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Distribution of Cavernicolous Bat Fauna in Ilam Province, Western and Southwestern of the Iranian Plateau

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Reports on distribution and abundance of bats from Iran exist since mid-nineteen century, but studies on this subject are very scarce and have been conducted very infrequently by European biologists who visited Iran occasionally. Until now, six caves have been investigated and eight species of cave-dwelling bats have been reported from Ilam province in south-western Iran. The present paper has also summarized additional information on 39 distribution records of 11 species in this province. In this study we visited a total of 28 caves, 23 of which contained at least one species of bat. Species recorded in the present study include *Rhinopoma microphyllum*, *R. hardwickii* and *R. muscatellum* from family Rhinopomatidae, *Asellia tridens* from family Hipposideridae, *Myotis blythii*, *M. emarginatus* from family Vespertilionidae, *Miniopterus pallidus* from family Miniopteridae, *Rhinolophus ferrumequinum*, *R. hipposideros*, *R. euryale* and *R. blasii* from family Rhinolophidae. *M. blythii* with 11 distribution records is the most widely distributed species and Khofash cave with four species and about 30,000 bats is the most crowded roost in the study area.

Key words: cave-dwelling bats, distribution, fauna, Ilam province.

INTRODUCTION

Bats (order Chiroptera) are an ecologically diverse and geographically widespread mammalian group and constitute approximately one-fifth of all extant mammals (Simmons, 2003). Bats are the only mammals that have evolved powered flight together with echolocation which has made it possible for bats to seek shelter in many different types of structures (e.g., foliage, tree cavities, caves, rock crevices) that are not generally used by terrestrial mammals and to exploit a wide variety of food sources (Kunz and Pierson, 1994). Caves alone provide a variety of structural substrates for roosting, including crevices, cavities, textured walls and ceilings, expansive ceilings, rock outcrops, and rock rubble on floors (Culver and White, 2005). Caves are used by bats for a variety of reasons, including courtship and mating, raising young, and hibernating (Fleming et al., 1998). The distribution of cave bats not only depends on the presence of caves, but is also a consequence of specific roosting requirements (Kunz, 1982).

Iran, lying on the crossroads of several biogeographic regions, supports a diverse mammalian fauna. The study of bats in Iran began in the mid-19th century when De Filippi in 1865 provided the first inclusive list of the mammals of Iran. Several researchers have studied the bat fauna of Iran. These included Belanford (1876), Cabrera (1901), Thomas (1905), Cheesman (1921), Misonne (1959), Lay (1967), Etemad (1969), Farhang-Azad (1970, 1971), DeBlase (1980), Sharifi et al. (2000), Karami et al. (2008), Akmali et al. (2011) and Benda et al. (1998, 2006, 2007, 2012). DeBlase (1980)

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has a significant role in the study of bats of Iran. He visited many sites and finally reported 38 species of bats from Iran. Study of bats in Iran has continued by European and Iranian biologists. Based on an annotated check-list of the mammals of Iran (Karami et al., 2008) there are 45 species of bats in Iran but in a detailed study by Benda et al. (2012) the number of bat species reported from Iran reaches to 50.

In the past, few studies have been conducted on cave-dwelling bats in Ilam province. Lay (1967) reported a specimen of *Rhinopoma hardwickii* in the collections of the British Museum from Bisheh Deraz cave in what is now in southern Ilam Province . In October 1970, Lay visited Khofash cave. At that time he estimated the population to include about 5,000 *Asellia* and 100 *Rhinopoma*. Three caves have been visited by DeBlase (1980) in Ilam province and he reported five species of bats including *Myotis blythii* from Porcupine cave (in this study Ban cave), *Rhinopoma muscatellum* from a small slit-like cave at a point about 64 km. south of Ilam and *R. microphyllum*, *Asellia tridens* and *Miniopterus pallidus* from Sarin Ab-Garma Cave (in this study Khofash cave) near Dehloran south of Ilam Province. In a comprehensive study by Benda et al. (2012), based on previous and new records they reported eight cave-dwelling bats species (*R. microphyllum*, *R. muscatellum*, *R. hardwickii*, *A. tridens*, *M. blythii*, *M. pallidus*, *Rhinolophus blasii* and *R. mehelyi*) from six caves (TangeRad, Porcupine, Darhamreh, Bisheh Deraz, Khofash and a small karst cave 11 km. SW of Mormori) in Ilam Province.

The present study is a wide-ranging study on the cave-dwelling bats in Ilam Province. The main objective of this study was to determine basic data on distribution of the cave-dwelling bat fauna in this province.

MATERIAL AND METHODS

The study area is located in the western and southwestern regions of the Iranian Plateau between 31°58' to 34°15' N and 45°24' to 48°10' E (Fig. 1). The region is bordered to the north by Kermanshah Province, to the south by Khuzestan Province, to the west by the Iraqi border, and to the east by Lorestan Province. Altitude ranges from 50 m a.s.l in the south to 3062 m in the Kabir-Kouh Mountain (to the east of the province). In general the north and north east areas of Ilam Province are mountainous and the areas of west and south-west province consist of lowlands. Annual precipitation varies from 200 mm in southern areas to 800 mm in the northern highlands (Fathinia et al., 2010). Ilam Province is an area where the Zagros Mountains meet the northern Mesopotamian low land. There are some parts of the Zagros range where a steep environmental gradient appears within a relatively small area, where high altitude cold weather from the Iranian plateau diffuses into the low altitude and warm Mesopotamian plain with a hot and dry climate. The weather condition in the western edge of the Iranian plateau in northern Ilam is characterized by a pronounced seasonal variation including a long freezing period in winter and a mild summer (Zehzad et al., 2002). In the northern Mesopotamian plain in southern Ilam Province the climate conditions shift to a warm climate without a freezing period in winter.

The survey was carried out from July 2011 to March 2014. Initially the list of caves in the province was provided by inquiring from Department of Environment, Office of Cultural Heritage and Tourism, Board of Mountaineering, Environmental NGOs and local people in Ilam Province. A total of 28 caves were identified, all of which were visited at least once. Geographical position for each cave was recorded using a Garmin GPS unit (GPSMAP 60CSx; Garmin International, Inc., city, state, USA). Most specimens were caught by hand-net, although some bats such as Rhinolophids were collected by hand. Live and fresh specimens were identified according to DeBlase (1980), Dietz and Von Helversen (2004) and Dietz (2005) using morphometric measurements by digital caliper to nearest 0.01 mm and morphological characteristics of live species. Specimens were released after identification immediately.

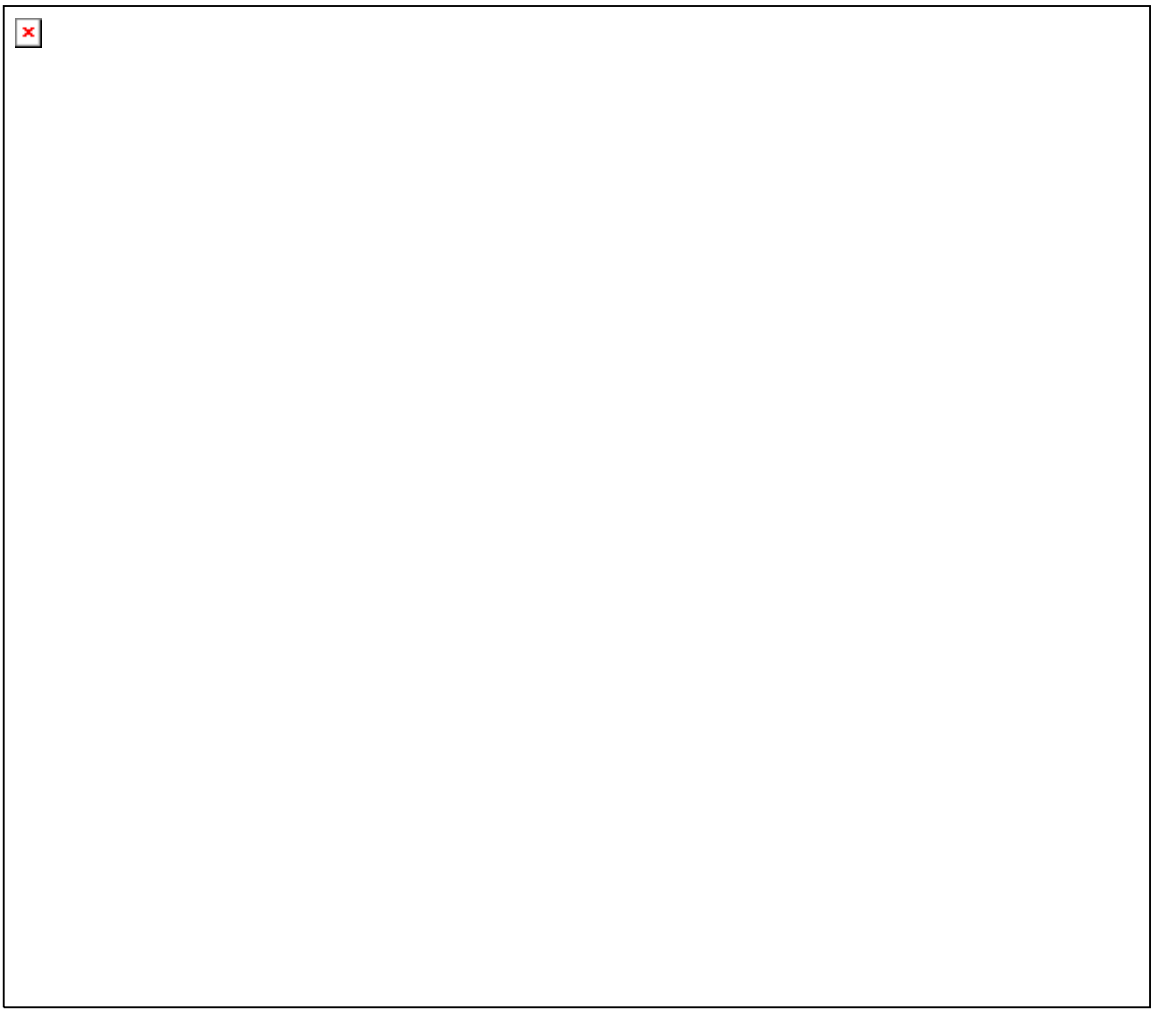

FIGURE 1. Geographical location of Ilam Province in the west of Iran and of 23 caves investigated in the study area. Numbers refer to caves as indicated in Table 1.

RESULTS

We identified with certainty 11 of the Iranian 50 bat species, representing five bat families, and five genera (Table 1). All of these species belong to order microchiroptera. In five caves no bat was observed but the remaining 23 caves were occupied seasonally or all year around by bats. Five caves had a bat fauna of 3 species, three caves occupied by 2 species and in fifteen caves only one species was found (Table 2). The most diverse and crowded cave was Khofash cave near Dehloran, with 4 species present and about 30,000 individuals. Overall, the most abundant species in the area were *R. microphyllum*, *M. pallidus*, *A. tridens* and *M. blythii*. Geoffroy's Myotis (*Myotis emarginatus*) with five individuals was the least abundant species found in the Ilam caves. During our visit the caves in winter (Mid-December to late March), only three species of bats were found in southern part of the province in Northern Mesopotamian plain. These include *R. microphyllum*, *R. muscatellum* and *A. tridens*. All other species were present in the study area during the spring and summer (Early April to late September) (Table 3) in maternity and nursing colonies. The largest nursery colony was observed in Ghadah cave in April 2013 with *M. pallidus* as the most abundant species. The size of this colony reached approximately to 5000 bats.

TABLE 1. Cave-dwelling bats found in Ilam Province during this study according to family, genus and species.

Family	Genus	Species
Rhinolophidae	*Rhinolophus*	1. *R. blasii* 2. *R. hipposideros* 3. *R. euryale* 4. *R. ferrumequinum*
Rhinopomatidae	*Rhinopoma*	1. *R. microphyllum* 2. *R. hardwickii* 3. *R. muscatellum*
Hipposideridae	*Asellia*	1. *A. tridens*
Vespertilionidae	*Myotis*	1. *M. blythii* 2. *M. emarginatus*
Minioptridae	*Miniopterus*	1. *M. pallidus*

TABLE 2. Distribution of cave-dwelling bats in 23 caves investigated in the Ilam Province. Species names are abbreviated as follows: *Rmic- Rhinopoma microphyllum*, *Rmus- Rhinopoma muscatellum*, *Rhar- Rhinopoma hardwickii*, *Atri- Asellia tridens*, *Mema- Myotis emarginatus*, *Mbly- Myotis blythii*, *Mpal-Miniopterus pallidus*, *Rfer- R. ferrumequinum*, *Rhip- Rhinolophus hipposideros*, *Reur- Rhinolophus euryale*, *Rbla- Rhinolophus blasii*. Total number of species present in each cave is also indicated. In the caves that visited more than once, the number of individuals reported is the maximum number among the visits.

No	Cave	Lat/N	Lon/E	*Rmic*	*Rmus*	*Rhar*	*Atri*	*Mema*	*Mbly*	*Mpal*	*Rfer*	*Rhip*	*Reur*	*Rbla*	T.Sp
1	Khofash	32°43′	47°18′	+	+		+			+					4
2	Bisheh Deraz	32°49′	46°58′	+	+		+								3
3	Ghelapikah	32°54′	46°43′				+								1
4	Zarin Abad	32°59′	46°52′				+								1
5	Ghachah Zakh	32°40′	47°35′					+							1
6	Mezharah	32°53′	47°41′						+						1
7	Vali	32°58′	47°29′		+										1
8	Ghadeh	32°57′	47°14′			+			+	+					3
9	Konar	32°57′	47°12′		+										1
10	Malek	33°12′	47°03′						+		+				2
11	Kabootarlan	33°12′	47°03′								+				1
12	Bendirh	32°58′	47°46′	+											1
13	Koolkani	32°59′	47°42′	+											1
14	Aghamir	33°23′	46°46′						+	+	+				3
15	Taygah	33°19′	46°35′						+	+		+			3
16	Ban	33°27′	46°30′						+						1
17	Darhamreh	32°55′	46°58′	+	+										2
18	Telesm-e Sarab	33°46′	46°22′						+						1
19	Telesm-e Dobiran	33°50′	46°18′						+				+		2
20	West TangeRad	33°54′	46°25′						+						1
21	East TangeRad	33°54′	46°25′						+			+		+	3
22	Chehel Sotoon	33°46′	46°37′						+						1
23	West Alipanah	33°37′	46°37′											+	1

TABLE 3. Recorded number of cave occupied by each species, their altitudinal range and the season bats were present in the cave.

Species	Number of caves	Altitudinal range (m)	Time observed
Asellia tridens	3	382-500	Year around
Rhinopoma microphyllum	6	396-1029	Year around
R. hardwickii	1	1029	Spring and Summer
R. muscatellum	4	396-1029	Year around
Myotis emarginatus	1	494	Spring and Summer
M. blythii	10	885-2560	Spring and Summer
Miniopterus pallidus	4	500-2560	Spring and Summer
Rhinolophus blasii	2	1300-1372	Spring and Summer
R. hipposideros	1	1204-1300	Spring and Summer
R. ferrumequinum	3	1878-2560	Spring and Summer
R. euryale	1	1440	Spring and Summer

A total of 11 species were collected in the study area comprising 5 genera and 5 families. Geographic location, number of specimens and some ecological notes for each species are as follows and their relevant photos are presented in figures 2 and 3.

Family Rhinopomatidae

***Rhinopoma microphyllum* (Brünnich, 1782)**

Type Locality: Egypt.

The Greater Mouse-tailed Bat (*Rhinopoma microphyllum*) is a medium-sized bat with a free tail, inhabiting arid and semiarid regions of the Old World and also is a very common bat in the southern and south-western parts of Iran. In previous study this species have been reported from five caves and crevices (Bisheh Deraz, Khofash, Darhamreh and 11 km SW of Mormori, 29 km E of Dehlorân) in the south and southwest of the Ilam province. In this study in addition to confirming its presence in Darhamreh, BishehDeraz and Khofash cave two other caves (Bendirh and Koolkani) in the southeast of province were added to the previous ranges (figure, 2). Caves that were occupied by this species are located in arid and semi-arid areas of the province that during the summer air temperature in this region reaches over 40°C.

***Rhinopoma hardwickii* Gray, 1831**

Type Locality: India.

The lesser Mouse-tailed Bat *(Rhinopoma hardwickii*) is a medium-sized insectivorous bat of the eastern part of the Saharo-Sindic zone (Hulva et al., 2007). These bats are often distinguished from their congeners on the basis of their tail which is always longer than their forearm (Roberts, 1997). The lesser mouse-tailed bat *R. hardwickii* was collected only from a single cave i.e. Ghadeh located in Abdanan City with dry and hot summers during the present survey. The only previous record of this species has been reported by Benda et al. (2012) in the south of Province in a crevice (11 km SW of Mormori, 29 km E of Dehlorân).

***Rhinopoma muscatellum* Thomas, 1903**

Type Locality: Wadi Bani Ruha, Muscat, Oman.

The Smallest Mouse-tailed Bat *(Rhinopoma muscatellum)* is a medium- to small-sized insectivorous bat of the eastern part of the Saharo-Sindic zone (Qumsiyeh and Knox Jones, 1986). *R. muscatellum* is an extremely frequent bat in the southern part of Iran (Benda et al., 2012). Based on previous data published from Ilam province, *R. muscatellum* has been reported from the four caves (small karst cave

65 km. S Ilam, Darhamreh, Bisheh Deraz and Khofash). In this study, in addition to confirming previous report we have added two other caves (Vali and Konar) to the previous records. Both Vali and Konar caves are small and shallow with relatively large and shiny openings. All shelters have been recorded for this species of bats in this study are located in the southern part of the province with a dry, semi-dry and warm climate.

Family Rhinolophidae

***Rhinolophus blasii* Peters, 1866**

Type Locality: Italy.

The Blasius's Horseshoe Bat *(Rhinolophus blasii)* is a species with a combined Mediterranean and Afro-tropical type of distribution (Corbet 1978, Koopman 1994, Csorba et al., 2003). Previous studies show that Presence of this species in Ilam province is limited to East TangeRad cave (Benda, 2012). In our study, *R. blassii* were observed in east TangeRad and west Alipanah caves. Both of these caves located in the northern areas of the province, with temperate mountainous climate.

***Rhinolophus hipposideros* (Borhausen, 1797)**

Type Locality: France.

The Lesser Horseshoe Bat *(Rhinolophus hipposideros*) is a species with mostly a Mediterranean type of distribution (Corbet, 1978, Koopman, 1994, Csorba et al., 2003). Based on Benda et al. (2012), *R. hipposideros* is recorded only in the TangeRad cave before our study. In this study, we observed this species in Taygah cave. As already mentioned, the distribution of this species in the province is limited. Taygah cave is located in northern area of province with temperate mountainous climate.

***Rhinolophus euryale* Blasius, 1853**

Type Locality: Italy, Milan.

The Mediterranean Horseshoe Bat (*Rhinolophus Euryale)* is a species with a Mediterranean type of distribution (Corbet, 1978; Csorba et al., 2003). Prior to conducting this study, there was no report on the record of this species in the Ilam province. We observed a colony (50 individuals) of *R. euryale* in the Telesm-e Dobiran cave. Telesm-e Dobiran cave is located in northern part of province with temperate mountainous climate.

***Rhinolophus ferrumequinum* (Schreber, 1774)**

Type Locality: France.

The Greater Horseshoe Bat (*Rhinolophus ferrumequinum*) is a South Palearctic faunal element with broad distribution in the temperate zone of the Palaearctic from the Maghreb, southern Britain and western Europe, over Central Europe, the northern Mediterranean (incl. most islands), the Caucasus Region and the Near East, Central Asia and northern India to southern China and Japan (Corbet, 1978, Koopman, 1994, Csorba et al., 2003). Prior to conducting this study, there was no report on the record of this species in the Ilam province. In present study, *R. ferrumequinum* recorded from three caves. Malek, Kabootarlan and Aghamir caves are located in Kabir-Kouh Mountain highlands.

Family Hipposideridae

***Asellia tridens* (Geoffroy, 1813)**

Type Locality: Egypt, Thebes.

The Geoffroy's Trident Leaf-nosed Bat (*Asellia tridens)* ranks among very common bats in the southern part of Iran. Considering the whole country distribution this species remains as a very frequent bat species (Benda et al., 2012). During this study in addition to caves mentioned we

observed this species in Ghelapikah and Zarin Abad caves. All of these caves are located in southwest of the province with hot, dry and semi-dry climates.

Family Vespertilionidae

***Myotis blythii* (Tomes, 1857)**

Type locality: Nasiribad, Rajputana, India.

The lesser mouse-eared bat *Myotis blythii* is a species with the Mediterranean and/or South Palaearctic types of distribution (Corbet, 1978, Koopman, 1994, Horáček et al., 2000, Topál and Ruedi, 2001). The lesser mouse-eared bat which originated from Asia, has a longer distributional range from southern and central Europe, Asia Minor, Cyprus, Israel, the Near East, Iran, Iraq to Crimea, Transcaucasia, central Asia, the Himalayas, Mongolia, India, and China and on Sicily, Crete, and many Greek islands (Benda and Horacek, 1998, Mitchell-Jones et al., 1999, Dietz and Von Helversen, 2004, Simmons 2005, Benda et al., 2006, 2007). *M. blythii* is a very common bat in Iran with at least 98 record sites known from the country (Benda et al., 2012). Concerning the number of records, *M. blythii* is the second most frequently documented bat species in Iran (Benda et al., 2012). Its range covers mainly the mountainous areas of the northern, western and south-western parts of the country. Until recently, *M. blythii* was recorded from TangeRad cave, Porcupine cave and a small cave about 20 miles southeast of Ilam in Ilam province. During this study, this species observed in Mezharah, Ghadeh, Malek, Aghamir, Taygah, Ban (Porcupine), Telesm-e Sarab, Telesm-eDobiran, west TangeRad, East TangeRad and Chehel Sotoon. Except for Ban (Porcupine) and East TangeRad *M. blythii* reported form all of these caves for the first time. *M. blythii* is the most wide ranging bat species in Ilam province. This species is found throughout the study area except for caves that are located in west and southwest of the province.

***Myotis emarginatus* (Geoffroy, 1806)**

Type locality: France, Ardennes, Charlemont.

The Geoffroy's Myotis bat (*Myotis emarginatus)* is a species with mostly a Mediterranean type of distribution (Corbet, 1978, Koopman, 1994, Horáček et al., 2000, Topál, 2001). Based on previous studies, *M. emarginatus* was not recorded in Ilam province before of our study. We capture one flying individual of *M. emarginatus* in the entrance of Ghachah Zakh cave. During our study this species recorded from Ghachah Zakh cave in Ilam province for the first time. Ghachah Zakh cave located in south of province with a dry, semi-dry and warm climate.

Family Miniopteridae

***Miniopterus pallidus* Thomas, 1907**

Type locality: Southern shore of Caspian Sea, Northern Iran, Near Bandar-e-Gaz.

The Bent-Wing Bat *(Miniopterus pallidus)* is a species with the Mediterranean type of distribution (Koopman, 1994; Akmali et al., 2014). *M. pallidus* inhabits mostly the Mediterranean habitats of the Near East, it marginally penetrates also into deserts (Harrison and Bates, 1991, Benda and Horáček, 1998Based on previous published data, *M. pallidus* solely recorded from Khofash cave in the north of Dehloran. In this study in addition to confirming its presence in Khofash cave three other caves (Ghadeh, Aghamir and Taygah) were added to the ranges. Location of these caves show different type of climates.

Distribution pattern for different species varies throughout the study area. Mouse-tailed bats (*R. microphyllum*, *R. hardwickii* and *R. muscatellum*) were present only in the southern parts of the province. Altitudinal range for this species varies between 382 m and 1,029 m. a. s. l. *A. tridens* was recorded in three cave at the southern part of the province at lower altitudes up to 500 m. Horseshoe bats (e.g. *R. blasii*, *R. hipposideros*, *R. euryale* and *R. ferrumequinum*) were observed only

during spring and summer in the northern and central highlands region of the study area that have altitudinal ranges between 1204 m to 2560 m a. s. l. *M. blythii* was identified as the most widely distributed species occurring in eleven caves in the south, center and north of the study area. Altitudinal range for this species is between 885 m to 2560 m. Altitudinal range for all species and number of caves occupied by each species is shown in Table 3.

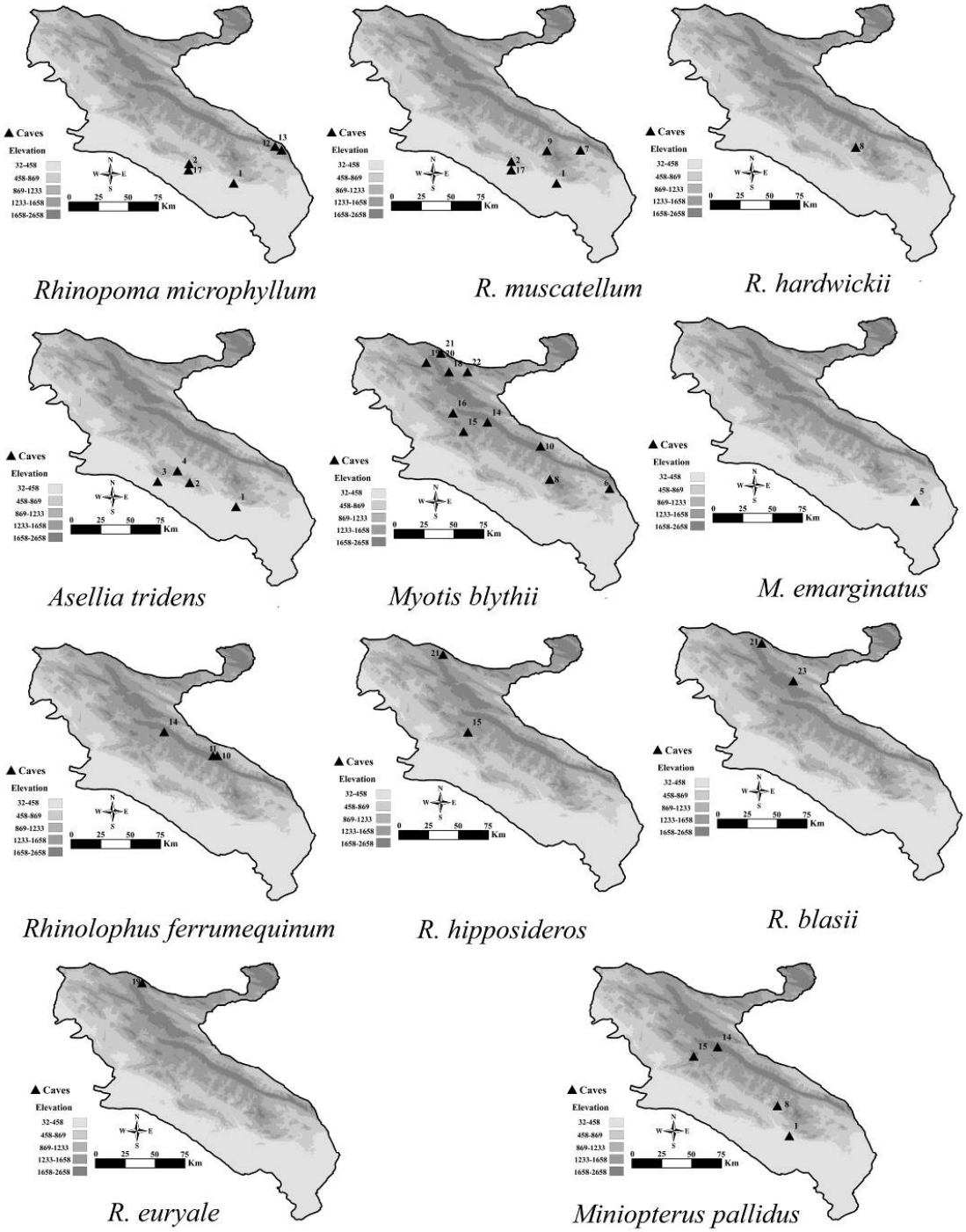

FIGURE 2. Map of records of all species.

FIGURE 3. Collected species in this study in caves located in Table 1. A: *Rhinolophus blasii*, B: *Rhinolophus euryale*, C: *Rhinopoma muscatellum*, D: *Myotis blythii*, E: *Myotis emarginatus*, F: *Miniopterus pallidus*, G: *Asellia tridens*, H: *Rhinopoma microphyllum*, I: *Rhinopoma hardwickii*, J: *Rhinolophus ferrumequinum*, K: *Rhinolophus hipposideros*.

DISCUSSION

Until present study, eight species of cave-dwelling bats had been reported from Ilam Province. Based on the results obtained during present study we recorded eleven species of cave-dwelling bats in this Province. Compared with the current bat species found in Iran (50 species), cave-dwelling bats species recorded in Ilam province constitute almost a fifth of the bats fauna of Iran. Higher taxon diversity of bats in this area is also high as 11 species reported in this study belong to five genera and five families. Rhinolophidae with four species was the most diverse family and Hipposideridae with only one species has the lowest diversity.

There are considerable differences in mean annual temperature, mean annual precipitation and altitude of different parts of the study area (Khaki et al., 2011) which may have influenced the pattern of distribution and abundance of bats in the Ilam Province. Distribution of bats indicates a preference towards low and medium altitudes, with 8 species observed below 1300 m, 5 species above 1,300 m that two of them are in 500- 2560 m (Figure 4). Distribution of mouse-tailed bats (*Rhinopoma microphyllum*, *R. muscatellum* and *R. hardwickii*) and *Asellia tridens*, which are well known for their adaptation to arid environments (DeBlase, 1980) is limited to lowlands of the Northern Mesopotamian plain in the southern Ilam province. Altitude of these parts is less than 1,030 m a. s. l. and in some periods of the year (e.g. late spring and summer) ambient temperatures reaches more than 40° C. During spring, due to existence of hot and humid caves (e.g. Ghadeh, Mezharah, Ban and Taygah) *Miniopterus pallidus* and *Myotis blythii* were seen in the area to form maternity and nursing colonies. These species move toward northern latitudes for finding cool caves and going into hibernation during winter period.

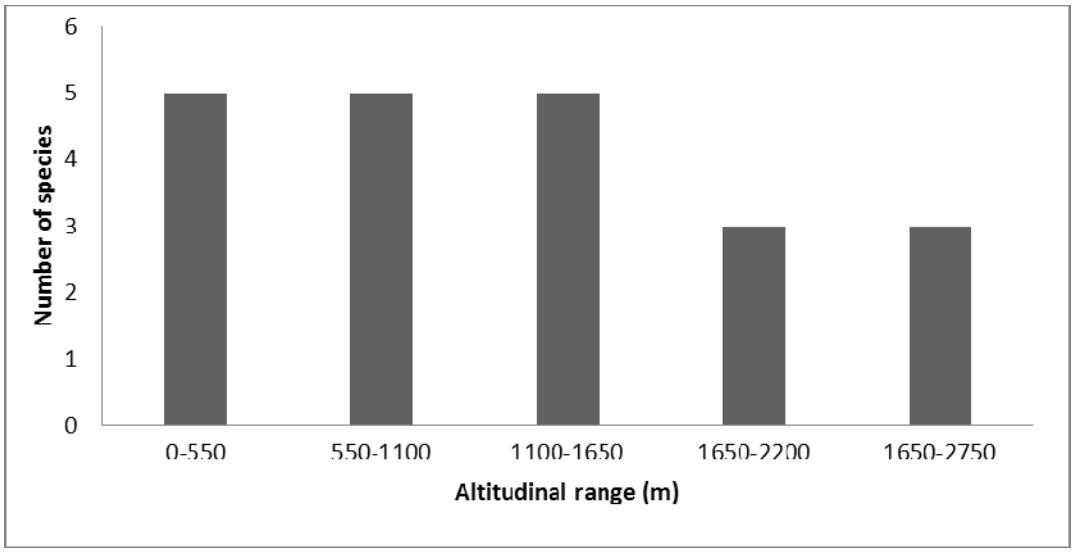

FIGURE. 4. Altitudinal distribution of bat species identified in the Ilam province.

Rhinolophids bats (*Rhinolophus blasii*, *R. hipposideros* and *R. euryale*) except for *R. ferrumequinum* were found in the northern areas of the province, with temperate mountainous climate. *R. ferrumequinum* that was found in only three caves (Malek, Kabootarlan and Aghmir) of the Kabir-Kouh Mountain has altitudinal ranges from 1878 m to 2560 m. Climate in this distribution rage is cold mountainous with mean annual precipitation above 600 mm (Khaki et al., 2011). There is not adequate information to infer about bat abundance in the study area. There is only one estimate (about 30000) of bat population in Khofash cave in Ilam Province (Abdali, 2010). Present study also confirms the high level of population size in this cave. However, there are evidences that show the bat population may have experienced a significant decline in caves in central and northern part of the study area.

For example local farmers suggest that guana harvest by farmers has been decreased sharply. Also, in some caves comparison between old (dead) and fresh guana indicates a lower population size in recent years. Recent decrease in precipitation attributed to the global climate change, as well as dust accumulation especially during the spring and summer may play a role in reducing the abundance and distribution of cave-dwelling bats in the region.

Although the number of bat species reported from Iran has exceeded to 50 species (Benda et al., 2012) during last three decades the record remains sketchy and incomplete. There are still large parts of the country that has not been adequately searched for the Chiroptera and there are several species that have been reported only from few localities. In 1981 when the total number of bats reported from Iran was 38, twenty-one of the species were known from five or fewer localities, and six of these have been reported from a single site (DeBlase, 1980). In spite of this incomplete distribution documentation, it is possible to draw some conclusions on faunal composition. From the 50 species of bats now reported from Iran, none is endemic to the political boundaries or physiographic feature of the Iranian territory. Moreover, the Iranian bat fauna is strongly Palearctic. At least 27 of bats reported from Iran are entirely, restricted to the Palearctic faunal region.

DeBlase in 1980 provided a geographic grouping for the Iranian bats by drawing a tentative line from eastern part to western Iran and divided the county into two geographic regions: northern and southern region. Most of the Iranian bat species fall into one of three geographic groups in Iran: "northern", "southern," and those species that widely ranging in both north and south. The "northern" species are found on the Caspian coast, in the Zagros Mountains south to about the area of Shiraz. The "southern" species range primarily through the Mesopotamian Plain, the Persian Gulf Littorals, the lower, more arid mountains in the Elburz Mountains, in northeastern Iran, and on the margins of the Iranian basin.

Ilam Province is typically located at the junction of the two contrasting physiognomic units including south-western edge of the Iranian Plateau and lowlands of the Persian Gulf Littorals and the Mesopotamian Plain. This area can pronounce the DeBlase grouping very well by encompassing both “northern” and “southern” species very close together or sometimes overlapping. For example of the nine species known as “southern” originated from Ethiopian Zone, *Rhinopoma microphyllum, R. hardwickei* and *R. muscatellum,* are reported from Ilam Province. Of these species of the genus Rhinopoma are well adapted to dry lands by their valved nostril which prevent the entry of dust and kidneys. Along with these dry land bat species, we can see numbers of Palearctic bats such as *Rhinolophus euryale*, *Myotis blythi*, and *Miniopterus schreibersi* now *M. pallidis*. There are also 4 species found at widely scattered points in both the "northern" and "southern" regions and meet other species in Ilam Province. These species are: *Rhinolophus ferrumequinum, R. hipposideros, R. blasii* and *Myotis emarginatus*.

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