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***Phengaris nausithous* (Bergsträsser, 1779)
(Lepidoptera: Lycaenidae: Polyommatainae)
discovered in Van Province, Türkiye,
with notes on its habitat and implications for conservation**

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Abstract. A population of dusky large blue *Phengaris nausithous* (Bergsträsser, 1779), an obligately myrmecophilous lycaenid butterfly species with endangered status according to the International Union for Conservation of Nature Red List for Türkiye, was discovered for the first time in Van Province, Eastern Türkiye. Here, the species inhabits tall-grass, damp meadows in a valley in the natural water system of Büyük Creek (Dönemeç Stream), above 2000 m a.s.l. This population is completely isolated from any recorded populations by at least 200 km distance and is threatened by various anthropogenic effects, including changes in agriculture practices, drainage and road construction. The habitat and food plant situation are described and biogeographical and conservation implications are given. Further systematic studies of similar habitats in the region are recommended to fully document and understand the distribution and population size of the species in Van Province. As the ant-host of *P. nausithous* in the region is unknown, study of the myrmecophilous relationship is also desirable to work out efficient conservation measures.

Key words: dusky large blue, myrmecophily, damp montane grasslands, traditional land use, anthropogenic pressure.

***Phengaris nausithous* (Bergsträsser, 1779) (Lepidoptera: Lycaenidae: Polyommatainae) –
вид, обнаруженный в провинции Ван, Турция,
с замечаниями о среде его обитания и мерах по охране**

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Резюме. Популяция голубянки сумрачной *Phengaris nausithous* (Bergsträsser, 1779), облигатно-мирмекофильного вида бабочек, находящегося под угрозой исчезновения согласно Красному списку Международного союза охраны природы для Турции, была впервые обнаружена в провинции Ван, Восточная Турция. Здесь вид обитает на высокотравных влажных лугах в долине естественной водной системы ручья Бююк (ручей Дёнемеч), на высоте выше 2000 м н.у.м. Популяция полностью изолирована от всех других зарегистрированных популяций на расстояние не менее 200 км и находится под угрозой в результате различных антропогенных воздействий, включая изменения в методах ведения сельского хозяйства, осушение местообитаний и строительство дорог. Приведены данные о состоянии среды обитания и кормовых растениях, а также биogeографические сведения и необходимые природоохранные меры. Рекомендовано продолжить систематические исследования подобных мест обитания в регионе, чтобы полностью документировать и понять распространение и размер популяции этого вида в провинции Ван. Поскольку муравьи, с которыми ассоциирован *P. nausithous* в исследуемом регионе, неизвестны, рекомендуется изучение мирмекофилии вида для разработки эффективных мер по его сохранению.

Ключевые слова: голубянка сумрачная, мирмекофилия, влажные горные луга, традиционное земледелие, антропогенное давление.

Introduction

The dusky large blue *Phengaris* (= *Maculinea*) *nausithous* (Bergsträsser, 1779) is a flagship butterfly species in conservation and along its relative, *P. teleius* (Bergsträsser, 1779), it is among the most studied species, concerning its distribution and ecology, at least on the European subcontinent. The butterfly develops in an obligately myrmecophilous association, where the young caterpillars are carried into the ant nest of stinging ants of the genus *Myrmica* Latreille, 1804. The larvae eat the

worker ants there, they also pupate inside the ant nest [Patricelli et al., 2010], and only the freshly eclosed adult butterfly leaves the nest, before pumping up the wings. The habitat of the species is damp and occasionally flooded meadows where the larval host plant and main nectar source of the butterflies, great burnet *Sanguisorba officinalis* L., and *Myrmica* ants coexist [Thomas, 1984; Dierks, Fischer, 2009].

Studies in Spain, Poland and Romania revealed that *P. nausithous* typically occurs in small isolated to large metapopulations [Novicki et al., 2007; Tartally et al., 2008;

Jubete, Román, 2016]. Similar patterns are also reported from Armenia. The populations in the northern and central regions also depend on similar ecological conditions [Khanamirian et al., 2015]. These studies emphasize the sensitivity of the species to hydrological balance and habitat fragmentation in the Western-Southwestern Palaearctic distribution of the species.

In the latest re-assessment of the extinction risk of European butterflies following criteria by the International Union for Conservation of Nature, *P. nausithous* received Near threatened status in Europe (both in the 27 EU countries and geographically) [Van Swaay et al., 2025]. *Phengaris nausithous* is classified as Endangered in Türkiye, according to the Red Book of Butterflies [Karaçetin et al., 2011], due to its restricted area of occupancy, estimated at only 68 km², and the severe fragmentation of its known populations.

Material and methods

All results presented here are based on direct field observations conducted by the authors. Habitat photographs and location coordinates were recorded using a Samsung S24 Ultra smartphone and associated freeware applications (e.g. Google Earth Pro). Live specimen photographs were taken using a Nikon Z 6II camera with a Nikon 105 mm f/2.8 macro lens.

ChatGPT (OpenAI, GPT-5.5) was used to correct grammar in some sentences.

Results and discussion

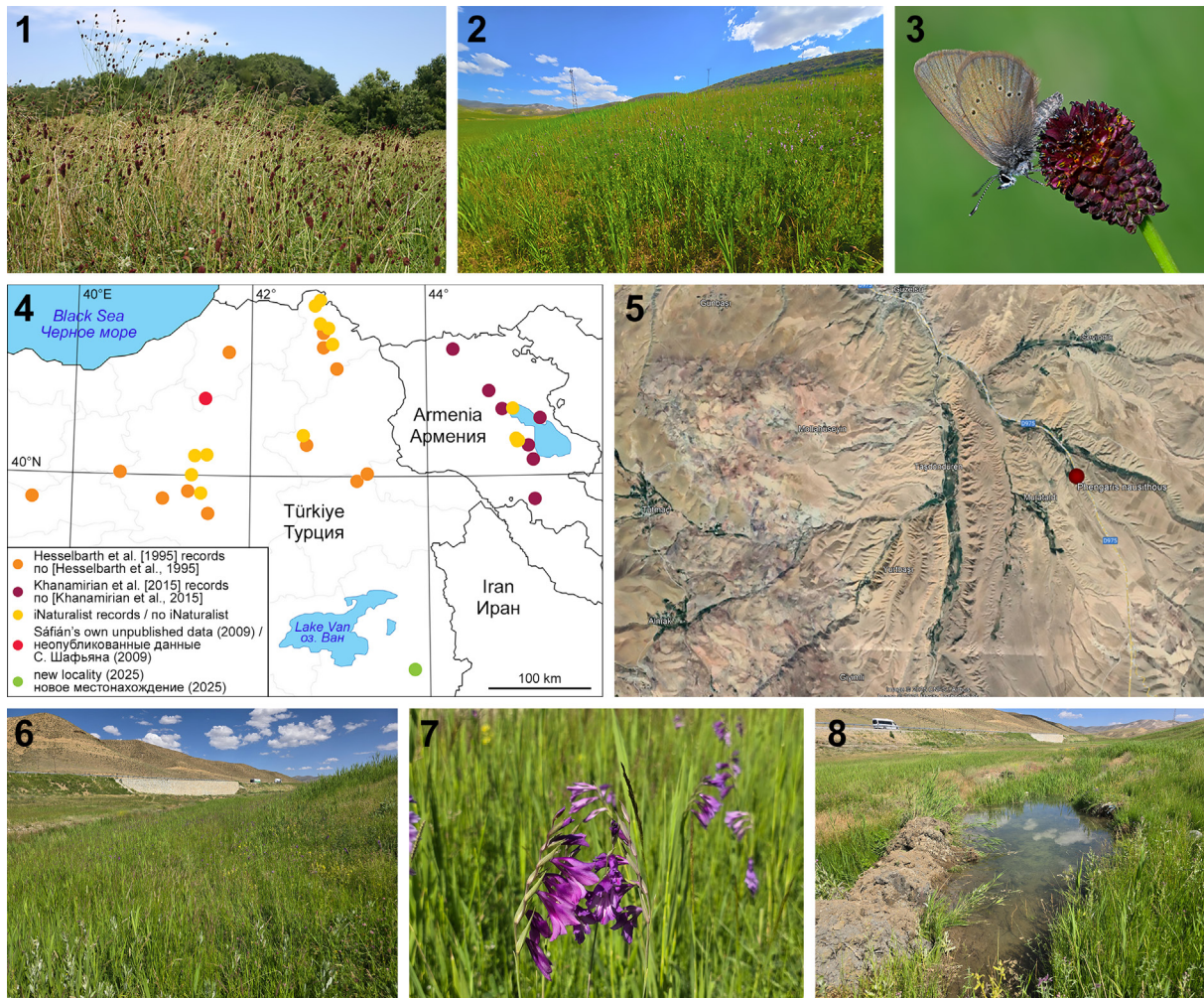
Observations on *Phengaris nausithous*. A breeding “colony” of *P. nausithous* was discovered during a field trip to the Güzeldere Pass on the 25th June 2025 by the authors, who, with butterfly photographers visiting from the United Kingdom, surveyed damp hay meadows along the Van-Hakkari highway D975, that follows a tributary of the Büyük Creek (referred to as Dönemeç Stream or Hoşap River downstream from Hoşap (Güzelsu) town). The locality is situated 8 km SW of Hosab town, Van Province (38°15'50.10"N / 43°52'4.76"E, 2130 m a.s.l.). Approximately 30 adult specimens were observed on the meadows, all closely associated with their larval food plant, great burnet *Sanguisorba officinalis*, as has been widely documented in the literature (see in Introduction). Most specimens were freshly emerged, although wings of a couple of males were already worn.

In the habitats in Central Europe, the food plant usually dominates the habitat visually with its high density and large, deep purplish-claret flower heads (Fig. 1). Unlike the habitats in Central Europe, in the Van Province locality the food plant was sparse, and the flower heads were much smaller and quite indistinct (Fig. 2). Male butterflies were frequently observed flying relatively long distances at high speed, often covering 50–100 m before stopping to investigate a flower head for the presence of a female. In the absence of a female, they continued searching for mates. They only rarely stopped to nectar or rest, typically landing briefly on a *Sanguisorba* flower head before resuming flight (Fig. 3).

The phenology of the species is also slightly different from the European populations and also from those situated in Northeast Türkiye. According to the limited number of records available on iNaturalist [2026] from Kars and Erzurum provinces, butterflies were observed between the 10th July to the 2nd August. The first author has also observed the species in the Kaçkar Mountains in Kılıçkaya village (Yusufeli District, Artvin Province) on the 8th July 2009, which is phenologically the earliest previous observation. Yet, the Van population was recorded 13 days earlier than this, indicating that the emergence of the species in Van Province occurs significantly earlier in the season, possibly due to a combination of altitude, continental climate, and specific microhabitat conditions.

Potential further occurrences. Due to very low intensity of Lepidoptera research and data collection by scientific institutions and citizen scientists in Türkiye, the current status of the previously documented “colonies” of *P. nausithous* is unknown. The map depicting the area of occupancy of the species in the Red Book [Karaçetin et al., 2011] supplemented by the map on Fig. 4 (which includes recent observations retrieved from iNaturalist and a previously unpublished one by the first author) records the species from eight provinces, including Ağrı Province, which is a direct neighbour to Van Province to the north. Still, the newly discovered population in the tributaries of Büyük Creek is situated over 200 km away from any recorded populations which is a significant range extension of the species to the south. The Armenian “colonies” exist less than 300 km north-east of Van Province and represent the nearest confirmed populations in the South Caucasus [Khanamirian et al., 2015]. This proximity also suggests possible historical connectivity and gene flow between the Armenian and eastern Anatolian populations. Although at current stage it is impossible to accurately assess any biogeographical connections, a number of mountain chains with numerous peaks above 3000 m, and large areas above 2000 m a.s.l. are present between Lake Van, Ağrı and Kars provinces and therefore the presence of similar habitats and fragmented populations of *P. nausithous* once connected probably across Transcaucasia, could be potentially present as well. This fragmentation pattern closely resembles the metapopulation structure documented in the Cantabrian Mountains of Spain, where limited dispersal ability and habitat isolation have led to genetically distinct regional clusters [Jubete, Román, 2016].

Importantly, similar habitats were also identified from Google Earth Pro satellite images in western Iran near the Turkish border. As the high mountain ranges separating the catchment areas of these smaller river systems evidently did not limit the past dispersal of *P. nausithous* towards central Van Province, the occurrence of the species under similar conditions in western Iran is also probable. It is more complicated to assess the possibility of the presence of the species in northern Iraq, where mountain ranges reach over 2500 m a.s.l. part of the westernmost subrange of the Zagros Mountains, but the extent of these habitats appears to be extremely limited, and the presence of smaller valleys with damp meadows could not be found with certainty from satellite images (source: Google Earth Pro).



Figs 1–8. *Phengaris nausithous* in nature, host plant, localities and distribution map in Türkiye and Armenia.

1 – in Central Europe, flowering *Sanguisorba officinalis* stands are often prominent and could dominate the meadows when *P. nausithous* is on the wing (Őrség National Park, Hungary); 2 – herb-rich damp meadow which hosts *P. nausithous* and *S. officinalis* (Van Province, Türkiye), the sparsely distributed, rather short food plants are not standing out and are barely distinguishable from the rest of the vegetation; 3 – male in usual resting position on the flower head of *S. officinalis*, the larval host plant and main nectar source of the adults (Van Province, Türkiye); 4 – the location of the new population of *P. nausithous* and confirmed previous occurrences in Türkiye and Armenia; 5 – the landscape of Büyük Creek valley and its tributaries (Van Province, Türkiye) with the dark green valley bottoms as potential habitats of *P. nausithous*, the original finding is marked with a red circle (source: Google Earth Pro); 6 – the habitat of *P. nausithous* in valley of the tributary of the Büyük Creek: in the centre, the steepness of the slope is turning gentler, slowing down the flow of seepage water in the topsoil that creates the damp conditions optimal for *S. officinalis*, on the left, the straight line of the excavated stream bed is visible, while the on the upper part the newly expanded Van-Hakkari highway and the dry ridges close the view; 7 – *Gladiolus* species (potentially *G. atroviolaceus*), characteristic to damp montane hay meadows and bogs are abundant in the habitat of *P. nausithous* in Van Province; 8 – a recently created water retention weir in the habitat of *P. nausithous*.

Рис. 1–8. *Phengaris nausithous* в природе, кормовое растение, места обитания и карта распространения в Турции и Армении.

1 – заросли цветущего *Sanguisorba officinalis* в Центральной Европе, которые часто доминируют на лугах во время лёта *P. nausithous* (Национальный парк Эршер, Венгрия); 2 – влажный разнотравный луг (провинция Ван, Турция), на котором обитает *P. nausithous* и произрастают его кормовые растения *S. officinalis* – редко расположенные, довольно низкорослые, они почти не выделяются и едва отличимы от остальной растительности; 3 – самец в типичном положении покоя на цветочной головке *S. officinalis*, кормового растения личинок и основного источника нектара для взрослых особей (провинция Ван, Турция); 4 – расположение местонахождения новой популяции *P. nausithous* и подтвержденные места обитания вида в Турции и Армении; 5 – ландшафт долины ручья Бююк и его притоков (провинция Ван, Турция) (темно-зеленого цвета) – возможные места обитания *P. nausithous*, новое местонахождение отмечено красным кругом (источник Google Earth Pro); 6 – биотоп *P. nausithous* в долине притока ручья Бююк: в центре склон более пологий, что замедляет поток просачивающихся в верхний слой почвы вод и создает оптимальные для произрастания *S. officinalis* условия, слева видна прямая линия нового (искусственного) русла ручья, а в верхней части – недавно расширенное шоссе Ван – Хаккари и сухие хребты; 7 – растение рода *Gladiolus* (возможно, *G. atroviolaceus*), характерное для влажных горных сенокосных лугов и болот, в изобилии встречается в биотопах *P. nausithous* в провинции Ван; 8 – резервуар для удержания воды, недавно построенный в местах обитания *P. nausithous*.

Notes on the habitat, ant-host and conservation issues. The valley of the Büyük Creek stretches for a few kilometres along the Van-Hakkari highway (D975), surrounded by dry mountain ridges and spurs, about 100 m higher than the valley bottom (Figs 5, 6, 8). The width of the

bottom of the valley, where damp, tall-grass hay meadows on soil sedimentation are naturally found varies between 100 to 250 metres, but many of these suitable-looking patches have been previously converted into arable land, or became degraded, intensively managed (e.g. artificially

fertilised) hay meadows. The recent extension of the Van-Hakkari highway also caused further degradation of natural areas due to passing of lorries and heavy construction machinery and dumping of building materials, etc. The immediate surrounding of the habitat of *P. nausithous* was also affected by human activities as this small tributary of the Büyük Creek was straightened with a rather deeply excavated new bed, allowing rapid drainage of the area. Comparable threats have been documented in the neighbouring Armenia, where drainage of meadows and overuse of mountain springs for human utilisation led to rapid decline or local extinction of *P. nausithous* “colonies” [Khanamirian et al., 2015]. Likewise, similar pressures have been reported from Spain, where large scale land consolidation and peat extraction caused extensive drainage and habitat loss [Jubete, Román, 2016]. These examples highlight that alteration of natural water systems is an existing threat throughout the western part of the distribution of the species. From the limited observations it is difficult to assess the original stage of the meadows in Van, but the drained part was still rich in *Gladiolus* species (potentially *G. atroviolaceus* Boiss., Fig. 7) and an orchid representing the genus *Dactylorhiza*, both are well-known indicators of damp meadows and montane bogs. *Sanguisorba officinalis* plants were not found on the drained side of the meadows, only between the excavated stream bed and the short-grassed, rocky mountain side, where the steepness of the slope increases significantly. The line between the habitats were sharply marked by the colour of the vegetation with almost no transition between them. Above the line, the vegetation was almost completely dry due to the steepness of the slope, as the fast-running rainwater washed the biomass and eroded the topsoil, resulting in accumulation at the valley bottom, sedimented when reaching the gently sloping or flat bed. This thick sedimentation also slows down the movement of underground water, allowing the presence of seepage water throughout the entire vegetation period. Figure 5 also shows that the vegetation of these stream valleys is still green at the end of September (the satellite images were taken on the 27th September 2024 according to Google Earth Pro) after at least five months without significant amount of precipitation, as the summer months between May and October are usually completely dry in the region, often without a single drop of rain. It was found that winters are extremely harsh in the area, with over 150 frosty days and snow cover of over 130 days in the mountain ecosystem of the nearby Ispiriz Mountain, Başkale District [Durmuş et al., 2013]. The slowly melting snow cover allows gradual infiltration of water into the topsoil even on steep slopes, which further supplies these meadows with seepage water. During our visit the lower meadows of the valley were still damp with boggy areas, where the soil was still completely saturated with water up to the surface. Flowering *S. officinalis* plants were mostly present slightly above these boggy patches, but unlike in some lowland Central European localities, the food plant was not abundant. Even in the densest patches, only a few flowerheads were visible in a few hundred square metre area. The plants were also shorter with smaller flower heads (Figs 2, 3) compared

to those growing in Central Europe (Fig. 1). *Sanguisorba* plants without flowers were also present, maybe allowing an extended blooming period. Whether or not this could affect the flight period of *P. nausithous* remains unknown.

Notes on potential ant-hosts of *P. nausithous*. So far nothing is known about the ant-host of *P. nausithous* in Van Province. According to Kiran and Karaman [2012], 21 species of ants of the genus *Myrmica* are listed from Türkiye. Among them, *M. ruginodis* Nylander, 1846 and *M. scabrinodis* Nylander, 1846 have also been recorded from Van Province. Multiple studies shown that the primary ant-host of *P. nausithous* is *M. rubra* (Linnaeus, 1758) in Central and Eastern Europe [Witek et al., 2008; Patricelli et al., 2010; Zakšek et al., 2021], although in a few cases, *M. scabrinodis* was also found to be hosting *P. nausithous* larvae [Munguira et al., 1999; Witek et al., 2008; Tartally et al., 2008; Pech, Sedláček 2016], which could be the potential ant-host of *P. nausithous* in the newly discovered population.

Implication for conservation. At current stage, it is very difficult to assess the conservation importance of the finding of *P. nausithous* in Van Province. The discovered habitat is very small, the approximate extent of suitable habitat patches does not exceed two hectares, and the observed number of *P. nausithous* individuals counted approximately 30 specimens. Although examination of satellite images published on Google Earth Pro revealed that further wet meadows in similar situation exist in the valley of Büyük Creek and in other tributaries, many of these would probably be found unsuitable to host *P. nausithous*, as they have previously been converted into arable land, suffered from one or another anthropogenic effect listed above, or the food plant or ant-host would be simply absent. The microclimatic niche of *P. nausithous* and its food plant is also unknown and meadows at lower altitude may not be climatically suitable to host the butterfly.

In Armenia the presence of *P. nausithous* populations depends strongly on the density of *S. officinalis* and the maintenance of hydrological conditions of the meadows under traditional land use practices [Khanamirian et al., 2015]. The same dependency likely applies to the Van population, highlighting the importance of preserving both hydrological stability and traditional mowing regimes. Additionally, studies from Spain show that even large metapopulations can collapse within a few years when meadow hydrology is altered by infrastructure or agricultural drainage projects [Jubete, Román, 2016]. Early recognition and legal protection of such newly discovered “colonies” like the that in Van Province are therefore essential to avoid similar irreversible losses.

Conclusion

Currently, only a single breeding population of *P. nausithous* is known in Van Province with very a restricted extent, although further potential habitats appear to be present along the Büyük Creek and its tributaries, potentially also in other natural water systems in the same area. The next step would be to accurately map these damp hay meadows, including the existing food plant stands and assess the presence of *P. nausithous* in the suitable

habitat patches. These surveys may even be expanded to similar habitats in neighbouring mountainous area in Iran, as the species may well occur there in small, discreet “colonies”. Further studies should target the ant-host and the population density of *P. nausithous*, as well as potential movement between habitat patches, assessing also the rate of gene-flow between “colonies”. Assessment of the land use and potential further degradation or annihilation of habitats should also be a priority. This could include government and municipality plans for development, changes of small-scale land use and changes in climatic variables during the latest period (e.g. precipitation, mean-temperature and extremes). The results of such assessments could certainly aid conservation measures to be planned and performed towards the protection of *P. nausithous* in Van Province. Comparative analyses with European, Armenian and even other Turkish populations would further enhance understanding of how *P. nausithous* adapts to contrasting mountain climates and hydrological regimes. These insights will be crucial for future trans-regional conservation strategies under changing climatic conditions and increasing development pressure.

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