Opusc. Zool. Budapest, 2026, 57(1): 47–72

On the Trichoptera of Western Europe, with revisiting the *Anisogamus* and *Sericostoma* genera (Trichoptera)

J. OLÁH[1]& G. VINÇON[2]

[1]*János Oláh, Residence postal address: Tarján u. 28, H-4032 Debrecen, Hungary. E-mail: profolah@gmail.com*
https://orcid.org/0000-0002-6137-0553

[2]*Gilles Vinçon, 55 Bd Joseph Vallier, F-38100 Grenoble, France. E-mail: gvincon@gmail.com*
https://orcid.org/0000-0003-4702-5136

Abstract. In this paper on the Trichoptera of Western Europe, we describe four new species: *Wormaldia atesina* sp. nov., *Hydropsyche loirensis* sp. nov., *Drusus mirus* sp. nov. and *Anisogamus cottius* sp. nov. Our unfortunate combinations of *Chaetopteryx kimera* Oláh & Vinçon, 2021 and *Consorophylax kimera* (Oláh & Vinçon, 2021) was corrected as *Acrophylax zerberus* Brauer, 1867. Revisiting the *Anisogamus* and *Sericostoma* genera the species status of *Anisogamus noricanus* McLachlan, 1875 and *Anisogamus nurianus* (Navas, 1917) were reinstated. In *Sericostoma* genus three species groups and three species complexes were re-diagnosed with their paraproct atlas of species: (1) *Sericostoma schneideri* species group with two armed deeply furcated paraproct composed of ten species: *schneideri*, *alakir*, *dimcay*, *flavicorne*, *ida*, *mesopotamicum*, *pinargozu*, *taskent*, *yuvarlakcay*. (2) *Sericostoma personatum* species group with two armed shallowly furcated paraproct composed of nine species in three species complexes. *Sericostoma personatum* species complex: *personatum*, *pedemontanum*, *subaequale*, *unaequale*. *Sericostoma maclachlanianum* species complex with two-armed extremely widely opened abbreviated paraproct, dorsal arm longer: *maclachlanianum*, *sasbaddes*. *Sericostoma vittatum* species complex with two-armed widely opened paraproct, dorsal arm with or without dorsal subapical elevation: *baeticum*, *heracles*, *vittatum.* (3) *Sericostoma galeatum* species group with lanceolate paraproct also composed of eight species: *galeatum*, *bergeri*, *cianficconiae*, *clypeatum*, *confusum*, *grusiense*, *italicum*, *romanicum*, *siculum*. We have established the variability ranges with presenting the paraproct that is the key speciation trait for the *baeticum-vittatum* and *pedemontanum-personatum* siblings, as well as for the widely distributed and taxonomically debated species, *Sericostoma schneideri*. Examining the paraproct of 22 populations from Britain and 5 populations from Ireland in context of larval findings, we have demonstrated by adult trait matrixes the presence of *Sericostoma personatum* (Spence, 1826) and the absence of *Sericostoma schneideri* (Kolenati, 1848) on The British Islands.

Keywords. New species, Western Europe, *Anisogamus* taxonomy, *Sericostoma* taxonomy.

INTRODUCTION

This is our third paper on the Trichoptera of Western Europe (Oláh *et al.* 2022, Oláh & Vinçon 2023). In the second paper we have surveyed briefly the taxonomic status of the *Anisogamus* and *Sericostoma* genera (Oláh & Vinçon 2023). After having collected and received more specimens here we revisit these genera in order to describe new species, reinstate certain species' statuses, re-diagnose species groups and to prepare speciation trait matrixes for documenting variability ranges of closely related incipient species.

MATERIAL AND METHODS

In the *Material examined* paragraph we have listed all the old and newly collected specimens, all the additional specimens received from Spain, Germany, Czech Republic, Sweden as well as pictures of paraproct and determinations of specimens from Britain and Ireland (see the Acknowledgements). For population studies we have cleared and cleaned the genitalia of all specimens with sophisticated KOH and manual treatment, carefully exposed the speciation traits of paraproct (*Sericostoma* genus) and paramere (*Anisogamus* genus) for creating the speciation

urn: lsid:zoobank.org:pub:FF3A918B-3C22-4B58-8606-A23FC0A031D4 *published: 24 April 2026*
HU ISSN 2063-1588 (online) *https://doi.org/10.18348/opzool.2026.1.47*

trait matrixes to delineate variability ranges for the incipient species.

TAXONOMY

Philopotamidae Stephens, 1829

Philopotamus ludificatus McLachlan, 1878

Material examined. **Italy,** Rhaetian Alps, above Livigno, brook and springs, 2150–2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18. 06.2023, leg. G. Vinçon (3 males, OPC). Brembana Valley, Passo San Marco, S. slope, 1710 m, spring, 46.0389°N, 9.6358°E, 18.06. 2023, leg. G. Vinçon (5 males, 2 females; OPC). Brembana Valley, Passo San Marco, S. slope, 1650 m, spring and brook, 46.0427°N, 9.6431°E, 18.06. 2023, leg. G. Vinçon (7 males, 3 females; OPC). Atesine Alps, N. Maranza, bottom of the cascade and brook and spring, 2000–2120 m, 46.8733°N, 11.6635°E – 46.8743° N, 11.659°E, 19.06.2023, leg. G. Vinçon (7 males, 2 females; OPC). Atesine Alps, N. Maranza, brook and spring, 2200 m, 46.8735°N, 11.659°E, 19.06.2023, leg. G. Vinçon (3 males, OPC). Brembana Valley, Passo San Marco, N. slope, 1560–1590 m, brook and spring, 46.0691°N, 9.629°E, 18.06. 2023, leg. G. Vinçon (4 males, 2 females; OPC). Rhaetian Alps, Stelvio Pass, spring, 2060 m, 46.5152°N, 10.4057°E, 19. 06.2023, leg. G. Vinçon (1 male, OPC). Brembana Valley, Passo San Marco, N. slope, 1800 m, slopy brook, 46.0581°N, 9.63° E, 18.06.2023, leg. G. Vinçon (1 male, OPC). Trentino Alto Adige, Atesine Alps, > Maranza, brook, 1730m, 46.8522°N, 11.6611°E, 18. VII.2025, leg. G. Vinçon (5 males, 2 females; OPC). Below Grand St Bernard Pass, torrent, 2250m, 45.8656°N, 7.1595° E, 17.VI. 2025, leg. G. Vinçon (15 males, 1 female; OPC). **France**, Alpes-de-haute-Provence, Laverq Valley, spring and brook, 2100m, 44.3076°N, 6.5245°E, 5.VI.2025, leg. G. Vinçon (4 males, 5 females; OPC).

Wormaldia atesina sp. nov.

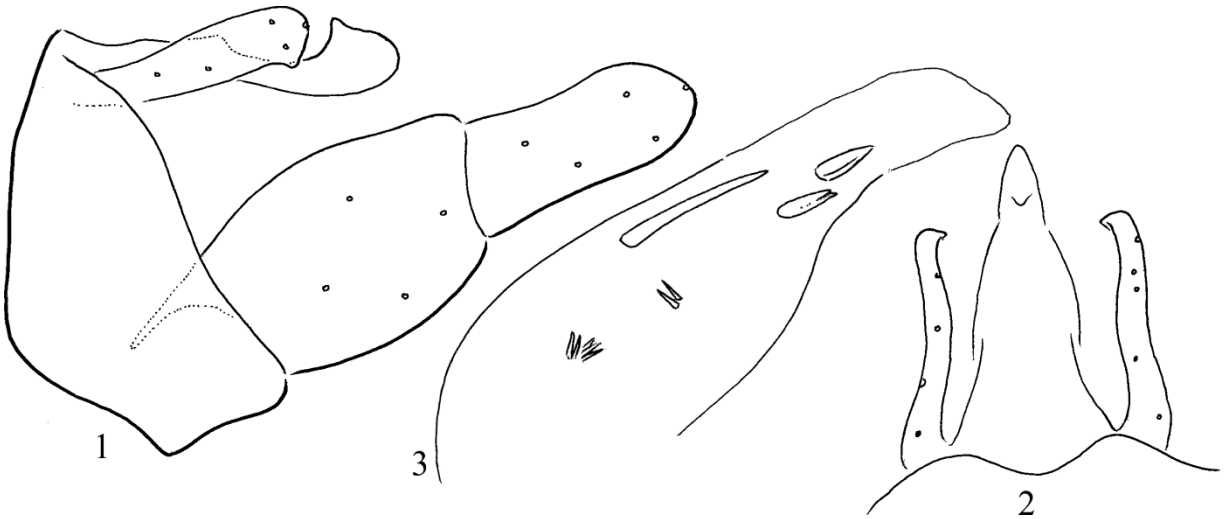
(Figures 1–3)

Material examined. **Holotype: Italy,** Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, below San Salvatore ai Bagni (Bagni di San Candido), mineral spring, 1320 m, 46.7213°N, 12.2947°E, 19.06. 2023, leg. G. Vinçon (1 male, OPC). **Paratype**: same as holotype (1 male, OPC).

Diagnosis. Having parallel-sided harpago, *W. atesina* sp. nov. belongs to the *Wormaldia occipitalis* species group and having almost complete endothecal spine system with three stout spines besides the slender long basal spines and the clusters of small tiny spines, this new species is a member of the *W. occipitalis* species complex. There are a small number of species in this complex with reduced cluster size of small spines distributed in the Alpes-Maritimes (*W. maritima*), Ligurian Apennines (*W. ligurica*), Toscana (*W. reggella*, *W. toscanica*). *Wormaldia atesina* sp. nov. in the Dolomitti also has only two clusters of small, tiny spines and the spine numbers inside the clusters are only two and five. According to the head of segment X and the endothecal spine pattern it is most close to *W. ligurica*, but differs by the more reduced spine pattern and the more pronounced subapical point on the head of segment X as well as by the rounded, not narrowing apical ending of the head of segment X. Moreover, one of the periphallic organs, the cercus differs from all its relatives; it is pointed subapicad not rounded.

Description. Male (in alcohol). Medium-sized brown animal. Sclerites medium brown, setal warts both on head, thorax and legs brown. Maxillary palp formula is I-II-IV-III-V. Forewing length 8 mm. Spur formula is 244.

Male genitalia. The head of segment X is characterized by a very pronounced dorsal pointed subapical process visible in lateral view; apex elongated semicircular with rounded terminal ending in lateral view; the ending is armed with sensory structures of *sensilla basiconica* (pegs) or *sensilla coeloconica* (pitted pegs) of unusual enlarged alveoli giving a rough surface. Cerci slender with small pointed ventroapical outgrowth in lateral view. Gonopods very produced, coxopodite and harpago with almost equal length; harpagones parallel-sided with slightly capitate



Figures 1–3. *Wormaldia atesina* sp. nov. Holotype male: 1=male genitalia in left lateral view, 2=mesal excision on tergite VIII and segment X with cerci in dorsal view, 3=phallic organ with the endothecal spine pattern in left lateral view.

head in lateral view. Phallic organ with eversible membranous endotheca containing elaborated network of spines as detailed below.

Character combination. (1) Dorso-subapical point of segment X is pronounced, visible in lateral profile as the top formed by the apical right-angle of the dorsal concavity. (2) Apex of segment X slightly elongated semicircular. (3) Apex of cerci with ventroapical point. (4) Small ventromesal projection of cerci present. (5) Harpagones parallel-sided with very slight middle constriction and with capitate head. (7) There is no slender basal spine present. (8) Proximal clusters of small spines composed of a few spines. (9) Distal cluster present, but composed of two spines. (10) Two short stout and one long, stout and straight spines present. (11) No arching cluster of small spines developed.

Etymology. Named after the region of the type locality.

Wormaldia copiosa (McLachlan, 1868)

Material examined. **Italy,** Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, below San Salvatore ai Bagni (Bagni di San Candido), nice mineral spring, 1320 m, 46.7213N, 12.2947E, 19.06.2023, leg. G. Vinçon (1 male, OPC). Italy, Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, below San Salvatore ai Bagni (Bagni di San Candido), nice mineral spring, 1320 m, 46.7182°N, 12.294°E, 18.VII. 2025, leg. G. Vinçon (9 males, 11 females; OPC).

Wormaldia mclachlani Kimmins, 1953

Material examined. **Italy,** Brembana Valley, Passo San Marco, N. slope, 1920–1950 m, nice brook and spring, 46.052°N, 9.628°E, 18.06.2023, leg. G. Vinçon (2 males, OPC). Aosta Valley, High Ayas Valley, above Lago Blu, 2230–2480 m, torrent and big spring, 45.892°N, 7.744°E – 45.9073°N, 7.7532°E, 17.06.2023, leg. G. Vinçon (1 male, OPC). Graian Alps, Lys Pass, S. Niquidetto, spring and brook, 1250m, 45.1843°N, 7.3647°E, 15.VII.2025, leg. G. Vinçon (1 male, OPC).

Psychomyiidae Walker, 1852

Tinodes jeekeli Botosaneanu, 1980

Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1710 m, nice spring, 46.0389°N, 9.6358°E, 18.06.2023, leg. G. Vinçon (7 males, 5 females; OPC).

Hydropsychidae Curtis, 1835

Diplectroninae Ulmer, 1951

***Diplectrona atra* McLachlan, 1878**

Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1710 m, spring, 46.0389°N, 9.635°8E, 18.06.2023, leg. G. Vinçon (5 males, 4 females; OPC). Italy, Brembana Valley, Passo San Marco, S. slope, 1650 m, nice spring and brook, 46.0427°N, 9.6431°E, 18.06. 2023, leg. G. Vinçon (9 males, 2 females ; OPC).

Hydropsychinae Curtis, 1835

***Hydropsyche loirensis* sp. nov.**

(Figures 4–8)

Material examined. Holotype: **France,** Maine et Loire, Louet River at Murs Erigné, 20m, 47.4035°N, 0.5452°W, 10.IV.2025, leg. G. Vinçon (1 male, OPC).

Diagnosis. This new species has resemblance to *Hydropsyche tobiasi* Malicky, 1977, but differs by lateral and ventral profiles of the phallotheca having regular tube, not constricted middle; head of phallotheca broadening, not parallel-sided in ventral view as well as head apicodorsum triangular, not semicircular.

Description. Male (in alcohol). Medium sized species. Body dark brown, almost castanean black; thoracic sclerites black; appendages including legs dark brown. Forewing dark brown. Length of forewing 9 mm.

Male genitalia. Segment IX fused annular and short, particularly on its ventrum; its median keel broad-based triangular; apical lobe on postero-lateral margin short and rounded triangular. Intersegmental profile between the ninth and tenth segments right-angled. Segment X short with well-produced setaless winglets double triangular in lateral view and small triangular lobes in dorsal view; lateral setose area, the cerci circular and located in apical position; ventroapical setose lobes short, less produced. The coxopodite of the gonopod as long as the apex of segment X; harpago broad-headed. Phallic organ with parallel-sided straight tube arching high basad in lateral view; head dorsum produced triangular, obliquely truncated straight.

Etymology. Named after the locus typicus.

Rhyacophilidae Stephens, 1836

***Rhyacophila glareosa* McLachlan, 1867**

Material examined. **Italy**, Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, S.E. Moso, nice springs below water capture, trib. Rio Bianco, 1650 m, 46.6557°N, 12.4062°E, 18.VII.2025, leg. G. Vinçon (1 male, OPC).

***Rhyacophila kelnerae* Schmid, 1971**

Material examined. **Italy,** Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370 m, 45.8955°N, 7.7448°E, 16.VII. 2025, leg. G. Vinçon (8 males, 11 females; OPC).

***Rhyacophila meyeri* McLachlan, 1879**

Material examined. **Italy,** Rhaetian Alps, above Livigno, nice brook and springs, 2150–2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18.06.2023, leg. G. Vinçon (1 male, OPC).

***Rhyacophila orobica* Moretti, 1991**

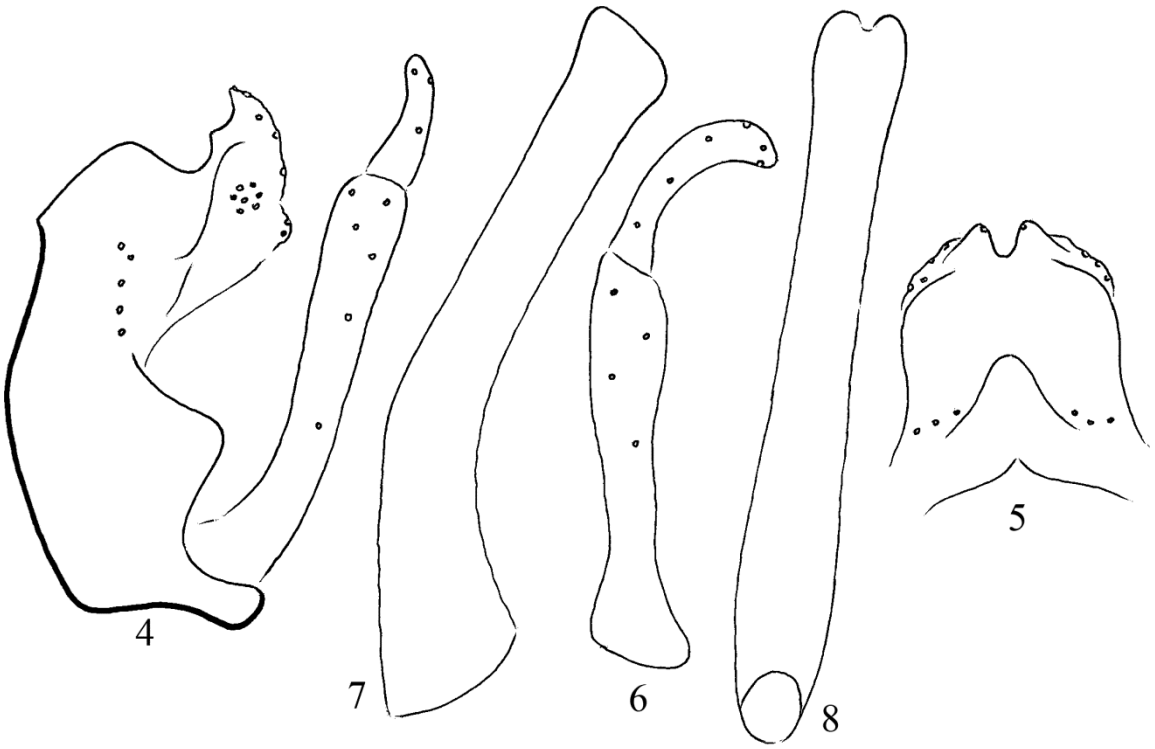
Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1650 m, nice spring and brook, 46.0427°N, 9.6431°E, 18.06.2023, leg. G. Vinçon (2 males, OPC).

***Rhyacophila producta* McLachlan, 1879**

Material examined. **Italy,** Lombardie, Passo Crocedomini, Malga Cadino, nice springs, 1750 m, 45.917°N, 10.4269°E, 19.VII.2025, leg. G. Vinçon (1 male, 2 females; OPC).

***Rhyacophila stigmatica* (Kolenati, 1859)**

Material examined. **Italy,** Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo,



Figures 4–8. *Hydropsyche loirensis* sp. nov. Holotype male: 4=male genitalia in left lateral view, 5=segments IX and X in dorsal view, 6=left gonopod in ventral view, 7=phallic organ in left lateral view, 8=phallic organ in ventral view.

below San Salvatore ai Bagni, nice brook, 1230 m, 46.7282°N, 12.2945°E, 19.06.2023, leg. G. Vinçon (7 males, 4 females; OPC).

Rhyacophila tristis Pictet, 1834

Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1710 m, nice spring, 46.0389°N, 9.6358°E, 18.06.2023, leg. G. Vinçon (14 males, 8 females; OPC). Brembana Valley, Passo San Marco, S. slope, 1650 m, nice spring and brook, 46.0427°N, 9.6431°E, 18.06.2023, leg. G. Vinçon (11 males, 3 females; OPC). Brembana Valley, Passo San Marco, N. slope, 1800 m, slopy brook, 46.0581°N, 9.63°E, 18.06.2023, leg. G. Vinçon (1 male, OPC). Trentino Alto Adige, Atesine Alps, > Maranza, nice brook, 1730m, 46.8522°N, 11.6611°E, 18.VII.2025, leg. G. Vinçon (5 males, 9 females; OPC). Rhaetian Alps, Gavia Pass, brook below a small lake, 2670m, 46.3664°N, 10.4977°E, 17.VII.2025, leg. G. Vinçon (8 males, 3 females; OPC). Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, below San Salvatore ai Bagni, nice brook with mosses, 1240m, 46.7213° N, 12.2947°E, 18.VII.2025, leg. G. Vinçon (7 males, 9 females; OPC).

Rhyacophila vulgaris Pictet, 1834

Material examined. **Italy,** Lombardie, Passo Crocedomini, Malga Cadino, nice springs, 1750 m, 45.917°N, 10.4269°E, 19.VII.2025, leg. G. Vinçon (2 males, 1 female; OPC).

Goeridae Ulmer, 1903

Lithax niger (Hagen, 1859)

Material examined. **Italy,** Rhaetian Alps, above Livigno, brook and springs, 2150–2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18.06.2023, leg. G. Vinçon (3 males, 2 females; OPC). Italy, Atesine Alps, N. Maranza, bottom of

the cascade and brook and spring, 2000–2120 m, 46.8733°N, 11.6635°E – 46.8743°N, 11.659°E, 19.06.2023, leg. G. Vinçon (6 males, 3 females; OPC).

Limnephilidae Kolenati, 1848

Drusinae Banks, 1916

***Drusus alpinus* (Meyer-Duer, 1875)**

Material examined. **Italy,** Val Savaranche, above Maisonasse, nice brook, 2070m, 45.5766° N, 7.1963°E, 18.VI.2025, leg. G. Vinçon (1 male, OPC). Italy, above St Jacques, above Lago Blu, nice spring and cascade, 2360m, 45.8955°N, 7.7448°E, 17.VI.2025, leg. G. Vinçon (1 male, OPC).

***Drusus biguttatus* (Pictet, 1834)**

Material examined. **Italy,** Trentino Alto Adige, Atesine Alps, > Maranza, nice brook, 1730 m, 46.8522°N, 11.6611°E, 18.VII.2025, leg. G. Vinçon (6 males, 2 females; OPC).

***Drusus chrysotus* (Rambur, 1842)**

Material examined. **Italy,** Rhaetian Alps, above Livigno, nice brook and springs, 2150–2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18.06.2023, leg. G. Vinçon (1 male, OPC). Italy, Rhaetian Alps, Livigno, S. slope of Passo del Foscagno, spring, 2180m, 46.483°N, 10.2218°E, 17.VII.2025, leg. G. Vinçon (1 male, OPC).

***Drusus discolor* (Rambur, 1842)**

Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1710 m, nice spring, 46.0389°N, 9.6358°E, 18.06.2023, leg. G. Vinçon (2 males, OPC). Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370m, 45.8955°N, 7.7448°E, 16.VII.2025, leg. G. Vinçon (8 males, 5 females; OPC). Rhaetian Alps, Gavia Pass, brook below a small lake, 2670 m, 46.3664°N, 10.4977°E, 17.VII.2025, leg. G. Vinçon (7 males, 3 females; OPC).

***Drusus lapos* Oláh, 2017**

Material examined. **Italy,** Rhaetian Alps, Livigno, S. slope of Passo del Foscagno, spring, 2180 m, 46.483°N, 10.2218°E, 17.VII.2025, leg. G. Vinçon (4 males, 2 females; OPC).

***Drusus leker* Oláh, 2016**

Material examined. **Italy**, Cottian Alps, Prali, above Bout du col, nice brook and springs, from 2240 m, 44.8395°N, 7.0326°E, to 2250 m, 44.8392°N, 7.0332°E, 20.VII.2025, leg. G. Vinçon (1 male, OPC).

***Drusus magas* Oláh, 2017**

Material examined. **Italy,** Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370 m, 45.8955°N, 7.7448°E, 16.VII. 2025, leg. G. Vinçon (1 male, 1 female; OPC). Above St Jacques, above Lago Blu, torrent, 2250 m, 45.8923N, 7.7446°E, 17.VI.2025, leg. G. Vinçon (1 male, OPC). Above St Jacques, above Lago Blu, nice spring and cascade, 2360m, 45.8955°N, 7.7448°E, 17.VI.2025, leg. G. Vinçon (4 males, OPC).

***Drusus melanchaetes* McLachlan, 1876**

Material examined. **Italy,** High Ayas Valley, 2600 m, spring and brook, 45.902° N, 7.763°E, 17.06.2023, leg. G. Vinçon (1 male, OPC). High Ayas Valley, above Lago Blu, 2230–2480 m, torrent and big spring, 45.892°N, 7.744°E – 45.907° N, 7.753°E, 17. 06.2023, leg. G. Vinçon (1 male, 5 females; OPC). Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370 m, 45.8955°N, 7.7448°E, 16.VII.2025, leg. G. Vinçon (1 male, OPC). Above St Jacques, above Lago Blu, torrent, 2250m, 45.892°N, 7.744°E, 17.VI.2025, leg. G. Vinçon (11 males, 8 females; OPC). Above St Jacques, above Lago Blu, spring and cascade, 2360 m, 45.8955°N, 7.7448°E, 17.VI.2025, leg. G. Vinçon (1 male, OPC).

Drusus mirus sp. nov.

(Figures 9–11)

Material examined. Holotype: **France,** Isère, Belledonne Massif, above Crop Lake, nice spring, 2030m, 45.2041°N, 5.9877°E, 8.VII.2023, leg. Nicolas Carjat, a little cousin of the second author, G. Vinçon (1 male, OPC).

Diagnosis. This unique new species having subdivided spine bunch subapicad on the paramere belongs to the *Drusus monticola* species group, although the number of spines in the bunch is reduced to only two small equal spines. The species complexes in this group are delineated by the shape divergences of the dorsal arms of the paraproct. The unusual right-angle patterned dorsal arm of *Drusus mirus* sp. nov. creates difficulties to relate this new species to any of the three known species complexes: *balcanicus*, *destitutus*, *monticola*. However, its periphallic organ of cerci and gonopods as well as the architecture of its paramere clearly relates it to *Drusus melanchaetes* McLachlan, 1876 in the *Drusus destitutus* species complex. The unique, particularly regular right-angled dorsal arm of the paraproct and the reduced subapical spine bunch on the paramere clearly delineates *Drusus mirus* sp. nov. from *Drusus melanchaetes* McLachlan, 1876.

Description. Dark coloured species, at least the head and thoracic sclerites are almost castanean brown. The wings are still not fully pigmented, forewing length 11 mm. Segment IX short; its dorsum very short bridled; its ventrum little longer; there is a pronounced horizontal suture present between tergite and sternite on middle pleural region. Cerci very produced elongated and high foliform.

Male genitalia. Paraproct with unique right-angled pattern clearly visible in lateral view, but discernible also in caudal view. Gonopods over-developed producing long bulk structure constricted middle. Paramere with less developed, almost reduced subapical spine bunch composed only by two small spines.

Etymology. *mirus*, miraculous in Latin refers to the very characteristic and very unusual, unique regular geometry of right-angled pattern of the dorsal arm of the paraproct. These kinds of structural patterns are unusual and rare in nature.

Drusus monticola McLachlan, 1876

Material examined. **Italy,** Rhaetian Alps, Livigno, S. slope of Passo del Foscagno, spring, 2180 m, 46.483°N, 10.2218°E, 17.VII.2025, leg. G. Vinçon (1 female, OPC).

Drusus nebulicola (McLachlan, 1867)

Material examined. **Italy,** Trentino Alto Adige, Atesine Alps, > Maranza, nice brook, 1730m, 46.8522°N, 11.6611°E, 18.VII.2025, leg. G. Vinçon (17 males, 3 females; OPC).

Drusus rhaeticus (Schmid, 1956)

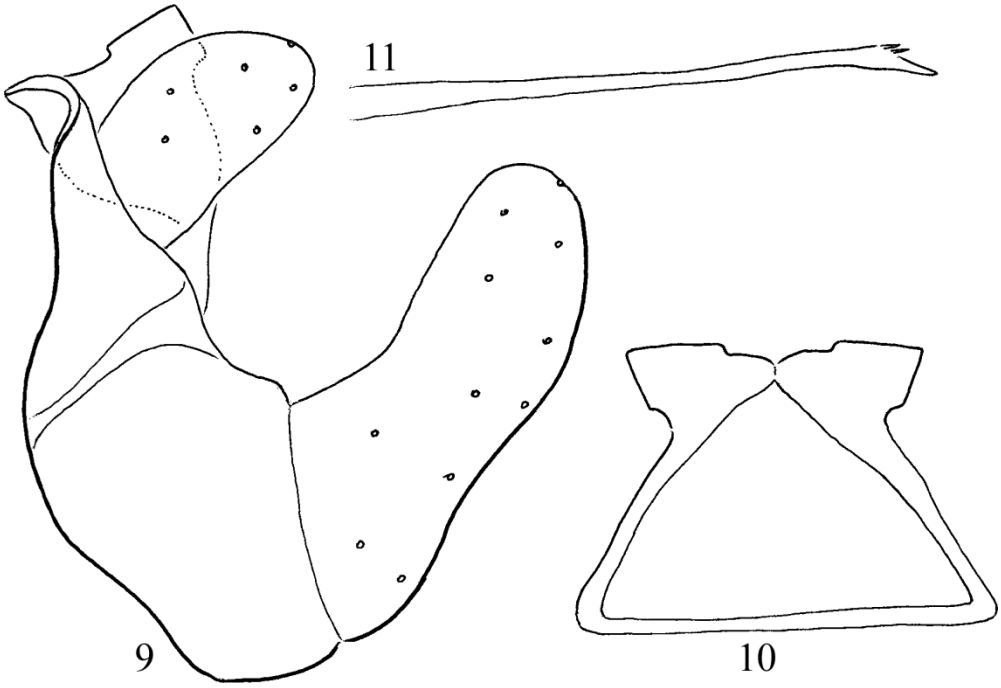
Material examined. **Italy**, Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, S.E. Moso, nice springs below water capture, trib. Rio Bianco, 1650 m, 46.6557°N, 12.4062°E, 18.VII.2025, leg. G. Vinçon (1 male, OPC). Italy, Trentino Alto Adige, Atesine Alps, Dolomiti, Parco Naturale Tre Cime di Lavaredo, below San Salvatore ai Bagni, nice brook with mosses, 1240m, 46.7213°N, 12.2947° E, 18.VII.2025, leg. G. Vinçon (5 males, 4 females; OPC).

Limnephilus bipunctatus Curtis, 1834

Material examined. **Italy,** Valtournenche, above Cheneil, Lago Falinière, 45.849°N, 7.661° E, 2570 m, 10.VIII.2025, leg. G. Vinçon (3 males, 5 females; pupae, subimago, OPC).

Limnephilus coenosus Curtis, 1834

Material examined. **Italy,** Lombardie, Passo Crocedomini, > Malga Cadino, swamp, 2090 m, 45.94°N, 10.4293°E, 19.VII.2025, leg. G. Vinçon (5 males, 4 females; OPC).



Figures 9–11. *Drusus mirus* sp. nov. Holotype male: 9=male genitalia in left lateral view, 10=paraproct in caudal view, 11=left paramere of phallic organ in lateral view.

Limnephilus sparsus Curtis, 1834

Material examined. **Italy,** Lombardie, Passo Crocedomini, > Malga Cadino, swamp, 2090 m, 45.94°N, 10.4293°E, 19.VII.2025, leg. G. Vinçon (1 male, OPC).

Acrophylax Brauer, 1867

Acrophylax zerberus Brauer, 1867

Chaetopteryx kimera Oláh & Vinçon, 2021, in Oláh *et al.* 2021:51. "A rather unique chimeric species having several character states of different origin." Misidentification!

Consorophylax kimera (Oláh & Vinçon, 2021): Oláh *et al.* 2022:164. "The general habitus, the reduced body size, the brachypterous, highly spiny forewings and the enlarged female abdomen are typical character states of several *Chaetopteryx* species. The genital structure as well as the structure of the phallic organ has relations to several stenophylacini and chaetopterygini genera." It has most resemblance to the *Consorophylax* genus. Therefore we change its genus affiliation to *Consorophylax*, comb. nov." Misidentification!

Consorophylax kimera (Oláh & Vinçon, 2021): Oláh *et al.* 2023:56: "This species was only known from the Italian Alps. It is new for France and also the first mention of the genus *Consorophylax* in the Pyrenees. The general tendency for brachyptery is lacking at specimens from the Dolomiti." Misidentification!

*Material reexamined***. France,** Pyrénées-Orientales, Puigmal Massif, Ribera d'Err, 1900–2200 m, 42.3855°N, 2.0926°E, 14.IV.2022, leg. G. Vinçon (22 males, 3 females; OPC). **Italy**, Piemonte, > Cogne, Gran Paradiso Massif, Gimillan, Lago di Lussert n° 2 (45.656°N, 7.4°E, 2800m) and n° 3 (Lago 3 almost completely frozen, 45.6583°N, 7.396°E, 2910m), 5.VII.2020, leg. Gilles Vinçon (21 males, 1 female; OPC). Cogne, Gran Paradiso Massif, Lago Lussant n° 3, 2910m, 45.6585°N, 7.3968°E, 16.VI.2021, leg. G. Vinçon (1 male, OPC). Italy, Cogne, Gran Paradiso Massif, Lago Lussant n° 2, 2810m, 45.6555° N, 7.4003°E, 16.VI.2021, leg. G. Vinçon (3 males, 2 females, OPC). Cogne, Gran Paradiso Massif, Lago Lussant n° 1, 2710m, 45.655°N, 7.407°E, 16.VI.2021, leg. G. Vinçon (1 male,

OPC). Lombardia, Passo di Gavia N. slope, Gavia River, 2560m, 46.35°N, 10.496°E, 15.VI.2021, leg. G. Vinçon (28 males, 4 females; OPC). Lombardia, Passo di Gavia S. slope, Rio di Gaviola, brook, 2420m, 46.337°N, 10.4875°E, 15. VI.2021, leg. G. Vinçon (3 males, OPC). Lombardia, Passo di Gavia N. slope, below Lago Bianco, river, 2610m, 46.346°N, 10.495°E, 14.VI. 2021, leg. G. Vinçon (39 males, 8 females; OPC). Lombardia, Passo di Gavia N. slope, Gavia trib., above Ponte dell'Alpe, brook, 2330m, 46.383°N, 10.494°E, 15.VI.21, leg. G. Vinçon (15 males, 1 female; OPC). Trentino Alto Adige, above Madonna di Campiglio, between Nero and Serotoli lakes, torrent, 2350 m, 46.246°N, 10.780° E, 14. VI.2021, leg. G. Vinçon (1 male, 1 female; OPC). Italy, Trentino Alto Adige, above Madonna di Campiglio, above Nambino lake, brook and spring, 2150 m, 46.247° N, 10.79°E, 14.06.2021, leg. G. Vinçon (1 female, OPC). Piemont, Pennines Alps, high Sesia Valley, above Sant' Antonio, big spring below Lago Nero, 2630 m, 45.814°N, 7.88°E, 26.V. 2022, leg. G. Vinçon (1 male, 4 females; OPC). Aosta Valley, High Ayas Valley, above St Jacques, near 'Alpe Mase', nice spring, 2400 m, 45.8929°N, 7.7039°E, 11.VI. 2022, leg. G. Vinçon (1 female, OPC). Dolomiti, S.E. Moso, Parco Naturale Tre Cime, many springs below water captures, trib. Rio Bianco, 1650 m, 46.6557°N, 12.4062°E, 24.V.2022, leg. Gilles Vinçon (8 males, 4 females; OPC). Rhaetian Alps, Livigno, N. slope of Passo del Foscagno, brook and spring, 2270 m, 46.4979°N, 10.2051°E. 25.V.2022, leg. G. Vinçon (1 male, OPC). Aosta Valley, High Ayas Valley, 2600 m, spring and brook, 45.902°N, 7.763°E, 17.06.2023, leg. G. Vinçon (2 males, OPC). below Grand St Bernard Pass, nice torrent, 2250m, 45.8656°N, 7.1595°E, 17.VI.2025, leg. G. Vinçon (1 male, OPC).

Remarks. This unfortunate misidentification is Freudian in origin due to misfixed idea of placement the *Acrophylax* in our mind as a Carpathian genus. This created, from the very beginning, a steady disturbing unsettled unconscious/subconscious feeling about the real taxonomic position of this unique species. Fortunately, there was a positive by-product of our mistake, the stimulus for extra collecting effort of this "*unique*" species that enlarged significantly the known distribution of *Acrophylax zerberus* Brauer, 1867 (Neu *et al.* 2018). It was newly recorded from the Pyrenean region.

Alpopsyche Botosaneanu & Giudicelli, 2004

Alpopsyche ucenorum (McLachlan, 1876)

Material examined. **France**, Alpes de Hautes Provence, Allos, torrent Medouille, 15.VII.2008, leg. G. Coppa (2 males, 2 females; OPC). **Italy,** Cottian Alps, Prali, above Bout du col, nice brook and springs, from 2240 m, 44.8395°N, 7.0326°E, to 2250m, 44.8392°N, 7.0332°E, 20.VII.2025, leg. G. Vinçon (4 males, 5 females; OPC).

Anisogamus McLachlan, 1875

Anisogamus McLachlan, 1874:32. First mentioned in a table of identification keys for genera in Limnephilidae family.

Anisogamus McLachlan, 1875:109. New genus described: "Wings differently formed in the sexes: in the ♂ much as in *Stenophylax* (typically), the costal margin little arched; radius very strongly bent before its termination: in the ♀ the anterior wings are short and broad, the costal margin strongly arched, the apical margin rounded, the 8th apical cellule elliptical; details of neuration otherwise much as in the ♂, but the apical cellules shorter. Abdominal characters nearly as in *Stenophylax* (typically). So far as the ♂ characters are concerned, the insects upon which this genus is founded differ little from small, scarcely aberrant, species of *Stenophylax*; but the ♀ in form far more resembles *Chaetopteryx* (only without the coarsely granulose wings and erect hairs). They inhabit the mountains of Central Europe, and probably there are more species than here given (*A. difformis* and *A. noricanus*), but the characters are evidently slight."

This small genus was established by McLachlan in 1874 as mentioned in a table of identification keys and described in 1875 with type species *Anisogamus difformis* (McLachlan, 1867) originally *Stenophylax difformis* McLachlan, 1867

and including *Anisogamus noricanus* McLachlan, 1875, both species from the Eastern Alps. The third species, *Anisogamus nurianus* was described from Spain, Nuria (Lérida) by Navas in 1917 also as *Stenophylax.* Later, *A. nurianus* was proposed to be a synonym of *A. difformis* by Schmid (1949). In Limnofauna Europaea, *A. noricanus* was still listed as a valid species (Botosaneanu 1967), but in the next edition of Limnofauna Europaea it was synonymized with *A. difformis* by Botosaneanu & Malicky (1978). In concordance with Malicky (2005) *A. nurianus* was considered recently as *nomen dubium* by Graf *et al.* (2015).

Based on the limits of gross morphology and dominance of lumping power *Anisogamus* genus was reduced to the single nominate species *Anisogamus difformis* (McLachlan, 1867). Thanks to applying the principles and practices of fine phenomics a new species, *Anisogamus waringeri* Graf & Vitecek, 2015 was described from the Pyrenees relying mostly on the fine structure of the paramere (Graf *et al.* 2015). Soon after two new species, *Anisogamus nahueli* Oláh & Vinçon, 2023 from the *Anisogamus difformis* species complex and *Anisogamus sandreniko* Oláh & Vinçon, 2023 representing a completely different lineage were described also from the Pyrenees. Revisiting the *Anisogamus* genus and applying our fine phenomics, here we describe another new species, *Anisogamus cottinus* sp. nov. from the Western Alps and reinstate the species status of *Anisogamus noricanus* McLachlan, 1875 and *Anisogamus nurianus* (Navas, 1917).

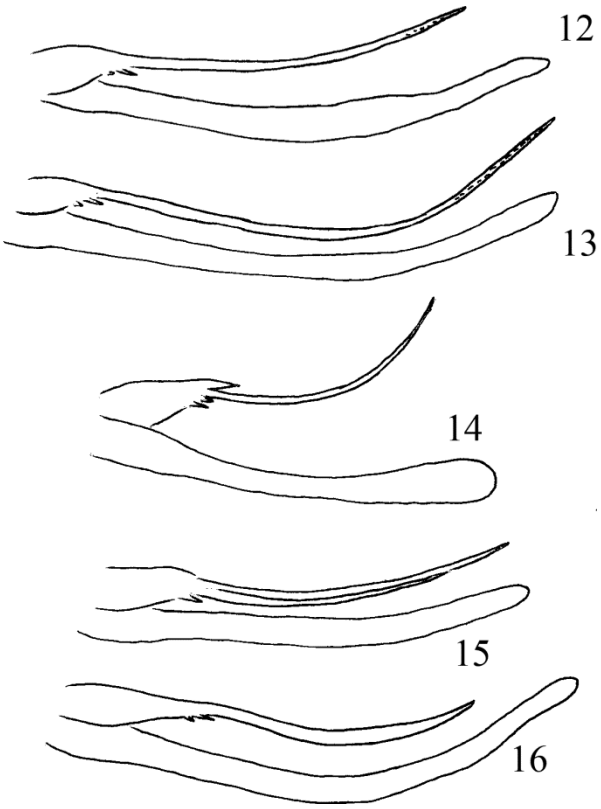
***Anisogamus cottius* sp. nov.**

(Figure 16)

Material examined. Holotype: **Italy,** Cottian Alps, Prali, above Bout du col, spring, 1900 m, 44.8544°N, 7.0376°E, 20.VII.2025, leg. G. Vinçon (1 male, OPC). Paratypes: same as holotype (7 males, 5 females; OPC). **France,** Hautes-Alpes, Queyras Massif, Aiguilles, brook and spring above 'Grand Laus lake', 2620 m, 44.8248°N, 6.8697°E 15.VIII.2021, leg. G. Vinçon (2 males, 4 females; OPC). **Italy**, Cottian Alps, Prali, above Bout du col, nice brook and springs, from 2240 m, 44.8395°N, 7.0326°E, to 2250m, 44.8392°N, 7.0332°E, 20.VII.2025, leg. G. Vinçon (8 males, OPC). Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370m, 45.8955°N, 7.7448°E, 16.VII. 2025, leg. G. Vinçon (11 males, 11 females; OPC). Above St Jacques, above Lago Blu, nice spring and cascade, 2360m, 45.8955°N, 7.7448°E, 17.VI.2025, leg. G. Vinçon (1 male, OPC). Cottian Alps, Macra valley, spring tributary of the Bedale Intersile, 44.426°N, 7.143°E, 2300 m, 9.VIII.2020, leg. Gilles Vinçon (3 males, 4 females; OPC). Graian Alps, Gran-Paradiso, NW Noasca, spring and brooklet, 45.473°N, 7.288°E, 2240 m, 7.VIII.2020, leg. Gilles Vinçon (7 females, OPC). Maritime Alps, S.E. Pratolungo, Vallone di Riofreddo, brooklet and spring in open grassland, above the Malinvern and della Paur lakes, 44.219°N, 7.207°E, 2500 m, 10.VIII.2020, leg. Gilles Vinçon (8 females, OPC). Maritime Alps, S.E. Pratolungo, Vallone di Riofreddo, brooklet and spring in open grassland, 44.213°N, 7.187°E, 1950 m, 10.VIII.2020, leg. Gilles Vinçon (2 males, 2 females; OPC). Maritime Alps, S.E. Pratolungo, Vallone di Riofreddo, big torrent, 44.2484°N, 7.176°E, 1500 m, 10.VIII.2020, leg. Gilles Vinçon (1 male, 2 females; OPC).

Diagnosis. This new species is distinguished from all the others in the complex by its short and stout glabrous paramere. It is widely distributed in the Western Alps forming contact populations with *Anisogamus difformis*.

Description. Similarly to all five known species in the *Anisogamus difformis* species complex, this new species exhibits a yellow-ochre coloration. The basic architecture of the genitalia is almost identical to the species in the species complex. Apical region of the gonopods appears similar to *A. waringeri*, a little longer and more slender than *A. difformis*. The paramere has unique structure in the complex; paramere shaft enforced and abbreviated, it is stouter than any other parameres in the complex; moreover, the entire surface is glabrous, not with tomentose apical region as well as the tiny ventral tine moved more posterad, almost to one third of the paramere.



Figures 12–16. Paramere and aedeagus of phallic organ in left lateral view: 12=*Anisogamus difformis*, 13=*Anisogamus noricanus*, 14=*Anisogamus waringeri*, 15=*Anisogamus nahueli*, 16=*Anisogamus cottius*.

Etymology. This new species is named after Marcus Julius Cottius who was King of the Celtic inhabitants of the mountainous Roman province then known as Alpes Taurinae and now as the Cottian Alps.

Anisogamus difformis (McLachlan, 1867)

(Figure 12)

Stenophylax difformis McLachlan, 1867:51–52. "Stelzing in Kärnthen, July (Zeller); 9 ♂, 3♀. Es ist mir keine mit dieser übereinstimmende Art bekannt. Der Unterschid zwischen beiden Geschlechtern ist sehr markirt, das Weichen ähnelt in Form einem *Chaetopteryx*; der Mann gleicht einigermassen *S. testaceus* Pict., ist aber kleiner."

Anisogamus difformis (McLachlan, 1867): McLachlan 1875:109–110."I have examined 9 ♂ and 3 ♀ from Carinthia (Stelzing, Zeller) in July."

Anisogamus difformis (McLachlan, 1867): Graf *et al.* 2015:387. "*Aniogamus difformis* (McLachlan, 1867) exhibits the following combination of male genitalia characters: (1) lateral processes of segment X("superior appendages") stout, wide; (2) median processes of segment X ("intermediate appendages") with tips projecting posterodorsad, posterior processes of segment X in lateral view with 2 sharp projections, discernible in caudal and dorsal view as distinct, sharp tips; (3) general appearance of inferior appendages slender, in lateral view slender with a long tip, in caudal view rounded; (4) parameres longer than the aedeagus, lacking a dorsal tine."

Material examined. **France,** Hautes-Alpes, Queyras Massif, Aiguilles, brook and spring above 'Grand Laus lake', 2620 m, 44.8248°N, 6.8697°E 15.VIII.2021, leg. G. Vinçon (3 males, OPC). **Italy**, Cottian Alps, Macra valley, spring tributary of the Bedale Intersile, 44.426°N, 7.143°E, 2300 m, 9.VIII.2020, leg. Gilles Vinçon (1 male, OPC). Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370m, 45.8955°N, 7.7448°E, 16.VII.2025, leg. G. Vinçon (1 male, OPC). Road to the Lago della Tempesta, spring and brooklet, 44.46°N, 7.124°E, 1950 m, 9.VIII.2020, leg. Gilles Vinçon (7 males, 11 females; OPC). Toscana, Passo del Cerreto, spring, brook and torrent, 44.291°N, 10.229°E, 1400m, 6.VI.2020, leg. Gilles Vinçon (4 males, OPC). Toscana, Passo del Cerreto, in direction of La Nuda Glacial Circus, spring and brook, 44.291°N, 10.229°E, 1400m, 30.VI.2020, leg. Gilles Vinçon (4 males, 1 female; OPC). Toscana, Passo del Cerreto, La Nuda Glacial Circus, spring of the Rosario River, 44.284°N, 10.232°E, 1630 m, 30.VI.2020, leg. Gilles Vinçon (7 males, 2 females; OPC). Toscana, West passo di Cerreto, spring tributary of the Secchia River, 44.327°N, 10.198°E, 1650m, 30.VI.2020, leg. Gilles Vinçon (1 male, 1 female; OPC). Toscana, Passo di Cerreto, 1500m spring + brook, 44.286°N, 10.228°E, 15.VI.20, leg. Gilles Vinçon (4 males, 2 females; OPC). Toscana, Passo del Cerreto, in direction of La Nuda Glacial Circus, 44.286°N, 10.228°E, 1460m, 30.VI.2020, leg. Gilles Vinçon (10 males, 6 females; OPC).

Revised diagnosis. The lateral profile of paramere is shorter, not longer than the aedeagus and the tomentose apical region is short, not long compared to *A. noricanus*. Compared to *A. cottius* sp. nov. paramere shaft is slender, not stout and the basal spine, the tiny tine is close to the basement, not moved posterad to the basal one third of the paramere.

Contact populations. After having the genitalia of the collected specimens carefully cleared and cleaned we have exposed the phallic organ and examined in details the fine structure of parameres in order to determine all specimens in all populations. We have recorded one contact population in France and two contact populations in Italy; **France,** Hautes-Alpes, Queyras Massif, Aiguilles, brook and spring above Grand Laus lake, 2620m, 44.8248°N, 6.8697°E 15.VIII.2021, leg. G. Vinçon (*cottius-difformis*: 2–3 males, OPC). **Italy**, Cottian Alps, Macra valley, spring tributary of the Bedale Intersile, 44.426°N, 7.143° E, 2300 m, 9.VIII.2020, leg. G. Vinçon (*cottius-difformis*: 3–1 males, OPC). Pennines Alps, Evançon Valley, above Lago Blu, spring and cascade, 2370m, 45.8955°N, 7.7448°E 16. VII.2025, leg. G. Vinçon (*cottius-difformis*: 11–1 males, OPC).

Anisogamus nahueli Oláh & Vinçon, 2023

(Figure 15)

Anisogamus nahueli Oláh & Vinçon, 2023:54. "Holotype: **France,** Pyrénées-Orientales, Canigou Massif, Prats-de-Mollo-la-Preste, nice brook and spring, 1860 m, 42.4523°N, 2.4102°E, 30.IV.2022, leg. G. Vinçon (1 male, OPC). Paratypes: same as holotype (7 males, OPC). France, Pyrénées-Orientales, Canigou Massif, above Mantet, Rotja tributary, 1850 m, nice big spring, 42.4755°N, 2.325°E, 14.IV. 2022, leg. G. Vinçon (1 male, 1 female; OPC)." "It was a great surprise to discover this unique species on both slopes of the Canigou Massif, not far from the locus typicus of *Anisogamus waringeri* located on the northern slope of the same mountain range "In the new species one of the short tiny ventral tines is developed into a long secondary spine. Examining the 8 paratypes there is a pronounced paramere asymmetry in the length of the long secondary spine."

Material examined. Holotype: **France,** Pyrénées-Orientales, Canigou Massif, Prats-de-Mollo-la-Preste, nice brook and spring, 1860 m, 42.4523°N, 2.4102°E, 30.IV.2022, leg. G. Vinçon (1 male, OPC). Paratypes: same as holotype (7 males, OPC).

Anisogamus noricanus McLachlan, 1875

(Figure 13)

Anisogamus noricanus McLachlan, 1875:110. "Ten males (but not females) from Noric Alps (Mallnitz, etc., Palmén) in July and August." "In general form and appearance much resembling *A. difformis.* After having compared a good series of the males of this and the preceding, it appears to me that they are certainly distinct."

Anisogamus noricanus McLachlan, 1875: Botosaneanu 1967:303. Listed in Limnofauna Europaea as a valid species"

Anisogamus noricanus McLachlan, 1875: Botosaneanu & Malicky 1978:352. Listed in Limnofauna Europaea as a synonym of *Anisogamus difformis* (McLachlan, 1867): "Syn. *noricanus* McL.

Anisogamus noricanus McLachlan, 1875: Malicky 2005:575. Listed as synonym of *Anisogamus difformis* (McLachlan, 1867): "*Anisogamus* Mc Lachlan, 1874 *difformis* (McLachlan, 1867) (= *noricanus* McLachlan, 1875)."

Anisogamus difformis (McLachlan, 1867): Oláh *et al.* 2019:68–69. The four specimens examined all have longer paramere than aedeagus. Misidentification!

Anisogamus difformis (McLachlan, 1867): Graf *et al*. 2015:387–390. "Paramere longer than aedeagus, evenly curved dorsad, each with proximal part bulbous, bearing 2–3 tines." Misidentification!

Material examined. **Austri**a, Carinthia, Saualpe, Ladinger Hütte, 25.VI.2007, leg. W. Graf, (4 male, OPC).

Remarks. *Anisogamus noricanus* McLachlan, 1875 was described from the Noric Alps (various mountain ranges of the Eastern Alps). *Anisogamus difformis* (MacLachlan, 1867) was re-described and drawn from the same 9 male speci mens by McLachlan (1975) himself as having "penis, which is long, slender, notched at the apex, and accompanied by a pair of shorter and

very slender spiniform sheaths (parameres). On the original drawing of the ventral view of the aedeagus and paramere of *Anisogamus difformis* (MacLachlan, 1867) the pair of parameres is distinctly shorter than the aedeagus. *Anisogamus noricanus* McLachlan, 1875 has a pair of parameres longer than aedeagus, it is a distinct species not a synonym of *Anisogamus difformis* (McLachlan, 1867). However, both *A. difformis* and *A. noricanus* were described from specimens collected in Eastern Alps. Unfortunately we have no sufficient number of specimens from various regions of the Eastern Alps in order to have any idea of their distribution and their interactions.

Anisogamus nurianus (Navas, 1917)

Stenophylax nurianus Navas, 1917:8–9. "Similis *alpestri* Kol." "Patria. Nuria (Lérida), 12 de Agosto de 1915, Codinaleg. (Col.m.)."

Stenophylax nurianus Navas, 1917: Schmid 1949:398. "Je n'ai pas retrouvé le type de cette espèce, mais j'ai *examiné deux ♂♂ provenant de Setcasas (VII et VIII). Ces spécimens sont des Anisogamus difformis* McL. Il est fort probable que *St. nurianus* soit synonyme de cette espèce."

Remarks. Taking into consideration the more diverse nature of this genus this taxon seems to be a valid species. The genuine *Anisogamus difformis* (McLachlan, 1867) is not known neither from the Pyrenees nor from Spain, it could not be a synonym of *Anisogamus nurianus* (Navas, 1917). Moreover, Lerida, the type locality of *Anisogamus nurianus* (Navas, 1917) is far from Canigou Massif, Pyrenees-Orientales, type locality of both the *Anisogamus waringeri* Graf & Vitecek, 2015 and the *Anisogamus nahueli* Oláh & Vinçon, 2023 species. *Anisogamus nurianus* (Navas, 1917) could be a valid species. To confirm its taxonomic status simply, we need to recollect it along the Nuria Valley in Spain and examine as well as describe the fine structure of its paramere.

Anisogamus sandreniko Oláh & Vinçon, 2023

Anisogamus sandreniko Oláh & Vinçon, 2023:54–55. "Holotype**: France**, Ariège, path to Arlu Lake, nice spring, 1650m, 42.8142°N, 1.438°E, 9.X.2022, leg. Gilles Vinçon (1 male, OPC). Allotype: same as holotype (1 female, OPC). Paratypes: same as holotype (12 males, 2 females; OPC)." "The new species of *Anisogamus sandreniko* is a highly modified taxon. Dorsum of segment IX produced, dorsal arm of paraproct lost and the gonopods modified."

Material examined. Holotype**: France**, Ariège, path to Arlu Lake, nice spring, 1650m, 42.8142° N, 1.438°E, 9.X.2022, leg. Gilles Vinçon (1 male, OPC). Allotype: same as holotype (1 female, OPC). Paratypes: same as holotype (12 males, 2 females; OPC)."

Anisogamus waringeri Graf & Vitecek, 2015

(Figure 14)

Anisogamus waringeri Graf & Vitecek, 2015:384–387. "Holotype. 1 male, France, Pyrenées-Orientales, Mont Canigou, Col de Jou, Refuge de Mariailles (42°29'6.21"N 002°24'48.31"E) 12.VII.2013 leg. W. Graf. Holotype deposited in the Biologiezentrum des Oberösterreischen Landesmuseum, Linz, Austria. Paratypes: 8 males, same location, 12.VII. 2012, 13.VII.2013, leg. Graf." "*Aniogamus waringeri* sp. nov. has the following combination of male genitalia characters: (1) lateral processes of segment X("superior appendages") slender, tall; (2) median processes of segment X ("intermediate appendages") with tips projecting dorsad, posterior processes of segment X in lateral view forming a rounded hump, discernible in caudal and dorsal view as a sharp ridge; (3) general appearance of inferior appendages stout, in lateral view stout with a short tip, in caudal view pointed; and (4) parameres shorter than the aedeagus, in dorsal and lateral views with a dorsomesal tine."

*Material examined***. France,** Pyrénées-Orientales, Canigou Massif, above Mantet Pass, Rotja tributary, 1850m, big spring, 42.4755°N, 2.325°E, 7.X.2022, leg. Gilles Vinçon (1 male, OPC).

Remarks. This is the first recovery of this rare species after its description. This interesting species was delineated from its sibling *Anisogamus difformis* McLachlan, by fine phenomics of the paramere by Graf & Vitecek (2015).

Halesus rubricollis (Pictet, 1834)

Material examined. **Italy**, Cottian Alps, Prali, above Bout du col, nice brook and springs, from 2240m, 44.8395°N, 7.0326°E, to 2250m, 44.8392°N, 7.0332°E, 20.VII.2025, leg. Gilles Vinçon (2 females, OPC).

Parachiona picicornis, Pictet, 1834

Material examined. **Italy,** Rhaetian Alps, above Livigno, nice brook and springs, 2150–2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18.06.2023, leg. G. Vinçon (8 males, 2 females; OPC). Atesine Alps, N. Maranza, bottom of the cascade and brook and spring, 2000–2120 m, 46.8733°N, 11.6635°E – 46.8743°N, 11.659°E, 19.06.2023, leg. G. Vinçon (5 males, 2 females; OPC). Trentino Alto Adige, Dolomiti, above Ortisei, 2100 m, nice brook and spring, 46.5486°N, 11.804°E, 20.06.2023, leg. G. Vinçon (6 males, OPC). Italy, Atesine Alps, N. Maranza, brook and spring, 2200 m, 46.8735°N, 11.659°E, 19.06. 2023, leg. G. Vinçon (2 males, OPC). Venetie, Dolomiti, below Lago Misurina, 1770 m, nice brook and spring, 46.5985°N, 12.2528°E, 20.06. 2023, leg. G. Vinçon (12 males, OPC).

Beraeidae Wallengren, 1891

Beraea pullata (Curtis, 1834)

Material examined. **France**, Haute-Savoie, above Tré le champ le haut, nice small river, Arve tributary, 1410m, 45.997°N, 6.9259°E, 16.VI. 2025, leg. G. Vinçon (1 male, OPC). **Italy,** Rhaetian Alps, above Livigno, nice brook and springs, 2150-2270 m, 46.531°N, 10.154°E and 46.53°N, 10.158°E, 18.06.2023, leg. G. Vinçon (1 male, OPC). Italy, Atesine Alps, N. Maranza, bottom of the cascade and brook and spring, 2000–-2120 m, 46.8733°N, 11.6635°E – 46.8743°N, 11.659°E, 19.06.2023, leg. G. Vinçon (2 males, OPC).

Ernodes vicinus (McLachlan, 1879)

Material examined. **Italy,** Trentino Alto Adige, Passo Duron, 1000 m, nice spring, 46.036° N, 10.791°E, 20.06.2023, leg. G. Vinçon (11 males, OPC).

Sericostomatidae Stephens, 1836

Sericostoma Latreille, 1825

Sericostoma gen. nov. Latreille, 1825:439 (*Sericostoma*; no species included). Type species: *latreillii* Curtis, 1834:215, (first included species), syn. of *personatum* Spence, 1826:489.

In the genus *Sericostoma* the high diagnostic value of the penis-sheaths (paraproct, spines of segment X) was very early discovered by McLachlan (1876). Afterwards, the lateral profile drawings of paraproct were applied regularly and almost exclusively as a magic morphological trait in the species delineations (McLachlan 1880, 1884). In fact the present classification of the species of the *Sericostoma* genus is mainly, if not completely, based by all trichopterologists on the form of the spines (paraproct) of segment X (Moretti & Cianficconi 1977). In our first survey on *Sericostoma* (Oláh & Vinçon 2023) we have reconfirmed the diagnostic value of the lateral profile of the spine-like paraproct as the most diverse morphological structure that is the speciation super trait helping us to delineate even the young incipient species under contemporary diversion or just under reinforcement processes to complete speciation.

During our first survey it was a real enigma for us why and how the misunderstandings in identifications were created after having, from the very beginning of caddisfly taxonomy, such a stable and reliable character state available for species delineation in *Sericostoma* genus as the paraproct that is McLachlan's magic trait of penis-sheaths (McLachlan 1876, 1880, 1884). Moreover, McLachlan's early finding was precisely reconfirmed by carefully detailed holotype studies by Botosaneanu (2001). Also, in our survey we have recorded only very rare intermediate divergences in paraproct shapes and only between *Sericostoma baeticum-vittatum* as well as between *S. pedemontanum-personatum* siblings. Applying our

standardised preparation and detailed examination procedures adapted to fine phenomics, we have recorded that all the other species in all the species groups and species complexes have very stable and distinct lateral profile of paraproct. In the *Sericostoma* genus paraproct is a perfect diagnostic tool for easy determination, including the artificially confused misidentifications of *Sericostoma flavicorne* and *Sericostoma schneideri* (Neu *et al*. 2018

Range of variation

(Figures 17–39, 40–61, 62–73, 74–88, 89–103, 104–125)

In our revisiting the *Sericostoma* "*enigma*" we have received additional representative specimens randomly collected in various countries from the entire distributional area, not purposefully selected from contact or mixed populations for a "curiosity-shop" in order to demonstrate their extremely high variability (Malicky 1993, 2004). We have re-examined all these specimens and prepared drawings of the lateral profile of terminal region of their paraproct for taxa with potential intermediate divergences. These are the *baeticum-vittatum* and *pedemontanum-personatum* siblings and the widely distributed species, the debated *Sericostoma schneideri* (Neu *et al.* 2018). For these five species we have presented a representative paraproct trait matrix of specimens collected from various region of their distributional area.

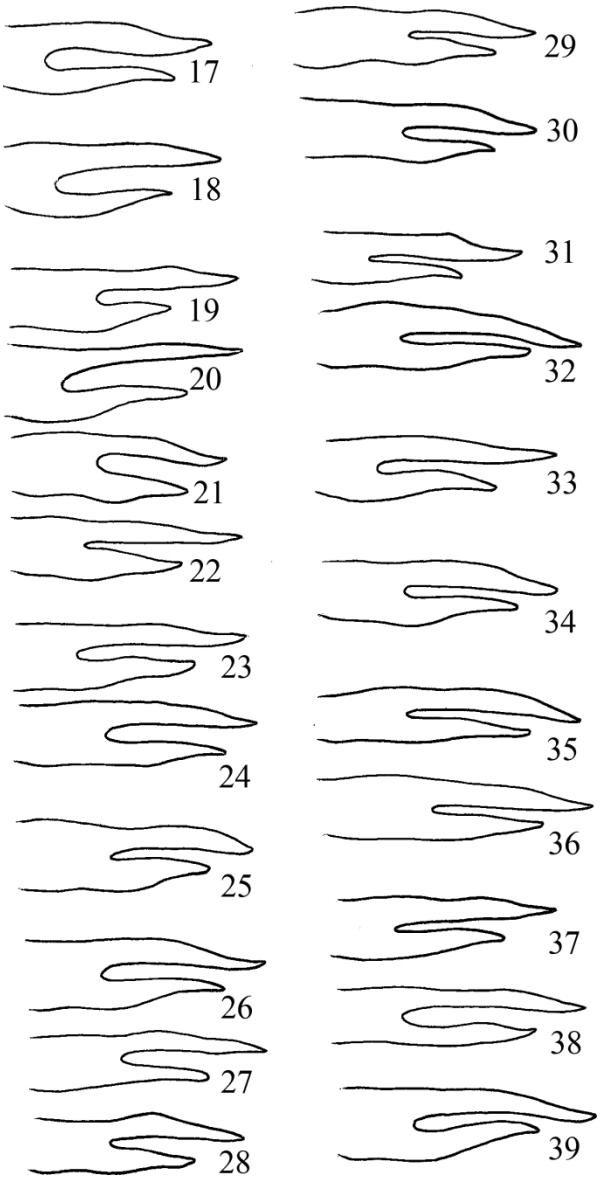
Every human being-in-the-world, even their languages, is picture minded (Oláh 2024, 2025). Image of the "put and look together" trait matrix is a very effective, multiplied powerful visual impact on the taxonomist's mind in transmitting or even manipulating (paraproct curiosity shop) the meanings of realities. These matrices of speciation traits with many specimens multiply our visual picture-mind capacity and help our epistemic trials in entity resolutions (Oláh *et al.* 2021).

According to these paraproct trait matrixes (Figures 17–125) all the examined five species are easily and reliably delineated, clearly distinct. Naturally, there are individual divergences, actually all specimens are individually unique, but variations are well in the range of character state of their speciation traits. Typical variation in the apical region of paraproct is realised by various small modifications in the dorsal subapical elevation of the dorsal arm of paraproct or the length and tip termination of the dorsal and ventral arms. These are results of standing genetic variation and incomplete lineage sorting.

Revised taxonomy

Based upon the lateral profile of the terminal region of paraproct in our first survey we have distinguished three species groups in the *Sericostoma* genera (Oláh & Vinçon 2023): *S. personatum* group with bifid, two-armed paraproct and small maxillary palp, *S. flavicorne* group with bifid, two-armed paraproct and enlarged maxillary palp and *S. galeatum* group with lanceolate, monofid, one-armed paraproct. However, the bizarre secondary modifications and neoformations on maxillary palp have sensory androconial function in sexual organisation and are frequently accompanied with closely related genital structure. Similarly to the secondary sexual structures in families of Lepidostomatidae (Weaver 2002) and Hydroptilidae (Oláh & Flint 2012, Oláh & Vinçon 2021), the androconial mask of male maxillary palp has lower ranking taxonomic values allowing for recognition only at a specific level as already has been recognised also in the *Sericostoma* genus (Moretti & Cianficconi 1977).

Lowering the ranking value of male maxillary palp and based our species grouping in the *Sericostoma* genus exclusively on speciation trait of lateral profile of paraproct we have distinguished the same three species groups as before. But we have changed the name of *flavicorne* to *schneideri* species group due to the more widely distributional area of the later. Moreover, we have replaced some species and included new species from two important papers. These papers were either not available (Sipahiler 2021) to us or published after our first survey (Lodovici and Valle 2023).



Figures 17–39. Paraproct matrix of *Sericostoma schneideri* populations: 17=McLachlan, 1880, Ragusa; 18=Botosaneanu, 2001, Holotype: Dalmatia; 19=Albania, Delvina Region; 20=Albania, Podradec District; 21=Albania, Periferi Dibre; 22=Albania, Delvine District; 23=Bulgaria, Stara Planina; 24=Bulgaria, Kraljevo; 25=Bosnia–Herzegovina, Una–Sana Canton; 26=Czech Republic, N. Bohemia; 27=Czech Republic, Moravia; 28=Czech Republic, Central Bohemia; 29=Gemany, Rheinland; 30=Germany, Saarland; 31=Greece, Ioannina County; 32=Greece, Olympos; 33=Hungary, Bükk Mt.; 34=Montanegro, Durmitor Mt.; 35=Romania, Apuseni Mt.; 36=Romania, Hargita; 37=Serbia, Zlatibor; 38=Slovakia, Hrabusice; 39=Spain, Posadas.

Species groups

(1) *Sericostoma schneideri* species group with two armed deeply furcated paraproct composed of ten species: *schneideri*, *alakir*, *dimcay*, *flavicorne*, *grusiense*, *ida*, *mesopotamicum*, *pinargozu*, *taskent*, *yuvarlakcay*.

(2) *Sericostoma personatum* species group with two armed shallowly furcated paraproct composed of nine species in three species complexes. *Sericostoma personatum* species complex: *personatum*, *pedemontanum*, *subaequale*, *unaequale*. *Sericostoma maclachlanianum* species complex with two-armed extremely widely opened abbreviated paraproct, dorsal arm longer: *maclachlanianum*, sa*sbaddes*. *Sericostoma vittatum* species complex with two-armed widely opened paraproct, dorsal arm with or without dorsal subapical elevation: *baeticum*, *heracles*, *vittatum.*

(3) *Sericostoma galeatum* species group with lanceolate paraproct also composed of eight species: *galeatum*, *bergeri*, *cianficconiae*, *clypeatum*, *confusum*, *italicum*, *romanicum*, *siculum*.

There are poorly known, puzzling and unplaced species without available type specimens and without published proper drawings or without proper examination of paraproct. These were discussed before (Oláh & Vinçon 2023) and they are probably synonyms of one of the above listed species.

Paraproct atlas of species

(Figures 126–135, 136–144, 145–152)

Ranges of paraproct variability, taxonomic revision and species groupings are all based on the lateral shape of the terminal region of the paraproct. For easy determination of all known species of the genus here we present our species atlas of the three species groups. We have drawn and figured in lateral profile the entire complex of segment X that is fused both to tergum IX and to paraproct. The sutures between segment IX and X as well as between segment X and paraproct are indistinct. Therefore, in the species atlas we draw

and figure the entire segment X together with tergite IX and paraproct. In lateral view this fused complex structure is dominated by the heavily sclerotized paraproct. Tergum IX lined on the anterior corner of the drawn complex and segment X is part of middle dorsum of the drawn complex represented mostly by paraproct, or visible partially in some species as dorsal margin ending before the tip of paraproct.

According to the Williston's law structures tend toward reduction (Williston 1914) and reduction in structural parts was demonstrated also by Gregory (1935). Ancestor has the largest number of characters (Schmid 1979). In the *Potamophylax nigricornis* species group we have selected the most complex and most distributed parameres for the ancestral (plesiomorphic) state (Oláh *et al.* 2013), but considered that such terms simple, complex, primitive, generalized, specialized, are all strictly comparative, therefore speculative (Ross 1956, Schmid 1958). Based upon these findings we treat the most complex and the most distributed paraproct as the ancestral character state in the *Sericostoma* genus, but considering it only as a speculation, because infinite incongruent character trees makes phylogenetic trials uncerain. Structural realism is reticulated (Ladyman 2023), rather retigenetical or dictiogenetical, not phylogenetical. Therefore, phylogenetic trials to reconstruct any cladistics lineages including our species grouping in the *Sericostoma* genus contain incongruent remnants or representatives of retigeny.

Sericostoma schneideri is the most widely distributed species group recorded from West Europe without The British Islands, South Europe including Spain, Middle Europe and East Europe to Turkey, Georgia, Armenia and Azerbaijan. Apical arms of the paraproct most produced and most close to its basolateral triangular sclerotized phallic guiding process.

Sericostoma personatum species group is recorded from West Europe including The British Islands, South Europe, North Europe including Scandinavia and Middle Europe. Apical arms are still present, but reduced and moving away from its basolateral triangular sclerotized phallic guiding process.

Sericostoma galeatum species group is recorded only from South Europe. Apical arms are fused or ventral arm moved to middle.

Re-examined specimens

In order to establish the variability ranges and present the paraproct that is the speciation trait matrixes for the *baeticum-vittatum* and *pedemontanum-personatum* siblings and for the widely distributed species, the debated *Sericostoma schneideri* we have re-examined and drawn all the old and newly collected specimens

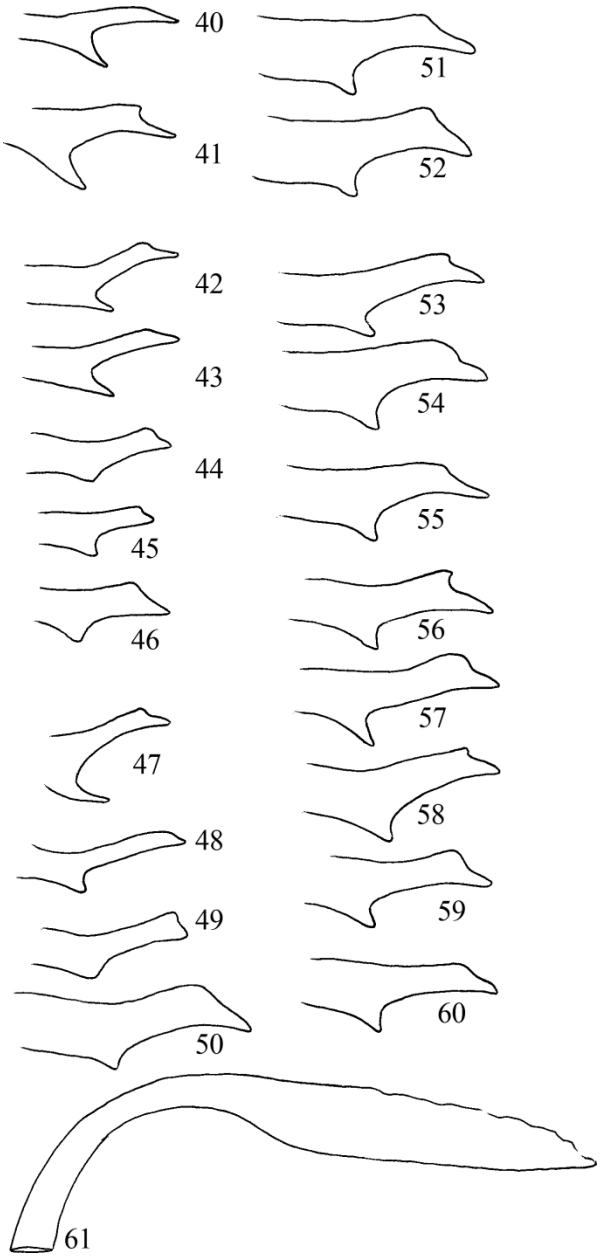
Sericostoma schneideri species group

Sericostoma schneideri (Kolenati, 1848)

(Figures 17–39)

Material examined. **Albania**, Delvina Region, between Bistrica Village and Syri i Kalter, 127 m, 39°55'53"N; 20°09'13"E 13.V.2017, leg. S. Beshkov & A. Nahirnic (4 males, 1 female; OPC). Periferi Dibre, Fushe-Lure, streamside and lumber yard, 1055 m, 29.VI.2007, leg. L. Dányi, Z. Erőss, Z. Fehér, A. Hunyadi & D. Murányi (1 male, HNHM). Delvinë District, Krongj, streem Vrisi, 140m, 39.91720°N 20.18245°E, to light, 09.05. 2014 leg. Z. Barina, D. Pifkó & G. Puskás (6 males, 3 females; OPC). Pogradec district, Piskupat, Ohrid Lake at Hotel Leon S of the village, 41°01.152'N, 20°38.196'E, 695 m, 12.05.2014, T. Kovács, D. Murányi (1 female, OPC). **Bosnia & Herzegovina**, Una-Sana Canton, Mrazovac, stream at open spring, 45°02'42.0"N, 16°05'19.7" E, 246 m, 26.V.2012, leg. T. Kovács & G. Puskás (3 males, OPC). **Bulgaria**, W Stara Planina Mts. Gushovski Monastir above Tchiprovtzi Town, 43.3661°N 022.8402°E, 808 m, 26.VI.2021, leg. S. Beshkov & A. Nahirnic-Beshkova (1 male, OPC). W. Stara Planina Mts, Zarezan Tcheshma above Tchuprene on Tchuprenska Reka reiver, 674m, 43.4874°N, 022.6154°E, 24.VI.2021, leg. S. Beshkov & A. Nahirnić-Beshkova (40 males, 10 females; OPC). **Czech Republic**, N Bohemia,

confluence of Křinice river and Bílý potok stream, 50°55'26"N, 14°24'07"E , 19.VI.2008, at light, leg. P. Chvojka (3 males, OPC). Central Bohemia, Zbirožský potok stream (Jezírka res.), 49°56' 54"N, 13°44'56"E, 265 m, 6.V.–6.VII.2011, Malaise trap, leg. P. Chvojka *et al.* (2 males, OPC). S Moravia, Podyjí NP, Dyje (Thaya) river, Braitava, 48°52'39"N, 15°50'13"E, 15.VIII.2001, at light leg. F. Krampl (4 males, OPC). **Germany**, Rheinland-Pfalz, Klotten, Oberer Kadarberg, 50.19189°N 7.17593°E, 18.VIII.2023, leg. A. Werno (det. P.J.Neu as *Sericostoma flavicorne* s.l. 2 males, 1 female; OPC). Rheinland-Pfalz, Kasel, Gerten P., 49.763369°N 6.729482°E, 160m, 2.VI.2016, leg. P.J. Neu (det. P.J.Neu as *Sericostoma flavicorne* s.l. 1 male, 1 female; OPC). Germany, Saarland, Waldhölzbach, Lannerbach, Schutzhütte am Oberlauf, 49.55701°N 6.73408°E, 8.VII.2016, leg. P.J. Neu & M. Weitzel, (det. P.J. Neu as *Sericostoma flavicorne* s.l. 1 male, 1 female; OPC). Germany, Rheinland-Pfalz, Holsthum, Quelbach im Wald oberh. Fischteichen, 49.88315°N 6.41516°E, 13.VIII.2024, leg. P.J. Neu, (det. P.J. Neu as *Sericostoma flavicorne* s.l. 2 males, 1 female; OPC). Saarland, Braunshausen, Horster, 49.57127°N 6.98637°E, 14.VIII.2023, leg. A. Werno, (det. P.J. Neu as *Sericostoma flavicorne* s.l. 2 males, OPC). **Greece**, Ioannina county, Lefkothea, Smolitsas River 4km E of the village, 39°43'03.2"N, 20°36'38.7"E, 198m, 12.V.2006, leg. L. Dányi, J. Kontschán & D. Murányi (1 male, 8 females, HNHM). Olympos, 1100 m, 9.VII.1986, leg. Á. Uherkovich (1 male, OPC). **Hungary**, Bükk Mountains, Garadna stream, just below Sebesvíz tributary, 8.VII.1983, leg. J. Oláh (5 males, 2 females; OPC). **Montenegro**, Durmitor Mts., Zabljak, 24–26, VII. 1965, leg. Z. Varga (1 male, 8 females; OPC). Bar municipality, Rumija Mts, Stari Bar, M. Mikulići, Rikavac, 42°06'16.7"N, E19°08'55.8"E, 320 m, 26.V.2013, leg. P. Juhász, T. Kovács, G. Magos, G. Puskás, (1 male, 3 females; OPC). **Romania**, Valea Cupas, Lacu Rosu, 21.VII.1981, leg. Peregovits & Ronkay (1male, 1 female; OPC). Romania, Banat, Iauna, 29.VII.2006, leg. M. Bálint (1 male, OPC). Apuseni Mts. Muntii Gilaului, Muntele Baisorii, stream Valea Gera, 46°33.00'N 23°20.014'E, 1055m, 18.VI.2013, light leg. J. Oláh, Cs. Balogh, & S. Fekete (7 males, OPC). Apuiseni Mts., Bihor Mts., Crisul Pietros – Valea Bulz, Pietra Bulzului, 46°36'8.12"N 22°38' 33.44"E, 560m, 3.VII.2013, light leg. Cs. Balogh, (2 males, 6 females; OPC). Apuiseni Mts., Bihor Mts., Crisul Pietros, Boga, Valea Bulz and Valea Galbena, 46°35'23.2"N 22°37'54.7"E, 450m, 4. VII.2013, light leg. Cs. Balogh, (14 males, 1 female; OPC). Eastern Carpathians, Vasláb (Voslabeni), Hargita County, marshy area, 11.VII.2002, leg. L. Keresztes (2 males, 24 females; OPC). Eastern Carpathians, Calimani Mts., Toplita stream, 29.VII.2003, leg. L. Keresztes (2 male, OPC). Eastern Carpathians, Hargitha County, Baile Chirui (Királyfürdő), 14.VII.1998, leg. Z. Izsák (11 male, 7 females; OPC). Eastern Carpathians, Hargitha County, Sincraieni, Valea Mare, 24.VI.1993, light trap leg. L. Keresztes (17 male, 13 females; OPC). Eastern Carpathians, Hargitha County, Sincraieni, forester's house, 31.VII.1992, leg. L. Keresztes, T. Ujvárosi & Z. Izsák (17 male, 6 females; OPC). Eastern Carpathians, Vasláb (Voslabeni), Hargita County, 11.VII.2002, leg. L. Keresztes (3 males, 15 females; OPC). **Serbia**, Zlatibor district, Zlatibor Mts, spring brook of Crni Rzav Stream beneath Mt. Cigota, 43°37.932' N, 19°46.305'N, 1160 m, 25.V.2013, leg. P. Juhász, T. Kovács, G. Magos, G. Puskás, (1 male, OPC). Kraljevo, above Kamenica Village, Stolovi Mt. Veliki čukar, 43°36'07" 020°41'08"E, 688 m, 4.VII.2021, leg. S. Beshkov & A. Nahirnic-Beshkova (1 male, 2 females; OPC). **Slovakia**, Hnilec stream, 27.VII.1964, leg. J. Oláh (14 male, 4 females; OPC). Hrabusice (Káposztafalva), Podlesok camping, Velka Bela voda, 48°57'50"N 20°23'1"E, 546 m, 9.VII.2012 light trap, leg. P. Boda, B. A. Lukács, I Szivák & G. Várbíró (4 males, 1 female; OPC). **Spain**, Os Cabaniños, Río de Ortigal, Lugo, Sierra de Ancares, 31.VII.1981, leg. M.A. Gonzalez, (det. M.A. Gonzalez as *Sericostoma pyrenaicum*, 3 males, OPC). Senda de la Blanca, Villoslada de Cameros, La Rioja, 6.VII.2015, leg. M.A. Gonzalez (det. M.A. Gonzalez as *Sericostoma pyrenaicum*, 3 males, OPC). Posadas, Valdezcaray, Sierra de la Demanda, La Rioja, 14.VII.2005, leg. M.A. Gonzalez (det. M.A. Gonzalez as *Sericostoma pyrenaicum*, 3 males, OPC).



Figures 40–61. Paraproct matrix of *Sericostoma baeticum* populations: 40=McLachlan, 1876; 41=McLachlan, 1880; 42–46=Schmid, 1952; 47–49=Botosaneanu & Schmid, 1973; 50–52=Spain, Amaderos; 53–55=Spain, Tragacete; 56–58= Spain, Cabanidos; 59=Portugal, Valezim; 60=Portugal, Lori ga; 61=Phallic organ in lateral view.

Remarks. Examining and comparing the terminal region of the bifid paraproct of the holotype and specimens from Greece, through Albania, Bulgaria, Serbia, Montenegro, Bosnia-Herzegovina, Romania, Hungary, Slovakia, Czech Republic, and Germany to Spain, we found it very stable. The dorsal and ventral arms are rather parallel-sided like at *mesopotamicum* from the same species complex and not more or less V-shaped like at *pedemontanum*, *personatum*, *subaequale*, *unaequale*. However its ventral arm is never as short as at *mesopotamicum*. *Sericostoma schneideri* is a very distinct species identified by its speciation trait of paraproct and it was never detected neither in Britain nor in Ireland.

Sericostoma personatum species group

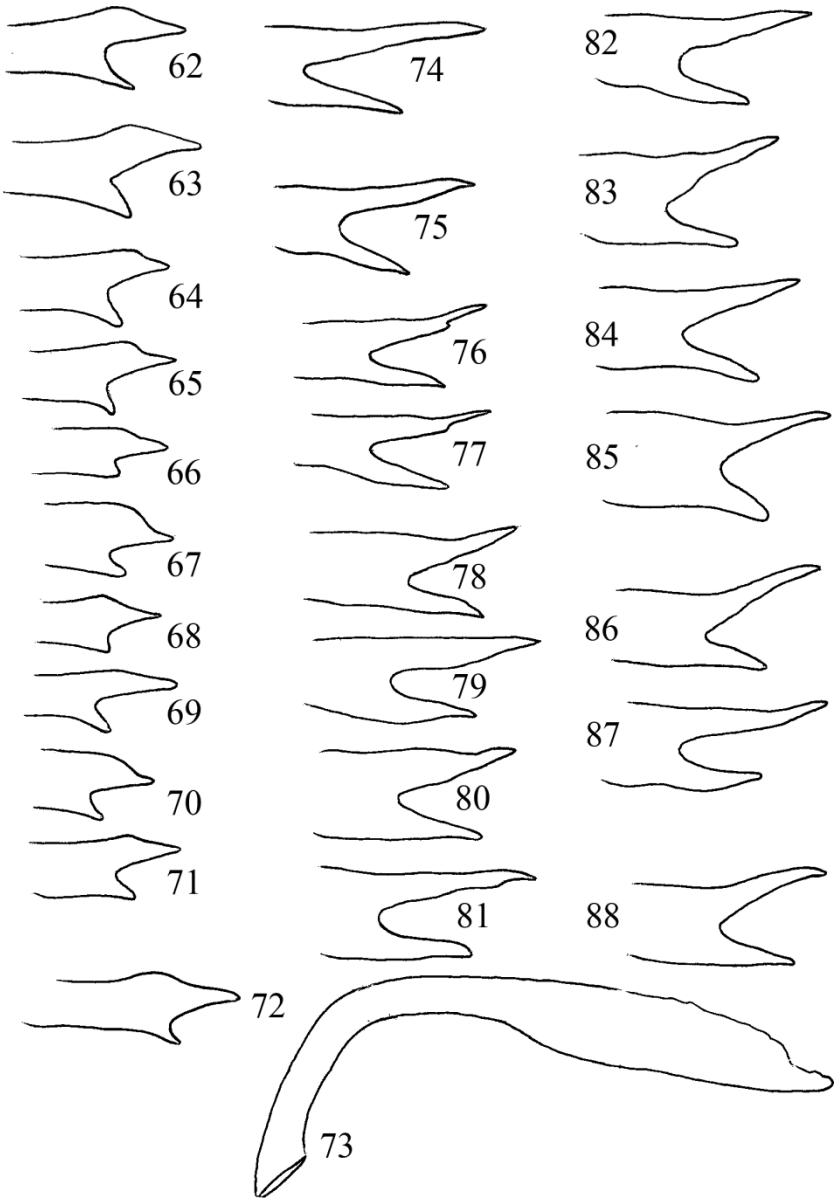
Sericostoma personatum species complex

Sericostoma pedemontanum McLachlan, 1876

(Figures 74–88)

Material examined. **France**, Provence Alps, Jausiers, 44.390°N 6.776°E, 1500 m, 11.VII.2007, leg. M. Bálint (7 males, 5 females, OPC). France, Alpes-Maritimes, Caïros Valley, Fromagine spring, 1500m, 44.0208°N, 7.4317°E, 17.VII.2022, leg. Gilles Vinçon (5 males, 5 females; OPC). **Italy**, Piemonte, Pennines Alps, Biella, above Sanctuario di Oropa, spring, 45.6435°N, 7.969°E, 1800m, 4.VII.2020, leg. Gilles Vinçon (1 male, OPC). Italy, Piémont, brook and spring tributary of Stura di Demonte, above Villaggio Primavera, 1530 m, 44.373°N, 6.9755°E, 16.VII.2022, leg. G. Vinçon (1 male, OPC). Italy, Graian Alps, Ingria, torrent, Rio del Mulinet, 45.463°N, 7.5676°E, 900 m, 8.VIII.2020, leg. Gilles Vinçon (1 male, OPC). Italy, Castel Vittorio (IM) 400m, affl. rio Gordale T.L., 30.V.2001, leg. Museo Caffi BG, Coll Mus. Sc. Nat. Bergamo (1 male, OPC). Italy, Piemont, Pennines Alps, Civiasco, spring below water catchment, 770 m, 45.8104°N, 8.2973°E, 27.V.2022, leg. Gilles Vinçon (2 males, OPC).

Remarks. *S. pedemontanum* is closely related to the widely distributed *S. personatum* and diverged along the French and Italian border. It seems to be restricted to adjacent regions of the Italian and French Alps. However, its distribution and its contact with its ancestral species have not



Figures 62–72. Paraproct matrix of *Sericostoma vittatum* populations: 62=McLachlan, 1876; 63=McLachlan, 1880; 64–71=Botosaneanu & Schmid, 1973; 72=Spain, Granada; 73=Phallic organ in lateral view.

Figures 74–88. Paraproct matrix of *Sericostoma pedemontanum* populations: 74=McLachlan, 1876, Italy, Turin; 75=McLachlan, 1880; 76–77=France, Provance Alps; 78–82=France, Alpes–Maritimes;83=Italy, Piemont; 84–85=Italy, Pennines Alps, Civiasco; 86=Italy, Pennines Alps,Biella; 87=Italy, Castel Vittorio; 88=Italy, Graian Alps.

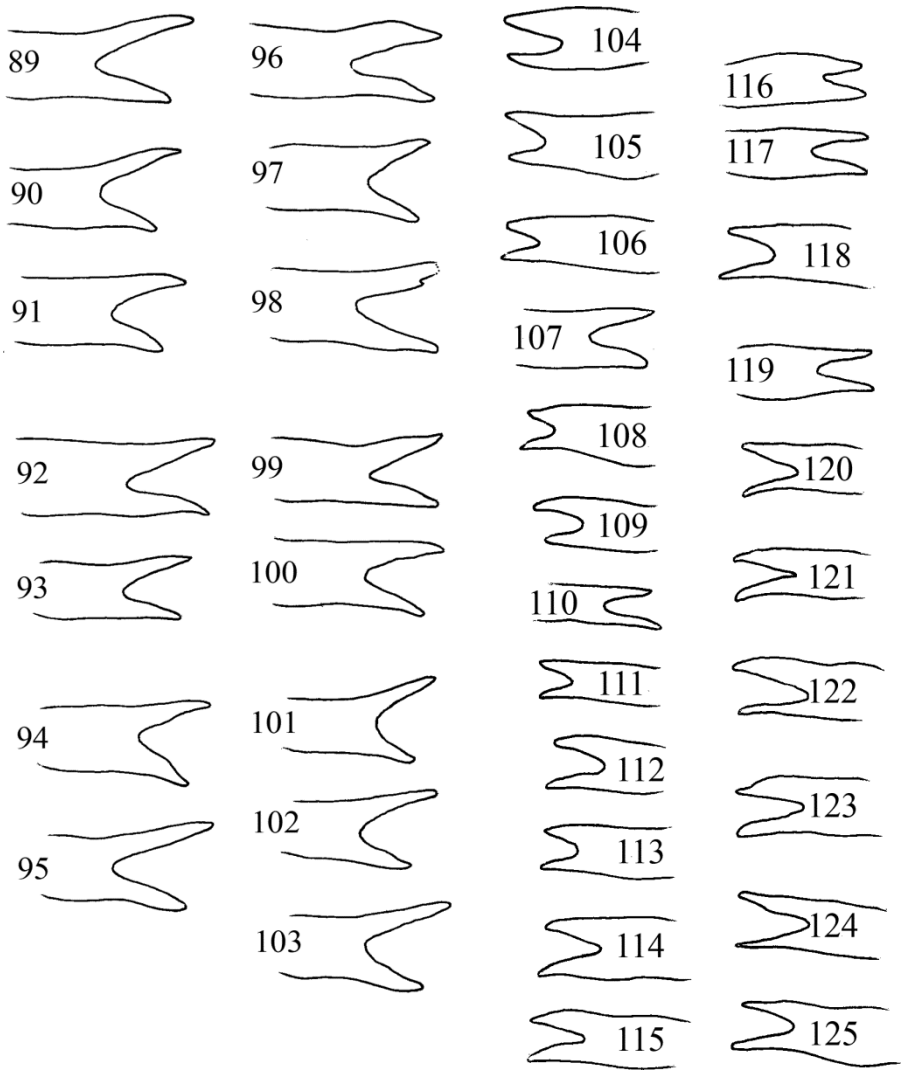
been studied. Actually, McLachlan was the first and last scientist who has studied its identity rather controversially in the nineteenth century. "*In the typical example, from Turin (holotype?), the upper branch of the sheaths is considerably longer than the lower, and quite simple; other examples from Central Italy mostly agree therewith*" (McLachlan 1884: 21). This early statement is reconfirmed by our recent examination on specimens from this area. Compared to *Sericostoma personatum* the dorsal arm of paraproct is considerably longer than the ventral

arm. We have found only a few specimens in the French Alpes-Maritimes and in the Italian Pennines Alps with some resemblance of intermediate paraproct structure.

Sericostoma personatum (Spence, 1826)

(Figures 89–103, 104–125)

Material examined. **Britain** (lateral profile pictures of paraproct taken by Ian Wallace from males collected in 22 different localities): Arian, Pwll Arian, 49.9924°N, 7.3203°E, 10.VI.2013, leg. Wallace family. Benllech, Benllech Beach, 50.125°5N, 7.2456°E, 1.IX.2016, leg. Wallace family. Caban Aur, Caban Aur, Anglesey, 50.1235° N, 7.2496°E, 7.VII.2017 leg. Wallace family. Corrour, Loch na Sgeallaig, 50.4679°N, 7.3077° E, 29.6.1988, leg. Wallace family. Cringle, Cringle Reservoir, stream, 50.2062°N, 7.2922°E, 22.VI.1987, leg. Wallace family. Cwmnt, Cwm Trwsgl, 50.0961°N, 7.2389°E, 28.VI.2011, leg. Wallace family. Eiddwen, Llyn Eiddwen, 49.7923°N, 7.5329°E, 13.VII.1988 leg. Wallace family. Elwy, Afon Elwy, St. Asaph, 50.1212°N, 7.1740°E, 31.VII.2017, leg. Wallace family. Fleet, River Fleet, Nether Rusko, 50.2851°N, 7.2540°E, 28.VI.1985, leg. Wallace family. Glen Affric, Loch Beinn a Mheadhoin, Affric, 50.5213°N, 7.3280°E, 12.VII.2022, leg. T. Hunter. Grizedale, Grizedale Beck, 50.1922°N, 7.1112°E, 9.VI.2022, leg. T. Hunter. Halton, Halton Wood, 50.1107°N, 7.3412°E, 12.VII.1981, leg. B. & I.D. Wallace. Llysyfran, Llys-y-fran, 49.9810°N, 7.2902°E, 6.VI.1992, leg. L.W. Hardwick. Loch Skeen. Loch Skeen, 50.3260°N, 7.4572°E, 22.VI.1988, leg. Wallace family. Marian Glas, Marian Glas, Anglesey, 50.0952°N, 7.2455°E, 23.IX.2022, leg. T. Hunter. Musselwick, 49.9635°N, 73620°E, 15.VII.2007, leg. Wallace family. Plymog, River Alun, Plymog, 50.9013°N, 7.1506°E, 4.VII.1982, leg. B. & I.D. Wallace. Porthselau, Porthselau, 50.0360°N, 5.9499°E, 19.VII.2006, leg. Wallace family. Rhinog, Afon Cwmnantcol, Rhinog, 50.0755°N, 7.2278°E, 16.VI.1982, leg. B. & I.D. Wallace. Tynceunant, Ty'n-y-Ceunant, Cadair Idris, 49.3891°N, 7.0660°E, 14,VI,1872, leg. B. & I.D. Wallace. Whineon, Loch Whinyeon, 50.2525°N, 7.2969°E, 28.VI.1985, leg. Wallace family. Ysbryn Afon Ystrad, 50.0167°N, 7.1761°E, 10.VIII. 1987, leg. Wallace family. **Czech Republic**, N Bohemia, Jizerské hory Mts. (Isergebirge), Bílý Potok-Bártlova bouda (Bartlbaude), 50°52'26"N, 15°14'21"E, 530 m, 15.VI.2007, at light, leg.F. Krampl (4 males, OPC). W Bohemia, Krušné hory Mts. (Erzgebirge), Hluboký potok stream W of Dolní Nivy, 50°14′24″N 12°36′24″E, 540 m, 29.IV.–28.VII.2015, Malaise trap, leg. P. Chvojka et al. (4 males, OPC). NE Bohemia, Orlické hory Mts., Polom N of Sedloňov, 50°21'23"N, 16°19' 06"E, 700 m, 23.VI.–10.VIII.2005, Malais trap, leg. J. Hájek (4 males, OPC). **France**, Lespinassiére, 43.402°N 2.532°E, 450 m, 14.VII.2007, leg. M. Bálint (1 male, OPC). Mt. Mezenc, Borée, Massif Central, 44.908°N 4.228° E, 1026m, 15.VII.2007, leg. M. Bálint (1 male, OPC). Hautes-Alpes, Queyras Massif, Aiguilles, torrent below 'Grand Laus lake', 2560 m, 44.82° N, 6.872°E, 15.VIII.2021, leg. G. Vinçon (1 male, OPC). France, Alpes-de-Haute-Provence, Ravin de St Barnabé, Verdon trib., road to Stade de neige de Vauplane, spring, 1400 m, 43.867°N, 6.632°E, 19.IX.2021, leg. G. Vinçon (1 male, OPC). Alpes-de-Haute-Provence, < Cayolle Pass, spring 'Fontaine Gaudine', 1690 m, 44.3216°N, 6.7039°E, 18.VII.2022, leg. G. Vinçon (1 male, OPC). Haute-Savoie, Bauges Massif, above Chevaline, spring, 1560 m, 45.7245°N, 6.1993°E, 26.VI.2022, leg. G. Vinçon (1 male, OPC). **Germany**, Rheinland-Pfalz, Kasel, Gerten P., 49.763369°N 6.729482°E, 160m, 4.VII.2019, leg. P.J. Neu (det. P.J. Neu as *Sericostoma personatum*, 1 male, OPC). Germany, Saarland, Orschotz, 1km E Orschotz, Zweibach, unterhalb Teichen, 49.51001°N 6.55957°E, 350m, 16.VI.2013, leg. P.J. Neu, (det. P.J. Neu as *Sericostoma personatum*, 1 male, OPC). Germany, Saarland, Bietzen, NSG in Zeiern, 49.417628°N 6.676427°E, 2.VIII.2018, leg. A. Werno, (det. P.J. Neu as *Sericostoma personatum*, 2 males, OPC). Germany, Saarland, Biringen/Oberesch, Weiher Umg., 49.400125°N 6.561642°E, 8.VI.2018, leg. A. Werno, (det. P.J. Neu as *Sericostoma personatum*, 2 males, OPC). Germany, Saarland, Gersheim, Orchideengebiet, 49.1499°N. 7.1999°E, 7.VII. 2017, leg. A. Werno, (det. P.J. Neu as *Serico*



Figures 89–103. Paraproct matrix of *Sericostoma personatum* populations: 89=Czech Republic, N. Bohemia; 90=Czech Republic, W. Bohemia; 91=Czech Republic, N. E. Bohemia; 92=France, Hautes–Alpes; 93=France, Haut–Provance; 94=Germany, Saarland; 95=Germany, Rheinland; 96=Hungary, Bükk Mt.; 97=Hungary, Recsk; 98=Hungary, Aggtelek; 99=Romania, Hargitha; 100=Romania, Valea Cupas; 101=Sweden, Kiruna; 102=Sweden, Jamtland; 103=Sweden, Skane.

Figures 104–125. Paraproct matrix of *Sericostoma personatum* populations from Britain: 104=Arian, 105=Benliech, 106=Caban Aur, 107=Corrour, 108=Cringle, 109=Cwmnt, 110=Eiddwen2, 111=Elwy, 112=Fleet, 113=Glen Affric, 114=Grizedale, 115=Halton, 116=Llysyfran, 117=Loch–Skeen, 118=Marian Glas, 119=Mussel Wick, 120=Plymog, 121=Porthselau, 122=Rhinog, 123=Tynceunant, 124=Whinyeon, 125=Ysbryn.

stoma personatum, 2 males, 1 female; OPC). **Hungary**, Bükk Mountains, Szalajka stream, collected by folia tent of J. Szabó, 11.VII.1982 (1 male, 2 females; OPC). Hungary, Aggtelek national Park, Ménes stream, 23.VII.1985, light leg. J. Oláh (1 male, OPC). Hungary, Recsk, Oroszlánvár, 18.VI.2012, leg. P. Gombkötő, T. Korompai, G. Magos & L. Urbán (1 male, OPC). **Ireland**, River Fergus, Popular Bridge, County Clare, 52°57′54.17″ N, 9°5′14.28″ W, Irish Grid Reference R2791V.2024, leg. Hugh Feeley (1 male, det. J. P. O'Connor). Lough Dan, County Wicklow, 53°3′55.80″ N 6°17′5.95″ W, Irish Grid Reference O1503, 18.VI. 2024, leg. Hugh Feeley

(2 males, det. J. P. O'Connor). River Boyne, Slane Bridge, County Meath, 53°41′53.06″ N, 6°32′49.54″ W, Irish Grid Reference N967, 3.VII. 2024, leg. Hugh Feeley (1 male, det. J. P. O'Connor). River Boyne, upstream of the Knightsbrook River confluence, 53°32′51.84″N,, 6°45′48.59″ W, Irish Grid Reference N8256, 10.VII.2024, leg. Hugh Feeley (1 male, det. J. P. O'Connor. Dunshauglin Stream, Cookstown Bridge, 53°30′28.48″ N, 6°25′58.82″ W, Irish Grid Reference O04521, 8.VII.2024, leg. Hugh Feeley (1 male, det. J. P. O'Connor). **Romania**, Valea Cupas, Lacu Rosu, 9.VII.1981, leg. Peregovits & Ronkay (1 male, OPC). Judetul Hargitha, Sincraieni, Valea Mare, 13.VII.1993, light trap leg. L. Keresztes (1 male, OPC). **Sweden**, Jämtland, Bräcke kommun, Gimån, immediately W rd.323 at bridge, 62.860°N 15.574°E, 278 m, 21.VI.2020, net, 21:00h, leg. K.A. Johanson (1 male, OPC). To-LPL, Kiruna Kommun, S bank of Idijoki River, at Vikkurinniemi /Maunu, 68.4776°N 22.2021°E, 344 m, 4.VII.2023, net, 19:30h, leg. K.A. Johanson (1 male, OPC). Skåne, Sjöbo Kommun, Stream Stampenbäcken, 55.610°N, 13.566°E, 18.VIII. 2017, light trap, leg. K.A. Johanson (1 male, OPC). Skåne, Sjöbo Kommun, 4.12 km NW Blentarp Church, Stream Stampenbäcken, 55.6102°N, 13.5658°E, 1.VII.2017, light trap, leg. K.A.Johanson (1 male, OPC).

*Remark*s. We have examined specimens of *Sericostoma personatum* the nominate species of the genus *Sericostoma*, from almost its entire range, from the type country Britain (England) through Ireland, Czech Republic, France, Germany, Hungary, Romania to Sweden. The bifid nature of the paraproct terminal seems to be rather stable. The dorsal and ventral arms of paraproct are almost with equal length. Only some tendency of slightly longer dorsal arm detectable at some specimens but there are some specimens with slightly longer ventral arm. The considerably longer dorsal arm divergence of *Sericostoma pedemontanum* was not detected on specimens of *Sericostoma personatum*, neither on the continent, nor on the British Islands including Britain and Ireland.

Sericostoma subaequale McLachlan, 1898

Material examined. **Italy,** Brembana Valley, Passo San Marco, S. slope, 1710 m, nice spring, 46.0389°N, 9.6358°E, 18.06.2023, leg. G. Vinçon (1 male, OPC).

Remark. The first specimen we have collected and examined in our first survey of the *Sericostoma* genus (Oláh & Vinçon 2023). We were very glad to collect and to examine a specimen of this rare animal from a spring habitat.

Sericostoma vittatum species complex

Sericostoma baeticum Pictet, 1856

(Figures 40–61)

Material examined. **Portugal,** Serra da Estrela Massif, above Loriga, nice brooklets, 940 m, 40.3381°N, 7.7074°W, 23.IV.2022, leg. G. Vinçon (2 males, 1 female; OPC). Serra da Estrela Massif, North Valezim, nice spring, 650 m, 40.3718°N, 7.713°W, 23.IV.2022, leg. G. Vinçon (1 male, 1 female; OPC). **Spain**, Os Cabaniños, Río de Ortigal, Lugo, Sierra de Ancares, 4.VIII. 1979 leg. M.A. Gonzalez (3 males, OPC). Tragacete (Cuenca), río Júcar, 5.VII.1995, leg. M.A. Gonzalez (3 males, OPC). Amanaderos, Camarena de la Sierra, Teruel, 2.VII.2017, leg. M.A. Gonzalez (3 males, OPC).

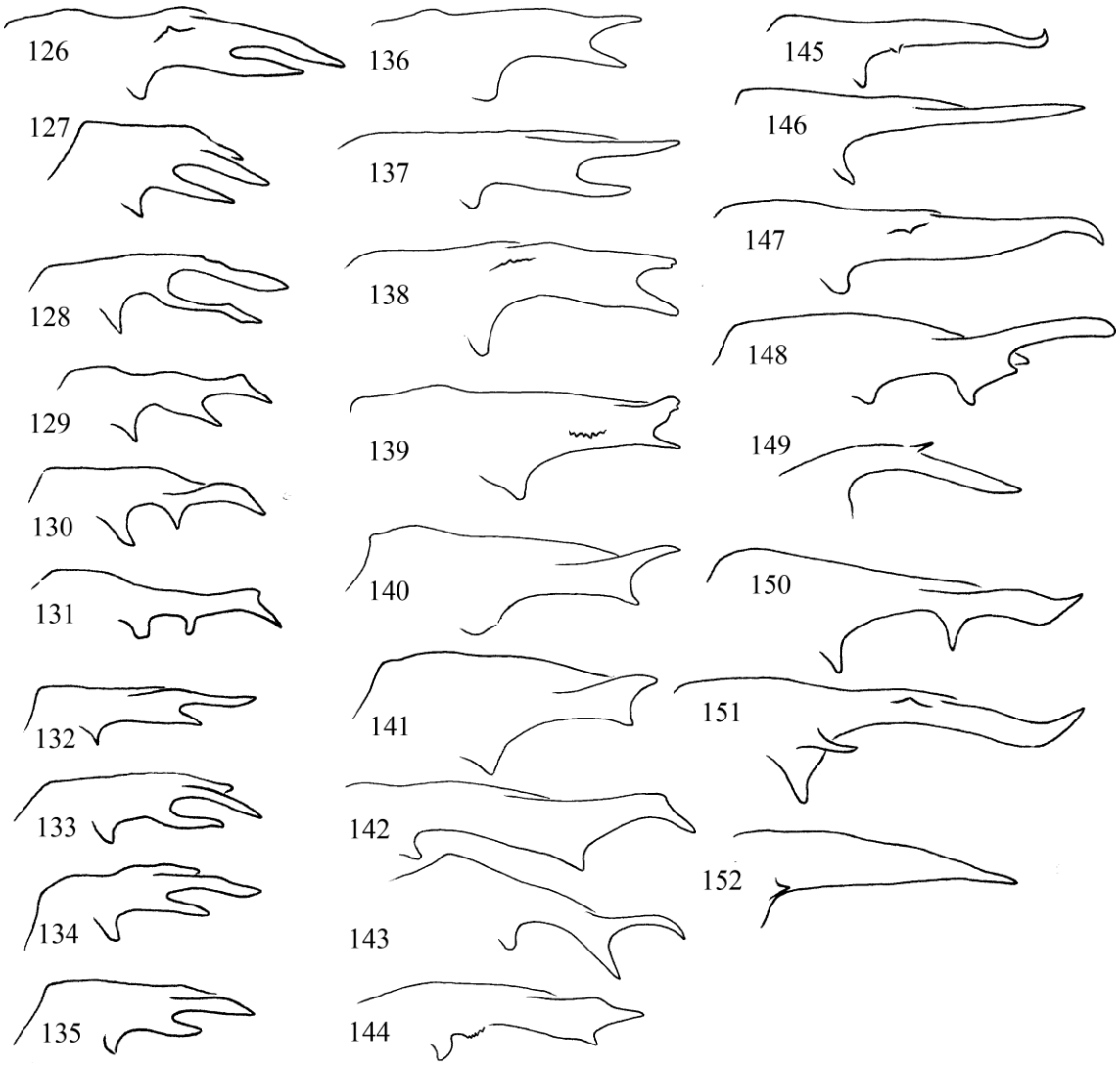
Remarks. Each specimen examined has its own individual shape of the enlarged dorsal apical arm of the paraproct, but the range of variation is stable and distinct. No real overlap with its sibling, *Sericostoma vittatum*.

Sericostoma vittatum Rambur, 1842

(Figures 62–73)

Material examined. **Spain**, Las Alberguillas, Capileira (Sierra Nevada), Granada, 7.VII.1988, leg. M.A. Gonzalez (1 male, OPC).

Remarks. Every specimen examined its own individual shape of the small dorsal apical arm of



Figures 126–135. Trait matrix atlas of the lateral view of the fused tergite IX, segment X and paraproct in *Sericostoma schneideri* species group: 126=*schneideri*, 127=*alakir*, 128=*dimcay*, 129=*flavicorne*, 130=*grusiense*, 131=*ida*, 132=*mesopotamicum*, 133=*pinargozu*, 134=*taskent*, 135=*yuvarlakcay*.

Figures 136–144. Trait matrix atlas of the lateral view of the fused tergite IX, segment X and paraproct in *Sericostoma personatum* species group: 136=*personatum*, 137=*pedemontanum*, 138=*subaequale*, 139=*unaequale*, 140=*maclachlanianum*, 141=*sasbaddes*, 142=*baeticum*, 143=*heracles*, 144=*vittatum*.

Figures 145–152. Trait matrix atlas of the lateral view of the fused tergite IX, segment X and paraproct in *Sericostoma galeatum* species group: 145=*galeatum*, 146=*bergeri*, 147=*cianficconiae*, 148=*clypeatum*, 149=*confusum*, 150=*italicum*, 151=*romanicum*, 152=*siculum*.

the paraproct, but the range of variation is stable and distinct. No real overlap with its sibling, *Sericostoma baeticum*.

Acknowledgements – The authors are thankful for all the kind helps and cooperation in realising our "put together" philosophy by sending additional *Sericostoma* specimens: Pavel Chvojka, National Museum, Museum of Natural History, Czech Republic; Marcos A. González, Department of Zoology and Physical Anthropology, Faculty of Biology, University of Santiago de Compostela, Spain; Kjell Arne Johanson, Swedish Museum of Natural History, Sweden. We are grateful to Peter Neu for providing important comparative materials and for exchanging ideas. We would particularly like to thank Ian Wallace from the National Museum of

Liverpool in England and James P. O'Connor from the National Museum of Ireland in Dublin for inspiring us to revisit the *Sericostoma* enigma, as well as for helping us to re-examine specimens of *Sericostoma personatum* in Britain (England) and Ireland.

REFERENCES

BOTOSANEANU, L. (1967): *Trichoptera*. In: ILLIES, J. (Ed.) Limnofauna Europea. Eine Zusammenstellung aller die europaischen Binnengewasser bewohnenden mehrzelligen Tierarten mit Angaben über ihre Verbreitung und Ökologie. Gustav Fischer Verlag, Stuttgart, p. 285–309.

BOTOSANEANU, L. & MALICKY, H. (1978): *Trichoptera*. In: J. ILLIES (Ed.) Limnofauna Europaea. Second edition. Gustav Fischer Verlag, Stuttgart, p. 333–359.

CURTIS, J. (1934): Description of some hitherto nondescript British species of mayflies of anglers. *London and Edinburgh Philosophical Magazine and Journal of Science,* 4: 120–125, 212–218.

GRAF, W., VITECEK, S., PREVIŠIĆ, A. & MALICKY, H. (2015): New species of Limnephilidae (Insecta: Trichoptera) from Europe: Alps and Pyrenees as harbours of unknown biodiversity. *Zootaxa,* 3911(3): 381–395. https://doi.org/10.11646/zootaxa.3911.3.5

GREGORY, W. K. (1935): Reduplication in evolution. *Quarterly Rewiew of Biology,* 10: 272–290. https://www.jstor.org/stable/2808471

LADYMAN, J. (2023): "*Structural Realism*". (Summer 2023 Edition), ZALTA, E.N & NODELMA, U. (Eds.), https://plato.stanford.edu/archives/sum2023/entries/structural-realism/.

LATREILLE, P.A. (1825): *Familles Naturelles de Regne Animal*. Paris, J. B. Baillière Libraire. 570 pp.

LODOVICI, O. & VALLE, M. (2023): *Sericostoma confusum* n. sp.: una nuova specie di Tricottero (Insecta, Trichoptera) dell'Italia meridionale. *Rivista del Museo di Scienze Naturali "Enrico Caffi", Bergamo,* 36: 59–64.

MALICKY, H. (1983): *Atlas of European Trichoptera*. Junk, The Hague, 298 pp.

MALICKY, H. (1999): Neue Köcherfliegen aus Europa, Asien und von den Seychellen. *Braueria,* 26: 44–48.

MALICKY, H. (2004): *Atlas of European Trichoptera*. Second Edition. Springer, Dordrecht, The Netherlands, 359 pp.

MALICKY, H. (2005): Ein kommentiertes Verzeichnis der Köcherfliegen (Trichoptera) Europas und des Mediterrangebietes. *Linzer biologische Beitrage* 37(1): 533–596.

MCLACHLAN, R. (1867): Bemerkungen über europäische Phryganiden, nebst Beschreibung einiger neuer Genera und Species. *Stettiner Entomologische Zeitung,* 28:50–63.

MCLACHLAN, R. (1874-1880): *A monographic revision and synopsis of the Trichoptera of the European fauna*. Reprinted 1968. E.W.Classey Ltd. Hampton, Middlesex, 142 pp https://doi.org/10.5962/bhl.title.28556

MCLACHLAN, R. (1884): *A monographic revision and synopsis of the Trichoptera of the European fauna.* First additional supplement. John van Voorst, London, 76 pp. + 7 pls.

MORETTI, G. P. & CIANFICCONI, F. (1977): The *Sericostoma* Latr. genus in Italy. In: CRICHTON, M.I. (Ed.) Proceedings of the 2nd International Symposium on Trichoptera, Junk, The Hague, p. 7–30.

NAVAS, L. (1917): Tricópteros nuevos de España. 3ª Serie. *Broteria,* 15: 5–17.

NEU, P.J., MALICKY, H., GRAF, W. & SCHMIDT-KLOIBER, A. (2018): *Distribution atlas of European Trichoptera*. Die Tierwelt Deutschlands, 84. Teil. 891 pp.

OLÁH, J. & JOHANSON, K.A. (2011): New Neotropical Hydroptilidae (Trichoptera). *Annales historico-naturales Musei nationalis hungarici,* 103: 117–255.

OLAH J. & FLINT, O.S. Jr. (2012): Description of new species in the Leucotrichiini tribe (Trichoptera: Hydroptilidae). *Annales historico-naturales Musei nationalis hungarici,* 104: 131–-213.

OLÁH, J., ANDERSEN, T., CHVOJKA, P., COPPA, G., GRAF, W., IBRAHIMI, H., LODOVICI, O., PREVIŠIĆ, A. & VALLE, M. (2013): The *Potamophylax nigricornis* group (Trichoptera, Limnephilidae): resolution of phylogenetic species by fine structure analysis. *Opuscula Zoologica, Budapest,* 44(2): 167–200.

OLÁH, J., VINÇON, G. & COPPA, G. (2021): On the Trichoptera of Italy with delineation of incipient sibling species. *Opuscula Zoologica, Budapest,* 52 (1):3–67. https://doi.org/10.18348/opzool.2021.1.3

OLÁH, J., KOVÁCS T. & VINÇON G. (2022): On the Trichoptera of Western Europe, with surveys of *Platyphylax*, *Simaphylax* genera, *Drusus chapmani*, *Chaetopteryx gessneri*, and *C. gonospina* species complexes. *Opuscula Zoologica, Budapest,* 53(2): 113–197. https://doi.org/10.18348/opzool.2022.2.113

OLÁH, J. & VINÇON G. (2023): On the Trichoptera of Western Europe: survey on Ptilocolepidae family, *Anisogamus* and *Sericostoma* genera. *Opuscula Zoologica, Budapest,* 54: 23–82. https://doi.org/10.18348/opzool.2023.2.23

OLÁH, J. (2024): *Light philosophy*. Kairos, Budapest, 214 pp. [in Hungarian: Fényfilozófia]

OLÁH, J. (2025): *Light world*. Kairos, Budapest, 240 pp. [in Hungarian: Fényvilág]

ROSS, H. H. (1956): *Evolution and classification of the mountain caddisflies*. The University of Illinois Press, Urbana, 213 pp.

SCHMID, F. (1949): Les Trichopteres de la collection Navas. *Eos, Revista Española de Entomologia,* 25: 305–426.

SCHMID, F. (1952): Contribution à l'étude des Trichoptères d'Espagne. *Instituto de Estudios Pirenaicos Consejo Superior de Investigaciones Cientificas, Zaragoza*, 1952: 627–695.

SCHMID, F. (1963): A propos de deux récents ouvrages sur la phylogénie et la zoogeographie des Trichopteres. *Miscellania Zoologica Barcelona* 1(5): 93–119.

SCHMID, F. (1979): On some new trends in Trichopterology. *Bulletin of the Entomological Society of Canada* 11:48-57.

SIPAHILER, F. (2021): Males of the genus *Sericostoma* Latreille 1825 in Turkey (Trichoptera, Sericostomatidae). *Zootaxa,* 4965(3): 483–500. https://doi.org/10.11646/zootaxa.4965.3.4

WEAVER, J.S., III, (2002): A synonymy of the caddisfly genus *Lepidostoma* Rambur (Trichoptera: Lepidostomatidae), including a species list. *Tijdschrift voor Entomologie,* 145: 173–192. https://doi.org/10.1163/22119434-900000110

WILLISTON, S.W. (1914): *Water Reptiles of the past and present*. University of Chicago Press, Chicago, 251 pp.