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Article

Polypedilum (*Tripodura*) *camai* sp. n. (*acifer*-group), a new species occurring in wetlands habitats of a large forest of Central-West France (Diptera, Chironomidae, Chironominae)

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ABSTRACT

Male adult of *Polypedilum* (*Tripodura*) *camai* sp. n. is described on the basis of material collected by Malaise trap placed in a young coniferous area of a large forest (Central-W France), nearby of little temporary streams and ponds. The new species keys directly in the *acifer* group (as emended by VARDAL et al. 2002) based on the shape of anal point and presence of two lateral setae on superior volsella. Other closely related congeners (namely: *P. acifer* Townes, 1945; *P. falcatum* Zhang et al., 2015; *P. procerum* Zhang et al., 2015; *P. pseudoacifer* Zorina & Makarchenko, 2001) are also included in the *acifer*-gr on the basis of some taxonomic similarities. Remarks and comments are given.

Keywords: taxonomy ; new species ; Malaise trap

Polypedilum (_Tripodura_) _camai_ sp. n. (groupe _acifer_) une nouvelle espèce de zones humides d'une grande forêt du Centre-Ouest de la France (Diptera, Chironomidae, Chironominae)

RÉSUMÉ

L'adulte mâle de *Polypedilum* (*Tripodura*) *camai* sp. n. est décrit à partir d'un matériel collecté avec une tente Malaise placée dans une zone de jeunes pousses de conifères d'une vaste forêt (France du Centre-Ouest) non loin de petits ruisseaux temporaires et de mares. La nouvelle espèce se place directement dans le groupe *acifer* (désigné par VARDAL et al. 2002) d'après la forme de la pointe anale et la présence de deux soies latérales sur la volselle supérieure. D'autres espèces congénères (ex. *P. acifer* Townes, 1945 ; *P. falcatum* Zhang et al., 2015 ; *P. procerum* Zhang et al., 2015 ; *P. pseudoacifer* Zorina & Makarchenko, 2001) font également partie du groupe *acifer* sur la base de certaines similarités taxonomiques. Des remarques et des commentaires sont ajoutés.

Mots-clés : taxonomie ; nouvelle espèce ; tente Malaise

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1. Introduction

As emended by VARDAL et al. (2002), the *acifer*-group is morphologically characterized by the shape of anal point and the presence or absence of setae on superior volsella. Main references devoted to the taxonomy and biogeography of the genus *Polypedilum*, subgenus *Tripodura*, *acifer*-group from Holarctic and Afrotropical zone include: TOWNES 1945, ALBU 1980, PINDER & REISS 1986, ROSSARO 1988, SERRA-TOSIO & LAVILLE 1991, LAVILLE & SERRA-TOSIO 1996, GARCIA & LAVILLE 2000a, 2000b, ZORINA & MAKARCHENKO 2001, VARDAL et al. 2002, LANGTON & PINDER 2007, ASHE & O'CONNOR 2012, SÆTHER & SPIES 2013, MOUBAYED-BREIL & ASHE 2016, ROSSARO et al. 2019, MOUBAYED 2025. In the present paper, the male adult of *P. camai* sp. n. is described based on material collected by Malaise trap placed in the Chinon State Forest, Teillay Forest Park (sampling site n°17 as reported in MOUBAYED - 2025).

2. Material and methods

Material composed of male adults of *P. camai* sp. n. were sampled using Malaise trap placed in the nearby of coniferous forest (mainly *Pinus sylvestris* -Photo 3). The type-material was preserved in 80-85% ethanol for the 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 follow those of SÆTHER (1980) and LANGTON & PINDER (2007) for the imagines.

3. Description

Polypedilum camai sp. n.

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Material examined

Holotype. Central-West **France**. 1 male adult (leg. C. Cocquempot). Saint-Benoît-la-Forêt (37210), Indre-et-Loire department, state forest of Chinon, 'Parc forestier du Teillay' (47.223985 °N; 0.359809 °E), alt. 114 m; young coniferous forest (Photo 3) with wetlands around (temporary little streams, ponds); 28.VI.2016.

Paratypes (leg C. Cocquempot). Four male adults, same locality and date as for holotype.

Holotype (GBIFCH01225874) and paratype-1 (mounted on one same slide) + paratypes 2 and 3 (mounted on one slide, GBIFCH01225875) are deposited in the collections of the 'Naturéum, Muséum cantonal des sciences naturelles, département de Zoologie, Palais de Rumine, Place de la Riponne 6, CH-1014 Lausanne (MZL), Suisse'.

The remaining paratypes are deposited in the collection of the author.

Etymology: the new species is named '*camai*' in honour of Alain Cama (†) who was an essential supporter of the field work managed in Indre-et-Loire by C. Cocquempot (DROUET 2025).

Diagnostic characters

Polypedilum acifer Townes, 1945 is the nearest species to *P. camai* sp. n. based in particular on a similarly shape of anal point and superior volsella. Therefore, the two species can be considered as sister species except for the following combination of distinctive characters: anal point lateral with expansions and apex are differently shaped; superior volsella unusually shaped, not sickle-like, typically enlarged basally and bearing two specific lateral setae instead only one in *P. acifer*; gonostylus wider at median part, abruptly tapering distally.

Male adult

Polypedilum (*Tripodura*) *camai* sp. n.

(n= 7; Figs 1A-D; Photo 1)

= *Polypedilum* sp. A, *acifer*-group, in MOUBAYED 2025

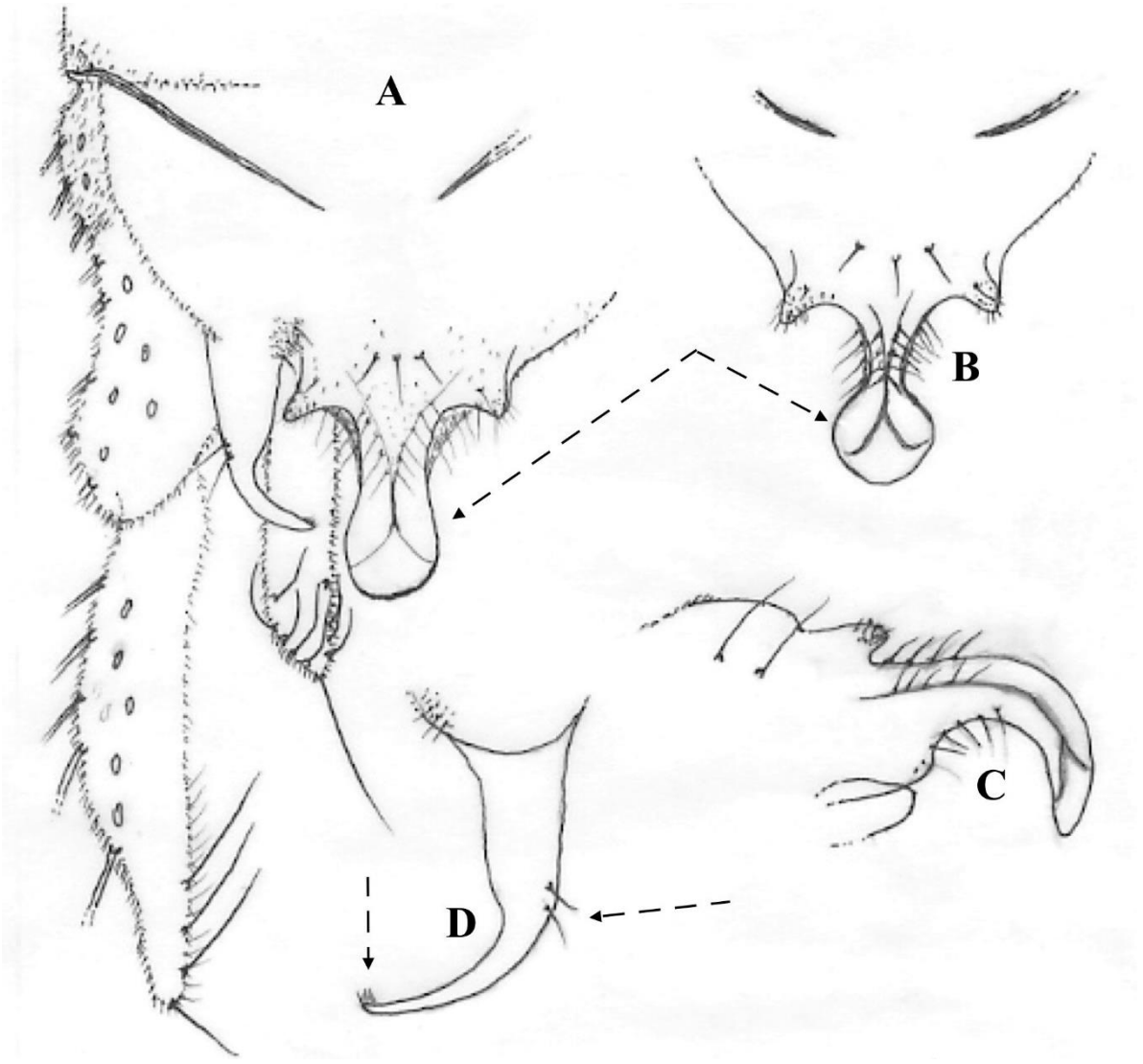


Figure 1. Male adult of P. camai *sp. n. Hypopygium in dorsal view* (*A*)*; anal point in dorsal* (*B*) *and lateral view* (*C*)*; superior volsella, right side* (*D*)*. Arrows indicate some distinctive characters.*

Figure 1. Adulte mâle de P. camai *sp. n. Hypopyge en vue dorsale* (*A*) *; pointe anale en vue dorsale* (*B*) *et latérale* (*C*) *; volselle supérieure* (*côté droit*) *en vue dorsale* (*D*)*. Les flèches indiquent certains caractères distinctifs.*

Small sized *Polypedilum* species. Total length: 1.95mm. Wing length 1.65 mm. General colouration contrasting dark brown to brownish with dark brown mesonotal stripes. Head with antenna and palpomeres dark brown. Thorax brown to dark brown mesonotal stripes. Wing with both membrane and veins pale to yellowish. Legs: femur and tibia of PI, PII and PIII dark brown. Abdomen including tergite IX and anal point contrasting brown to dark brown.

Head. Eyes bare. Coronal triangle well developed and broadly extended. Temporal setae 9 including 7 inner and 2 outer verticals. Palp with 5-segmented, segment 3 with weak sensilla clavata. Antenna with 13 flagellomeres, 780 μm long; ultimate flagellomere about 380 μm long, linear and not clubbed apically, bearing numerous curved sensilla chaetica apically; antennal groove reaching segment 3; AR 0.95.

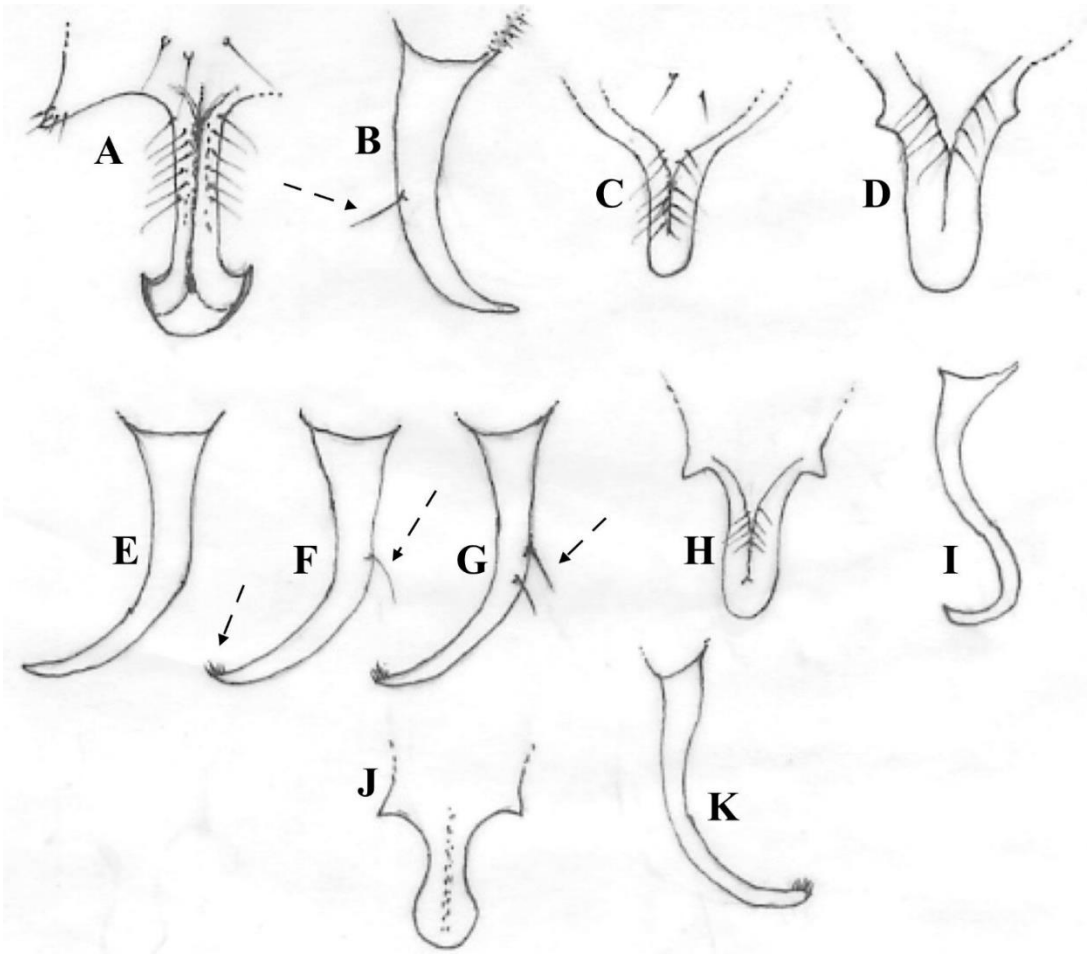


Figure 2. Anal point (*A, C, D, H, J*) *and superior volsella* (*B, E, F, G, I, K*) *of* Polypedilum (Tripodura) *spp.* P. acifer (*AB*)*;* P. falcatum (*C-G*)*;* P. procerum (*HI*)*;* P. pseudoacifer (*JK*). *Arrows indicate some distinctive characters. Figures reproduced after* ALBU (*1980*), ZORINA & MAKARCHENKO *2001 and* ZHANG *et al. 2015.*

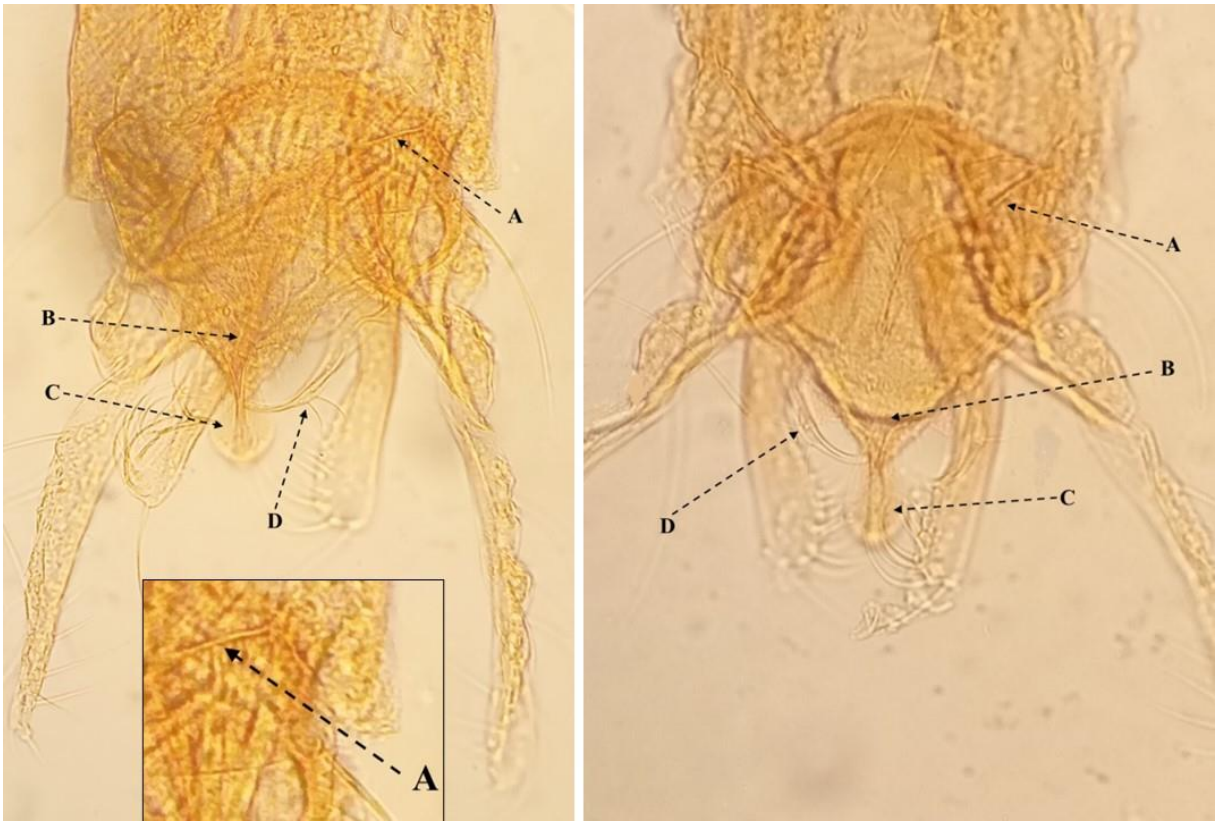
Figure 2. Pointe anale (*A, C, D, H, J*) *et volselle supérieure* (*B, E, F, G, I, K*) *de* Polypedilum (Tripodura) *spp.* P. acifer (*AB*) *;* P. falcatum (*C-G*) *;* P. procerum (*HI*) *;* P. pseudoacifer (*JK*). *Les flèches indiquent certains caractères distinctifs. Figures reproduites d'après* ALBU (*1980*), ZORINA & MAKARCHENKO *2001 et* ZHANG *et al. 2015.*

Thorax. Acrostichals about 14 setae placed in 1-2 rows; scutellum with 8 uniserial setae. Wing. Brachiolum with 2 setae; all veins bearing numerous setae except for M; shading mark absent on membrane bare; anal lobe well developed, squama with 4 setae. Legs. Apex of fore tibia with slender and pointed spur; mid tibia with nearly joined combs; hind tibia with distinctly separate combs. Average length (in μm) and proportion of legs (n = 1, paratype) as in Table I.

Abdomen. Hypopygium in dorsal view (Figs 1A-D, Photo 1). Tergite IX broadly semicircular,

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
PI	375	390	645	385	295	230	155	1.65
PII	660	545	280	175	125	70	65	0.51
PIII	675	605	440	245	205	105	65	0.73

Table I. Polypedilum camai *sp. n. Leg ratio of the male adult : LR = length of tarsomere* ta_1 *divided by length of tibia* (*ti*).



Photos 1-2. Male adult of P. camai *sp. n. Hypopygium in dorsal view* (*holotype, left; paratype, right*)*; anal tergal bands* (*A*)*; anal point* (*BC: B, basal part; C, apex*)*; superior volsella* (*D, lateral setae*)*. In square: setae of the anal tergal band.*

Photos 1-2. Adulte mâle de P. camai *sp. n. Hypopyge en vue dorsale* (*holotype à gauche, paratype à droite*) *; bandes tergales anales* (*A*) *; pointe anale* (*BC : B, partie basale ; C, apex*) *; volselle supérieure* (*D, soies latérales*)*. Dans le carré : soies de la bande tergale anale.*

median area bearing 3 stout setae and a low hump, distinctly visible in lateral view (Fig. 1C), posterior margin with 6 setae (3 on each side of the basal part of anal point); anal tergite bands (Figs 1A-B, Photo 1) about 65 µm long, narrowing and converging medially, becoming gradually thinner and interrupted medially; 8-9 dorsal setae present above the basal part of anal point. Anal point about 50 µm long, in dorsal and lateral view as in Figs 1 A-C and Photo 1, lateral expansion well developed, median part occasionally parallel-sided (Fig. 1A), bearing about 10 setae (5 on each side), apex occasionally large spatulate lobe-like (Fig. 1A, Photo 1) to spherically shaped (Fig. 1B). Laterosternite IX with 10 setae (5 on each side). Superior volsella in dorsal view (Figs 1A, D, Photo 1), about 50 µm long, vertically directed; composed of two portions of nearly equal size:

- proximal one small lobe-like, covered with macrotrichia and bearing 3 inner fine bristle setae;

- distal one typically pad-like to sickle-like shaped, distinctly enlarged basally, bearing two lateral fine setae on median part as in Figs 1A, D and Photo 1 (well visible at 400-600X magnification), apex with a specific and markedly tuft of short and fine setae.

Sternapodeme and phallapodeme (Photo 1) transverse part not projecting orally, weakly lobed medially, lacking lateral horn-like projections; phallapodeme very long. Inferior volsella

Photo 3. Sampling site of Polypedilum camai *sp. n.: state forest of Chinon, 'Parc forestier du Teillay', Central-W. France* (*photo by C. Cocquempot, 09-III- 2016*).

Photo 3. Site de collecte de Polypedilum camai *sp. n. : Forêt domaniale de Chinon, Parc forestier du Teillay* (*cliché C. Cocquempot, 09-03-2016*).

(Fig. 1A) about 200µm long, 90-100µm maximum width; uniformly elongate and massively winding. Gonocoxite (Fig. 1A, Photo 1) about 75 µm long, concave medially, bearing about 18-20 setae. Gonostylus (Fig. 1A, Photo 1) 125 µm long, slender, distinctly enlarged medially, abruptly tapering distally; distal part of inner margin with 4 stout long setae (about 40-50 µm long), including 3 orally directed and one downwardly projecting. HR, 0.60; HV, 1.56.

4. Remarks and differential diagnosis

Based on the shape of anal point and superior volsella (Figs 1 A-B, D; Photos 1-2), the new species keys directly in the *acifer*-group of *Polypedilum* (*Tripodura*) species. A comparative approach of distinctive morphological similarities between pertinent characters found in the male adult of the new species (in particular the enlarged basal part of superior volsella) and those of other members of the *acifer*-group is highlighted. Though some morphological resemblances are observed in the closely related congeners (namely: *P. acifer* Townes, 1945; *P. falcatum* Zhang et al. 2015; *P. procerum* Zhang et al. 2015 and *P. pseudoacifer* Zorina & Makarchenko, 2001), the new species is easily separated by the following combination of differentiating characters:

- Anal point (Figs 1A-B, Photos 1-2) with spatulate to spherical apex, is differently figured in *P. acifer* distal part arrow-like (Fig. 2A), with or without lateral expansions and parallel-sided in *P. falcatum* (Figs 2C-D), with weak lateral expansions and parallel-sided in *P. procerum* (Fig. 2 H), with weak lateral expansions and spatulate apex in *P. pseudoacifer* (Fig. J);

- Superior volsella (Figs 1A, D; Photos 1-2) enlarged basally with 2 lateral setae, is bearing only one in *P. acifer* (Fig. 2B), bare or bearing 1 or 2 in *P. falcatum* (Figs 2E-G),

- Wing not spotted, is spotted in *P. falcatum* (ZHANG et al. 2015, Fig. 1 A);

- Gonostylus (Fig. 1A, Photos 1-2) wider medially and abruptly tapering distally, is slender and not tapering distally in the other species of the *acifer*-group.

Currently, the genus *Polypedilum* subgenus *Tripodura* is represented by 9 species from continental France (SERRA-TOSIO & LAVILLE 1991, MOUBAYED-BREIL & ASHE 2016, MOUBAYED-BREIL 2020, MOUBAYED 2025): *P. acifer* Townes, 1945; *P. aegyptium* Kieffer, 1925; *P. apfelbecki* (Strobl, 1900); *P. bicrenatum* Kieffer, 1921; *P. elongatum* Albu, 1980; *P. moubayedbreili* Ashe & O'Connor, 2015; *P. pullum* (Zetterstedt, 1838); *P. quadriguttatum* Kieffer, 1921; *P. scalaenum* (Schrank, 1803). Consequently, the description of *P. camai* sp. n. increases the total number of species to 10 from this country.

5. Ecology and geographical distribution

Examined imaginal populations of *P. camai* sp. n. were collected on a forest plot of regeneration of Scots pines less than two years old, 50 m wide and bordered by plots, always of Scots pines of 20 to 25 years old (Photo 3), with wetlands around (temporary little streams, ponds), alt. 114 m, site n° 17 as reported by MOUBAYED 2025. Emergence is recorded from April-May to late June.

At present, the new species is known from Indre-et-Loire local region. This highlights and indicates that its occurrence in similar aquatic habitats located in France is likely considered as a biogeographic local representative and pertinent biological indicator.

Species encountered in the same Malaise trap with *P. camai* sp. n. include:

Conchapelopia hittmairorum Michiels & Spies, 2002; *C. pallidula* (Meigen, 1818); *Nilotanypus dubius* (Meigen, 1804); *Procladius sagittalis* (Kieffer, 1909); *Rheopelopia maculipennis* (Zetterstedt, 1838); *Brillia bifida* (Kieffer, 1909); *C. lobata* Edwards, 1924; *C. scutellata* Winnertz, 1846; *Cricotopus albiforceps* (Kieffer, 1916); *C. annulator* Goetghebuer, 1927; *Eukiefferiella claripennis* (Lundbeck, 1898); *E. fuldensis* Lehmann, 1972; *Nanocladius balticus* (Palmén, 1959); *N. rectinervis* (Kieffer, 1911); *Orthocladius oblidens* (Walker, 1856); *O. rubicundus* (Meigen, 1818); *Parakiefferiella coronata* (Edwards, 1929); *Psectrocladius platypus* (Edwards, 1929); *P. limbatellus* (Holmgren, 1869); *Tvetenia calvescens* (Edwards, 1929) ; *Polypedilum albicorne* (Meigen, 1838); *P. tritum* (Walker, 1856); *Micropsectra apposita* (Walker, 1856); *M. atrofasciata* (Kieffer, 1911); *Rheotanytarsus curtistylus* (Goetghebuer, 1921); *R. muscicola* Thienemann, 1929; *R. pentapoda* (Kieffer, 1909); *R. photophilus* (Goetghebuer, 1921); *S. bausei* (Kieffer, 1911); *Stempellinella brevis* (Edwards, 1929); *Tanytarsus albisutus* (Santos Abreu, 1918) ; *T. arduennensis* (Goetghebuer, 1922); *T. brundini* Lindeberg, 1963; *T. eminulus* (Walker, 1856); *T. heusdensis* Goetghebuer, 1923; *T. signatus* (van der Wulp, 1859).

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