

RENDEZVOUS IN THE WOODS: REDISCOVERY OF *Lopinga achine* (SCOPOLI, 1763) (LEPIDOPTERA: NYMPHALIDAE) IN SERBIA

Mihailo Vujić^{1,2*}, Kosta Reljić², Filip Franeta³, Ivan Tot²

¹*Institute of Zoology, Faculty of Biology, University of Belgrade,
Studentski trg 16, 11000, Belgrade, Republic of Serbia*

²*HabiProt - Association for Sustainable Development and Conservation of
Natural Habitats of Serbia, Cankareva 9/13, 21000 Novi Sad, Republic of Serbia*

³*Institute of Field and Vegetable Crops, Maksima Gorkog 30,
21000 Novi Sad, Republic of Serbia*

*Corresponding author's e-mail: mihailovujic01@gmail.com

(Received November 19, 2025; Accepted February 05, 2026)

ABSTRACT. After nearly a century without confirmed records, the woodland butterfly species *Lopinga achine* (Scopoli, 1763) has been rediscovered in Serbia. During a lepidopterological survey in June 2025, several individuals were recorded in the Bosut Forests (northwestern Serbia), representing the first confirmed observation since 1935. The species inhabits ancient, well-preserved oak–hornbeam forests dominated by *Quercus robur* L. and *Carpinus betulus* L., with a rich herb layer characterized by dense *Carex* spp. stands. Behavioral observations indicate typical forest-dwelling habits, including slow flight and probable oviposition near *Carex* spp. The population faces several threats, primarily inadequate forest management. Conservation measures should prioritize sustainable forest practices and protection of remaining habitats to ensure the long-term survival of *L. achine* in Serbia.

Keywords: alluvial forest, butterfly, *Carex*, conservation, Pannonian Plain

INTRODUCTION

According to the most recently published checklist of butterflies (Lepidoptera: Papilionoidea) of Serbia (POPOVIĆ and VEROVNIK 2018), 199 species, from six families, have been recorded for the country. Recently, three additional species were added to the checklist: *Cacyreus marshalli* Butler, 1987 (MILOJKOVIĆ *et al.* 2021), *Tarucus balkanicus* (Freyer, 1845) (TOT *et al.* 2021) in 2021, and *Papilio alexanor* Esper, 1800 (VUKAJLOVIĆ *et al.* 2025) in 2025. In 2024, a photo of *Gegenes* cf. *nostrodomus* (Fabricius, 1793) from West Serbia was published in 2024 on the iNaturalist platform. However, based on the available image, it was

ORCID:

M. Vujić - 0000-0003-1633-7831; K. Reljić - 0009-0000-6745-8890; F. Franeta - 0000-0002-4391-0915.

not possible to reliably separate *G. nostradamus* and *G. pumilio* (Hoffmannsegg, 1804), nor to conclusively determine the origin of this Mediterranean species in the country. With this in mind, the official number of butterfly species in the fauna of Serbia remains 202. Among the already listed species, three have been considered locally extinct or most likely extinct: *Leptidea morsei* (Fenton, 1882), *Colias myrmidone* (Esper, 1781), and *Lopinga achine* (Scopoli, 1763).

Listed as most probably extinct in Serbia (POPOVIĆ and VEROVNIK 2018), *L. achine* (Lepidoptera: Nymphalidae: Satyrinae) was previously known from specimens collected in 1935, in the vicinity of the town of Majdanpek (ŽIVOJINOVIĆ, 1950). POPOVIĆ and VEROVNIK (2018) also reported that ZEČEVIĆ and RADOVANOVIĆ (1974) observed specimens in the same area between 1950 and 1975, but no specimens were collected. POPOVIĆ and VEROVNIK (2018) concluded that the habitats surrounding the town of Majdanpek have suffered considerable alteration due to extensive mining activities, possibly resulting in larger scale devastation and biodiversity loss, including the extinction of *L. achine* populations there. The nearest known population of *L. achine* is in Croatia, in a neighboring forested area known as Spačva Forests (in Biologer.hr database, see POPOVIĆ *et al.* 2020), which practically forms a continuum with Bosut Forests in northwestern Serbia.

According to the IUCN Red List, *L. achine* is categorized as Near Threatened (NT) at the European assessment level, with a decreasing population trend (VAN SWAAY *et al.* 2025). The species is also listed in Annex IV of the European Union Habitats Directive (Council Directive 92/43/EEC), as well as in Annex II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

This article aims to report the new record of *L. achine* in Serbia, after nearly a century without confirmed records.

MATERIALS AND METHODS

During a lepidopterological survey in the territory of the Autonomous Province of Vojvodina (North Serbia), the natural and preserved habitats of Western Syrmia were researched. Among the surveyed localities, butterflies were recorded at Bosut Forests near the villages of Morović and Jamena (Šid Municipality) on June 4, 2025, and on that occasion, a population of *L. achine* was discovered. On June 7, 2025, the habitats at Bosut Forests were resurveyed, and on this occasion, *L. achine* specimens were recorded at three localities in total, including one new site (Fig. 1).

RESULTS AND DISCUSSION

Lopinga achine (Scopoli, 1763) (Fig. 2)

New localities

Serbia, Vojvodina Autonomous Province, Syrmia (Srem), Šid Municipality: Bosut Forests (Fig. 3) (Bosutske šume) between the village of Morović and the village of Jamena; 44.948889, 19.164444; 85 m a.s.l.; UTM: CQ57; June 4, 2025; obs. M. Vujić & I. Tot; June 7, 2025; obs. K. Reljić & F. Franeta; Bosut Forests near the village of Jamena; 44.941944, 19.1525; 92 m a.s.l.; UTM: CQ57; June 4, 2025; obs. M. Vujić & I. Tot; June 7, 2025; obs. K. Reljić & F. Franeta; Bosut Forests near the village of Morović, 44.969167, 19.211944; 87 m a.s.l.; UTM: CQ58; June 7, 2025; obs. K. Reljić & F. Franeta.

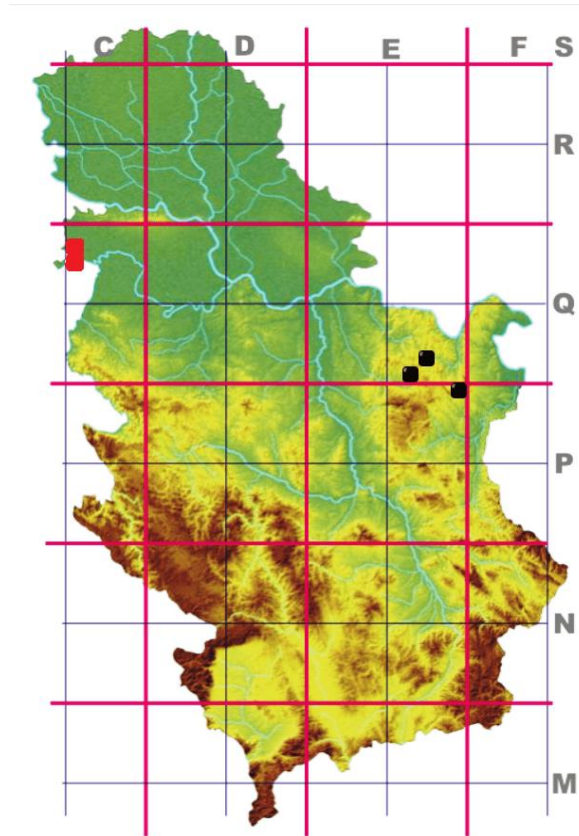


Figure 1. The map of Serbia with historical and new records of *Lopinga achine* (Scopoli, 1763); red squares – new records; black squares – historical records.



Figure 2. *Lopinga achine* (Scopoli, 1763) from the Bosut Forests, Serbia.
A-C the habitus of specimens found at different localities;
D the egg of *L. achine*. Photos A-C I. Tot; D K. Reljić.



Figure 3. Satellite image of the central part of the Bosut Forests complex, with *Lopinga achine* (Scopoli, 1763) records marked with a red diamond symbol (◆).

Behaviour

Individuals were observed during the flight, which is slow and fluttery, easily gliding through tree canopies and shrubs, exclusively within the forest or in forest clearings. The flying height ranged from near the forest floor to several meters in the canopy. The butterflies rarely rest on leaves or tree trunks, and when they do so, they keep their wings closed. They have been observed to be timid and quickly fly away when approached, often evading to impenetrable parts of the forest. They were not observed visiting flowers. Females were observed during the flight around *Carex* spp. stands, probably ovipositing in flight.

Habitat description and host plants

All newly found habitats of *L. achine* are situated in Bosut Forests (Serbian: Bosutske šume) (Fig. 4), in the Syrmia region, NW Serbia. Habitats at all three localities are similar and close to each other, with subtle variations in the plant communities. The locality between the village of Morović and the village of Jamena (Fig. 2 A-B) is a bright, ancient, well-preserved forest dominated by *Quercus robur* L., and *Carpinus betulus* L. Other tree species, such as *Fraxinus excelsior* L., *Ulmus laevis* Pall., and *Acer campestre* L., are present at the locality, but represent a minor component of the forest. The forest is characterized by a substantial age variety, from ancient specimens, likely over a century old, to young seedlings. The forest exhibits well-developed vertical stratification, reflected in the presence of trees of various heights, a well-developed shrub layer, and a rich herbaceous ground cover. The community of herbaceous plants at the forest floor is strongly dominated by dense stands of *Carex brizoides* L. and *C. remota* L., particularly in brighter areas, while other herbaceous plants usually develop in shadier areas, or between *Carex* stands. The layer of forest litter is well-developed, and there is also a large amount of tree trunks and stumps in the rotting stage, as well as upright dead trees. The habitat at the locality near the village of Jamena (Fig. 4 C-D) is very

similar, except the vegetation of the forest floor is mainly dominated by stands of *C. remota* and *Rubus* sp. The habitat at the locality near the village of Morović are very similar to the previously described habitats, without significant differences. The complete list of plants recorded at the localities (and at the same time when *L. achine* was found) is given in Tab. 1.



Figure 4. The habitats of *Lopinga achine* (Scopoli, 1763) in Bosut Forests, Serbia. Photos: M. Vujić.

Oviposition in the field was not observed, nor were caterpillars recorded, since the timing of the survey was not optimal for assessing their presence. However, *L. achine* caterpillars most probably feed on already known host plants that have been recorded in the habitat: *Carex* spp. (*Carex brizoides* L. and *Carex remota* L.) (Poales: Cyperaceae), and *Brachypodium sylvaticum* (Huds.) P. Beauv. (Poales: Poaceae). BERGMAN (2000) stated that *L. achine* females have a preference for oviposition towards sedge *Carex montana* L., but that caterpillars will accept and even choose some grasses, which are usually not present in their habitat. LINDMAN *et al.* (2013) concluded that *L. achine* is a polyphagous species, whose development can be successful on various sedges and grasses, and that there is no crucial host plant species with which it is strongly associated.

Associated butterfly fauna

Given that *L. achine* was found exclusively within forests and forest clearings, only a small number of other butterfly species were recorded at the same locality. The other recorded butterfly species at the localities are: *Ochlodes sylvanus* (Esper, 1777), *Pieris napi* (Linnaeus, 1758), *Argynnis paphia* (Linnaeus, 1758), *Melitaea athalia* (Rottemburg, 1775), *Apatura ilia* (Denis & Schiffermüller, 1775), *Polygonia c-album* (Linnaeus, 1758), *Vanessa atalanta* (Linnaeus, 1758), *V. cardui* (Linnaeus, 1758), *Araschnia levana* (Linnaeus, 1758), and *Maniola jurtina* (Linnaeus, 1758).

Table 1. The list of plants recorded at habitats where *Lopinga achine* was recorded in Bosut Forests in NW Serbia.

Family	Species
Athyriaceae	<i>Athyrium filix-femina</i> (L.) Roth
Dryopteridaceae	<i>Dryopteris filix-mas</i> (L.) Schott
Alismataceae	<i>Alisma plantago-aquatica</i> L.
Asparagaceae	<i>Convallaria majalis</i> L.
Cyperaceae	<i>Carex brizoides</i> L.
	<i>Carex remota</i> L.
Poaceae	<i>Alopecurus geniculatus</i> L.
	<i>Brachypodium sylvaticum</i> (Huds.) P.Beauv.
Orchidaceae	<i>Platanthera bifolia</i> (L.) L.C.Rich.
Ranunculaceae	<i>Ranunculus sceleratus</i> L.
Onagraceae	<i>Circaea lutetiana</i> L.
Plantaginaceae	<i>Callitriche palustris</i> L.
	<i>Plantago major</i> L.
	<i>Veronica montana</i> L.
Polygonaceae	<i>Rumex conglomeratus</i> Murray
Primulaceae	<i>Lysimachia nummularia</i> L.
Fagaceae	<i>Quercus cerris</i> L.
Betulaceae	<i>Carpinus betulus</i> L.
Ulmaceae	<i>Ulmus laevis</i> Pall.
Oleaceae	<i>Fraxinus excelsior</i> L.
Sapindaceae	<i>Acer campestre</i> L.
	<i>Acer tataricum</i> L.
Celastraceae	<i>Euonymus europaeus</i> L.
Rosaceae	<i>Crataegus</i> sp.
	<i>Fragaria vesca</i> L.
	<i>Geum urbanum</i> L.
	<i>Malus sylvestris</i> (L.) Mill.
	<i>Potentilla reptans</i> L.
	<i>Rubus</i> spp.
Euphorbiaceae	<i>Euphorbia lucida</i> Waldst. & Kit.
	<i>Euphorbia stricta</i> L.
Rubiaceae	<i>Galium aparine</i> L.
Geraniaceae	<i>Geranium robertianum</i> L.
Brassicaceae	<i>Alliaria petiolata</i> (M.Bieb.) Cavara & Grande
	<i>Cardamine impatiens</i> L.
Asteraceae	<i>Bidens</i> sp.
	<i>Symphyotrichum lanceolatum</i> (Willd.) G.L.Nesom
	<i>Taraxacum officinale</i> (L.) Weber ex F.H.Wigg.
Violaceae	<i>Viola reichenbachiana</i> Jord. ex Boreau 1857
Cornaceae	<i>Cornus sanguinea</i> L.
Urticaceae	<i>Urtica dioica</i> L.
Lamiaceae	<i>Ajuga genevensis</i> L.
	<i>Galeopsis speciosa</i> Mill.
	<i>Glechoma hirsuta</i> Waldst. & Kit.
	<i>Melissa officinalis</i> L.
	<i>Prunella vulgaris</i> L.
	<i>Stachys sylvatica</i> L.
Araliaceae	<i>Hedera helix</i> L.
Apiaceae	<i>Chaerophyllum temulum</i> L.

Serbian name replacement

The actual Serbian name of *L. achine* was Lopinga/Лопинга, the same name as the generic name of this species. In this article, we propose a new Serbian name for the species: Lužnjar/Лужњар. This newly replaced name has a root in the archaic Serbian word "lug", with the meaning "grove". The new name was coined due to the fact that *L. achine* occurs in forests and groves, and in particular those of *Q. robur*, whose Serbian name is hrast lužnjak/храст лужњак, literally meaning "the oak of the grove".

Threats

In accordance with the special ecological requirements for the survival of *L. achine*, we identified several threatening factors for the survival of the newly discovered population of this species in Serbia:

- I. Inadequate forest management. Although we observed that a significant forest area can be described as adequate habitat for *L. achine*, some parts of the forest (e.g., near the village of Jamena, 44.936389, 19.128056) have been almost completely deforested, with only a few older trees left. Such practice poses a serious threat to the survival of *L. achine* populations, especially when it occurs near forest edges, where numerous invasive plant species have also been recorded. However, excessive forest overgrowth and formation of a dense forest complex can also endanger *L. achine*, mainly by blocking sunlight and formation of *Carex* stands, which are crucial for larval development.
- II. Spreading of invasive species. A significant presence of various allochthonous plant species was observed, primarily along the forest edges and adjacent to roads crossing the forest. The recorded invasive species included *Amorpha fruticosa* L., *Asclepias syriaca* L., *Robinia pseudoacacia* L., *Erigeron annuus* (L.) Desf., and *E. sumatrensis* Retz. In combination with the previously mentioned threatening factor, these invasive species are capable of colonizing deforested areas, altering the native plant community, and potentially posing a direct threat to early developmental stages of *L. achine*.
- III. Agriculture and poplar plantations. The forest where *L. achine* has been recorded is almost completely surrounded by agricultural land. The conversion of any part of the forest into agricultural fields would likely cause a decline in *L. achine* populations, and in the worst-case scenario, even lead to its local extinction. The extensive usage of pesticides can also harm its population. Logging and replacement of indigenous tree species with clonal poplar, *Populus × euramericana* (Dode) Guinier, which is a widespread practice in Serbia, is a serious threat, especially given into account that a significant number of clonal poplar plantations were observed in the immediate vicinity of the *L. achine* habitats.
- IV. Large-scale threats. Besides locally identified threatening factors, some global and/or large-scale phenomena cannot be excluded, such as global climate change, an increase in the concentration of pollutants in the environment, and extensive mining near large rivers. The extensive mining is probably the most alarming in the case of Serbia, given that the only previously known *L. achine* population in Serbia, near the town of Majdanpek, probably went extinct due to extensive mining activities (see POPOVIĆ and VEROVNIK, 2018). One of the still unrealized mining projects that has attracted particular attention due to its potential negative environmental effects is the jadarite mine near the Jadar River, West Serbia, which has been discussed by various authors (ĐORĐEVIĆ *et al.* 2024; STUEHLEN and ANDERL, 2024; MARKOVIĆ *et al.* 2025). The distance between the habitats where the *L. achine* population was recorded, and the planned mine site is less than 50 km in linear distance, close enough to alert everyone on possible negative impacts. The fact that the border of Bosut Forests lies only 4 to 8

km from the confluence of the Drina and Sava rivers is of particular concern, given that pollutants from the mine could be transported downstream.

Recommendations for *Lopinga achine* protection in Serbia

All the suggested recommendations aim to eliminate or minimize the negative impacts of the previously identified threats. It is essential to maintain good forest management practices, which include careful thinning that does not lead to large disturbances of forest habitats, population control or eradication of nearby populations of identified invasive plant species, and preventing the legal conversion of land from forest to agricultural land. Of particular importance is the minimization of large-scale threats, which in this case primarily involves halting the development of the jadarite mine project in the Jadar River valley of western Serbia.

According to IUCN, *L. achine* is declared as Near Threatened (NT) on the European level, with a decreasing population trend (VAN SWAAY *et al.* 2025). Given that this species occurs only in very specific habitats, the appropriate habitat management is crucial for its survival (BERGMAN, 2001). STREITBERGER *et al.* (2012) emphasize that the vegetation structure, the presence of host plants, and microclimate are crucial factors for the species' habitat selection. They also identified that cessation of coppicing, as well as abandonment of wood pasture, were the major factors contributing to range retraction, at least in Germany (STREITBERGER *et al.* 2012), which is in accordance with previously published conclusions from Czechia in KONVICKA *et al.* (2008).

CONCLUSION

Although previously considered extinct in Serbia and known only from historical localities around the town of Majdanpek in the eastern part of the country, *Lopinga achine* has been shown to still maintain extant populations in Serbia. These populations were discovered at new localities in the Bosut Forests, within ancient and relatively well-preserved lowland forests in the far west of Serbia, in the Syrmia region. However, despite the discovery of these new populations, it is important to emphasize their vulnerability in light of the identified threat factors. Therefore, all necessary conservation measures should be undertaken to ensure the protection of the newly recorded populations.

References:

- [1] BERGMAN, K.O. (2000): Oviposition, host plant choice and survival of a grass feeding butterfly, the Woodland Brown (*Lopinga achine*) (Nymphalidae: Satyrinae). *Journal of Research on the Lepidoptera* **35**: 9–21.
- [2] BERGMAN, K.O. (2001): Population dynamics and the importance of habitat management for conservation of the butterfly *Lopinga achine*. *Journal of Applied Ecology* **38** (6): 1303–1313. doi: 10.1046/j.0021-8901.2001.00672.x
- [3] ĐORĐEVIĆ, D., TADIĆ, J.M., GRGUR, B., RISTIĆ, R., SAKAN, S., BREZJANOVIĆ, J., STEVANOVIĆ, V., ŠOLAJA, B. (2024): The influence of exploration activities of a potential lithium mine to the environment in Western Serbia. *Scientific Reports* **14** (1): 17090. doi: 10.1038/s41598-024-68072-9
- [4] KONVICKA, M., NOVAK, J., BENES, J., FRIC, Z., BRADLEY, J., KEIL, P., HRCEK, J., CHOBOT, K., MARHOUL, P. (2008): The last population of the Woodland Brown butterfly

- (*Lopinga achine*) in the Czech Republic: habitat use, demography and site management. *Journal of Insect Conservation* **12**: 549–560. doi: 0.1007/s10841-007-9087-4
- [5] LINDMAN, L., JOHANSSON, B., GOTTHARD, K., TAMMARU, T. (2013): Host plant relationships of an endangered butterfly, *Lopinga achine* (Lepidoptera: Nymphalidae) in northern Europe. *Journal of Insect Conservation* **17**: 375–383. doi: 10.1007/s10841-012-9519-7
- [6] MARKOVIĆ, V., GOJŠINA, V., TOMOVIĆ, J., NOVAKOVIĆ, B., VUJIĆ, M., ILIĆ, M., ŽIVIĆ, I., BOŽANIĆ, M., TATOVIĆ, A. (2025): *Theodoxus transversalis* (C. Pfeiffer, 1828) (Gastropoda: Neritidae) in the Western Balkans: an endangered freshwater snail bouncing back?. *Journal of Conchology* **45** (3): 407–414. doi: 10.61733/jconch/4535
- [7] MILOJKOVIĆ, S., VUJIĆ, M., DJURIĆ, M., TOT, I. (2021): Geranium bronze, *Cacyreus marshalli* Butler, 1897 – new butterfly species for fauna of Serbia (Papilionidea: Lycaenidae). *Acta Entomologica Slovenica* **29** (1): 121–124.
- [8] POPOVIĆ, M., VEROVNIK, R. (2018): Revised checklist of the butterflies of Serbia (Lepidoptera: Papilionoidea). *Zootaxa* **4438** (3): 501–527. doi: 10.11646/zootaxa.4438.3.5
- [9] POPOVIĆ, M., VASIĆ, N., KOREN, T., BURIĆ, I., ŽIVANOVIĆ, N., KULIJER, D., GOLUBOVIĆ, A. (2020): Biologer: an open platform for collecting biodiversity data. *Biodiversity Data Journal* **8**: e53014. doi: 10.3897/BDJ.8.e53014
- [10] STREITBERGER, M., HERMANN, G., KRAUS, W., & FARTMANN, T. (2012): Modern forest management and the decline of the Woodland Brown (*Lopinga achine*) in Central Europe. *Forest Ecology and Management* **269**: 239–248. doi: 10.1016/j.foreco.2011.12.028
- [11] STUEHLEN, C., ANDERL, F. (2024): Transnational companies in environmental conflicts: Rio Tinto, anti-mining resistance in Serbia, and the contradictions of Europeanization. *Zeitschrift für Friedens-und Konfliktforschung* **13**: 1–26. doi: 10.1007/s42597-024-00114-5
- [12] TOT, I., ĐURIĆ, M., VUKAJLOVIĆ, F., VUJIĆ, M. (2021): Little tiger blue, *Tarucus balkanicus* (Freyer, 1845) – a new butterfly species in the fauna of Serbia (Lepidoptera: Lycaenidae). *Acta Entomologica Serbica* **26** (2): 85–88. doi: 10.5281/zenodo.5675734
- [13] VAN SWAAY, C., ELLIS, S., WARREN, M. (2025): *Lopinga achine* (Europe assessment). The IUCN Red List of Threatened Species 2025: e.T174299A211407740. Accessed 06 June 2025.
- [14] VUKAJLOVIĆ, F.N., RELJIĆ, K., KOSTIĆ, M., VOJNOVIĆ, B. (2025): The southern swallowtail, *Papilio alexanor* Esper, 1800 (Lepidoptera: Papilionidae) – New butterfly species for the fauna of Serbia. *Kragujevac Journal of Science* **47** (1): 111–119. doi: 10.5937/KgJSci2501111V
- [15] ZEČEVIĆ, M., RADOVANOVIĆ, S. (1974): *Leptiri Timočke Krajine (makrolepidoptera): prilog poznavanju faune leptirova Srbije*. Zavod za poljoprivredu, Zaječar. 185 pp.
- [16] ŽIVOJINOVIĆ, S. (1950): *Fauna insekata šumske domene Majdanpek (entomološka monografija)*. Naučna knjiga, Beograd. 262 pp.