NEW DATA ON EXTREMELY RARE CADDISFLY *PHILOPOTAMUS MONTANUS* (DONOVAN, 1813) (TRICHOPTERA, PHILOPOTAMIDAE) IN LITHUANIA

KAZIMIERAS MARTINAITIS[1], ROMAS FERENCA[1], JUHA SALOKANNEL[2] GIEDRĖ VIŠINSKIENĖ[3]

[1] Kaunas T. Ivanauskas Museum of Zoology, Laisvės al. 106, LT - 44253, Kaunas, Lithuania. E-mail: kazimieras.martinaitis@zoomuziejus.lt; romas.ferenca@zoomuziejus.lt
[2] Finnish Aquatic Insects Specialist Group, Siikinkatu 13, FIN - 33710, Tampere, Finland. E-mail: juha.salokannel@gmail.com
[3] Nature Research Centre, Akademijos str. 2, LT - 08412 Vilnius, Lithuania. E-mail: giedre.visinskiene@gamtc.lt

Introduction

Philopotamus is one of the three genera (*Chimarra, Philopotamus, Wormaldia*) of the family Philopotamidae found in Lithuania, and is represented by single species - *Philopotamus montanus* (Donovan, 1813) (Višinskienė, 2009). The Nerėpa Entomological Reserve was established in 1988 in order to protect this relict caddisfly (Kirstukas *et al.,* 2004). There are only a few reports on internet and publications about the occurrence of *P. montanus* in Lithuania (Kazlauskas, 1960; Virbickas & Pliūraitė, 2002). In some reports, the data could be questionable and unverifiable. *P. montanus* was recorded in the Lithuanian Red Data Book (Rašomavičius, 2007), but later deleted due to data deficiency. The species was thought to have been extinct in Lithuania due to human economic activity.

Information on the exact distribution and ecological features of *P. montanus* is absent in Lithuania and in this work we present new records about this rare caddisfly and discuss its European distribution, identification, and ecological characteristics.

Material and Methods

An adult specimen (1 ♀) of *Philopotamus montanus* was found during a field trip in Nerėpa Entomological Nature Reserve (29 ha section of the valley of the Narėpa stream near Kulautuva, established in 1988) on July 23, 2020. The insect was collected from plants near Nerėpa stream by hands using standard entomological tube. Three larvae were found later in Nerėpa river, on October 16, 2020. Nerėpa River (Nemunas basin) is a small (~1.6 km), fast flowing (~0.2 m/s) cold-water stream. It is shallow (up to 30 cm deep), but never dries and is constantly filled with water from the surrounding springs (Baškytė *et al*., 2006). The identification guides by Kachalova (1987) and Malicky (2004) were used for species identification. Taxonomic treatment of the taxon follows the Fauna Europaea database (Malicky, 2013). The specimens of *P. montanus* are deposited in the insect collection of the Kaunas T. Ivanauskas Zoological Museum.

Locality	Administrative district	Coordinates (LAT, LONG)
Nerėpa Entomological Nature Reserve	Kaunas district	54.945096, 23.654312

***Philopotamus montanus* (Donovan, 1813)** (Fig. 1 a, b, c)

Nerėpa riverside, 23 07 2020, 1 ♀. (collected by K. Martinaitis).

Nerėpa stream, 16 10 2020, 3 larvae (collected by K. Martinaitis and R. Ferenca).

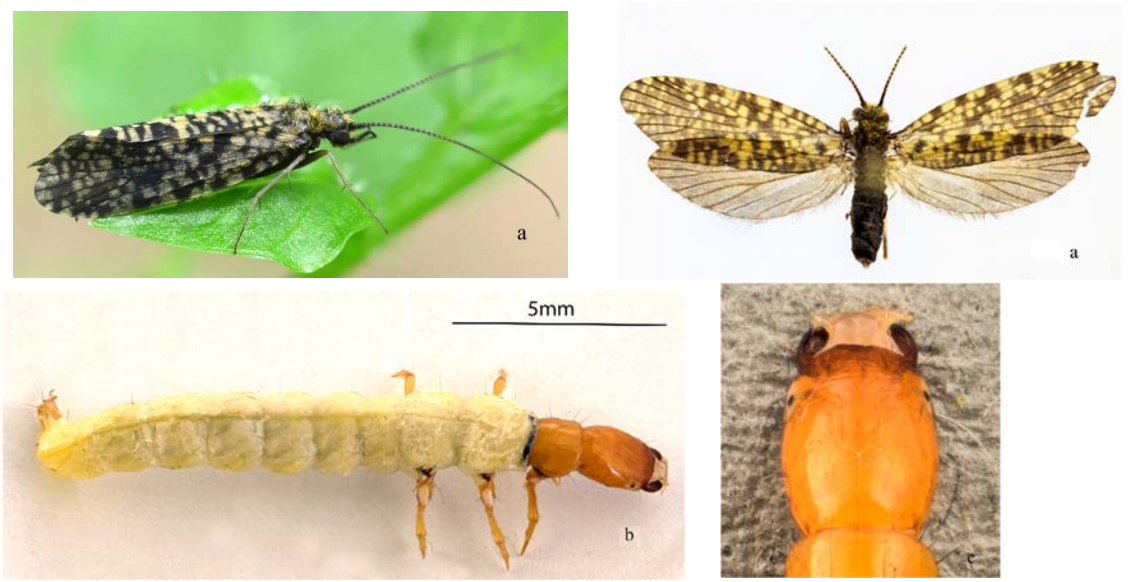

Figure 1. *Philopotamus montanus* from Nerėpa Entomological Nature Reserve, Lithuania: a) adult female, b) larva, c) head of larva (photos: K. Martinaitis).

Discussion

Philopotamus montanus (syn. *P. scopulorum, P. tigrinus, Phryganea montanus, P. charpentieri*) is a West Palearctic species, present in 37 European countries; the nearest for Lithuania is Poland and Belarus (Malicky, 2013; Moroz & Lipinskaya, 2014). There is no data about *P. montanus* from other neighbouring countries - Latvia and Estonia (Viidalepp *et al*., 2010; Malicky, 2013). There are up to 8 species of *Philopotamus* in Europe (*P. achemenus, P. corsicanus, P. ketama, P. liguricus, P. ludificatus, P. montanus, P. tenuis, P. variegatus*). The most common *Philopotamus* species in Central Europe (including Poland) are *P. montanus*, *P. ludificatus* and *P. variegatus* (Pitsch, 1987; Głowaciński, 2002). *P. ludificatus,* and *P. variegatus* (could be found together with. *P. montanus*) seem to be a more highland species, living for example in the High Tatra Mts., Slovakia, at the altitude of ~1000–1250 m (Kalaninová *et al.,* 2013; Malicky, 2013). The distribution area of *P. montanus* extends over the whole Europe eastwards to NW- and N-Russia (Malicky, 2004; 2005; 2013, Ivanov, 2011; Neu *et al*., 2018). *P. montanus* is considered as common species with restricted distribution in the inner part of the Romanian Carpathians (Robert & Curtean–Bănăduc, 2005); as widespread species in Balkans (Ibrahimi *et al.,* 2019); widespread and common species in N and W England (Wallace, 2016). In Finland, it is relatively common in the mountainous or hilly northern areas, but only few isolated populations are known in the southern lowlands (Salokannel & Mattila, 2018).

Larvae of *Philopotamus montanus* are caseless, up to 2,4 cm long, pale with a yellowish-orange coloured head (Fig. 1 b, c). Only pronotum is sclerotised, usually without or with minor abdominal gills, labrum not sclerotised, soft, wide, T-shaped with lots of hair at front edge (Fig. 1 c, 2 a, b). Larvae construct spinning nets in the form of long tubular bags from very fine mesh size, which are used for filtration of small-sized food particles and diatoms, generally attached to the stones, large woody debris on the bottom of cold, clean, streams and small rivers in uplands, with moderate or high current velocity (Edington & Hildrew, 1995; Solem & Gullefors, 1996; Tsalolikhin, 2001; Rinne & Wiberg-Larsen, 2017). The Nerėpa stream was full of different bottom structures – sand, gravel, stones, and wood debris. Larvae were found on stones or wooden pieces in depths up to 10 cm. Larvae of *Philopotamus* can be distinguished from other Philopotamidae genera by the form of anterior edge of frontoclypeus (*Philopotamus* has shallow, v-shaped notch) (Fig. 1 c, 2 b); by the pigmentation pattern on the lateral side of pronotum and anterior face of procoxa (*Philopotamus* has pronotum pigmentation like continuous band extending at the end of the pronotum; *Philopotamus* has two black bristles, one of them is situated on a small rounded protuberance) (Pitsch, 1987; Edington & Hildrew, 1995; Solem & Gullefors, 1996; Tsalolikhin, 2001) (Fig. 2 c). The pupal stage is in cocoons made of small pebble and sand particles.

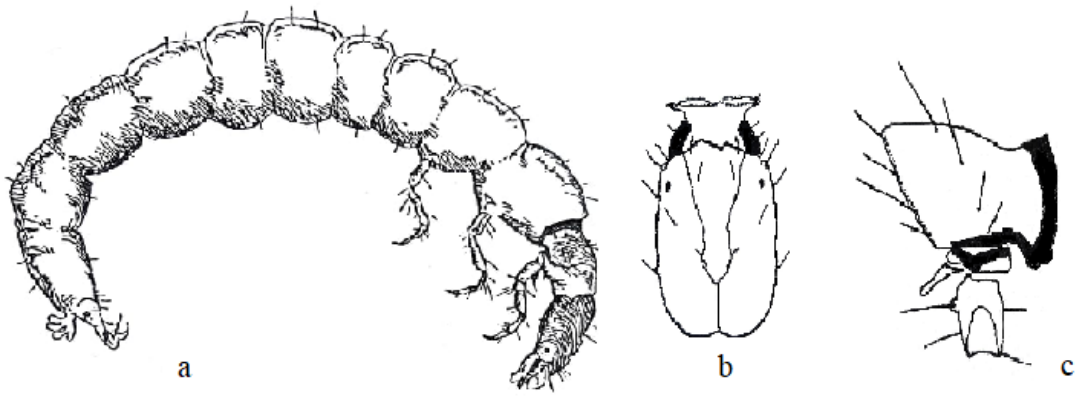

Figure 2. *P. montanus* larva: a) lateral view, b) head dorsal view, c) pronotum and procoxa, lateral view (a) according to Solem & Gullefors, 1996; b), c) according to Tsalolikhin, 2001).

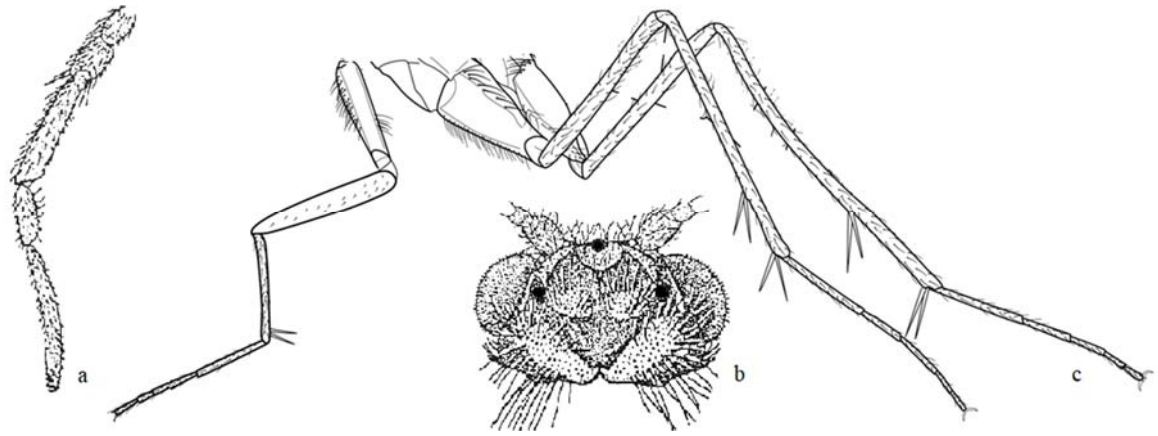

Figure 3. *Philopotamus sp.* adult: a) maxillary palp, b) head with ocelli, (according to Solem & Gullefors, 1996) c) tibial spurs (according to Holzenthal *et al*., 2007).

Adults of *Philopotamus* can be simply distinguished from other Trichoptera families and other Philopotamidae genera by several characteristics: a) maxillary palps are with flexible terminal segment and approximately 2–3 times longer than previous segment (Fig. 3 a, b) presence of ocelli, (Fig. 3 b), and formula of tibial spurs is 2-4-4 (Fig. 3 c) (Kachalova, 1987; Solem & Gullefors, 1996; Holzenthal *et al*., 2007).

Adults of *Philopotamus montanus are s*mall to moderate in size, wings are brown with yellow-gold spots (forewing length 7–12 mm) (Fig. 1 a). *Philopotamus* male genitalia differ well between species. Female differences are smaller (Fig. 4) (Malicky, 2004). The species has an univoltine (one generation a year) reproduction scheme with long flight period. Adults of *P. montanus* can be found on the wing from February to October in Ireland (O'Connor & O'Connor, 2018; trichopteraireland.wordpress.com), from January to November in Austria (Waringer & Graf, 1997). However, in the northern countries the flight season is short, from June to August in Norway and Finland (Andersen & Hagenlund, 2012, Salokannel & Mattila, 2018).

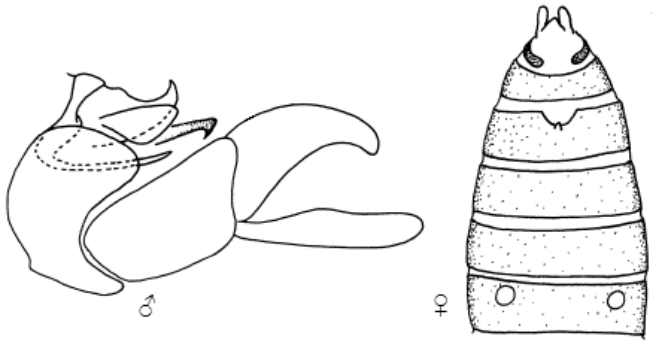

Figure 4. *P. montanus* male genitalia (lateral view) and female genitalia (ventral view) (according to Malicky, 2004).

The Nerėpa Entomological Reserve was established in 1988 in order to protect *Philopotamus montanus* caddisfly in Lithuania (Kirstukas *et al.,* 2004). There is only one report about *P. montanus* occurrence and abundance of population in Nerėpa stream (Kazlauskas, 1960). Professor R. Kazlauskas (1960) wrote that 3 winged males and larvae of *P. montanus* were found on 2 of June 1955 in the Kulautuva stream, which is the same Nerėpa stream. He wrote that there were more caddisfly adults flying at that time and larvae were found in the stream among the *Fontinalis* mosses, that covered stones. The online report states that *P. montanus* was detected in the Jiesia valley, but this information is not documented in any way and we believe it is incorrect (https://lt.wikipedia.org/wiki/Kalninė_apsiuva). Another record of the discovery of *P. montanus* larvae in Saria River is known, but neither the date, nor the exact location or the size of the population are known (Virbickas & Pliūraitė, 2002). This information cannot be verified, and the species may have been incorrectly identified.

P. montanus was included in the Lithuanian Red Data Book (Rašomavičius, 2007), but it was later decided to delete the species as its status was Data Deficient (DD). The species was thought to have been extinct in Lithuania due to human economic activity. We had not removed *P. montanus* from the list of Lithuanian caddisflies, but we have now confirmed the real existence of the species after 65 years. *Philopotamus montanus* has different protection status in other countries, for example, it has classed as Least Concern (LC) species in Poland and Great Britain (Głowaciński, 2002; Wallace, 2016), or simply

protected species in Russia (Czachorowski *et al*., 2004).

Acknowledgements

We are thankful to Brigita Paulavičiūtė (Kaunas T. Ivanauskas Zoological Museum) for assistance in *P. montanus* preparation.

References

Andersen T., Hagenlund L.K. 2012. Caddisflies (Trichoptera) from Finnmark, northern Norway. *Norwegian Journal of Entomology* 59: 133–154.

Baškytė R., Bezaras V., Kavaliauskas P., Klimavičius A., Raščius G. 2006. *Protected areas in Lithuania*. Lututė: 328 p.

Czachorowski S., Visinskiene G., Uherkovich A., Chojka P., Kalnins M., Moroz M., Neu P., Pitsch T., Ivanov V., Goduńko R., Ujvarosi L. 2004. European refuges of entomofauna – caddisflies (Trichoptera) in protected areas in Central and Eastern Europe. *Wiadomości Entomologiczne XXIII*, Poznań, supl. 2: 57–65.

Edington J.M., Hildrew A.G. 1995. A revised key to the caseless caddis larvae of the British Isles with notes on their ecology. *Freshwater Biological association, scientific publication* 53: 119.

Głowaciński Z. (ed.). 2002. Red list of threatened animals in Poland. *Polish academy of sciences institute of nature conservation*, Cracow, 155 p.

Holzenthal R.W., Blahnik R.J., Prather A.L., Kjer K.M. 2007. Order Trichoptera Kirby, 1813 (Insecta), Caddisflies. In: Zhang, Z.-Q., Shear, W.A. (eds.) Linnaeus Tercentenary: Progress in Invertebrate Taxonomy. *Zootaxa*, 1668: 639–698.

Ibrahimi H., Spahija I., Bilalli A., Kuçi R. 2019. Contribution to the knowledge of the Caddissfly (Insecta: Trichoptera) fauna of the Drenica River in Kosovo. *Acta agriculturae Slovenica* 27 (1): 59–64.

Ivanov, V. D. 2011. Caddisflies of Russia: Fauna and biodiversity. *Zoosymposia* 5: 171–209. Magnolia Press.

Janonis T. 2013. Prof. R. Kazlauskas: Lietuvos draustiniai yra „popieriniai“. http://grynas.delfi.lt/aplinka/profesorius-rkazlauskas-lietuvos-draustiniai-yra-popieriniai.d?id=60672487

Kachalova O.L. 1987. Caddis flies. Keys to insects of the European part of the USSR [Качалова О.Л. 1987. Отряд Trichoptera – Ручейники. В.: Медведев Г.С. (ред.) *Определитель насекомых европейской части СССР*. 4 (6): большекрылые, верблюдки, сетчатокрылые, скорпионовые мухи, ручейники. Ленинград, *Наука*, 107–194 с.]

Kalaninová D., Bulánková E., Sporka F. 2013. Caddisfly assemblages of high mountain streams (the High Tatra Mts, Slovakia) influenced by a major windstorm event. Biologia 68 (3): 501–509.

Kazlauskas, R. 1960. Kai kurie duomenys apie Lietuvos TSR upių apsiuvas (Trichoptera). *Vilniaus valstybinio V. Kapsuko vardo Universiteto mokslo darbai, XXXVI. Biologija, Geografija, Geologija*, VII: 179-193.

Kirstukas M., Barauskas R., Baškytė R. 2004. Lietuvos gamta. Saugomos teritorijos. Kaunas, *Lututė*, 392 p.

Malicky H. 2004. *Atlas of European Trichoptera. 2nd ed.* Netherlands, Springer. 359 p.

Malicky H. 2005. Ein kommentiertes Verzeichnis der Köcherfliegen (Trichoptera)

Europas und des Mediterrangebietes. *Linzer biologische Beiträge* 37 (1): 533–596.
Malicky H. 2013. Trichoptera. Fauna Europaea: Philopotamidae. version 2017.06. Available at: http://www.fauna-eu.org (accessed September 20, 2020).
Moroz M.D., Lipinskaya T.P. 2014. Мороз М.Д., Липинская Т.П. *Каталог поденок (Ephemeroptera), веснянок (Plecoptera) и ручейников (Trichoptera) Беларуси [The catalog of the Mayflies (Ephemeroptera), Stoneflies (Plecoptera), and Caddis-flies (Trichoptera) of Belarus].* Belaruskaya Nauka, Minsk. 315 p.
Neu, P. J., Malicky, H., Graf, W. & Schmidt-Kloiber, A. 2018. Distribution Atlas of European Trichoptera. Die Tierwelt Deutschlands. 891 p.
O'Connor J.P., O'Connor M.A. 2018. Records of Irish caddisflies (Trichoptera) including a county list. *Bulletin of the Irish Biogeographical Society*, 42: 75–154
Pitsch T. 1987. Contribution to Larval Taxonomy, Ecology and Distribution of the Central European Species of the Genus *Philopotamus* (Trichoptera: Philopotamidae). In: Bournaud M., Tachet H. (eds.) *Proceedings of the Fifth International Symposium on Trichoptera. Series Entomologica*, 39: 331–335.
Rašomavičius V. (red.). 2007. *Lietuvos Raudonoji Knyga.* Kaunas: Lututė. 90 p.
Rinne A., Wiberg-Larsen P. 2017. Trichoptera Larvae of Finland: A Key to the caddis larvae of Finland and nearby countries. Trificon, Tampera. 152 p.
Robert S., Curtean–Bănăduc A. 2005. Cadys fly (Insecta. Trichoptera) larvae communities. *Transylvanian Review of Systematical and Ecological Research* 2: 89–98.
Salokannel, J. & Mattila, K. 2018. *Suomen vesiperhoset*. Trichoptera of Finland. Hyönteistarvike Tibiale Oy, Helsinki. 448 p.
Solem J.O., Gullefors B. 1996. Trichoptera, Caddisflies. In: Nilsson A. (ed.). *Aquatic Insects of North Europe* – A taxonomic hand book, Vol. 1: 224–255.
Tsalolikhin S.J. 2001. Key to freshwater invertebrates of Russia and adjacent lands. [Цалолихин С.Я. (ред.) *Определитель пресноводных безпозвоночных России и сопредельных территорий*. СПб: *Наука*. Т. 5: 19, 392, 393 с.].
Viidalepp, J., Timm, H. & Salokannel, J. 2010. Estonian Caddisflies (Insecta: Trichoptera). An annotated checklist. *Entomol. Fennica* 21: 193–201.
Virbickas, J., Pliūraitė, V., 2002. The species composition of macrozoobenthos in small Lithuanian rivers. *Acta Zoologica Lituanica* 12 (3), 254–264.
Višinskienė **G.** 2009. The updated checklist of Lithuanian caddisflies (Insecta: Trichoptera) with notes on species rarity. *Acta Zoologica Lituanica* 19 (1): 25–40.
Wallace I.D. 2016. A review of the status of the caddis flies (Trichoptera) of Great Britain -Species Status No.27. *Natural England Commissioned Reports*, 191: 127 p.
Waringer J., Graf W. 1997. Atlas der österreichischen Köcherfliegenlarven. *Facultas Universi-tätsverlag*, Wien, 286 p.

Nauji duomenys apie Lietuvoje itin retą apsiuvą *Philopotamus montanus* (Donovan, 1813) (Trichoptera, Philopotamidae)

K. MARTINAITIS, R. FERENCA, J. SALOKANNEL, G. VIŠINSKIENĖ

Santrauka

Nerėpos upelio pakrantėje (Kauno r., Nerėpos entomologinis draustinis) 2020 m sugauta itin retos kalninės apsiuvos *Philopotamus montanus* patelė. Vėliau, tų pačių metų spalio 16 d. Nerėpos upelyje buvo surinktos ir 3 rūšies lervos, tačiau matėsi, kad lervų yra ir daugiau. Lervos rastos nedideliame gylyje (5–10 cm) ant akmenų, tarp nuskendusių medžių nuolaužų. Šios reliktinės apsiuvos apsaugai 1988 metais buvo įsteigtas Nerėpos Entomologinis draustinis. Apie kalninės apsiuvos paplitimą Lietuvoje yra vos kelios publikacijos, kai kuriose duomenys yra abejotini ir nepatikrinami. Rūšis buvo įrašyta į Lietuvos Raudonąją knygą, vėliau dėl duomenų trūkumo, išbraukta. Manyta, kad dėl žmogaus ūkinės veiklos *P. montanus* Lietuvoje išnykusi. Prof. R. Kazlauskas mini (1960), kad kalninė apsiuva buvo randama Kulautuvos upelyje, kas ir yra tas pats Nerėpos upelis. Internete rašoma, kad būta Jiesios slėnyje, tačiau pastaroji informacija jokiais dokumentais nepagrįsta ir manome, kad yra klaidinga. Dar viena publikacija mini *P. montanus* lervų radimą Sarioje (Virbickas & Pliūraitė, 2002), tačiau labiausiai tikėtina, kad tai identifikacijos klaida, kurios nėra galimybės patikrinti. Kad ir kokia abejotina informacija buvo rasta, po 65 metų, patvirtinome *Philopotamus montanus* egzistavimą Lietuvoje ir panašu, kad apsiuvų populiacija Nerėpos upelyje yra vienintelė ir gana gyvybinga.

Received: 16 October, 2020