Ephemera, 2025, Vol. **26** : 57-64

Disponible en ligne sur ephemera.insectes.org

Ephemera

revue du groupe Opie-benthos publiée par l'Office pour les insectes et leur environnement

Article

On the genus *Pseudosmittia* from continental France. II. Description of *P. aina* sp. n. (Diptera, Chironomidae, Orthocladiinae)

Joel Moubayed* & Peter H. Langton**

*Freshwater & Marine Biology, 10 rue des Fenouils, 34070 Montpellier, France ; chirojmb@gmail.fr

**University Museum of Zoology Cambridge, Downing Street, Cambridge, UK CB2 3EJ; Address for correspondence: 16 Irish Society Court, Coleraine, Co. Derry, BT52 IGX, Northern Ireland.

Reçu le 24 juin 2024 - Accepté le 18 septembre 2024 - Publié le 25 février 2025

ABSTRACT

The male adult of *Pseudosmittia aina* sp. n. is described based on material collected in riparian habitats bordering wet meadows of the Dombes (Ain department, SE-France). On the basis of the following common morphological characters with P. *tyrrhena* Moubayed, 2025 (anal point triangular, inferior volsella double), *P. aina* sp. n. appears to belong to the *tyrrhena*-gr as recently emended by MOUBAYED (2025a). The nearly similar shape of the gonostylus (narrowing and projecting distally) is also observed in *P. withersi* Langton, 2012. To date, the genus *Pseudosmittia* is represented by 14 species from continental France. The description of *P. aina* sp. n increases the total number of species to 15 from this country. The new species is considered to be local biogeographic representative, the habitat deserving appropriate conservation measures. Remarks and comments on the ecology with a key to male adults are given.

Keywords: Diptera Chironomidae, taxonomy, new species, France, conservation measures.

Sur le genre *Pseudosmittia* de France continentale. II. Description de *P. aina* sp. n. (Diptera, Chironomidae, Orthocladiinae)

RÉSUMÉ

L'adulte mâle de *Pseudosmittia aina* sp. n. est décrit à partir d'un matériel collecté dans des habitats ripicoles situés dans les marais de la Dombes (département de l'Ain, SE-France). Des caractères morphologiques communs avec *P. tyrrhena* Moubayed, 2025 (pointe anale triangulaire, volselle inférieure double), soutiennent l'appartenance de *P. aina* sp. n. au groupe *tyrrhena* mis en évidence par MOUBAYED (2025a). La forme du gonostyle (partie distale effilée et projetée) est également observée chez *P. withersi* Langton, 2012. À ce jour, le genre *Pseudosmittia* est représenté en France continentale par 14 espèces. La description de *P. aina* sp. n. porte à 15 le nombre d'espèces connues de cette région. La nouvelle espèce est considérée comme un élément biogéographique à l'échelle locale, qui mérite des mesures de conservation appropriées. Des commentaires sur la position taxonomique et l'écologie ainsi qu'une clé de détermination des adultes mâles sont fournis.

Mots-clés : Diptera Chironomidae, taxonomie, nouvelle espèce, France, mesures de conservation.

Ephemera est une revue du groupe Opie-benthos publiée par l'Office pour les insectes et leur environnement en libre accès et en flux continu. Rendez-vous sur https://ephemera.insectes.org pour toutes vos propositions d'articles.

e-ISSN : 3077-8549. DOI : https://doi.org/10.71868/ge3g-b433

urn:lsid:zoobank.org:pub:849AE104-E93E-450F-A6F2-31C3E449C8F1

1. Introduction

Publications on the taxonomy, geographical distribution and ecology of the genus *Pseudosmittia* Edwards, 1932 (Edwards 1929, 1932, Goetghebuer 1940-1950, Strenzke 1950, 1960, Brundin 1956, Tokunaga 1964, Albu 1968, Sasa 1979, 1985, 1993, 1998, Caspers & Reiss 1989, Cranston et al. 1989, Wang 1990, Sasa & Okazawa 1992, Sæther & Ferrington 2003, Sæther 2004, 2006, Spies & Sæther 2004, Yamamoto 2004, Makarchenko & Makarchenko 2007, 2008, Langton & Pinder 2007, Ferrington & Sæther 2011, Ashe & O'Connor 2012, Langton & Syrovatka 2013, Mauad et al. 2013, Sæther & Spies 2013, Moubayed-Breil & Mary 2023, Moubayed 2025a, 2025b, 2025c), show that about 110 described species are known worldwide, of which up to 25 species are reported from Europe (Ferrington & Sæther 2011, Sæther & Spies 2013, Moubayed-Breil & Mary 2023, Moubayed 2025a, 2025b, 2025c).

2. Material and methods

The male adults of *P. aina* sp. n. were collected by sweep net in riparian habitats bordering the wet meadows of the Dombes (Ain Dpt, France). The material was preserved in 80-85% ethanol for taxonomic examination and description. Information on the methodology of mounting and conservation of the type-material is provided in Moubayed & Langton (2019). Morphological terminology and measurements of the imagines follow those of Sæther (1980) and Langton & Pinder (2007).

3. Description

Pseudosmittia aina sp. n.

urn:lsid:zoobank.org:act:B41A9BBD-81FB-40A3-8771-6395A2F18746

Material examined

Holotype. **France**. One male adult, riparian habitats surrounding the wet meadows of the Dombes; 'Saint-Jean-de-Thurigneux' (01362); 'Domaine de la Fondation de Pierre Vérots'; alt. 295 m; 45.9546088, 4.9182704; leg. Phil Withers†, 01.VII.2008.

Paratype (leg. Phil Withers†). One male adult, same locality and date as for holotype.

Holotype (mounted on one slide) is deposited in the collections of the 'Cantonal Museum of Natural Sciences, dept of zoology, Palais de Rumine, 6 place de la Riponne, CH-1014 Lausanne (MZL), Switzerland', (GBIFCH01223211). The paratype is deposited in the collection of the first author.

Etymology: the name *"aina"* of the new species refers to the Ain department (SE-France), where the type-material was collected.

Diagnostic characters

On the basis of the similarly shaped inferior volsella (bilobed with ventral lobe nose-like), the new species belongs to the *tyrrhena*-gr. However, the following morphological characters will separate *P. aina* sp. n from closely related congeners. Head. Antenna 625 μm long, terminal segment 300 μm long, densely covered with long setae, apical seta present, AR 0.92; temporals 5; clypeus with 11 setae; palpomere 3 with one sensilla coeloconica. Thorax. Acrostichals 2, dorsocentrals 13, scutellars 6. Hypopygium. Tergite IX with 4 setae inserted at base of anal point; anal point small, triangular, pubescent; virga consists of 2 pointed spines. Gonocoxite with truncate apex, basal junction without pars ventralis. Inferior volsella double, dorsal lobe wide, ventral lobe nose-like, bent downwards, anterior part covered with setae, caudal part bare; gonostylus narrowing and projecting posteriorly, much wider at base; crista dorsalis absent.

Male imago

(n = 2; Figs 1A-I)

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
PI	390	380	200	95	75	50	40	0,53	3,73	3,85	3.15
PII	390	395	215	105	85	55	50	0,54	3,39	3,65	3.20
PIII	385	425	250	125	110	65	50	0,59	3,03	3,24	3.30

Table 1. " LR = Length of tarsomere ta_1 divided by length of tibia (ti); BV = Combined length of femur (fe), tibia and ta_1 divided by combined length of tarsomeres ta_2-ta_5; SV = Ratio of femur plus tibia to tarsomere ta_1; BR = Ratio of longest seta of ta_1 divided by minimum width of ta_1, measured one third from apex."

Medium sized: total length 1.60 mm; wing length 1.05 mm; TL/WL = 1.52. General colouration brownish; head dark brown; antenna and palpomeres pale brown; thorax brownish with dark brown mesonotal stripes; legs, abdomen and anal segment brownish.

Head. Eyes bare; coronals 2; temporals 5 including 3 inner and 2 outer verticals. Antenna 13-segmented, 625 μm long, densely covered with long setae (300-320 μm long), segments 5-12 subequal (25 μm long); last flagellomere (Fig. 1A) 300 μm long, not clubbed, linearly elongate, covered with setae 200-250 μm long, distal part with about 10-12 curved setae, apical seta absent; antennal groove reaching segments 2-3; AR 0.92. Clypeus (Fig. 1B) 125 μm long, 100 μm maximum width, broadly trapezoidal with semicircular distal margin, with 11-12 setae in 3 rows. Palp (Fig. 1C) 5-segmented, segments 1-2 fused; segment 5 (Fig. 1D) with characteristic micro-undulation and 4 apical setae; length (in μm) of segments: 20, 35, 65, 75, 115. Thorax. Lobes of antepronotum not gaping; lateral antepronotals 3; acrostichals 2, inserted long distance from antepronotum; prealars 4 uniserial; dorsocentrals 15 uniserial; scutellum with 6 setae (3 on each side of the midline). Wing. Brachiolum with one seta; subcosta overreaching fork of radius; costal expansion about 20 μm long; R with 5 setae; remaining veins and squama bare. Legs. Length (in μm) of tibial spurs: PI, 25; PII, 30, 25; PIII, 40, 30. Sensilla chaetica present on tarsomeres ta_1-ta_5. Length (μm) and proportions of prothoracic (PI), mesothoracic (PII) and metathoracic (PIII) legs (n =1) as in the Table 1.

Abdomen. Hypopygium in dorsal and ventral view as in figures 1E-F (ventral view, Fig. 1F, with tergite IX and anal point omitted). Tergite IX about 765 μm long, 100 maximum wide, broadly semicircular, dorsal hump absent; with 4 dorsal setae (Fig. 1E) inserted at base of anal point (3 on each side). Laterosternite IX with 6 setae (3 on each side). Anal point (Fig. 1E) 10 μm as long as wide at base; triangular, not reaching tip of tergite IX; densely covered with macrotrichia. Apodemes (Fig. 1F): transverse sternapodeme rounded, lateral expansion present; phallapodeme weak, saw-shaped. Virga (Figs 1E-G) about 12 μm long, composed of 2 long pointed spines. Gonocoxite 125 μm long, 55 μm maximum width including inferior volsella; distinctly truncate apically; pars ventralis absent; ventral margin with 8-9 stout inner setae. Superior volsella absent. Inferior volsella (Figs 1E-F), double; dorsal lobe (Fig. 1E) 50 μm long, 20 μm maximum width, large lobe-like shaped, semicircular, located medially, sparsely covered with setae; accessory lobe nose-shaped, located distally, distinctly projecting downwards, almost free apically, anterior part densely covered with setae, posterior side bare. Gonostylus (Figs 1H-I) 55 μm long, 25 μm maximum width at base, 3-5 mm wide distally; concave medially, gradually narrowing distally, basal part more massive, distal half projecting upwards; anterior side with orally directed setae; crista dorsalis absent; megaseta 3 μm long, well developed. HR 2.27; HV 2.91.

Female adult and larva: unknown.

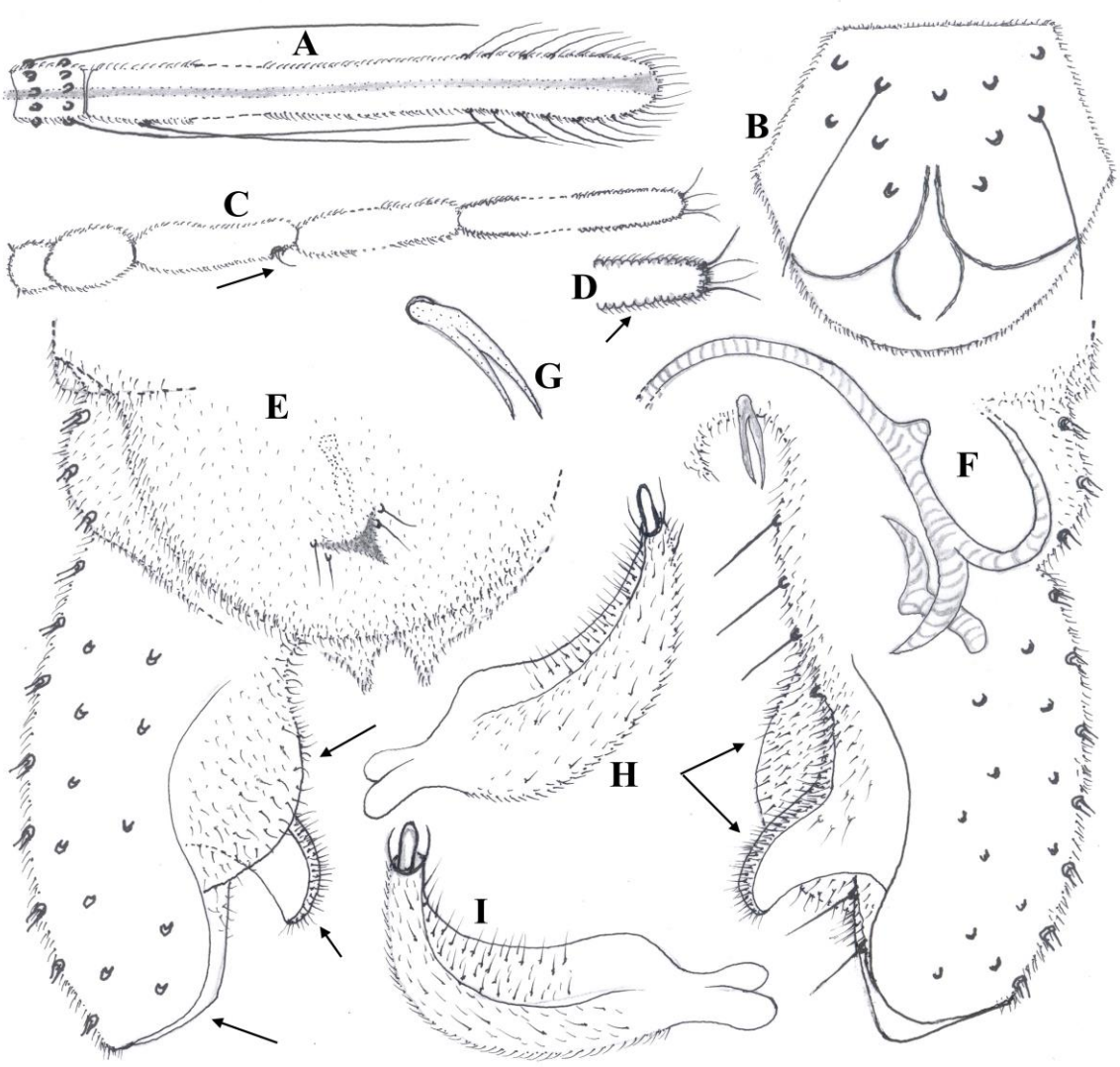

Figure 1. Male imago of Pseudosmittia aina *sp. n. Antenna, two last segments* (*A*)*; clypeus* (*B*)*; palpomeres 1-5* (*C*)*; hypopygium in dorsal* (*D*) *and ventral view* (*E, with virga and pars ventralis*)*; tergite IX and anal point in lateral view* (*F*)*; virga* (*G*)*; gonostylus, right angle* (*H*)*. The arrows indicate some distinctive characters.*

Figure 1. Imago mâle de Pseudosmittia aina *sp. n. Antenne, deux derniers segments* (*A*) *; clypéus* (*B*) *; palpomères 1-5* (*C*) *; hypopyge en vue dorsale* (*D*) *et ventrale* (*E, avec virga et pars ventralis*) *; tergite IX et pointe anale en vue latérale* (*F*) *; gonostyle, angle droit* (*H*)*. Les flèches indiquent quelques caractères distinctifs.*

4. Remarks

Currently, the genus *Pseudosmittia* comprises about 110 known described species worldwide, of which up to 25 known species are reported from Europe (FERRINGTON & SÆTHER 2011, SÆTHER & SPIES 2013; MOUBAYED 2025a, 2025b, 2025c) and only 14 from continental France as reported in MOUBAYED (2025b). Accordingly, the description of *P. aina* sp. n. increases the total number to 15 from this country.

On the basis of the following atypical morphological characters (antenna without apical seta; palpomere 3 with one sensilla coeloconica; anal point triangular; gonocoxite distinctly truncate apically; inferior volsella double, dorsal lobe

Photo 1. Type-locality of Pseudosmittia aina *sp. n.: riparian habitats bordering the ponds of the Dombes Region* (*Ain french department; eastern France*).

Photo 1. Localité-type de Pseudosmittia aina *sp. n.: habitats ripicoles des étangs de la Dombes* (*département de l'Ain, Est de la France*).

large, accessory lobe long nose-like, with rows of short setae on anterior half, caudal part bare), *P. aina* sp. n. appears to belong to a separate subgroup of the *tyrrhena*-gr as emended in MOUBAYED (2025a). This new species is here considered to be a local biogeographic representative of the French chironomid-fauna.

A morphological affinity is also observed between *P. aina* sp. n. and *P. withersi* Langton, 2012, as both species share a similarly shaped gonostylus (narrowing and projecting distally). However, the new species can easily be separated from other related congeners on the basis of a combination of differentiating characters, which are highlighted in the following key to known male adult of the 5 recently described species from continental France, Corsica and Lebanon.

Key to male adult of the 5 recently (2025) described *Pseudosmittia* species from continental France, Corsica and Lebanon

1. Anal point absent (Moubayed 2025c, Figs 1D, I); inferior volsella with 3 lobes, antero-ventral lobe needle-like, dorsal and postero-ventral lobes digitiform (Moubayed 2025c, Figs 1D-E); gonostylus is *P. trilobata*-type (Moubayed 2025c, Figs 1D, J) .....***P. mediterranea*** Moubayed, 2025

- Anal point present; inferior volsella bilobed; gonostylus otherwise shaped **2**

2. Pars ventralis present; dorsal lobe of inferior volsella triangular, ventral lobe nose-like, projecting downwards, anterior side bare, posterior side densely covered with setae; gonostylus massive, with apical crista dorsalis (Moubayed 2025b, Figs H) .....***P. tyrrhena*** Moubayed, 2025

- Pars ventralis absent; inferior volsella otherwise shaped **3**

3. Dorsal and ventral lobes of inferior volsella (Moubayed 2025a, Figs 1E-F, I) acutely triangular, similarly shaped; gonostylus (Moubayed 2025a, Figs 1J-L) linearly elongate and massive; crista dorsalis double, proximal lobe much broader, distinctly swollen medially.....***P. acquavivai*** Moubayed, 2025

- Dorsal and ventral lobes of inferior volsella and gonostylus otherwise shaped **4**

Photo 2. Type-locality of Pseudosmittia aina *sp. n.: riparian habitats bordering the ponds of the Dombes Region* (*Ain french department; eastern France*).

Photo 2. Localité-type de Pseudosmittia aina *sp. n.: habitats ripicoles des étangs de la Dombes* (*département de l'Ain, Est de la France*).

4. Dorsal lobe of inferior volsella large, broadly rounded, nearly semicircular (Figs 1E-F), ventral lobe nose-like, anterior side covered with setae, posterior side bare (Figs 1 E-F); gonostylus wider at base, narrowing and projecting distally (Figs 1H-I), crista dorsalis absent.....***P. aina*** sp. n.

- Dorsal lobe of inferior volsella smaller, lobe-like (Moubayed 2025b, Figs 1G-H, K), ventral lobe low, densely covered with setae; gonostylus (Moubayed 2025b, Figs 1L-M) nearly semicircular, concave medially, crista dorsalis weak, located pre-apically ....***P. beverana*** Moubayed, 2025

5. Ecology and geographical distribution

P. aina sp. n. is confined to riparian habitats enriched with aquatic and subaquatic plants, which deserve greater consideration, protection and preservation. Emergence is observed in summer. To date, the new species is known only from its type-locality at the wet meadows of Dombes ('Marais de la Dombes', Ain dpt), eastern France.

Species encountered in the same locality with *P. aina* sp. n. include: *Ablabesmyia monilis* (Linnaeus, 1758); *Clinotanypus nervosus* (Meigen, 1818); *Procladius choreus* Meigen, 1804; *Rheopelopia maculipennis* (Zetterstedt, 1838); *Thienemannimyia lentiginosa* (Fries, 1823); *Camptocladius stercorarius* (De Geer, 1976); *Corynoneura scutellata* Winnertz, 1846; *Cricotopus bicinctus* (Meigen, 1818); *C. flavocinctus* (Kieffer, 1924); *C. intersectus* (Staeger, 1869); *C. pulchripes* Verrall, 1912; *C. sylvestris* (Fabricius, 1794); *Hydrobaenus scanicus* Brundin, 1947; *Paralimnophyes longiseta* Thienemann, 1919; *Psectrocladius sordidellus* (Zetterstedt, 1838); *Smittia aterrima* (Meigen, 1818); *S. pratorum* (Goetghebuer, 1927); *Chironomus riparius* Meigen, 1804; *Glyptotendipes gripekoveni* (Kieffer, 1913); *Kiefferulus tendipediformis* (Goetghebuer, 1921); *Microchironomus deribae* (Freeman, 1957); *M. tener* (Kieffer, 1918); *Paracladopelma camptolabis* (Kieffer, 13); *Paratendipes albimanus* (Meigen,

1818); *Pentapedilum sordens* (Wulp, 1874); *Polypedilum nubifer* (Skuse, 1889); *P. convictum* (Walker, 1826); *Cladotanytarsus lepidocalcar* Krüger, 1838; *C. mancus* (Walker, 1856); *Paratanytarsus dissimilis* (Johannsen, 1905); *P. laetipes* (Zetterstedt, 1850); *Tanytarsus curticornis* Kieffer, 1911; *T. debilis* (Meigen, 1830); *T. signatus* (Wulp, 1859); *T. arduennensis* (Goetghebuer, 1922).

Acknowledgements

The authors are grateful to the director of the nature Reserve (Domaine de la Fondation Pierre Vérots), as well to their colleague Phil Withers† for collecting the type-material of the new species.

References

ALBU, P. 1968. *Pseudosmittia mathildae* sp. n. (Diptera, Chironomidae). *Annales Zoologici Fennici*, **5**: 4-5.

ASHE, P. & J.P. O'CONNOR. 2012. *A World Catalogue of Chironomidae* (*Diptera*). *Part 2. Orthocladiinae.* Irish Biogeographical Society & National Museum of Ireland, Dublin. 968 pp.

BRUNDIN, L. 1956. *Zur Systematic der Orthocladiinae* (*Diptera, Chironomidae*). Report of the Institute of Freshwater Research, Drottningholm, **37**: 5-185.

CASPERS, N. & F. REISS. 1989. Die Chironomidae der Türkei. Teil I: Podonominae, Diamesinae, Prodiamesinae, Orthocladiinae (Diptera, Nematocera, Chironomidae). *Entomofauna*, **10**: 105-160.

CRANSTON, P.S., D. R. OLIVER & O.A. SÆTHER. 1989. The adult males of Orthocladiinae (Diptera, Chironomidae) of the Holarctic region - Keys and diagnoses. In Wiederholm, T. (ed.): *Chironomidae of the Holarctic region. Keys and diagnoses. Part 3 - Adult males*. *Entomologica Scandinavica,* Supplement **34**: 164-352.

EDWARDS, F. W. 1929. British non-biting midges (Diptera, Chironomidae). *Transactions of the Entomological Society of London*, **77**: 279-430.

EDWARDS, F. W. 1932. *Recent literature. Faune de France: 23. Diptères: Chironomidae*. IV. Par M. Goetghebuer, Paris (Lechevallier), 1932. *The Entomologist*, **65**: 1-240.

FERRINGTON, L.C. JR. & O.A. SÆTHER. 2011. A revision of the genera *Pseudosmittia* Edwards, 1932, *Allocladius* Kieffer, 1913, and *Hydrosmittia* gen. n. (Diptera, Chironomidae). *Zootaxa*, **2849**: 1-314.

GOETGHEBUER, M. 1940-1950. Tendipedidae (Chironomidae). f) Subfamily Orthocladiinae. A. Die Imagines. In Lindner, E. (Hrsg.): *Die Fliegen der Palaearktischen Region*. **13g**: 1-208 + XXIV Figs.

LANGTON, P.H. & L.C.V. PINDER. 2007. *Keys to the adult males of Chironomidae of Britain and Ireland*. Volume 1 (Pp: 1-239) and volume 2 (Pp: 1-68). Freshwater Biological Association, Scientific Publication, n° **64**.

LANGTON, P.H & V. SYROVATKA. 2013. New chironomid pupal types from Norway, one with a male pharate adult: *Pseudosmittia paraspinispinata* n. sp. *Chironomus Journal of Chironomidae Research*, **26**: 29-32.

MAKARCHENKO, E. & M. MAKARCHENKO. 2007. New records of chironomids (Diptera, Chironomidae) in the Russian Far East. I. Subfamily Orthocladiinae. *Euroasian Entomological Journal*, **6** (3): 299-310.

MAKARCHENKO, E. & M. MAKARCHENKO. 2008. Review of the genus *Pseudosmittia* Edwards (Diptera, Chironomidae, Orthocladiinae) from the Russian Far East. *Euroasian Entomological Journal*, **17** (2): 215-226.

MAUAD, M., A. SIRI & M. DONATO. 2013. New species of *Pseudosmittia* Edwards, 1932 and new records of *Allocladius* Kieffer, 1913 (Diptera, Chironomidae, Orthocladiinae) from South America. *Zootaxa*, **3694** (5): 445-460.

MOUBAYED, J. 2025a. On the genus *Pseudosmittia* from Corsica. I. Description of *P. acquavivai* and *P. tyrrhena* spp. n. (Diptera, Chironomidae, Orthocladiinae). *Ephemera*, **26**:26-37.

MOUBAYED, J. 2025b. On the genus *Pseudosmittia* from continental France. I. Description of *P. beverana* sp. n. from the upper basin of the River Bevera (Diptera, Chironomidae, Orthocladiinae). *Ephemera*, **26**: 38-47.

MOUBAYED, J. 2025c. *Pseudosmittia mediterranea* sp. n., a new crenophilous species from Corsica and Lebanon (Diptera, Chironomidae, Orthocladiinae). *Ephemera*, **26**: 48-56.

MOUBAYED, J. & P.H. LANGTON. 2019. *Chaetocladius*

berythensis sp. n., *C. calloensis* sp. n, *C. guardiolei* sp. n. and *C. parerai* sp. n., four relict species inhabiting glacial springs and streams in Eastern Pyrenees and Lebanon (Diptera, Chironomidae). *Chironomus Journal of Chironomidae Research*, **23**: 42-59.

MOUBAYED-BREIL, J. & N. MARY. 2023. On the genus *Pseudosmittia* Edwards, 1932 from New Caledonia. I. Description of *P. noumeana* sp. n., *P. paniena* sp. n. and *P. pouemboutana* (Diptera, Chironomidae, Orthocladiinae). *Ephemera*, **24** (2): 105-120.

SÆTHER, O.A. 1980. Glossary of chironomid morphology terminology (Diptera, Chironomidae). *Entomologica Scandinavica*, Supplement **14**: 1-51.

SÆTHER, O.A. 2004. The Chironomidae (Diptera) of the Seychelles. *Annales de Limnologie*, **40**, 285-308.

SÆTHER, O.A. 2006. Japanese *Pseudosmittia* Edwards (Diptera: Chironomidae). *Zootaxa*, **1198**: 21-51.

SÆTHER, O.A. & L.C. FERRINGTON JR. 2003. Nomenclature notes on some orthoclads (Diptera, Chironomidae. *Zootaxa*, **322** : 1-7.

SÆTHER, O.A. & M. SPIES. 2013. Fauna Europaea: Chironomidae. In Beuk, P. & T. Pape (eds): *Fauna Europaea: Diptera Nematocera. Fauna Europaea version* 2.6. Internet database at http://www.faunaeur.org [accessed February 2015].

SASA, M. 1979. A morphological Study of adults and immature stages of 20 Japanese species of the family Chironomidae (Diptera). *Research Report from the National Institute of Environmental studies*, **7**: 1-158.

SASA, M. 1985. Studies on Chironomid collected from the lakes of the Mount Fuji area (Diptera, Chironomidae). *Research Report, Institute of Environmental and Welfare Studies*: 1-156.

SASA, M. 1993. Studies on the chironomid midges (Yusurika) collected in Toyama and other areas of Japan. Part 5. The chironomids collected from lakes in the Aizu District (Fukushima). *Research Report from Toyama Prefectural Environment Pollution Research Centre*, **1993**: 69-95.

SASA, M. 1998. Chironomid of Japan 1998. List of species recorded, and supplemented keys for identification. *Research Report from the National Institute of Environmental studies, Japan*.

SASA, M. & T. OKAZAWA. 1992. Studies on Chironomid midges (*Yusurika*) of Toga-Mura, Toyama. Part 2. The subfamily Orthocladiinae. *Research Report from the National Institute of Environmental studies*, **1992**: 92-204.

SPIES, M. & O.A. SÆTHER. 2004. Notes and recommendations on taxonomy and nomenclature of Chironomidae (Diptera). *Zootaxa*, **752**:1-90.

STRENZKE, K. 1950. Systematik, Morphologie und Ökologie der terrestrischen Chironomiden. *Archiv für Hydrobiologie,* Supplement **18**: 207-414.

STRENZKE, K. 1960. Terrestrische Chironomiden XIX-XXIII (Diptera, Chironomidae). *Deutsche Entomologische Zeitschrift*, **7**: 414-441.

TOKUNAGA, M. 1964. Insects of Micronesia Diptera: Chironomidae and Simuliidae. *Bernice P. Bishop Museum*, **12** (5): 485-628.

WANG, S. 1990. *Pseudosmittia aizaiensis*, a new species of Orthocladiinae (Diptera, Chironomidae) from Hunan Province of China. *Chinese Journal of Oceanology and Limnology*, **8**: 273-279.

YAMAMOTO, M. 2004. A catalogue of Japanese Orthocladiinae (Diptera, Chironomidae). *Makunagi, Acta Dipterologica*, **21**: 1-121.