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Nyctalus leisleri (*Chiroptera: Vespertilionidae*), confirmation of presence in Azerbaijan over the last eight decades

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This study presents an updated confirmation of the occurrence of the lesser noctule, or Leisler's bat (*Nyctalus leisleri*, Kuhl, 1817), in Azerbaijan. Before this record, the only documented occurrence of the species in the country dated back to 1939. The new record was obtained by the author on 7 October 2025 near the village of Pirekeshkul (also known as Chayli) in the Absheron administrative district, approximately 12 km east of Sumgait, the second - largest city in Azerbaijan. The locality is situated at 40°32′30.77″ N, 49°30′12.90″ E, at an elevation of 198 m above sea level. This finding is further supported by recent acoustic detections of *N. leisleri* between the Absheron Peninsula and the Gobustan district. The temporal distribution of echolocation calls and the ecological characteristics of the observation site, documented through both physical and acoustic surveys, provide new insights into the regional occurrence and habitat utilization of Leisler's bat in the South Caucasus.

Keywords: *Distribution, confirmation, biodiversity, Absheron peninsula, Azerbaijan*

INTRODUCTION

The bat fauna of Azerbaijan currently comprises 34 species belonging to 11 genera and 4 families (Hasanov, Guliyeva, 2023). Among these, only three species are recognized as migratory, one of which is *Nyctalus leisleri*, representing one of the rarest chiropteran taxa in the country. This medium-sized species has a broad but patchy distribution, occurring locally across Europe (Stebbings, 1986) and western Asia, extending eastward to the Ural Mountains and the Himalayas, and is also known from north-western Africa, the Canary Islands, and Madeira. *N. leisleri* remains rare throughout most parts of its distribution. The species is currently assessed as Least Concern (LC) on the IUCN Red List (Juste, Paunović, 2016) and has not been included in the Red Book of the Azerbaijan Republic (RB of AR, 2023).

According to published records, this species has been documented in Azerbaijan only once, in the northeastern part of the country, specifically in the Gusar district. On 3 September 1939, A.P. Kuzyakin captured two females and one male of Leisler's bat from a hollow in a maple tree (Kuzyakin, 1950; Vereshchagin, 1059; Rakhmatulina, 2005). The Qusar region is characterized by a predominantly mountainous forest landscape (Budagov, 2005) and is situated along the northern border of the republic, adjacent to the Dagestan AR of the Russian Federation.

Since that time, no additional records of the species have been reported from Azerbaijan. The absence of confirmed observations for more than eight decades underscored the need to verify the continued presence of Leisler's bat within the country.

MATERIALS AND METHODS

The present study was undertaken following a review of the existing literature on the distribution of *Nyctalus leisleri* in Azerbaijan and

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the wider South Caucasus region.

Fieldwork was conducted in the Absheron and southern Gobustan regions during both daytime and nighttime periods between 2024 and 2025.

The bat survey (and species identification) was conducted using two complementary approaches. The first involved traditional (Kunts et al., 2001; Dietz, Helversen, 2004) field methods, including mist-netting, transect counts, roost inspections, and gathering information from residents. The second employed modern acoustic techniques, specifically static monitoring through the deployment of passive detectors. Together, these approaches provided a comprehensive assessment of the bat fauna in the study area. In this study, we focus exclusively on the results of the 2024 acoustic survey.

During the acoustic survey, we used four passive ultrasonic detectors (ANABAT Swift and ANABAT Ranger; Wildlife Acoustics, USA) deployed on two masts erected near Pirekeshkul village (see coordinates in Table 2). Detectors were positioned at two height levels: 7-10 m and 65-75 m above ground, to record both low and high-flying bat species. The monitoring covered the longest portion of the bat activity season. Continuous recording was achieved for 192 and 163 days on masts 1 and 2, respectively. All acoustic data were systematically downloaded, archived, and organized by sampling point and detector to facilitate subsequent analysis. Data was analyzed using Kaleidoscope Pro software (Wildlife Acoustics, Inc.), applying the "Bats of Europe 5.4.0" classifier. For taxa not represented in the classifier library, identification was refined by cross-referencing locally available reference calls and spectrograms.

RESULTS AND DISCUSSION

In Azerbaijan, *Nyctalus leisleri* is extremely rare and has not been included in any of the three editions of the Red Book of Azerbaijan (1989, 2013, 2023). At a regional scale, the species is more broadly distributed across the South Caucasus, although populations remain relatively sparse. Its range extends from the Black Sea coast in the west to the Caspian Sea in the east. Based on published and unpublished data, 87 records of *N. leisleri* have been documented in Georgia (Natradze and Buknikashvili et al., 2023), whereas only three, relatively old, records are known from Armenia (Gazaryan and Buknikashvili, 2005). In Azerbaijan, the species has been reported from a single locality, with only three individuals recorded (Kuzyakin, 1950).

Four female individuals of Leisler's bat (found deceased) were recorded by the author on 29 September and 7 October 2025 near Pirekeshkul (also known as Chayli) village in the north-western part of the Absheron Peninsula (199 m a.s.l.), in an open semi-desert landscape.

Among the three *Nyctalus* species present in the region, *N. leisleri* is the smallest in terms of body size and other morphological parameters, making it readily distinguishable. The external measurements and additional information for all four individuals are provided in Table 1.

Stationary acoustic monitoring conducted during 2024-2025 consistently detected echolocation calls of *Nyctalus* species, with *N. noctula* recorded most frequently, *N. leisleri* less commonly, and *N. lasiopterus* only rarely, the latter being previously predicted but not confirmed to occur in Azerbaijan.

In Azerbaijan, the bat activity season typically begins in late March to early April and extends until late October (Rakhmatulina, 2005). In 2024, a stationary acoustic survey was conducted covering the majority of this active period. Analysis of the recordings indicated that echolocation calls attributable to *Nyctalus leisleri* accounted for 1.5% and 1.7% of the total calls at the two monitoring stations, respectively (Table 2). This represented the first confirmed record of the species in Azerbaijan in over eight decades. The physical observation of this species in 2025 provided definitive confirmation of its presence in Azerbaijan, and we recorded the calls even in early November in Gobustan.

Nyctalus leisleri is generally considered a migratory species, capable of crossing inhospitable habitats. However, populations in the Caucasus appear largely resident and relatively isolated from those in Eastern Europe (Gazaryan & Buknikashvili, 2002). Analysis of acoustic data collected in 2024 revealed monthly variation in call activity, with peaks observed in September,

October, and April (data for March were unavailable).

Fig. 1. Registered individual (one of the four bodies) of Leisler's bat (*Nyctalus leisleri*).

Table 1. Some morphological parameters, sex and observation date of the recorded individuals of *Nyctalus leisleri.*

N	FA	M	Body	Tale	Au	Tr	D5	D3	D1	Sex	Date
1	43.2	12.5	53.8	42.1	15.4	6.4	49.0	71.5	5.6	female	07.10.20025
2	43.1	14.0	54.1	44.6	15.9	6.0	48.2	73.0	5.1	female	
3	45.0	14.8	61.4	44.8	15.9	6.2	49.7	76.3	5.8	female	30.09.20025
4	44.6	seriously damaged body/head					49.7	72.8	5.4	female	

Table 2. Percentage of *Nyctalus leisleri* calls among the recorded total bat calls set - Pirekeshkul settlement, 2024.

Recording locations	Altitude (a.s.l.)	Coordinates	Start date	End date	Recording days	Total calls	Calls of *N.leisleri*	*N.leisleri* calls %
Station 1	211	40°28'3.53"N 9°32'50.93"E	26-Apr-24	24-Oct-24	192	6000	92	1.5
Station 2	313	40°28'36.70"N 49°25'59.29"E	19-Apr-24	24-Oct-24	163	7535	100	1.7

Fig. 2. Natural landscape of the territory where *Nyctalus leisleri* individuals were registered.

Calls were recorded throughout the active season, from April to late October, supporting the view that the local population is predominantly sedentary. The higher frequency of calls in spring and late autumn may reflect certain migratory movements within Azerbaijan. Interestingly, all individuals recorded in October 2025 were female, and the subsequent physical observations provided definitive confirmation of the species' continued presence in the country.

Across much of its range, *Nyctalus leisleri* primarily inhabits open deciduous and coniferous forests, with a particular affinity for old-growth stands that provide hollow trees suitable for roosting and hibernation. Additionally, parks and estates containing mature trees may offer suitable habitat. Additionally, this species can occur in agricultural and suburban landscapes, where it frequently utilizes buildings and bat boxes as alternative roosting sites (BCT, 2020).

The area where *Nyctalus leisleri* was recorded in October 2025 near Pirekeshkul is an open semi-desert landscape with nearby human settlements. The nearest natural woodlands are located at least 35 km to the northwest. This area likely functions both as a foraging habitat, supported by artificial wetlands, seasonal riverbanks, and patches of reeds and Tamarix bushes, and as a roosting site, with bats utilizing man-made structures. Moreover, the adjacent Caspian coast forms part of a regional migratory corridor for the species.

Recent acoustic and physical records of Leisler's bat not only confirm its presence in Azerbaijan but also provide new insights into its habitat preferences at the southern extent of its global distribution range. These observations further inform the ecological status of the local population, specifically whether it is predominantly sedentary or fully migratory, both within Azerbaijan and potentially across the broader South Caucasus region.

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CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study.

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