

NEW LOCALITY OF THE RARE RIFFLE BEETLE *POTAMOPHILUS ACUMINATUS* (FABRICIUS, 1772) (COLEOPTERA, ELMIDAE) IN LITHUANIA

GIEDRĖ VIŠINSKIENĖ, KĘSTUTIS ARBAČIAUSKAS, EGLĖ ŠIDAGYTĖ

Nature Research Centre, Akademijos str. 2, LT-08412 Vilnius-21, Lithuania.

E-mail: giedre@ekoi.lt, arbas@ekoi.lt, e.sidagyte@gmail.com

Introduction

Riffle beetles of the family Elmidae are frequent members of riverine invertebrate communities; more than 50 elmid species (and series of subspecies also) have been recorded from Europe (Jäch *et al.*, 2006). The latest extensive list of Lithuanian Coleoptera, containing 3597 species, was published in 2011 (Tamutis *et al.*, 2011). It contained 10 reported species of elmids and 6 yet undetected elmids with expected presence in Lithuania due to records in the neighboring territories. Later Hungarian scientists published records of two expected species from Lithuania, namely *Potamophilus acuminatus* (Fabricius, 1772) and *Limnius intermedius* Fairmaire, 1881 (Kovács *et al.*, 2011). Both of these species were recorded from a single locality in the Jūra River.

The primary aim of this paper is to report a new locality of the generally rare riffle beetle *P. acuminatus* in Lithuania, in the Minija River. Additionally, distribution and ecological peculiarities of the species are discussed.

Material and Methods

As part of the investigations of Lithuanian rivers in 2015 (within the frame of the Project No. SIT-10/2015 from the Research Council of Lithuania), the Minija River was surveyed for benthic macroinvertebrates on 04 09 2015. A standard dip net (25×25 cm opening, 0.5 mm mesh size) was used to sample submerged vegetation using the sweep method (O'Hare *et al.*, 2007; Arbačiauskas, 2009). The semi-quantitative sample was collected by one person for 5-minutes. Depths up to 1.2 m were surveyed in a site where channel width was approx. 25–30 m and flow velocity was 33 cm s⁻¹. The bottom was comprised mostly of sand with patches of gravel, silt and submerged wood.

Locality

Klaipėda district	Minija River near Priekulė town	55.55494, 21.32686
-------------------	---------------------------------	--------------------

The Key to freshwater invertebrates of Russia and adjacent lands (Kireychuk, 2001) for all Elmidae species identification was used. *P. acuminatus* identity was later confirmed by Dr. Paweł Buczyński (Marie Curie-Skłodowska University, Lublin, Poland).

Results

One 11-mm long larva of *Potamophilus acuminatus* (Fabricius, 1792) (syn. *Parnus acuminatus* Fabricius, 1792) was collected by sweeping among aquatic vegetation in the Minija River site near Priekulė town on 04 09 2015 (Leg. K. Arbačiauskas) (Fig. 1). Six other taxa of aquatic beetles co-occurred in the sample: *Laccophilus hyalinus* (De Geer, 1774) (2 adults), *Nebrioporus depressus* (Fabricius, 1775) (2 adults), *Platambus maculatus* (Linnaeus, 1758) (2 adults), *Oulimnius* sp. (1 larva), *Orectochilus villosus* (O. F. Muller, 1776) (1 adult, 5 larvae), *Gyrinus* sp. (11 adults), and *Haliphus* sp. (2 adults).

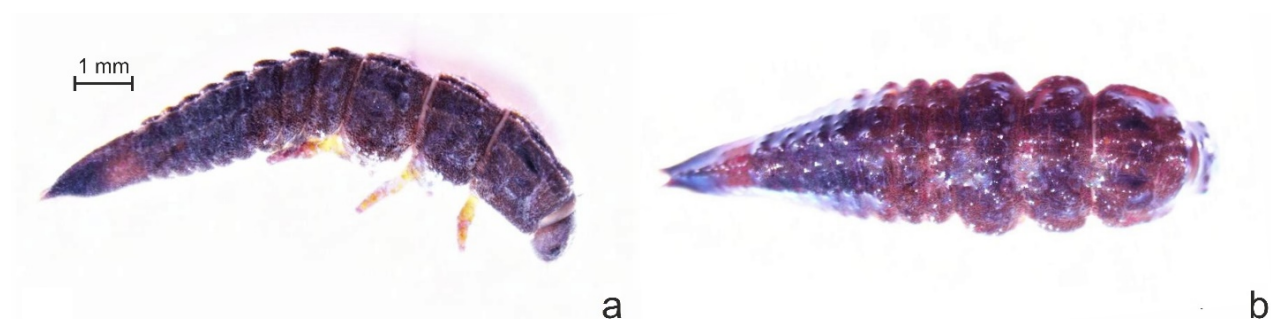


Figure 1. A 11-mm long larva of *Potamophilus acuminatus* found in current study: lateral (a) and dorsal (b) views.

Discussion

Potamophilus acuminatus is a Palearctic species known from many European countries (Poland, Belarus, Slovakia, Serbia, Romania, Austria, Germany, The Netherlands, Hungary, Czech Republic, European Turkey, Spain, Italy, France, Greece) (Jäch *et al.*, 2006), although only as locally and/or sporadically distributed, and relatively rare; (Buczyński *et al.*, 2011; Gerend, 2011; Przewoźny *et al.*, 2011; Jäch, 2013; Novaković *et al.*, 2016). For instance, during the period of almost 200 years *P. acuminatus* has only been recorded 19 times from 18 sites in Poland (Buczyński *et al.*, 2011). Beside the possibility that the edge of the species' distribution range may fall over the South-Eastern Baltic territory (Buczyński *et al.*, 2011), an important reason for the generally seldom detection of *P. acuminatus* may be specific habitat requirements.

All elmids have aquatic larvae with five to eight instars, depending on the genus, and most adults are aquatic with plastron respiration (Elliott, 2008). Adults of *P. acuminatus* can occasionally be found in terrestrial environment (on emergent objects, under stones, in light traps) (Kovács *et al.*, 1999; Jäch *et al.*, 2006; Buczyński *et al.*, 2011), which is a rather peculiar behaviour among European elmids. Being the only representative of the genus (and of the subfamily Larainae) in the continent (Jäch, 2013), it easily stands out among other European elmids for its conspicuously larger body size. The 11-mm long larva registered in this study falls within the larval size range characteristic of the species (6.5–12.0 mm) (Kodada *et al.*, 2016; Novaković *et al.*, 2016), and the adults are known to be 6.5–8.5-mm long (Kodada, 1991; Kodada *et al.*, 2016).

The latest catalogue of Lithuanian beetles (Tamutis *et al.*, 2011) listed *L. intermedius* (known from Denmark and Belarus) and *P. acuminatus* (northern Belarus and Poland)

among with four other expected elmids species. Only half a year on, Hungarian scientists, Kovács *et al.* (2011), published records of the two species from the Jūra River near Kalėnai town (55.17806, 22.16144): *L. intermedius* (1 adult on 12 07 2011) and *P. acuminatus* (1 larva on 05 05 2010 and 3 larvae on 12 07 2011) in a local Hungarian journal.

The information on second actual locality of presence *P. acuminatus* in Lithuania is given in this paper. First record of this species (1 larva on 05 05 2010 and 3 larvae on 12 07 2011), found in Jūra River near Kalėnai town (coordinates of locality: N 55.178056, E 22.161444;) was published by Kovács *et al.* (2011). Though aiming at a broad spectrum of other insects, the publication did not include any additional information to the side-noted elmids records, e. g. habitat description. However, the latter and our records of *P. acuminatus* indicate congruent distribution in western Lithuania and at least similar hydrological conditions: both Jūra and Minija are tributaries of the River Nemunas, and both sighting stretches are at roughly similar distances to the entries (~30 km), of similar width (25–30 m) and could be classified as near natural (both are at sandy bathing beaches of rather small settlements) lowland (2–10 m above sea level) meandering channels. These conditions are consistent with records in Poland, where *P. acuminatus* was mainly observed in lowland (or larger) rivers with more or less natural channels and surroundings (Buczyński *et al.*, 2011). Although throughout Europe the rheophilous species has been ascribed divergent longitudinal zonation (see Buczyński *et al.*, 2011), generally strong association to low altitudes, slow to medium current velocity (mostly 5–50 cm s⁻¹) and the potamal zone (which is even indicated by the genus name) seems to have been broadly agreed upon (Schöll *et al.*, 2005; Tachet *et al.*, 2010). Interestingly, although sites throughout all of Poland were investigated, so far *P. acuminatus* has not been recorded from the north-eastern part of the country (Buczyński *et al.*, 2011). The lack of records could be partially attributed to absence of hydrologically suitable rivers in this predominantly highland-lakeland devoid of substantial anthropogenic disturbances.

While most elmids (larvae and adults) are grazers, scrapers or collector-gatherers, feeding chiefly on algae and detritus, only *Macronychus quadrituberculatus* Müller, 1806 and *P. acuminatus* are known as xylophagous shredders-scrapers (Elliott, 2008; Tachet *et al.*, 2010; Buczyński *et al.*, 2011; Schmidt-Kloiber & Hering, 2017). Both larvae and adults of *P. acuminatus* are xylophagous, but adults are also noted to feed on aquatic moss (Kodada, 1991; Tachet *et al.*, 2010; Buczyński *et al.*, 2011; Schmidt-Kloiber & Hering, 2017). During both stages, the beetle prefers submerged wood/tree-roots, hard bottoms and may be associated with phytal microhabitat (algae, moss, macrophytes, living parts of terrestrial plants) (Kodada, 1991; Tachet *et al.*, 2010; Kodada *et al.*, 2016). Pupation also occurs in wood (Kodada, 1991). Consistently, decaying wood, which appears to be an essential element of the species habitat, was also present in our sampling site.

As many other elmids, *P. acuminatus* also requires decent dissolved oxygen concentrations (Elliott, 2008; Buczyński *et al.*, 2011). Therefore, it indicates high water quality and may also be sensitive to climate change (Elliott, 2008). Although facing regressions in Central Europe due to deteriorating status of rivers, it is assumed to have been historically rare and no such loss of suitable habitats is expected in Poland (Buczyński *et al.*, 2011). However, the coincidence of rivers Jūra and Minija, where the beetle has been recorded, being among the most undisturbed rivers in Lithuania

(Aplinkos apsaugos agentūra, 2017) may indicate the possibility of pollution as a threatening factor for species' survival in the region.

To conclude, *P. acuminatus* is distributed in relatively undisturbed western Lithuanian lowland rivers. Together with the Belarusian records, the Lithuanian records constitute the northern-most sightings of the species. It is a rare species in all over Europe due to highly specific environmental requirements. As *P. acuminatus* is reophilous, oxyphilous and predominantly xylophagous, destruction of natural riverine habitats resulting from pollution, shore alteration and removal of decaying wood could primarily pose threat to its reproduction and survival.

Acknowledgements

The authors are thankful to Dr. Paweł Buczyński for confirming the identity of the *P. acuminatus* larva. The survey of river benthic macroinvertebrates was supported by the Research Council of Lithuania, Project No. SIT-10/2015.

References

- Aplinkos apsaugos agentūra, 2017. Upių ekologinė ir cheminė būklė. Available at: <http://vanduo.gamta.lt/cms/index?rubricId=6adeeb1d-c902-49ab-81bb-d64b8bccefdd>. Accessed October 25, 2017.
- Arbačiauskas K. 2009. Bentoso makrobestuburiai. In Arbačiauskas K. (ed.) *Gyvūnijų monitoringo metodai*. Vilnius, 22–46.
- Buczyński P., Przewoźny M., Zawal A., Zgierska M. 2011. On the occurrence of *Potamophilus acuminatus* (Fabricius, 1772) (Coleoptera: Elmidae) in Poland. *Baltic J. Coleopterol.*, 11 (1): 45–56.
- Elliott J. M. 2008. The ecology of riffle beetles (Coleoptera: Elmidae). *Freshwater Reviews*, Vol. 1 (2): 189–203.
- Gerend R. 2011. A remarkable assemblage of riffle beetles (Coleoptera: Dryopoidea: Elmidae) from the Aisne river, northern France, with records of *Potamophilus acuminatus* (Fabricius, 1792) and *Limnius muelleri* (Erichson, 1847). *Bulletin de la Société des naturalistes luxembourgeois* 11: 83–90.
- Jäch M. A. 2013. Fauna Europaea: Elmidae: *Potamophilus acuminatus*. In Alonso-Zarazaga M. A. (ed.) *Fauna Europaea: Coleoptera, Elateriformia*. Fauna Europaea version 2017.06. Available at: <https://fauna-eu.org>. Accessed October 25, 2017.
- Jäch M. A., Kodada J., Ciampor F. 2006. Elmidae. In Löbl I., Smetana A. (Eds.) *Catalogue of Palaearctic Coleoptera, Vol. 3: Scarabaeoidea–Byrrhoidea*. Stenstrup, 432–440.
- Kireychuk A. G. 2001. Elmidae. In: Tsalolikhin S.J. (ed.) *The Key to freshwater invertebrates of Russia and adjacent lands*. St. Petersburg, Nauka, Vol. 5: 334–340.
- Kodada J. 1991. *Potamophilus acuminatus* (F.) – not extinct in Central Europe! (Coleoptera: Elmidae). *Koleopterologische Rundschau* 61: 157–158.
- Kodada J., Jäch M. A., Čiampor F. 2016. Elmidae. In Beutel R. G., Leschen A. B. (Eds.) *Coleoptera, Beetles, Vol. 1: Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim)*. Berlin, 561–589.
- Kovács T., Ambrus A., Merkl O. 1999. *Potamophilus acuminatus* (Fabricius, 1792) and *Macronychus quadrituberculatus* P. W. J. Müller, 1806: new records from Hungary

- (Coleoptera: Elmidae). *Folia Entomologica Hungarica* 60: 187–194.
- Kovács T., Olajos P., Szilágyi G. 2011. Records of Ephemeroptera, Odonata and Plecoptera from Lithuania, with notes on aquatic arthropods. *Folia Historico Naturalia Musei Matraensis* 35: 21–32.
- Novaković B. B., Marković V. M., Ilić M. D., Tubić B. P., Đuknić J. A., Živić I. M. 2016. Recent records and ecological notes on the riffle beetle *Potamophilus acuminatus* (Fabricius, 1792) (Coleoptera: Elmidae) in Serbia. *Acta Zoologica Bulgarica* 68 (2): 207–214.
- O'Hare M. T., Tree A., Neale M. W., Irvine K., Gunn I. D., Jones J. I., Clarke R. T. 2007. *Lake benthic macroinvertebrates I: improving sampling methodology*. Almondsbury, Bristol.
- Przewoźny M., Buczyński P., Greń C., Ruta R., Tończyk G. 2011. New localities of Elmidae (Coleoptera: Byrrhoidea), with a revised checklist of species occurring in Poland. *Polish Journal of Entomology* 80: 365–390.
- Schmidt-Kloiber A., Hering D. 2017. www.freshwaterecology.info – the taxa and autecology database for freshwater organisms, version 7.0. Available at: <http://www.freshwaterecology.info>. Accessed October 25, 2017.
- Schöll F., Haybach A., König, B. 2005. Das erweiterte Potamontypieverfahren zur ökologischen Bewertung von Bundeswasserstraßen (Fließgewässertypen 10 und 20: kies- und sandgeprägte Ströme, Qualitätskomponente Makrozoobenthos) nach Maßgabe der EU-Wasserrahmenrichtlinie. *Hydrologie und Wasserwirtschaft* 49 (5): 234–247.
- Tachet H., Bournaud M., Richoux P., Usseglio-Polatera P. 2010. *Invertébrés d'eau douce – systématique, biologie, écologie*. Paris. Available at www.freshwaterecology.info – the taxa and autecology database for freshwater organisms, version 7.0, <http://www.freshwaterecology.info>. Accessed October 25, 2017.
- Tamutis V., Tamutė B., Ferenc R. 2011. A catalogue of Lithuanian beetles (Insecta, Coleoptera). *Zookeys* 121: 1–494.

Nauja reto nendriavabalis *Potamophilus acuminatus* (Fabricius, 1772) (Coleoptera, Elmidae) radvietė Lietuvoje

G. VIŠINSKIENĖ, K. ARBAČIAUSKAS, E. ŠIDAGYTĖ

Santrauka

Iki šiol buvo publikuota tik viena retos visoje Europoje nendriavabalių (šeima Elmidae) rūšies, *Potamophilus acuminatus*, radvietė Lietuvoje – Jūros upėje, ties Kalėnais (55.17806, 22.16144). Šiame straipsnyje aprašoma nauja šios rūšies radvietė Minijos upėje, ties Priekule (55.55494, 21.32686). Viena šios rūšies lerva rasta upės atkarpoje, kurioje vagos plotis buvo 25–30 m, srovės greitis – 33 cm s⁻¹, vyraujantis dugno substratas – smėlis, buvo žolinės vandnes augmenijos bei panirusios medienos. Straipsnyje taip pat aptariama gan išskirtinė *P. acuminatus* ekologija bei paplitimas.

Received: 6 November, 2017