

Revision of the genus *Philopotamus* Stephens (Trichoptera, Philopotamidae): Lumping and splitting

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Abstract. *Philopotamus* is a common and abundant European caddisfly genus, but it is hard to identify them. Applying fine phenomics, and combining the principles and procedures of lumping and splitting together, here we revised its taxonomy. Based on gross character states of lumpers, narrow or wide dorsal profile of segment X; presence or absence of basomesal dent on coxopodite; curvature of the dorsal branch of harpago; hooked or pointed terminal of the ventral sclerite of the phallic organ and number of primary endothelial spines we have established three species groups: *Philopotamus montanus* including *P. achemenus* and *P. montanus* species complexes, *P. variegatus* and *P. ludificatus*. Based on fine character states of the dorsal profile of segment X, terminalia of ventral sclerite, endothelial spine structure we have delineated the species inside each species group. We have described eleven new species: *Philopotamus azerorum* Oláh sp. nov., *P. graecus* Oláh sp. nov., *P. albanicus* Oláh sp. nov., *P. marignanicus* Oláh sp. nov., *P. adjaricus* Oláh & Vinçon sp. nov., *P. bulgaricus* Oláh sp. nov., *P. emiliacus* Oláh & Vinçon sp. nov., *P. epirus* Oláh & Ibrahim sp. nov., *P. gionicus* Oláh sp. nov., *P. ibericus* Oláh sp. nov., *P. tavigan* Oláh sp. nov. and re-diagnosed eleven known species: *P. achemenus* Schmid, 1959, *P. caurelensis* González & Terra, 1979 stat. nov., *P. montanus* (Donovan, 1813), *P. perversus* McLachlan, 1884 stat. restit., *P. siculus* Hagen, 1860, *P. amphilectus* McLachlan, 1884 stat. restit., *P. liguricus* Malicky, 1984, *P. tenuis* Martynov, 1913, *P. variegatus* (Scopoli, 1763), *P. corsicanus* Mosely, 1938, *P. ludificatus* McLachlan, 1878. We have raised the subspecies status of *P. montanus caurelensis* González & Terra, 1979, to species rank as *P. caurelensis* González & Terra, 1979, stat. nov. We reinstated the species status of *P. perversus* McLachlan, 1884 stat. restit. and *P. amphilectus* McLachlan, 1884 stat. restit. In addition to the new species, we have redrawn the eleven known species too using the same principles and procedures as before, creating a perfectly comparable genital atlas in diagrammatic style. Unfortunately eight species of Sipahiler and one species of Giudicelli & Dakki were not available for this study.

Keywords. Fine phenomics, speciation traits, *Philopotamus* revision, new species.

INTRODUCTION

The *Philopotamus* species are the most common and abundant caddisflies along the European streams and springs extending from the British Isles/Scandinavia/Spain through France/Italy/Germany/Central Europe/Balkan/Turkey to the Caucasus and Iran. By its distribution *Philopotamus* is mostly a European caddisfly genus.

Having golden and light-patterned forewing they are the most outstanding and most colourful flying insects detectable frequently along our flowing waters. *Philopotamus* species are river-lovers: *philein* ‘to love’, *philos* ‘loving’ and *potamos* ‘river, stream’ in Greek. They are showing themselves everywhere, and collectable by sweep netting along smaller streams. They are not particularly attracted to light, as could be experi-

enced by anybody who collects caddisflies along the flowing waters by light. Adults of these beautiful caddisflies are on the wing from January to November. Their larvae are filter-feeders, building long, finely woven tubular nets attached to rocks and feeding mainly on fine particles and diatoms by filtering and clearing our waste discharged waters.

They are very abundant and produce life-supporting ecosystem services for us, both directly and indirectly. Unfortunately, despite their importance, we are unable to reliably identify them. It is easier to declare their great variabilities than to determine their incipient species status by exploring speciation traits of fine phenomics. This is a clear indication of our limited knowledge resulted by the present stagnating or even declining state of taxonomy.

We lump together many unknown and undescribed *Philopotamus* species with the excuse of high variability and routinely classify them under three old names: *Philopotamus variegatus* (Scopoli, 1763), *Philopotamus montanus* (Donovan, 1813), and *Philopotamus ludificatus* McLachlan, 1878.

Our everyday practice, both lay and academic, to determine caddisfly species is influenced mostly by the very practical, clever and popular Atlas of the European Trichoptera (Malicky 1983, 2004). Unfortunately, it regards the highly divergent and stable trait of the dorsal profile of segment X of several unknown and undescribed *Philopotamus* species as merely variations of *Philopotamus variegatus* (Scopoli, 1763), *Philopotamus montanus* (Donovan, 1813) or *Philopotamus achemenus* (Schmid, 1959). By treating these independent incipient species only as variations, we highly underestimate the real biodiversity of any particular regions. We neglect the most valuable and outstanding local allopatric genetic resources of biodiversity. This is an attitude of lumpers. They declare the diversity of speciation traits that organise the early divergences in the speciation processes, simply as geographical vari-

ability of the “widely distributed and highly varying species”. However, the species organised by these adaptive non-neutral speciation traits are not varieties, they are not races, and they are not subspecies. They are newly born, incipient distinct species (Oláh et al. 2019, 2022, 2024).

In this revision of the *Philopotamus* genus we apply our fine phenomics in order to detect and describe these incipient species diverged rapidly, subtly, but stably by adaptive speciation traits. These species of recent contemporary speciation processes are created by integrative organisation through adaptation in the structural reality along network emergencies nested in hierarchies of Koestrel’s (1967) holarchy. Detecting and understanding of these complex network hierarchies of the particular entities are a real challenge for our human being-in-the-world with limited sensation/perception capacity and by subjective human hermeneutics. However, human corporeal finitude is destined to accommodate to these entities with permanent adaptive and integrative organisation maintaining and improving his being-in-the-world. This is realised through discovering and understanding their complex nature of existence either by lumping or by splitting in order to survive and utilise them at both the macro and the micro ends of the infinite structural reality.

Philosophy of lumping and splitting together

Below we cite two sentences of two trichopterologists, representing two worldviews with two kinds of epistemology. The cited texts paraphrase two research frameworks reflecting two points of views demarcated by eye view horizons. The lumper’s gross and the splitter’s fine resolution levels for studying natural hierarchies. “*La variabilité des deux espèces est très réduite pour les armatures ♂ en général et pour le phallus en particulier*” (Botosaneanu, 1960). “*Im Lauf der Jahre habe ich Tausende Philopotamus-Exemplare aus vielen Ländern gesehen, so daß mir die geographische Variabilität der weitverbreiteten Arten P. montanus und P. variegatus nichts Neues ist*” Malicky (1984).

In everyday reality of the taxonomy there is however, a mixed practice behind the lumpers' and splitter's procedures or bird's-eye and frog's-eye views determined by our human personal subjective background to understand the complex nature of hierarchies. Actually the being of hierarchies is endless both in the macro and in the micro perspectives; therefore both the birds and the frogs live and function in the same structural reality and trying to integrate their own being-in-the-worlds that are their own existence by their own understanding.

Taxa of nature hierarchies are dynamic ontic structural realities of continuous quantum networks with permanent rearrangement and specific emerging hierarchies of ephemeral complexes (Oláh et al. 2021). There are reticulated structures of entanglement instead of objects; there are network structures all the way down. If there are objects at all, these are derived from the structures as being nodes of structures (Ladyman 1998)! The interactive power of wave and particle duality maintains an endless process of specification/ speciation emergences of network hierarchies. This is realised by integrative organisation along the holarchy of hierarchies against disintegrative power of the second law of thermodynamics provoked by the entropy of accelerating expansion of the universe, driven by dark energy of inflation. Holarchy is the hierarchy of self-emerging and reticulating holons, the species of taxonomy; autonomous wholes and as interdependent parts.

This ontic structural reality is studied by epistemic structural realism. How this study is practically realised, determines the concrete procedures of species delineation. Species as reticulated holons of holarchy along nature hierarchies are reticulated by chimeric construct composed of disparate parts of different origins exhibiting endless character trees. Many of them are deviating from own species tree. Chimerism of incongruences and discordances is created by the complex pattern of gene integration (Oláh et al. 2019). Lumpers, relying on gross resolution and searching similarities of scalar origin rather than differences of vectorial processes, neglect incipient di-

vergences of vectorial speciation hierarchies conflating them with stabilities of scalar hierarchies (Salthe 1991). This manifold construct of the taxa, specific being-in-the-worlds under the interactive power of inflating disintegration and creating integrative organisation, produces real challenges to delineate taxa, especially for lumpers with their bird's eye view. Here, we try to delimitate taxa by the speciation trait of our fine phenomics, by the particular frog's eye view focus of the splitters.

Speciation traits in *Philopotamus* genus

Speciation traits are both magic (Serverdio et al. 2011) and super (Oláh et al. 2015). They are magic because simultaneously involved by adaptation both in the processes of ecological divergence and in the organisation of assortative mating. They are super because they initiate and realise a speciation process by sexual integration mostly in allopatry as well as they offer for us powerful diagnostic weapons in delineating incipient taxa in taxonomy. They are able to indicate early stages of divergences. However, the fundamental question remains; how can we recognise them as diagnostic tools in the taxonomy of the *Philopotamus* genus?

The discovery and theoretical basis of our fine phenomics to detect speciation traits are discussed and detailed earlier (Oláh et al. 2015). An early attempt of fine phenomics in Trichoptera research goes back to the author of the first cited sentence with the declaration about the high stability of male structures, particularly the endothelial spine pattern of the phallic organ in *Philopotamus* genus (Botosaneanu 1960). Contrary, the lumpers' perspective (Malicky 1984) declares the high variability of the phallic organ. **Lazar Botosaneanu**, teacher of the first author, with his proper anatomical knowledge was a devoted splitter highly committed and engaged in studying and understanding the variability and stability of fine genital structures in several caddisfly genera (Oláh et al. 2015, 2022, 2024). His findings on the fine structure of the male genitalia and particularly the endothelial sclerotized structures, the ejaculatory duct and the spine pattern was widely accepted

and applied in important studies on the *Philopotamus* species (Jacquemart 1962, Vaillant 1974, Gonzalez & Terra 1979). Unfortunately, this significant progress in the delineation of *Philopotamus* species by the fine structure of the phallic organ that is by the sclerotized part of the ejaculatory duct as well as by the endothelial spine pattern was not continued, rather it was disrupted. The lumpers' world view returned back to the taxonomy of *Philopotamus* genus and got dominance by the European Trichoptera atlas. The excellent drawings of the endothelial spine pattern of Botosaneanu (1960), Jacquemart (1962), Vaillant (1974) Gonzalez and Terra (1979) with clear divergences between species were not applied. They were simply omitted from the Atlas of European Trichoptera (Malicky 1983, 2004).

Fortunately, following our detailed studies on the principles and practices of fine phenomics (Oláh et al. 2015, 2017) there was a new trial to apply Botosaneanu's early findings in the taxonomy of *Philopotamus* genus (Sipahiler 2018). In the present revision of the genus we combine the lumpers' resolution level of species group or complex and the splitter's delineation power for incipient siblings. We put the scientific effort both of the lumpers and the splitters together to establish new species groups and complexes with well-defined characters of old divergences and new incipient sibling species of the species complexes by speciation traits of recent, contemporary divergences. These stable genital substructures are performing the adaptive, non-neutral speciation trait function in early period of their diversification. They are under directional sexual organisation and stabilising integration. Both speciation mechanisms reduce trait variability with processes of canalised growth effectively protected from environmental perturbation and resulting in the highly invariant, stable speciation or magic traits.

METHODS TO DELINEATE *PHILOPOTAMUS* TAXA

We have found the dorsal and lateral profiles of segment X as the most diverse and most stable substructure in the genitalia of *Philopotamus* ge-

nus, sensitive and stable enough to differentiate incipient siblings of species complexes in the genus. Similarly, the sensitive head of segment X covered with non-trichoid sensilla in *Wormaldia*, the other genus of the ancient Philopotamidae family proved to be the most reliable diagnostic trait to delineate sibling species (Oláh et al. 2019), both in West Europe (Oláh et al. 2021, Oláh et al. 2022) and the Caucasus (Oláh et al. 2020, Oláh et al. 2024). However, the inherent stability of segment X could be realised only by keeping the same observation angle very strictly stable. Otherwise, even a slight and subjective change in viewing angle may produce "great variation". Mostly, our human inabilities, limited capacities or under-trained knowledge creates the great variability of the adaptive, non-neutral traits.

Beside the head of segment X, the lateral profile of the ventral strap or ventral sclerite of the phallic organ, which is the ventral enforcement, the brace structure of the phallosome is a good diagnostic trait, particularly to delineate species complexes. The ventral sclerite has some diagnostic value also in ventral view, but its visible profile is less stable, and less observable. These structures in the particular observational views are the most practical, most reliable diagnostic characters, the easiest to observe.

Similarly, the endothelial spine pattern proved to be diverse and stable enough, but not easily available for study. Frequently it is not easy or sometimes even impossible to observe the exact pattern of the spines in the endotheca of the phallic organ even after a careful and sophisticated cleaning in sodium hydroxide and clearing by removing the remaining tissue debris in microsurgery by fine pins and forceps. Compared to the genus *Wormaldia*, the endothelial spine pattern is less clearly visible in *Philopotamus*. The basic endothelial tissue is more structured, more light-scattering, and less transparent even after the time-consuming clearing processes therefore masking the smaller secondary spines and especially the less sclerotized structure of the ductus ejaculatorius. Additionally, pulling out the endotheca with their spines from the shadow cover of

segment IX is workable in *Wormaldia*, but not easy, at least without damages, in *Philopotamus*. Already Botosaneanu (1960a) has found the pair of secondary endothelial spines of *Philopotamus montanus* very short, almost invisible. In the present study we have also found it almost impossible to observe exactly, in most of the examined specimens. Moreover, the pair of small secondary spines seems to be connected to the sclerotized structure of ductus ejaculatorius or sometimes seems freely moving, discernible detached and dispersed in various positions.

The observation of the entire sclerotized structures of the ductus ejaculatorius was even more difficult and their drawings would be very unreliable and incomparable. Therefore, we have not drawn the faintly sclerotized and variously localized terminal head of the ductus ejaculatorius. Instead, we have drawn the primary spines, single in the *Philopotamus montanus* and *Philopotamus ludificatus* and double in the *Philopotamus variegatus* species groups. We have also drawn the pair of distinct smaller secondary spines, the detachable component of the sclerotized head of ductus ejaculatorius.

Beside the limited visibility, the position and location of the endothelial primary and secondary spines as well as the sclerotized section of ductus ejaculatorius are very unstable depending on the actual erection state of the phallic organ. The secondary endothelial spines as component of ductus ejaculatorius, or detached from it, as well as the sclerotized ductus ejaculatorius itself are very seldom discernible in fixed position. They are very flexible in moving, turning and rotating in various directions. Due to bad visibility and instable locality, in spite of our great effort and many trials to detect them reliably, these characters have no real diagnostic value.

It is a naïve believe that we can have a real comparative knowledge about these tiny structures without stable comparable locality and with bad visibility. The excellent drawings of Botosaneanu (1960), Jacquemart (1962), Vaillant, (1974), Gonzalez & Terra (1979) and recently

Sipahiler (2018) are actually representing the spines and other sclerotized part of ductus ejaculatorius of a concrete specimen they have examined and drawn. Based on their drawings we are looking after and searching the same tiny but complex three-dimensional structures in our specimens we are trying to identify, but with potential misleading conclusions as identity, mis-identity or most frequently as variability. Due to the above listed observational difficulties the same tiny structure could be present or could be varying or even missing in our specimens.

We have simplified our drawing by omitting characters without real diagnostic value and presenting diverging structures with diagnostic value for each species in the same simplified style ensuring reliable and easy comparability. First simplified drawing, the lateral profile of the entire genitalia without phallic organ indicates three important diagnostic traits; the lateral profile of segment X with basodorsal ridge traits, the length and curving of paraproct, as well as the length and curvature of the dorsal branch of harpago. The second simplified drawing presents the dorsal profile of segment X together with the configuration of basodorsal ridge. The cerci and paraproct having no real diagnostic value in dorsal view is omitted. The third simplified drawing present the lateral view of the phallic organ with the ventral sclerite, primary spines and the pair of secondary spines having some relation to the sclerotized head of ductus ejaculatorius. The weakly sclerotized, functionally moving, variously located and variously discernible structures of the head of ductus ejaculatorius without reliable diagnostic value are omitted from our drawings.

We have carefully examined and compared in dorsal view the speciation traits of segment X and in lateral view of the vertical sclerite together with the primary endothelial spines of all specimens of each species including the 224 specimens of *Philopotamus montanus* available for this revision. Adaptive speciation traits proved to be rather stable as we have documented this stability many times, in dozens of our earlier publications with trait matrices in several Trichoptera taxa.

Here we publish no trait matrices of the drawn and compared figures. We present only a single drawing of speciation traits in comparable style for each examined species. Unfortunately 10 species were inaccessible for this revision in spite of our steady trials to loan them. 9 species described by Sipahiler (1910, 1918) and 1 species described by Guidicelli & Dakki (1984).

Depositories.

Cantonal Museum of Zoology Lausanne, Switzerland (CMZL).

Department of Biology, Faculty of Mathematics and Natural Sciences, University of Prishtina, Prishtina, Kosovo (DBFMNSUP)

National Museum, Prague, Czech Republic (NMPC)

Manchester Museum, The University of Manchester, England (MMUM)

Oláh Private Collection, Debrecen, Hungary, under national protection by the Hungarian Natural History Museum (HNHM), Budapest (OPC).

Swedish Museum of Natural History, Stockholm, Sweden (SMNH)

The Manchester Museum, University of Manchester, England (MMUE)

University Museum of Bergen, University of Bergen, Norway (ZMBN)

TAXONOMY

In this revision we continue Botosaneanu's fine phenomics and Sipahiler's new trial (2018) to revise the genus *Philopotamus* combining the divergences detected in the fine structures of the adaptive, non-neutral segment X and the phallic organ as well as in the gross morphology of the neutral, non-adaptive paraproct and gonopod structures. Based upon lumping and splitting of different character states of these structures together, we have distinguished the *Philopotamus montanus*, the *Philopotamus variegatus* and the *Philopotamus ludificatus* species groups. The last group with its straight or upward directed dorsal branch of harpago is a loosely comprised group composed by the most chimeric species.

We have distinguished the three species groups by the following character combinations. Dorsal profile of segment X narrowing/pointing

(*variegatus*) or wide (*montanus*). Coxopodite, the first segment of the gonopod with basomesal dent (*ludificatus*, *montanus*) or without dent (*variegatus*). Dorsal branch of the harpago downward curving (*variegatus*, *montanus*) or straight/upward curving (*ludificatus*). Ventral strap or ventral sclerite of the aedeagus (Ross 1956) pointed (*variegatus*) or hooked (*ludificatus*, *montanus*). Number of primary endothecal spines one (*ludificatus*, *montanus*), two (*variegatus*). In the *Philopotamus montanus* species group we have differentiated two species complexes: *Philopotamus achemenus* species complex with dorsal arm of harpago bulky and shorter than the ventral arm of harpago and the *Philopotamus montanus* species complex with more slender and longer dorsal arm of harpago.

Philopotamus montanus species group

Dorsal profile of segment X is wide. Coxopodite, the first segment of the gonopod, supplied with a single variously produced basomesal dent. Dorsal branch of the harpago is downward curving. Ventral sclerite of the aedeagus hooked. Number of primary endothecal spines is only one.

Philopotamus achemenus species complex

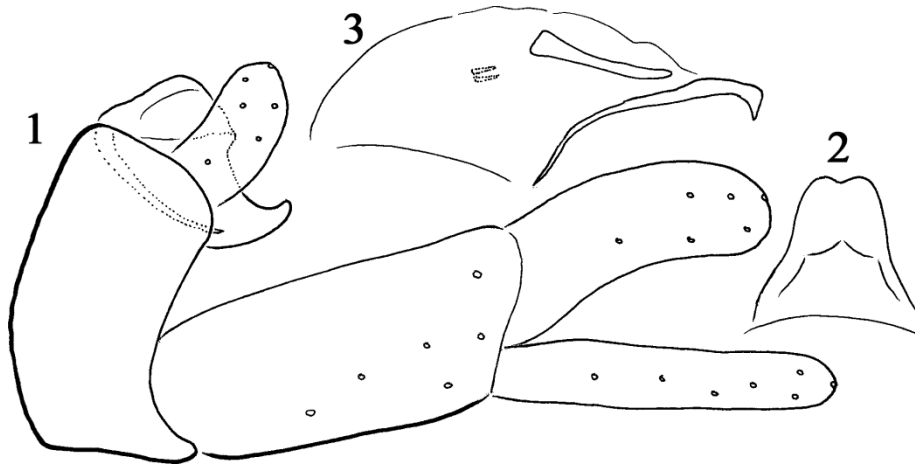
Dorsal profile of segment X is wide. Coxopodite supplied with variously produced or almost vestigial basomesal dent. Dorsal branch of the harpago is downward curving, bulky and shorter than the ventral arm. Ventral strap or ventral sclerite of the aedeagus hooked. Number of primary endothecal spines only one.

Philopotamus achemenus Schmid, 1959

(Figures 1–3, Map 1)

Philopotamus achemenus Schmid, 1959:694–696.

“Cette espèce est fort commune entre le niveau de la Caspienne et 7.500 ft d'altitude.” (holotype type locality: Iran, Garna, 7000 ft, near Caspian coast) “*Ph. achemenus* n'est nullement voisin de l'espèce caucasienne *tenuis* Mart., mais bien de *montanus* Don. En vue latérale, la forme des appendices est semblable à ceux de ce dernier, mais ils appa



Figures 1–3. *Philopotamus achemenus* Schmid, 1959 male: 1 = genitalia in left lateral view; 2 = dorsal profile of segment X; 3 = phallic organ in left lateral view.

raissent plus grêles. *Ph. achemenus* se distingue toutefois sans équivoque de *montanus* par le lobe inférieur du 2^{ème} article des appendices inférieurs nettement plus long que le lobe supérieur, par l'absence de la pointe basale interne du premier article et surtout par l'aspect anguleux que montre l'extrémité du X^{ème} segment et par son échancrure apicale."

Material examined. Iran: Gilan Province, Shafarud village, Shafarud forested stream, 7.IX. 1990, singled by sweeping along the stream, leg. J. Oláh (35 males, 4 females; OPC). Golestan prov.: stream 2 km E Tunel-e-Golestan 37°22,2'N 55°59,3'E; 830m 26.V.2006, leg. P. Chvojka (1♂ 1♀ NMPC + 1♂ OPC). Golestan prov.: stream 2 km E Tunel-e-Golestan 37°22,2'N 55°59,5'E; 850m 27.V.2006, leg. P. Chvojka (1♂ NMPC). Mazandaran prov.: Kandalous S Pul (SE Chalus) 36°20.5'N 51°32,9'E; 1550m 1.VI.2006, leg. P. Chvojka (1♂ NMPC). Gilan prov.: spring nr. Kakrud Rudsar 36°45,6'N 50°18,5'E; 1300m 2.VI.2006, leg. P. Chvojka (1♂ NMPC). Gilan prov.: stream 5 km from Kakrud Rudsar 36°51.2'N 50°13,9'E; 670m 2.VI.2006, leg. P. Chvojka (1♂ NMPC + 1♂ OPC). Gilan prov.: streamlet nr. Lunak Lahijan 37°00.8'N 49°51.9'E; 475m 3.VI.2006, P. Chvojka leg (2♂ NMPC + 1♂ OPC). Gilan prov., Shafa Rud W Punel W Rezvanshahr, 37°31'47"N 49°00'52"E 228 m, 15.V.2016, leg. J. Bojková, T. Soldán & J. Imanpour Namin (1♂ NMPC).

Revised diagnosis. Easily recognisable by the dorsal profile of segment X with apicomeral small excision, by coxopodite, the first segment of the gonopod supplied with small, almost vestigial basomesal dent; by dorsal branch of the harpago that is downward curving, bulky and shorter than the ventral arm; by ventral sclerite of the aedeagus hooked; by number of primary endothecal spines only one accompanied by the just discernible pair of secondary spines in contact with the sclerotized structure of the head of ductus ejaculatorius.

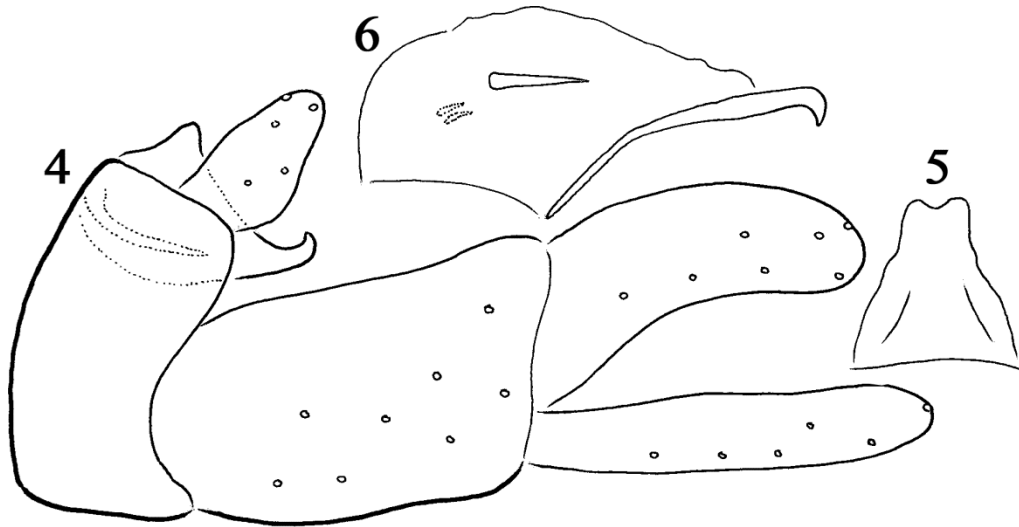
***Philopotamus azerorum* Oláh, sp. nov.**

(Figures 4–6, Map 1)

Philopotamus achemenus Schmid, 1959: Oláh et al. 2020:5. Azerbaijan, Nakhchivan AR, Ordubad District, Tivi village, river Tivi, sweep netting, N 39° 8'0.24" E 45°55'47.07", 25.VI. 2019, leg. I. Kerimova (4 males, 2 females; OPC). Misidentification.

Material examined. Holotype: Azerbaijan: Nakhchivan AR, Ordubad District, Tivi village, river Tivi, sweep netting, N 39°8'0.24" E 45°55'47.07", 25.VI. 2019, leg. I. Kerimova (1 male, OPC). Paratypes: (2 males, 2 females; OPC).

Diagnosis. Having dorsal profile of segment X wide; dorsal branch of the harpago downward curving, bulky, parallel-sided and shorter than the



Figures 4–6. *Philopotamus azerorum* Oláh, sp. nov. Holotype male: 4 = genitalia in left lateral view; 5 = dorsal profile of segment X; 6 = phallic organ in left lateral view.

ventral arm; ventral sclerite of the aedeagus hooked; single primary endothecal spine this new species belongs to the *Philopotamus achemenus* species complex of *Philopotamus montanus* species group. Most close *Philopotamus achemenus* Schmid, 1959 but differs by segment X having narrow parallel-sided apical third in dorsal view, not roundly tapering; its dorsobasal region simple, without pentagonal ridge as well as paraproct shorter, not longer than segment IX.

Description. Small sized, dark species. In alcohol the body, antennae, maxillary palps, wings and legs are dark brown. The markings of spot pattern on forewing paler and less bright, less numerous, dull pale brown. Forewing length 10 mm.

Male genitalia. Dorsal profile of segment X wide, parallel-sided apicad with apical excision in dorsal view; upturned pointed in lateral view without discernible basal ridge. Coxopodite, the first segment of the gonopod with a just visible vestigium of basomesal dent. Dorsal branch of the harpago bulky, parallel-sided, not tapering and downward curving. Ventral strap or ventral sclerite of the aedeagus hooked. Endothecal spine pattern reduced to a single long stout straight spine and with slightly produced basal enlargement. The pair of smaller secondary spines frequently attached to the sclerotized head of ductus

ejaculatorius present, visible nearby to the sclerotized complex of the head of ductus ejaculatorius.

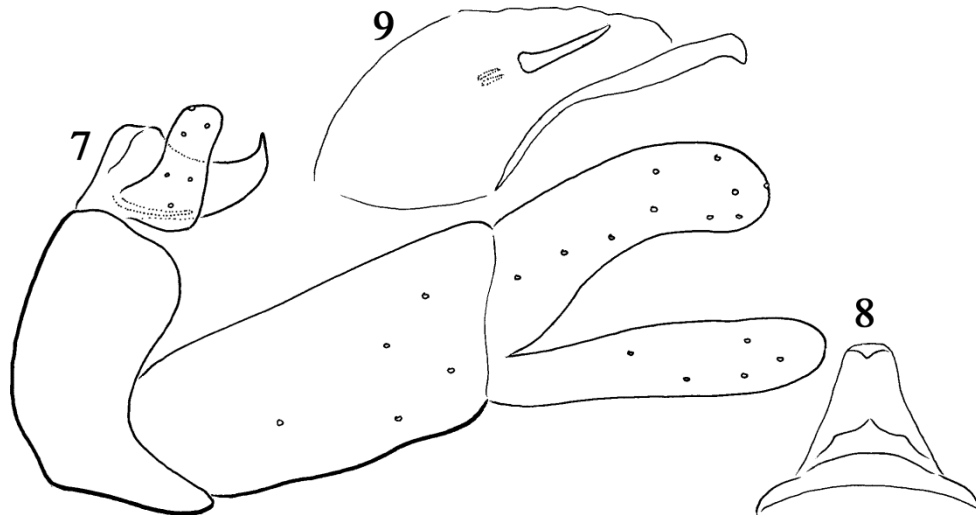
Etymology. It is named after the Azeri-speaking people who populate Azerbaijan, as well as parts of Iran, Georgia and Armenia.

***Philopotamus graecus* Oláh, sp. nov.**

(Figures 7–9, Map 1)

Material examined. Holotype: **Greece:** South Aegean, Naxos regional unit, Koronis, occupied brook N of the village, 620m, 37°06.857'N 25°32.077'E, 06.04.2013, leg. J. Kontschán, D. Murányi, T. Szederjesi, (1 male, HNHM). Paratypes: **Greece:** Rodopi county, Sapka Mts., torrent in an oak forest, 14 km E of Nea Sanda, 651 m, 4.IV.2007, leg. Dányi, Eröss-Fehér-Kontschán-Murányi (1 male, OPC). **Turkey:** Istranca Mts. Degirmen stream and its gallery at Cauli Alabalik (1 km of Demirköy), 253 m, 41°49.300' N 27°45.085'E, 6.IV.2007, leg. Dányi, Eröss-Fehér-Kontschán-Murányi (1 male, OPC).

Diagnosis. Having dorsal profile of segment X wide; dorsal branch of the harpago downward curving, bulky, parallel-sided and shorter than the ventral arm; ventral sclerite of the aedeagus



Figures 7–9. *Philopotamus graecus* Oláh, sp. nov. Holotype male: 7 = genitalia in left lateral view; 8 = dorsal profile of segment X ; 9 = phallic organ in left lateral view.

hooked; with single primary endothecal spine this new species belongs to the *Philopotamus achemenus* species complex of *Philopotamus montanus* species group. The lack or indiscernibility of basomesal dent on coxopodite is a chimeric character state. A within-species conflicting character state proved to be a general rule, as incongruence and discordance among individual character trees detected frequently in the every-day practices of taxonomists (Oláh et al. 2019b). The new species *Philopotamus graecus* sp. nov. is most close *Philopotamus marignanicus* sp. nov., but differs by segment X having narrow and narrowing, not broad narrowing dorsal profile as well as differently patterned lateral profile; by cercus angled ventrad, not simple without angle; by dorsal branch of harpago parallel-sided, not tapering apicad.

Description. Medium sized, relatively dark species. In alcohol the body, antennae, maxillary palps, wing and legs are brown. The markings of spot pattern on forewing paler and less bright, less numerous, almost indiscernible dull pale brown. Forewing length 11 mm.

Male genitalia. Dorsal profile of segment X narrowing wide in dorsal view; upturned pointed in lateral view. Coxopodite, the first segment of the gonopod, without discernible basomesal dent.

Dorsal branch of the harpago bulky, parallel-sided, not tapering and downward curving. Ventral strap or ventral sclerite of the aedeagus hooked. Endothecal spine pattern reduced to a single long stout spine slightly curving and with slightly produced basal enlargement. The pair of smaller secondary spines frequently attached to the sclerotized head of ductus ejaculatorius lacking, at least seems indiscernible except at one paratype it is slightly sclerotized visible nearby to the sclerotized complex of the head of ductus ejaculatorius.

Etymology. Named after the country of locus typicus.

***Philopotamus kemer* Sipahiler, 2018 stat. nov.**

(Map 1)

Philopotamus achemenus kemer ssp.n. Sipahiler, 2018: 66–67. “Holotype male and paratypes (4 males): Turkey, Antalya, Kemer, Çirali, Ulupmar, (light), 39°11’N, 39°32’E, 15.VII.2004, leg and coll. Sipahiler.” “Segment X in dorsal view trapezoidal, the apex with a small excision medially; Inner surface of the inferior appendages with a small stout projection in the middle; the upper branch of the harpago is slightly shorter than the lower branch. The phallic apparatus has distally a pair of long and thick sclerotized spines, which are connected at the base; beneath a pair of small sclerotized spines.”



Map 1. Species distribution of the *Philopotamus achemenus* species complex of the *Philopotamus montanus* species group (full circles represent the type localities).

Material examined. Only drawings were examined as specimens were not available for study.

Remarks. According to our reasoning (Oláh et al. 2018) here and in the following subspecies the taxonomic statuses are raised to species rank.

***Philopotamus mencilis* Sipahiler, 2018 stat. nov.**

(Map 1)

Philopotamus achemenus mencilis ssp.n. Sipahiler, 2018:67. “1 male (holotype), Turkey, Karabük, Safranbolu, Mencilis Stream, (light), 41°15’N, 32°47’E, 23.VIII.1993.” “In dorsal view, the side edges of segment X largely dilated nearly in the middle, the apical margin with a small excision in the middle. The inner surface of the coxopodite with a pointed projection located two-thirds of its length, thin and close to the coxopodite; the upper branch of harpago is shorter than the ventral branch. In dorsal view, the sclerotized spines of the phallic apparatus consist of two long and rather thin spines, which are located at the bases of these long spines; beneath them two oval sclerotized plates are connected to the two shorter spines.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus namrun* Sipahiler, 2018 stat. nov.**

(Map 1)

Philopotamus achemenus namrun ssp.n. Sipahiler, 2018:65–66: “Holotype male and paratypes (2 males): Turkey, Adana Namrun, Bahçe, 1050 m,

37°09’N, 34°35’E, 21.V.1993, leg and coll. Sipahiler.” “Segment X in dorsal view broad at base, the sides with right angle on the subdistal portions, the apical edge curved inward. The first segment of the inferior appendages with a small projection on two-thirds of the inner surface, a membranous lobe is located above it; the upper branch of the harpago is almost the same length as the lower branch. The phallic apparatus with a ventral sclerotized spine curved apically; in dorsal view, the sclerotized parts are composed of a pair of long spines, which are connected at the base, beneath them two shorter and thinner spines.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus montanus* species complex**

Dorsal profile of segment X is wide. Coxopodite, the first segment of the gonopod, supplied with a single basomesal dent. Dorsal branch of the harpago is downward curving, slender and not shorter than the ventral arm. Ventral strap or ventral sclerite of the aedeagus hooked. Number of primary endotheal spines is only one.

***Philopotamus albanicus* Oláh, sp. nov.**

(Figures 10–12, Map 2)

Material examined. Holotype: **Albania:** Delvina Region, between Bistrice Village and Syri i Kaltër, 127 m, N39°55’53”; E020°09’13” 13.V. 2017, leg. S. Beshkov & A. Nahirnic (1 male, OPC). Paratypes: **Albania:** Vlorë, Dhermi stream,



Figures 10–12. *Philopotamus albanicus* Oláh, sp. nov. Holotype male: 10 = genitalia in left lateral view; 11 = dorsal profile of segment X ; 12 = phallic organ in left lateral view.

5.X.1992, leg. P. Chvojka (4♂1♀, NMPC; 4♂ OPC). Vlorë, Dhermi, stream, 16.VI.1994, leg. P. Chvojka (1♂ NMPC). Tiranë, M. Dajti Mt., streams 22–23.VI.1994, leg. P. Chvojka (9♂1♀, NMPC; 5♂ OPC). Korçë, Boboshticë, stream 6 km S Korçë, 14.VI.1994, leg. P. Chvojka (3♂ NMPC). **Greece:** Mitsikéli, Dikórifó, 1000m (N Ioánnina), 7.VII.2005, leg. J. Skyva (1♂ NMPC).

Diagnosis. Having dorsal profile of segment X wide; dorsal branch of the harpago downward curving and tapering, its length equal with ventral branch; ventral sclerite of the aedeagus hooked; single primary endothecal spine, this new species belongs to the *Philopotamus montanus* species complex of *Philopotamus montanus* species group. The new species is most close to *Philopotamus marignanicus* sp. nov, but differs by segment X almost parallel-sided, not narrowing; by long, not short paraproct; by S-shaped, not L-shaped ventral sclerite, and the produced not reduced hook on ventral sclerite of phallic organ.

Description. Medium dark species. In alcohol the body, antennae, maxillary palps, wings and

legs are yellowish brown. The markings of light spot pattern on forewing indistinct. Forewing length 11 mm.

Male genitalia. Dorsal profile of segment X long and wide, almost parallel-sided, slightly narrowing roundly on its very apical portion in dorsal view; upward turning and narrowing in lateral view. Paraproct very long, the longest in the entire genus; apical section slightly broken. Coxopodite, the first segment of the gonopod with well-produced basomesal dent. Dorsal branch of the harpago as long as the lower branch, significantly narrowing and downward curving. Ventral sclerite of the aedeagus hooked, the sclerite elongated S-shaped; the hook long and well-produced. Endothecal spine pattern reduced to a single long stout spine with slightly produced basal enlargement. The pair of smaller secondary spines frequently attached to the sclerotized head of ductus ejaculatorius lacking, at least seems indiscernible.

Etymology. Named after the country of locus typicus.

***Philopotamus caurelensis* González & Terra,
1979 stat. nov.**

(Figures 13–15, Map 2)

Philopotamus montanus caurelensis González & Terra, 1979:166–168. “Material estudiado España, Arroyo de Vilela, Vilela (Sierra del Caurel, Lugo), 800 m, 19.VIII.1978, 8♂♂, 2♀♀. España, Pacios, Vilela (Sierra del Caurel, Lugo), 1000 m, 20.VIII.1978, 24♂♂, 3♀♀. España, Rio Ser, Os Cabaniños, Vilela (Sierra de Ancares, Lugo), 1100 m, 17.VIII.1978, 56♂♂, 10♀♀. España, Rio Cance-lada, Villanueva, (Lugo), 750 m, 18.VIII.1978, 3♂♂.” “ El holotipo ha sido depositado en el Museo de Historia Natural “Prof. Luis Iglesias” de la Universidad de Santiago de Compostela.” “En actualidad, *P. montanus* cuenta con cuatro sub-especies en Europa. (*P. m. montanus*, *P. m. insularis*, *P. m. siculus* y *P. m. arvernicus*), las cuales difieren entre si principalmente por el número, forma y tamaño relativo de las espinas fállicas. Los *P. montanus* capturados en distintas localidades de Galicia coinciden, por el número de espinas fállicas, con *P. montanus montanus* y *P. montanus insularis*, pero no así en lo que concierne a sus tamaños relativos. A pesar de que existen ligeras variaciones en los tamaños relativos de las espinas proximales presentes en el falo de *P. montanus montanus* y *P. montanus insularis*, sus longitudes raramente sobrepasan un tercio de la longitud total de la espina larga, por lo que sus dimensiones son netamente inferiores a las de las espinas cortas presentes en el falo de *P. montanus* de Galicia. Por ello, consideramos necesaria la creación de una nueva subespecie que denominamos *P. montanus caurelensis* n. ssp.”

Material examined. **Spain:** Os Cabaniños, Rio de Ortigal, Sierra de Ancares, Lugo, light trap, 30.VII.1981 (5 males, OPC).

Remarks. Dorsal profile of segment X is wide. Coxopodite, the first segment of the gonopod supplied with basomesal dent. Dorsal branch of the harpago downward curving, slender and not shorter than the ventral arm. Ventral sclerite of the aedeagus hooked. Number of primary endothe-cal spines is only one. Based upon this character combination *Philopotamus caurelensis* belongs to the *Philopotamus montanus* species

complex of *Philopotamus montanus* species group. Recognising by fine phenomics the divergences between incipient phylogenetic species we raise the subspecies status of *Philopotamus caurelensis* González & Terra, 1979 to incipient sibling species status, **stat. nov** (Oláh et al. 2018).

Having small but stable apical excision on dorsal profile this species is most close to *Philopotamus perversus* McLachlan, 1884, but differs by the narrowing, not parallel-sided dorsal profile of segment X; by the pair of secondary spines very long, not indistinct, as well as by the lateral profile of ventral sclerite of phallic organ robust, not slender and its hook short, not long.

***Philopotamus marignanicus* Oláh, sp. nov.**

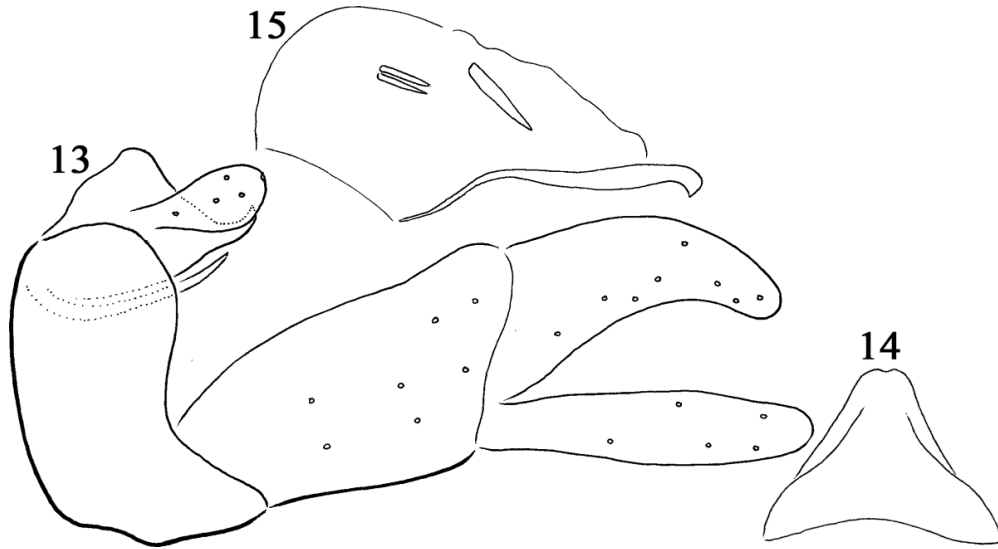
(Figures 16–18, Map 2)

Material examined. Holotype: **France:** Corse, N. of Marignana, River de Porto, N42.239270° E8.770400°, 567 m, 4.V.2006, leg. Z. Barina, (1 male, OPC).

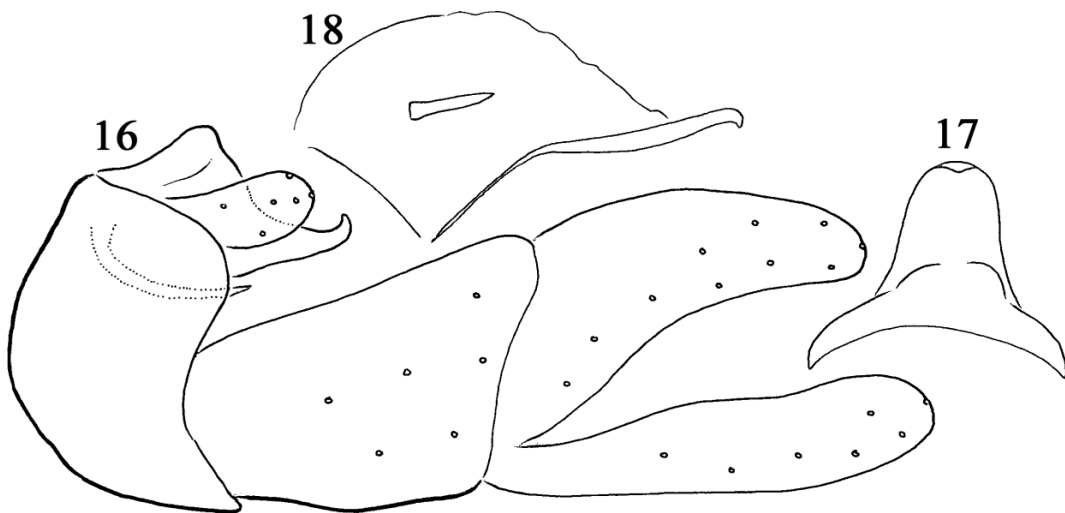
Diagnosis. Having dorsal profile of segment X wide; dorsal branch of the harpago downward curving, bulky, but tapering and only slightly shorter than the ventral arm; ventral sclerite of the aedeagus hooked; single primary endothe-cal spine this new species belongs to the *Philopotamus montanus* species complex of *Philopotamus montanus* species group. The new species *Philopotamus marignanicus* sp. nov. is most close *Philopotamus siculus* Hagen, 1860 but differs by segment X almost double broad, slightly narrowing dorsal profile; shorter paraproct as well as differently patterned lateral profile; by cercus simple not upward curving; by the curving pattern of the dorsal branch of harpago.

Description. Medium sized, medium dark species. In alcohol the body, antennae, maxillary palps, wing and legs are yellowish brown. The markings of light spot pattern on forewing distinct. Forewing length 12 mm.

Male genitalia. Dorsal profile of segment X wide, slightly narrowing apicad in dorsal view;



Figures 13–15. *Philopotamus caurelensis* González & Terra, 1979, male: 13 = genitalia in left lateral view; 14 = dorsal profile of segment X; 15 = phallic organ in left lateral view.



Figures 16–18. *Philopotamus marignanicus* Oláh, sp. nov. Holotype male: 16 = genitalia in left lateral view; 17 = dorsal profile of segment X; 18 = phallic organ in left lateral view.

upturned pointed in lateral view. Paraproct short, just longer than segment IX. Coxopodite, the first segment of the gonopod without well discernible basomesal dent rather with a basomesal hump. Dorsal branch of the harpago bulky, narrowing and downward curving. Ventral strap or ventral sclerite of the aedeagus hooked. Endothecal spine pattern reduced to a single long stout spine

slightly curving and with slightly produced basal enlargement. The pair of smaller secondary spines frequently attached to the sclerotized head of ductus ejaculatorius lacking, at least seems indiscernible.

Etymology. Coined from the name of the locus typicus.

***Philopotamus montanus* (Donovan, 1813)**

(Figures 19–21, Map 2)

Phryganea montana Donovan, 1813:16:21. “Anterior wings testaceous with daubs and confluent transverse marks of fuscous: posterior wing pale, border with alternate fuscous and pale spots. Found abundant on the borders of rocky mountain streams in Wales, and similar situation in Ireland and other parts of Britain.”

Philopotamus montanus (Donovan, 1813): Botosaneanu 1960:223–224. “les gonopods des deux espèces (*montanus*, *variegatus*) sont au contraire très ressemblants, mais eux-aussi aisément différenciables grâce à la présence seulement dans *montanus* d’une dent sclérotisée, plus ou moins forte, sur la face médiane des coxopodites. Dans *montanus* le phallus présente un sclérite ventral fortement recourbé vers le bas à l’apex, et une armature qui se compose d’une longue épine simple, pointue à l’apex et de deux spinules très courts, simples et droits (rarement plus allongée, comme c’est le cas d’une population de Macédoine); en plus de cette armature on trouve un organe compliqué, placé très vraisemblablement dans la région où s’ouvre le ductus ejaculatorius à la base de l’endothèque.

Philopotamus scoticus McLachlan, 1862:34–35. “A single (female) specimen in the British Museum, taken at Rannoch, Perthshire, by late Mr. Foxcroft.” “Appearance quite distinct from the recorded species, in which the dark fuscous coloration occupies the greater portion of the anterior wings, which are thickly maculated with round, regularly formed, yellow spots. It is by far the handsomest species of the group.

Philopotamus montanus var. *scoticus* McLachlan, 1862: McLachlan 1878:385. “Differs from the type-form in the golden markings of the anterior-wings being confluent, and forming longitudinal streaks; the posterior-wings with a golden-yellow apical border. As I can discover no structural characters whatever, I now consider this as probably only variety and not a species.”

Philopotamus montanus var.? *pyrenaicus* McLachlan, 1878:384. “Pyrenees; one ♂ in Hagen’s collection.” “Small in size and pale in colour.” “Penis with an abruptly down-turned tip as in *montanus*.” “I am uncertain about this, but think it best to regard it (at present) as only a variety.”

Philopotamus insularis McLachlan, 1878:384–385. “Island of Guernsey. A single female collected by the late Francis Walker in Guernsey. Later Mr Luff

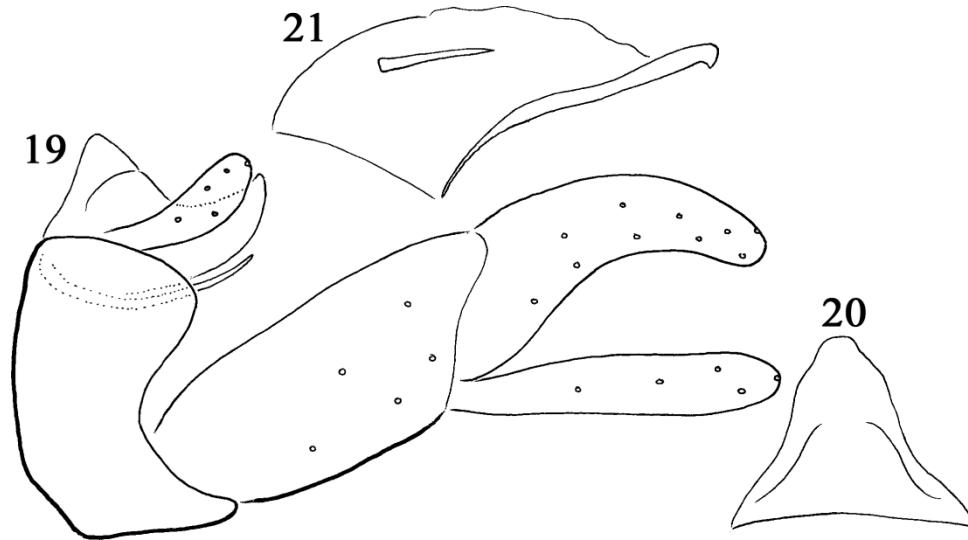
sent nearly 30 specimens, which do not vary in any way.” “The anterior wings are dull pale yellow (caused by yellow pubescence on a nearly hyaline membrane), transversely reticulated with greyish-fuscous, and with a few larger fuscous spots, whereof one at the arculus is much larger and more conspicuous than the other; the costal and apical margins somewhat regularly spotted with fuscous; fringes wholly yellow.” “Agreeing entirely with *montanus* in the colour of the antennae, neuration of wings, and apparently without the slightest difference in the anal parts of the ♂; but differing totally in the colour and markings of the wings.” “In general form and structure this so precisely agrees with *montanus* that I fail to find any differences; but its peculiar colour and markings are so constant as to fully entitle it to rank as distinct. It may be that we have here a well-marked instance of the power of long isolation to produce a form worthy of being considered specifically distinct.”

Philopotamus montanus var. *cesareus* McLachlan, 1884:47. “Island of Jersey (W. A. Kuff, 3 ♂, 2 ♀).” “From its insular habitat and general appearance it appears worthy of a varietal name, for although some specimens from the mainland of Britain show an approach to it.” “In bestowing a varietal name on this insect, a doubt may rightly be raised as to whether *Ph. insularis* from the neighbouring Island of Guernsey be entitled to rank more than a variety of *montanus*. Possibly it should not be so entitled.”

Philopotamus montanus var. *chrysopterus* Morton, 1884:273. “Scotland. Three ♂ at a little stream running down the side of Tinto, a hill in South Lanarkshire.” “A remarkable local peculiar coloration variety or race of *P. montanus*, Donovan.” “Other characters and anal structure apparently agreeing with the typical form.”

Philopotamus montanus var. *chrysopterus* Morton, 1884: McLachlan 1884:47. “Very similar to the var. *cesareus*. “All the forms (*insularis*, *cesareus*, *chrysopterus*) have been examined with regards to the inner anal parts of the ♂, without the discovery of appreciable differences.”

Philopotamus montanus insularis McLachlan, 1878: Botosaneanu & Schmid 1973:227–228. “L’étude de l’armature génitale montre l’aspect absolument typique de *montanus*. Mais tenant compte de la coloration particulière des ailes, bien décrite par MacLachlan, et aussi du facteur d’isolation géographique, nous considérons, quoiqu’avec quelque doute, *insularis* comme une bonne race géographique de *montanus*.” Typical *Philopotamus montanus* with diverged local coloration.



Figures 19–21. *Philopotamus montanus* (Donovan, 1813), male: 19 = genitalia in left lateral view; 20 = dorsal profile of segment X; 21 = phallic organ in left lateral view.

Philopotamus montanus arvernicus Vaillant, 1974: 1971–1972. “Les exemplaires examinés ont tous été capturés dans le Massif central, les uns au-dessus d’un ruisseau entre Saint-Chély et Aubrac (Aveyron) à 1 250 m, les autres en bordure d’un petit affluent de l’Eyrieux (Ardèche) près de Saint-Agrève, 1 050 m, le 8-IX-1973. “L’armature du phallus est formée d’une longue épine proximale et d’une épine courte.” “Notons que les *Ph. montanus* des Carpates et des Balkans, ainsi que les *Ph. montanus insularis* McLachlan de l’île de Guernesey, ont trois épines dans leur phallus et se séparent en cela des exemplaires du Massif central. Les *Ph. montanus siculus* Hagen, de Calabre, ont bien deux épines phallicques seulement, mais de taille presque égale.” Both syntypes examined, now deposited in CMZL. According to the examined permanent and fixed genital preparations both the dorsal profile of segment X and the lateral profile of the ventral sclerite of phallic organ are identical with *Philopotamus montanus* (Donovan, 1813).
New Synonym.

Material examined. **Bosnia-Herzegovia:** Netetva tributary near Mostar, 14.IX.1989, singled by sweeping net along the side stream, leg. J. Oláh (3 male, OPC). **Bulgaria:** Rilska River, 19.VIII.1984. light leg. J. Oláh (3 males, 1 female; OPC). 3 km W Smoljan Gerzovica stream valley (1000 m) 4.VII.1999, leg. J. Hájek (1♂ NMPC). Pirin Mts. Gradevska Reka below Predel 21.IX.

1990, leg. P. Chvojka (1♂ NMPC). Plovdiv, 8 km N of Karlovo 18.VIII.2015, leg. J. Hájek leg. (1750 m) (1♂ NMPC). **Czech Republic:** Central Bohemia, Vůznice stream NW Beroun, 50°01'10" N 13°59'35"E 250–310 m, 3.VIII.2006, leg. P. Chvojka (10♂2♀ OPC). Northern Bohemia, Vlčí brook NW Krásná Lípa, 390 m 50°56'30"N, 14°26'54"E IV.–VIII.2008, leg. M. Trýzna (6♂4♀ OPC). Western Bohemia, Krušné hory Mts. Radvanovský brook NE Habartov 50°12'00"N, 12°33'58"E, 505 m 26.IV.–26.VII.2012, leg. J. Kabelák (4♂4♀ OPC). **England:** Small woodland stream, Whitewell, Yorkshire, 19.5.1972, leg. A. Brindle (2 males, 1 female; loan specimens from Manchester Museum, The University of Manchester). **Greece:** Rodopi county, Papikio Mts. stream and its gorge at Vronti (4km N of Kerasia), 425 m, N41° 11.421' E25° 17.693', 4.IV.2007 leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán & D. Murányi (2 males, OPC). Serres county, Kerkini Mts. Ano Poroia, stream and spring in a platan forest, 511 m, N41° 17.637' E23° 02.187', 30.III.2007, leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán & D. Murányi (5 males, 1 female, HNHM). Xanthi county, Koula Mts. Aspro stream and its gallery beneath Oreo, 550 m, N41° 16.369' E24° 51.275', 3.IV.2007, leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán & D. Murányi (1 male, 1 female, HNHM). Xanthi, 10 km E Stavroupoli 40°58.3'N,

24°47.8'E (80 m) 26.IV.2007, leg. J. Hájek (1♂1♀ NMPC). **France:** **Syntype** of *Philopotamus montanus arvernicus* Vaillant, 1974. Massif-Central, au-dessus d'un ruisseau entre Saint-Chély et Aubrac (Aveyron) (d'après public) 1250 m, [8.9.1973] Coll. Vaillant F. (now deposited in CMZL). **Syntype** of *Philopotamus montanus arvernicus* Vaillant, 1974. Massif Central, affluent de l'Eyrieux (Ardèche), près de Saint-Agrève (d'après public) 1050 m, [8.9.1973]. Coll. Vaillant F. (now deposited in CMZL). **Hungary:** Mátraháza, 700 m, 28.VII.1938, leg. József Sători (7 males, 1 female; OPC). Parádördő, Ilona valley, 10.VII.1941, leg. József Sători (1 male, 1 female; OPC). Zemplén Mts., Kemence valley, singled by sweeping net along stream, 11.VI.1964, leg. J. Oláh (8 males, 2 females; OPC). Mátra Mts. Csörgő stream, 14.VII.1983, singled by sweeping net along stream, leg. J. Oláh (3 males, OPC). Mátra Mts. Lengyendi stream spring area, 15.VII.1983, singled by sweeping net along stream, leg. J. Oláh (3 males, OPC). Mátra Mts. Szuhai stream, 15.VII.1983, singled by sweeping net along stream, leg. J. Oláh (13 males, 3 females; OPC). Zemplén Mts., Füzér, Nagy stream, 12.vii.2005, leg. Papp & Földváry (19 males, 11 females HNHM). Zemplén Mts, Füzér, Nagy stream, Kövecses, 21.VI.2005, leg. D. Murányi (16 males, 21 females; HNHM). Gyöngyös: Mátraháza, Honvédüdüdő, Hidas-patak, N47° 52'33.0", E19°59'12.4", 686 m, 22. V. 2012, leg. T. Kovács, G. Magos & L. Urbán (3 males, 1 female, OPC). Zemplén Mts. Füzér: Füzér: Kövecses, Nagy-patak, 48°33'16.3", 21°27'5.2", 500 m, 19.VIII.2012. leg. T. Kovács, Z. Sipeki, & G. Szilágyi (1 male, 1 female in copula; OPC). Börzsöny, Diósjenő, Kemence patak, 700 m, 3.V.2006 leg. D. Murányi (2 males, HNHM). **Kosovo:** Pejë, Lumbardhi i Pejës River, Pejë Municipality, 42.28727 N, 21.45736°E, 13.V.2025, leg. H. Ibrahim, A. Bilali (3 males, 1 female; OPC). Sharr: Lumbardhi i Prizrenit River, Sredskë Village, Prizren Municipality, 42.1708°N, 20.8623°E, 820 m, 3.VI.2023, leg. H. Ibrahim & A. Bilalli (1 male, OPC). Selac, Selac River, Selac Village, Mitrovica Municipality, 42.979°N, 20.959°E, 973 m, 2.VII.2023, leg. H. Ibrahim & A. Bilalli (2 males, OPC). **Macedonia:** Polog

region, Šar Planina, Bozovce, open brook W of the village, N42°02.759', E20°47.776', 1545 m, 24.06.2014, P. Juhász, T. Kovács, D. Murányi (3 males, 2 females; OPC). Polog region, Šar Planina, Bozovce, forest stream W of the village, N42°02.755', E20°47.723', 1565 m, 24.06.2014, P. Juhász, T. Kovács, D. Murányi, (4 males, 3 females; OPC). Polog region, Šar Planina, Brodec, Tetovska Reka (Pena) in the village, N42° 03.375', E20°53.561', 980 m, 24.06.2014, P. Juhász, T. Kovács, D. Murányi (4 males, 2 females; OPC). Southwestern region, Jablanica Mts, Labuništa, open brook W of the city, N41° 16.069', E20°31.242', 1905 m, 26.06.2014, P. Juhász, T. Kovács, D. Murányi (1 male, 3 females; OPC). Korab Mts. 18.VII.1930, leg. J. Komárek (1♂ NMPC). Right tributary of Radika riv. Sv. Jovan Bigorski Monastery 15 km NE Debar, 13.vi.1994, leg. P. Chvojka (4♂ NMPC + 3♂ OPC). Zdujce (600 m) tributary of Treska river N of Makedonski Brod 13.X.1997 leg. Horvat & Krpač (1♂ NMPC). **Norway:** Finnmark, Alta Gargiaelven ved Gargia fjellstue, 69.80525°N 23.48937°E, 120 moh, 26.VI–10.VII.2010, Malaise trap 1, leg. Finnmarksprojektet (5 males, OPC). Finnmark, Vardø Næringserva, 70.43801° N 30.88202°E, 16 m.a.s.l., net, 18.VI.2010, Finnmarksprojektet, leg. Trond Andersen (6 males, 6 females; OPC). Finnmark, Tana Vestertana, Kjørebekken, 70.42588°N 27.87454°E, 6 m.a.s.l., net, 17.VI.2010, Finnmarksprojektet, leg. Trond Andersen (1 male, OPC). Finnmark, Vardø Næringserva River, at bridge, 70.43801°N 30.88202°E, 16 moh, 28.VII.2010, Finnmarksprojektet, leg. T. Ekrem (1 male, OPC). Finnmark, Sør Varanger, Tårneelven, 69.67786°N 30.44941°E, 17 moh, 1.VIII.2010, Finnmarksprojektet, leg. T. Ekrem (1 male, OPC). **Romania:** Vâlcea county, Parâng Mts, Obrâșia Lotrului, open spring area, 500 m along Transalpina (67C) road, downstream from 45°22'27.7"N, 23°39'4.0"E, 1915 m, 30.VI.2016, leg. J. Oláh & J. Oláh jr. (5 males, 2 females; OPC). Apuseni Mts., Vlădeasa Mt., Stana de Vale, upper section of Ciripa stream, 46°40.546'N 22°38.515'E, 1360 m, 6.VII.2016, leg. J. Kecskés (3 males, 2 females; OPC). Maramures county, Rodna Mts, Borsa – Statiunea Borsa (Borsa – Borsafüred), Cimpoies valley, beech forest, wet

grassland and brooks in the vicinity of the mineral water spring, 47°36'11.2"N 24°46'30.0"E, 1023 m, 23.V.2007, leg. Cs. Csuzdi, L. Dányi, J. Kontschán, & D. Murányi (1 male, HNHM). Caras-Severin county, Tarcu Mts. Open stream on N slope of Mt. Tarcu, 1500m, 45°17.678'N 22°31.742'E, 09.VI.2011, leg. T. Kovács, D. Murányi & G. Puskás, (2 males, HNHM). Maramures county, Maramaros Mts. Frumuseaua stream, 764 m, 47°52'43"N 24°18'22"E, 7.VIII.2012, light trap leg. J. Oláh & L. Szél (1 male, 1 female; OPC). Apuseni Mts. Muntii Gilaului, Muntele Baisorii, stream Valea Iertii, 46°33.001'N 23°20.014'E, 1055m, 27.V.2013, singled leg. J. Oláh, E. Bajka, Cs. Balogh, & G. Borics (1 male, OPC). Apuseni Mts. Muntii Gilaului, Caps, stream Iara, 46°35.688'N 23°15.067'E, 979m, 27.V.2013, singled leg. J. Oláh, E. Bajka, Cs. Balogh, & G. Borics (9 males, OPC). Cindrel Mts. Paltinis, stream Daneasa, 45°39.524'N 23°55.019'E, 1138 m, 29.V.2013, singled leg. J. Oláh, E. Bajka, Cs. Balogh, & G. Borics (4 males, OPC). Apuseni Mts., Bihor Mts., Crisul Pietros - Valea Bulz, Pietra Bulzului, 46°36'08,12"N 22°38'E 33,44"560m, 3.VII.2013, light leg. Cs. Balogh, (3 males; OPC). Apuseni Mts., Bihor Mts., Crisul Pietros, Valea. Sebiselu, 46°36'56,61"N 22°29'16,68"E, 518m, 4.VII.2013, leg. Cs. Balogh, (4 males; OPC). Apuseni Mts., Bihor Mts., Crisul Pietros, Valea. Aleului, 46°38'24,3"N 22°36'27,9"E, 634m, 4.VII.2013, leg. Cs. Balogh, (2 males, 8 females; OPC). Apuseni Mts., Bihor Mts., Crisul Pietros Saritoarea-Cascade Bohodeiului, N: 46°39'31,97" E: 22°38'26,25", 1123m, 4.VII.2013, leg. Cs. Balogh, (1 male, 1 female; OPC). Apuseni Mts. Bihor Mts. Baita, Baita Plai, tributary Crisul Baita, 46°28'52,10"N 22°36'10,03E, 507 m, 15.05.2014, leg. Cs. Balogh & B.V. Béres (8 males, OPC). Apuseni Mts. Bihor Mts. Bubesti-Cobles, tributary P. Cobles, 46°29'56.08"N 22°43'48.64"E, 902 m, 14.05. 2014, leg. Cs. Balogh & B.V. Béres (9 males, OPC). **Slovakia:** Banskobystrický region, Javorie Mts, Stará Huta, Blýskavica, Tisovník Stream, 48°27.553'N 19°18.048'E, 671m, 7–9.X.2013, singled leg. J. Oláh & L. Szél (4 males, OPC). Banskobystrický region, Javorie Mts, Stará Huta, Blýskavica, Stara Rieka Stream, 48°25.248'N

19°17.822'E, 764m, 7–9.X.2013, singled leg. J. Oláh & L. Szél, (2 females; OPC). Vikartovce (Hernádfő), 48°59'8"N 20°7'1"E, 868 m, 9. VII. 2012 singled leg. I Szivák (1 male; OPC). **Slovenia:** Železniki env. Češnjica stream (600 m) Rudenska Grapa valley 9.IX.1999, leg. J. Ježek (1♂ NMPC). **Spain:** Cataluña; Pyrenees; Hospital de Viella, B. de Mulleres (≈ 1660 m) 31.VII.1996, leg. Chvojka (2♂1♀ NMPC). Aragón; Pyrenees; Valle de Pineta NW Bielsa, Bco. de las Opacas 29.VII.1996, leg. Chvojka (≈1580 m) (1♂1♀ NMPC). Pyrenees; Aragón; P.N. Ordesa y Monte Perdido, Valle de Ordesa, stream, 30.VII.1996, leg. Chvojka (1♂ NMPC). Cataluña; Pyrenees; Vall Gerber W of Esterra d'Aneu, stream (≈ 1900 m) 5.VIII.1996, leg. Chvojka (5♂ NMPC, 5♂ OPC). **Sweden:** Lappland, Kiruna kommun, fast-flowing stream, 25 km SW Karesuando, 68.2789° N, 22.0630°E, sweep net, 3.VIII.2015, leg. K. A. Johanson (1 male, OPC). Dalarna, Rättvik kommun, Styggforsån, Styggforsen Naturreservat, 1.5 km (air) W road 301, 61.004961°N, 15.191238°E, at light, 23–24.VII. 2014, leg. K. A. Johanson (1 male, OPC). Dalarna, Älvdalen kommun, River Fulan, 61.6696°N, 12.7238°E, 5.VI.2016, net leg. K. A. Johanson (1 male, OPC). Dalarna, Mora kommun, stream in forest, 20 km SW Mora, 60.9104°N, 14.2617°E, 14.VII.2015, sweep net leg. K. A. Johanson (1 male, OPC). Sweden, Dalarna, Granfjällstötens källa 3, ca 61.255°N, 12.844°E, 30.VII.2017, net leg. K. A. Johanson & M. Peyrard (1 male, OPC). Sweden, Skåne, Båstad kommun, Axelstorps skogar, 56.4126°N, 12.8611°E, 31.V.2017, net leg. K. A. Johanson (1 male, OPC). Sweden, NHRS-EKVA, 000000124, 125 (1 male, OPC). **Ukraine:** Bieszczady Mts (Besszádok), Ung National Park, below Lubnya (Kiesvölgy), 49°00'54,81"N 22°43'23,82"E, 478 m, singled, 20.IX.2013, leg. J. Oláh, Cs. Balogh, Cs. Deák & I. Meszesán (2 males, 1 female; OPC).

Revised diagnosis. The type species of the *Philopotamus* genus, was described as *Phryganea montana* by Donovan (1813) by colour characters, without designated specimen, but with notes that this species is very common and widely distributed in Wales, Ireland and other parts of Britain.

McLachlan (1884) examined the morphological characters of *montanus* and its related forms (*insularis*, *cesareus*, *chrysopterus*, *scoticus*) without the discovery of any appreciable differences in the inner anal parts of the male genitalia, namely in the upper penis-cover (segment X) and in the penis terminal (ventral sclerite).

Here we re-diagnose the type species of the genus based on specimen from Whitewell, Yorkshire, England deposited in Manchester Museum, The University of Manchester. In *Philopotamus montanus* species complex of *Philopotamus montanus* species group, the name bearing species *Philopotamus montanus* is close to *Philopotamus siculus* Hagen, 1860 and *Philopotamus marignanicus* sp. nov. but differs from both by its downward curving pattern of dorsal branch of harpago, and the very produced basomesal dent of coxopodite vestigial, which is almost lacking at *siculus* and *marignanicus*; moreover, *Ph. montanus* differs from both species by the dorsal and lateral profile of segment X where in dorsal view the apical ending characterized with slight but distinct constriction, in *siculus* and *marignanicus* have no any terminal constriction; in lateral view the concavity pattern of segment X different at all the three species. The very hooked tip of vertical sclerite of phallic organ is short and robust, not slender and long; contrary the primary endothecal spine very long at *montanus* and short both at *siculus*, *marignanicus*.

We have examined both the constricting head of segment X and the very tip of the vertical sclerite of the phallic organ in detail and found these speciation traits remarkably stable at every 224 specimens listed in the material examined paragraph from fifteen countries covering most of the distributional area. Divergences of adaptive, non-neutral traits seem subtle and variable for gross, but real and stable for fine phenomics. Observed variabilities are less genetic but more functional (copulatory deformations), artificial (preparatory injuries), observational (changes in angles of observations) and the results of subjectivity of second order science that is governed by personal education, capacity and intelligence

of individual scientists carrying out genitalia preparations, observations, drawings evaluation and explanations.

***Philopotamus perversus* McLachlan, 1884 stat. restit.**

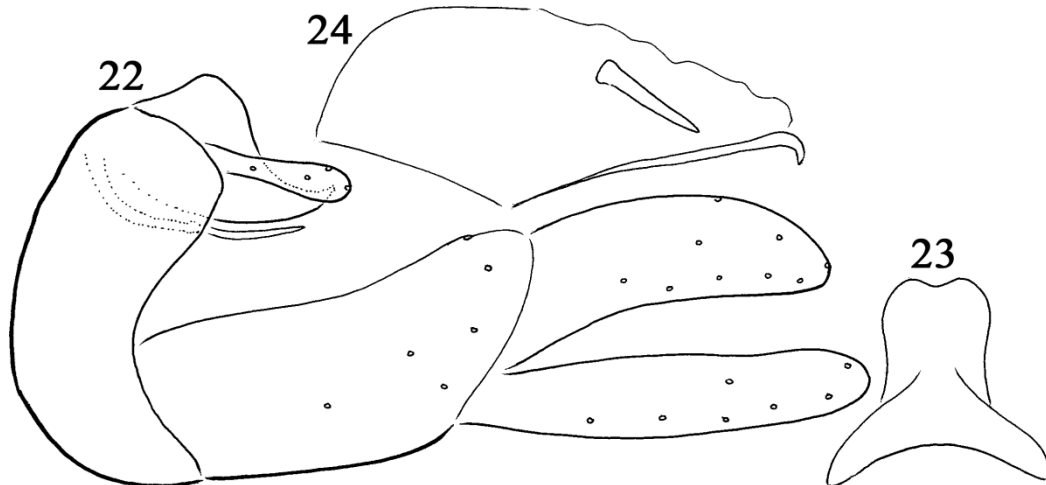
(Figures 22–24, Map 2)

Philopotamus perversus McLachlan, 1884:46–47. “Portugal (near Villa Real and Ruivães, Traz-os-Montes, end of June, Eaton, 6 examples). Giving the idea of a small and very dark form of *montanus*. At first I was inclined to consider this only a melanic form of *montanus*, but apart from the colour-characters, it seems to me that the form of the upper penis-cover entitles it to specific rank; this character is constant in all the individuals. I think *Ph. perversus* should immediately precede *montanus*.”

Philopotamus montanus perversus McLachlan, 1884: Gonzalez & Terra 1979: 165–166. “La armadura de la endotheca fállica consiste en una espina simple, larga, recta (o muy débilmente curvada), bulbosa en su base y puntiaguda en el ápice. Este caracter es constant en todos los individuos examinados, aunque la morfología de la espina puede presentar variaciones, constants a nivel de cada población. La validez de *P. perversus* como especie se ha basado en el peculiar aspect del X terguito y la supuesta constancia de este caracter. En nuestra opinion, las diferencias existentes entre *P. montanus* y *P. perversus* son demasiado pequeñas como para admitir la validez específica de esta última, pues, en algunos casos, tan solo la débil bilobulación del X terguito (a veces poco apreciable) y el examen de las espinas fállicas, permite distinguirlas. Por tanto, creemos que *P. perversus* debe perder su rango específico y ser considerada como una subespecie de *P. montanus*.”

Material examined. Spain: Pite, Rio Tella, Coruña, 1.IV.1979, leg. M. Gonzalez (4 males, OPC).

Revised diagnosis. Dorsal profile of segment X is wide. Coxopodite, the first segment of the gonopod supplied with basomesal dent. Dorsal branch of the harpago downward curving. Ventral sclerite of the aedeagus hooked. Number of primary endothecal spines is only one. Based



Figures 22–24. *Philopotamus perversus* McLachlan, 1884, male: 22 = genitalia in left lateral view; 23 = dorsal profile of segment X; 24 = phallic organ in left lateral view.

upon this character combination *Philopotamus perversus* belongs to the *Philopotamus montanus* species complex of *Philopotamus montanus* species group. Having stable apical excision on dorsal profile of segment X this species is most close to *Philopotamus caurelensis* González & Terra, 1979, but differs by the parallel-sided, not narrowing dorsal profile of segment X; by the pair of secondary spines indistinct, not long and well-produced, as well as by the lateral profile of ventral sclerite of phallic organ slender, not robust, and its hook long, not short.

Remarks. Recognising by fine phenomics the divergences between incipient phylogenetic species, the products of phylogeny, or rather of reticulation/dictyogeny, the races and subspecies are taken out from science (Oláh et al. 2018). Here we reinstate the species status of *Philopotamus perversus* McLachlan, 1884 **stat. restit.**

***Philopotamus siculus* Hagen, 1860**

(Figures 25–27, Map 2)

Philopotamus siculus Hagen, 1860:278. “Grösse und Form von *P. variegatus*; Körper Schwarz; Kopf und Thorax oben braun behaart; Fühler Schwarz; Beine falb; Flügel falb, unbehaart, Adern deutlich, hellbraun; Hinterflügen von gleicher Fä-

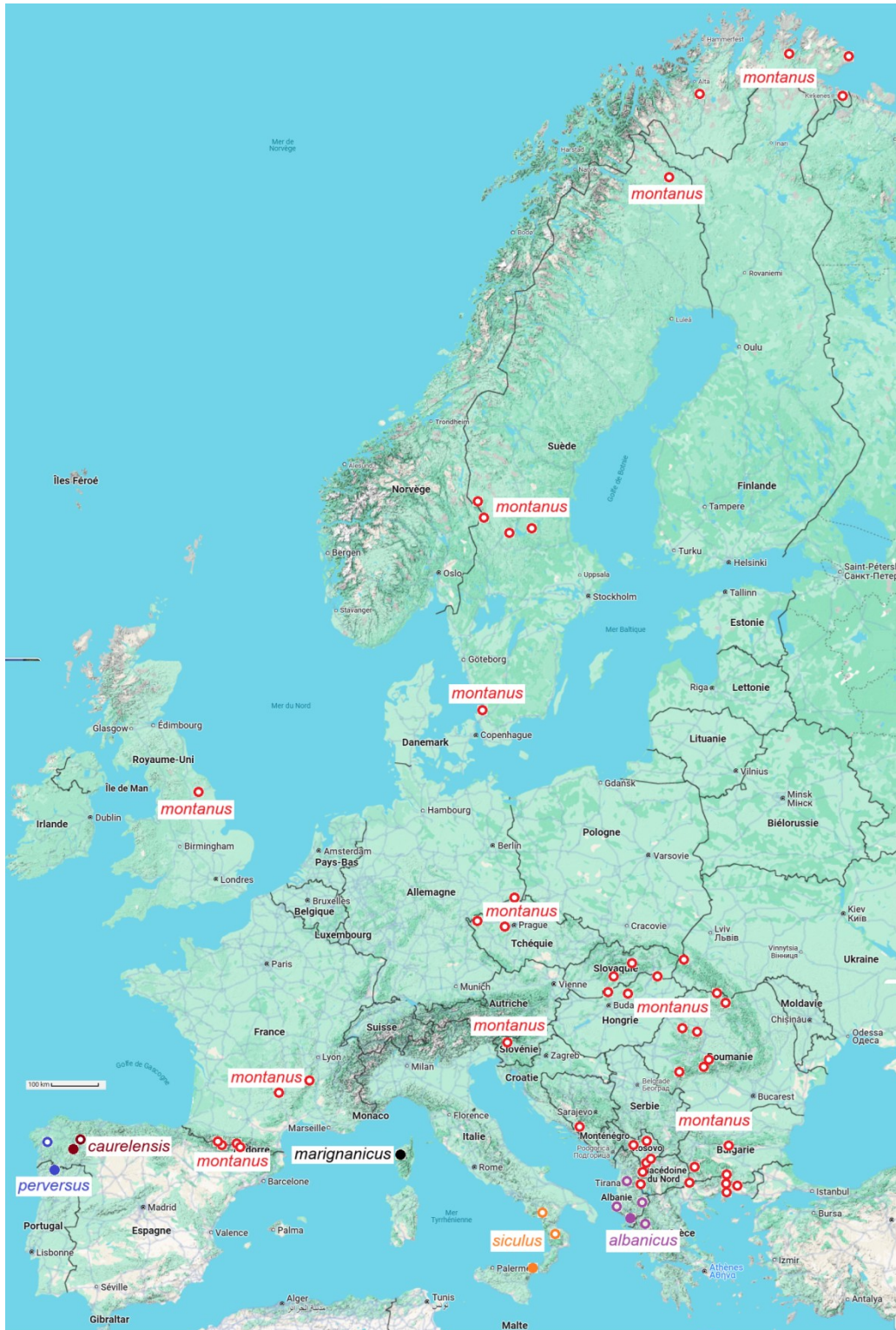
bung. Ich besitze zwei Weibchen aus Messina, Ende März.”

Philopotamus siculus Hagen, 1860: McLachlan 1867: 61. “Ich besitze 1 ♂ und 2 ♀, beide von Messina, Ende März (Zeller).” “Die männlichen Appendices sind ähnlich gebildet wie die von *scopulorum* und *variegatus*; die Spitze der app. inf. ist nach unten gebogen.”

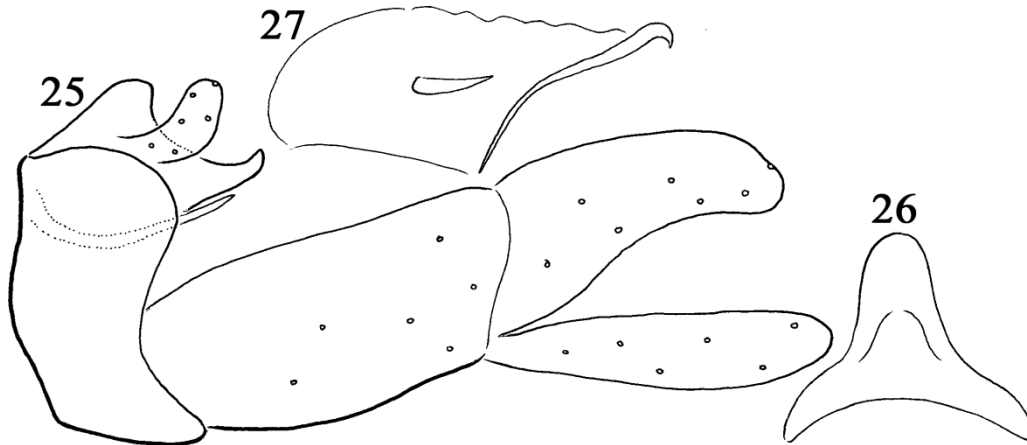
Philopotamus siculus Hagen, 1860: McLachlan 1878: 385. “Sicily (Messina, Zeller, 30th March).” “Its relationship is with *montanus* rather than with *variegatus* (notwithstanding the petiolate apical fork No.4), as is proved by the anal parts of the ♂, the upper branch of the second joint of the inferior appendages being broad, and the upper penis-cover similarly formed: the penis appears to be rather more hook-shaped at its apex than in *montanus*, but I have only been able to examine this organ in one ♂.”

?*Philopotamus montanus siculus* Hagen, 1860: Botosaneanu & Schmid 1973:228. “1♂ de Camigliatello, Calabre, 24.VI.1952. L’examen de ce spécimen montre qu’il s’agit certainement d’une bonne race géographique de *montanus*. Elle se caractérise par les dents de la face interne des coxopodites qui sont présentes, mais nettement plus petites que chez la forme typique et chez *insularis*, mais surtout par l’armature de l’endothèque représentée par une seule épine conique.”

Material examined. Italy, Basilicata, Lagonegro, Reserva regionale Lago Laudemio, big



Map 2. Species distribution of the *Philopotamus montanus* species complex of the *Philopotamus montanus* species group (full circles represent the type localities).



Figures 25–27. *Philopotamus siculus* Hagen, 1860, male: 25 = genitalia in left lateral view; 26 = dorsal profile of segment X; 27 = phallic organ in left lateral view.

resurgence, 1300 m, 40.154°N, 15.821°E, 10. VI.2020, leg. Gilles Vinçon (5 males, OPC). Italy, Calabria, Sila grande, many lateral springs, 1580–1650 m, 39.32°N, 16.401°E, 11.VI.2020 leg. Gilles Vinçon (12 males, 4 females; OPC).

Revised diagnosis. The original species description was restricted to colours and based on two females from Messina (Hagen 1860). Mc Lachlan (1867, 1878) examined 2 females and 1 male and recorded the dorsal branch of harpago broad and the penis (ventral sclerite of aedeagus) more hook-shaped than *P. montanus*. We have found these character states also among the diagnostic traits to delineate *P. siculus* from *P. montanus*. Like McLachlan we have found also this species as most related to *Philopotamus montanus* (Donovan, 1813), but differs by dorsal profile of segment X wide with regularly rounded, not slightly and consistently constricting apical ending. Coxopodite, the first segment of the gonopod supplied with a single basomesal dent reduced, not produced in size. Dorsal branch of the harpago is downward curving, broad, not slender; slightly shorter than the ventral arm, not equal. Ventral sclerite of the aedeagus hooked, but long hooked, not short hooked. Number of primary endothecal spines is only one. In our 17 specimens this primary spine is as long as the primary spine of *P. montanus*; surprisingly it is very short and conic as Botosaneanu & Schmid (1973) has mentioned and drawn at the single male they have

examined from Camigliatello, Calabria. They raised the question whether the single specimen they have examined in the Muséum d’Histoire naturelle of Geneva is really a genuine *siculus*.

Philopotamus variegatus species group

The dorsal profile of segment X is narrowing or pointing. Coxopodite, the first segment of the gonopod lacks basomesal dent. Dorsal branch of the harpago is downward curving. Ventral strap or ventral sclerite of the aedeagus pointed. Numbers of primary endothecal spines unstable: one, two or missing.

Philopotamus adjaricus Oláh & Vinçon, sp. nov.

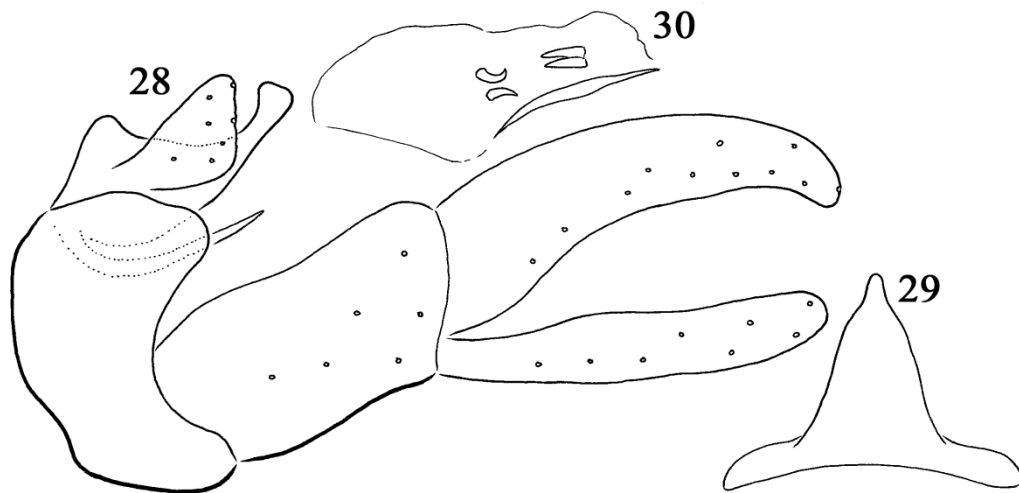
(Figures 28–30, Map 3)

Material examined. Holotype, **Georgia:** Adjara, Mtirala National Parc, nice torrent, 330m, 41.6762°N, 41.8707°E, 30.IV.2024, leg. Gilles Vinçon (1 male, OPC).

Diagnosis. Having dorsal profile of segment X with very narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; double primary endothecal spines, this new species belongs to the *Philopotamus variegatus* species group. The new species *Philopotamus*



Map 3. Species distribution of the *Philopotamus variegatus* species group (full circles represent the type localities).



Figures 28–30. *Philopotamus adjaricus* Oláh & Vinçon, sp. nov. Holotype male: 28 = genitalia in left lateral view; 29 = dorsal profile of segment X ; 30 = phallic organ in left lateral view.

adjaricus sp. nov. is most close to *Philopotamus kumbet* Sipahiler, 2018, but differs by narrowing segment X without lateral angles; triangular cerci; shorter paraproct straight, not twice broken ventral sclerite of phallic organ and by the differently sized and shaped primary and secondary endothecal spines.

Description. Small sized, medium dark species. In alcohol the body, antennae, maxillary palps, wings and legs are yellowish brown. The

markings of light spot and patch pattern on forewing distinct. Forewing length 9 mm.

Male genitalia. Dorsal profile of segment X triangular, significantly tapering with almost pointed ending; obliquely upward directed and clavate in lateral view. Paraproct much shorter than segment X. Coxopodite, the first segment of the gonopod, without basomesal dent. Dorsal branch of the harpago little longer than the lower branch, narrowing and downward curving. Ventral sclerite of the aedeagus without terminal hook

formation; almost straight, broad on middle and pointing both in anterior and posterior ends. Endothelial spine pattern composed of a pair of long, straight stout primary spines and a pair of smaller curving secondary spines attached somehow to the sclerotized head of ductus ejaculatorius.

Etymology. Named after the region of locus typicus.

***Philopotamus amphilectus* McLachlan, 1884
stat. restit.**

(Figures 31–33, Map 3)

Philopotamus amphilectus McLachlan, 1884:48–49. Mountains of the Estrella, Portugal, (near Cea, 1792 ft., 4th June, 5♂, and near Sabugueiro, 4100 ft., 5th June, 1♂, Beira Baixa; Eaton). “Upper penis cover very obtuse and turned upward if viewed laterally; penis broad, produced into a fine point, concave beneath; sheaths very slender, flattened-spiniform, very acute and slightly up-turned at the tips.” “A large and very handsome species, agreeing with *montanus* in the form of the external anal parts, and practically with *variegatus* in the inner anal parts, but seemingly quite distinct from both: agreeing also with *variegatus* in the unicolorous antennae, but these are brown instead of yellow.”

Philopotamus variegatus amphilectus McLachlan, 1884: González & Terra 1979:168–170. “En nuestra opinión, las diferencias existentes entre *P. amphilectus* y *P. variegatus* no son mayores que las existentes entre *P. perversus* y *P. montanus*, y, por tanto, estimamos que *P. amphilectus* debe ser considerada como una subespecie de *P. variegatus*.”

Material examined. **Spain:** Coruña, 15.VII.1979, leg. M. A. Gonzalez (3 male, OPC).

Revised diagnosis. Having dorsal profile of segment X with very narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; double primary endothelial spines this species belongs to the *Philopotamus variegatus* species group. *Philopotamus amphilectus* McLachlan, 1884 is most close to *Philopotamus bulgaricus* sp. nov., but differs by the more broad dorsal branch of harpago less curving downward;

by the head of segment X excised, bilobed, not monolobed in dorsal view and less curving upward in lateral view; by a single pair of curving endothelial spines, difficult to qualify whether this pair of spines is primary or secondary.

***Philopotamus bulgaricus* Oláh, sp. nov.**

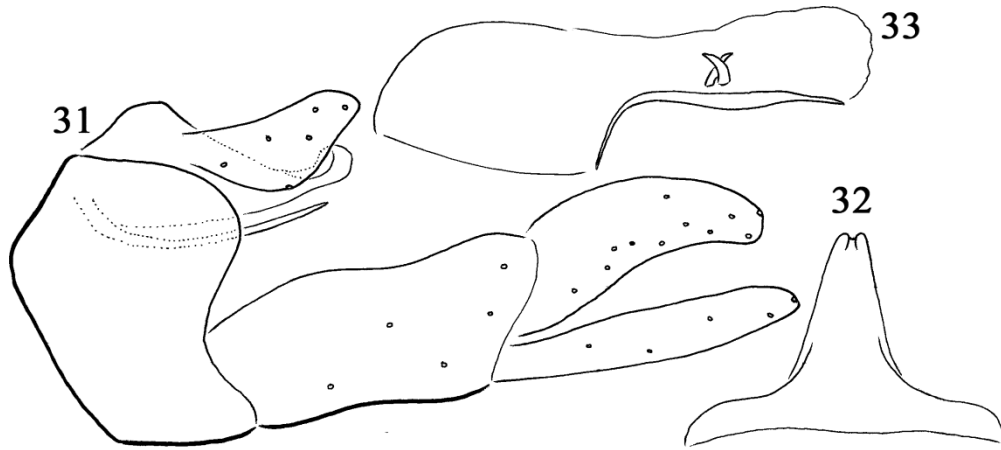
(Figures 34–36, Map 3)

Material examined. Holotype, **Greece:** Rodopi county, Papikio Mts., Karstic spring at Vronti, 4 km N of Kerasia, 445 m, 41°11.412'N 25°17.752'E, 4.IV.2007, leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán & D. Murányi (1 male, OPC). Paratypes, **Greece:** Rodopi county, Papikio Mts., stream and its gorge at Vronti (4km N of Kerasia), 425 m, 41°11.421'N 25°17.693'E, 4.IV.2007 leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán & D. Murányi (3 males, OPC). **Bulgaria:** Gara Lakatnik, 31.V.1996, leg. O. Hovorka (1♂ NMPC). Rila Mts. Kirilova Poljana env., 1500 m 11.VII.1998, leg. J. Hájek (2♂ NMPC). 3 km W Smoljan, Gerzovica stream valley (1000 m) 4.VII.1999, leg. J. Hájek (2♂2♀ NMPC + 1♂1♀ OPC).

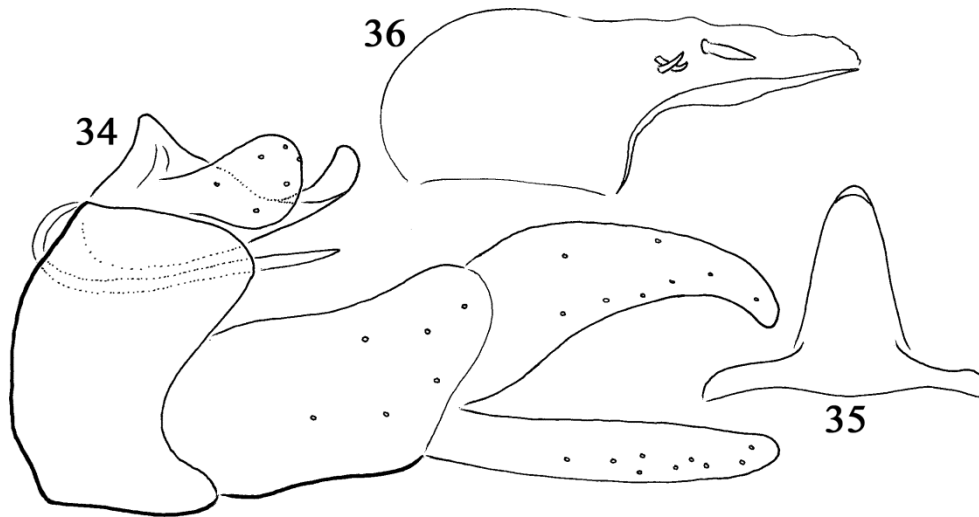
Diagnosis. Having dorsal profile of segment X with very narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; double primary endothelial spines, this new species belongs to the *Philopotamus variegatus* species group and most close to *Philopotamus amphilectus* but differs by the dorsal branch of harpago equal, not shorter than the ventral branch, more tapering and curving downward; by the head of segment X monolobed, not excised, bilobed, in dorsal view and more curving upward in lateral view; by a single straight primary spine present, not lacking.

Description. Large sized, medium dark species. In alcohol the body, antennae, maxillary palps, wing and legs are yellowish brown. The markings of light spot and patch pattern on forewing distinct. Forewing length 13 mm.

Male genitalia. Dorsal profile of segment X elongated, narrow triangular, significantly taper



Figures 31–33. *Philopotamus amphilectus* McLachlan, 1884, male: 31 = genitalia in left lateral view; 32 = dorsal profile of segment X; 33 = phallic organ in left lateral view.



Figures 34–36. *Philopotamus bulgaricus* Oláh, sp. nov. Holotype male: 34 = genitalia in left lateral view; 35 = dorsal profile of segment X; 36 = phallic organ in left lateral view.

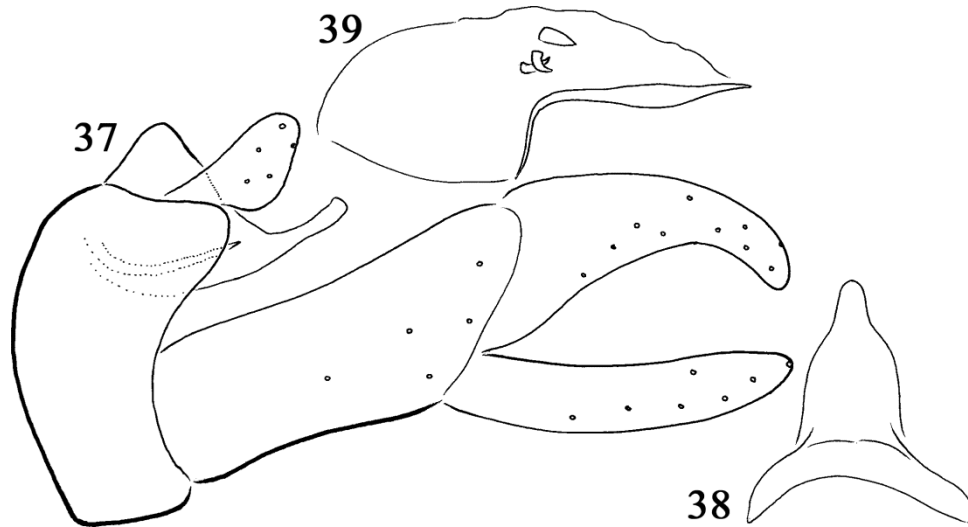
ing without any apical excision; significantly upward directed in lateral view. Paraproct much shorter than segment X. Coxopodite without basomesal dent. Dorsal branch of the harpago as long as the lower branch, significantly narrowing and downward curving. Ventral sclerite of the aedeagus without terminal hook formation; almost straight, very broad on middle and pointing both in anterior and posterior ends. Endothecal spine pattern composed of a single straight stout primary spine with basal enlargement and a pair of smaller curving secondary spines.

Etymology. Named after the country of locus typicus.

***Philopotamus emiliacus* Oláh & Vinçon, sp. nov.**

(Figures 37–39, Map 3)

Material examined. Holotype, **Italy:** Emilia-Romagna, Passo delle Radici, Nd slope, 1430 m, brook, 44.197°N, 10.501°E, 4.VI.2020, leg. Gilles Vinçon (1 male, OPC). Paratypes: same as holotype (7 males, 6 females; OPC).



Figures 37–39. *Philopotamus emiliacus* Oláh & Vinçon, sp. nov. Holotype male: 37 = genitalia in left lateral view; 38 = dorsal profile of segment X; 39 = phallic organ in left lateral view.

Diagnosis. Having dorsal profile of segment X with narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook and single primary endothecal spine, this new species belongs to the *Philopotamus variegatus* species group and most close to *Philopotamus gionicus* sp. nov., but differs by the head of segment X less narrow in dorsal view and digitate, not capitate in lateral view; by much shorter paraproct; by curved, not right angled anterior third of ventral sclerite; by presence, not absence of a single short and stout primary spine; by smaller size of the pair of secondary spines.

Description. Medium sized medium dark species. In alcohol the body, antennae, maxillary palps, wings and legs are yellowish brown. The markings of light spot and patch pattern on forewing less distinct. Forewing length 10 mm.

Male genitalia. Dorsal profile of segment X elongated, narrow triangular, significantly tapering on apical region; long digitiform in lateral view. Paraproct much shorter than segment X, just longer than segment IX. Coxopodite, the first segment of the gonopod without basomesal dent. Dorsal branch of the harpago as long as the lower branch, significantly narrowing and downward curving. Ventral sclerite of the aedeagus without

terminal hook formation; straight on apical two thirds, broad on middle and right angled on anterior third. Endothecal spine pattern composed of a single short stout primary spine and a pair of smaller, just discernible curving secondary spines.

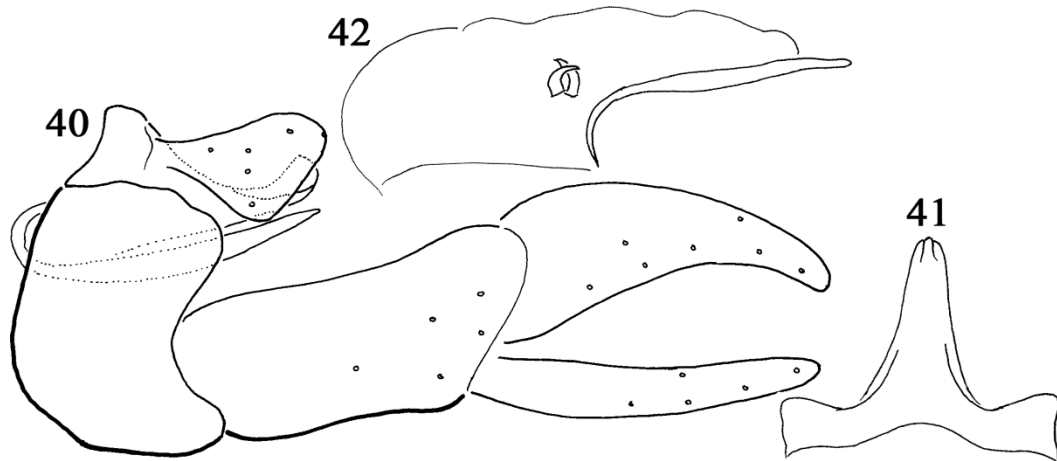
Etymology. Named after the region of locus typicus.

***Philopotamus epirus* Oláh & Ibrahimi, sp. nov.**

(Figures 40–42, Map 3, Photo)

Material examined. Holotype, **Albania:** Borsh, Borsh River, Borsh, Vlorë Municipality, 40.0717° N, 19.8524°E, 1.VI.2022, leg. H. Ibrahimi & A. Bilalli. (1 male, OPC). Paratypes, **Albania:** Qeparo stream, Qeparo, Vlorë, 40.073°N, 19.860° E, 14. VII. 2022, leg. B. Gemnika (2 males).

Diagnosis. Having dorsal profile of segment X with narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook and single primary endothecal spine present, this new species belongs to the *Philopotamus variegatus* species group and most close to *Philopotamus amphilectus* McLachlan, but differs by the head of segment X without apical excision in dorsal view and with triangular, not rounded dorsum in lateral



Figures 40–42. *Philopotamus epirus* Oláh & Ibrahim sp. nov. Holotype male: 40 = genitalia in left lateral view; 41 = dorsal profile of segment X; 42 = phallic organ in left lateral view.

view; by the vertically flattened broad, not slender digitate paraproct; by almost posterad turning right angled anterior third of ventral sclerite; by the rounded, not pointed posterior tip of ventral sclerite.

Description. Small sized medium dark species. In alcohol the body, antennae, maxillary palps, wings and legs are yellowish brown. The markings of light spot and patch pattern on the golden coloured forewing very distinct. Forewing length 9 mm.

Male genitalia. Dorsal profile of segment X narrow elongated, almost parallel-sided; head of segment X, upward turning with triangular dorsal head in lateral view. Paraproct as long as segment X, vertically flattened, broad in lateral view. Coxopodite, the first segment of the gonopod, without basomesal dent. Dorsal branch of the harpago as long as the lower branch, significantly narrowing and downward curving. Ventral sclerite of the aedeagus without terminal hook formation; straight on apical two thirds with rounded tip, broad on middle and right angled, slightly posterad turning on anterior third. Endothecal spine pattern composed of a pair of curving secondary spines.

Etymology. Named after the region of locus typicus around Borsh. Ancient Epirus, a geogra-

phical and historical region now shared between Greece and Albania.

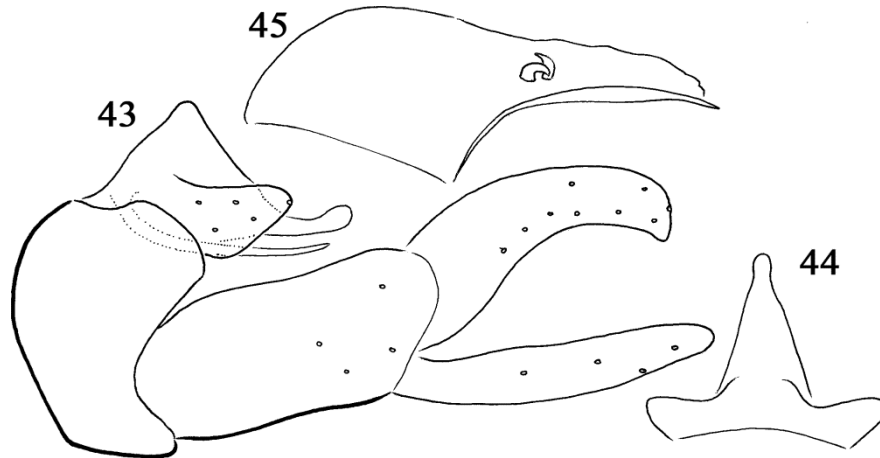
***Philopotamus gionicus* Oláh, sp. nov.**

(Figures 43–45, Map 3)

Material examined. Holotype, **Greece:** Phocis county, Giona Mts. Prosilio, stream S of the village 680 m, N38°33.827' E22°20.939', 8.IV. 2009, leg. L. Dányi, J. Kontschán & D. Murányi (1 male, OPC). Paratypes: same as holotype (1 male, 1 female; OPC).

Diagnosis. Having dorsal profile of segment X with narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; without primary endothecal spine, this new species belongs to the *Philopotamus variegatus* species group and most close to *Philopotamus emiliacus* sp. nov., but differs by the head of segment X more narrow in dorsal view and capitate, not digitate in lateral view; by much longer paraproct; by right angled, not curved anterior third of ventral sclerite; by absence, not presence of the single short and stout primary spine; by larger size of the pair of secondary spines.

Description. Smaller sized medium dark species. In alcohol the body, antennae, maxillary



Figures 43–45. *Philopotamus gionicus* Oláh sp. nov. Holotype male: 43 = genitalia in left lateral view; 44 = dorsal profile of segment X ; 45 = phallic organ in left lateral view.

palps, wings and legs are yellowish brown. The markings of light spot and patch pattern on forewing less distinct. Forewing length 9 mm.

Male genitalia. Dorsal profile of segment X elongated, narrow triangular, significantly tapering on apical region; long digitiform with capitate head in lateral view. Paraproct much longer than segment IX. Coxopodite, the first segment of the gonopod, without basomesal dent. Dorsal branch of the harpago as long as the lower branch, less narrowing but downward curving. Ventral sclerite of the aedeagus without terminal hook formation; straight on apical two thirds, broad on middle and downward curving on anterior third. Endothecal spine pattern composed of a pair of curving secondary spines, primary spine indiscernible, lacking.

Etymology. Named after the region of locus typicus.

***Philopotamus giresunicus* Sipahiler, 2010**

(Map 3)

Philopotamus giresunicus Sipahiler, 2010:351–352. “Holotype ♂: Turkey, Giresun, Çikrikkapi, Yağlıdere direction, 1340 m, spring, 40°32'N/38°36'E, 10.VII.2008, leg. and coll. Sipahiler.” “*Philopotamus giresunicus* nov. sp. is well characterized by the shape of segment X and the shape of the sclerites of the phallic apparatus. It is closely related to *P. variegatus* Scopoli, 1763, but the fol-

lowing differences are seen in the male genitalia: in *P. variegatus* segment X is triangular, the apex is broadly curved upwards; in *P. giresunicus* nov. sp. segment X is trapezoidal, with triangular projections on the corners; its median portion is as a narrow lobe; in *P. variegatus* the sclerites of the phallic apparatus are composed of a pair of spines found in the middle and a spine located subdistally and the ventral sclerite is long and rather thick, while in *P. giresunicus* nov. sp. there is only one inner sclerite, which is large almost rounded possessing two apical projections; the ventral sclerite is thin and short.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus hasanyavuzi* Sipahiler, 2018, stat. nov.**

(Map 3)

Philopotamus variegatus hasanyavuzi Sipahiler, 2018:60–61: “Holotype male and paratypes (4 males): Turkey, Şavşat, Meydancık, Çermik Village, 1300 m, (light), 41°19'N, 42°03'E, 6.VIII.1996 leg. and coll. Sipahiler.” “In dorsal view, segment X triangular, the lateral prolongations are shorter, reaching two-thirds of the length of segment X. The coxopodite of the inferior appendages is shorter than the harpago, dorsal and ventral branches of the harpago are the longest parts of the genitalia. The dorsal sclerotized spine of the phallic apparatus is small and narrow.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus ibericus* Oláh, sp. nov.**

(Figures 46–48, Map 3)

Material examined. Holotype, **Spain:** Aragón, Pyrenees, Valle de Pineta (NW Bielsa), Río Cinca (1270 m), 29.VII.1996, leg. P. Chvojka (1♂ NMPC).

Diagnosis. Having dorsal profile of segment X with narrow pointed apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; without primary endothecal spine, this new species belongs to the *Philopotamus variegatus* species group and is most close to *Philopotamus variegatus* (Scopoli), but differs by the head of segment X more narrow and more pointed apicad in dorsal view, and with triangular, not rounded dorsum in lateral view; by longer downward curving anterior part of ventral sclerite; by absence, not presence of the single long and stout primary spine; by larger size of the pair of secondary spines.

Description. Medium sized, medium dark species. In alcohol the body, antennae, maxillary palps, wings and legs are yellowish brown. The markings of light spot and patch pattern on forewing less distinct. Forewing length 12 mm.

Male genitalia. Dorsal profile of segment X elongated, narrow triangular, with pointed ending; head dorsum triangular in lateral view. Paraproct almost as long as segment X. Coxopodite without basomesal dent. Dorsal branch of the harpago as long as the lower branch, less narrowing but downward curving. Ventral sclerite of the aedeagus without terminal hook formation; straight on apical two thirds, broad on middle and right-angled on anterior third. Endothecal spine pattern composed of a pair of curving secondary spines, primary spine indiscernible, lacking.

Etymology. Named after the region of locus typicus.

***Philopotamus kumbet* Sipahiler, 2018 stat. nov.**

(Map 3)

Philopotamus variegatus kumbet Sipahiler, 2018:59. “Holotype male: Turkey, Giresun, 45 km south, Kumbet Yaylasi direction, 700 m, 41°34’N, 33°05’E, 6.VII.2007, leg and coll. Sipahiler.” “In dorsal view, segment X triangular, the lateral prolongations are long, somewhat shorter than segment X. The phallic apparatus possesses two small and thin spines on the subdistal portion, the pair of spines, which are large and long; the dorsal sclerotized part of ductus ejaculatorius is thin.”

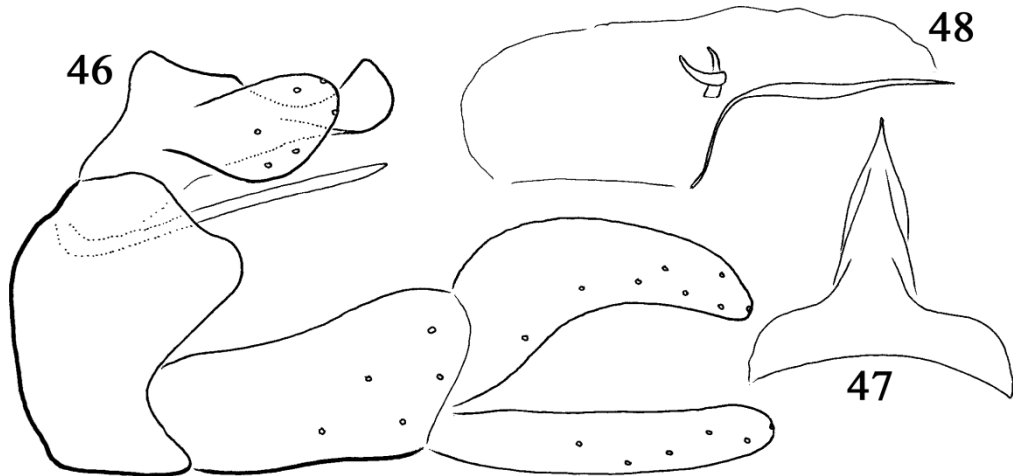
Material Only drawings were examined as specimens were not available for study.

***Philopotamus liguricus* Malicky, 1984**

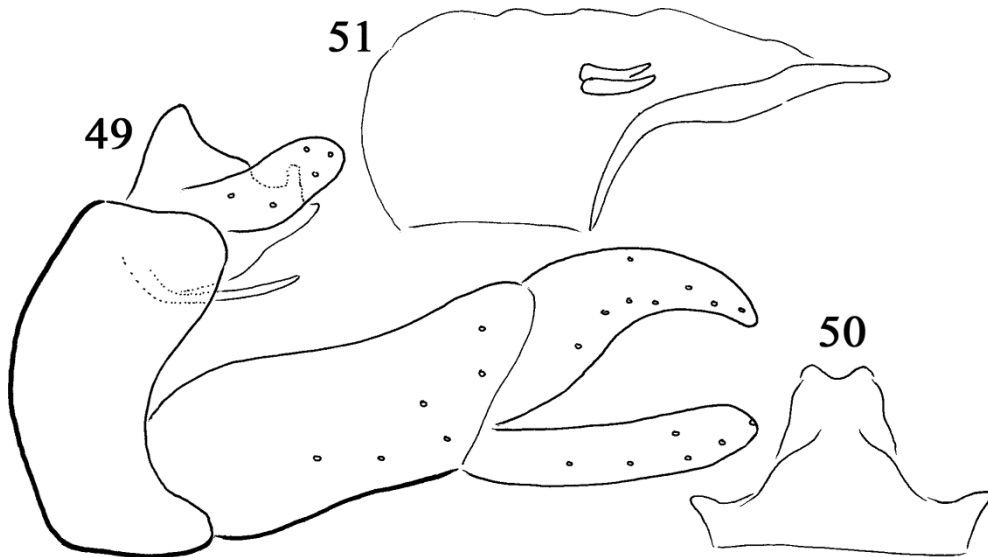
(Figures 49–51, Map 3)

Philopotamus liguricus Malicky, 1984:298–300. “Holotypus ♂ und zwei Paratypen ♂: Italien, Ligurien, Zufluß des T. Erro oberhalb Malvicino, 12.V.1980, leg Zwick, in meiner Sammlung.” “Kopulationsarmaturen ♂: Am ehesten mit *Philopotamus montanus* Donovan 1813 vergleichbar.” “Diese drei Tiere waren eine Überraschung für mich. Im lauf der Jahre habe ich Tausende *Philopotamus*-Exemplare aus vielen Ländern gesehen, so daß mir die geographische Variabilität der weitverbreiteten Arten *P. montanus* und *P. variegatus* nichts Neues ist. Die drei ligurischen Stücke passen aber zu keiner dieser Arten, und auch die anderen bekannten Arten kommen nicht in Betracht. Am ähnlichsten sind sie noch *P. montanus* aber das obere 2. Glied der untere Anhänge ist so kurz und breit, wie ich es bei keinen *montanus* gesehen habe. Der Zahn auf der innenseite des Basalglieds fehlt; das kommt auch bei *montanus* gelegentlich vor. Der Terminalsklerit des Aedoeagus is gerade und nicht hakig gebogen; in dieser Hinsicht ist er dem von *P. variegatus* ähnlicher. Im Innern des Aedoeagus hat *P. montanus* einen unpaaren geraden Dorn; die paarigen gekrümmten Dornen würden eher zu *variegatus* passen. Ganz unähnlich jeder anderen Art ist aber das 10. Segment mit den abstehenden behaarten Warzen.”

Material examined. **Italy,** Liguria, Urbe (SV), 600 m, T.L.Torr. Orba, c/o Vara Inf., 27.V.2001, leg. Museo Caffi Bergamo (5 males, OPC).



Figures 46–48. *Philopotamus ibericus* Oláh, sp. nov. Holotype male: 46 = genitalia in left lateral view; 47 = dorsal profile of segment X; 48 = phallic organ in left lateral view.



Figures 49–51. *Philopotamus liguricus* Malicky, 1984, male: 49 = genitalia in left lateral view; 50 = dorsal profile of segment X; 51 = phallic organ in left lateral view.

Revised diagnosis. In spite of the broad slightly excised apical ending of segment X, the dorsal branch of the harpago downward curving and tapering; the coxopodite without basomesal dent; the ventral sclerite of the aedeagus without hook; the endotheca with a pair of spines this new species belongs to the *Philopotamus variegatus* species group but differs from each species of the group by its broad segment X.

***Philopotamus sapanca* Sipahiler, 2018 stat. nov.**

(Map 3)

Philopotamus variegatus sapanca Sipahiler, 2018:58–59. “Holotype male, and 1 female (*Sic!*): Turkey, Sakarya, Sapanca, Mahmudiye, Mahmudiye Stream, 262 m, 40°39’N, 30°12’E, 10.VI.2013 leg and coll. Sipahiler.” “In dorsal view, segment X triangular, the lateral prolongations are long, longer

than segment X. The apical sclerotized spine is thin and rather long, the pair of spines located in the middle are long, with rounded parts in the middle; the dorsal sclerotized portion of the ductus ejaculatorius with additional dorsolateral prolongations on the sides.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus sumela* Sipahiler, 2018 stat. nov.**

(Map 3)

Philopotamus tenuis sumela Sipahiler, 2018:63. “Holotype male and paratypes male: Turkey, Trabzon, Sumela, 1200 m, 40°41’N, 39°39’E, 19.VIII.2005, leg and coll. Sipahiler.” “In dorsal view, segment X nearly triangular, the lateral prolongations reach the subdistal part of segment X; the apical parts are curved on the sides; distal spine pair with large and round apical part and narrow, nearly comma-shaped basal part. The coxopodite of the inferior appendages possesses small membranous lobes on the inner surfaces.”

Material examined. Only drawings were examined as specimens were not available for study.

***Philopotamus tavigan* Oláh, sp. nov.**

(Figures 52–54, Map 3)

Material examined. Holotype, **France:** Corsica, 4.5 km W Corte, Gorges du Tavignano, river, 700 m 7.VI.2000, leg. J. Hájek (1male, NMPC). Paratype: same as holotype (1 female, NMPC).

Diagnosis. Having dorsal profile of segment X with narrowing pointed apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; with one primary endothecal spine, this new species belongs to the *Philopotamus variegatus* species group and is most close to *Philopotamus variegatus* (Scopoli), but differs by the triangular, not foliform cerci; by the longer paraproct; by head of segment X more narrow and more pointed apicad in dorsal view, and with upward curving,

not rounded dorsum in lateral view; by longer downward curving anterior part of ventral sclerite.

Description. Medium sized, medium dark species. In alcohol the body, antennae, maxillary palps, wings and legs are yellowish brown. The markings of light spot and patch pattern on forewing less distinct. Forewing length 11 mm.

Male genitalia. Dorsal profile of segment X elongated, narrowing triangular, with pointed ending; head dorsum of segment X upward curving in lateral view. Paraproct longer than segment X. Coxopodite, the first segment of the gonopod without basomesal dent. Dorsal branch of the harpago as long as the lower branch, narrowing and downward curving. Ventral sclerite of the aedeagus without terminal hook formation; straight on apical two thirds, broad on middle and right-angled on anterior third. Endothecal spine pattern composed of a pair of curving secondary spines and a single straight, stout primary spine.

Etymology. Named after the region of locus typicus.

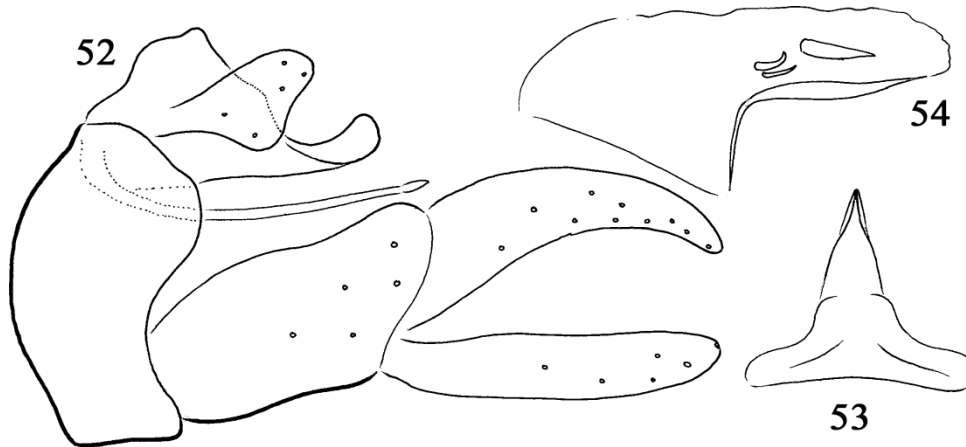
***Philopotamus tenuis* Martynov, 1913**

(Figures 55–57, Map 3)

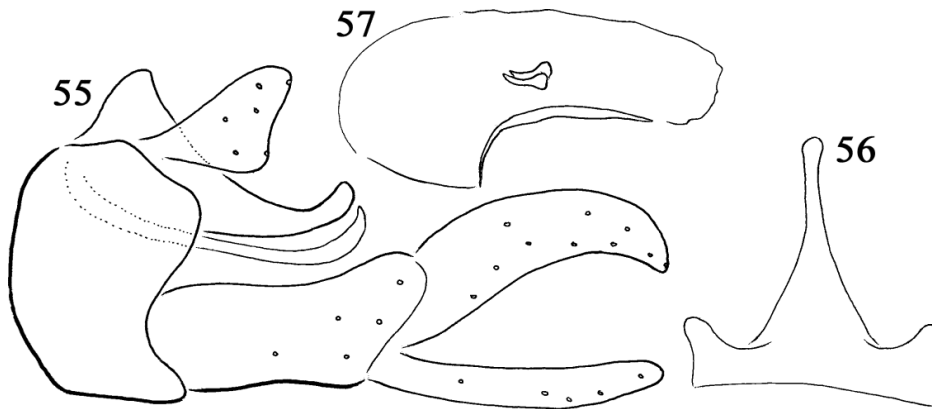
Philopotamus tenuis Martynov, 1913:32–33. Translated from Russian: “2♂. Stream at station Lars. 30.VI. 1♂. Mountain stream near station Passanaur. V.-G. dor. 27.VI.” *Philopotamus tenuis* sp. nov. related to *Ph. variegatus* and to Portuguese *Ph. amphilectus*. Particularly the structure of segment X is similar at the three species having middle region elongated and broadened apicad. Narrowed elongation most developed at *P. tenuis*. Lower branch of harpago shorter compared to *P. montanus*.”

Philopotamus caucasicus Navas, 1933a:111: “Patria: “Borjon: Kaukasus, 14.VI.1927. coll. Shestoporow.” “Similis to *montano* Don.” (Syn. Botosaneanu 1967)

Material examined. **Georgia:** Adjaria, Mtirala National Parc, nice torrent, 330m, 41.6762°N, 41.8707°E, 30.IV.2024, leg. Gilles Vinçon (4 males, OPC). Tsabliani, spring, 41.58139°N



Figures 52–54. *Philopotamus tavigan* Oláh, sp. nov. Holotype male: 52 = genitalia in left lateral view; 53 = dorsal profile of segment X; 54 = phallic organ in left lateral view.



Figures 55–57. *Philopotamus tenuis* Martynov, 1913, male: 55 = genitalia in left lateral view; 56 = dorsal profile of segment X; 57 = phallic organ in left lateral view.

42.36455°E, 1.V.2024, leg. Aleksí Memishishi (3 males, OPC). Kvatia, spring, 41.57335°N 42.4183°E, 1.V.2024, leg. Aleksí Memishishi (1 male, OPC). Baladzeebi, spring, 41.65696°N 42.09526°E, 1.V.2024, leg. Aleksí Memishishi (1 male, OPC). Varjanuli, spring, 41.788°N 41.9629°E, 29.IV.2024, leg. Aleksí Memishishi (2 males, OPC). Svanetia, Lengeri 4.5km, WSW of Mestia, stream, 43°01.9'N 42°40.6'E; 1415 m 3.VII.2013, leg. P. Chvojka (1♂ NMPC). Adjara, Mtirala NP, Chakvistavi ca. 20 km NE of Batumi, right tributaries of Chakvistiskali riv., 41°40.6'N 41°52.4'E; 315 m, 30.VI.2013, leg. P. Chvojka (1♂ NMPC + 1♂ OPC). Adjara, Mtirala NP, Chakvistavi ca. 20 km NE of Batumi, springs, brooks, 41°40.4'N 41°51.2'E; 410 m, 1.VII.2013,

leg. P. Chvojka (1♂1♀ NMPC). Svanetia, stream N of Mestia; 1510–1700 m, 43°03.0'N 42°43.1'E, 5.VII.2013, leg. P. Chvojka (6♂1♀ NMPC + 4♂ OPC). Svanetia, left tributary of Mulkhra riv. SE of Mestia, 43°02.4'N 42°45.5'E; 1490 m, 5.VII.2013, leg. P. Chvojka (4♂2♀ NMPC). Svanetia, left tributary of Mulkhura riv. SE of Mestia, 43°02.5'N 42°46.3'E, 1510 m 5.VII.2013, leg. P. Chvojka (5♂ NMPC + 5♂ OPC). **Turkey:** Rize prov., left tributary of Firtina river below Çat SW of Çamlıhemsin, 40°51.8'N 40°55.8'E; ca.1250 m, 9.VII.2013, leg. P. Chvojka (3♂ NMPC + 2♂ OPC). Artvin Prov., left tributary of Murgul Çayı SW Borçka, 41°17'30"N 41°34'45"E, 6.VII.1993, leg. P. Chvojka (3♂ NMPC + 2♂ OPC).

Revised diagnosis. Having dorsal profile of segment X with narrow apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; primary endothecal spine lacking, this new species belongs to the *Philopotamus variegatus* species and differs from all the known members of the group by the very narrow, digitiform shape of segment X.

***Philopotamus variegatus* (Scopoli, 1763)**

(Figures 58–60, Map 3)

Phryganea variegata Scopoli, 1763:266. “Diagn. Alae anticae fuscae, punctis ferrugineis. In aquosis & circa torrents. Antennae longitudine fere alarum superiorum ferrugineae. Oculi, corpus, femora nigricantia. Caput ferrugineis, villis pubescens. Tibiae ferrugineae.”

Philopotamus flavidus Hagen, 1864:44. (Type locality Corse). “Long, avec les ailes, 15 mill. L’espèce. la plus claire de couleur du genre. D’un jaune très vif. Antennes, palpes et pieds jaunes. Les quatre ailes d’un jaune assez vif; les antérieures avec un petit nombre de taches noirâtres. Tête et thorax noirâtres. Abdomen jaune. Appendices semblables à ceux du *Ph. variegatus*, la branche inférieure jaune. La première aréole apicale n’arrivant pas à l’anastomose.”

Philopotamus flavidus Hagen, 1864:44: McLachlan 1878:386–387. “Corsica (Bellier de la Chavignerie).” “Anterior-wings bright golden-yellow, transversely reticulated with pale fuscous; a large fuscous spot at the arculus, a few smaller ones on the disc and costal margin, and a series round the apex, of the same colour; fringes wholly yellow.” “Anal parts of ♂ apparently agreeing with those of *variegatus*; or the differences scarcely appreciable; the upper penis-cover similar (I have not been able to examine the penis.) This pretty species appears to bear the same relationship to *variegatus* that *insularis* does to *montanus*. So far as I can see there are no structural differences (from *variegatus*) of importance. Its larger size, yellow antennae, bright yellow anterior-wings, and pale posterior wings (combined with the anal structure), readily separate it from *insularis*.”

Philopotamus flavidus Hagen, 1864:44: Jacquemart 1962:1. “Comme les collections de l’I.R.Sc.N.B. contenaient des types des espèces communes de la collection Sélys revue par G. Ulmer, nous avons

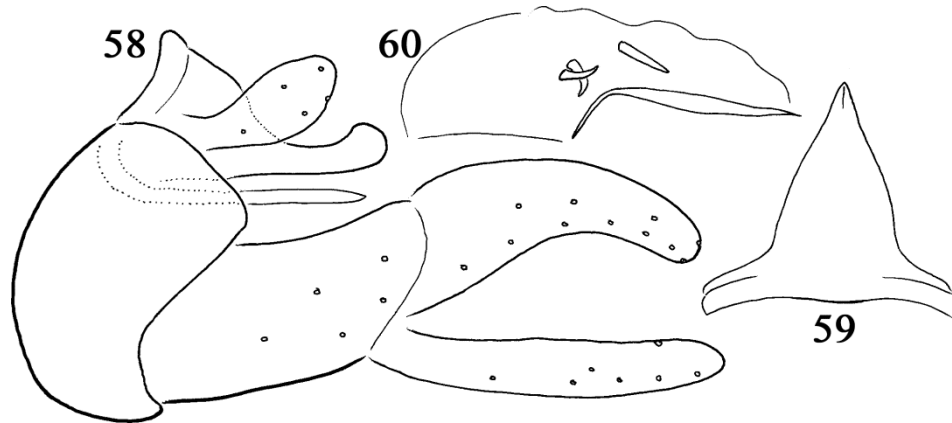
donné une iconographie de ces Trichoptères, ceci était d’ailleurs intéressant pour *P. flavidus* Hagen, car sans voir le type, nous n’aurions pu le différencier de *P. variegatus* Scopoli. Les ailes sont nettement caractéristiques par leur teinte, il est d’ailleurs assez rare chez les Trichoptères qu’à un tel caractère ne correspondent pas d’autres variations dans l’armure génitale.”

Hydropsyche pictetii Costa, 1847:120–123: McLachlan 1878:387. “This may, perhaps, be the proper place to notice *Hydropsyche pictetii* Costa (Ann. Ac. Nat. Napoli, 1847, 120; Faun. Reg. Napoli, Frigan., 5, pl. xiii, fig 10), of which I have not seen a type. Hagen has referred it doubtfully to *Polycentropus*, but the size given (long, cum alis lin. 6) is so much in excess of that of an ordinary *Polycentropus*, as to induced me to think it may be a *Philopotamus*; and Costa alludes to its apparent resemblance to *variegatus*.”

Philopotamus hispanicus McLachlan, 1878:386 var. of *variegatus*, only ♀. “Spain (Sierra de Grades, Bolivar).” “Differs especially in the spots of the anterior-wings being more numerous and paler, (almost whitish-yellow); apical fork No. 4 with a footstalk. Posterior-wings much paler, with very distinct whitish-yellow spots round the apical margin, and a faint paler reticulation in the apical portion: the neuration dark and very distinct (in consequence of the paler ground). “I strongly suspect that this is a distinct species, but cannot decide in the absence of ♂. I have two ♀ before me.” **Syn. nov.**

Philopotamus pedemontanus Navas, 1933:158–159: “Patria: Bollengo (Aosta) 13–20.VI.1931.” “Similis montano.” “Ho nominato pedemontanus, per il suo habitat, questa specie, che mi pare notevole e ben distinta dal *montanus* Don. e dal *variegatus* Scop., colle quali ha alcune affinità. L’aspetto generale è del *montanus* specialmente nelle ali; ma i cerci del maschio sono diversi: negli inferiori il ramo inferior è più lungo del ramo superior, mentre il contrario avviene nel *montanus*. Le antenne assomigliano a quelle del *variegatus*, ma i palpi sono brunastri, i cerci diversissimi da quelli di questa ultima specie. Inoltre i cerci superiori sono di una forma interamente diversa da quella delle altre specie congeneri.” (Syn. Schmid 1949)

Philopotamus variegatus (Scopoli, 1763): Botosaneanu 1960:224. “Dans *P. variegatus* le phallus présente un sclérite ventral parfaitement éfilé à l’apex, et une armature qui se compose d’une épine distale robuste et pas très longue, d’habitude à double ou triple pointes, et de deux épines proximales robustes-



Figures 58–60. *Philopotamus variegatus* (Scopoli, 1763), male: 58 = genitalia in left lateral view; 59 = dorsal profile of segment X; 60 = phallic organ in left lateral view.

tes, à base large et fortement recourbées en crochets; l'organe de la région où s'ouvre le ductus ejaculatorius est nettement différent de celui de *montana*."

Philopotamus variegatus variegatus (Scopoli, 1763): Gonzalez & Terra 1979:170. Material estudiado. España. El Paular (Sierra del Guadarrama, Madrid), 1200 m, 15.V.1976, 4 ♂♂ (Leg. V. Monserrat y R. Outerelo). España. Piedralaves, Garganta de Nuño-cojo (Avila), 400 m, 3. V. 1975, 6 ♂♂, 3 ♀♀ (Leg. V. Monserrat. La forma del X terguito no presenta variaciones respect a la de los *P. variegatus* de otras zonas europeas. La armadura fálica se compone de una espina distal, cilindrocónica, frecuentemente provista de pequeños dientes en su porción anteapical, y de dos espinas proximales, curvadas en forma de uña."

Material examined. Czech Republic: Northern Bohemia, Jizerské hory Mts. Jedlový důl valley, 650 m 50°47'11"N, 15°14'38"E 10.VII.2001, leg. F. Krámpf (at light) (10♂2♀ OPC). Western Bohemia, Krušné hory Mts. Hluboký brook NW Sokolov 50°14'24"N 12°36'24"E, 540 m V.-VII. 2015, leg. M. Kosík (10♂4♀ OPC). **Hungary:** Zemplén Mts., Telkibánya, ligh trap, 1–20. VIII. 1985, (54 males, OPC). Zemplén Mts., Kemence valley, singled along the stream, 14. VI. 1985, leg. J. Oláh (1 male, OPC). **Poland:** Gorce Mts., Kamienica stream, 26.VI.1985, singled by netting leg. J. Oláh (10 males, 3 females; OPC). **Romania:** Vâlcea county, Parâng Mts, Obrâșia Lotrului, open spring area, 500 m along Transalpina (67C)

road, downstream from 45°22'27.7"N, 23°39'4.0"E, 1915 m, 30.VI.2016, leg. J. Oláh & J. Oláh jr. (6 males, 4 females; OPC). Apuseni Mts, Ocolis, 46.30449°N 23.26474°E, 519m, 29.V.2007, leg. M. Bálint (4 males, 1 female, OPC). Rodna Mts. Borsa-Statiunea Borsa, garden, 878m 47°36'48.0" N E24°46'55.8"E, 28–29.VI.2005, light trap, J. Kontschán, D. Murányi, K. Orci (1 male, HNHM). Transylvania, Lacu Rozu, Valea Cupas, 17.VII.1981, light leg. L. Peregovits & L. Ronkay (2 males, OPC). Viso spring area tributaries, 15.VI.1993, leg. J. Oláh (2 males, OPC). Apuseni Mts. Muntii Gilaului, Muntele Baisorii, stream Valea Gera, 46°33.001' 23°20.014'E, 1055m, 18. VI.2013, light leg. J. Oláh, Cs. Balogh, & S. Fekete (8 males, 3 females; OPC). Apuseni Mts. Muntii Trascaului, Valea Borzesti stream, near Turda, 20.VI.2013, sinled leg. J. Oláh, Cs. Balogh, & S. Fekete (2 males, OPC). Apuseni Mts., Vladeasa Mts., Jada stream, Cascada Valul Mir-esei, 46°42'42.2"N 22°35'04.9"E 900m, 3. VII. 2013, leg. Cs. Balogh, (3 males; OPC). **Slovakia:** Rozsnyó valley, 24.VII.1964, singled by sweep netting, leg. J. Oláh (3 males, OPC). Muranska Plain, Hrdzava Dolina, 26.VII.1964, singled by sweeping, leg. J. Oláh (1 male, OPC). Tátralomnic, along stream in pine forest, 19.VII. 1966, singled by sweeping, leg. J. Oláh (1 male, OPC). Biela Voda, 22.VII.1966, singled by sweeping, leg. J. Oláh (9 males, OPC). Slovakia, Zdiar, Riglany stream, 23.VII.1966, singled by sweeping, leg. J. Oláh (1 male, OPC).

Revised diagnosis. Having dorsal profile of segment X with narrow pointed apical ending; dorsal branch of the harpago downward curving and tapering, ventral sclerite of the aedeagus without hook; with a single primary endothelial spine, this new species belongs to the *Philopotamus variegatus* species group and is most close to *Philopotamus ibericus* sp. nov., but differs by the head of segment X less narrow and less pointed apical in dorsal view, and with rounded, not triangular dorsum in lateral view; by shorter downward curving anterior part of ventral sclerite; presence, not absence of the single long and stout primary spine; smaller size of the pair of secondary spines.

Remark. *Philopotamus hispanicus* McLachlan, 1876 was described from Spain (Sierra de Grades, Bolivar) as a variation of *Philopotamus variegatus*. The description was based exclusively on wing colour and pattern of two females. Based on this wing colour and pattern description, Navas (1917) has identified *Philopotamus hispanicus* McLachlan from Spain, together with the descriptions of *Philopotamus hispanicus* McLachlan var. *aureus* nov., *Philopotamus hispanicus* McLachlan var. *lucida* nov. and *Philopotamus hispanicus* McLachlan var. *grisea* nov., also from Spain. However, wing pattern, colour and pigment intensity are not sufficient to delineate reliably species in the *Philopotamus* genus. Here we treat *Philopotamus hispanicus* McLachlan, 1876 as synonym of *Philopotamus variegatus* (Scopoli, 1763). **Syn, nov.**

***Philopotamus ludificatus* species group**

Dorsal profile of segment X is narrowing or broad. Coxopodite, the first segment of the gonopod with variously elongated basomesal dent or long digitiform process. Dorsal branch of the harpago is straight or upward curving. Ventral strap or ventral sclerite of the aedeagus hooked. Number of primary endothelial spines is one. With its straight or upward directed dorsal branch of harpago this is a loosely comprised small group integrated under great random environmental per-

turbations and as a result composed of the most chimeric species having trait divergences from both the *Philopotamus montanus* and *Philopotamus variegatus* species groups.

***Philopotamus corsicanus* Mosely, 1938**

(Figures 61–63, Map 4)

Philopotamus corsicanus Mosely, 1938:204–205. “Corsica: Corte, 21.V.-5.VI.1928; Vizzavona, 13.VII–5.IX.1931. Corsica: in Esben Petersen’s collection.” “Type ♂ in the author’s collection, now lodged in the British Museum.” “I am now satisfied that the species I had before me is distinct from *siculus*, both in neurulation and also in the form of the inferior appendages. McLachlan states of *siculus* that it is related to *montanus*, and the upper branch of the second joint of the appendage is broad; he adds that apical fork no. 4 of the anterior wing has a long foot-stalk. In *corsicanus* the upper branch of the terminal joint of the inferior appendages is narrow, and the foot-stalk of fork no. 4 of the anterior wing is not so long as in *siculus*, and in some examples even sessile.”

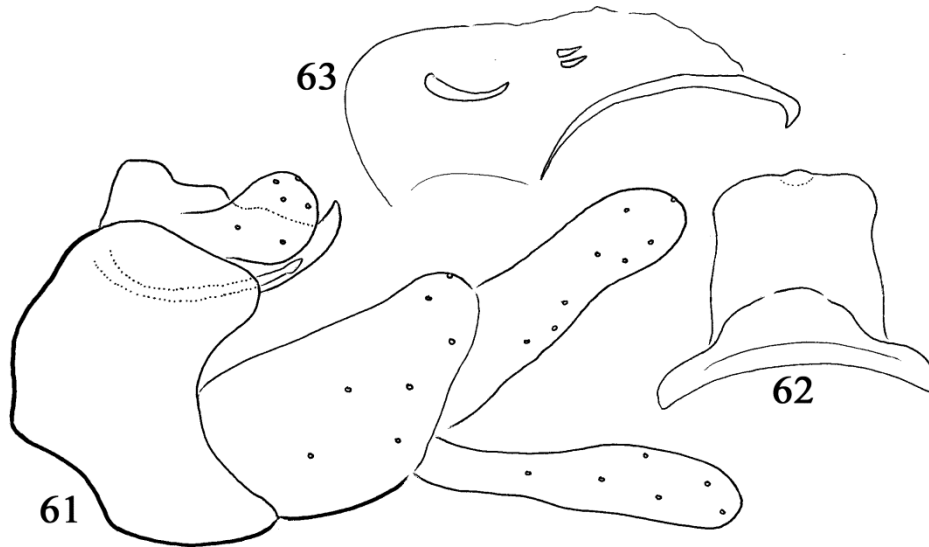
Material examined. **France:** Galeria-Haut Corse, Loc. Le Fango, Fiume Fango, 29 m, TL, 26.VI.2000, leg. B. Salmini (3 males, OPC). France, Corsica, 4.5 km W Corte, Gorges du Tavignano, river, 700 m, 7.VI.2000, leg. J. Hájek (1♂ NMPC).

Revised diagnosis. Easily recognisable by the straight dorsal branch of the harpago; by the small dent of coxopodite shifted dorsad; by the subquadrangular dorsal profile of segment X; by the ventral sclerite of phallic organ with the downward turning hook formation and by the single primary endothelial spine located basad of the pair of secondary spines coupled with the sclerotized structure of the head of ductus ejaculatorius.

***Philopotamus ketama* Giudicelli & Dakki, 1984**

(Map 4)

Philopotamus ketama Giudicelli & Dakki, 1984:91-93. “Holotype ♂: **Maroc**, Rif (petit source-R3-près de la route P 39 de Bab-Bered à Ketama, à environ 14



Figures 61–63. *Philopotamus corsicanus* Mosely, 1938, male: 61 = genitalia in left lateral view; 62 = dorsal profile of segment X; 63 = phallic organ in left lateral view.

km de Ketama), le 22.IX.1979.” “*Philopotamus ketama* est proche du groupe *ludificatus-corsicanus*. Elle présente les plus grandes affinités avec *P. corsicanus* Mosely, endémique corse; elle s’en distingue par la forme générale de l’harpago (bord ventral de la branche dorsale sinueux avec épines plus nombreuses et branche ventrale plus courte que la branche dorsale chez *P. corsicanus*).

Material examined. No specimens of this interesting species were available for study and to produce comparative drawings.

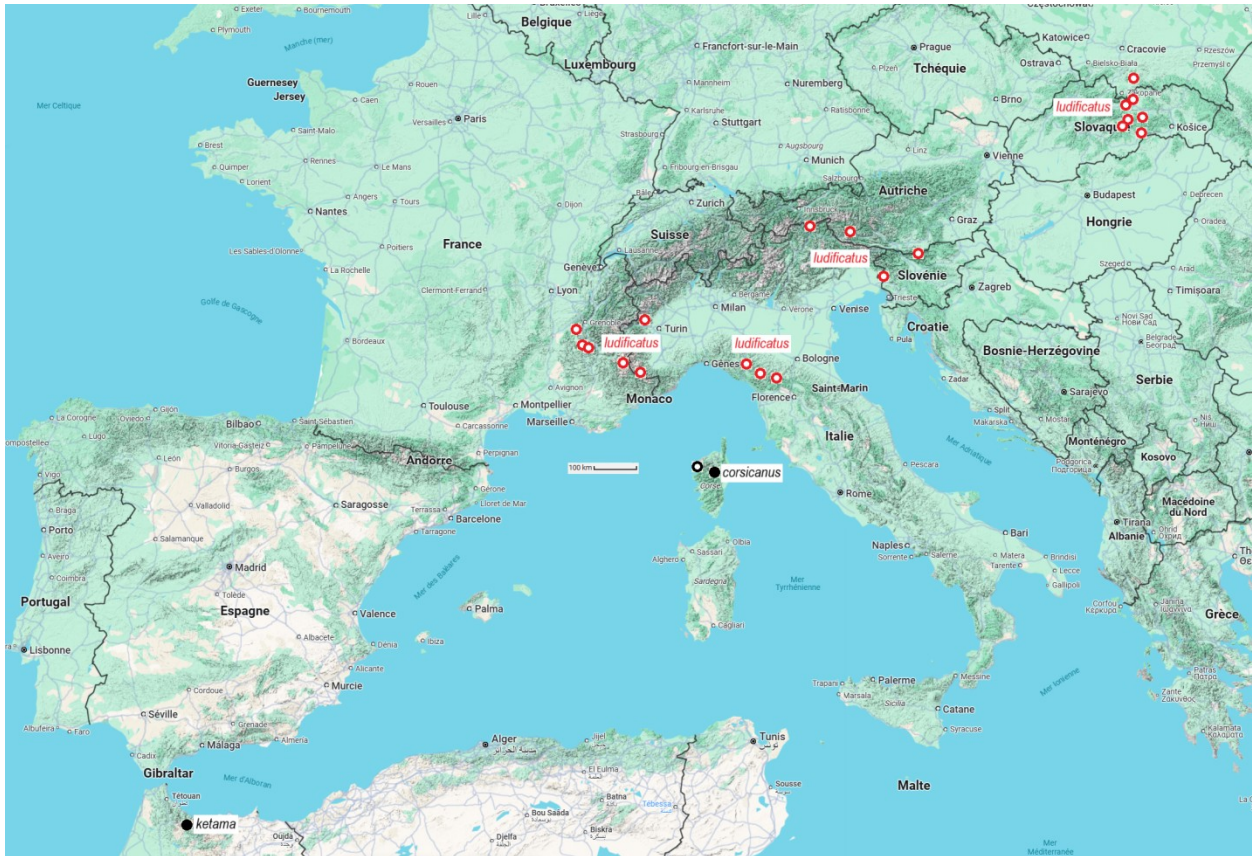
Philopotamus ludificatus McLachlan, 1878

(Figures 64–66, Map 4)

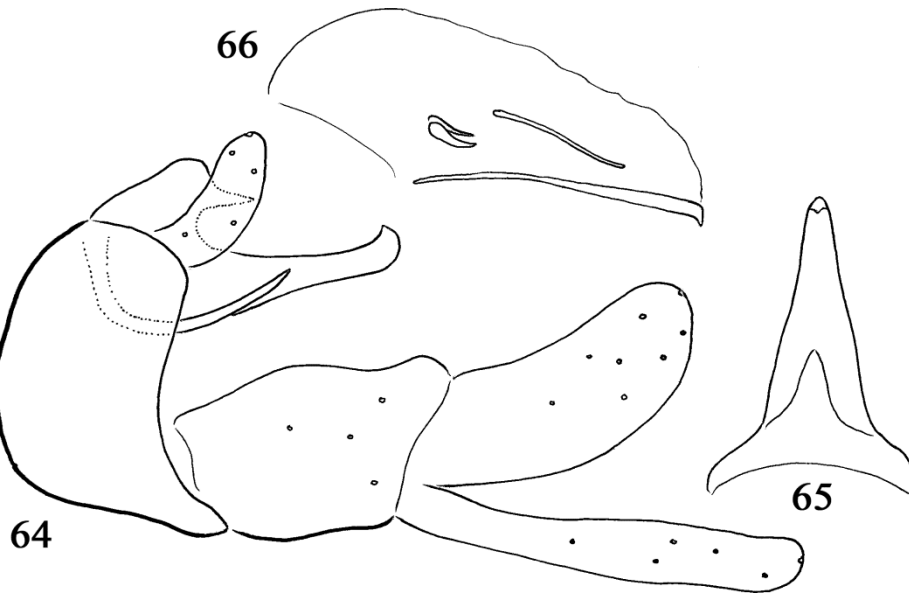
Philopotamus ludificatus McLachlan, 1878:381–382. “France, Belgium, Switzerland, North Italy, Central Germany, Austrian Empire, Greece. It does not occur in the British Isles, nor in the Scandinavia.” “The ♂ instantly recognisable by the up-curved superior branch of the second joint of the inferior appendages; in all other known species this is curved downward at the tip.”

Material examined. **Austria:** Lienz, a. d. Drau, 16.VI.1938, leg. József Sători (3 males, OPC). Mondsee, 8.VII,1986 light leg. J. Oláh (3 males, 4

females; OPC). Karawanken, Vellach stream, 25.VII,1989, 8.VII,1986, singled by sweep netting along stream, leg. J. Oláh (4 males, 1 female; OPC). **France:** La Condamine, Provence Alps, 1263 m, 44.451°N 6.741°E, 11.VII.2007, leg. M. Bálint (1 male, OPC). Western Alps, Lalley, 1221 m, 44.732°N 5.679°E, 16.VII.2007, leg. M. Bálint (9 males, 1 female, OPC). Drôme, Vercors, Tourtre, Adouin, 760 m, 45.0035°N, 5.4563°E, 11.III.2022, leg. G. Vinçon (6 males, 4 females; OPC). Drôme, Dévoluy massif, Jarjatte, Fontaine des Mougious, very nice spring, 1470 m, 44.6863°N, 5.7964°E, 13.05.2024, leg. G. Vinçon (2 males, 6 females; OPC). **Italy:** Atesine Alps, N. Maranza, spring and brook, 1590 m, 46.8345°N, 11.6479°E, 25.V.2022, leg. G. Vinçon (2 males, 3 females; OPC). Maritime Alps, S.E. Pratolungo, Vallone di Riofreddo, big torrent, 44.2484°N, 7.176°E, 1500 m, 10.08.2020, leg. Gilles Vinçon (8 males, 7 females; OPC). Graian Alps, Viu Valley, Borgial, big torrent, 45.203N 7.302E, 1500 m, 26.VI.2020, leg. Gilles Vinçon (4 males, OPC). Northern Apennines, Toscane, Croce Arcana, spring and brooklet, 44.129°N, 10.767°E, 1450 m, 8.VI.2020, leg. Gilles Vinçon (1 male, OPC). Emilia-Romagna: Passo delle Radici, Nd slope, 1430 m, brook, 44.197°N, 10.501°E, 4.VI.2020, leg. Gilles Vinçon (2 males, OPC). Atesine Alps, N. Maranza, big brook near



Map 4. Species distribution of the *Philopotamus ludificatus* species group (full circles represent the type localities).



Figures 64–66. *Philopotamus ludificatus* McLachlan, 1878, male: 64 = genitalia in left lateral view; 65 = dorsal profile of segment X; 66 = phallic organ in left lateral view.

Hexenhütte, 1750 m, 46.8562°N, 11.6637°E, 25.V.2022, leg. G. Vinçon (4 males, 3 females; OPC). Emílie-Romagne, above Prato Spilla, from 1580 m, 44.352°N, 10.1001°E to 1630 m, 44.35°N, 10.1°E, 16.V.2022, leg. G. Vinçon (4 males, 3 females; OPC). **Poland:** Gorce Mts. Kamienica stream, 26.VI.1985, singled by sweep netting along the stream, leg. J. Oláh (12 males, 6 females; OPC). **Slovakia:** Rozsnyó valley, 24.VII.1964, singled by sweep netting, leg. J. Oláh (4 males, OPC). Hnilec valley, 27.VII.1964, singled by sweep netting, leg. J. Oláh (2 males, OPC). Muranska Plain, Hrdzava Dolina, 26.VII.1964, singled by sweeping, leg. J. Oláh (2 males, 1 female; OPC). Tatralomnic, pine forest stream, 9.VII.1966, singled by sweeping, leg. J. Oláh (1 male, OPC). Tatralomnic, pine forest stream, 16.VII.1966, singled by sweeping, leg. J. Oláh (2 males, OPC). Tatralomnic, main stream, 16.VII.1966, singled by sweeping, leg. J. Oláh (1 male, OPC). Csorba lake, stream, 17.VII.1966, singled by sweeping, leg. J. Oláh (1 male, OPC). Biela Voda, 22.VII.1966, singled by sweeping, leg. J. Oláh (1 male, OPC). High Tatra, Zdiar, 27.V.1986, singled by sweep netting along stream leg. J. Oláh (4 males, 2 females; OPC). Rejdova (Sajó-réde), Slana (Sajó) stream, lower reach, 48°48'5''N 20°13'33''E 910 m, 3. X. 2013, singled leg. J. Oláh & J. Kecskés (1 male, OPC). **Slovenia:** Julian Alp, Soca Valley, tributary to Soca stream, 23.VI.1988, singled by sweep netting along stream, leg. J. Oláh (2 males, 4 females; OPC).

Revised diagnosis. Easily recognisable by the upward turning dorsal branch of the harpago; by the elongated basomesal dent of coxopodite; by the elongated and narrowing dorsal profile of segment X; by the ventral sclerite of phallic organ with the very tiny pointed ventrum of the terminal hook and by the primary endothecal spine modified into a very thin rod-like structure somehow connected to or moving together with the sclerotized head of ductus ejaculatorius as observed in various stages of copulating males.

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Living picture of *Philopotamus epirus* Oláh & Ibrahimi sp. nov.