savii* and *Pipistrellus pipistrellus*, and *Ornithonyssus* sp. from *Plecotus macrobullaris*.

Traces and/or individuals of the keratophagous mites of the family Sarcoptidae were found three times in Albanian bats, *Notoedres chiropteralis*, *Nycteridocoptes poppei*, and specifically unidentified skin infestations in *Tadarida teniotis*. The former mite species is here reported from the country for the first time; it represents a rather rarely found parasite, although its distribution range covers large parts of Eurasia (Klompen 1992).

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APPENDIX

Annotated catalogue of bats of the western Balkans in the collection of the National Museum, Prague

The lists of material (arranged in alphabetical and/or chronological orders) include, for each item (Table 6), the following information: (1) number of specimens with indication of sex and with a reference to museum evidence (and where available, field evidence in curly brackets {}) and type of preparation (in square brackets []; A = alcoholic specimen, B = skin (balg), K = skin (carpet), S = skull, Sk = skeleton, W = skeleton of a wing), (2) name of the locality (each record is primarily listed by a name of the nearest settlement or notable physical feature), (3) date of collection, and (4) collector name/s. The geographical names originally written in non-Latin scripts are transliterated according to the ISO standards (ISO 1995 for the Cyrillic, ISO 1997 for the Greek script). In the biometric tables, the following abbreviations are used: M = mean; max., min. = dimension range margins; SD = standard deviation; for the dimension abbreviations, see Abbreviations, Measurements (page 14). In Remarks on particular species, the specimens originating from Albania are not annotated, for their comments see above.

Rhinolophus ferrumequinum (Schreber, 1774)

Material. **Croatia**: 2 ♂♂, 2 ♀♀ (NMP 96818, 96821, 96822 {yu17/77, yu21/77, yu24/77} [S+A], 96823 {yu25/77} [A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera; – 2 ♀♀ (NMP 96853, 96854 {a279} [A]), Selce, sea shore cave, 3 March 1856, leg. A. Frič.
Croatia/Montenegro: 1 ♂ (NMP 96852 {–} [A]), Dalmatia, date unlisted [~1905], ded. V. Frič.
Montenegro: 1 ♂ (NMP 90229 {CG1} [S+A]), Stari Bar, 19 September 2001, leg. J. Hájek & J. Hotový.
Kosovo: 1 ♂, 1 ♀ (NMP 96804 {pb2080} [S+A], 96805 {pb2081} [A]), Mrasor, Mirusha Waterfall, cave, 27 October 2001, leg. P. Benda.
Albania: 1 ♂ (NMP 96487 {B280} [S+A]), Juban, Ali Dedës Cave, 20 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96498 {pb5984} [S+A]), Krongj, Vris stream, 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 2 ♀♀ (NMP 58777, 96494 [A]), Kruje, 25 June 1996, leg. M. Vlašín; – 3 ♂♂, 6 ♀♀ (NMP 96445 {B149} [S+B], 96397 {B71} [S+A], 96455–96458, 96462, 96464 {B166–168, 170, 175, 177} [S+A], 96449 {B155} [S]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96592 {pb6309} [S+A]), Ndërlysaj, Thethi River, 8 July 2016, leg. P. Benda; – 3 ♂♂, 2 ♀♀ (NMP 96356, 96357 {B13, 14} [S+B], 96358, 96359 {B17, 18} [S+A], 96492 {B16} [A]), Pishkash, Pishkashi Cave, 5 October 1960, leg. V. Hanák; – 1 ♂, 1 ♀ (NMP 96351, 96352 {B4, 5} [S+B]), Pogradec, Červenaka Cave, 4 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96530 {pb6016} [S+A]), Prezë, bunker, 11 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96470 {B186} [S]), Vanistër, Vanishta Cave, 12 October 1960, leg. V. Hanák; – 11 ♂♂, 17 ♀♀ (NMP 96360–96363, 96365, 96366, 96368–96370, 96373, 96374, 96376–96380, 96385–96387 {B19–22, 24, 25, 27, 29, 30, 33, 34, 36, 38, 40, 41, 43, 50–52} [S+B], 96371, 96372, 96375, 96381, 96383, 96384 {B31, 32, 35, 44, 46, 47} [S+A], 96364, 96367, 96382 {B23, 26, 45} [S]), Velçë, Velça Cave, 9 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96603 {pb6605} [S+A]), Zall-Dardhë, Drini i Zi River, 30 June 2018, leg. P. Benda; – 5 inds. (NMP 96488–96491 {B-A–D}, unnumbered [S]), Albania (undef.), October 1960, leg. V. Hanák.
Greece (mainland): 1 ♂ (NMP 48709 {TH 173} [S+B]), Despotiko, stream, 3 July 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 48568 {TH 24} [S+B]), Delfoi, 23 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48729 {pb897} [S+A]), Kompotades, bunker, 11 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 2 ♀♀ (NMP 48644, 48645 {TH 106, 107} [S+B]), Marōneia, stream, 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 3 ♂♂, 1 ♀ (NMP 48638, 48640, 48641 {TH 100, 102, 103} [S+B], 48639 {TH 101} [S]), Marōneia, Kyklōpa Cave, 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 96658 {124/2007/Ř2} [S+A]), Naoysa, cave, 16–24 May 1937, leg. J. Mařan & K. Táborský; – 1 ♀ (NMP 48608 {TH 68} [S]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík; – 1 ♂ (NMP 49049 {pb2075} [S+A]), Pylī, Zachariadī Cave, 3 September 2001, leg. P. Benda.
Greece (Crete): 1 ♂ (NMP 91189 {pb3391} [S+A]), Amnisos, Eileithyia Cave, 4 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂, 1 ♀ (NMP 91195, 92293 {pb3399, 3568} [S+A]), Gerani, Geranioy Cave, 6 October 2006 & 8 October 2007, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂, 1 ♀ (NMP 91119 {pb3426} [S+A], 91120 {pb3427} [A]), Kolymvari, mine, 9 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 91048 {pb3354} [S+A]), Koymares, Arkoydiōtissa Cave, 28 September 2006, leg. P. Benda, V. Hanák & P. Hulva; – 2 ♂♂, 1 ♀ (NMP 92319, 92342, 92343 {pb3594, 3970, 3971 [S+A]), Kritsa, Gaidoyrotrypa Cave, 14 October 2007 & 31 May 2008, leg. P. Benda & V. Hanák; – 1 ♀ (NMP 92332 {pb3960} [S+A]), Leykogeia, Katō Prevelī Monastery, Venetian bridge, 30 May 2008, leg. P. Benda & V. Hanák; – 6 ♂♂, 3 ♀♀ (NMP 91101–91103, 91105, 91199, 91200 {pb3406–3410, 3412} [S+A], 91104, 91106, 91107 {pb3411, 3413, 3414} [A]), Milatos, Milatoy Cave, 7 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 2 ♂♂ (NMP 91177, 91178 {pb3377, 3378} [S+A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♀ (NMP

Table 6. Review of the bat specimens in the collection of the National Museum. Prague (NMP) from the western Balkans. Abbreviations: CR – Croatia, BH – Bosnia and Herzegovina, MN – Montenegro, SR – Serbia, KO – Kosovo, NM – North Macedonia, AL – Albania, GR – Greece (mainland), CR – Greece, Crete, GI – Greece, islands

	CR	BH	MN	SR	KO	NM	AL	GR	CR	GI	total
Rhinolophus ferrumequinum	7	–	1	–	2	–	57	12	26	4	109
Rhinolophus hipposideros	2	–	–	2	1	–	4	8	13	4	34
Rhinolophus euryale	–	–	–	–	–	1	9	11	–	–	21
Rhinolophus mehelyi	–	–	–	–	–	–	–	10	–	–	10
Rhinolophus blasii	3	–	–	–	1	–	16	15	9	5	49
Myotis myotis	2	–	–	–	–	1	22	41	–	–	66
Myotis blythii	13	–	3	–	–	1	16	8	6	3	50
Myotis bechsteinii	–	–	–	–	–	–	3	1	–	–	4
Myotis nattereri	1	1	–	–	1	–	2	8	–	–	13
Myotis emarginatus	–	3	6	–	–	–	5	1	–	3	18
Myotis davidii	–	–	4	–	–	–	7	11	3	–	25
Myotis brandtii	–	–	1	–	–	–	–	–	–	–	1
Myotis alcathoe	–	–	1	–	–	–	–	–	–	–	1
Myotis daubentonii	–	–	–	–	–	–	3	1	–	–	4
Myotis capaccinii	1	–	2	–	–	–	21	49	3	–	76
Myotis dasycneme	–	–	–	–	–	–	–	–	–	–	–
Vespertilio murinus	–	–	–	–	–	–	1	1	–	–	2
Eptesicus serotinus	–	–	–	–	–	–	10	11	1	–	22
Eptesicus anatolicus	–	–	–	–	–	–	–	–	–	1	1
Eptesicus nilssonii	–	–	–	–	–	–	–	–	–	–	–
Hypsugo savii	1	–	6	–	–	–	17	10	12	20	66
Pipistrellus pipistrellus	–	1	–	–	–	–	5	14	–	3	23
Pipistrellus pygmaeus	–	–	2	–	–	–	2	9	–	–	13
Pipistrellus hanaki	–	–	–	–	–	–	–	–	8	–	8
Pipistrellus nathusii	–	–	2	–	–	–	–	4	–	–	6
Pipistrellus kuhlii	10	–	3	–	–	–	7	17	15	2	54
Nyctalus noctula	–	–	–	–	–	–	14	1	–	1	16
Nyctalus leisleri	–	–	1	–	–	–	9	14	–	–	24
Nyctalus lasiopterus	–	–	–	–	–	–	–	1	–	–	1
Barbastella barbastellus	–	–	–	–	–	–	–	–	–	–	–
Plecotus auritus	–	–	–	–	–	–	1	1	–	–	2
Plecotus macrobullaris	–	–	–	–	–	–	–	–	4	–	4
Plecotus austriacus	–	–	–	1	–	–	–	1	–	–	2
Plecotus kolombatovici	1	1	–	–	–	–	–	12	11	12	37
Miniopterus schreibersii	21	–	1	–	–	–	25	27	25	2	101
Tadarida teniotis	–	–	–	–	–	–	7	1	–	4	12
total specimens	62	6	33	3	5	3	263	300	136	64	875
total species	11	4	13	2	4	3	23	28	13	13	33

91188 {pb3388} [S+A]), Patsos, Agios Antōnios Cave, 3 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 92291 {pb3566} [S+A]), Ploytī, Mikrī Lavyrinthos Cave, 7 October 2007, leg. P. Benda; – 1 ♂, 2 ♀♀ (NMP 92294, 92296 {pb3569, 3571} [S+A], 92295 {pb3570} [A]), Theriso, Sarakinas Cave, 8 October 2007, leg. P. Benda.

Greece (islands): 3 ♀♀ (NMP 48697–48699 {TH 161–163} [S+B]), Thassos, Arhaggeloy Monastery, spring, 26 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 48688 {TH 152} [S+B]), Thassos, Panagia, Drakotrypa Cave, 24 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. Frič (1864), Hanak et al. (1961), Hůrka (1962, 1963a, c), Hanák (1964), Červený & Kryštufek (1988), Kryštufek (1993), Hanák et al. (2001), Benda et al. (2006, 2009, 2014), Rossiter et al. (2007), Benda & Vallo (2012), [Jůn (2013)], Ševčík et al. (2013), Presetnik et al. (2014), this volume.

Table 7. Basic biometric data on the examined NMP specimens of *Rhinolophus ferrumequinum* (Schreber, 1774) from the mainland western Balkans (including those from the island of Thassos) and from Crete, and *R. euryale* Blasius, 1853 from the mainland western Balkans. For abbreviations see pp. 14, 212

	Rhinolophus ferrumequinum										*Rhinolophus euryale*				
	Western Balkans					Crete					Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	72	**57.38**	52.4	61.6	1.574	26	**55.92**	54.3	58.8	1.374	19	**48.25**	46.0	50.9	1.388
LCr	43	**23.90**	23.08	25.22	0.405	21	**23.42**	22.88	23.81	0.265	16	**19.12**	18.68	19.62	0.230
LOc	74	**23.42**	22.54	24.28	0.332	21	**22.81**	22.29	23.11	0.203	19	**18.63**	18.31	19.08	0.199
LCc	74	**20.84**	20.15	21.69	0.291	21	**20.43**	20.05	20.83	0.212	19	**16.23**	15.92	16.57	0.163
LaZ	75	**12.24**	11.74	12.84	0.205	21	**12.18**	11.64	12.84	0.263	18	**9.40**	9.02	9.72	0.198
LaI	75	**2.45**	2.09	2.96	0.170	21	**2.43**	2.24	2.88	0.184	19	**2.20**	2.05	2.34	0.065
LaInf	75	**6.20**	5.86	6.44	0.134	21	**6.13**	5.92	6.34	0.127	18	**4.67**	4.51	4.82	0.085
LaN	75	**9.39**	9.03	9.84	0.189	21	**9.33**	9.15	9.61	0.134	19	**8.29**	7.96	8.56	0.181
LaM	74	**10.54**	10.17	10.90	0.159	21	**10.34**	10.16	10.67	0.129	19	**9.45**	8.93	9.77	0.171
ANc	74	**6.96**	6.48	7.63	0.226	21	**6.92**	6.39	7.58	0.254	19	**6.02**	5.87	6.24	0.094
LBT	61	**3.55**	3.15	4.14	0.184	21	**3.48**	3.05	4.21	0.248	18	**3.04**	2.84	3.28	0.120
CC	75	**6.77**	6.42	7.19	0.161	21	**6.59**	6.34	6.86	0.141	18	**4.58**	4.32	4.71	0.105
M^3M^3	75	**8.78**	8.41	9.28	0.194	21	**8.61**	8.44	8.88	0.115	18	**6.56**	6.34	6.77	0.105
CM^3	75	**8.78**	8.49	9.16	0.148	21	**8.58**	8.42	8.75	0.093	19	**6.30**	6.11	6.54	0.107
LMd	75	**15.90**	15.22	16.67	0.232	21	**15.57**	15.13	16.13	0.254	17	**11.75**	11.47	12.08	0.148
ACo	75	**4.06**	3.74	4.38	0.151	21	**4.00**	3.76	4.18	0.113	18	**2.53**	2.24	2.64	0.102
CM_3	75	**9.42**	9.02	9.82	0.156	21	**9.27**	9.04	9.43	0.120	19	**6.68**	6.43	7.07	0.158

Remarks. Two specimens of *Rhinolophus ferrumequinum* from a sea cave near Selce, western Croatia, were collected in 1856 by Antonín Frič (1832–1913), a leading person of the natural history section of the Museum of the Kingdom of Bohemia (now the National Museum, NMP) in Prague (Vávra 1914), during his first trip to the western Balkans (Frič 1857, 1964). In his report on the trip, Frič (1964) mentioned a finding of several individuals of *Rhinolophus clivosus* [= *R. blasii*] in the cave, but not a collection of them. The respective specimens have been recently discovered in the museum collection and their identification revised.

The specimen of *R. ferrumequinum* labelled to originate from Dalmatia was collected at the beginning of the 20th century, at that time the Kingdom of Dalmatia covered the Adriatic coastal areas of the present-day south-eastern Croatia and north-western Montenegro. The specimen was transferred to the NMP collection along with other items in 1959 (Štěpánek 1975), when the remains of a store content of the former famous and important natural history trading company of Václav Frič (1839–1916), a brother of Antonín Frič, was confiscated by the Czechoslovakian state from Václav Frič's son Jaroslav (Spunarová 1994). The collection of this company was not primarily created as a scientific collection and the specimens lacked most data concerning their origin and taxonomic affiliation (Reiling & Spunarová 2005). Thus, more detailed data on the locality, date of collection and the collector of the Dalmatian specimen of *R. ferrumequinum* are not available.

Two specimens of *R. ferrumequinum* from the cave at the Mirusha waterfall near Mrasor, western Kosovo, represent a new finding of this species from the country, from where Paunović (2016) reports only four previous records.

The specimen of *R. ferrumequinum* originating from a cave near Naoussa (Naoysa/Νάουσα), western Macedonia, Greece, was collected during the NMP expedition to Greece in 1937 (Jůn

2013) and has been only recently discovered in the museum collection. However, from the area of Naoussa, *R. ferrumequinum* was documented already by Lindberg (1955).

The remaining specimens of *R. ferrumequinum* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *R. ferrumequinum* are shown in Table 7.

Rhinolophus hipposideros (Borkhausen, 1797)

Material. **Croatia**: 1 ♂, 1 ♀ (NMP 96815 {yu13/77} [S+A], 96816 {yu14/77} [A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
Serbia: 1 ♂ (NMP 38955 {612} [S+B]), Petnica, 23 May 1969, leg. J. Hanzák; – 1 ind. (NMP 96856 {106/69/0} [S+B]), Serbia (undef.), May 1969, leg. J. Hanzák.
Kosovo: 1 ♂ (NMP 96803 {pb2079} [S+A]), Bubël, cave, 27 October 2001, leg. P. Benda.
North Macedonia: 1 ♂ (NMP 96847 {yu55/77} [S+A]), north-eastern bank of the Ohrid Lake, 10 July 1977, leg. V. Tauber.
Albania: 1 ♂ (NMP 96541 {pb6140} [S+A]), Gjirokastër, castle, 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂ (NMP 96536 {pb6135} [S+A]), Gollomboç, Hermit Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂ (NMP 96531 {pb6130} [S+A]), Tren, Treni Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂ (NMP 96551 {pb6268} [A]), Vithkuq, chapel crypt, 27 June 2016, leg. P. Benda & M. Uhrin.
Greece (mainland): 1 ♂, 6 ♀♀ (NMP 48710–48715, 49028 {pb875, 877–881, 2054} [S+A]), Kompotades, bunker, 9 & 10 September 1996, 31 August 2001, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♀ (NMP 48643 {TH 105} [S+B]), Marōneia, Kyklōpa Cave, 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.
Greece (Crete): 1 ♂ (NMP 92303 {pb3578} [A]), Avdoy, Agios Fōteinīs Cave, 10 October 2007, leg. P. Benda; – 2 ♂♂, 1 ♀ (NMP 91193, 91194 {pb3397, 3398} [S+A], 92292 {pb3567} [A]), Gerani, Geranioy Cave, 6 October 2006 & 8 October 2007, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 92320 {pb3595} [S+A]), Kritsa, Gaidoyrotrypa Cave, 14 October 2007, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 91197, 91198 {pb3404, 3405} [S+A]), Milatos, Milatoy Cave, 7 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 92290 {pb3565} [A]), Ploytī, Mikrī Lavyrinthos Cave, 7 October 2007, leg. P. Benda; – 1 ♂ (NMP 92317 {pb3592} [S+A]), Sitanos, Exō Latsidi Cave, 13 October 2007, leg. P. Benda; – 2 ♂♂, 2 ♀♀ (NMP 92297–92300 {pb3572–3575} [S+A]), Theriso, Sarakinas Cave, 8 October 2007, leg. P. Benda.
Greece (islands): 1 ♂ (NMP 96614 {pb5432} [S+A]), Rhodes, Agios Paylos, 16 August 2012, leg. P. Benda; – 3 ♀♀ (NMP 96615, 96616 {pb5433 pb5434} [S+A], 96617 {pb5435} [A]), Rhodes, Gadoyra Dam, hut, 17 August 2012, leg. P. Benda.

References. Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006, 2009, 2011), Benda & Vallo (2012), Dool et al. (2013), Benda & Gaisler (2014), this volume.

Remarks. The specimen of *Rhinolophus hipposideros* from a cave near Bubël, western Kosovo, represents a new finding of this species from the country, from where Paunović (2016) reports only three previous records.

Two specimens of *R. hipposideros* from Serbia constitute new records of the species from this country. The specimen from Petnica, central Serbia, originates from a region of common occurrence of this species (Paunović 2016).

The specimen of *R. hipposideros* from the Ohrid lake shore, south-western North Macedonia, represents a new record from the country, from a region where the evidence of this bat is scarce (Kryštufek et al. 1992, Stojanovski 1994, Micevski et al. 2014).

The specimens from Rhodes constitute the first localised findings of *R. hipposideros* originating from this island. Till now, only a record with unspecified locality was available from Rhodes (Pieper 1966).

The remaining specimens of *R. hipposideros* from Croatia were published by Červený & Kryštufek (1988) and from Greece by Hanák et al. (2001) and Benda et al. (2009). None of these specimens represents a significant record concerning the species distribution range (see

Table 8. Basic biometric data on the examined NMP specimens of *Rhinolophus hipposideros* (Borkhausen, 1797) from the mainland western Balkans and from Crete and Rhodes, and *R. mehelyi* Matschie, 1901 from the mainland western Balkans. For abbreviations see pp. 14, 212

	Rhinolophus hipposideros										*Rhinolophus mehelyi*				
	Western Balkans					Crete & Rhodes					Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	17	**37.96**	34.9	39.8	1.376	16	**37.29**	36.2	39.1	0.708	10	**50.63**	49.2	52.1	0.945
LCr	14	**15.96**	15.33	16.64	0.374	13	**15.82**	15.25	16.02	0.191	10	**20.05**	19.65	20.52	0.256
LOc	16	**15.31**	14.76	15.98	0.323	12	**15.07**	14.92	15.22	0.092	10	**19.58**	19.28	20.08	0.235
LCc	16	**13.59**	13.02	14.21	0.328	12	**13.29**	13.08	13.47	0.097	10	**17.06**	16.81	17.43	0.209
LaZ	16	**7.47**	7.14	7.78	0.198	13	**7.53**	7.43	7.66	0.071	10	**10.32**	10.07	10.55	0.160
LaI	16	**1.62**	1.44	2.04	0.150	13	**1.48**	1.34	1.76	0.117	10	**2.47**	2.37	2.62	0.081
LaInf	16	**3.47**	3.26	3.67	0.089	13	**3.46**	3.36	3.56	0.068	10	**5.02**	4.93	5.22	0.088
LaN	16	**6.47**	6.24	6.74	0.157	13	**6.44**	6.21	6.72	0.128	10	**8.49**	8.30	8.67	0.117
LaM	16	**7.31**	7.13	7.54	0.150	13	**7.19**	6.98	7.31	0.106	10	**9.65**	9.47	9.78	0.108
ANc	15	**4.68**	4.48	4.91	0.105	12	**4.63**	4.49	4.81	0.090	10	**6.18**	5.93	6.38	0.140
LBT	16	**2.44**	2.21	2.98	0.185	13	**2.27**	2.12	2.51	0.117	10	**3.10**	2.95	3.32	0.132
CC	16	**3.37**	3.14	3.52	0.097	12	**3.39**	3.31	3.54	0.064	10	**4.95**	4.73	5.07	0.100
M^3M^3	16	**5.30**	5.12	5.45	0.118	13	**5.30**	5.07	5.53	0.130	10	**7.18**	7.05	7.38	0.096
CM^3	16	**5.30**	5.09	5.45	0.113	13	**5.24**	5.12	5.42	0.094	10	**6.66**	6.50	6.82	0.107
LMd	16	**9.61**	9.28	10.04	0.223	13	**9.44**	9.25	9.57	0.103	10	**12.55**	12.42	12.82	0.135
ACo	15	**1.97**	1.78	2.13	0.114	13	**2.03**	1.91	2.17	0.083	10	**2.86**	2.73	3.02	0.093
CM_3	16	**5.45**	5.27	5.62	0.096	13	**5.46**	5.31	5.62	0.088	10	**7.07**	6.88	7.27	0.114

Dietz et al. 2016). External and cranial dimensions of the examined specimens of *R. hipposideros* are shown in Table 8.

Rhinolophus euryale Blasius, 1853

Material. **North Macedonia**: 1 ♂ (NMP 96855 {–} [S]), Leskoec, cave, 18 September 1964, leg. H. Felten & G. Storch.
Albania: 6 ♂♂, 1 ♀ (NMP 96442 {B144} [S+A], 96444, 96450, 96451, 96460, 96461 {B148, 157, 158, 173, 174} [S+B], 96443 {B147} [B]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96355 {B12} [B]), Pishkash, Pishkashi Cave, 5 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96493 [S+A]), Albania (undef.), 1960, leg. V. Hanák.
Greece (mainland): 1 ♂ (NMP 96657 {47/2007/Ř1} [S+A]), Naoysa, cave, 16–24 May 1937, leg. J. Mařan & K. Táborský; – 8 ♂♂, 1 ♀ (NMP 48595, 48596, 48597, 48604, 48612–48615 {TH 52, 53, 56, 64, 72–75} [S+B], 48598 {TH 57} [S]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík; – 1 ♀ (NMP 49046 {pb2072} [S+A]), Pylī, Zachariadī Cave, 3 September 2001, leg. P. Benda.

References. Hanak et al. (1961), Hůrka (1962, 1963a), Hanák (1964), Felten et al. (1977), Kryštufek et al. (1992), Hanák et al. (2001), Benda et al. (2006), [Jůn (2013)], this volume.

Remarks. The specimen of *Rhinolophus euryale* originating from a cave near Naoussa (Naoysa/Νάουσα), western Macedonia, Greece, was collected during the NMP expedition to Greece in 1937 (Jůn 2013) and has been ony recently discovered in the museum collection. It represents the only record of this species in the centre of the western part of Macedonia.

The remaining NMP specimens of *R. euryale* from North Macedonia were published by Felten et al. (1977) and from Greece by Hanák et al. (2001). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *R. euryale* are shown in Table 7.

Rhinolophus mehelyi Matschie, 1901

Material. **Greece (mainland)**: 3 ♀♀ (NMP 48668–48670 {TH 132–134} [S+B]), Didymoteiho, cave, 22 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 48672 {TH 136} [S+B]), Kimmeria, mine, 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 48637 {TH 99} [S+B]), Marōneia, Kyklōpa Cave, 18 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 4 ♂♂, 1 ♀ (NMP 48591, 48592, 48600, 48602, 48605 {TH 48, 49, 60, 62, 65} [S+B]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík.

References. Hanák et al. (2001), Benda et al. (2006, 2014).

Remarks. The specimens of *Rhinolophus mehelyi* from Greece were published by Hanák et al. (2001). They do not represent any significant records concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *R. mehelyi* are shown in Table 8.

Rhinolophus blasii Peters, 1866

Material. **Croatia**: 1 ♂ (NMP 96808 {yu1/77} [S+W]), Mokošica, cave, 26 August 1977, leg. J. Červený & J. Kučera; – 1 ♂, 1 ♀ (NMP 96819, 96820 {yu18/77, yu20/77} [S+W]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
Kosovo: 1 ♀ (NMP 96802 {pb2078} [S+A]), Bubël, cave, 27 October 2001, leg. P. Benda.
Albania: 3 ♂♂, 1 ♀ (NMP 96543–96546 {pb6142–6145} [S+A]), Jermë, bunker, 28 January 2016: leg. F. Bego, P. Benda & M. Uhrin; – 3 ♂♂, 5 ♀♀ (NMP 96447, 96452, 96454, 96459 {B151, 160, 163, 171} [S+B], 96463 {B176} [S], 96446, 96448 {B150, 152} [A], 96453 {B162} [B]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96537 {pb6136} [S+A]), Mezhgoran, Mezhgorani Cave, 26 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96353, 96354 {B7, 8} [B]), Pishkash, Pishkashi Cave, 5 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96535 {pb6134} [S+A]), Tren, Treni II Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin.
Greece (mainland): 1 ♀ (NMP 48590 {TH 47} [S+B]), Aidonohōri, Aōos River, 28 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 3 ♀♀ (NMP 48634–48636 {TH 96–98} [B]), Marōneia, Kyklōpa Cave, 18 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 4 ♂♂, 3 ♀♀ (NMP 48593, 48594, 48599, 48601, 48603, 48606, 48607 {TH 50, 51, 58, 61, 63, 66, 67} [B]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík; – 2 ♂♂, 2 ♀♀ (NMP 51479–51482 {EE 24/91, EE 29–31/91} [S+A]), Stoypa near Kardamylī, cave, 7 & 8 July 1991, leg. M. Anděra & P. Zbytovský.
Greece (Crete): 1 ♂ (NMP 91190 {pb3392} [S+A]), Amnisos, Eileithyia Cave, 4 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 3 ♂♂ (NMP 92325, 92326 {pb3953, 3954} [S+A]), 92327 {pb3955} [A]), Katholiko Monastery, Agios Iōannis Cave, 27 May 2008, leg. P. Benda; – 1 ♀ (NMP 91179 {pb3379} [S+A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♀ (NMP 92312 {pb3587} [S+A]), Peykoi, Vreiko Cave, 12 October 2007, leg. P. Benda; – 2 ♂♂ (NMP 92348 {pb3976} [S+A], 92347 {pb3975} [A]), Royva Forest, Agios Iōannis Royva, 4 June 2008, leg. P. Benda, P. Georgiakakis & V. Hanák; – 1 ♀ (NMP 92301 {pb3576} [S+A]), Theriso, Sarakinas Cave, 8 October 2007, leg. P. Benda.
Greece (islands): 1 ♂ (NMP 96651 {pb6570} [S+A]), Kalymnos, Skalia Cave, 3 October 2017, leg. P. Benda & M. Uhrin; – 3 ♂♂ (NMP 92358, 92359 {pb4001, 4002} [S+A], 92357 {pb4000} [A]), Karpathos, Aperi, bridge, 30 September 2008, leg. P. Benda; – 1 ♀ (NMP 96727 {36/75} [B]), Petala, cave, 17 July 1956, leg. F. Baschieri Salvadori & S. Patrizi.

References. Lanza (1957), Hanak et al. (1961), Hůrka (1962, 1963a), Hanák (1964), Červený & Kryštufek (1988), Hanák et al. (2001), Kryštufek & Đulić (2001), Benda et al. (2006, 2009, 2012), Benda & Gaisler (2014), Benda & Uhrin (2017), this volume.

Remarks. The specimen of *Rhinolophus blasii* from a cave near Bubël, western Kosovo, represents the second finding of this species from this country and a part of its northern distribution limits in the western Balkans. The first Kosovan record was made in a small cave in the Rugova gorge near Pejë/Peć in 1958 (Paunović & Stamenković 1998, Paunović 2016), some 35 km north-west of Bubël.

The series of specimens collected in Karpathos constitutes the first exactly localised finding of *R. blasii* originating from this island. Till now, a record with only a roughly specified locality was available from Karpathos, between Aperi and Pigadhia (Pieper 1965).

Table 9. Basic biometric data on the examined NMP specimens of *Rhinolophus blasii* Peters, 1866 from the mainland western Balkans and from Crete and Dodecanese islands, and *Myotis myotis* (Borkhausen, 1797) from the mainland western Balkans. For abbreviations see pp. 14, 212

	Rhinolophus blasii										*Myotis myotis*				
	Western Balkans					Crete & Dodecaneses					Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	33	**47.00**	44.8	49.6	1.250	13	**46.68**	44.9	47.9	0.897	57	**62.38**	57.5	66.7	2.215
LCr	18	**19.63**	18.92	20.28	0.324	10	**19.68**	19.35	19.96	0.168	56	**24.05**	22.60	25.21	0.485
LOc	19	**19.10**	18.54	19.59	0.281	10	**19.09**	18.68	19.34	0.172	–	–	–	–	–
LCc/b	19	**16.69**	16.22	17.13	0.232	10	**16.63**	16.46	16.74	0.096	56	**22.90**	21.52	23.69	0.421
LaZ	19	**9.06**	8.67	9.31	0.171	10	**9.22**	9.07	9.34	0.086	55	**15.22**	14.56	15.74	0.300
LaI	19	**2.28**	2.07	2.55	0.129	10	**2.30**	2.13	2.51	0.116	56	**5.08**	4.76	5.37	0.164
LaInf	19	**4.60**	4.42	4.81	0.116	10	**4.72**	4.62	4.78	0.050	56	**6.12**	5.63	6.53	0.213
LaN	19	**8.24**	7.95	8.49	0.173	10	**8.41**	8.28	8.57	0.111	56	**10.05**	9.48	10.57	0.224
LaM	19	**9.11**	8.84	9.39	0.123	10	**9.17**	9.00	9.28	0.090	56	**10.96**	10.18	11.38	0.228
ANc	19	**6.12**	5.78	6.38	0.185	10	**6.11**	5.89	6.34	0.153	56	**8.18**	7.80	8.64	0.173
LBT	18	**3.29**	3.02	3.53	0.143	10	**3.41**	3.14	3.75	0.224	55	**4.25**	4.05	4.48	0.111
CC	18	**4.37**	4.08	4.55	0.131	10	**4.51**	4.28	4.67	0.132	56	**6.28**	5.74	6.61	0.153
M^3M^3	19	**6.37**	6.08	6.63	0.151	10	**6.51**	6.32	6.73	0.110	56	**9.88**	8.75	10.24	0.249
CM^3	19	**6.66**	6.35	6.94	0.144	10	**6.76**	6.62	6.92	0.095	56	**10.20**	9.54	10.72	0.212
LMd	19	**11.91**	11.58	12.21	0.180	10	**11.90**	11.72	12.16	0.133	56	**18.32**	17.33	18.94	0.349
ACo	19	**2.60**	2.38	2.78	0.128	10	**2.70**	2.63	2.85	0.065	56	**6.30**	5.72	6.74	0.215
CM_3	19	**6.96**	6.61	7.24	0.145	10	**7.11**	6.82	7.27	0.140	56	**10.97**	10.32	11.92	0.267

The remaining NMP specimens of *R. blasii* from Croatia were published by Červený & Kryštufek (1988) and from Greece by Lanza (1957), Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). These specimens do not represent any significant records concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *R. blasii* are shown in Table 9.

Myotis myotis (Borkhausen, 1797)

Material. **Croatia**: 2 ♂♂ (NMP 96831, 96832 {yu35/77, yu37/77} [S+A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
North Macedonia: 1 ♂ (NMP 96806 {pb5977} [S+A]), Gavato, bridge, 30 June 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Albania: 1 ♀ (NMP 96583 {pb6300} [S+A]), Berat Castle, 4 July 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96538 {pb6137} [S+A]), Gerhot, Viroi Spring, bunker, 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂ (NMP 96602 {pb6604} [S+A]), Golaj, Vlahëna River, 29 June 2018, leg. P. Benda; – 4 ♂♂, 7 ♀♀ (NMP 96388–96390, 96394, 96395, 96398, 96401, 96403, 96404, 96465 {B59, 60, 63, 68, 69, 73, 77, 79, 82, 180} [S+B], 96396 {B70} [S]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♀ (NMP 96552 {pb6269} [S+A]), Roshanj, Dëshnica River, 27 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96529 {pb6015} [S+A]), Selishtë, Dunica River, 9 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96532 {pb6131} [S+A]), Tren, Treni Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 3 ♂♂, 1 ♀ (NMP 96467, 96469, 96471, 96472 {B183, 185, 187, 188} [S+B]), Vanistër, Vanishta Cave, 12 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96604 {pb6606} [S+A]), Zall-Dardhë, Drini i Zi River, 30 June 2018, leg. P. Benda.
Greece (mainland): 6 ♂♂ (NMP 48620, 48673, 48675–48677 {TH 82, 137, 139–141} [S+B], 48619 {TH 81} [S]), Kimmeria, mine, 16 & 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 49047 {pb2073} [S+A]), Krya Nera, river, 4 September 2001, leg. P. Benda; – 8 ♂♂, 25 ♀♀ (NMP 58309, 96670–96675, 96704–96711, 96715–96722 (5/2007/Ř14–20, 20/2007/Ř49–56, 21/2007/Ř60–67} [S+A], 96676–96678, 96712–96714, 96723–96726 {5/2007/Ř21–23, 20/2007/Ř57–59, 21/2007/Ř68–71} [A]), Naoysa, cave, 12 July 1938, leg. J. Mařan & K. Táborský; – 1 ♀ (NMP 48558 {TH 13} [S+B]), Prionia, waterfall, 17 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík.

References. [Chalupský (1956)], Hanak et al. (1961), Hůrka (1962, 1963a), Hanák (1964), Červený & Kryštufek (1988), Benda & Horáček (1995), Hanák et al. (2001), Benda et al. (2006), this volume.

Remarks. The specimen of *Myotis myotis* from Gavato, south-western North Macedonia, represents a new record of this species from the country, where it belongs to common bats (Kryštufek et al. 1992, Kryštufek & Petkovski 2003).

The series of specimens of *M. myotis* originating from a cave near Naoussa (Naoysa/Νάουσα), western Macedonia, Greece, was collected during the NMP expedition to Greece in 1938 (Jůn 2013) and has been only recently discovered in the museum collection. However, from the area of Naoussa, *M. myotis* was documented already by Lindberg (1955).

The remaining specimens of *M. myotis* from Croatia were published by Červený & Kryštufek (1988) and from Greece by Hanák et al. (2001). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. myotis* are shown in Table 9.

Myotis blythii (Tomes, 1857)

Material. **Croatia**: 10 ♂♂, 3 ♀♀ (NMP 96833–96843 {yu38/77–yu49/77} [S+A], 96844, 96845 {yu50/77, yu51/77} [A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
Montenegro: 1 ♂ (NMP 90217 {pb2397} [A]), Rijeka Crnojevića, Rijeka Crnojevića River, 1 August 2002, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 90218, 90219 {pb2398, 2399} [S+A]), Rijeka Crnojevića, Obodska Cave, 1 August 2002, leg. P. Benda.
North Macedonia: 1 ♂ (NMP 96807 {pb5978} [S+A]), Gavato, bridge, 30 June 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Albania: 2 ♂♂ (NMP 96495, 96496 {pb5981, 5982} [S+A]), Gjirokastër Castle, 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96561 {pb6278} [S+A]), Jermë, bunker, 1 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96506 {pb5992} [S+A]), Trekëndore Fortress, 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 2 ♀♀ (NMP 96499, 96500 {pb5985, 5986} [S+A]), Krongj, Vris stream, 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂, 5 ♀♀ (NMP 96391–96393, 96399, 96400, 96402 {B64, 66, 67, 75, 76, 78} [S+B]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96548 {pb6261} [S+A]), Nikollarë, Devolli River, 26 June 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96507 {pb5993} [S+A]), Shalës, Pavllo River, 4 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♀ (NMP 96606 {pb6608} [A]), Urakë, Tarini River, 2 July 2018, leg. P. Benda; – 1 ♂ (NMP 96582 {pb6299} [S+A]), Visokë, Gjanica River, 3 July 2016, leg. P. Benda & M. Uhrin.
Greece (mainland): 1 ♂ (NMP 48671 {TH 135} [S+B]), Didymoteiho, cave, 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 4 ♂♂, 1 ♀ (NMP 48617, 48618, 48621, 48627, 48674 {TH 79, 80, 83, 89, 138} [S+B]), Kimmeria, mine, 16 & 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ind. (NMP 48580 {TH 37} [S]), Papigko, cave, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♀ (NMP 48559 {TH 14} [S+B]), Prionia, waterfall, 17 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík.
Greece (Crete): 2 ♂♂ (NMP 92328 {pb3956} [S+A], 92329 {pb3957} [A]), Katholiko Monastery, Agios Iōannis Cave, 27 May 2008, leg. P. Benda; – 1 ♂, 2 ♀♀ (NMP 92333–92335 {pb3961–3963} [S+A]), Leykogeia, Katō Prevelī Monastery, Venetian bridge, 30 May 2008, leg. P. Benda & V. Hanák; – 1 ♀ (NMP 91108 {pb3415} [S+A]), Milatos, Milatoy Cave, 7 October 2006, leg. P. Benda, V. Hanák & P. Hulva.
Greece (islands): 1 ♀ (NMP 92360 {pb4003} [S+A]), Karpathos, Olympos, 1 October 2008, leg. P. Benda; – 2 ♂♂ (NMP 96632, 96633 {pb5450, 5451} [S+A]), Symi, Karo, Agios Anargyros Monastery, 24 August 2012, leg. P. Benda.

References. Hanak et al. (1961), Hůrka (1962, 1963a), Hanák (1964), Červený & Kryštufek (1988), Benda & Horáček (1995), Hanák et al. (2001), Benda et al. (2006, 2009), [Georgiakakis et al. (2012)], Ševčík et al. (2013), Presetnik et al. (2014), Benda & Uhrin (2017), this volume.

Remarks. The specimen of *Myotis blythii* from Gavato, south-western North Macedonia, represents a new record of this species from the country, where it ranks among rather uncommon bats (Kryštufek et al. 1992, Kryštufek & Petkovski 2003).

The specimen from Karpathos constitutes the second localised finding of *M. blythii* from this island. Till now, only one record with specified locality was published, von Wettstein (1942)

Table 10. Basic biometric data on the examined NMP specimens of *Myotis blythii* (Tomes, 1857) from the mainland western Balkans and from Crete and Dodecanese islands, and *M. bechsteinii* (Kuhl, 1817) from the mainland western Balkans. For abbreviations see pp. 14, 212

	Myotis blythii										*Myotis bechsteinii*				
	Western Balkans					Crete & Dodecaneses					Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	40	**57.30**	53.6	62.7	1.935	9	**59.10**	56.5	61.0	1.360	4	**42.55**	41.5	42.9	0.700
LCr	37	**21.24**	19.83	22.33	0.475	8	**22.27**	21.03	22.93	0.611	4	**17.56**	17.47	17.68	0.105
LCb	36	**20.20**	19.21	21.10	0.436	8	**21.16**	19.84	21.97	0.659	4	**16.49**	16.32	16.58	0.120
LaZ	36	**13.69**	12.95	14.19	0.321	8	**14.18**	13.32	15.04	0.522	4	**10.41**	10.26	10.72	0.213
LaI	37	**5.01**	4.72	5.33	0.156	8	**5.05**	4.75	5.26	0.165	4	**4.09**	3.93	4.22	0.120
LaInf	37	**5.41**	4.91	5.88	0.237	8	**5.61**	5.14	6.29	0.332	4	**3.84**	3.52	4.03	0.230
LaN	37	**9.52**	9.13	9.93	0.211	8	**9.75**	9.52	10.19	0.233	4	**7.92**	7.76	8.25	0.225
LaM	37	**9.96**	9.58	10.34	0.209	8	**10.33**	9.87	10.81	0.281	4	**8.43**	8.42	8.45	0.013
ANc	36	**7.47**	7.07	8.02	0.226	8	**7.78**	7.31	8.19	0.265	4	**5.91**	5.68	6.25	0.253
LBT	34	**3.64**	3.35	3.92	0.143	8	**3.81**	3.58	3.98	0.149	4	**3.50**	3.42	3.60	0.077
CC	37	**5.66**	5.32	6.04	0.196	8	**5.77**	5.41	6.01	0.184	4	**4.16**	4.07	4.28	0.100
M^3M^3	37	**8.78**	8.28	9.32	0.249	8	**8.95**	8.23	9.36	0.350	4	**6.99**	6.83	7.21	0.176
CM^3	37	**8.79**	8.34	9.24	0.206	8	**9.17**	8.67	9.52	0.257	4	**7.13**	7.04	7.18	0.061
LMd	37	**16.11**	15.42	16.98	0.370	8	**16.91**	15.75	17.64	0.623	4	**12.82**	12.63	12.95	0.136
ACo	37	**5.18**	4.53	5.68	0.243	8	**5.46**	4.93	5.81	0.261	4	**4.05**	3.79	4.23	0.188
CM_3	37	**9.41**	9.02	9.95	0.224	8	**9.83**	9.22	10.17	0.300	4	**7.54**	7.41	7.73	0.153

mentioned a male collected at Finiki in 1935, while another record naming only Karpathos as the site was made in 1964 (Pieper 1965).

The remaining specimens of *M. blythii* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. blythii* are shown in Table 10.

Myotis bechsteinii (Kuhl, 1817)

Material. **Albania**: 1 ♀ (NMP 96601 {pb6603} [S+A]), Dragobi, beech forest, 28 June 2018, leg. P. Benda; – 1 ♀ (NMP 96600 {pb6602} [S+A]), Kimëz, river, 27 June 2018, leg. P. Benda; – 1 ♂ (NMP 96509 {pb5995} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♀ (NMP 49018 {pb2044} [S+A]), Spatharīs, stream, 24 August 2001, leg. P. Benda.
References. Hanák et al. (2001), Kerth et al. (2008), Benda et al. (2012), this volume.

Remarks. The specimen of *Myotis bechsteinii* from near Spatharis, central Peloponnese, Greece, represents the southernmost record of this bat species in the Balkans (Hanák et al. 2001, Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. bechsteinii* are shown in Table 10.

Myotis nattereri (Kuhl, 1817)

Material. **Croatia**: 1 ♂ (NMP 96817 {yu15/77} [S+A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.

Bosnia and Herzegovina: 1 ♂ (NMP 96813 {yu8/77} [S+A]), Zavala, Bjelušica Cave, 29 August 1977, leg. J. Červený & J. Kučera.
Kosovo: 1 ♂ (NMP 96801 {pb2076} [S+A]), Brezovicë, bridge, 22 October 2001, leg. P. Benda.
Albania: 1 ♂ (NMP 96508 {pb5994} [S+A]), Tepelenë Castle, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96510 {pb5996} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 4 ♀♀ (NMP 49024, 49027 {pb2050, 2053} [S+A], 49025, 49026 {pb2051, 2052} [A]), Mystras, ruins of Byzantine town, 27 August 2001, leg. P. Benda; – 1 ♂ (NMP 48581 {TH 38} [S+B]), Papigko, cave, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48560 {TH 15} [S+B]), Prionia, waterfall, 17 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 2 ♂♂ (NMP 49019, 49020 {pb2045, 2046} [S+A]), Viziki, bridge, 25 August 2001, leg. P. Benda.

References. [Horáček & Hanák (1984)], Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006), this volume.

Remarks. The specimen of *Myotis nattereri* collected at the Bjelušica Cave, southern Herzegovina (Červený & Kryštufek 1988), represented the first and only record of this species from Bosnia and Herzegovina until 2014 (see Karapandža et al. 2014), when two new findings were made near Mostar, some 50 km north of the previous site (Rnjak et al. 2017); other records of this bat from the country followed soon after (Hodžić et al. 2017, Presetnik 2017, Lobbová et al. 2018, Presetnik et al. 2019).

The specimen collected at Brezovicë, southern Kosovo, in 2001 represents the first record of *M. nattereri* from the country, while another (unspecified) finding was made in 2017–2018 (Presetnik et al. 2018).

The specimen of *M. nattereri* from Croatia was published by Červený & Kryštufek (1988) and the specimens from Greece by Hanák et al. (2001). These specimens do not represent any significant records concerning the species distribution range (see Dietz et al. 2016).

External and cranial dimensions of the examined specimens of *M. nattereri* are shown in Table 11.

Myotis emarginatus (Geoffroy, 1806)

Material. **Bosnia and Herzegovina**: 3 ♂♂ (NMP 96810, 96811 {yu5/77, yu6/77} [S+A], 96812 {yu7/77} [A]), Zavala, Bjelušica Cave, 29 August 1977, leg. J. Červený & J. Kučera.
Montenegro: 2 ♂♂, 2 ♀♀ (NMP 90213–90216 {pb2393–2396} [S+A]), Rijeka Crnojevića, Rijeka Crnojevića River, 1 August 2002, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 90206, 90207 {pb2386, 2387} [S+A]), Risan, Sopot Cave, 31 July 2002, leg. P. Benda.
Albania: 1 ♀ (NMP 96605 {pb6607} [S+A]), Fshat, river, 1 July 2018, leg. P. Benda; – 1 ♀ (NMP 96497 {pb5983} [S+A]), Gjirokastër Castle, 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 2 ♀♀ (NMP 96501, 96502 {pb5987, 5988} [S+A]), Krongj, Vris stream, 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96524 {pb6010} [S+A]), Selcë, Selca River, 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♀ (NMP 48630 {TH 92} [S+B]), Xanthī, Kosynthos River, 17 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.
Greece (islands): 3 ♂♂ (NMP 96624, 96625 {pb5442, 5443} [S+A]), 96626 {pb5444} [A]), Symi, Ampeli, Kourkouniōtīs, 23 August 2012, leg. P. Benda.

References. Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006), Presetnik et al. (2014), Benda & Uhrin (2017), this volume.

Remarks. The specimens of *Myotis emarginatus* from Bosnia nad Herzegovina were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001) and Benda & Uhrin (2017). These specimens do not represent any significant records concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. emarginatus* are shown in Table 11.

Table 11. Basic biometric data on the examined NMP specimens of *Myotis nattereri* (Kuhl, 1817), *M. emarginatus* (Geoffroy, 1806), and *M. dubentonii* (Kuhl, 1817) from the mainland western Balkans. For abbreviations see pp. 14, 212

	Myotis nattereri Western Balkans					*Myotis emarginatus* Western Balkans					*Myotis daubentonii* Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	13	**39.82**	37.2	41.6	1.242	18	**38.93**	37.2	42.8	1.394	4	**36.85**	34.8	38.5	1.752
LCr	11	**15.75**	14.83	16.43	0.440	16	**15.57**	14.77	16.28	0.385	3	**14.30**	13.79	14.74	0.480
LCb	11	**14.73**	13.76	15.27	0.417	16	**14.68**	14.02	15.34	0.342	3	**13.63**	13.40	14.03	0.345
LaZ	10	**9.95**	9.58	10.47	0.268	16	**9.64**	9.29	10.19	0.242	3	**9.00**	8.68	9.34	0.330
LaI	11	**3.76**	3.55	3.98	0.131	16	**3.53**	3.26	3.93	0.158	3	**3.97**	3.92	4.02	0.050
LaInf	11	**3.90**	3.68	4.14	0.128	16	**3.73**	3.47	4.12	0.172	3	**3.70**	3.61	3.82	0.108
LaN	11	**7.82**	7.21	8.34	0.279	16	**7.33**	6.91	8.28	0.297	3	**7.63**	7.46	7.75	0.151
LaM	11	**7.90**	7.54	8.35	0.228	16	**7.97**	7.82	8.24	0.141	3	**7.83**	7.74	7.93	0.095
ANc	11	**5.64**	5.33	5.89	0.154	16	**5.77**	5.61	5.93	0.110	3	**5.31**	5.22	5.41	0.095
LBT	11	**2.83**	2.61	3.04	0.146	16	**2.82**	2.56	3.12	0.176	3	**3.39**	3.21	3.64	0.225
CC	11	**4.02**	3.86	4.20	0.123	16	**4.03**	3.81	4.97	0.280	3	**3.72**	3.58	3.81	0.123
M^3M^3	11	**6.40**	6.13	6.70	0.180	16	**6.05**	5.71	6.53	0.248	3	**5.72**	5.71	5.74	0.015
CM^3	11	**6.11**	5.48	6.52	0.271	16	**6.27**	5.92	6.57	0.169	3	**5.12**	4.92	5.23	0.174
LMd	11	**11.46**	10.56	12.02	0.388	16	**11.49**	10.88	11.91	0.283	3	**10.06**	9.82	10.38	0.288
ACo	11	**3.34**	2.93	3.61	0.194	16	**3.47**	3.33	3.71	0.081	3	**2.97**	2.83	3.07	0.123
CM_3	11	**6.50**	5.91	6.86	0.251	16	**6.64**	6.32	6.89	0.166	3	**5.64**	5.45	5.96	0.279

Myotis davidii (Peters, 1869)

Material. **Montenegro**: 1 ♂ (NMP 90226 {pb2406} [S+A]), Stabna, Vrbnica River, 8 August 2002, leg. P. Benda; – 1 ♂ (NMP 90208 {pb2388} [S+A]), Risan, Sopot Cave, 31 July 2002, leg. P. Benda; – 2 ♂♂ (NMP 96850, 96851 {3, 4} [S+A]), Vusanje, 1 August 2007, leg. M. Kubešová.
Albania: 1 ♂ (NMP 96570 {pb6287} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96587, 96588 {pb6304, 6305} [S+A]), Krajkë, Zerdjani River, 7 July 2016, leg. P. Benda; – 1 ♀ (NMP 96599 {pb6601} [S+A]), Prekal, Kiri River, 25 June 2018, leg. P. Benda; – 1 ♀ (NMP 96553 {pb6270} [S+A]), Roshanj, Dëshnica River, 27 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96525, 96526 {pb6011, 6012} [S+A]), Selcë, Selca River, 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♀ (NMP 48517 {TH 174} [S]), Metamorfōsī, Havrias River, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂, 3 ♀♀ (NMP 48512–48515 {TH 5, 7, 8, 10} [S+B]), Ormylia, Havrias River, 14 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 49044 {pb2070} [S+A]), Pappagiannīs, Sakoylevas River, 2 September 2001, leg. P. Benda; – 1 ♀ (NMP 48516 {TH 16} [S+B]), Prionia, waterfall, 17 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♀ (NMP 48518 {TH 3} [B]), Rentina, stream in a gorge, 12 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♀ (NMP 49017 {pb2043} [S+A]), Simopoylo, Pīneios River, 23 August 2001, leg. P. Benda; – 1 ♀ (NMP 48346 {pb908} [S+A]), Spartī, Eyrōtas River, 16 September 1996, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 51477 {EE 23/91} [S+A]), Stoypa near Kardamylī, cave, 7 July 1991, leg. M. Anděra & P. Zbytovský.
Greece (Crete): 1 ♂ (NMP 91191 {pb3393} [S+A]), Meskla, stream, 5 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♀ (NMP 92330 {pb3958} [S+A]), Katholiko Monastery, Agios Iōannis Cave, 27 May 2008, leg. P. Benda; – 1 ♂ (NMP 48345 {KR 2} [S+A]), Stayros, cave, 10 July 1995, leg. I. Horáček.

References. Benda & Tsytsulina (2000), Hanák et al. (2001), Benda (2004a), [Benda (2004b)], Benda & Karataş (2005), Benda et al. (2006, 2009, 2012, 2016a), Ševčík et al. (2013), Presetnik et al. (2014), this volume.

Remarks. Two recently collected specimens of *Myotis davidii* from Vusanje, eastern Montenegro, represent a new locality of this bat, situated close to the northern limits of its occurrence in the western Balkans.

All other specimens of *M. davidii* from Montenegro were published by Benda (2004a) and from Greece by Hanák et al. (2001) and Benda et al. (2009), all under the name *M. aurascens* Kuzâkin, 1935. These specimens do not represent any significant records concerning the species distribution

range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. davidii* are shown in Table 12.

Myotis brandtii (Eversmann, 1845)

Material. **Montenegro**: 1 ♀ (NMP 90227 {pb2407} [S+A]), Stabna, Vrbnica River, 8 August 2002, leg. P. Benda.

References. Benda (2004a), Benda & Karataş (2005), Presetnik et al. (2014), Benda et al. (2016a).

Remarks. The specimen of *Myotis brandtii* from Stabna, north-western Montenegro, constitutes the second record of the species from the country (Benda 2004a, Presetnik et al. 2014). The first record of this bat in Montenegro is represented by the ZIN specimen collected by a Russian zoologist Vladimir E. Martino (1889–1961) at the Čakor pass in 1939 and named *Myotis mystacinus brandti* on the specimen label. Hanák (1965) examined this specimen and identified it identically, as *M. m. brandti*, and considered it along with two specimens of *M. davidii* (from Pejë/Peć, Kosovo, and Kočani, North Macedonia) as an indication of *M. brandtii* occurrence in the Balkans (based on the skull dimensions), but he did not mention their specific localities (see Benda 1999). However, the Čakor specimen itself was first published as *M. mystacinus* [s.l.] by Petrov (1967), and was later affiliated to *M. brandtii* by Strelkov (1983) and Benda (1999).

External and cranial dimensions of the examined specimen of *M. brandtii* are shown in Table 12.

Myotis alcathoe von Helversen et Heller, 2001

Material. **Montenegro**: 1 ♀ (NMP 90228 {pb2408} [S+A]), Stabna, Vrbnica River, 8 August 2002, leg. P. Benda.

References. Benda (2004a), Benda & Karataş (2005), Benda et al. (2012, 2016a), Presetnik et al. (2014).

Remarks. The specimen of *Myotis alcathoe* from Stabna, north-western Montenegro, was initially published under a tentative identification as *M. mystacinus* s.str. or *M. alcathoe* by Benda (2004a). The proper identification, based on a molecular genetic examination, was published by Benda et al. (2012). The specimen represents the first and only evidence of the species from Montenegro (Presetnik et al. 2014). External and cranial dimensions of the examined specimen of *M. alcathoe* are shown in Table 12.

Myotis daubentonii (Kuhl, 1817)

Material. **Albania**: 2 ♂♂ (NMP 96555 {pb6272} [S+A], 96554 {pb6271} [A]), Roshanj, Dëshnica River, 27 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96527 {pb6013} [S+A]), Selcë, Selca River, 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♀ (NMP 48552 {TH 2} [S+B]), Rentina, stream in a gorge, 12 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík.

References. Hanák et al. (2001), this volume.

Remarks. The specimen of *Myotis daubentonii* collected at Rentina, Macedonia, Greece, represents one of the records delimiting the southern margin of the species distribution range in the Balkans (Hanák et al. 2001, Dietz et al. 2016).

External and cranial dimensions of the examined specimens of *M. daubentonii* are shown in Table 11.

Table 12. Basic biometric data on the examined NMP specimens of *Myotis davidii* (Peters, 1869) from the mainland western Balkans and from Crete, *M. brandtii* (Eversmann, 1845) and *M. alcathoe* von Helversen et Heller, 2001 from Montenegro, and *Eptesicus anatolicus* Felten, 1971 from Rhodes. For abbreviations see pp. 14, 212

	Myotis davidii										*Myotis brandtii*	*Myotis alcathoe*	*Eptesicus anatolicus*
	Western Balkans					Crete							
	n	**M**	min	max	SD	n	**M**	min	max	SD	90227	90228	96643
LAt	22	**35.55**	34.1	36.6	0.685	3	**33.77**	33.7	33.8	0.058	35.2	31.8	50.7
LCr	21	**14.14**	13.72	14.61	0.271	3	**13.71**	13.62	13.82	0.103	14.14	12.97	18.47
LCb	21	**13.39**	13.05	13.88	0.231	3	**13.13**	13.02	13.28	0.135	13.41	12.32	18.04
LaZ	19	**8.57**	8.30	8.83	0.159	3	**8.19**	8.04	8.42	0.200	8.69	7.26	12.93
LaI	21	**3.39**	3.22	3.63	0.111	3	**3.32**	3.27	3.40	0.070	3.78	3.18	3.65
LaInf	21	**3.34**	3.06	3.51	0.133	3	**3.22**	3.15	3.28	0.066	3.83	3.22	5.81
LaN	21	**6.78**	6.48	7.14	0.157	3	**6.54**	6.45	6.60	0.081	6.98	6.14	8.51
LaM	21	**7.24**	6.98	7.61	0.140	3	**6.94**	6.87	7.03	0.083	7.32	6.75	10.01
ANc	21	**4.94**	4.63	5.27	0.169	3	**4.63**	4.51	4.77	0.131	4.66	4.39	6.18
LBT	21	**2.82**	2.48	3.28	0.186	3	**2.78**	2.75	2.82	0.035	3.12	2.66	3.93
CC	21	**3.45**	3.22	3.58	0.114	3	**3.37**	3.15	3.52	0.193	3.49	3.08	5.76
M^3M^3	21	**5.44**	5.07	5.61	0.143	3	**5.27**	5.13	5.38	0.127	5.37	4.75	7.94
CM^3	21	**5.26**	5.05	5.47	0.113	3	**5.23**	5.17	5.32	0.078	5.31	4.92	7.02
LMd	21	**10.01**	9.70	10.28	0.174	3	**9.78**	9.64	9.92	0.140	10.07	9.36	13.63
ACo	21	**2.85**	2.67	3.02	0.094	3	**2.74**	2.63	2.83	0.103	2.94	2.76	5.24
CM_3	21	**5.67**	5.47	5.88	0.112	3	**5.53**	5.50	5.57	0.035	5.58	5.23	7.64

Myotis capaccinii (Bonaparte, 1837)

Material. **Croatia**: 1 ♂ (NMP 96814 {yu11/77} [S+W]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
Montenegro: 2 ♂♂ (NMP 90211, 90212 {pb2391, 2392} [S+A]), Rijeka Crnojevića, Rijeka Crnojevića River, 1 August 2002, leg. P. Benda.
Albania: 2 ♂♂ (NMP 96539, 96540 {pb6138, 6139} [S+A]), Gerhot, Viroi Spring, bunker, 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♀ (NMP 96542 {pb6141} [S+A]), Gjirokastër Castle, 27 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 15 ♂♂ (NMP 96407–96410, 96412, 96414–96417, 96421 {B90, 94–96, 99, 106, 107, 109, 110, 115} [S+B], 96405, 96411, 96413, 96420 {B83, 97, 102, 114} [S], 96419 {B113} [B]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96594 {pb6311} [S+A]), Selcë, Cemi River, 9 July 2016, leg. P. Benda; – 1 ♂ (NMP 96533 {pb6132} [S+A]), Tren, Treni Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♀ (NMP 96607 {pb6609} [A]), Urakë, Tarini River, 2 July 2018, leg. P. Benda.
Greece (mainland): 1 ♂, 6 ♀♀ (NMP 48658–48664 {TH 122–128} [S+B]), Didymoteiho, cave, 22 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 48626 {TH 88} [S]), Kimmeria, mine, 16 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 3 ♂♂, 1 ♀ (NMP 48582–48584 {TH 39–41} [S+B], 48616 {TH 76} [S]), Kleidōnia, Voidomatīs River, 27 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 49048 {pb2074} [S+A]), Krya Nera, river, 4 September 2001, leg. P. Benda; – 6 ♂♂, 4 ♀♀ (NMP 48647–48656 {TH 110–119} [S+B]), Marōneia, stream, 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 9 ♂♂, 16 ♀♀ (NMP 96679–96692 {132/2007/Ř24–37} [S+A], 96693–96703 {132/2007/Ř38–48} [A]), Naoysa, cave, 12 July 1938, leg. J. Mařan & K. Táborský; – 1 ♀ (NMP 49023 {pb2049} [A]), Tzanes, river, 26 August 2001, leg. P. Benda.
Greece (Crete): 2 ♀♀ (NMP 92345, 92346 {pb3973, 3974} [S+A]), Argyroypolī, Mavselas River, 3 June 2008, leg. P. Benda & V. Hanák; – 1 ♀ (NMP 91196 {pb3400} [S+A]), Dramia, Petres Bridge, 6 October 2006, leg. P. Benda, V. Hanák & P. Hulva.

References. [Chalupský (1956)], Hanak et al. (1961), Hůrka (1962, 1963a), Hanák (1964), Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006, 2009, 2012), [Jůn (2013)], Ševčík et al. (2013), Presetnik et al. (2014), this volume.

Remarks. The series of specimens of *Myotis capaccinii* originating from a cave near Naoussa (Naoysa/Νάουσα), western Macedonia, Greece, was collected during the NMP expedition to Greece

in 1938 (Jůn 2013) and has been only recently discovered in the museum collection. However, from the area of Naoussa, *M. capaccinii* was documented already by Lindberg (1955).

The remaining NMP specimens of *M. capaccinii* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001) and Benda et al. (2009). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *M. capaccinii* are shown in Table 13.

Vespertilio murinus Linnaeus, 1758

Material. **Albania**: 1 ♂ (NMP 96556 {pb6273} [S+A]), Roshanj, Dëshnica River, 27 June 2016, leg. P. Benda & M. Uhrin.
Greece (mainland): 1 ♂ (NMP 48557 {TH 12} [S+B]), Prionia, waterfall, 17 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík.

References. Hanák et al. (2001), this volume.

Remarks. The specimen of *Vespertilio murinus* collected at a waterfall of the Enipeas river at Prionia in the Olympos Mountains in southern Macedonia, Greece, represents the southernmost verified record of this bat in Europe (Hanák et al. 2001, see above). External and cranial dimensions of the examined specimens of *V. murinus* are shown in Table 13.

Eptesicus serotinus (Schreber, 1774)

Material. **Albania**: 2 ♀♀ (NMP 96562, 96563 {pb6279, 6280} [S+A]), Borsh, Borshi River, 1 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96571 {pb6288} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96593 {pb6310} [S+A]), Ndërlysaj, Thethi River, 8 July 2016, leg. P. Benda; – 2 ♀♀ (NMP 96549 {pb6266} [S+A], 96550 {pb6267} [A]), Nikollarë, Devolli River, 26 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96558 {pb6275} [S+A]), Tepelenë, Bënça River, 30 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96534 {pb6133} [S+A]), Tren, Treni Cave, 25 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♀ (NMP 96586 {pb6303} [S+A]), Zgosht, Zalli i Shëmilit & Zalli i Lurikut Rivers confluence, 6 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96511 {pb5997} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 9 ♀♀ (NMP 48679–48687 {TH 151} [S+B]), Galanī, cave, 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 48723 {pb891} [S+A]), Kompotades, Sperheios River, 9 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♂ (NMP 48646 {TH 109} [S]], Marōneia, stream, 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.
Greece (Crete): 1 (NMP 91087 {pb3394} [S+A]), Meskla, stream, 5 October 2006, leg. P. Benda, V. Hanák & P. Hulva.

References. Hanák et al. (2001), Benda et al. (2006, 2009), Juste et al. (2013), this volume.

Remarks. The specimens of *Eptesicus serotinus* from mainland Greece were published by Hanák et al. (2001) and the specimen from Crete by Benda et al. (2009). These specimens do not represent any significant records concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *E. serotinus* are shown in Table 14.

Eptesicus anatolicus Felten, 1971

Material. **Greece (islands)**: 1 ♀ (NMP 96643 {pb5461} [S+A]), Rhodes, Stegna, cave, 27 August 2012, leg. P. Benda & M. Uhrin.

References. –

Remarks. The specimen of *Eptesicus anatolicus* from Rhodes constitutes a new record of this bat from the island. However, it does not represent a rare faunal element there (see von Helversen

Table 13. Basic biometric data on the examined NMP specimens of *Myotis capaccinii* (Bonaparte, 1837) from the mainland western Balkans and from Crete, and *Vespertilio murinus* Linnaeus, 1758 from the mainland western Balkans. For abbreviations see pp. 13, 212

	Myotis capaccinii										*Vespertilio murinus*	
	Western Balkans					Crete					Albania	Greece
	n	**M**	min	max	SD	n	**M**	min	max	SD	96556	48557
LAt	50	**41.49**	36.8	43.4	1.153	3	**41.03**	40.2	41.5	0.723	45.5	43.8
LCr	51	**15.51**	14.83	16.02	0.262	3	**15.10**	14.87	15.27	0.207	15.22	14.96
LCb	46	**14.47**	13.98	15.07	0.289	3	**14.22**	14.16	14.28	0.060	15.18	14.68
LaZ	41	**9.41**	8.83	9.83	0.184	1	9.32				9.93	9.33
LaI	52	**3.62**	3.37	5.53	0.283	3	**3.56**	3.54	3.61	0.040	4.01	3.88
LaInf	51	**3.83**	3.58	4.08	0.115	3	**3.71**	3.67	3.73	0.032	5.67	5.27
LaN	51	**7.94**	7.58	8.26	0.151	3	**7.76**	7.73	7.81	0.042	7.88	7.43
LaM	51	**8.10**	7.74	8.36	0.143	3	**7.99**	7.85	8.06	0.118	8.78	8.75
ANc	49	**5.72**	5.46	6.12	0.125	3	**5.57**	5.42	5.76	0.172	5.07	5.00
LBT	48	**3.04**	2.73	3.44	0.128	3	**3.04**	2.94	3.16	0.111	3.65	3.62
CC	49	**3.91**	3.65	4.08	0.086	3	**3.90**	3.88	3.93	0.029	5.23	4.77
M^3M^3	51	**6.04**	5.57	6.47	0.157	3	**5.97**	5.96	5.98	0.012	6.47	5.72
CM_3	51	**5.69**	5.48	5.92	0.126	3	**5.69**	5.61	5.79	0.092	5.42	5.07
LMd	51	**10.84**	10.44	11.31	0.208	3	**10.69**	10.64	10.75	0.055	11.04	10.73
ACo	51	**2.97**	2.73	3.28	0.113	3	**2.90**	2.81	2.98	0.086	3.44	3.42
CM_3	51	**6.00**	5.77	6.24	0.115	3	**5.95**	5.91	5.98	0.038	5.76	5.37

1998). External and cranial dimensions of the examined specimen of *E. anatolicus* are shown in Table 12.

Hypsugo savii (Bonaparte, 1837)

Material. **Croatia**: 1 ♂ (NMP 96846 {yu54/77} [S+B]), Hvar, Stari Grad, 20 August 1977, leg. J. Červený & J. Kučera. **Montenegro**: 3 ♂♂, 1 ♀ (NMP 90220–90222 {pb2400–2402} [S+A], 90223 {pb2403} [A]), Gurec, Cijevna River, 4 August 2002, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 90209, 90210 {pb2389, 2390} [S+A]), Risan, Sopot Cave, 31 July 2002, leg. P. Benda.
Albania: 1 ♀ (NMP 96547 {pb6146} [S+A]), Arrëz, bunker, 29 January 2016, leg. F. Bego, P. Benda & M. Uhrin; – 1 ♂ (NMP 96521 {pb6007} [S+A]), Beduqas, Dishnica River, 6 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂, 2 ♀♀ (NMP 96564, 96565 {pb6281, 6282} [S+A], 96566 {pb6283} [A]), Borsh, Borshi River, 1 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96572, 96573 {pb6289, 6290} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96589, 96590 {pb6306, 6307} [S+A]), Krajkë, Zerdjani River, 7 July 2016, leg. P. Benda; – 2 ♂♂ (NMP 96609, 96610 {pb6611, 6612} [S+A]), Murrë, river, 3 July 2018, leg. P. Benda; – 2 ♂♂ (NMP 96595, 96596 {pb6312, 6313} [S+A]), Selcë, Cemi River, 9 July 2016, leg. P. Benda; – 2 ♂♂, 2 ♀♀ (NMP 96516–96519 {pb6002–6005} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♂ (NMP 49029 {pb2055} [S+A]), Anthīro, Tayrōpos River, 31 August 2001, leg. P. Benda; – 2 ♀♀ (NMP 48701, 48702 {TH 165, 166} [S+B]), Asprokklīsi, pool, 1 July 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 48678 {TH 142} [S+B]), Galanī, cave, 23 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 48571 {TH 27} [S+B]), Mikro Papigko, pool, 25 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48730 {pb898} [S+A]), Neo Proastio, cave, 12 September 1996, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 48577 {TH 34} [S+B]), Papigko, cave, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48565 {TH 21} [S+B]), Paralia Skotinas, beach, 19 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂, 1 ♀ (NMP 48731, 48732 {pb899, 900} [S+A]), Trahīla, cave, 13 September 1996, leg. P. Benda & M. Uhrin.
Greece (Crete): 2 ♂♂, 1 ♀ (NMP 91094, 91095 {pb3401, 3402} [S+A], 91096 {pb3403} [A]), Dramia, Petres Bridge, 6 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 2 ♂♂ (NMP 92309, 92310 {pb3584, 3585} [S+A]), Leykogeia, Katō Prevelī Monastery, Venetian bridge, 11 October 2007, leg. P. Benda; – 2 ♂♂ (NMP 91088, 91089 {pb3395, 3396} [S+A]), Meskla, stream, 5 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 2 ♂♂, 1 ♀ (NMP 91109–91111 {pb3416–3418}

[S+A]), Milatos, Milatoy Cave, 7 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂, 1 ♀ (NMP 91083 {pb3390} [S+A], 91082 {pb3389} [A]), Patsos, Agios Antōnios Cave, 3 October 2006, leg. P. Benda, V. Hanák & P. Hulva. **Greece (islands)**: 1 ♀ (NMP 96650 {pb6569} [S+A]), Astypalea, Hōra Castle, 25 September 2017, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96618 {pb5436} [S+A]), Rhodes, Gadoyra Dam, bridge, 17 August 2012, leg. P. Benda; – 1 ♂ (NMP 96644 {pb5462} [S+A]), Rhodes, Stegna, cave, 27 August 2012, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96634, 96635 {pb5452, 5453} [S+A]), Symi, Karo, Agios Anargyros Monastery, 24 August 2012, leg. P. Benda; – 6 ♂♂ (NMP 96627, 96628, 96638, 96639 {pb5445, 5446, 5456, 5457 [S+A], 96629, 96640 {pb5447, 5458} [A]), Symi, Ampeli, Kourkouniōtīs, 23 & 26 August 2012, leg. P. Benda; – 2 ♂♂ (NMP 96636 {pb5454} [S+A], 96637 {pb5455} [A]), Symi, Glyfonies, 25 August 2012, leg. P. Benda; – 1 ♀ (NMP 48696 {TH 160} [S]), Thassos, Arhaggeloy Monastery, spring, 26 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 2 ♂♂ (NMP 48689, 48690 {TH 153, 154} [S+B]), Thassos, Panagia, Drakotrypa Cave, 24 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 3 ♂♂, 1 ♀ (NMP 48691–48694 {TH 155, 158} [S+B]), Thassos, Theologos, stream, 25 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. [Horáček & Hanák (1986)], Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006, 2009, 2016b), Presetnik et al. (2014), Benda & Uhrin (2017), this volume.

Remarks. Two specimens of *Hypsugo savii* originating from Rhodes represent two new sites of the species from this island, from which it has been known only from one record, a male collected at Profitis Ilias in 1983 (Volleth 1987).

The remaining specimens of *H. savii* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *H. savii* are shown in Table 15.

Pipistrellus pipistrellus (Schreber, 1774)

Material. **Bosnia and Herzegovina**: 1 ind. (NMP 96848 {1} [A]), Izbišno, Bystrica River, 27 July 2007, leg. M. Kubešová. **Albania**: 1 ♀ (NMP 96567 {pb6284} [S+A]), Borsh, Borshi River, 1 July 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96575 {pb6292} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96528 {pb6014}

Table 14. Basic biometric data on the examined NMP specimens of *Eptesicus serotinus* (Schreber, 1774), *Pipistrellus pipistrellus* (Schreber, 1774), and *P. pygmaeus* (Leach, 1825) from the western Balkans. For abbreviations see pp. 14, 212

	Eptesicus serotinus Western Balkans					*Pipistrellus pipistrellus* Western Balkans					*Pipistrellus pygmaeus* Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	22	**53.00**	50.1	56.8	1.746	23	**30.39**	29.0	32.6	1.154	13	**30.15**	28.6	32.4	1.031
LCr	21	**21.07**	20.08	21.72	0.442	22	**11.67**	11.07	12.56	0.355	13	**11.54**	11.32	12.19	0.241
LCb	21	**20.21**	19.43	20.84	0.404	21	**11.21**	10.62	11.94	0.347	13	**11.08**	10.78	11.58	0.217
LaZ	21	**14.14**	13.32	14.85	0.377	19	**7.38**	7.06	7.77	0.205	10	**7.33**	7.12	7.61	0.137
LaI	21	**4.29**	4.03	4.75	0.185	22	**3.23**	2.85	3.53	0.158	13	**3.17**	2.98	3.27	0.076
LaInf	21	**6.57**	6.17	7.18	0.269	22	**3.45**	3.22	3.74	0.142	13	**3.39**	3.27	3.61	0.105
LaN	21	**9.60**	9.29	9.95	0.170	22	**6.13**	5.73	6.45	0.159	13	**6.09**	5.92	6.27	0.123
LaM	21	**11.13**	10.68	11.87	0.303	22	**6.59**	6.08	7.06	0.196	13	**6.60**	6.28	6.97	0.170
ANc	20	**6.75**	6.33	7.08	0.199	22	**4.26**	3.96	4.43	0.112	13	**4.26**	4.13	4.45	0.099
LBT	20	**3.91**	3.48	4.47	0.183	21	**2.73**	2.31	3.02	0.168	13	**2.63**	2.23	2.86	0.154
CC	21	**6.68**	6.23	7.17	0.234	22	**3.50**	3.21	3.82	0.153	13	**3.43**	3.24	3.69	0.125
M^3M^3	21	**8.59**	8.22	9.17	0.265	22	**4.78**	4.45	5.11	0.181	13	**4.72**	4.61	5.01	0.108
CM^3	21	**7.96**	7.62	8.52	0.216	22	**4.07**	3.82	4.41	0.154	13	**4.00**	3.76	4.18	0.112
LMd	21	**15.64**	14.92	16.35	0.390	22	**8.05**	7.72	8.64	0.247	13	**8.00**	7.63	8.43	0.212
ACo	21	**5.82**	5.25	6.41	0.241	22	**2.27**	2.00	2.52	0.112	13	**2.29**	2.12	2.45	0.081
CM_3	21	**8.76**	8.36	9.17	0.226	22	**4.29**	3.98	4.61	0.163	13	**4.24**	4.05	4.44	0.126

Table 15. Basic biometric data on the examined NMP specimens of *Hypsugo savii* (Bonaparte, 1837) from the mainland western Balkans, Crete, and the Aegean islands. For abbreviations see pp. 14, 212

	Western Balkans					Crete					Aegean Islands				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	32	**34.08**	31.2	36.2	1.185	12	**33.67**	31.2	36.1	1.418	20	**33.97**	31.8	36.1	1.018
LCr	30	**13.51**	12.75	14.07	0.318	10	**13.43**	12.71	13.83	0.356	17	**13.56**	13.22	14.17	0.213
LCb	29	**13.16**	12.58	13.73	0.280	10	**13.07**	12.38	13.68	0.431	17	**13.18**	12.83	13.66	0.190
LaZ	30	**8.74**	8.32	9.15	0.246	10	**8.73**	8.49	8.93	0.139	17	**8.85**	8.36	9.54	0.282
LaI	30	**3.47**	3.18	3.78	0.151	10	**3.37**	3.17	3.61	0.118	17	**3.51**	3.22	3.74	0.143
LaInf	30	**4.40**	3.95	4.82	0.189	10	**4.50**	4.21	4.68	0.162	17	**4.55**	4.21	4.81	0.171
LaN	30	**6.68**	6.36	7.13	0.168	10	**6.55**	6.21	6.74	0.143	17	**6.77**	6.55	7.07	0.168
LaM	30	**7.38**	6.91	7.74	0.211	10	**7.32**	7.07	7.64	0.185	17	**7.43**	7.03	7.68	0.186
ANc	29	**4.53**	4.18	4.79	0.150	10	**4.44**	4.28	4.61	0.104	17	**4.62**	4.45	4.82	0.117
LBT	30	**3.07**	2.76	3.41	0.149	10	**2.90**	2.61	3.18	0.191	17	**3.11**	2.94	3.36	0.137
CC	30	**4.24**	3.97	4.55	0.141	10	**4.38**	4.19	4.75	0.179	17	**4.32**	4.11	4.55	0.128
M^3M^3	30	**5.75**	5.47	6.13	0.161	10	**5.79**	5.61	6.03	0.148	17	**5.80**	5.32	6.26	0.224
CM^3	30	**4.55**	4.32	4.92	0.134	10	**4.65**	4.43	4.88	0.125	17	**4.60**	4.26	4.83	0.135
LMd	30	**9.50**	9.02	10.08	0.240	10	**9.56**	9.08	9.97	0.275	17	**9.53**	9.32	9.85	0.157
ACo	30	**2.78**	2.57	3.06	0.113	10	**2.88**	2.67	3.13	0.141	17	**2.86**	2.64	3.02	0.113
CM_3	30	**4.88**	4.65	5.26	0.150	10	**4.96**	4.74	5.11	0.118	17	**4.90**	4.55	5.18	0.152

[S+A]), Selcë, Selca River, 8 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 2 ♀♀ (NMP 96513, 96514 {pb5999, 6000} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.

Greece (mainland): 1 ♀ (NMP 48553 {TH 4} [S+B]), Agios Prodromos, Vatonias River, 13 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 2 ♂♂ (NMP 48588, 48589 {TH 45, 46} [S+B]), Aidonohōri, Aōos River, 28 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 2 ♀♀ (NMP 48586, 48587 {TH 43, 44} [S+B]), Kleidōnia, Voidomatīs River, 27 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 2 ♂♂, 2 ♀♀ (NMP 48717, 48719–48721 {pb886–889} [S+A]), Kompotades, Sperheios River, 9 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 48707, 48708 {TH 171, 172} [S+B]), Mesopotamo, channel, 2 July 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂ (NMP 48570 {TH 26} [S+B]), Meteōra, Agia Triada Monastery, 24 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♀ (NMP 48556 {TH 11} [S+B]), Ormylia, Havrias River, 14 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48628 {TH 90} [S+B]), Xanthī, Kosynthos River, 17 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

Greece (islands): 1 ♂ (NMP 96648 {pb5466} [S+A]), Rhodes, Eleoysa, 28 August 2012, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96623 {pb5441} [S+A]), Rhodes, Epta Pīges Springs, 18 August 2012, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 48700 {TH 164} [S+B]), Thassos, Thassos, ancient agora, 27 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. Hanák et al. (2001), Benda et al. (2006), this volume.

Remarks. Two specimens of *Pipistrellus pipistrellus* from Rhodes constitute the first localised findings of this species from this island. Till now, two reports of this bat with unspecified locality were available from Rhodes (Festa 1914, Mayer & von Helversen 2001).

The specimen of *P. pipistrellus* collected at Izbišno, eastern Bosnia, represents a new finding of this species from Bosnia and Herzegovina. However, this bat is relatively frequently found in the country (Karapandža et al. 2014).

The remaining specimens of *P. pipistrellus* from Greece were published by Hanák et al. (2001). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). Some Greek specimens here affiliated to *P. pipistrellus* and collected before 1995 could actually represent *Pipistrellus pygmaeus*, see Hanák et al. (2001). External and cranial dimensions of the examined specimens of *P. pipistrellus* are shown in Table 14.

Pipistrellus pygmaeus (Leach, 1825)

Material. **Montenegro**: 1 ♂ (NMP 96849 {2} [S+A]), Mratinje, Piva River, 28 July 2007, leg. M. Kubešová; – 1 ♀ (NMP 90232 {CG4} [S+A]), Sutomore, 21 September 2001, leg. J. Hájek & J. Hotový.
Albania: 1 ♂ (NMP 96574 {pb6291} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96515 {pb6001} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 1 ♂ (NMP 49030 {pb2056} [S+A]), Anthīro, Tayrōpos River, 31 August 2001, leg. P. Benda; – 1 ♂ (NMP 49021 {pb2047] [S+A]), Artiki, river, 25 August 2001, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 49040, 49041 {pb2066, 2067} [S+A]), Dīmītra, Potamia River, 1 September 2001, leg. P. Benda; – 3 ♀♀ (NMP 48716, 48718, 48722 {pb884, 885, 890} [S+A]), Kompotades, Sperheios River, 9 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♂ (NMP 49016 {pb2042} [S+A]), Simopoylo, Pīneios River, 23 August 2001, leg. P. Benda; – 1 ♂ (NMP 48738 {pb914} [S+A]), Spartī, Eyrōtas River, 16 September 1996, leg. P. Benda & M. Uhrin.

References. Hanák et al. (2001), Benda et al. (2003a, 2004a), Hulva et al. (2004, 2010), Presetnik et al. (2014), this volume.

Remarks. The specimen of *Pipistrellus pygmaeus* from Mratinje, north-western Montenegro, represents a new record of this species from the country. However, this bat seems to be common in Montenegro, see Presentnik et al. (2014) and Rachwald et al. (2019).

The remaining specimens of *P. pygmaeus* from Montenegro were published by Presetnik et al. (2014) and from Greece by Hanák et al. (2001). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *P. pygmaeus* are shown in Table 14.

Pipistrellus hanaki Hulva et Benda, 2004

Material. **Greece (Crete)**: 1 ♂ (NMP 92344 {pb3972} [S+A]), Monastīraki, Genianos stream, 2 June 2008, leg. P. Benda, P. Georgiakakis & V. Hanák; – 1 ♂ (NMP 91180 {pb3380} [S+A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 5 ♂♂ (NMP 92349–92351 {pb3977–3979} [S+A], 92352 {pb3980} [A], 92353 {pb3981} [S], incl. holotype of *Pipistrellus hanaki creticus* Benda, 2009), Royva Forest, Agios Iōannis Royva, 4 June 2008, leg. P. Benda, P. Georgiakakis & V. Hanák; – 1 ♂ (NMP 92323 {pb3951} [S+A]), Zaros, stream, 25 May 2008, leg. P. Benda & V. Hanák.

References. Hulva et al. (2007, 2010), Benda et al. (2009, 2014), Mlíkovský et al. (2011).

Remarks. The specimens of *Pipistrellus hanaki* from Crete were published by Hulva et al. (2007) and Benda et al. (2009). These eight specimens form the type series of *Pipistrellus hanaki creticus* Benda, 2009, one of the numerous endemics of the island. Along with *Myotis alcathoe*, these two taxa represent the only valid bat names described from Greece.

External and cranial dimensions of the examined specimens of *P. hanaki* are shown in Table 16.

Pipistrellus nathusii (von Keyserling et Blasius, 1839)

Material. **Montenegro**: 1 ♂, 1 ♀ (NMP 90230, 90231 {CG2, CG3} [S+A]), Vranjina, Lesendro Fortress, 20 September 2001, leg. J. Hájek & J. Hotový.
Greece (mainland): 1 ♂, 1 ♀ (NMP 48563, 48564 {TH 19, 20} [S+B]), Paralia Skotinas, beach, 19 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48551 {TH 1} [S+B]), Thessalonikī, University Campus, 11 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♀ (NMP 48629 {TH 91} [S+B]), Xanthī, Kosynthos River, 17 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. Hanák et al. (2001), Presetnik et al. (2014).

Remarks. The specimens of *Pipistrellus nathusii* collected in Montenegro were published by Presetnik et al. (2014) and in Greece by Hanák et al. (2001). They do not represent any significant records concerning the species distribution range (see Dietz et al. 2016). Formerly, the finding from

Table 16. Basic biometric data on the examined NMP specimens of *Pipistrellus hanaki* Hulva et Benda, 2004 from Crete, and *P. kuhlii* (Kuhl, 1817) from the mainland western Balkans and from the Greek Islands. For abbreviations see pp. 14, 212

	Pipistrellus hanaki					*Pipistrellus kuhlii*									
	Crete					Western Balkans					Crete & Aegean Islands				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	8	**29.64**	29.0	30.3	0.389	37	**34.10**	32.3	35.8	0.897	19	**33.44**	31.0	35.1	1.059
LCr	7	**11.75**	11.55	11.99	0.144	28	**13.23**	12.92	13.65	0.204	16	**13.22**	12.76	13.61	0.253
LCb	7	**11.28**	11.09	11.64	0.194	28	**12.83**	12.43	13.18	0.217	16	**12.77**	12.31	13.20	0.268
LaZ	6	**7.35**	7.25	7.45	0.083	28	**8.58**	8.18	8.92	0.170	13	**8.48**	8.18	8.85	0.183
LaI	7	**3.12**	3.02	3.24	0.075	28	**3.27**	3.02	3.57	0.124	16	**3.22**	3.12	3.43	0.088
LaInf	7	**3.49**	3.38	3.63	0.079	28	**4.03**	3.78	4.19	0.112	16	**3.92**	3.68	4.19	0.135
LaN	7	**6.13**	5.91	6.28	0.131	28	**6.60**	6.34	6.88	0.157	16	**6.57**	6.40	6.78	0.124
LaM	7	**6.65**	6.48	6.79	0.110	28	**7.52**	7.13	7.81	0.174	16	**7.39**	7.01	7.71	0.230
ANc	7	**4.32**	4.13	4.48	0.107	28	**4.80**	4.53	5.07	0.138	16	**4.71**	4.53	4.88	0.098
LBT	7	**2.83**	2.61	2.96	0.122	28	**3.07**	2.84	3.26	0.111	16	**2.95**	2.70	3.16	0.134
CC	7	**3.55**	3.38	3.65	0.085	28	**4.23**	3.86	4.47	0.131	16	**4.16**	3.91	4.34	0.134
M^3M^3	7	**4.89**	4.74	5.04	0.106	28	**5.57**	5.17	5.75	0.140	16	**5.55**	5.29	5.74	0.130
CM^3	7	**4.13**	4.05	4.21	0.065	28	**5.05**	4.92	5.18	0.078	16	**4.97**	4.81	5.15	0.096
LMd	7	**8.07**	7.95	8.28	0.123	27	**9.62**	8.87	10.00	0.231	16	**9.55**	9.18	9.88	0.212
ACo	7	**2.32**	2.24	2.41	0.054	27	**3.06**	2.87	3.32	0.126	16	**3.04**	2.91	3.21	0.101
CM_3	7	**4.38**	4.30	4.48	0.065	27	**5.37**	5.23	5.56	0.072	16	**5.33**	5.08	5.49	0.108

Paralia Skotinas, southern Macedonia, delimited the southern margin of the species distribution in Europe (see Hanák et al. 2001); however, now the known range of this bat covers the whole Balkan Peninsula, including Crete (Benda et al. 2009, Dietz et al. 2016).

External and cranial dimensions of the examined specimens of *P. nathusii* are shown in Table 17.

Pipistrellus kuhlii (Kuhl, 1817)

Material. **Croatia**: 1 ♀ (NMP 96865 {–} [A]), Brač, 10 January 1955, collector unlisted; – 2 ♂♂, 6 ♀♀ (NMP 96857–96864 {a278/1–8} [A]), Bribir, March 1856, leg. A. Frič; – 1 ♂ (NMP 96809 {yu2/77} [S+W]), Dubrovnik, 26 August 1977, leg. J. Červený & J. Kučera.
Montenegro: 2 ♂♂, 1 ♀ (NMP 90233–90235 {CG5–7} [S+A]), Sutomore, 21 September 2001, leg. J. Hájek & J. Hotový.
Albania: 1 ♀ (NMP 96520 {pb6006} [S+A]), Beduqas, Dishnica River, 6 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96557 {pb6274} [S+A]), Belistan, bunker, 30 June 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96584 {pb6301} [S+A]), Berat Castle, 4 July 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96568 {pb6285} [S+A]), Borsh, Borshi River, 1 July 2016, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 96591 {pb6308} [S+A]), Krajkë, Zerdjani River, 7 July 2016, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 96559, 96560 {pb6276, 6277} [S+A]), Tepelenë, Bënça River, 30 June 2016, leg. P. Benda & M. Uhrin.
Greece (mainland): 1 ♀ (NMP 49022 {pb2048} [S+A]), Artiki, River, 25 August 2001, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 48703, 48704 {TH 167, 168} [S+B]), Asprokklīsi, pool, 1 July 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 2 ♀♀ (NMP 48705, 48706 {TH 169, 170} [S+B]), Mesopotamo, channel, 2 July 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 2 ♂♂ (NMP 48554, 48555 {TH 6, 9} [S+B]), Ormylia, Havrias River, 14 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂, 1 ♀ (NMP 48561, 48562 {TH 17, 18} [S+B]), Paralia Skotinas, beach, 19 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 3 ♀♀ (NMP 49013–49015 {pb2039–2041} [S+A]), Simopoylo, Pīneios River, 23 August 2001, leg. P. Benda; – 1 ♂, 4 ♀♀ (NMP 48733–48737 {pb909–913} [S+A]), Spartī, Eyrōtas River, 16 September 1996, leg. P. Benda & M. Uhrin.
Greece (Crete): 1 ♀ (NMP 92302 {pb3577} [S+A]), Kalami, Koiliarīs River, 9 October 2007, leg. P. Benda; – 6 ♂♂, 6 ♀♀ (NMP 92304, 92305, 92307, 92308, 92321, 92337–92341 {pb3579, 3580, 3582, 3583, 3596, 3965–3969} [S+A],

92306, 92336 {pb3581, 3964} [A]), Leykogeia, Katō Prevelī Monastery, Venetian bridge, 11 October 2007 & 30 May 2008, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 92324 {pb3952} [S+A]), Spilia, Agia Eirīnī, stream, 26 May 2008, leg. P. Benda & V. Hanák; – 1 ♂ (NMP 91185, 91186 {pb3385, 3386} [S+A], 91187 {pb3387} [A]), Vryses, Almyros River, 2 October 2006, P. Benda, V. Hanák & P. Hulva.
Greece (islands): 1 ♂, 1 ♀ (NMP 96646, 96647 {kas01, kas02} [S+A]), Kastelorizo, Megistī, 22 August 2012, leg. M. Uhrin.

References. Frič (1858, 1864), Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2004c, 2006, 2009, 2015), Presetnik et al. (2014), Benda & Uhrin (2017), this volume.

Remarks. Eight specimens of *Pipistrellus kuhlii* from Bribir, western Croatia, were collected in 1856 by Antonín Frič (1832–1913), during his first trip to the western Balkans (Frič 1857, 1964), for details see above, under *Rhinolophus ferrumequinum*. Although in his report on the trip, Frič (1964) mentioned shooting of these bats in the village, the respective specimens have been discovered in the museum collection only recently. The specimen of *P. kuhlii* collected in Brač, Croatia, represents a new record of this species from the island, where it is a common bat (Tvrtković 2017).

The remaining specimens of *P. kuhlii* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016). External and cranial dimensions of the examined specimens of *P. kuhlii* are shown in Table 16.

Nyctalus noctula (Schreber, 1774)

Material. **Albania**: 4 ♂♂, 3 ♀♀ (NMP 96480, 96481, 96483–96486 {B262, 264, 266–269} [S+B], 96482 {B265} [S]), Shkodër, Turizmi hotel, 19 October 1960, leg. V. Hanák; – 6 ♂♂, 1 ♀ (NMP 96476 {B256} [S+A], 96473–96475, 96479 {B249, 254, 255, 260} [S+B], 96477, 96478 {B257, 258} [S+K]), Tiranë, house, 20 October 1960, leg. V. Hanák.

Table 17. Basic biometric data on the examined NMP specimens of *Pipistrellus nathusii* (von Keyserling et Blasius, 1839), *Nyctalus noctula* (Schreber, 1774), and *N. leisleri* (Kuhl, 1817) from the western Balkans. For abbreviations see pp. 14, 212

	Pipistrellus nathusii Western Balkans					*Nyctalus noctula* Western Balkans					*Nyctalus leisleri* Western Balkans				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	6	**33.98**	33.0	35.4	1.046	15	**52.62**	49.6	54.2	1.258	24	**43.27**	40.5	45.8	1.028
LCr	6	**13.11**	12.36	13.74	0.453	16	**18.45**	17.78	19.22	0.443	24	**15.32**	14.66	15.77	0.300
LCb	6	**12.60**	11.96	13.27	0.430	16	**18.66**	18.10	19.27	0.373	24	**15.48**	14.85	16.08	0.331
LaZ	5	**8.12**	7.75	8.44	0.279	14	**13.12**	12.60	13.91	0.406	21	**10.30**	9.85	10.83	0.263
LaI	6	**3.56**	3.21	3.67	0.176	16	**5.06**	4.69	5.33	0.170	24	**4.63**	4.36	4.82	0.118
LaInf	6	**4.10**	3.68	4.29	0.221	16	**7.30**	6.91	7.74	0.208	24	**5.75**	5.43	6.07	0.169
LaN	6	**6.88**	6.22	7.11	0.334	16	**9.81**	9.21	10.38	0.344	24	**8.18**	7.98	8.42	0.139
LaM	6	**7.22**	6.67	7.59	0.301	16	**11.68**	11.23	12.43	0.300	24	**9.54**	9.28	9.97	0.190
ANc	6	**4.44**	4.17	4.66	0.180	16	**6.76**	6.44	7.28	0.248	23	**5.51**	5.17	5.74	0.143
LBT	6	**3.07**	2.81	3.33	0.190	14	**4.65**	4.34	5.03	0.195	24	**3.83**	3.58	4.02	0.105
CC	6	**3.96**	3.65	4.18	0.172	16	**7.19**	6.93	7.74	0.219	23	**5.64**	5.35	5.90	0.144
M^3M^3	6	**5.20**	4.95	5.31	0.132	16	**8.67**	8.38	9.13	0.208	24	**7.01**	6.46	7.42	0.208
CM^3	6	**4.44**	4.32	4.62	0.132	16	**7.23**	6.95	7.47	0.184	24	**5.81**	5.52	6.03	0.125
LMd	4	**8.97**	8.42	9.18	0.365	16	**14.21**	13.75	14.78	0.295	24	**11.50**	11.08	11.82	0.193
ACo	4	**2.35**	2.27	2.40	0.056	16	**4.55**	4.26	4.81	0.184	24	**3.20**	3.00	3.41	0.102
CM_3	4	**4.71**	4.60	4.84	0.116	16	**7.67**	7.43	8.02	0.200	24	**6.15**	5.96	6.38	0.126

Greece (mainland): 1 ♀ (NMP 49032 {pb2058} [S+A]), Anthīro, Tayrōpos River, 31 August 2001, leg. P. Benda.
Greece (islands): 1 ♂ (NMP 48695 {TH 159} [S+B]), Thassos, Theologos, stream, 25 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. Hanak et al. (1961), Hůrka (1963b), Hanák (1964), Hanák et al. (2001), Benda et al (2006, 2011), Benda & Gaisler (2015), this volume.

Remarks. The specimens of *Nyctalus noctula* collected in Greece were published by Hanák (2001). The specimen from Anthiro, Thessaly, represents the only record from the second southernmost verified occurrence area of this bat in the Balkan Peninsula; only the records from Mount Parnon, Peloponnese, are known more to the south (Papadatou et al. 2015). The specimen originating from the Thracian island of Thassos constitutes the only available island record of *N. noctula* from the southern Balkans.

External and cranial dimensions of the examined specimens of *N. noctula* are shown in Table 17.

Nyctalus lasiopterus (Schreber, 1780)

Material. **Greece (mainland)**: 1 ♂ (NMP 49031 {pb2057} [S+A]), Anthīro, Tayrōpos River, 31 August 2001, leg. P. Benda.

References. Hanák et al. (2001), Benda et al. (2014).

Remarks. The specimen of *Nyctalus lasiopterus* collected at Anthiro, Thessaly, Greece, was published by Hanák et al. (2001). It does not represent any significant record concerning the species distribution range in the Balkans (see Dietz et al. 2016). External and cranial dimensions of the examined specimen of *N. lasiopterus* are shown in Table 18.

Nyctalus leisleri (Kuhl, 1817)

Material. **Montenegro**: 1 ♂ (NMP 90225 {pb2405} [S+A]), Gusinje, Grnčar River, 5 August 2002, leg. P. Benda.
Albania: 1 ♂ (NMP 96569 {pb6286} [S+A]), Borsh, Borshi River, 1 July 2016, leg. P. Benda & M. Uhrin; – 2 ♂♂ (NMP 96576, 96577 {pb6293, 6294} [S+A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 3 ♂♂ (NMP 96503–96505 {pb5989–5991} [S+A]), Krongj, Vris stream, 3 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96585 {pb6302} [S+A]), Shëngjin i Madh, Erzeni River, 5 July 2016, leg. P. Benda & M. Uhrin; – 1 ♂ (NMP 96522 {pb6008} [S+A]), Sinicë, Devolli River, 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂ (NMP 96512 {pb5998} [S+A]), Zhulat, Kardhiqi River, 5 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß.
Greece (mainland): 3 ♂♂, 2 ♀♀ (NMP 49033–49037{pb2059–2063} [S+A]), Anthīro, Tayrōpos River, 31 August 2001, leg. P. Benda; – 1 ♂, 1 ♀ (NMP 49038, 49039 {pb2064, 2065} [S+A]), Dīmītra, Potamia River, 1 September 2001, leg. P. Benda; – 1 ♂ (NMP 48724 {pb892} [S+A]), Kompotades, Sperheios River, 9 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♂ (NMP 96655 {pb5979} [S+A]), Monastīri, Vergoy Bridge, 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ind. (NMP 48739 {TH 29} [S]), Papigko, Drakolimni Lake, 25 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 2 ♂♂ (NMP 49042, 49043 {pb2068, pb2069} [S+A]), Pappagiannīs, Sakoylevas River, 2 September 2001, leg. P. Benda; – 1 ♀ (NMP 48566 {TH 22} [S+B]), Paralia Skotinas, beach, 19 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48631 {TH 93} [S+B]), Xanthī, Kosynthos River, 17 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík.

References. Hanák et al. (2001), Salgueiro et al. (2007, 2010), Benda et al. (2014), Presetnik et al. (2014), Benda & Gaisler (2015), this volume.

Remarks. The specimen of *Nyctalus leisleri* collected at Gusinje, Montenegro, represents the second record of this species from the country (Presetnik et al. 2014). Previously, this bat was known from a single male collected at Dobrodole in 1976 (Mirić & Paunović 1997), 46 km north of Gusinje.

Table 18. Basic biometric data on the examined NMP specimens of *Nyctalus lasiopterus* (Schreber, 1780), *Plecotus auritus* (Linnaeus, 1758), and *P. austriacus* (Fischer, 1829) from the mainland western Balkans, and *P. macrobullaris* Kuzâkin, 1965 from Crete. For abbreviations see pp. 14, 212

	Nyctalus lasiopterus	*Plecotus auritus*		*Plecotus austriacus*		*Plecotus macrobullaris*				
	Greece	Albania	Greece	Greece	Serbia			Crete		
	49031	96611	48567	49045	49050	n	**M**	min	max	SD
LAt	65.1	40.5	37.8	41.0	–	4	**41.20**	40.3	42.1	0.775
LPol	–	7.8	7.3	6.6	–	4	**7.13**	6.9	7.3	0.171
LCr	21.77	16.34	16.40	17.35	17.41	3	**17.33**	16.93	17.56	0.345
LCb	22.08	15.23	15.08	16.32	16.28	3	**16.16**	15.88	16.49	0.308
LaZ	15.57	8.79	8.85	9.28	9.14	2	**9.13**	9.12	9.14	0.014
LaI	5.66	3.48	3.32	3.47	3.26	3	**3.58**	3.52	3.64	0.060
LaInf	8.62	4.25	3.95	4.28	4.33	3	**4.02**	3.96	4.08	0.060
LaN	11.52	8.42	8.38	8.83	8.28	3	**8.77**	8.61	9.02	0.217
LaM	14.43	9.03	8.86	9.68	9.41	3	**9.47**	9.38	9.53	0.078
ANc	8.05	5.28	5.13	5.59	5.47	3	**5.46**	5.42	5.48	0.032
LBT	6.19	4.05	4.03	4.81	4.75	3	**4.77**	4.71	4.87	0.085
CC	8.93	3.77	3.92	4.12	4.10	3	**3.68**	3.62	3.75	0.065
M^3M^3	10.13	6.15	6.07	6.55	6.26	3	**6.15**	6.12	6.19	0.035
CM^3	8.64	5.38	5.40	6.25	5.95	3	**5.81**	5.72	5.97	0.137
LMd	17.53	10.36	10.53	11.23	11.24	3	**10.96**	10.73	11.19	0.230
ACo	5.05	2.78	2.72	3.37	3.32	3	**3.17**	3.02	3.31	0.145
CM_3	9.32	5.88	5.81	6.62	6.42	3	**6.31**	6.16	6.44	0.142

The specimens from mainland Greece were published by Hanák et al. (2001) except that from Monastiri, northern Epirus, which constitutes a new record of *N. leisleri* from the country.

External and cranial dimensions of the examined specimens of *N. leisleri* are shown in Table 17.

Plecotus auritus (Linnaeus, 1758)

Material. **Albania**: 1 ♂ (NMP 96611 {pb6613} [S+A]), Fushë Studë, forest, 4 July 2018, leg. P. Benda.
Greece (mainland): 1 ♂ (NMP 48567 {TH 23} [S+B]), Paralia Skotinas, beach, 19 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík.

References. Hanák et al. (2001), Benda & Ivanova (2003), this volume.

Remarks. The specimen of *Plecotus auritus* collected at Paralia Skotinas in southern Macedonia, Greece, represents the second southernmost undoubted finding of this species in the Balkans (Hanák et al. 2001). More to the south a verified record was made only once, in the Oiti Mountains, Sterea Ellada (von Helversen & Weid 1990).

External and cranial dimensions of the examined specimens of *P. auritus* are shown in Table 18.

Plecotus macrobullaris Kuzâkin, 1965

Material. **Greece (Crete)**: 1 ♂ (NMP 91052 {pb3358} [S+A]), Nida Plateau, Idaio Antro Cave, 30 September 2006, leg. P. Benda, V. Hanák & P. Hulva; – 3 ♂♂ (NMP 91182, 91183 {pb3382, 3383} [S+A], 91181 {pb3381} [A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva.

References. Benda et al. (2009).

Remarks. The specimens of *Plecotus macrobullaris* from Crete were published by Benda et al. (2009). They originate from the highest altitudes of the island, where bats were recorded during their flight activity (the known range of bat occurrence in the island is 0–1,650 m a. s. l.; Benda et al. 2009). The Idaio Antro Cave on the Nida Plateau in the central part of Crete is the highest known site of the species in the island (1,490 m a. s. l.).

External and cranial dimensions of the examined specimens of *P. macrobullaris* are shown in Table 18.

Plecotus austriacus (Fischer, 1829)

Material. **Serbia**: 1 ♂ (NMP 49050 {101/65} [S], Petrovaradin, February 1965, leg. J. Figala, J. Gaisler, V. Hanák & K. Hůrka.
Greece (mainland): 1 ♀ (NMP 49045 {pb2071} [S+A]), Pappagiannīs, Sakoylevas River, 2 September 2001, leg. P. Benda.

References. [Hanák (1966)], Hanák et al. (2001), Benda & Ivanova (2003).

Remarks. The specimen of *Plecotus austriacus* from Petrovaradin, Vojvodina, Serbia, was first indirectly published by Hanák (1966), who marked a symbol of this species to the appropriate place into a map of distribution of *P. austriacus* [s.l.] in his revision of taxonomy and distribution of the genus *Plecotus* in the Palaearctic. Benda & Ivanova (2003) revised the specimen identification in the context of the current taxonomic arrangement of the genus (cf. Kiefer et al. 2002, Spitzenberger et al. 2002) and confirmed it as *P. austriacus* s.str. The specimen from Pappagiannis, north-western Macedonia, Greece, was published by Hanák et al. (2001). It does not represent any significant record concerning the species distribution range in the Balkans (see Dietz et al. 2016).

External and cranial dimensions of the examined specimens of *P. austriacus* are shown in Table 18.

Plecotus kolombatovici Đulić, 1980

Material. **Croatia**: 1 ♂ (NMP 49091 {yu10/77} [S+A]), Hvar, Stari Grad, 1 September 1977, leg. J. Červený & J. Kučera.
Bosnia and Herzegovina: 1 ♂ (NMP 49092 {yu9/77} [S+A]), Zavala, Bjelušica Cave, 29 August 1977, leg. J. Červený & J. Kučera.
Greece (mainland): 1 ♂ (NMP 48569 {TH 25} [S]), Delfoi, 23 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48585 {TH 42} [S+B]), Kleidōnia, Voidomatīs River, 27 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 3 ♂♂ (NMP 48726–48728 {pb894–896} [S+A]), Kompotades, cave, 10 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♀ (NMP 48725 {pb893} [S+A]), Kompotades, Sperheios River, 9 September 1996, leg. M. Andreas, P. Benda & M. Uhrin; – 1 ♀ (NMP 48572 {TH 28} [S+B]), Mikro Papigko, pool, 25 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 4 ♂♂ (NMP 48573–48575 {TH 30–32} [S+B], 48576 {TH 33} [S]), Papigko, cave, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂ (NMP 48609 {TH 69} [S+B]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík.
Greece (Crete): 1 ♂ (NMP 92322 {pb3597} [S+A]), Katholikon Arkadioy Monastery, 16 October 2007, leg. P. Benda; – 1 ♂ (NMP 92331 {pb3959} [S+A]), Katholiko Monastery, Agios Iōannis Cave, 27 May 2008, leg. P. Benda; – 1 ♂, 2 ♀♀ (NMP 91050, 91051 {pb3356, 3357} [S+A], 91049 {pb3355} [A]), Koymares, Arkoydiōtissa Cave, 28 September 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♀ (NMP 91160 {pb3359} [S+A]), Nida Plateau, Idaio Antro Cave, 30 September 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♂ (NMP 91184 {pb3384} [A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 2 ♂♂, 1 ♀ (NMP 92314, 92315 {pb3589, 3590} [S+A], 92313 {pb3588} [A]), Peykoi, Vreiko Cave, 12 October 2007, leg. P. Benda; – 1 ♀ (NMP 92318 {pb3593} [S+A]), Sitanos, Exō Latsidi Cave, 13 October 2007, leg. P. Benda.
Greece (islands): 1 ♂ (NMP 96654 {pb6573} [S+A]), Kalymnos, Pothia, Epta Parthenōn Cave, 5 October 2017, leg. P. Benda & M. Uhrin; – 1 ♂, 1 ♀ (NMP 96653 {pb6572} [S+A], 96652 {pb6571} [A]), Kalymnos, Vathys, Daskaleio Cave, 4 October 2017, leg. P. Benda & M. Uhrin; – 1 ♀ (NMP 92354 {pb3997} [S+A]), Karpathos, Leykos, cave, 26 September 2008, leg. P. Benda; – 1 ♂ (NMP 92356 {pb3999} [S+A]), Karpathos, Aperi, Ahata Valley, cave, 29 September 2008,

leg. P. Benda; – 1 ♂ (NMP 92355 {pb3998} [S+A]), Karpathos, Pīgadia, Profītīs Zaharias, cave, 28 September 2008, leg. P. Benda; – 1 ♂ (NMP 96649 {pb5467} [S+A]), Rhodes, Eleoysa, 28 August 2012, leg. P. Benda & M. Uhrin; – 2 ♂♂ (NMP 96612, 96645 {pb5430, 5463} [S+A]), Rhodes, Stegna, cave, 14 & 27 August 2012, leg. P. Benda & M. Uhrin; – 2 ♂♂, 1 ♀ (NMP 96630, 96641, 96642 {pb5448, 5459, 5460} [S+A]), Symi, Ampeli, Kourkouniōtīs, 23 & 26 August 2012, leg. P. Benda.

References. Červený & Kryštufek (1988), Hanák et al. (2001), Benda & Ivanova (2003), Benda et al. (2004b, 2006, 2009), Benda & Uhrin (2017).

Remarks. The specimen of *Plecotus kolombatovici* collected at the Bjelušica Cave, southern Herzegovina (NMP 49092), was originally published as from Dalmatia, Yugoslavia (Červený & Kryštufek 1988); later on, it was erroneously reported to come from Croatia instead from Bosnia and Herzegovina, by Benda & Ivanova (2003) and Benda et al. (2004b, 2006). Here, it is localised correctly concerning the country of origin, like by other authors, see e.g. Karapandža et al. (2014), Presetnik (2017), and Sachanowicz & Ciechanowski (2018). This specimen represents the second confirmed finding of *P. kolombatovici* from Bosnia and Herzegovina and first after its description by Đulić (1980), see Karapandža et al. (2014).

The specimens originating from mainland Greece were published under the name *P. kolombatovici* by Hanák et al. (2001) at the time when this name temporarily covered a pair of the currently recognised species, *P. kolombatovici* s.str. and *P. macrobullaris* (see Spitzenberger et al. 2001, 2002, 2003, Kiefer et al. 2002). Therefore, Kiefer & von Helversen (2004b) regarded these specimens/records as a mixture of both species, which thus cannot be referred to any of them. However, Benda & Ivanova (2003) and Benda et al. (2004b) revised the respective specimens with respect to the new taxonomic view (sensu Kiefer et al. 2002 and Spitzenberger et al. 2002), with the help of both morphological and molecular genetic methods, and confirmed the original identification of these bats as *P. kolombatovici* s.str. (see also Benda et al. 2006, 2007, 2009).

The specimens of *P. kolombatovici* collected in the Greek islands of Crete, Kalymnos, and Symi were published by Benda et al. (2009) and Benda & Uhrin (2017). The specimens from Rhodes

Table 19. Basic biometric data on the examined NMP specimens of *Plecotus kolombatovici* Đulić, 1980 from the mainland western Balkans, Crete, and the Dodecanese islands. For abbreviations see pp. 14, 212

	Western Balkans					Crete					Dodecanese Islands				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	14	**37.34**	36.1	38.7	0.785	11	**37.48**	35.9	39.8	1.308	12	**37.88**	36.2	39.9	1.021
LPol	12	**5.90**	5.4	6.3	0.222	11	**5.75**	5.5	6.1	0.170	12	**5.73**	5.2	6.5	0.352
LCr	14	**16.28**	15.87	16.97	0.301	9	**16.14**	15.75	16.53	0.227	11	**16.36**	15.93	16.93	0.349
LCb	14	**15.12**	14.68	15.73	0.288	9	**14.95**	14.65	15.39	0.225	11	**15.17**	14.82	15.67	0.317
LaZ	14	**8.56**	8.36	8.97	0.151	9	**8.38**	8.23	8.53	0.107	11	**8.54**	8.24	8.88	0.214
LaI	14	**3.15**	2.93	3.37	0.111	9	**3.21**	3.07	3.31	0.069	11	**3.21**	3.07	3.36	0.098
LaInf	14	**3.92**	3.70	4.18	0.151	8	**3.82**	3.74	3.93	0.069	11	**3.88**	3.71	4.08	0.111
LaN	14	**8.08**	7.62	8.67	0.279	9	**8.10**	7.91	8.48	0.225	11	**8.23**	8.02	8.62	0.169
LaM	14	**8.86**	8.66	9.12	0.133	9	**8.74**	8.58	8.90	0.117	11	**8.94**	8.61	9.26	0.170
ANc	14	**5.38**	5.13	5.56	0.115	9	**5.35**	5.24	5.44	0.072	11	**5.34**	5.16	5.51	0.102
LBT	14	**4.35**	4.22	4.45	0.082	9	**4.25**	4.14	4.36	0.075	11	**4.39**	4.26	4.56	0.103
CC	14	**3.63**	3.52	3.88	0.098	9	**3.56**	3.48	3.70	0.071	10	**3.60**	3.35	3.87	0.170
M^3M^3	14	**5.88**	5.72	6.15	0.136	9	**5.82**	5.58	5.93	0.116	11	**5.91**	5.74	6.09	0.136
CM^3	14	**5.34**	5.15	5.64	0.131	9	**5.35**	5.26	5.52	0.077	11	**5.42**	5.21	5.61	0.121
LMd	13	**10.18**	9.88	10.43	0.174	9	**10.19**	9.93	10.60	0.211	11	**10.28**	9.93	10.68	0.234
ACo	13	**2.97**	2.73	3.20	0.114	9	**2.95**	2.82	3.06	0.070	11	**2.98**	2.74	3.21	0.135
CM_3	13	**5.77**	5.64	5.88	0.084	9	**5.78**	5.66	5.96	0.090	11	**5.82**	5.61	5.98	0.117

represent two new sites of the species from this island, from which it was known only from a single specimen, collected at S Salachos / S Salakos* (Spitzenberger et al. 2001, 2006). The series of three specimens from three sites in Karpathos constitute the first evidence of *P. kolombatovici* from this island. This species is one of the most widespread island bats of the eastern Mediterranean, known from at least 19 islands between Dalmatia and the Levant (incl.).

External and cranial dimensions of the examined specimens of *P. kolombatovici* are shown in Table 19.

Miniopterus schreibersii (Kuhl, 1817)

Material. **Croatia**: 2 ♂♂, 5 ♀♀ (NMP 96824–96829 {yu26/77–yu31/77} [S+A], 96830 {yu34/77} [A]), Pokrovnik, Škarin Samograd Cave, 5 September 1977, leg. J. Červený & J. Kučera.
Croatia/Montenegro: 5 ♂♂, 9 ♀♀ (NMP 96866–96879 {A.7/1–14} [A]), Dalmatia, date unlisted [~1905], ded. V. Frič.
Montenegro: 1 ♀ (NMP 90224 {pb2404} [S+A]), Gurec, Cijevna River, 4 August 2002, leg. P. Benda.
Albania: 10 ♂♂, 11 ♀♀, 1 ind. (NMP 96426, 96427 {B125, 126} [S+A], 96422, 96423, 96434, 96436–96439, 96441 {B116, 119, 134, 136–138, 141} [S+B], 96406, 96418, 96424, 96425, 96428–96433, 96435, 96440 {B89, 111, 120, 124, 127, 129–133, 135, 139} [S]), Mezhgoran, Mezhgorani Cave, 11 October 1960, leg. V. Hanák; – 1 ♂ (NMP 96523 {pb6009} [S+A]), Tren, Treni Cave, 7 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 2 ♀♀ (NMP 96466, 96468 {B182, 184} [S]), Vanistër, Vanishta Cave, 12 October 1960, leg. V. Hanák.
Greece (mainland): 1 ♂ (NMP 48657 {TH 120} [S+B]), Avas, gorge, 20 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂, 2 ♀♀ (NMP 48665–48667 {TH 129–131} [S+B]), Didymoteiho, cave, 22 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 2 ♂♂, 2 ♀♀ (NMP 48622–48625 {TH 84–87} [S+B]), Kimmeria, mine, 16 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♂, 2 ♀♀ (NMP 48632, 48633, 48642 {TH 94, 95, 104} [S+B]), Marōneia, Kyklōpa Cave, 18 & 19 June 1989, leg. R. Chaloupka, V. Hanák & V. Vohralík; – 1 ♀ (NMP 96656 {pb5980} [S+A]), Monastīri, Vergoy Bridge, 2 July 2015, leg. P. Benda, F. Spitzenberger, M. Uhrin & E. Weiß; – 1 ♂, 10 ♀♀ (NMP 96659–96665, 96669 {48/2007/Ř3–8, 13} [S+A], 96666–96668 {48/2007/Ř10–12} [A]), Naoysa, cave, 12 July 1938, leg. J. Mařan & K. Táborský; – 2 ♀♀ (NMP 48578, 48579 {TH 35, 36} [S]), Papigko, cave, 26 September 1988, leg. V. Hanák, Z. Roček & V. Vohralík; – 1 ♂, 1 ♀ (NMP 48610, 48611 {TH 70, 71} [S+B]), Petralōna, cave, 28 September 1988, leg. V. Hanák, I. Horáček, Z. Roček & V. Vohralík.
Greece (Crete): 1 ♂ (NMP 92311 {pb3586} [S+A]), Leykogeia, Katō Prevelī Monastery, Venetian bridge, 11 October 2007, leg. P. Benda; – 3 ♂♂, 4 ♀♀ (NMP 91112–91115, 91118 {pb3419–3422, 3425 [S+A], 91116, 91117 {pb3423, 3424} [A]), Milatos, Milatoy Cave, 7 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 14 ♂♂, 2 ♀♀ (NMP 91161–91171, 91176 {pb3360–3370, 3375} [S+A], 91172–91175 {pb3371–3374} [A]), Omalos, Tzanī Cave, 1 October 2006, leg. P. Benda, V. Hanák & P. Hulva; – 1 ♀ (NMP 92316 {pb3591} [S+A]), Peykoi, Vreiko Cave, 12 October 2007, leg. P. Benda.
Greece (islands): 1 ♂ (NMP 96613 {pb5431} [S+A]), Rhodes, Lardos, Fonias river, 15 August 2012, leg. P. Benda; – 1 ♀ (NMP 96631 {pb5449} [S+A]), Symi, Ampeli, Kourkouniōtīs, 23 August 2012, leg. P. Benda.

References. [Chalupský (1956)], Hanak et al. (1961), Hůrka (1962, 1963a, c), Hanák (1964), Červený & Kryštufek (1988), Hanák et al. (2001), Benda et al. (2006, 2009, 2014), [Jůn (2013)], Ševčík et al. (2013), Šrámek et al. (2013), Presetnik et al. (2014), Benda & Uhrin (2017), this volume.

Remarks. The series of specimens of *Miniopterus schreibersii* labelled to originate from Dalmatia was collected at the beginning of the 20th century, at that time the Kingdom of Dalmatia covered a large part of the Adriatic coast of the present-day south-eastern Croatia and north-western Montenegro. The specimens were transferred to the NMP collection in 1959 along with a specimen of *Rhinolophus ferrumequinum*, see under this species for details. The original collection containing these bats was not primarily created as a scientific collection and the specimens lacked most data concerning their origin and taxonomic affiliation. Thus, more detailed data on the locality, date of collection and the collector of the Dalmatian specimens of *M. schreibersii* are not available.

The set of specimens of *M. schreibersii* originating from a cave near Naoussa (Naoysa/Νάουσα), western Macedonia, Greece, was collected during the NMP expedition to Greece in 1938 (Jůn 2013) and has been only recently discovered in the museum collection. However, from the area of Naoussa, *M. schreibersii* was documented already by Lindberg (1955).

* 1 ♀ (NMW 28694 [S+B]), Salakos [Σαλάκος], 13 May 1971, leg. E. Kritscher & K. Bilek.

Table 20. Basic biometric data on the examined NMP specimens of *Miniopterus schreibersii* (Kuhl, 1817) from the mainland western Balkans and from the Greek Islands, and *Tadarida teniotis* (Rafinesque, 1814) from the mainland western Balkans and Rhodes. For abbreviations see pp. 14, 212

	Miniopterus schreibersii										*Tadarida teniotis*				
	Western Balkans					Crete & Dodecaneses					Western Balkans & Rhodes				
	n	**M**	min	max	SD	n	**M**	min	max	SD	n	**M**	min	max	SD
LAt	60	**45.75**	43.3	47.4	0.902	27	**44.95**	44.0	46.0	0.538	11	**61.09**	59.8	63.7	1.270
LCr	54	**15.10**	14.59	15.58	0.218	21	**14.89**	14.49	15.23	0.202	11	**24.25**	23.71	25.02	0.424
LCb	54	**14.65**	14.18	15.07	0.227	21	**14.46**	14.11	14.68	0.145	10	**23.55**	22.34	24.36	0.561
LaZ	51	**8.54**	8.21	8.87	0.164	21	**8.52**	8.22	8.77	0.126	11	**14.24**	13.82	14.62	0.285
LaI	56	**3.56**	3.38	3.84	0.094	21	**3.55**	3.38	3.73	0.100	11	**4.69**	4.42	4.92	0.171
LaInf	54	**3.98**	3.78	4.16	0.099	21	**3.90**	3.77	4.06	0.089	11	**5.01**	4.66	5.21	0.170
LaN	56	**7.99**	7.68	8.25	0.136	21	**7.84**	7.68	8.04	0.089	11	**11.68**	11.15	12.05	0.289
LaM	56	**8.73**	8.36	9.07	0.173	21	**8.58**	8.42	8.71	0.084	11	**12.95**	12.68	13.26	0.203
ANc	56	**6.29**	6.02	6.54	0.114	21	**6.25**	6.02	6.44	0.098	10	**7.43**	7.22	7.71	0.141
LBT	47	**3.02**	2.75	3.28	0.104	19	**2.90**	2.67	3.28	0.151	11	**5.45**	5.17	5.75	0.157
CC	54	**4.53**	4.20	4.75	0.136	21	**4.53**	4.39	4.74	0.081	10	**5.63**	5.43	5.83	0.145
M^3M^3	55	**6.31**	5.98	6.52	0.121	21	**6.29**	6.09	6.48	0.094	11	**9.53**	9.09	9.86	0.256
CM^3	56	**5.88**	4.98	6.08	0.160	21	**5.87**	5.62	6.04	0.091	11	**9.03**	8.74	9.38	0.174
LMd	54	**10.70**	10.38	11.02	0.167	21	**10.57**	10.27	10.77	0.124	11	**16.99**	16.65	17.56	0.294
ACo	54	**2.51**	2.21	2.84	0.123	21	**2.57**	2.42	2.66	0.057	11	**4.19**	4.02	4.32	0.110
CM_3	54	**6.26**	6.04	6.45	0.097	21	**6.25**	6.02	6.34	0.069	11	**9.67**	9.41	9.96	0.170

Two specimens of *M. schreibersii* from Greece represent new records of this bat from the country, a male collected at Lardos, Rhodes, and a female netted at Monastiri, northern Epirus, Greece. The remaining specimens of *M. schreibersii* from Croatia were published by Červený & Kryštufek (1988), from Montenegro by Presetnik et al. (2014), and from Greece by Hanák et al. (2001), Benda et al. (2009), and Benda & Uhrin (2017). None of these specimens represents a significant record concerning the species distribution range (see Dietz et al. 2016).

External and cranial dimensions of the examined specimens of *M. schreibersii* are shown in Table 20.

Tadarida teniotis (Rafinesque, 1814)

Material. **Albania**: 4 ♀♀ (NMP 96578–96580 {pb6295–6297} [S+A], 96581 {pb6298} [A]), Dukat, Dukati River, 2 July 2016, leg. P. Benda & M. Uhrin; – 2 ♂♂ (NMP 96597, 96598 {pb6314, 6315} [S+A]), Selcë, Cemi River, 9 July 2016, leg. P. Benda; – 1 ♀ (NMP 96608 {pb6610} [S+A]), Urakë, Tarini River, 2 July 2018, leg. P. Benda.
Greece (mainland): 1 ♂ (NMP 96728 {2/93} [S+B]), Thessalonikī, University Campus, 5 April 1992, leg. V. Hanák.
Greece (islands): 2 ♂♂, 2 ♀♀ (NMP 96619–96622 {pb5437–5440} [S+A]), Rhodes, Gadoyra Dam, bridge, 17 August 2012, leg. P. Benda.

References. This volume.

Remarks. The specimen of *Tadarida teniotis* from Thessaloniki, Greece, constituting a new record of this bat, confirms its known permanent occurrence in this largest urban agglomeration of Macedonia, see Hanák et al. (2001) and Kalpakis et al. (2005).

The specimens from Rhodes represent the first localised finding of *T. teniotis* from this island. Till now, only a record with unspecified locality was available from Rhodes (Pieper 1966).

External and cranial dimensions of the examined specimens of *T. teniotis* are shown in Table 20.

Gazetteer

Geographical coordinates of the sites mentioned in Remarks

Croatia: Brač (island), ca. 43° 19’ N / 16° 39’ E; – Bribir, 45° 10’ N / 14° 46’ E; – Selce, 45° 09’ N / 14° 43’ E.
Bosnia and Herzegovina: Bunari, Šipovac (5 km ESE of Mostar), 43° 20’ N / 17° 53’ E; – Bunari, Svinjarina (7 km SE of Mostar), 43° 19’ N / 17° 54’ E; – Izbišno, 43° 32’ N / 18° 36’ E; – Zavala, Bjelušica Cave, 42° 51’ N / 17° 59’ E.
Montenegro: Čakor pass, 42° 40’ N / 20° 00’ E; – Dobrodole, 42° 58’ N / 19° 59’ E; – Gusinje, riverbed, 42° 34’ N / 19° 50’ E; – Mratinje, 43° 16’ N / 18° 49’ E; – Stabna, 43° 10’ N / 18° 46’ E; – Vusanje, 42° 32’ N / 19° 51’ E.
Serbia: Petnica, 44° 15’ N / 19° 56’ E; – Petrovaradin, fortress, 45° 15’ N / 19° 52’ E.
Kosovo: Brezovicë, bridge, 42° 12’ N / 20° 59’ E; – Bubël, cave, 42° 32’ N / 20° 39’ E; – Mrasor, Mirushë Waterfall, cave, 42° 31’ N / 20° 35’ E; – Pejë, 42° 40’ N / 20° 17’ E; – Rugova gorge near Pejë, cave, ca. 42° 40’ N / 20° 15’ E.
North Macedonia: Gavato, bridge, 41° 04’ N / 21° 08’ E; – Kočani, 41° 55’ N / 22° 25’ E; – Ohrid Lake bank, 41° 10’ N / 20° 45’ E.
Greece (mainland): Anthīro, 39° 12’ N, 21° 45’ E; – Monastīri, bridge, 40° 07’ N / 20° 47’ E; – Naoysa, cave, ca. 40° 38’ N, 22° 04’ E; – Oiti Mountains, cave, 38° 48’ N / 22° 20’ E; – Pappagiannīs, river, 40° 51’ N / 21° 29’ E; – Paralia Skotinas, bridge, 40° 02’ N / 22° 35’ E; – Prionia, waterfall, 40° 05’ N / 22° 24’ E; – Rentina, stream, 40° 40’ N / 23° 38’ E; – Spatharīs, forest stream, 37° 43’ N / 21° 53’ E; – Thessalonikī, university campus, 40° 38’ N / 22° 58’ E.
Greece (Crete): Idaio Antro Cave, 35° 12’ N / 24° 50’ E; – Monastīraki, Genianos stream, 35° 14’ N / 24° 41’ E; – Omalos, Tzanī Cave, 35° 21’ N / 23° 54’ E; – Royva Forest, Agios Iōannis Royva, 35° 11’ N / 24° 55’ E; – Zaros, stream, 35° 09’ N / 24° 54’ E.
Greece (islands): Karpathos, Aperi, Ahata Valley, cave, 35° 33’ N / 27° 11’ E; – Karpathos, Aperi, bridge, 35° 32’ N / 27° 11’ E; – Karpathos, Finiki, 35° 30’ N / 27° 07’ E; – Karpathos, Leykos, 35° 36’ N / 27° 11’ E; – Karpathos, Olympos, 35° 44’ N / 27° 11’ E; – Karpathos, Pīgadia, Profītīs Zaharias, cave, 35° 30’ N / 27° 14’ E; – Rhodes, Agios Paylos, hut, 35° 57’ N / 27° 50’ E; – Rhodes, Eleoysa, house, 36° 16’ N / 28° 02’ E; – Rhodes, Epta Piges Springs, 36° 15’ N / 28° 07’ E; – Rhodes, Gadoyra Dam, bridge, 36° 12’ N / 27° 59’ E; – Rhodes, Gadoyra Dam, hut, 36° 12’ N / 27° 59’ E; – Rhodes, Lardos, Fonias river, 36° 05’ N / 28° 01’ E; – Rhodes, Profitis Ilias, 36° 17’ N / 27° 57’ E; – Rhodes, Stegna, cave, 36° 13’ N / 28° 08’ E; – Thassos, Theologos, stream, 40° 39’ N / 24° 42’ E.