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Research Article

New records of Asilidae and Therevidae (Diptera) in Hungary

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Abstract. *Pandivirilia eximia* (Meigen, 1820) (Therevidae), *Leptarthrus vitripennis* (Meigen, 1820), and *Andrenosoma atrum* (Linnaeus, 1758) (Asilidae) are reported for the first time from present-day Hungary, based on recent field collections and examination of museum specimens. The occurrence of *Neomochtherus schineri* (Egger, 1855) in Hungary is also confirmed. In addition, the external and internal male genitalia of *P. eximia* are redescribed and illustrated in detail, providing updated morphological data to facilitate identification and comparison with related species.

Keywords: Robber flies, species diversity, fauna, stiletto flies

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Introduction

The superfamily Asiloidea, a major lineage within Brachycera, comprises five families with confirmed records from Hungary (Papp, 2001). Among these, Asilidae remains relatively under-researched. In the corresponding section of the *Checklist of Diptera of Hungary* (Majer, 2001), only species for which voucher specimens were available were listed as occurring in Hungary. As a result, several species previously catalogued by Thalhammer (1900) are noted merely as "not yet recorded from Hungary" or "no voucher specimens available." Given these circumstances, the exact number of Asilidae recorded from this country cannot be determined. Since Majer's (2001) checklist (containing 70 species), only a few additions have been made, the most recent being the description of a new species (holotype originating from Hungary) along with the first country records of two additional species (Varga & Keresztes, 2026). A comprehensive and updated checklist of Hungarian Asilidae is therefore warranted; however, its compilation is hindered by the significant decline in the number of faunists and taxonomists—particularly Diptera specialists—in Hungary (Páll-Gergely & Csabai, 2025).

Family Therevidae is considered rather well studied, due to the work of Sándor Tóth (e.g. Tóth, 1977). In the corresponding section of the Checklist of Diptera of Hungary (Tóth, 2001), he listed 33 species, and 7 more as expected to occur in this country. Larvae of both families are predatory and live in soil or decaying wood; adults of Asilidae are active predators of other insects and spiders, whereas adults of Therevidae are thought to feed exclusively on water and tree nectar (Londt & Dikow, 2017; Hauser *et al.*, 2017). The aim of this study is to report new country records and to confirm previously doubtful records of the families Asilidae and Therevidae, based on specimens collected during field trips conducted by the author—mostly in the mountainous regions of Hungary—in 2024 and 2025, as a continuation of Varga & MacGowan (2025). Additional specimens from the collection of József Majer and from the Hungarian Natural History Museum (HNHM) are also included. Most of the specimens have been collected in Bükk Mountains. This mountain range is characterised by distinctive environmental and climatic conditions, including below-zero temperatures during the summer months (e.g., at Mohos Töbör [Mohos Ponor]; Dobos *et al.*, 2024). Such unique microclimatic conditions combined with relatively high altitudes likely facilitate the occurrence of species previously unrecorded in this country. The Bükk Mountains continue to provide new faunistic records despite the extensive research conducted by the Hungarian Natural History Museum in the 1990s (Mahunka, 1996a,b).

Materials and methods

The specimens were collected by hand-netting or light-trapping (for the latter, 125 W HgLI E27 bulbs were used, combined with 25 W Sylvania UV-A compact lights). Chloroform or ethyl acetate was used as the killing agent, and the specimens were preserved dry, mounted on pins. Specimens are deposited in HNHM (Hungarian National Museum Public Collection Centre – Hungarian Natural History Museum, Budapest). For genitalia preparations, the method described in Papp (2008) was used. Photographs were taken using a Keyence 5000 digital microscope and an Olympus TG-6 digital camera, Fig. 2A was drawn with black fine-tip pens and subsequently digitised. General terminology follows Cumming & Wood (2017) with additions of Therevidae genitalia morphology from Irwin *et al.* (2020).

Results

Class Insecta Linnaeus, 1758 Order Diptera Linnaeus, 1758 Family Therevidae Newman, 1834

Subfamily Therevinae Newman, 1834

Genus *Pandivirilia* Irwin & Lyneborg, 1981

Pandivirilia eximia (Meigen, 1820) Figs 1C–D, 2A–C, 3A–E

Material examined

HUNGARY. Heves County: Bükk Mountains, Felsőtárkány, meadow near Tárkányi- patak, 47°59'05"N 20°27'07"E, 264 m, hand-netting, 1.V.2024, 1 ♂, leg. Varga N. & Tamási G.

Distribution

Palaearctic – Austria, Belgium, Czechia, Finland, France, Germany, Italy, Norway, Poland, Russia, Slovakia, Sweden, Switzerland (Lyneborg, 1989; Falck, 2011; Mortelmans & de Bree, 2022). Hungary (new record).

Identification

P. eximia can be distinguished from congeners by dichoptic male eyes, orange-coloured tibiae, shiny black occiput and fourth tergite, and characters of male genitalia (Lyneborg, 1986; Tóth, 1977). Lyneborg (1986) illustrated the internal male genitalia of this species. Here, both the most important external and internal male genital structures are figured and redescribed (see Fig. 2A–C, 3A–E).

Description

See Lyneborg (1986) (redescription). *Male genitalia. External genitalia.* Epandrium (Fig. 2A–B) shiny black, elongated, slightly tapering apically; base of non-fused apical part slightly protruding in lateral view. Epandrial setae scarce, exclusively blackish. Gonocoxite shiny black, ca. half of epandrium length, with a small concave area at mid-apical margin. Ventral parts of gonocoxite with several long, black macrosetae directed posteriorly, longest ones exceeding vertical line of epandrial apex. Remaining gonocoxal setae exclusively blackish. Inner gonocoxal processes clearly visible externally, almost reaching epandrium posteriorly. *Internal genitalia.* Gonostylus curved, inner margin concave, apically pointed, glabrous (Fig. 3D). Inner gonocoxal process rather straight, tapering apically, with ca. 6 preapical black setae (Fig. 3E). Aedeagus (Fig. 3C) weakly sclerotised; distiphallus short, slightly curved dorsally (towards dorsal apodeme of parameral sheath). Ventral apodeme of parameral sheath ca. half-length of elongated ejaculatory apodeme. Cerci rounded, somewhat longer than wide, with white setae only (Fig. 3A).

Remarks

Lyneborg (1986) listed Hungary within the distribution range of *P. eximia*; however, he did not provide any exact localities or specimen data. The same author later omitted Hungary from the relevant section of the Catalogue of Palaearctic Diptera (Lyneborg, 1989). Tóth (2001) noted the species solely as expected to occur in Hungary. No specimens were found in the HNHM collection either. The present record is therefore the first reliable one of *P. eximia* from this country.

Family Asilidae Latreille, 1802

Subfamily Dasypogoninae Macquart, 1838 Genus *Leptarthrus* Stephens, 1829

Leptarthrus vitripennis (Meigen, 1820) Fig. 1A

Material examined

HUNGARY. Heves County: Bükk Mountains, Felsőtárkány, Hereg-rét, 48°02'48"N 20°28'40"E, 600.5 m, attracted to light, 7–8.VII.2024, 1 ♀, leg. Varga N. & Horváth Á.

Distribution

Palaearctic – Austria, Belgium, France, Germany, Greece, Italy, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, United Kingdom (Geller-Grimm, 2016; Wolff *et al.*, 2018; Tamsyn *et al.*, 2020). Hungary (new record).

Identification

Females of *Leptarthrus vitripennis* are strongly similar to *Leptarthrus brevirostris* (Meigen, 1804); however, in *L. vitripennis* facial tubercle is almost absent, mystax consists of white setae, and wing bases are strongly brownish-tinged basally (Fig. 1A) (Wolff *et al.*, 2018).

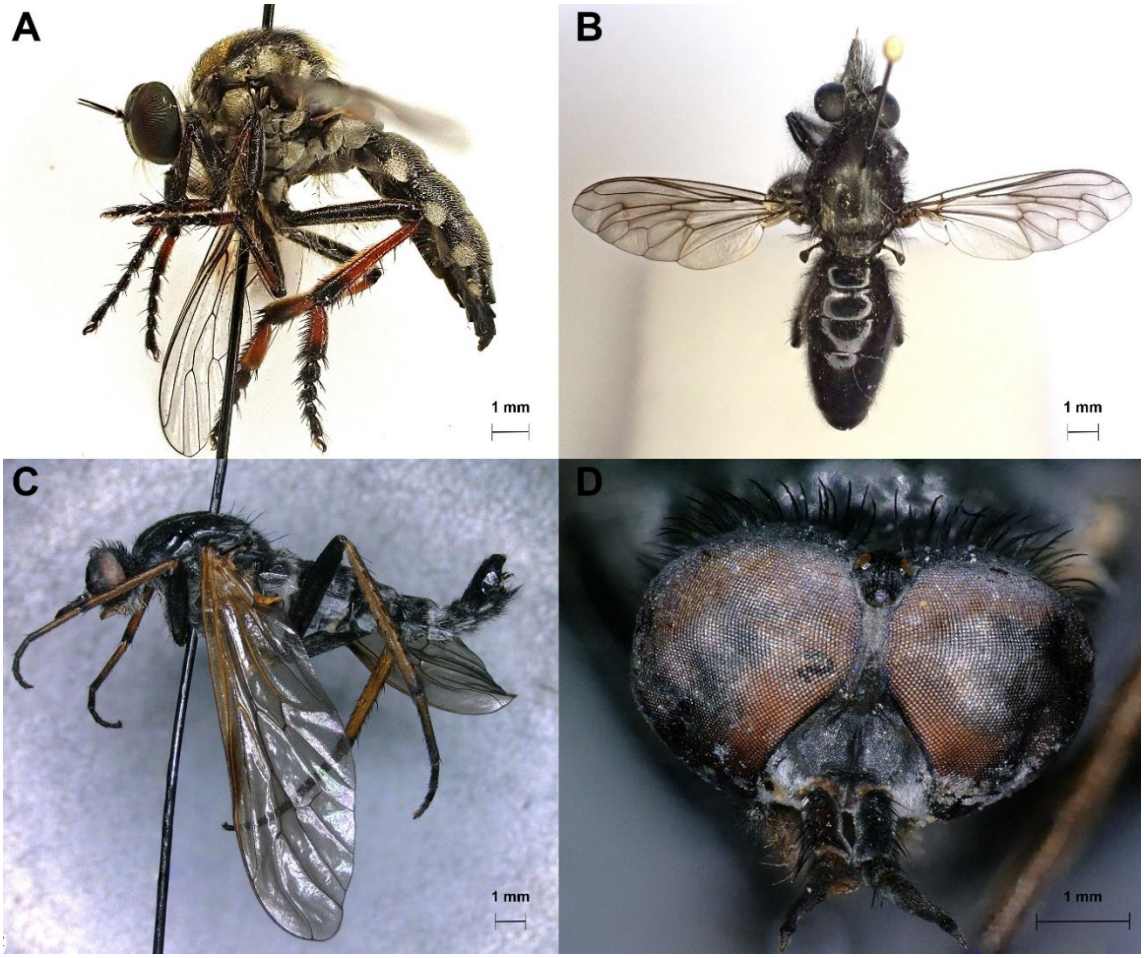

Fig. 1. General habitus of the newly recorded Asiloidean species from Hungary. A. *Leptarthrus vitripennis* (Meigen, 1820), female; B. *Andrenosoma atrum* (Linnaeus, 1758), female; C–D. *Pandivirilia eximia* (Meigen, 1820), male. (A., C. Habitus, lateral view; B. Habitus, dorsal view; D. Head, frontal view).

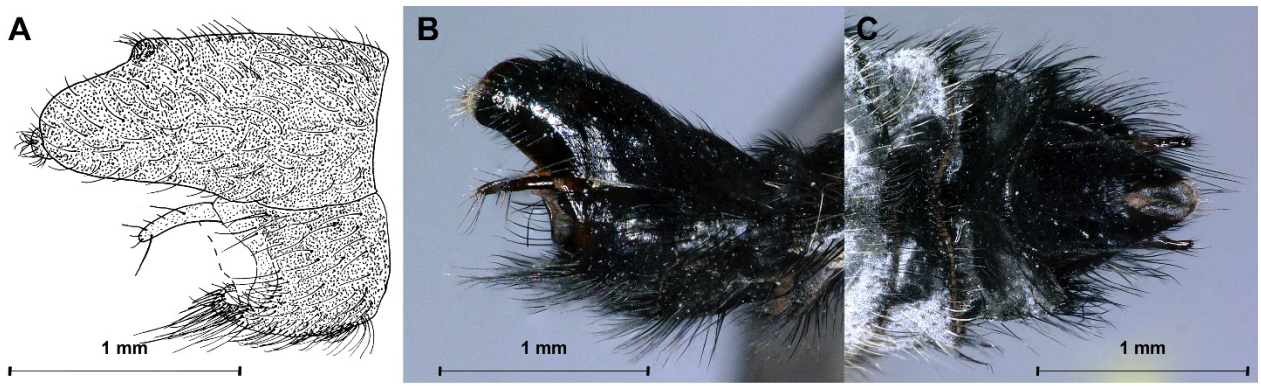

Fig. 2. Intact external male genitalia of *Pandivirilia eximia* (Meigen, 1820). A–B. Epandrium and gonocoxite; C. Epandrium. (A. Lateral view; B. Ventrolateral view; C. Dorsal view).

Remarks

This species is considered rare throughout its entire distribution range and is regarded as an indicator of well-preserved FFH 6520 habitat types (mountain hay meadows) (Wolff *et al.*, 2018). The recent collecting site (Heregrét) fits this habitat type well, characterised by annual mowing, an elevation of approximately 580–600 m, rich flora, and suitable climatic conditions.

Subfamily Laphriinae Macquart, 1838

Genus *Andrenosoma* Rondani, 1856

Andrenosoma atrum (Linnaeus, 1758) Fig. 1B

Material examined

HUNGARY. Veszprém County: Paloznak [no more exact locality mentioned], 11.VI.1971, 1 ♀, leg. Novák F.; Csopak [no more exact locality mentioned], 27.VI.1960, 1 ♀, leg. Novák F.; Győr-Moson-Sopron County: Fenyőfő, Ősfenyves, 300 m radius of 47°21'21"N 17°46'07"E, 260–280 m, hand-netting, 3.VIII.2024, 1 ♀, leg. Varga N., Horváth Á., Zvezdovics T.

Distribution

Palaearctic – Algeria, Austria, Bulgaria, Czechia, Denmark, France, Germany, Greece, Italy, Iran, Lithuania, Poland, Romania, Russia, Slovakia, Spain, Sweden, Turkey, former Yugoslavia (Geller-Grimm, 2016; Pakalniškis *et al.*, 2006; Wolff *et al.*, 2018). Hungary (new record).

Identification

The only similar species in Central Europe is *Andrenosoma albibarbe* (Meigen, 1820), however, it has a large reddish dorsal spot on abdomen (from tergites 2 to 7), lacking in *A. atrum* (Wolff *et al.,* 2018).

Remarks

Thalhammer (1900) mentioned *A. atrum* from Hungary as "In montanis sat frequens [quite common in the mountains]", without providing more specific locality. However, he used the pre-Trianon borders of Hungary, encompassing large areas that today belong to Romania, Slovakia, and other neighbouring countries. Moreover, his collection was destroyed in 1956, so his specimens are no longer available for verification. Majer (2001) listed the species only as "expected to occur in Hungary". Neither the Palaearctic catalogue (Lehr, 1988) nor the world catalogue (Geller-Grimm, 2016) includes Hungary within the species' distribution range. The present records are therefore regarded as the first confirmed ones for present-day Hungary.

Subfamily Asilinae Latreille, 1802

Genus *Neomochtherus* Osten-Sacken, 1878

Neomochtherus schineri (Egger, 1855)

Material examined

HUNGARY. Borsod-Abaúj-Zemplén County: Bükki National Park, Cserépfalu, Mész-árok mellett [300 m radius of 47°57'37"N 20°32'38"E, 230–250 m], 7.VII.2011, 1 ♂, leg. Papp L.; Baranya County: Aranyosgadány, Gadányi erdő, 6.VIII.2013, 1 ♂, leg. Papp L.; Budapest, Rózsadomb, 16.VII.1974, 1 ♂, leg. Szőcs G.

Distribution

Palaearctic – Austria, Bosnia and Herzegovina, Croatia, Czechia, France, Germany, Greece, Italy, Iran, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Switzerland (Weinberg, 1969; Lehr, 1988; Geller-Grimm, 2016; Mohammadi *et al.*, 2021; Pires *et al.*, 2022; Marhoul & Bosák, 2023; Pétremand & Blanc, 2024). Thalhammer (1900) also mentioned Hungary.

Identification

The most similar species in Central Europe is *Neomochtherus pallipes* (Meigen, 1820) which can readily be distinguished from the present species by brownish pedicel (yellow in *N. schineri*) and different male genitalia (see detailed figures and redescriptions in Tsacas (1968)).

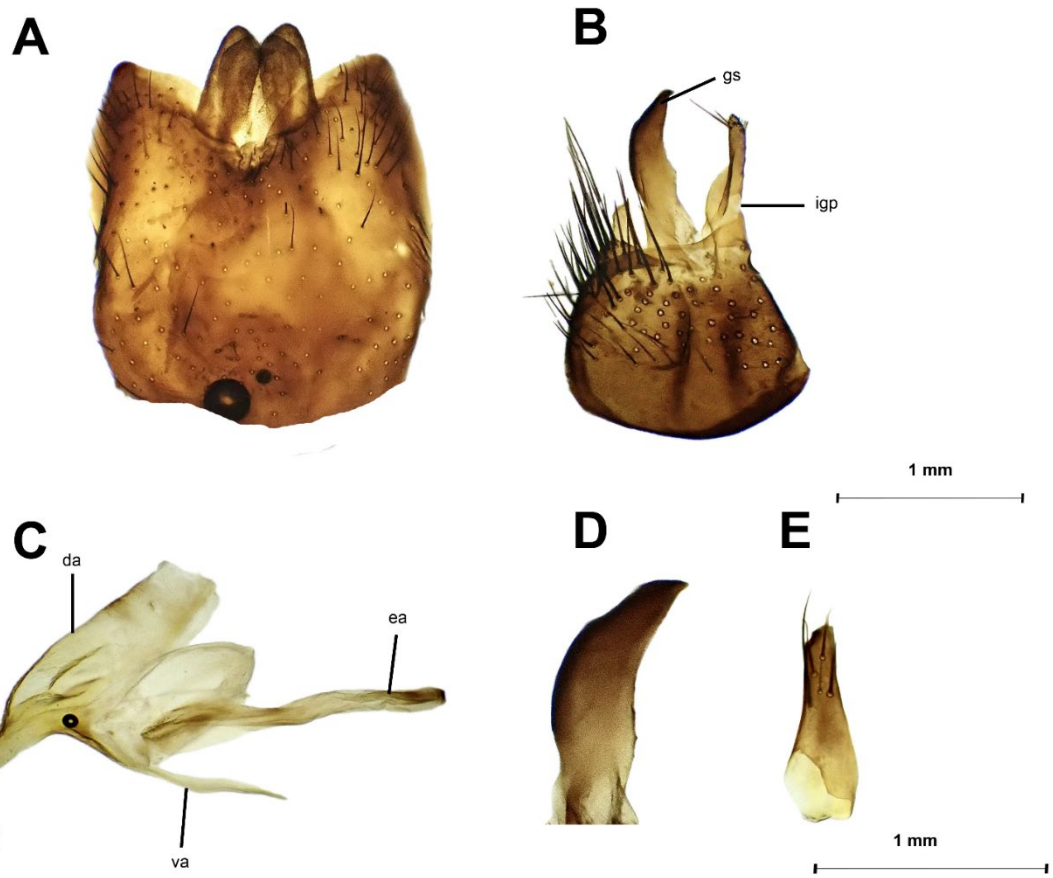

Fig. 3. Dissected internal and external male genitalia of *Pandivirilia eximia* (Meigen, 1820). A. Epandrium and cerci; B. Gonocoxite, gonostylus (gs) and inner gonocoxal process (igp); C. Aedeagus (d = distiphallus, da = dorsal apodeme of parameral sheath, ea = ejaculatory apodeme, va = ventral apodeme of parameral sheath); D. Gonostylus; E. Inner gonocoxal process. (A. Dorsal iew, B., C., D. Lateral view). Scale bars: upper, Figs. A–B; lower, Figs. C–E.

Remarks

Thalhammer (1900) listed this species from three sites corresponding to present-day Hungary (Budapest, Kalocsa, Sopron); however, none of these specimens survive, as they were destroyed in the 1956 fire at the HNHM. Majer (2001) listed the species as "not yet recorded from Hungary". Lehr (1988) did not mention Hungary in the distribution section of this species. The present findings confirm the occurrence of *N. schineri* in this country.

Discussion

The occurrence of *A. atrum* in Hungary is not unexpected; however, the species may have been underreported due to the limited extent of high-altitude natural coniferous forests—its preferred habitat—and the relatively low research intensity focused on Asilidae in the country. The latter factor likely also accounts for the absence of *N. schineri* from previous catalogues. The records of *Leptarthrus vitripennis* and *Pandivirilia eximia* are noteworthy, as both species are rarely collected, exhibit strong habitat specificity, and possess poorly known life cycles (Falck, 2011; Wolff *et al.*, 2018). Nevertheless, their occurrence in Hungary was to be expected, given that both species are recorded from several neighbouring countries. With the new record presented here, the number of Therevidae species known from Hungary increases to 34. Although the exact number of Asilidae species recorded from Hungary remains uncertain, the present data raise the total number of additions to Majer's (2001) checklist to six species in 2026 alone (with Varga & Keresztes, 2026).

Author's Contributions

Nimród Varga had sole role for Conceptualization; methodology; formal analysis; investigation; draft preparation; final review and edit; visualization; supervision; project administration and funding acquisition.

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Data Availability Statement

The specimens mentioned in the study are deposited in HNHM (Hungarian Natural History Museum).

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Ethics Approval and Consent to Participate

All applicable international, national, and institutional guidelines for the care and use of animals were followed. This article does not contain any studies with human participants performed by the author.

Conflict of Interest

No conflict of interest

Generative AI statement

The author declares that no Gen AI was used in the creation of this manuscript.

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گزارش‌های جدید از خانواده‌های Asilidae و Therevidae (راسته Diptera) در مجارستان

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چکیده: گونه‌های *Pandivirilia eximia* (Meigen, 1820) از خانواده Therevidae و *Leptarthrus vitripennis* (Meigen, 1820) و *Andrenosoma atrum* (Linnaeus, 1758) از خانواده Asilidae، برای نخستین بار بر اساس نمونه‌های جمع‌آوری‌شده اخیر در طبیعت و بررسی نمونه‌های موزه‌ای، از مجارستان امروزی گزارش می‌شوند. همچنین حضور گونه *Neomochtherus schineri* (Egger, 1855) در مجارستان تأیید می‌گردد. افزون بر این، ساختار اندام‌های تناسلی خارجی و داخلی نر در *P. eximia* به‌طور کامل بازتوصیف و با جزئیات تصویرسازی شده است که داده‌های ریخت‌شناسی به‌روزشده‌ای را برای تسهیل شناسایی و مقایسه با گونه‌های نزدیک فراهم می‌کند.

کلمات کلیدی: مگس‌های راهزن، تنوع گونه‌ای، فون، مگس‌های خنجری

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