

First record of Alpine long-eared bat, *Plecotus macrobullaris* Kuzjakin, 1965 (Chiroptera: Vespertilionidae) from east of Iran

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The Alpine long-eared bat, *Plecotus macrobullaris* Kuzjakin, 1965 is widely distributed in west of the Palaearctic. This species is frequently recorded from west of Iran, representing the easternmost occurrence point within whole distribution range of *P. macrobullaris*. The distribution of the species is poorly known in eastern half of the country. In the present study, *P. macrobullaris* is recorded from NE of Iran (Moghan cave, Khorasan-e-Razavi province) for the first time. Moreover, the presence of the Lesser Mouse-eared Myotis, *Myotis blythii* (Tomes, 1857) in the cave is confirmed after 1999.

Key words: *Plecotus macrobullaris*, Moghan cave, Khorasan-e-Razavi, Iran, first record

INTRODUCTION

Bats (Chiroptera) are the second-diverse mammalian order that include about 1270 species in the world (Herkta et al., 2016). Seven families, 17 genera and 50 species of the order have been reported from Iran (Karami et al., 2008; Benda et al., 2012); Of which, two families, eight genera and 17 species have been recorded from Khorasan Provinces (Darvish & Rastegar-Pouyani, 2012).

The genus *Plecotus* Geoffroy, 1818 is a specious genus within family Vespertilionidae and distributed throughout the Palaearctic region from Western Europe to Eastern Asia (Benda et al., 2004; Spitzenberger et al., 2006). All members of the genus *Plecotus* are characterized by very long ears, upward opening nostrils and spur without post calcareal lobe (Dietz & Helversen, 2004; Spitzenberger et al., 2006).

Three species of the genus *Plecotus*, *P. macrobullaris*, *P. auritus* (Linnaeus, 1758) and *P. strelkovi* Spitzenberger, 2006 have been recorded from Iran (Karami, 2008; Benda et al., 2012). *P. macrobullaris* has frequently been recorded from northwest and west of Iran, while *P. auritus* and *P. strelkovi* were reported based on a single record from northwest (Assalem, Gilan province) and southeast (Khorasan-e-Jonubi and Sistan va Baluchestan provinces) of Iran, respectively (Spitzenberger et al., 2006; Karami, 2008; Benda et al., 2012).

P. macrobullaris, the mountain long-eared bat, is widespread through west of the Palaearctic which mainly occurs in mountain chains from Pyrenees (Spain) via the southern part of the European continent (Andorra France, Switzerland, Liechtenstein, Austria, Italy, Slovenia, Turkey) to the Caucasus and several mountainous regions in the Middle East (Spitzenberger et al., 2006; Alberdi, 2013) (Fig. 2a).

According to literature reviews (Etemad 1967; Spitzenberger et al., 2006; Benda et al., 2004, 2012; Alberdi, 2013), *P. macrobullaris* has been recorded from several localities from Iran. Most of which are recorded from western part of the country locating on the narrow belt extending from

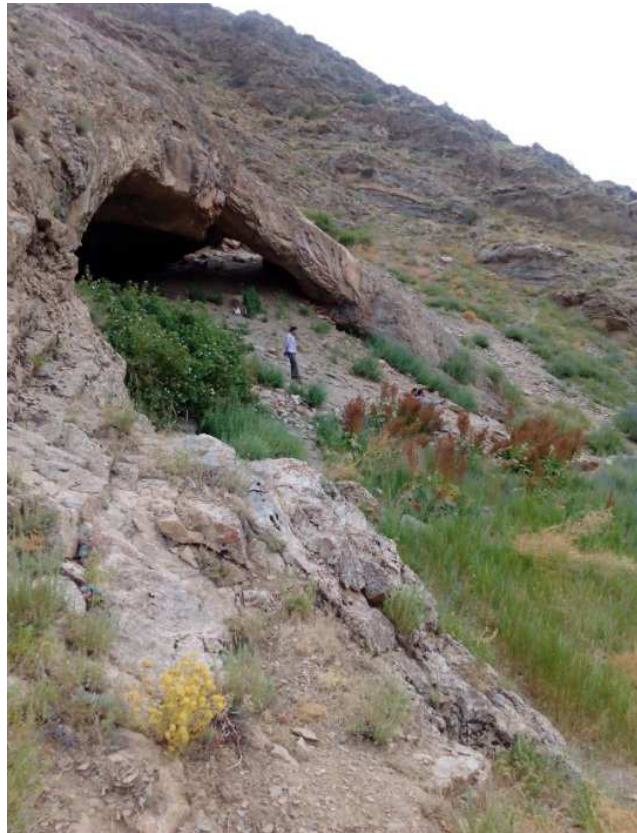


FIGURE 1. The entrance to the Moghan cave.

northern slope of the Sabalan Mountain (Ardabil province) to the central part of the Zagros Mountain (Chahar Malal va Bakhtiari province) (Fig. 2b). A single record of *P. macrobullaris* from Gandab, NW Semnan province is the only occurrence on the Alburz Mountain indicating the easternmost occurrence point within this species range (Spitzenberger et al., 2006) (Fig. 2b).

As there is no locality record of this species in the literatures from east of Iran, the occurrence of this species in east of the country is questionable. The current study provides new distributional data of *P. macrobullaris* from east of Iran.

MATERIAL AND METHODS

Study area

Moghan village is in 35 km southwest Mashhad (Khorasan-e-Razavi province, Iran) that located on the eastern part of Alburz Mountain. The village located on relatively elevated part of Binalud Mountain with steep slope and mean summer temperature 18 °C. Moghan is a medium size cave (Fig. 1) with historic values which located at about 2 km southwest of the Moghan village.

Collecting and identification methods

Some mistnets were set for capturing birds in the surrounding of the Moghan village during June 2015. Two bat specimens were unexpectedly captured in a mist net which was set nearby the Moghan cave entrance shortly after sunset. Specimens were identified based on general morphology and biometric measurements (Dietz & Helversen, 2004; Spitzenberger et al., 2006; Kiefer, 2008) and deposited in the collection at the Zoological Museum, Ferdowsi University of Mashhad, Mashhad, Iran (ZMFUM). Distribution map was provided using DIVA-GIS software version 7.5.0. Measurements were made using Vernier calipers with an accuracy of 0.01 mm.

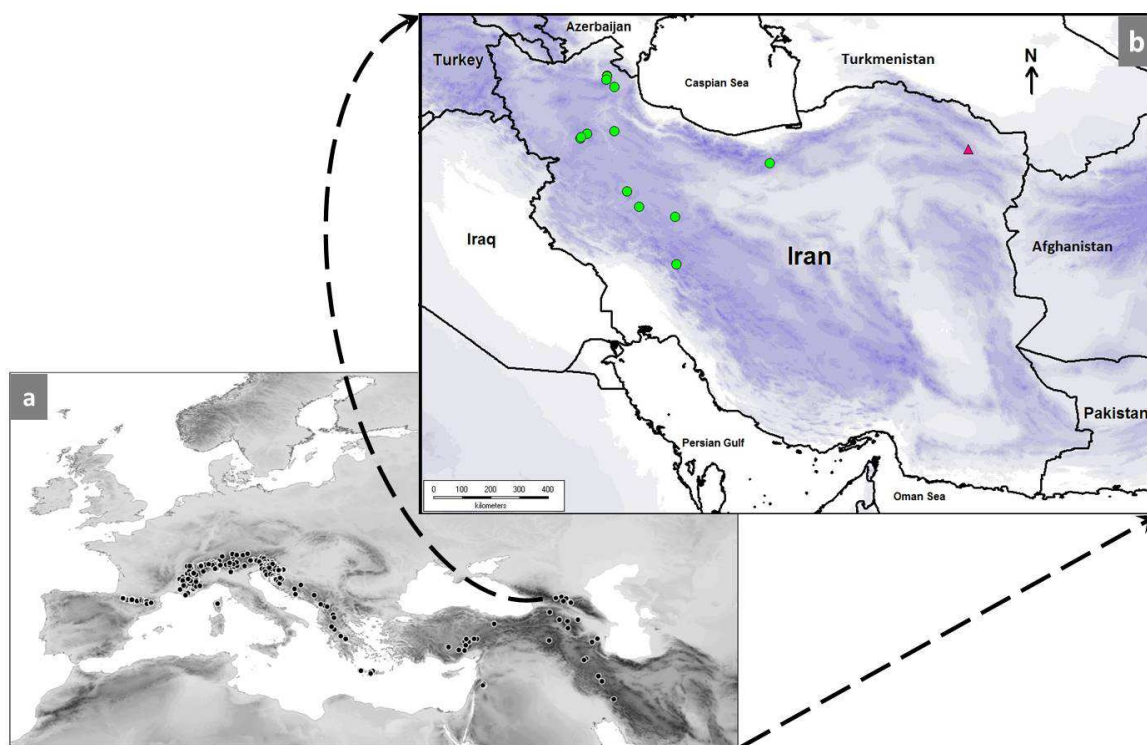


FIGURE 2. Records of *P. macrobullaris* on elevation map: a) The Western Palearctic (Alberdi et al., 2013) and b) Iran (Benda et al., 2012) (green circles), and present study (red triangle).

RESULTS

Myotis blythii (Tomes, 1857)

Lesser Mouse-eared Myotis

Material examined: 1♂ (ZMFUM 4950), Khorasan-e-Razavi Prov., 35 km SW Mashhad, Moghan village, Moghan cave (36°07'22"N, 59°21'39"E), 2102 m a.s.l., 29.06.2015, leg. M. Dezhman.

Morphological characteristics: Large-sized bat; tragus long, lanceolate, narrow at its base; without post calcareal lobe at the spur; dorsal color grayish brown, ventral fur whitish. Morphometric measurements are presented in table 1.

Plecotus macrobullaris Kuzjakin, 1965

Material examined: 1♂ (ZMFUM 4949), Khorasan-e-Razavi Prov., 35 km SW Mashhad, Moghan village, Moghan cave (36°07'22"N, 59°21'39"E), 2102 m a.s.l., 29.06.2015, leg. M. Elahi.

Morphological characteristics: Small-sized bat; ears large and joined over the forehead, tragus well-developed (Figs. 3b & 3c), nostrils open upwards; a hard triangular pad on the lower lip (Fig. 3d); upper jaw with two pairs of incisors and two pairs of premolars; lower jaw with three pairs of incisors and three pairs of premolars; penis parallel sided, only tapered at the tip; tail long; spur without post calcareal lobe (Fig. 3a); dorsal color grey, ventral fur long, whitish (Figs. 3a, 3c). Morphometric measurements are presented in table 1.

TABLE 1. Morphometric measurements (mm) for *Plecotus macrobullaris* Kuzjakin, 1965. BL= Body length; TL= Tail length; FA= Forearm-length; D5= Length of fifth finger; D3= Length of third finger; D1= Length of thumb; Tib= Length of tibia; HF= Length of hind foot; earL = Length of ear; earW= Width of ear; TragL= Length of tragus; TragW= Width of tragus.

	BL	TL	FA	D5	D3	D1	Tib	HF	earL	earW	TragL	TragW
<i>Plecotus macrobullaris</i>	50.23	44.09	43.75	39.65	55.25	8.34	18.65	10.68	35.87	10.26	15.41	4.84
<i>Myotis blythii</i>	82.16	50.73	49.91	80.07	74.56	10.11	27.79	14.11	20.21	8.49	9.93	2.89



FIGURE 3. Photos of the *Plecotus macrobullaris* Kuzjakin, 1965. a) dorsal view; b) ears connection in front at their bases; c) ventral view of head; d) triangle pad on the lower lip as a diagnostic character of the species.

DISCUSSION

Three bat species *Myotis blythii*, *Rhinolophus hipposideros* and *Miniopterus pallidus* have been recorded from Moghan cave (Etemad, 1967; Faizolahi, 1999), thus, *Plecotus macrobullaris* is the fourth species that recorded from the cave. This record is easternmost occurrence of *P. macrobullaris* not only in Iran, but also in its whole distribution range.

A huge distribution gap is seen between two most eastern records of *P. macrobullaris* (Gandab, Semnan and Moghan, Khorasan-e-Razavi), which is probably due to lack of sufficient distribution data. It is expected that future studies will reveal more locality records along Central and Eastern Alburz Mountain as is predicted based on the environmental niche analysis (Alberdi et al., 2014). According to their results, eastern half of Alburz Mountain is considered as a rather suitable habitat for this species which is confirmed with our result.

Short distance to rock, high abruptness and steep slope were shown as important factors for presence of *P. macrobullaris* (Alberdi, 2014) which conform to topographical variables of Moghan cave. Additionally, elevation of the captured specimen (2102 m) is in agreement with average altitude of the previous Iranian locality records (2113 m) (Benda et al., 2012). Regarding to climatic factors, mean summer temperature of Moghan region is about 18 °C which is relatively resemble to one (16 °C) calculated by Alberdi et al. (2014).

P. macrobullaris has been documented to share its roosts with several bat species (Benda et al., 2012), of which, *Myotis blythii* comprise second frequently of co-roosting species, as this shown in this study. By considering two other species *R. hipposideros* and *M. pallidus* that previously recorded from Moghan cave (Etemad, 1967; Faizolahi, 1999), bat fauna of this cave constitute from four species. Generally, the bat fauna is less studied in east of Iran, hence more studies can be revealed the diversity of bats in the area.

Acknowledgments

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LITERATURE CITED

- Alberdi, A., Garin, I., Aizpurua, O., Aihartza, J., 2013. Review on the geographic and elevational distribution of the mountain long-eared bat *Plecotus macrobullaris*, completed by utilising a specific mist-netting technique. *Acta Chiropterologica* 15(2), 451-61.
- Alberdi, A., Aizpurua, O., Aihartza, J., Garin, I., 2014. Unveiling the factors shaping the distribution of widely distributed alpine vertebrates, using multi-scale ecological niche modelling of the bat *Plecotus macrobullaris*. *Frontiers in zoology* 11(1), 77.
- Benda, P., Kiefer, A., Hanák, V., Veith, M., 2004. Systematic status of African populations of long-eared bats, genus *Plecotus* (Mammalia: Chiroptera). *Folia Zoologica* 53, 1-47.
- Benda, P., Faizolahi, K., Andreas, M., Obuch, J., Reiter, A., Ševčík, M., 2012. Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 10. Bat fauna of Iran. *Acta Societatis Zoologicae Bohemicae* 76, 163-582.
- Darvish, J., Rastegar-Pouyani, E., 2012. Biodiversity conservation of reptiles and mammals in the Khorasan Provinces, northeast of Iran. *Progress in Biological Sciences* 2(1), 95-109.
- Dietz, C., von Helversen, O., 2004. Illustrated identification key to the bats of Europe.
- Etemad, E., 1967. Notes on bats from Iran. *Mammalia* 31(2), 275-80.
- Herkt, K.M.B., Barnikel, G., Skidmore, A.K., Fahr, J., 2016. A high-resolution model of bat diversity and endemism for continental Africa. *Ecological Modelling* 320, 9-28.
- Faizolahi, K., 1999. Motâle'e-ye moqaddamâti-ye parvâz va shenâsâ'i-ye chand gune az khoffash'ha-ye shomâl-e khorâsân [Preliminary Study of Flight Anatomy and Identification of Several North Khorasani Bat Species]. Unpubl. BSc. Thesis, Ferdowsi University, Mashhad. 139 pp (In Persian).

Karami, M., Hutterer, R., Benda, P., Siahsarvie, R., Krystufek, B., 2008. Annotated check-list of the mammals of Iran. *Lynx, series nova* 39(1), 63-102.

Kiefer, A., 2008. Phylogeny of Western Palaearctic long-eared bats (Mammalia, Chiroptera, *Plecotus*)—a molecular perspective. Ph.D. Thesis, Johannes Gutenberg-Universität in Mainz.

Spitzenberger, F., Strelkov, P.P., Winkler, H., Haring, E., 2006. A preliminary revision of the genus *Plecotus* (Chiroptera, Vespertilionidae) based on genetic and morphological results. *Zoologica Scripta* 35(3), 187-230.