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Smittia decoini and *S. hadrimani* spp. n. two new semiterrestrial species from eastern France [Diptera, Chironomidae, Orthocladiinae]

by Joël MOUBAYED[*] & Bruno TISSOT[**]

[*]Freshwater & Marine biology, 10 rue des Fenouils, 34070 Montpellier, France
jm.aquabiol@free.fr

[**]Réserve Naturelle du Lac de Remoray, 28 rue de Mouthe, 25160 Labergement-Sainte-Marie, France
bruno.tissot@espaces-naturels.fr

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Male adult of *Smittia decoini* and *S. hadrimani* spp. n. is described based on material collected by Malaise traps placed in the integral biological reserve of the Remoray Nature Reserve, eastern France. Some relevant morphological characters (long anal point, triangular inferior volsella, crista dorsalis tooth shaped, etc.) present in *S. decoini* sp. n. are also observed in *S. amoena* Caspers, 1988, *S. nudipennis* (Goetghebuer, 1913), *S. paranudipennis* Brundin, 1947 and *S. pratorum* (Goetghebuer, 1927). The latter five species belong to the *nudipennis*-gr. *S. hadrimani* sp. n. resembles to *S. remoraya* Moubayed & Tissot, 2019. Both species are considered as sister species and belong to the *remoraya*-group. The presence of some unusual characters in *S. decoini* sp. n. (anal point spatulate apically, virga composed of 3 long spines, pars ventralis present, megaseta located apically) and *S. hadrimani* sp. n. (anal point constricted and ellipsoidal at base, virga absent, gonostylus with a pointed posterior spine, crista dorsalis single) allowed us to consider them as biogeographic representative elements, which deserve greater conservation measures. The current two descriptions increase the total number in the genus to 40 species from Europe and 28 from France. At present, *S. decoini* sp. n. and *S. hadrimani* sp. n. are only known from their type-locality. Comments on their taxonomic position and their ecology are highlighted.

Smittia decoini et *S. hadrimani* spp. n., deux nouvelles espèces semiterrestres connues de l'Est de la France [Diptera, Chironomidae, Orthocladiinae]

Mots-clés : Diptera Chironomidae, genre *Smittia*, nouvelles espèces, France continental, conservation

L'adulte mâle de *Smittia decoini* et *S. hadrimani* spp. n. sont décrits à partir d'un matériel collecté au moyen de tentes Malaise placées dans la réserve biologique intégrale incluse dans la Réserve naturelle du Lac de Remoray (Est de la France). Certains caractères morphologiques discriminants (pointe anale longue, volselle inférieure triangulaire, crista dorsalis en forme de dent, etc.) présents chez *S. decoini* sp. n. sont également observés chez *S. amoena* Caspers, 1988, *S. nudipennis* (Goetghebuer, 1913), *S. paranudipennis* Brundin, 1947 et *S. pratorum* (Goetghebuer, 1927). Les cinq espèces précédentes appartiennent au groupe *nudipennis*. *S. hadrimani* sp. n. ressemble à *S. remoraya* Moubayed & Tissot, 2019. Elles sont considérées comme espèces sœurs et appartiennent toutes deux au même groupe *remoraya*. La présence de certains caractères particuliers chez *S. decoini* sp. n. (pointe anale avec apex spatulé, virga avec 3 longues épines, pars ventralis présent, megaseta inséré apicalement) et chez *S. hadrimani* sp. n. (pointe anale étranglée et ellipsoïdale à sa base, virga absente, gonostyle muni d'une pointe postérieure, crista dorsalis unique), permet de les assimiler à des

éléments biogéographiques représentatifs qui méritent de grandes mesures de conservation. Les deux présentes descriptions portent à 40 le nombre total d'espèces du genre présentes en Europe et 28 en France. À ce jour, *S. decoini* et *S. hadrimani* spp. n. ne sont connues que de leur localité type. Des commentaires sur leur position taxonomique et leur écologie sont ajoutés.

1. Introduction

The larval populations of the genus *Smittia* Holmgren, 1869 are commonly encountered in terrestrial, semi-terrestrial, riparian and temporary habitats surrounding wetlands, wet soils, wet meadows, pools, peat bogs and wet grasses bordering streams and rivers. On the basis of knowledge provided on the taxonomy, geographical distribution and ecology of the known *Smittia* species from Europe and other neighbouring areas (EDWARDS 1929, GOETGHEBUER 1940-1950, BRUNDIN 1947, 1956, ALBU 1970, HIRVENOJA 1973, CASPERS 1988, ROSSARO 1988, MOUBAYED 1989, CRANSTON et al. 1989, ROSSARO & DELETTRE 1992, ROSSARO & LENCIONI 2000, ROSSARO & ORENDT 2001, MOUBAYED-BREIL et al. 2007, LANGTON & PINDER 2007, MOLLER PILLOT 2008, ASHE & O'CONNOR 2012, SÆTHER & SPIES 2013, MOUBAYED-BREIL & ASHE 2016, MOUBAYED & TISSOT 2019, MOUBAYED & CLEVENOT 2022, MOUBAYED et al. 2022), there are about 38 known valid species from Europe. Consequently, the present descriptions increase the total number in the genus to 40 from Europe and to 28 from France. Currently, the two new species are only known from their type locality. Some atypical characters found in the male adult of *S. decoini* sp. n. and *S. hadrimani* sp. n. allowed us to consider these two new species as local biogeographical elements, which deserve a great conservation measures

2. Material and methods

The studied male adults were collected by Malaise traps placed close to the most representative habitats of the Nature Reserve of Remoray, namely the Forest of Grand'Côte. The 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 of the imagines follow those of SÆTHER (1980) and LANGTON & PINDER (2007).

3. Results and descriptions

Smittia decoini Moubayed sp. n.

Material examined

Holotype. France. One male adult; Malaise traps; Grand'Côte Forest, integral biological reserve in Nature Reserve of Remoray Lake, eastern France (46.7717° N; 6.2632° E); enriched undergrouth with humid bryophytes, fern, humus, deciduous wood and tree bark (Photos 1-2); altitude 800-850 m, 06.XI.2020 (leg. B. Tissot),

Paratype. One male adult mounted one slide, same locality and data as for holotype (leg. B. Tissot).

Holotype (mounted on one slide) is deposited in the collections of the 'Musée cantonal de Zoologie, Palais de Rumine, 6 place de la Riponne, CH-1014 Lausanne (MZL), Switzerland'. The remaining paratype is deposited in the collection of the author.

Photo 1. Type-locality of *Smittia decoini* and *S. hadrimani* spp. n. (B. Tissot).

Photo 1. Localité type de *Smittia decoini* et *S. hadrimani* spp. n. (B. Tissot).

Etymology: the species is named *"decoini"* in honour of Romain Decoin, who remains active as entomologist in preserving the biodiversity of aquatic habitats in the Nature Reserve of Remoray.

Diagnostic characters

The closest species to *S. decoini* sp. n. are *S. amoena* Caspers, 1988, *S. nudipennis* (Goetghebuer, 1913), *S. paranudipennis* Brundin, 1947 and *S. pratorum* (Goetghebuer, 1927). However, the new species can easily be distinguished by a combination of characters. Head. Eyes bare, temporals 6 (4 inner and 2 outer verticals); antenna 975 µm long, with one apical stout seta; AR 1.50. Thorax. Lobes of antepronotum not gaping; acrostichals 16, dorsocentrals 12; humeral pit absent. Wing. Brachiolum with 1-2 setae, squama bare. Legs. Sensilla chaetica present on tibia and tarsomeres ta_1-ta_5 of PI-PIII. Anal segment. Tergite IX broadly semi-circular in its distal half, with a weak dorsal hump. Anal point very long, wider at base, parallel-sided medially, distinctly flattened to spatulate apically; basal part with 6 setae placed laterally (3 on each side). Sternapodeme rounded, not projecting. Virga present, consists of 3 curved long spines. Gonocoxite with a characteristic pars ventralis (ventral lobe) on its basal junction; apex rounded; ventral margin markedly sclerotized. Superior volsella well-developed, large lobe-like. Inferior volsella triangular; median area with setae; apex nose-like, hyaline and bare, slightly bent downwards. Gonostylus linearly elongate in both acute and obtuse angle; anterior side covered with orally directed setae; distal part rounded, not projecting posteriorly, apex rounded; crista dorsalis well-developed, large tooth shaped, located on half distal part, occupying ¼ of the anterior side.

Male imago

(n = 2; Figs 1-14)

Small sized species. Total length 2.65 mm; wing length 1.60 mm; TL/WL = 1.66. General colouration contrasting dark brown to blackish; head dark brown; antenna brownish; thorax distinctly contrasting dark brown to blackish with blackish mesonotal stripes; legs and abdomen brownish; anal segment contrasting brown to blackish, tergite IX with 2 lateral short sclerotized bands located at base of anal point. Head. Eyes bare; frontal margin without tubercle; suture of

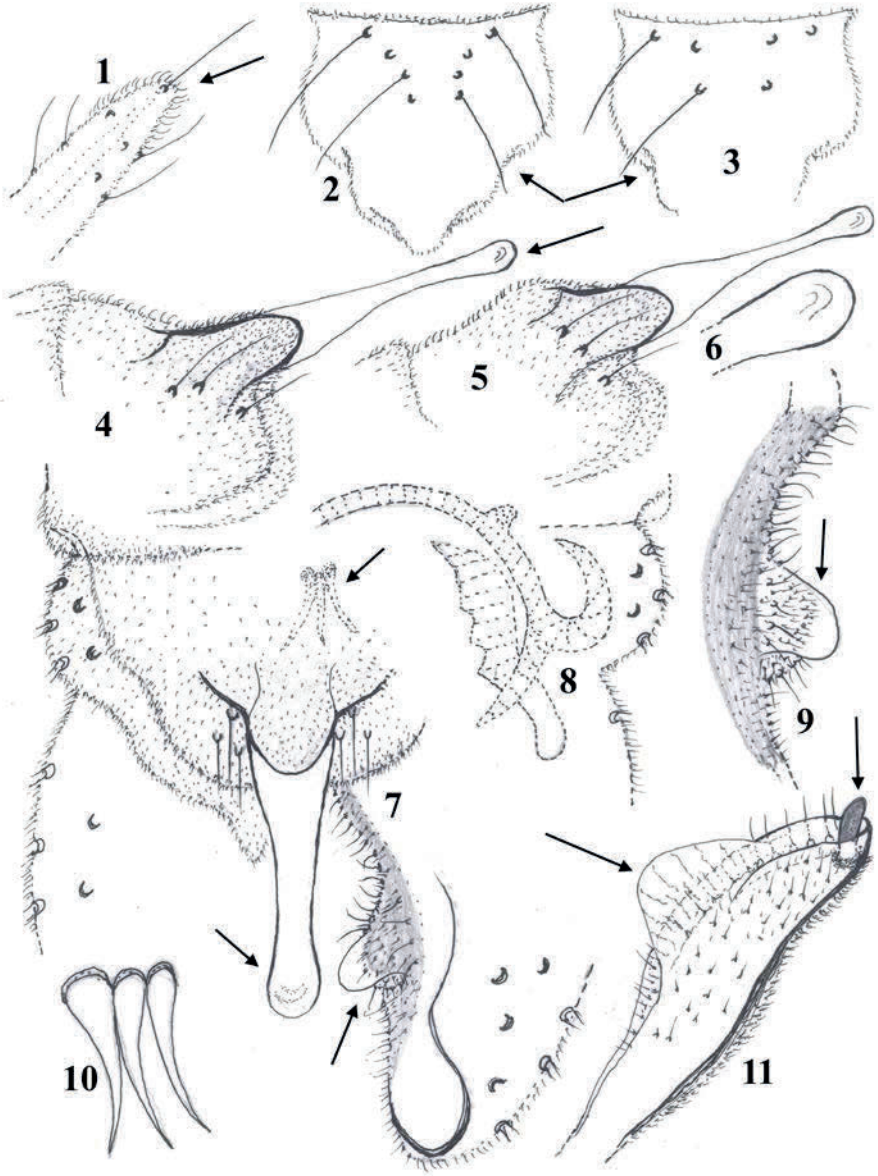
coronal triangle regularly thick, with 2 lateral sclerotized bands; coronals 2. Temporals 6 including 4 inner and 2 outer verticals. Antenna 13-segmented, 975 µm long; last flagellomere 585 µm long, stout pre-apical seta (Fig. 1) about 55 µm long; antennal groove reaching segments 3-4; AR 1.50. Clypeus (Figs 2-3) 115 µm long, 95 µm maximum width; broadly enlarged medially and narrowing distally, lateral margin with undulation; holotype (Fig. 2) with 8 setae, set close together in 4 rows, paratype (Fig. 3) with 6 setae in 2 rows. Palp 5-segmented, segments 1-2 fused; length (in µm) of segments: 45, 55, 150, 125, 115; segment 3 much longer than segments 4 and 5; sensilla coeloconica absent on palpomere 3. Thorax. Lobes of antepronotum not gaping, lateral antepronotal consist of 3 short setae; acrostichals 16 in1-2 rows, starting close to base of scutum; dorsocentrals 12 in 1 row; prealars 4 in 1 row; humeral pit absent; preepisternum bare; scutellum with 8 setae (4 on each side of the midline). Wing. Brachiolum with 1-2 setae. Subcosta extending beyond fork of radius, costal expansion about 45 µm long. Distribution of setae on veins: R, 3 located proximally; remaining veins bare; squama bare. Legs. Length (in µm) of tibial spurs: PI, 45; PII, 30 and 22; PIII, 50, 20. Sensilla chaetica present on tibia (apical part) and tarsomeres ta_1-ta_5 of PI-PIII. Length (µm) and proportions of prothoracic (PI), mesothoracic (PII) and metathoracic (PIII) legs (n =1) as in the following table:

	fe	**ti**	**ta_1**	**ta_2**	**ta_3**	**ta_4**	**ta_5**	**LR**	**BV**	**SV**	**BR**
PI	645	710	395	240	165	110	80	0.56	2.94	3.43	1.80
PII	680	650	260	150	115	80	70	0.40	3.83	5.12	3.0
PIII	675	710	375	215	170	110	85	0.53	3.03	3.69	2.0

"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."

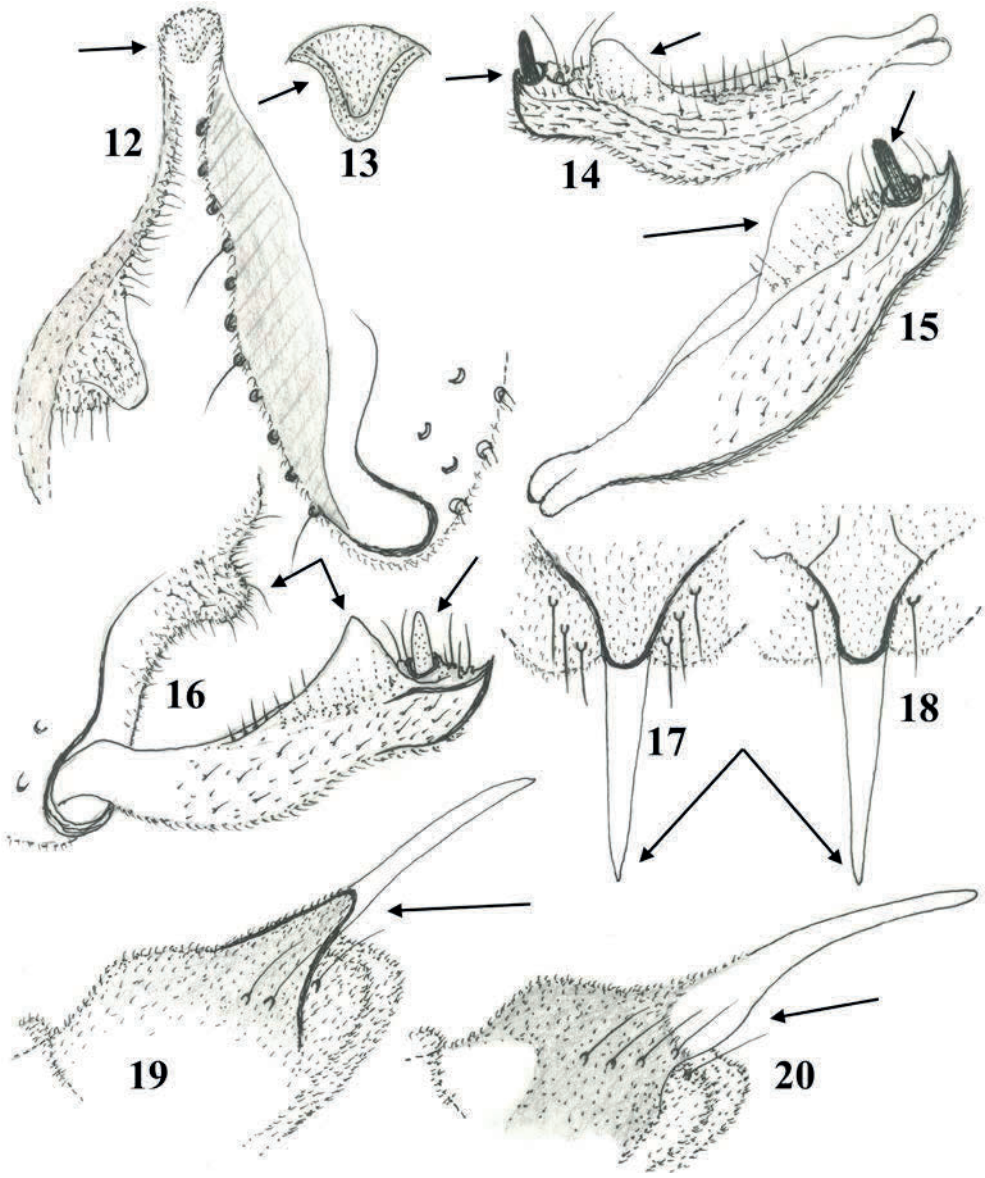
Abdomen. Hypopygium in dorsal and ventral view as in figures 7-8 (ventral view, Fig. 8, with tergite IX and anal point omitted). Tergite IX broadly rectangular in its proximal half, distal half semi-circular, lateral margin with undulation. Laterosternite IX with 10 setae (5 on each side). Anal point (Figs 4-6, lateral; Fig. 7, dorsal) about 87-90 µm long; wider and enlarged at base, parallel-sided medially; typically spatulate apically, apical part (Fig. 6) with 2 distinct arched marks, clearly visible in both dorsal and lateral view; slightly overreaching tip of inferior volsella; basal part with 2 characteristic short lateral sclerotized bands; with 6 setae placed laterally close to the basal margin (3 on each side). Sternapodeme and phallapodeme (Fig. 8); transverse sternapodeme semi-circular, low and not projecting orally; phallapodeme well-developed, saw shaped. Gonocoxite 160 µm long, rounded apically; dorsal side (Fig. 7) with sclerotization at basal part; ventral side (Fig. 12) with 11 stout setae on inner margin; basal junction with a characteristic drop-like pars ventralis, covered with very fine and dark microtrichia. Virga (Figs 7, 10), composed of 3 curved long spines. Superior volsella well-developed, broadly lobe-like shaped. Inferior volsella (Figs 7, 9, 12) triangular, slightly bent downwards, median area covered with short setae in a semicircular row, apex nose-like, hyaline and bare; distal part bearing a characteristic minute pubescent posterior lobe. Gonostylus (Figs 11, acute angle; 13, right angle) about 95 µm long, 30-35 µm maximum width; linearly elongate; posterior margin rounded; anterior side convex in acute angle, slightly concave in right angle, densely covered with setae; distal part not projecting, posterior edge rounded; crista dorsalis well-developed, located on distal half, consists of a large rounded tooth occupying 25% of the anterior side; megaseta about 8 µm long, well-developed, located apically. HR 1.69; HV 2.54.

Female adult, pupal exuviae and larva: unknown.



Figures 1-11. Male imago of *Smittia decoini* sp. n. Apex of antenna (1); clypeus, two aspects (2, holotype; 3, paratype); tergite IX and anal point in lateral view, two aspects (4-5); apex of anal point, lateral view (6); hypopygium in dorsal (7) and ventral view (8); inferior volsella, right side (9); virga (10); gonostylus, acute angle (11). Arrows indicate some distinguishing characters.

Figures 1-11. Imago mâle de *Smittia decoini* sp. n. Apex de l'antenne (1) ; clypéus (2, holotype ; 3, paratype) ; tergite IX et pointe anale en vue latérale, deux aspects (4-5) ; apex de la pointe anale, vue latérale (6) ; hypopyge en vues dorsale (7) et ventrale (8) ; volselle inférieure, côté droit (9) ; virga (10) ; gonostyle, angle aigu (11). Les flèches indiquent quelques caractères discriminants.



Figures 12-20. Male imago of *Smittia* spp. *S. decoini* sp. n.: hypopygium in ventral view (12); pars ventralis (13); gonostylus, right angle (14). *S. amoena*: gonostylus, acute angle (15); inferior volsella and gonostylus (16); anal point in dorsal view, two aspects (17-18); tergite IX and anal point in lateral view (19). *S. scutellosetosa*: tergite IX and anal point in lateral view (20). Arrows indicate some distinguishing characters.

Figures 12-20. Imago mâle de *Smittia* spp. *S. decoini* sp. n. : hypopyge en vue ventrale (12) ; pars ventralis (13) ; gonostyle, angle droit (14). *S. amoena* : gonostyle, angle aigu (15) ; volselle inférieure et gonostyle (16) ; pointe anale en vue dorsale, deux aspects (17-18) ; tergite IX et pointe anale en vue latérale (19) ; *S. scutellosetosa* : tergite IX et pointe anale en vue latérale (20). Les flèches indiquent quelques caractères discriminants.

Smittia hadrimani Moubayed sp. n.

Material examined

Holotype. France. One male adult; Malaise traps; Grand'Côte Forest, integral biological reserve in Nature Reserve of Remoray Lake, eastern France (46.7717° N; 6.2632° E); enriched undergrouth with humid bryophytes, fern, humus, deciduous wood and tree bark (Photos 1-2); altitude 800-850 m, 06.XI.2020 (leg. B. Tissot).

Paratypes. 6 male adults including 3 mounted on three slides and 3 preserved in 80% ethanol, same locality and data as for holotype (leg. B. Tissot).

Holotype (mounted on one slide) is deposited in the collections of the 'Musée cantonal de Zoologie, Palais de Rumine, 6 place de la Riponne, CH-1014 Lausanne (MZL), Switzerland'. The remaining paratypes are deposited in the collection of the author.

Etymology: the name *'hadrimani'* of the new species refers to the first name 'Hadrien' of H. Gens, who remains active as entomologist in preserving the biodiversity of aquatic habitats in the Nature Reserve of Remoray.

Diagnostic characters

Though some common morphological characters are observed between *S. hadrimani* p. n. and *S. remoraya* Moubayed & Tissot, 2019, the first species is separated by a combination of the following distinguishing characters. Head. Eyes bare; basal part of coronal suture with outwards lateral extensions; temporals 9 (6 inner and 3 outer verticals); antenna 725 µm long, last flagellomere 355 µm long, apex with 3 stout pre-apical setae; AR 0.96. Thorax. Lobes of antepronotum gaping, lateral antepronotals 3, acrostichals 15-16, dorsocentrals 13-14; humeral pit present, scutellum with 14 setae. Wing. Brachiolum with 2 setae, squama bare. Legs. Sensilla chaetica present on tarsomeres ta_1-ta_5 of PI-PIII, absent on tibia. Tergite IX broadly semi-circular, dorsal hump low; caudal part with 8 setae (occasionally 2) located close to the basal part of anal point (4 on each side). Anal point wider basally, markedly triangular and narrowing distally; basal part with a characteristic constriction and lateral sclerotization covering the anteromedian margins. Transverse sternapodeme rounded, orally projecting; phallapodeme well-developed. Virga absent. Gonocoxite rounded apically, ventral side with sclerotization. Inferior volsella large semi-circular lobe, dorsal side covered with short spines located in a typical rounded row, inner margin hyaline and bare. Gonostylus massively bulbous medially, anterior side nearly linear; posterior margin rounded, ending with a characteristic pointed blackish spine; crista dorsalis conspicuous, large lobe shaped, occupying almost 100% of the anterior side; megaseta well-developed, located preapically.

Male imago

(n = 3; Figs 21-29, 31-32)

Small sized species. Total length 2.25 mm; wing length 1.25 mm; TL/WL = 1.80. General colouration contrasting brown and dark brown to blackish; head dark brown; antenna brownish; thorax distinctly contrasting dark brown to blackish with blackish mesonotal stripes; legs and abdomen brownish; anal segment contrasting brown to dark brown to blackish, anal point with a characteristic sclerotization at its base and lateral sides; inferior volsella hyaline to brownish; gonostylus contrasting dark brown to blackish. Head. Eyes bare; triangular tubercle absent on frontal margin; suture of coronal triangle regularly thick, basal part with 2 characteristic lateral extensions,

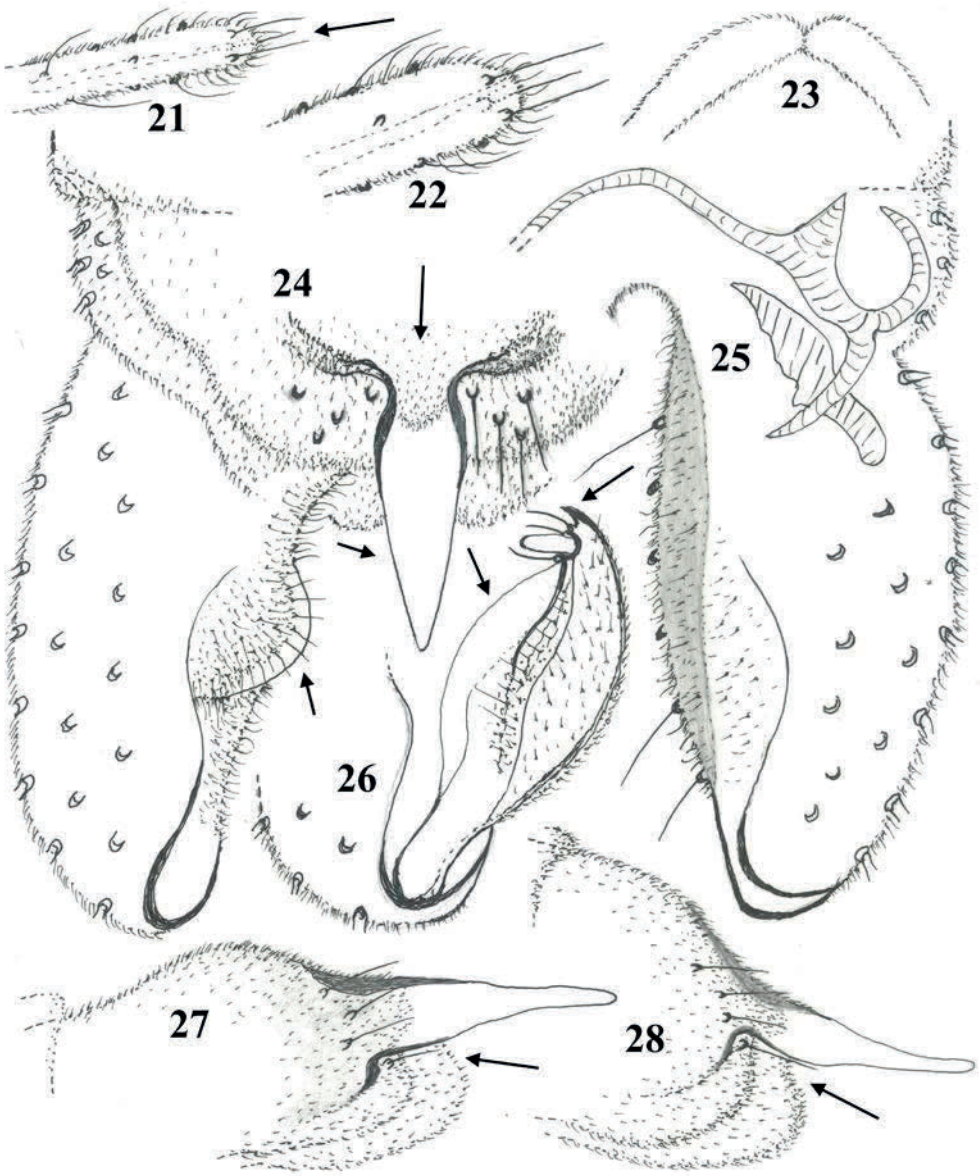
coronals 2. Temporals 11-12 including 8 inner and 3-4 outer verticals. Antenna 13-segmented, 725 µm long; last flagellomere 355 µm long, apex with 1-2 stout pre-apical seta (occasionally 3); antennal groove starting on segments 3; AR 0.96. Palp 5-segmented, segments 1-2 fused; length (in µm) of segments: 15, 35, 95, 125, 165; palpomere 3 with 2 sensilla clavata and 2-3 pre-apical needle-like sensilla coeloconica. Clypeus sub-rectangular to trapezoidal, with 8-9 setae in 3 rows. Thorax. Lobes of antepronotum (Fig. 23) evenly thick and well gaping; lateral antepronotals 5; acrostichals 15-16 short, starting close to base of scutum; dorsocentrals 13-14 in 1-2 rows; prealars 7 in 2 rows; preepisternum bare; scutellars 14, composed of 2 sized multi-serial setae; humeral pit well-developed, with granulation. Wing. Brachiolum with 2 setae; subcosta extending beyond fork of radius, costal expansion 70-75 µm long. Number of setae on veins: R, 13; R_{1+2}, 9; R_{4+5}, 14; remaining veins bare; squama bare. Legs. Length (in µm) of tibial spurs: PI, 35; PII, 25 and 20; PIII, 50, 35. Sensilla chaetica: present on tarsomeres ta_1-ta_5 of PI-PIII, absent on tibia. Length (µm) and proportions of prothoracic (PI), mesothoracic (PII) and metathoracic (PIII) legs (n =1) as in the following table:

	fe	**ti**	**ta_1**	**ta_2**	**ta_3**	**ta_4**	**ta_5**	**LR**	**BV**	**SV**	**BR**
PI	560	615	265	150	110	75	70	0.43	3.56	4.43	2.10
PII	565	520	210	115	95	60	65	0.40	3.87	5.17	1.40
PIII	615	635	320	185	170	95	80	0.50	2.96	3.91	2.0

"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."

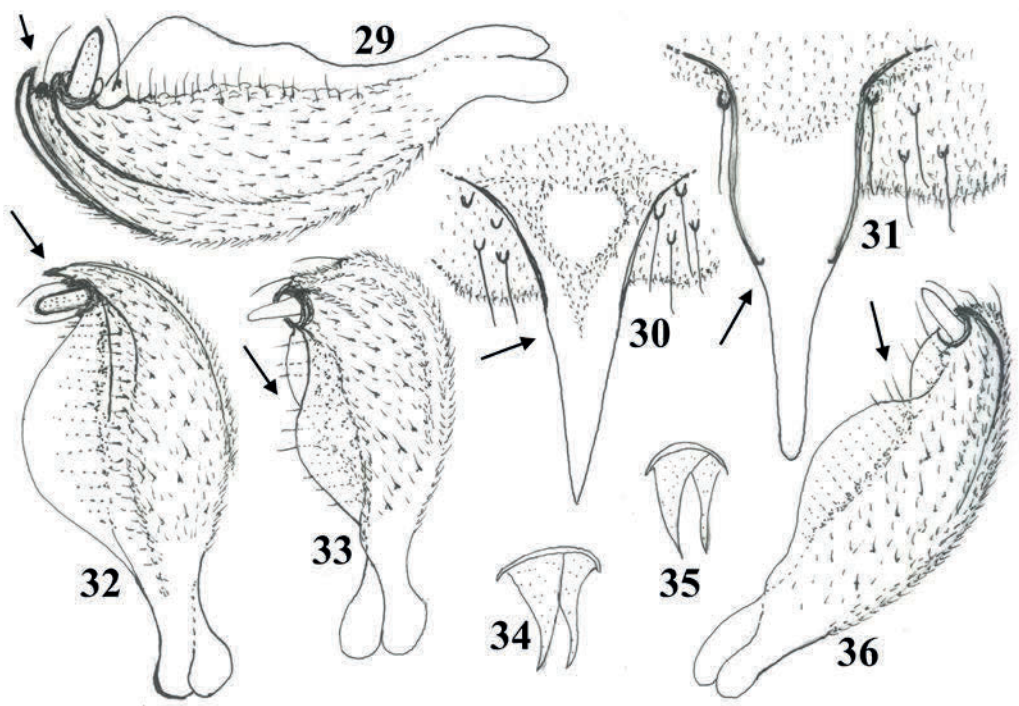
Abdomen. Hypopygium in dorsal and ventral view as in figures 24-25 (ventral view, Fig. 25, with tergite IX and anal point omitted). Tergite IX broadly semi-circular, lateral margin with median undulation, posterior margin nearly straight, dorsal hump low, clearly visible in lateral view (Figs 27-28); caudal area with 8 setae located close to the base of anal point (4 on each side). Laterosternite IX with 10 setae (5 on each side). Anal point (Figs 24, 31, dorsal; 27-28, lateral), about 75 µm long; markedly triangular, narrowing distally, base with lateral sclerotized bands; basal part much wider and ellipsoidal with a characteristic constriction; basal margin with sclerotization reaching the median area as in figures 24, 27-28, 29, 31; apex not pointed. Transverse sternapodeme (Fig. 25) rounded, orally projecting; lateral expansions horn shaped, well-developed; coxapodeme short. Phallapodeme well-developed, saw shaped. Virga absent. Gonocoxite 185 µm long, about 90 µm maximum width, rounded apically; dorsal side (Fig. 24) with sclerotization at basal part; ventral side (Fig. 25) with 6 stout setae on inner margin; pars ventralis absent on basal junction. Inferior volsella semi-circular, large lobe-like; dorsal side covered with a characteristic rounded row of short spines, inner margin hyaline and bare. Gonostylus (Figs 26, acute angle; 29, right angle; 32, lateral view); 90 µm long, 35-40 µm maximum width; bulb-shaped and bulging medially, anterior side with a linear cluster of dorsal and ventral setae, posterior side rounded, ending with a characteristic pointed sclerotized spine; crista dorsalis conspicuous, single and large lobe shaped occupying the entire anterior side; megaseta well-developed, typically located pre-apically. HR 2.06; HV 2.50.

Female adult, pupal exuviae and larva: unknown



Figures 21-28. Male imago of *Smittia hadrimani* sp. n. Apex of antenna (21-22); lobes of antepronotum, anterior part (23); hypopygium, holotype, in dorsal (24) and ventral view (25); apical part of gonocoxite with gonostylus in acute angle (26); tergite IX and anal point in lateral view, two aspects (27, holotype; 28, paratype). Arrows indicate some distinguishing characters.

Figures 21-28. Imago mâle de *Smittia hadrimani* sp. n. Apex de l'antenne (21-22) ; lobes de l'antépronotum, partie antérieure (23) ; hypopyge en vue dorsale (24) et ventrale (25) ; partie apicale du gonocoxite et gonostyle à angle aigu (26) ; tergite IX et pointe anale en vue latérale, deux aspects (27, holotype ; 28, paratype). Les flèches indiquent quelques caractères discriminants.



Figures 29-36. Male imago of *Smittia* spp.: *S. hadrimani* sp. n. (29, 31, 32), *S. remoraya* (30, 33, 34, 35, 36). Gonostylus at right angle (29, paratype); anal point in dorsal view (30, 31, paratype); gonostylus in lateral view (32, 33); virga, 2 aspects (34-35); gonostylus at acute angle (36). Arrows indicate some distinguishing characters.

Figures 29-36. Imago mâle de *Smittia* spp.: *S. hadrimani* sp. n. (29, 31, 32), *S. remoraya* (30, 33, 34, 35, 36). Gonostyle avec angle droit (29, paratype) ; pointe anale en vue dorsale (30, 31, paratype). Gonostyle en vue latérale (32, 33); virga, 2 aspects (34-35); gonostyle avec angle aigu (36). Les flèches indiquent quelques caractères discriminants.

4. Differential diagnosis

On the basis of the differentiating characters reported below, the two new species (*S. decoini* sp. n. and *S. hadrimani* sp. n.) appear to key morphologically in two separate groups of *Smittia* species.

- The closest *Smittia* species to *S. decoini* sp. n. are *S. amoena* Caspers, 1988, *S. nudipennis* (Goetghebuer, 1913), *S. paranudipennis* Brundin, 1947 and *S. pratorum* (Goetghebuer, 1927). Though a strong similar morphological affinity is observed between the latter five species (shape of anal point, inferior volsella, gonostylus), they appear to belong to a same *Smittia*-group: the *nudipennis*-group.

- The strong morphological affinities between *S. hadrimani* sp. n. and *S. remoraya* Moubayed & Tissot, 2019 allowed us to consider them as sister species. Therefore, the two latter species belong to a same group of *Smittia* species: the *remoraya*-group.

However, both of *S. decoini* sp. n. and *S. hadrimani* sp. n. can be distinguished from their related congeners by a combination of characters, which are highlighted in the following differential diagnosis:

Smittia decoini sp. n.

- Eyes bare as in *S. amoena* and *S. pratorum,* while are pubescent in both *S. nudipennis* and *S. paranudipennis*;

- Anal lobe of wing well developed as in *S. amoena* and *S. pratorum*, while is weakly-developed in *S. nudipennis* and *S. paranudipennis*;

- Virga consists of 3 curved long spines (Figs 7, 10), is otherwise shaped in *S. amoena*, *S. nudipennis, S. paranudipennis* and *S. pratorum*;

- Anal point long with flattened apex (Figs 4-7) as in *S. pratorum*, is pointed apically in *S. amoena* (Figs 17-19), *S. nudipennis* and *S. paranudipennis*;

- Pars ventralis distinctly present (Figs 12-13), absent in the other 3 species;

- Inferior volsella nose-like and downwardly bent apically (Figs 7, 9), is differently shaped in *S. amoeana* (Fig. 16; CASPERS 1988, Fig. 7; LANGTON & PINDER 2007, Fig. 191C);

- Gonostylus at acute angle (Fig. 11) is differently figured in *S. amoeana* (CASPERS 1988, Fig. 7; LANGTON & PINDER 2007, Figs 73I-J);

- Megaseta located apically (Figs 11, 14), is placed pre-apically in *S. amoeana* (CASPERS 1988, Fig. 7; LANGTON & PINDER 2007, Fig. 191C) and the remaining 3 species.

Smittia hadrimani sp. n.

- Lateral sclerotized extensions present on basal part of coronal triangle, are absent in *S. remoraya*;

- Lobes of antepronotum gaping (Fig. 23), are in contact in *S. remoraya* (MOUBAYED & TISSOT 2019, Fig. 5);

- Virga absent (Figs 24-25), is present, in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 11, 14);

- Dorsomedian area of tergite IX and base of anal point entirely whitish (Figs 24, 27-28), are distinctly spotted in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 11, 13);

- Anal point (Figs 24, 31) distinctly ellipsoidal basally and narrowing distally, is simply triangular (Fig. 30) in *S. remoraya* (MOUBAYED & TISSOT 2019, Fig. 11);

- Basal part of anal point with characteristic constriction and sclerotized lateral margins (Figs 24, 31), is differently figured in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 11, 13);

- Ventral side of gonocoxite linearly swollen (Fig. 25), with 2 characteristic large lobes in *S. remoraya* (MOUBAYED & TISSOT 2019, Fig. 12);

- Inferior volsella single and large semi-circular lobe shaped (Fig. 24), is double with anterior part nose-like and posterior part marsupial pouch-like shaped (MOUBAYED & TISSOT 2019, Figs 11, 15, 18);

- Apical part of gonostylus pointed, well-sclerotized and inwardly turned over (Figs 26, 29, 32), is rounded and not sclerotized in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 15-17, 19);

- Posterior side of gonostylus not contrasting (Figs 26, 29, 32), is distinctly contrasting in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 15-17, 19);

- Gonostylus at acute and in lateral view (Figs 26, 32), is otherwise shaped in *S. remoraya* (Figs 33, 36; MOUBAYED & TISSOT 2019, Figs 17, 19);

- Crista dorsalis single, large lobe shaped (Figs 26, 29, 32), is double in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 15, 17, 19);

- Megaseta distinctly pre-apical (Figs 26, 29, 32), is located apically in *S. remoraya* (MOUBAYED & TISSOT 2019, Figs 16, 17, 19).

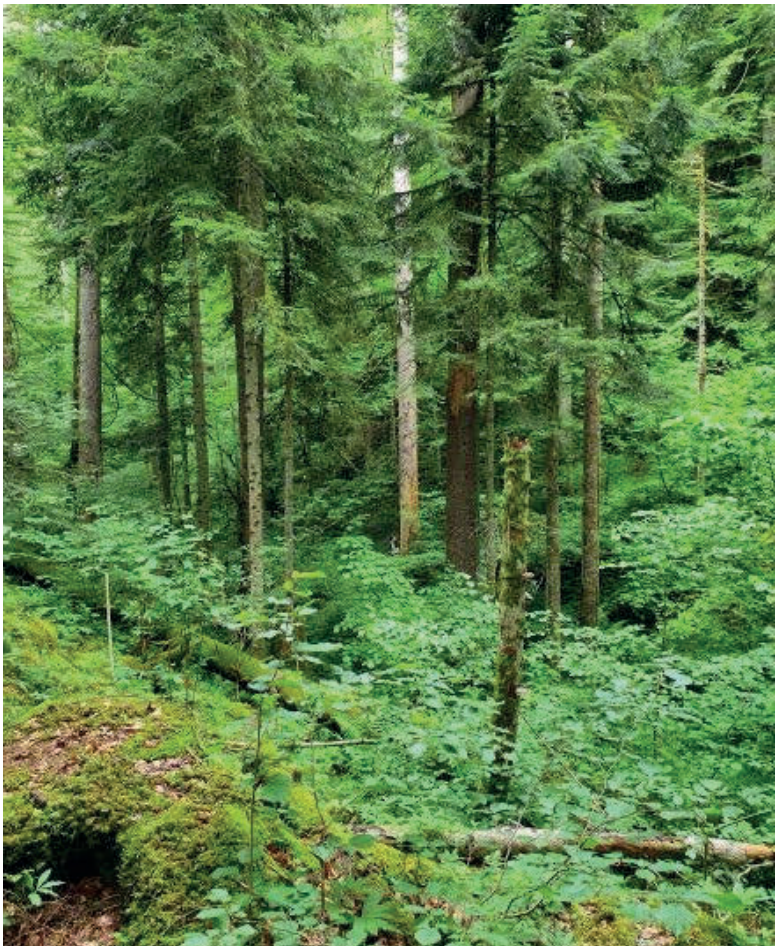


Photo 2. Type-locality of *Smittia decoini* and *S. hadrimani* spp. n. (Photo R. Decoin).

Photo 2. Localité type de *Smittia decoini* et *S. hadrimani* spp. n. (Cliché R. Decoin).

5. Ecology and geographical distribution

Male adults of *S. decoini* sp. n. and *S. hadrimani* sp. n. were collected in semiterrestrial to terrestrial forestery habitats delimited by the Forest of 'La Grand'Côte' (Integral Biological Re-

serve, NR of Remoray Lake, E-France, alt. 800-850 m). Enriched undergrouth with humid bryophytes, fern, humus, deciduous wood and tree bark (Photos 1-2), must represent the most favourable microhabitats for their larval populations. Emergence is observed between June and November.

Geographical distribution is respectively restricted to their type-locality. This highlights and indicates that the new species appear to be confined to north eastern forestery areas of France, where they may be considered as biogeographic representative elements, which deserve greater consideration and conservation measures.

Associated semiterrestrial species, encountered in the same locality with *S. decoini* sp. n. and *S. hadrimani* sp. n., include: *Hydrosmittia brevicornis* (Strenzke, 1950); *H. oxoniana* (Edwards, 1929); *Limnophyes angelica* Sæther, 1990; *L. asquamatus* Søgaard Andersen, 1937; *L. bidumus* Sæther, 1990; *L. edwardsi* Sæther, 1990; *L. gelasinus* Sæther, 1990; *L. minimus* (Meigen,1818); *L. ninae* Sæther, 1975; *Pseudosmittia angusta* (Edwards, 1929); *P. obtusa* (Strenzke, 1960); *P. trilobata* (Edwards, 1929); *Smittia alpicola* Goetghebuer, 1941; *S. contingens* Walker, 1856; *S. foliosa* (Kieffer, 1921); *S. leucopogon* (Meigen, 1804); *S. stercoraria* Rossaro & Lencioni, 2000; *S. scutellosetosa* Caspers, 1988.

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