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NOTES ON GEOGRAPHIC DISTRIBUTION

Northward range extension of *Atrichops crassipes* (Meigen, 1820) (Diptera, Athericidae) in the Baltic ecoregion, with the first record from Latvia

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Abstract. The first record of *Atrichops crassipes* (Meigen, 1920) (Diptera, Athericidae) in Latvia is reported, together with additional findings from Lithuanian waters in 2015. The data are based on larval records collected during freshwater macroinvertebrate research and water-quality monitoring. *Atrichops crassipes* represents a new Diptera species record for Latvia and marks the northernmost limit of the species known range. Our data suggest that *A. crassipes* is expanding its range northward, possibly driven by climate warming.

Key words. Aquatic insect, larval observations, Least Water-snipefly, new localities

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INTRODUCTION

The family Athericidae comprises 10 genera worldwide (Nagatomi and Stuckenberg 2004), of which four genera are reported from Europe (Lablat 2023). The genus *Atrichops* Verall, 1909 globally contains 11 extant species (Muller et al. 2023), with the least water-snipefly *Atrichops crassipes* (Meigen, 1820) being the only representative of the genus in Europe (Schmidt-Kloiber and Hering 2025). In general, *A. crassipes* is considered a Western and Central European species with findings from the United Kingdom, Belgium, the Netherlands, Spain, France, Germany, Italy, the Czech Republic, Poland, Slovakia, and Romania (Murányi et al. 2009). According to the International Union for Conservation of Nature (IUCN) criteria, *A. crassipes* has been assessed as Vulnerable in the Czech Republic (Kolaříková et al. 2014), but as Endangered in Poland (Głowaciński et al. 2002). In the last two decades, this species has been reported for the first time from several European countries: Hungary (Murányi et al. 2009), Switzerland (Sartori et al. 2011), and Portugal (Andrade 2014).

The life cycle of *A. crassipes* is reported to be biennial, with the adult flight period occurring from mid-June to August (Gerke and Böttger 2001). Ecological studies suggest that *A. crassipes* is a thermophilic species (Daufresne et al. 2003; Bulánková et al. 2019) that prefers lower altitudes (Sartori et al. 2011). The larvae are strictly aquatic, preying on other aquatic invertebrates, such as chironomids and oligochaetes, and typically inhabit soft substrates in streams, rivers, and standing waters. Adult females are haematophagous and have been reported to feed on frogs (Thomas 1997).

In Lithuania and Latvia, only two species of Athericidae belonging to the genus *Atherix* Meigen, 1803 are listed in published checklists of Diptera (Pakalniškis et al. 2006; Karpa 2008). However, some larval observations of *A. crassipes* from Lithuania have been previously mentioned in ecological studies (Bernotienė and Višinskienė 2007, 2008). Our study reports the first and northernmost occurrence of *A. crassipes* in Latvia, documents new localities in Lithuania, and reviews the species known distribution.

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METHODS

The specimens in Latvia were collected in the Tartaks River during the national surface water monitoring programme conducted by the Latvian Environment, Geology and Meteorology Centre (LEGMC). The Tartaks is a medium-sized rheophilic river with a catchment area of 890 km^2. Altogether 77% of the landcover in the

Figure 1. The habitat of *Atrichops crassipes* in Tartaks River, Latvia (14.VI.2025).

Tartaks River catchment area consists of agricultural land, while 23% are covered by forests. The sampling was done on 25 April 2023. Five replicate kick-samples were collected near the riverbank using a standard hand net from dominating substrates at depths ranging from 0.3 to 0.6 m. The riverbed was covered by sand and silt, with emergent macrophytes (*Glyceria fluitans* (L.) R.Br., *Phalaris arundinacea* L., and *Sparganium emersum* Rehmann) growing along the banks, and a moderate amount of woody debris was present (Figure 1).

The material from Latvia is deposited in the voucher specimen collection of LEGMC, Rīga, and two specimens are deposited in the collection of the Latvian National Museum of Natural History (LNMNH), Rīga.

The records from Lithuania were obtained from the publications of Bernotienė and Višinskienė (2007, 2008), the doctoral dissertation of Višinskienė (2010) and unpublished data collected by the Laboratory of Evolutionary Ecology of Hydrobionts at the Nature Research Centre (NRC). The new material of *A. crassipes* from Lithuania presented in this study were collected in the larval stage in 2015 and deposited in NRC, Vilnius.

Information on the global distribution of *Atrichops crassipes* (Meigen, 1920) was obtained from the Global Biodiversity Information Facility (GBIF 2025) and published literature (Murányi et al. 2009; Sartori et al. 2011; Andrade 2014; Zeegers and Pollet 2024). The distribution map was made using ArcMap v. 10.8.2 (Esri 2011).

RESULTS

Family Athericidae

Atrichops crassipes (Meigen, 1820)

New records. LATVIA — Augšdaugava Municipality • Višķu parish, Tartaks River; 56°04′44″N, 026°49′01″E; 103 m alt.; 25.IV.2023; K. Paulauska leg.; 1 larva mounted on plastic card, LNMNH, En Dip/5651, 1 larva in ethanol, LNMNH, En Dip/5652, 5 larvae in ethanol, LEGMC, 23ZB0031/AC

LITHUANIA — Druskininkai Municipality • Merkys River near the road to Druskininkai; 54°08′39″N, 024°12′18″E; 73 m alt.; 30.IX.2015; K. Arbačiauskas leg.; 1 larva in ethanol, NRC, NRCE000251 — Lazdijai District Municipality • Baltoji Ančia River near Kapčiamiestis; 53°59′08″N, 023°39′29″E; 108 m alt.; 30.IX.2015; K. Arbačiauskas leg.; 2 larvae in ethanol, NRC, NRCE000252 — Panevėžys District Municipality • Nevėžis River near Liūdine; 55°41′06″N, 024°27′55″E; 41 m alt.; 28.IX.2015; K. Arbačiauskas leg.; 5 larvae in ethanol, NRC, NRCE000250 • Nevėžis River near Panėvežys, near the Sanžilė Canal; 55°44′07″N, 024°14′09″E; 28 m alt.; 28.IX.2015; K. Arbačiauskas leg.; 4 larvae in ethanol, NRC, NRCE000249 — Švenčionys District Municipality • Žeimena River below Pabradė wastewater treatment plant; 54°57′57″N, 025°43′43″E; 117 m alt.; 24.IX.2015; K. Arbačiauskas leg.; 2 larvae in ethanol; NRC, NRCE000253 • Žeimena River at Kaltanėnai; 55°15′10″N, 025°59′29″E; 141 m alt.; 24.IX.2015; K. Arbačiauskas leg.; 2 larvae in ethanol, NRC, NRCE000255 • Žeimena River at Liūlinė; 55°06′04″N, 025°56′52″E; 133 m alt.; 24.IX.2015; K. Arbačiauskas leg.; 5 larvae in ethanol, NRC, NRCE000254

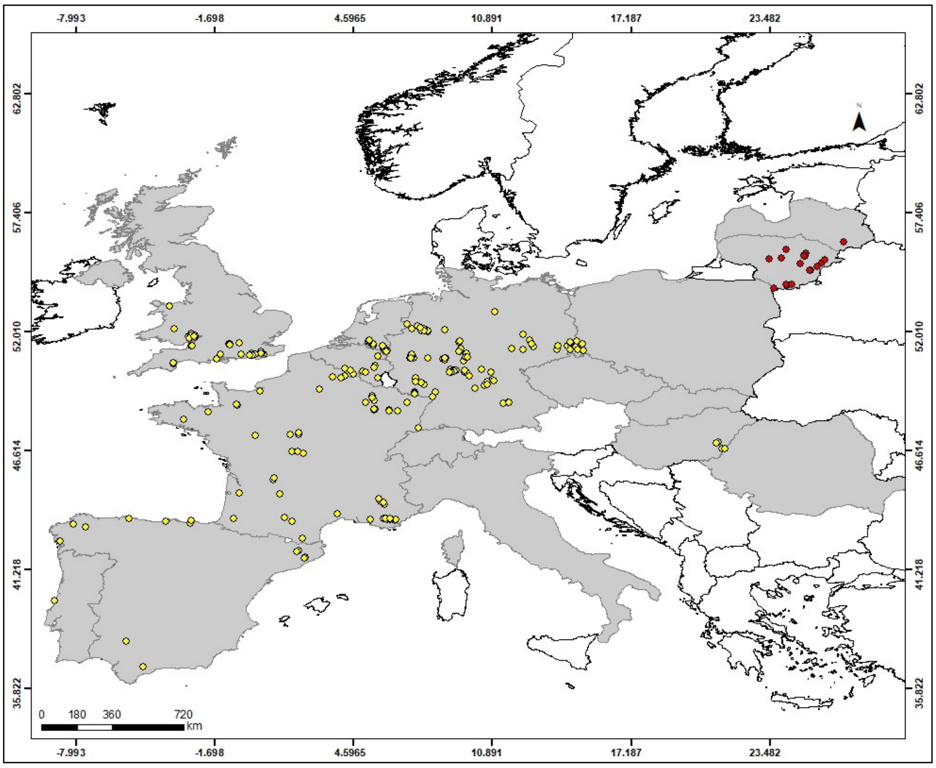

Figure 2. The geographical distribution of *Atrichops crassipes*. red dots = occurrences in Latvia and Lithuania; yellow dots: occurrences elsewhere in Europe (GBIF 2025).

Distribution. The known distribution of *A. crassipes* based on literature and the localities of our study is shown in Figure 2.

Identification. The morphology of the larvae is very distinctive and cannot be confused with that of other Diptera species. The larvae have prolegs on abdominal segments 1–7. Abdominal segments 6 and 7 each bear four tracheal projections (two dorsal and two lateral), and two additional projections are present on the anal segment. The tracheal projections are at least half the length of the body. Last-instar larvae measure 14–15 mm in length (Thomas 1997; Figure 3).

DISCUSSION

The checklist of Latvian Diptera includes 1,654 confirmed species, although the estimated total is around 3,600 species (Karpa 2008). In comparison, the Lithuanian dipteran fauna includes 3,311 species (Pakalniškis et al. 2006). Both works mention two species belonging to the family Athericidae: *Atherix aurichalcea* Becker, 1921 and *A. ibis* (Fabricius, 1798) (Pakalnišķis et al. 2006; Karpa 2008). In Lithuania, all identified athericid specimens were in the adult stage: eight *A. aurichalcea* females were recorded (Dumčius and Pakalniškis 2004), along with one *A. ibis* male (Podėnas and Pakalniškis 2000). It is noteworthy that *Atrichops crassipes* is absent from the Lithuanian Diptera checklist, despite frequent occurrences of its larvae in benthic invertebrate surveys (Bernotienė and Višinskienė 2007, 2008; Višinskienė 2010; unpublished data from the Laboratory of Evolutionary Ecology of Hydrobionts, NRC). Since the Lithuanian Diptera checklist is based solely on adult specimens, *A. crassipes* has remained unreported in the published records of the Lithuanian fauna. In different studies of Lithuanian river macroinvertebrates, it was found that *A. crassipes* was a common species in medium-sized rivers (Bernotienė and Višinskienė 2007). Studies in the Lithuanian rivers Neris and Šventoji

Figure 3. The larva of *Atrichops crassipes* (Meigen, 1821), collected in Višķu parish, Tartaks River, 25.IV.2023.

have revealed a positive relationship not only between river current velocity and total aquatic invertebrate abundance, but also between current velocity and *A. crassipes* larval density (Bernotienė and Višinskienė 2008).

We suggest that *A. crassipes* is a new species for Latvia as the surface water monitoring program has been active since 2006 and encompasses the entire territory of the country (LEGMC 2009). In contrast, *A. crassipes* was first recorded in Lithuania in 2003 and has since been regularly detected in benthic invertebrate samples. Based on our 2023 finding in Latvia, we assume that the species is a recent addition to the Latvian fauna, rather than a result of insufficient sampling efforts in the past. The biennial life cycle of *A. crassipes* confirms that the larvae are present in water throughout the year (Gerke and Böttger 2001). Our results suggest that *A. crassipes* is undergoing a range extension northwards, as it was previously considered a species of Western and Central Europe (Sartori et al. 2011; Bulánková et al. 2019). The locality in Latvia represents the northernmost known limit of the species, which had previously been recorded only as far north as the United Kingdom (GBIF 2025). The mean annual temperatures are known to be increasing in the Baltic countries (Jaagus et al. 2014; Kalvāns et al. 2023) and Sartori et al. (2011) mentioned *A. crassipes* as a potential climate migrant, as it appears to benefit from climate warming (Daufresne et al. 2003; Bulánková et al. 2019). The low altitudes of the Baltic ecoregion (Jusik et al. 2015) seems to correspond to the favorable habitat requirements of this species (Sartori et al. 2011). In conclusion, we suggest that *A. crassipes* will expand its distribution across Latvian waters in the coming decades and continue to spread northwards.

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ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contributions

Conceptualization: DO. Data curation: DO, GV, KA. Investigation: DO, JJ, GV. Methodology: DO, JJ, UP, GV, KA. Supervision: DO, GV. Visualization: JJ, UP. Writing – original draft: DO, GV. Writing – review and editing: DO, JJ, UP, GV, KA.

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Data availability

All data that support the findings of this study are available in the main text. Data from the specimens collected in this study are deposited in GBIF via the Pensoft IPT and available at the following link: https://doi.org/10.15468/e5b7wp.

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