

Microtendipes morii sp.n., *Polypedilum* (*Polypedilum*) *mercantourus* sp.n.
and *Virgatanytarsus rossaroi* sp.n., three new Tyrrhenian species
from cold mountain streams and lakes in Corsica and the Maritime
Alps (Diptera, Chironomidae)

Microtendipes morii sp.n., *Polypedilum* (*Polypedilum*) *mercantourus*
sp.n. и *Virgatanytarsus rossaroi* sp.n., три новых этрусских видов
из холодных горных водотоков и озер Корсики
и Приморских Альп (Diptera, Chironomidae)

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Keywords: Diptera, Chironomidae, Chironominae, new species, Tyrrhenian Region, Corsica, SE-France, NW-Italy.

Ключевые слова: Diptera, Chironomidae, Chironominae, новые виды, этрусский район, Корсика, юго-восточная Франция, северо-западная Италия.

Abstract. Description of *Microtendipes morii* sp.n., *Polypedilum* (*Polypedilum*) *mercantourus* sp.n. and *Virgatanytarsus rossaroi* sp.n. is provided based on material collected in the Tyrrhenian Sub-Region including the continental and insular Provinces. *M. morii* sp.n. and *V. rossaroi* sp.n. are described as male adult and pupal exuviae based on associated male adults and male pharate adults, while *P. mercantourus* sp.n., is described only as male adult. *M. morii* sp.n. is occurring in lotic pristine habitats delimited by the upper basin of cold mountain streams located in central and west Corsica. *P. mercantourus* sp.n. is only known from two small lakes located in the Maritime Alps (E-France). *V. rossaroi* sp.n. is currently known from the middle basin of several streams located in both French and Italian Maritime Alps. Taxonomic remarks and comments on the ecology and geographical distribution of the new species are given.

Резюме. Приведены описания трёх новых для науки видов хирономид *Microtendipes morii* sp.n., *Polypedilum* (*Polypedilum*) *mercantourus* sp.n. и *Virgatanytarsus rossaroi* sp.n. по материалам, собранным в этрусском субрегионе, включающем континентальные и островные провинции. Виды *M. morii* sp.n. и *V. rossaroi* sp.n. описаны по имаго самцам и экзувиям куколок, которые ассоциированы с выведенными из куколок взрослыми насекомыми, а описание *P. mercantourus* sp.n. приведено только по имаго самцу. Распространение вида *M. morii* sp.n. ограничено верховьями холодных горных ручьёв, расположенных в центральной и западной части Корсики. Вид *P. mercantourus* sp.n. известен только из двух небольших озёр, расположенных в Приморских Альпах (Восточная Франция). Вид *V. rossaroi* sp.n. в настоящее время известен из среднего течения нескольких ручьёв, находящихся во французской и итальянской частях Приморских Альп. Приводятся таксономические замечания и комментарии

по экологии и географическому распространению новых видов.

Introduction

In this paper three new Chironominae species are described, based on a large material recently collected in August 2015 (central and W-Corsica) and Jun 2016 (Maritime Alps, SE-France and NW-Italy). Associated material of male adults and male pharate adults allowed us to separate three new species: *Microtendipes mori* sp.n. (Corsica); *Polypedilum mercantourus* sp.n. and *Virgatanytarsus rossaroi* sp.n. (Maritime Alps, E-France). Additional material composed of new undescribed adults and morphotypes belongs to the *Microtendipes* sp. A, *Microtendipes* sp. B, *Microtendipes* sp. C, *Microtendipes* sp. D; *Polypedilum* sp. 1; *Virgatanytarsus* sp. A, *Virgatanytarsus* sp. B, *Virgatanytarsus* sp. C.

M. morii sp.n. and *V. rossaroi* sp.n. are described as male adult and pupal exuviae based on associated male adults and male pharate adults, while *P. mercantourus* sp.n., is described only as male adult. Nearest European *Microtendipes* species to *M. morii* sp.n. include: *M. rydalensis* (Edwards, 1929); *M. diffinis* (Edwards, 1929); *M. nitidus* (Meigen, 1818); *M. pedellus* (De Geer, 1776). *P. mercantourus* sp. n. is keyed near: *P. amoenum* (Goetghebuer, 1930); *P. intermedium* Albu, 1966; *P. asakawasense* Sasa, 1980; *P. notabile* Yamamoto, Yamamoto et Hirowatari, 2012; *P. pseudamoenum* Moubayed, 1992. Nearest European *Virgatanytarsus* species to *V. rossaroi* sp.n. are: *V. albisutus* Santos

Abreu, 1918; *V. ansatus* Reiss et Schuerch, 1984; *V. arduennensis* (Goetghebuer, 1922); *V. triangularis* Goetghebuer, 1928).

M. morii sp.n. is occurring in lotic pristine habitats delimited by the upper basin of cold mountain streams located in central and west Corsica (Gravona and Porto Rivers). *P. mercantourus* sp.n. is only known from two small lakes located in the upper and middle basin of the Roya River (Minière Lake, altitude 1650 m; Casterino Lake, 1500 m; Maritime Alps, E-France). *V. rossaroi* sp.n. is known from the middle basin of several streams located in both French and Italian Maritime Alps (alt. 450–750 m) including: Bevera stream (type-locality at Sospel village, gorges at the Olivetta Italian village, NW-Italy); Guiou (a tributary of the Bevera stream); Bendola (a tributary of the Roya River); Roya River at Breil-Sur-Roya.

Geographical distribution of *M. morii* sp.n. is apparently restricted to pristine and well preserved streams located in central and western Corsica, while *P. mercantourus* sp.n. and *V. rossaroi* sp.n. are likely more widespread and occurring in high mountain lakes (for *P. mercantourus* sp.n.) and rhithral of streams and rivers (for *V. rossaroi* sp.n.) delimited by the Maritime Alps which are extended along the French and the Italian borders. More over, mountain streams and lakes covered by the upper and middle basins of the Roya River (E-France and NW-Italy) and Gravona and Porto Rivers (Corsica) consist of a significantly spared area from the impact of various perturbation factors including accidental flooding, human activities, ecotourism and modification of habitats.

Main references devoted to the taxonomy, biogeography and ecology of the known related species from Europe and neighbouring geographic areas include: Goetghebuer [1937]; Albu and Botnariuc [1966]; Albu [1980]; Reiss [1984]; Pinder and Reiss [1986]; Rossaro [1988]; Cranston et al. [1989]; Langton [1991]; Serra-Tosio and Laville [1991]; Laville and Serra-Tosio [1996]; Myers et al. [2000]; Lencioni et al. [2007]; Moubayed [1992, 2007]; Langton and Pinder [2007]; Gilka [2009, 2011]; Ree et al. [2010]; Yamamoto et al. [2012]; Sæther and Spies [2013]; Moubayed-Breil and Ashe [2012, 2016, 2017].

Terminology and measurements largely follow Sæther [1980], Cranston et al. [1989] for the imagines and Pinder and Reiss [1986], Langton [1991] for the pupal exuviae. Remarks and discussion on some related members of the three described species with comments on the ecology and geographical distribution are given.

Material and methods

The studied material was collected using some standard methods: Langeron, or Troubleau net for larvae and floating pupae; Brundin drift nets for pharates and pupae; sweep net and light trap for flying imagines. In each collecting site (especially helocrenes, waterfalls and rhithral) a square (15x15 to 20x20 cm²) of bryophytes including liverwort were sampled. Benthic fauna

was collected into a 500 µm mesh and then fixed in 7 to 8 % formaldehyde. Hunted insects were preserved in 85 % ethanol for later identification and analysis. In each of the collecting sites, altitude, depth, flow velocity and environmental data (conductivity, pH and temperature of water) were recorded before benthic and drifting sampling.

Material composed of adults were cleared of musculature in 90 % lactic acid (head, thorax, abdomen and anal segment) for about 60 to 80 minutes, which can be left overnight at room temperature without any detrimental effect or damage. The specimens were checked under a binocular microscope after 20 minutes in lactic acid to determine how the clearing was progressing. When clearing was complete the specimens were washed in two changes of 70 % ethanol to ensure that all traces of lactic acid were removed. Compared to clearing with potassium hydroxide, or other clearing solutions, no deterioration of the typical «original» structure is reported by using lactic acid. All examined material (adults and pupal exuviae) was mounted in polyvinyl lactophenol; remaining material including paratypes was preserved in 70 % ethanol. The eye on one side has been dissected from the head, which ensures that the hairs on the inner margin of eye are more clearly visible. Before the final slide mountings (dorsally) of the type and paratype material, the hypopygium, the female genitalia and the abdomen of the Pe were viewed ventrally and laterally to examine and draw in both sides all the necessary details of the species:

— in the male adult, the IXth tergum and anal point are removed for a more detailed illustration of the volsellae, apodemes and gonocoxite in dorsal view;

— in the female adult, the genitalia including the gonapophysis VIII with different lobes, the sternite VIII, the IXth tergum and cercus;

— in the Pe, the chaetotaxy, armament and distribution pattern of shagreen, rows of spines and spinules on segments including conjunctives.

Descriptions

Microtendipes morii Moubayed-Breil, sp.n.

Type material. Holotype: Corsica. 1 male pharate adult, leg J. Mb-Br, upper basin of the Gravona River at Bocognanu, Monte d'Oro, riffles and waterfall, altitude 1300–1400 m, 27.08.2015. Environmental data of water are: crystalline water, conductivity (Cd) 70–80 µS/cm; temperature (T°C) 7.5–10.5 during late spring till June, 8–12 during the late summer till September; pH acid, 5.1–5.5. Paratypes: Corsica. Porto River, middle basin, 1 male pharate adult, leg J. Mb-Br, W-Corsica, rhithral with riffles and waterfalls at 250–500 m, 1.05.2012; Cd 80–90 µS/cm; T °C 9.5–11.5.

Holotype on 2 slides (male adult and its pupal exuvia) is deposited in the collections of the Museo delle Scienze, Trento (Italy). Remaining paratypes are deposited in the author's collection.

Type material was preserved in 80 % alcohol, and later mounted in polyvinyl lactophenol. For each adult, the head, thorax and abdomen were cleared in 90 % lactic acid then washed in 80 % Ethanol before mounting on slides.

Etymology. The new species is named *morii* in honour of my colleague Dr Christophe Mori from the University of

Corsica Pascal Paoli (Corté), who remains active as professor and hydrobiologist in contributing to preserve the biological and ecological quality of water and environment in Corsica.

Diagnosis. Nearest European *Microtendipes* species to *M. morii* sp.n. include: *M. rydalensis*; *M. diffinis*; *M. nitidus*; *M. pedellus*. *M. morii* sp. n. can be distinguished from other related members of the genus in having:

— in the male adult: tergite IX rectangular with straight posterior margin, anal tergite bands wide-V shaped converging medially and terminating at an acute angle near the dorsomedian setae; anal point long with rounded apex bearing a dorsal crest with presence of 4 dorsolateral short setae placed on proximal part, 5–6 setae placed basally on each side, 2 ventral setae; superior volsella shovel-shaped, b; dct j,j,obnm

earing 3 setae on dorsal side, dorsal and ventral side with dense field of microtrichia; setiferous ventral lobe of inferior volsella consists of 3 stout setae; gonostylus markedly broadened medially);

— in the pupal exuviae: frontal tubercles conical and lacking frontal setae, weakly curved inwards apically; conjunctives III/IV–IV/V with sparsely distributed field of orally directed small spines; lateral anal comb brown yellowish consists of 1–2 rows of strong spines placed obliquely and 2–5 smaller spines placed above on inner part, presence of distinct reticulation on its anterior part).

Male adult (n = 2 including 2 male pharate adults; Figs 1–3, 5–11). Medium to big sized *Microtendipes* species. Total length: 4.00–4.10 mm. Wing length 1.80–1.90 mm. General colouration dark green to brown with dark brown scutal stripes; head brown with pedicel brownish; antenna and palpoмеры with dark brown segments; thorax brown to dark brown mesonotal stripes; mesosternum, scutellum and prosternum light brown; wing with both membrane and veins nearly transparent, brachiolum and arculus greenish; legs brownish; abdomen including tergite IX and anal point dark green.

Head. Eyes bare; hairs absent on inner margin of eyes. Frontal tubercles absent. Temporals composed of 11 setae including 8 inner and 3 outer verticals. Clypeus trapezoidal with rounded posterior margin, bearing 15 placed in 4 rows. Antenna (Fig. 1) 2.20 mm long, last flagellomere 1.40 mm long; apex of last flagellomere (Fig. 1) with 3 preapical setae and numerous sensilla clavata; antennal groove reaching segment 3; AR 1.75. Palp 5-segmented; sensilla chaetica present on segment 3 (2–3) and segment 5 (about 10, Fig. 2); length (µm) of segments: 45, 55, 80, 135, 175.

Thorax. Anteprenotals consist of 5 lateromedian seta, median anteprenotals absent; acrostichals 3–5; dorsocentrals 19–21, uni-biserial; prealars 5; scutellars 22–23. Wing. Brachiolum with 2 setae 90 µm long; distribution of setae on veins: R 19–21, R₂₊₃ 18–19, R₄₊₅ about 45. Squama with 7–9 setae.

Legs. Average length (in µm) and proportions of legs (Table 1).

Hypopygium in dorsal, ventral and lateral view (Figs 5–11); ventral view (Fig. 6) with anal point and tergite IX removed. Tergite IX broadly rectangular with straight posterior margin, anal tergite bands continuous, wide-V shaped (Fig. 5) and converging medially, ending at an acute angle near the insertion of dorsomedian setae; 1–2 seta are present posteriorly close to the base of anal point. Anal point in dorsal (Fig. 5), ventral (Fig. 7) and lateral view (Fig. 8); long about 75–80 µm long, maximum width 55 µm at base; parallel-sided except for its base, apex rounded; bearing a distinct dorsal crest basally and 4–6 characteristic dorsolateral short setae inserted on proximal part; presence of 11–12 setae including: 6–7 dorsolateral on each side of the base, 4 dorsolateral laterally directed placed on proximal part, 2 ventral (Figs 7–8). Sternapodeme (Fig. 6) X-like, large at base and bearing 2 characteristic horn-like anterolateral projections, which are slightly curved downwards apically. Laterosternite VIII with 4–5 setae. Superior volsella (Figs 5, 9–10) shovel-shaped in dorsal view, downwardly orientated with pointed tip, bearing 3 setae on dorsal side; both dorsal and ventral side with microtrichia; parrot's-beak shaped in lateral view (Fig. 11). Inferior volsella (Fig. 5–6, 9), 150–160 µm long, maximum width 40–45 µm at median part; distinctly swollen medially and tapering distally with rounded apex; setiferous ventral lobe (Figs 6, 9) consists of 3 stout setae including 2 placed apically and 1 inserted near the outer margin. Gonocoxite 160–170 µm long, bearing 7–8 dorsolateral setae. Gonostylus (Fig. 5) 220–225 µm long, 60–65 µm maximum width, markedly broadened medially; inner margin with 8–9 uniserial setae.

Male pupal exuviae: (n = 3 including 2 males and 1 female; Figs 20, 24–25, 29–31, 40–41. Pupal case, Figs 47–48).

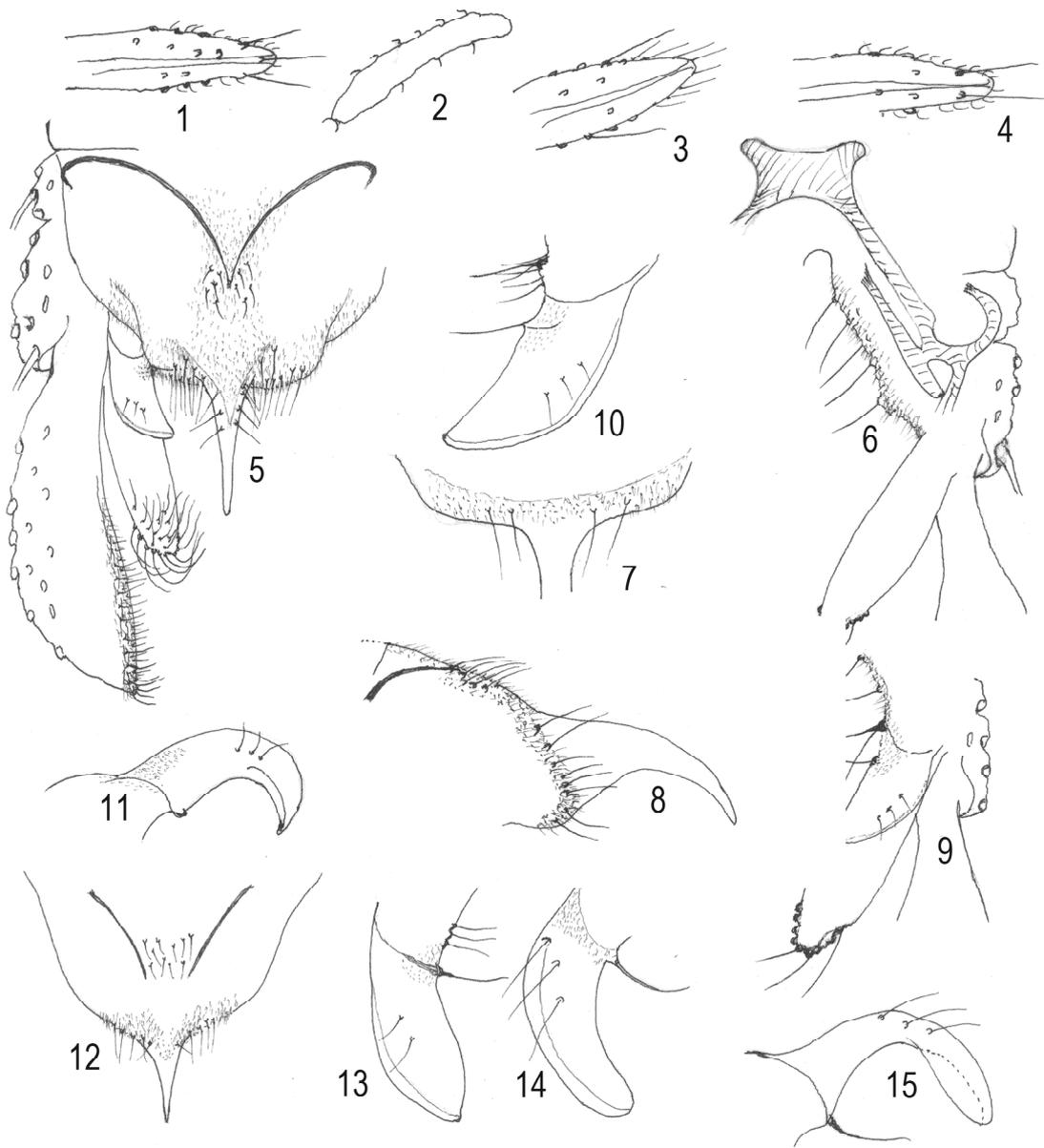
Total length 4.20–4.30 mm. Abdomen 3.20–3.30 mm. General colouration contrasted golden brown to dark brown. Frontal apotome dark brown with dense wrinkles on median area; thorax dark brown with blackish shading along anterior half of thoracic suture and near base of wing sheaths, thoracic suture with sparse granulations on median part, 2 markedly blackish wrinkles present near base of thoracic horn; margin of wing sheaths blackish. Abdomen golden brown with dark brown anal comb, which is bearing a field of reticulations visible at 20X; anal segment golden brown.

Cephalothorax. Frontal apotome well domed, frontal tubercles (Fig. 20) 50 µm long and 70–75 µm wide at base, distinctly conical and lacking frontal setae, apex slightly curved inwards. Thoracic horn composed of 5–6 branches, basal ring (Figs 24–25) ellipsoidal with a distinct anterolateral expansion. Anteprenotals consist of only 1 long median anteprenotal 70–75 µm long; precorneals 2 about 30 µm long; dorsocentrals 4 consist of 2 widely separated pairs of sub-equal setae 30–35 µm long, Dc₁–Dc₂ separated from Dc₃–Dc₄ by 210–220 µm.

Abdomen (Figs 29–31, 40–41). Tergite and sternite I bare. Armament of tergites II–III as in Figs 29, 31. Posterior

Table 1. *Microtendipes morii*, average length (in µm) and proportions of legs
Таблица 1. *Microtendipes morii*, средняя длина (в мм) и пропорции ног

P	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
P _I	710	940	450	490	470	420	220	0.48	1.31	3.67	4.40
P _{II}	790	800	610	300	220	170	110	0.76	2.75	2.61	3.30
P _{III}	970	1010	720	410	250	220	130	0.71	2.67	2.75	2.78



Figs 1–15. Male adult of *Microtendipes* spp. *M. morii* sp.n.: apex of last flagellomere (1); segment 5 of palp (2). Apex of last flagellomere of: *M. diffinis* (3), *M. rydalensis* (4). *M. morii* sp.n.: hypopygium, dorsal (5), ventral with anal point and tergite IX removed (6); anal point in ventral (7) and lateral view (8); superior and inferior volsella, ventral (9); superior volsella in dorsal (10) and lateral view (11). *M. rydalensis*: anal point, dorsal (12); superior volsella, dorsal (13). *M. diffinis*: superior volsella in dorsal (14) and lateral view (15).

Рис. 1–15. Имаго самец *Microtendipes* spp. *M. morii* sp.n.: вершина последнего членика антенны (1); сегмент 5 максиллярного щупика (2). Вершина последнего членика антенны *M. diffinis* (3) и *M. rydalensis* (4). *M. morii* sp.n.: гипопигий дорсально (5), вентрально с анальным отростком и удалённым тергитом IX (6); анальный отросток вентрально (7) и латерально (8); верхний и нижний придатки гоноксита вентрально (9); верхний придаток гоноксита дорсально (10) и латерально (11). *M. rydalensis*: анальный отросток дорсально (12); верхний придаток гоноксита дорсально (13). *M. diffinis*: верхний придаток гоноксита дорсально (14) и латерально (15).

transverse row of hooks on tergite II 255–260 μm wide (about 40% of tergite width), composed of 60–65 hooks (longest hook 10–15 μm long). PSB II absent. Armament of tergites II–VI includes: 1 transverse anteromedian rows of small spines (1–7 rows), 1 larger median field of points becoming gradually more extensive and slightly bigger poste-

riorly; details of armament are illustrated in figure 31. Con-junctives on segments III/IV–IV/V (Figs 29–30) faint and sparsely composed of orally directed small spines mostly inserted posteriorly as follows: 1–3 rows (III/IV); 4–5 rows (IV/V). Distributional pattern of lateral setae and taeniae on segments II–VIII: II–IV (3 setae); V (3 taeniae); VI–VIII (4

taeniae). Lateral anal comb of segment VIII (Figs 40–41) 70–75 μm long, placed obliquely to the lateral edge; consists of 1–3 rows of spines, including 4–5 strong spines placed laterally and 3–5 smaller placed on inner part (longest spine 30–35 μm long, shortest one 10–15 μm long); presence of distinct reticulation on proximal area. Anal lobe 200–220 μm long, maximum width 290–300 μm . Genital sac 220–225 μm long, overreaching tip of anal lobe by 140–150 μm . Pupal case (Figs 47–48) cylindrical and uniformly linear, composed of filamentous green algae mixed to fine sediments; opercula (Fig. 48) with small holes, circular in frontal view and disk-like in lateral view.

Larva. Known but not described.

Taxonomic position. *M. morii* sp.n. is keyed near *M. rydalensis*, *M. diffinis*, *M. nitidus*, *M. pedellus* from which it can be separated by a combination of differentiating characters.

— in the male adult: tergite IX with anal tergite bands continuous, wide-V shaped and converging medially at an acute angle (Fig. 5), discontinuous and interrupted medially in *M. rydalensis* (Fig. 12); anal point nearly parallel-sided and bearing 4–6 short dorsolateral setae while is triangular and bearing only 2 dorsolateral setae in *M. rydalensis* (Fig. 12), apex rounded and straight in *M. morii* sp. n. but is curved apically in *M. diffinis* (Fig. 16); superior volsella shovel-shaped (Figs 5, 9–10), while is ellipsoidal in *M. rydalensis* (Fig. 13) and foot-shaped in *M. diffinis* (Figs 14–15); distributional pattern of setae on setiferous ventral lobe and shape of inferior volsella are differently figured in: *M. diffinis* (Fig. 17), *M. pedellus* (Fig. 18), *M. rydalensis* (Fig. 19)];

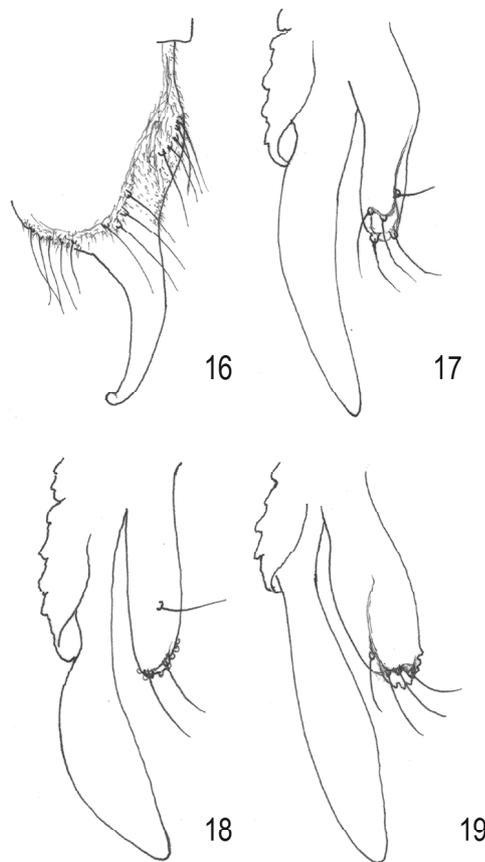
— in the pupal exuviae: frontal tubercles, basal ring conjunctives and anal comb (Figs. 20, 24–25, 29–31, 40–41) are differently figured in: *M. diffinis* (Figs 21, 26, 37–39, 42), *M. rydalensis* (Figs 22, 27, 32–33, 43–44) and *M. sp. A* (Figs 23, 28, 34–36, 45–46).

Ecology. Habitats where pharates, pupal exuviae and larvae of *M. morii* sp.n. were sampled consist of shady stretches of cold mountain helocrenes and streams with small waterfalls and sandy to gravelly substrata, which deserve greater consideration and preservation. Bryocolous, hygropetric and madicolous habitats represent the most common and possibly favoured aquatic areas for larval populations. *M. morii* sp.n. belongs to the crenobiontic and rhithrobiontic community of species documented by Lindegaard (1995). Emergence is recorded from April–May to August till late September. Associated species encountered in the same localities include: *Corynoneura tyrrhena* Moubayed-Breil, 2015; *Rheocricotopus thomasi* Moubayed-Breil, 2016; *Boreoheptagya dasyops* Serra-Tosio, 1989; *Diamesa latitarsis* (Goetghebuer, 1921); *D. tonsa* (Haliday, 1856); *Thienemannia corsicana* Moubayed-Breil, 2013; *T. gracilis* Kieffer, 1909; *T. Trissocladius orsinii* Moubayed-Breil et Ashe, 2015; etc.

Geographical distribution. Currently, the new species is only known from the rhithral of cold mountain streams located in both central and W-Corsica. Consequently, *M. morii* sp.n. is believed to be a typical biogeographic representative of the insular Tyrrhenian Province.

Polypedilum mercantourus
Moubayed-Breil, sp.n.

Type material. *Holotype.* France: 1 male adult, leg J. Mbr, 23.06.2016, Minière Lake, middle basin of the Minière stream, Maritime Alps (E-France), alt. 1650 m. Environmental data of water are: calcareous water, Cd 325–335 $\mu\text{S}/\text{cm}$; mean T°C 12–16; pH 7.3–7.8. The holotype locality is situated in zone 10a, after Moubayed-Breil and Ashe (2016).



Figs 16–19. Male adult of *Microtendipes* spp. *M. diffinis*: anal point, lateral (16). Inferior volsella and gonostylus in ventral view of: *M. diffinis* (17); *M. pedellus* (18); *M. rydalensis* (19).

Рис. 16–19. Имаго самец *Microtendipes* spp. *M. diffinis*: анальный отросток латерально (16). Нижний придаток гоноксита и гоностиль вентрально: *M. diffinis* (17); *M. pedellus* (18); *M. rydalensis* (19).

Paratype. France: 1 male adult, locality and data as for holotype.

Holotype on 1 slide (male adult) is deposited in the collections of the Museo delle Scienze, Trento (Italy). Paratype is deposited in the author's collection.

Type material was preserved in 80% alcohol, and later mounted in polyvinyl lactophenol. For each adult, the head, thorax and abdomen were cleared in 90% lactic acid then washed in 80% Ethanol before mounting on slides.

Etymology. The new species is named *mercantourus* after the type locality of holotype, which is located in the National Park of Mercantour (E-France, Maritime Alps).

Diagnosis. Based on the distinctive sickle-like character of superior volsella, *P. mercantourus* sp.n. can be placed close to the following *Polypedilum* (*Polypedilum*) species: *P. intermedium*, *P. amoenum*, *P. asakawasense*, *P. notabile*, *P. pseudamoenum*. The new species is easily distinguished from the previously cited species in having: wing with 4 distinct darkened spots; tergite IX broad with nearly sub-circular posterior margin, presence of a distinct rounded notch medially, anal tergite bands wide cup-like, distinctly narrowed basally and abruptly ending medially; superior volsella sickle-like with 1 lateral seta inserted nearly half-way

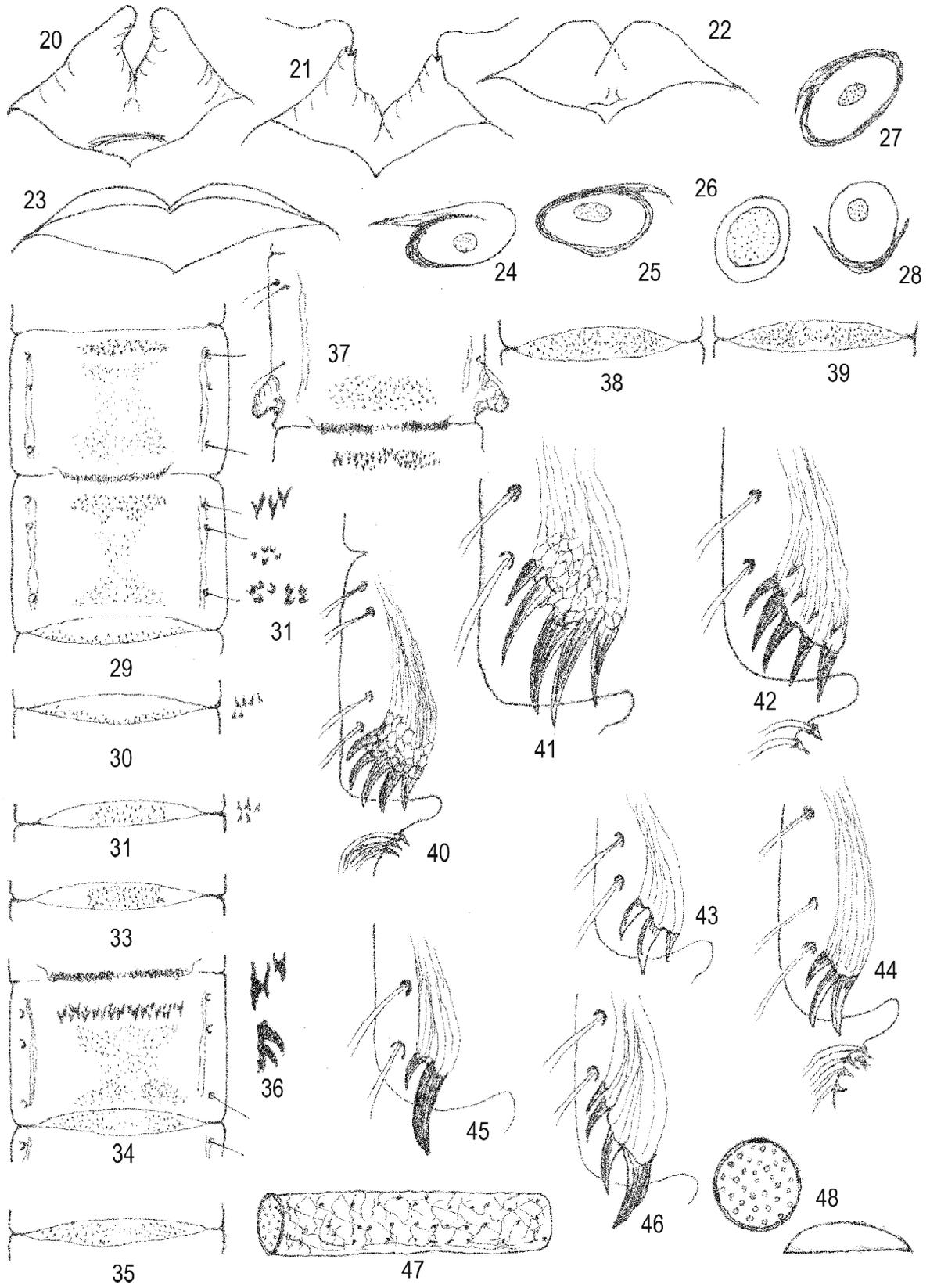


Table 2. *Polypedilum mercantourus* Moubayed-Breil, sp.n. — average length (in μm) and proportions of legs
Таблица 2. *Polypedilum mercantourus* Moubayed-Breil, sp.n. — средняя длина (в μm) и пропорции ног

P	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
P _I	1010	870	630	465	440	330	195	0.72	1.80	1.87	1.70
P _{II}	1150	975	590	320	260	150	120	0.61	3.20	3.60	1.50
P _{III}	1220	1115	520	290	245	180	125	0.47	3.40	4.49	2.10

along; inferior volsella very long and uniformly linear bearing 1 long apical ventral seta; gonostylus long with tip abruptly reduced in width. Nevertheless, the spotted wing of *P. mercantourus* sp.n and the presence of lateral seta on superior volsella apparently represent the main separating features from other members of the *intermedium*-group, which currently includes *P. intermedium*, *P. amoenum* and *P. pseudamoenum*.

Male adult (n = 2; Figs 49–53, 55–60).

Polypedilum sp. A in Moubayed-Breil and Ashe [2017].

Big sized *Polypedilum* species. Total length: 3.75–3.80 mm. Wing length 2.50–2.55 mm. General colouration dark brown to brown yellowish. Head dark brown with blackish eyes. Thorax contrasting dark brown to pale brown with a distinct pale yellowish humeral area. Wing spotted with a markedly dark brown spot on cell r4+5. Abdomen including anal segment dark brown. Legs contrasting dark brown to brown, only femur of PI is ringed, femur of PII and PIII dark brown.

Head. Eyes bare; hairs absent on inner margin of eyes. Frontal tubercles weak with blackish base. Temporals composed of 14–15 nearly uniserial setae placed in 1 row, including inner and outer verticals. Clypeus trapezoidal with rounded posterior margin, bearing 19–20 inserted in 4–5 rows on its proximal part. Palp 5-segmented, segments 3 and 5 with few sensilla chaetica; length (μm) of segments: 65, 75, 80, 95, 145. Antenna 13-segmented, about 1.15 mm long; last flagellomere 700 μm long; antennal groove reaching base of segment 1; AR 1.55.

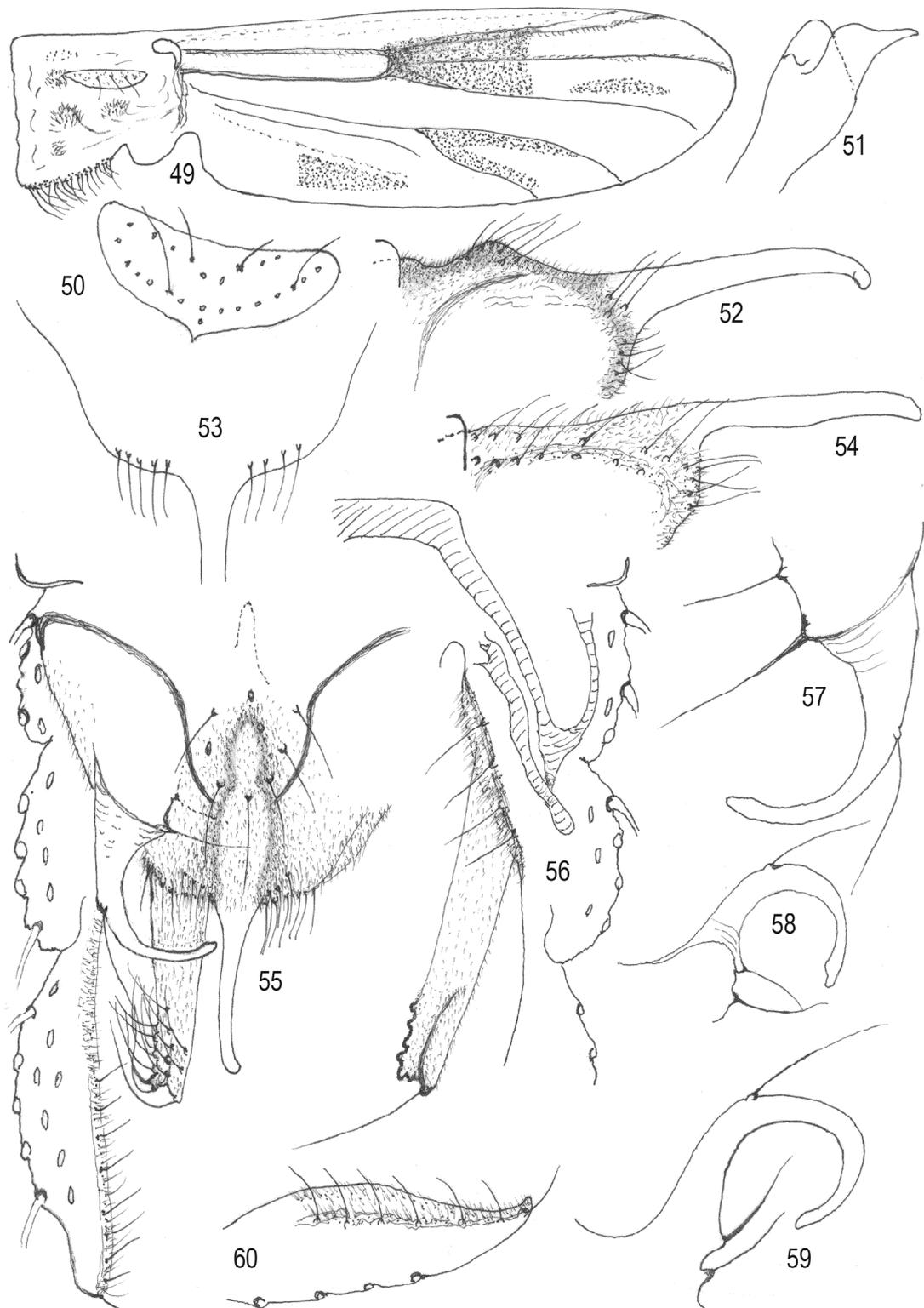
Thorax. Antepronotal lobes narrowly separated, lacking setae; acrostichals 3–4; dorsocentrals 9–10, uni-biserial; prealars 4–5. Scutellum (Fig. 50) with 7–8 scutellars markedly placed along 2 arcs, setae on anterior arc shorter. Wing (Fig. 49). Brachiolium with 3 setae. Distribution of setae on veins: R 29–31, R₂₊₃ 27–29, R₄₊₅ 30–33. Presence of 4 distinct darkened spots placed on the following cells: 1 large on proximal part of cells r₁, r₂₊₃, r₄₊₅; 1 small-sized on median

part of cell r₄₊₅; 1 medium-sized on cell m₁₊₂; 1 on cell an. Squama with 18–19 setae in 1–2 rows. Legs. Apex of fore tibia as in figure 51; sensilla chaetica present on: ta₄–ta₅ (PI); ta₁ (PII); ta₃ and ta₅ (PIII). Average length (in μm) and proportions of legs (Table 2):

Hypopygium in dorsal, ventral and lateral view as in Figs 55–60. Ventral view (Fig. 56) illustrated with tergite IX and anal point removed. Tergite IX sub-rectangular; dorsal margin with a distinct ellipsoidal notch medially, which is delimited by a darkened microtrichia well visible in dorsal and lateral view (Figs 52, 55); posterior margin broad and nearly rounded to straight; anal tergite bands (Fig. 55) large cup-like shaped, widely separated basally, tapering medially and abruptly interrupted near base of anal point, regularly thick from base to tip, rounded medially and tapering apically, separated by 120 μm at base, by 55–60 μm medially and by 36 μm at apex; 10 dorsomedian setae are placed between the tergite bands; posterior margin with 3 lateral setae placed on each side of the anal point. Anal point (dorsal, Fig. 55; ventral, Fig. 53; lateral Fig. 52), about 100 μm long, maximum width 15–20 μm at base; parallel-sided except for the apex which is rounded; a faint crest is present on proximal part; bearing 6 setae including: 2 placed laterally and 4 ventrally. Sternapodeme (Fig. 56) orally projecting, transverse sternapodeme 65–68 μm long, 13–15 μm wide; lateral coxapodeme 135 μm long. Superior volsella (Figs 55, 57–59) about 55 μm long, 45 μm width at base; large-sickle shaped in dorsal view (Figs 55, 57), sub-circular in dorsolateral and lateral view (Figs 58–59), linearly elongated and bearing 1 lateral seta 70–75 μm long inserted about halfway along; distance between lateral seta and tip 65–68 μm ; base lacking microtrichia, inner basal margin with 2 basal setae: 1 stout 45 μm long and 1 shorter placed above. Inferior volsella (Figs 55–56, 60) 180–185 μm long, maximum width 31–33 μm at base, uniformly linear; presence of 12–13 dorsolateral setae upwardly directed; ventral setiferous ventral lobe (Fig. 56) projecting upwards and bearing 1 apical long seta 115 μm

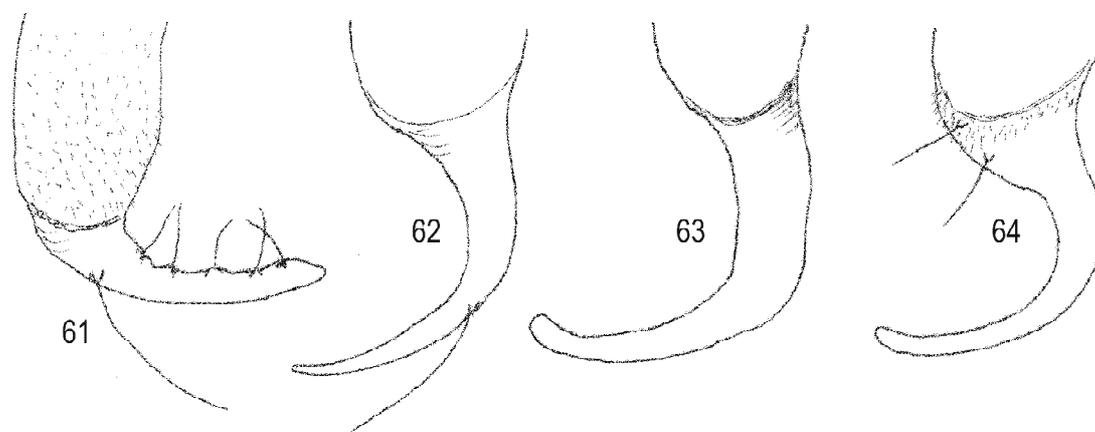
Figs 20–48. Pupal exuviae and pupal case of *Microtendipes* spp. Frontal tubercles of *M. morii* sp.n. (20); *M. diffinis* (21); *M. rydalensis* (22); *Microtendipes* sp. A (23). Basal ring of *M. morii* sp.n. (24–25); *M. diffinis* (26); *M. rydalensis* (27); *Microtendipes* sp. A (28). *M. morii* sp.n.: armament of abdominal segments II–III and conjunctive III/IV (29); conjunctive IV/V (30); details of armaments on tergite III (31). *M. rydalensis*: conjunctives III/IV (32) and IV/V (33). *Microtendipes* sp. A: hook rows of tergite II, armament of segment III and conjunctive III/IV (34); conjunctive IV/V (35); details of anterior rows of spines on tergite III (36). *M. diffinis*: hook rows and PSB II of tergite II and anterior rows of spines of segment III (37); conjunctive III/IV (38); conjunctive IV/V (39). Lateral anal comb of *M. morii* sp.n. (40–41); *M. diffinis* (42); *M. rydalensis* (43–44); *Microtendipes* sp. A (45–46). Pupal case of *M. morii* sp.n.: case (47); opercula in frontal and lateral view (48).

Рис. 20–48. Экзувии и чехлики куколок *Microtendipes* spp. Фронтальные бугорки *M. morii* sp.n. (20); *M. diffinis* (21); *M. rydalensis* (22); *Microtendipes* sp. A (23). Базальный круг *M. morii* sp.n. (24–25); *M. diffinis* (26); *M. rydalensis* (27); *Microtendipes* sp. A (28). *M. morii* sp.n.: вооружение сегментов II–III брюшка и межсегментального участка сегментов III/IV (29); межсегментальный участок сегментов IV/V (30); детали вооружения тергита III (31). *M. rydalensis*: межсегментальный участок сегментов III/IV (32) и IV/V (33). *Microtendipes* sp. A: ряды крючковидных шпиков тергита II, вооружение сегмента III и межсегментального участка сегментов III/IV (34); межсегментальный участок сегментов IV/V (35); детали строения и расположения передних рядов шипов тергита III (36). *M. diffinis*: ряды крючковидных шпиков и PSB тергита II и передние ряды шипов сегмента III (37); межсегментальный участок сегментов III/IV (38); межсегментальный участок сегментов IV/V (39). Латеральный анальный гребень *M. morii* sp.n. (40–41); *M. diffinis* (42); *M. rydalensis* (43–44); *Microtendipes* sp. A (45–46). Чехлик куколки *M. morii* sp.n.: чехлик (47); оперкуля спереди и сбоку (48).



Figs 49–60. Male adult of *Polypedilum (Polypedilum)* spp. *P. mercantourus* sp.n.: wing (49); scutellum (50); apex of fore tibia (51); anal point in lateral (52) and ventral view (53). *P. amoenum*: anal point, lateral (54). *P. mercantourus* sp.n.: hypopygium in dorsal (55) and ventral view (56); superior volsella in dorsal (57), dorsolateral (58) and lateral view (59); gonostylus, lateral (60).

Рис. 49–60. Имаго самец *Polypedilum (Polypedilum)* spp. *P. mercantourus* sp.n.: крыло (49); щиток (50); вершина передней голени (51); анальный отросток латерально (52) и вентрально (53). *P. amoenum*: анальный отросток латерально (54). *P. mercantourus* sp.n.: гипопигий дорсально (55) и вентрально (56); верхний придаток гонококсита дорсально (57), дорсолатерально (58) и латерально (59); гоностиль латерально (60).



Figs 61–64. *Polypedilum* (*Polypedilum*) spp. Superior volsella of *P. notabile* (61); *P. intermedium* (62); *P. pseudamoenum* (63); *P. asakawasense* (64).

Рис. 61–64. *Polypedilum* (*Polypedilum*) spp. Верхний придаток гонококсита *P. notabile* (61); *P. intermedium* (62); *P. pseudamoenum* (63); *P. asakawasense* (64).

long. Gonocoxite 100–105 μm long, 60 μm wide, bearing 7–8 dorsolateral setae; basal inner margin (Fig. 56) with 4–5 stout setae. Laterosternite VIII with 5 setae. Gonostylus (Figs 55, 60) 200–210 μm long, 60–65 μm maximum width, distinctly broadened medially and abruptly tapering apically, maximum width (60 μm) similar to that of the gonocoxite; inner distal margin bearing: 6–7 uniserial stout setae, 9–10 shorter and curved setae.

Taxonomic position. *P. mercantourus* sp.n. is characterized by four relevant characters including: wing spotted; tergite IX with a distinct rounded notch medially well visible in both dorsal and lateral view; superior volsella sickle-like; presence of 1 lateral seta on superior volsella. The third character keys the new species near *P. amoenum*, *P. intermedium*, *P. asakawasense*, *P. notabile*, *P. pseudamoenum*, whose are bearing a sickle-like superior volsella (Figs 61–64). The presence/absence of lateral seta on superior volsella (Figs 61–64) keys the new species close to: *P. amoenum* (Albu 1980, Fig. 138); *P. pseudamoenum* [Moubayed, 1992, Figs 3–4; Fig. 64]; *P. notabile* [Yamamoto et al., 2012, Figs 19, 21–22; Fig. 61]; *P. intermedium* [Albu and Botnariuc, 1966, Fig. 4; Fig. 62]; *P. asakawasense* [Ree et al., 2012, Fig. 1B; Fig. 64]. Though *P. mercantourus* sp.n. and *P. intermedium* can be considered as a sister species, these two species can be easily separated by the following distinguishing characters: wing spotted and tergite IX bearing a distinct rounded notch medially in *P. mercantourus* sp.n.

Ecology. *P. mercantourus* sp.n. is only occurring in high to middle mountain lakes where larvae are apparently confined to the inflow section of lakes. Emergence is recorded from Mai-Jun till early September. Associated species encountered in the same localities include: *Dicretendipes notatus*, *Polypedilum amoenum*, *P. nubeculosum* (Meigen, 1804), *P. pedestre* (Meigen, 1830), *Micropsectra auvergnensis* Reiss, 1969, *M. chionophila* (Edwards, 1933), *M. clastrieri* Reiss, 1969, *M. nana* (Meigen, 1818), *M. nohedensis* (Moubayed et Langton, 1996), *M. recurvate* Goetghebuer, 1928, *M. roseiventris* (Kieffer, 1909), *Neozavrelia bernensis* Reiss, 1968, *N. cuneipennis* (Edwards, 1929), *N. fuldensis* Fittkau, 1954, etc.

Geographical distribution. Currently, *P. mercantourus* sp.n. is only recorded in mountain lakes (alt. 1500–2000 m)

located in the upper and middle basin of the Minière stream (a tributary of the Roya River, Maritime Alps, E-France). The new species is believed to be a typical biogeographic representative of Alpine mountain lakes located in both French and Italian Maritime Alps.

Virgatanytarsus rossaroi
Moubayed-Breil, sp. n.

Type material. *Holotype.* France: Bevera stream, middle basin at Sospel village (SE-France), a tributary of the Roya River, lentic habitats delimited by the rhithral; Maritime Alps, southern part of the National Park of Mercantour, alt. 350–450 m; 1 male adult, leg J. Mb-Br, 25.06.2016. Environmental data of water are: calcareous water, presence of tufa concretions, Cd 650–795 $\mu\text{S}/\text{cm}$, temperature 12.5–19.5, pH 7.3–8.2. The holotype locality is situated in zone 10a, after Moubayed-Breil and Ashe (2016). *Paratypes.* SE-France: 1 male pharate adult, 1 male adult, 10 pupal exuviae (6 males, 4 females), same date and locality as for holotype. 1 male pharate adult and 5 pupal exuviae (3 males, 2 females), leg J. Mb-Br, 23.06.2016, Minière Lake, Maritime Alps, alt. 350–450 m. NW-Italy: 6 pupal exuviae (4 males, 2 females), leg J. Mb-Br, Bevera stream at Olivetta village, 24.VI.2016. Holotype on 1 slide (male adult and its pupal skin) with 2 additional paratypes (male Pe) are deposited in the collections of the Museo delle Scienze, Trento (Italy). Remaining paratypes are deposited in the author's collection.

Type material was preserved in 80% alcohol, and later mounted in polyvinyl lactophenol. For each adult, the head, thorax and abdomen were cleared in 90% lactic acid then washed in 80% Ethanol before mounting on slides.

Etymology. This new species is named '*rossaroi*' in honour to my colleague Prof. Bruno Rossaro (university of Milano, Italy) who remains active in performing valuable works on the biology, ecology, bio-statistic, biogeography and taxonomy of Chironomidae known from Italy and the Mediterranean Region.

Diagnosis. Male adult of *V. rossaroi* sp.n. can be easily separated from the other European members of the genus — *V. albisutus* Santos Abreu, 1918; *V. ansatus* Reiss et Schuerch, 1984; *V. arduennensis* (Goetghebuer, 1922); *V. triangularis* Goetghebuer, 1928) by the following main distinguishing characters: dark green to brown with dark brown scutal



Figs 65–79. Male adult of *Virgatanytarsus* spp. *V. rossaroi* sp.n.: frontal tubercle (65); apex of last flagellomere (66); anteprepronotum (67). Apex of last flagellomere of: *V. arduennensis* (68), *V. albisutus* (69). *V. rossaroi* sp.n.: apex of tibia of PI (70), PII (71), PIII (72). *V. arduennensis*: apex of tibia of PI (73). *V. rossaroi* sp.n.: hypopygium, dorsal (74); digitus (74a); hypopygium, ventral with anal point and tergite IX removed (75); median volsella, lateral (76); superior volsella, inferior volsella and gonostylus in lateral view (77); anal point in lateral view (78); details of proximal part of anal point in lateral view (79).

Рис. 65–79. Имаго самец *Virgatanytarsus* spp. *V. rossaroi* sp.n.: фронтальный бугорок (65); вершина последнего членика антенны (66); переднеспинка (67). Вершина последнего членика антенны *V. arduennensis* (68) и *V. albisutus* (69). *V. rossaroi* sp.n.: вершина голени PI (70), PII (71), PIII (72). *V. arduennensis*: вершина голени PI (73). *V. rossaroi* sp.n.: гипопигий дорсально (74); дигитус (74a); гипопигий вентрально, с анальным отростком и удалённым тергитом IX (75); срединный придаток гонококситы латерально (76); верхний и нижний придатки гонококситы и гоностиль латерально (77); анальный отросток латерально (78); детали проксимальной части анального отростка латерально (79).

stripes; tergite IX bearing a distinct triangular projection on proximal part; anal point constricted medially and weakly broadened distally with rounded apex; superior volsella sub-rectangular to sub-oval with a distinct distal expansion; finger-like digitus which is sinuous and mostly of equal width; median volsella with 15–16 long lanceolate setae rearranged into three groups; setiferous ventral lobe of inferior volsella with 5 stout setae including 3 on inner margin and 2 on outer margin; gonostylus moderately narrowed distally. The pupal exuviae is characterized in having: median area of thorax with a distinct wrinkled small area located close to Dc_1 – Dc_2 ; thoracic horn short and densely toothed at base; patch of small spines present anteromedially on tergite II; pair of longitudinal long spines bands on tergites III–IV continuous, becoming shorter and interrupted on tergites V–VI; lateral anal comb of segment VIII consist of 13–15 posterior strong spines and 4–5 rows of smaller spines placed above.

Male adult (n = 3, 2 male pharate adults and 1 male adult; Figs 65–67, 70–72, 74–82).

Virgatanytarsus sp. 3 in Moubayed-Breil and Ashe [2017].

Medium to big sized *Virgatanytarsus* species. Total length: 3.80–3.90 mm. Wing length 1.80–1.90 mm. General colouration dark green to brown with dark brown mesonotal stripes and ultimate tarsus; apparently could be keyed near that of the *arduennensis*-group. Head brown with pedicel brownish. Antenna and palpomeres with dark brown segments. Thorax brown to dark brown mesonotal stripes; mesosternum, scutellum and prosternum light brown. Wing with both membrane and veins nearly transparent, brachiolum and arculus greenish. Legs: femur and tibia of PI, PII and PIII brownish; tarsus 3 dark brown, tarsus 5 blackish. Abdomen including tergite IX and anal point dark green.

Head. Eyes bare; hairs densely present on distal half of inner margin of eyes. Frontal tubercles (Fig. 65) conical to sub-triangular with rounded apex. Coronal triangle acute and well marked. Temporal setae 12–13, uniserial, including inner and outer verticals. Clypeus elongated rectangle-like with 27–28 setae inserted in 7–8 rows. Palp with 5 segments, segment 2 bearing basally a circular patch of minute microtrichia. Antenna with 13 flagellomeres, 1040–1050 μ m long; segments 5 to 12 sub-equal; ultimate flagellomere about 530–540 μ m long, linear and not clubbed apically, bearing 1 pre-apical seta (Fig. 66), and numerous sensilla clavata; antennal groove reaching segments 1–2; AR 1.04–1.06.

Thorax. Scutum lacking a domed scutal tubercle mediodorally. Thoracic setae: anteprenotals absent; 21 uni-biserial acrostichals; 14–15 uniserial dorsocentrals; 0–1 prealars; 0 humerals. Scutellum with 8 uniserial setae. Wing. All veins bearing numerous setae except for M; membrane covered with macrotrichia progressively becoming denser in distal $\frac{1}{4}$; anal lobe well enveloped, squama bare. Legs. Apex of fore tibia with slender and pointed spur; mid tibia (Fig. 71) with nearly joined combs; hind tibia (Fig. 72) with distinctly separate combs. Average length (in μ m) and proportions of legs (Table 3).

Hypopygium: dorsal (Fig. 74); ventral (Fig. 75) with anal point and tergite IX removed; lateral (Fig. 77). Tergite IX broadly sub-triangular, anterodorsal area bearing a rounded projection distinctly visible in lateral view (Figs 78–79), posterior margin slightly bi-lobed; anal tergite bands (Fig. 74) wide V-like shaped, becoming gradually thinner, narrowing and converging medially, terminated at an acute angle-like end placed above apex of the anal point rods. Anal point in dorsal and lateral view as in Figs 74, 78–79, about 60 μ m long, maximum width 10 μ m; parallel-sided on its proximal part, constricted medially and slightly broadened distally with rounded apex; bearing two dorsal orally to laterally-directed long rods which are turned over into a circular crochets; crests in lateral view (Figs 78–79) include 5–6 orally-directed strong spines; 5–6 setae present laterally and 3 ventrally on each side. Sternapodeme (Fig. 75) orally directed medially, bearing two characteristic lateral horn-like projections. Superior volsella in dorsal, ventral and lateral view as in Figs 74, 77, 80–82; circumference broadly sub-rectangular to sub-oval, downwardly orientated with a distinct apical rounded base; median inner margin bearing 3 long setae, 12–13 shorter setae are present on anteromedian and distal areas; digitus (Figs 74, 74a) uniformly elongated and winding with rounded apex which is little overreaching the inner margin. Median volsella (Figs 75–76) consists of long pointed lanceolate lamellae rearranged into three groups, anterior and posterior group curved upwards, medium group curved downwards. Inferior volsella (Figs 74, 75, 77) 150 μ m long, maximum width 30 μ m at apex, setiferous ventral lobe consists of 5 stout setae (3 placed on inner margin and 2 on outer margin). Gonocoxite moderately swollen at ventral base, which is covered with small setae and microtrichia, inner basal margin bearing 1 stout seta placed distally close to base of median volsella. Gonostylus uniformly linear on its proximal part, slightly narrowed distally and distinctly curved outwards; distal inner margin bearing 1 row of about 7–8 fine long setae.

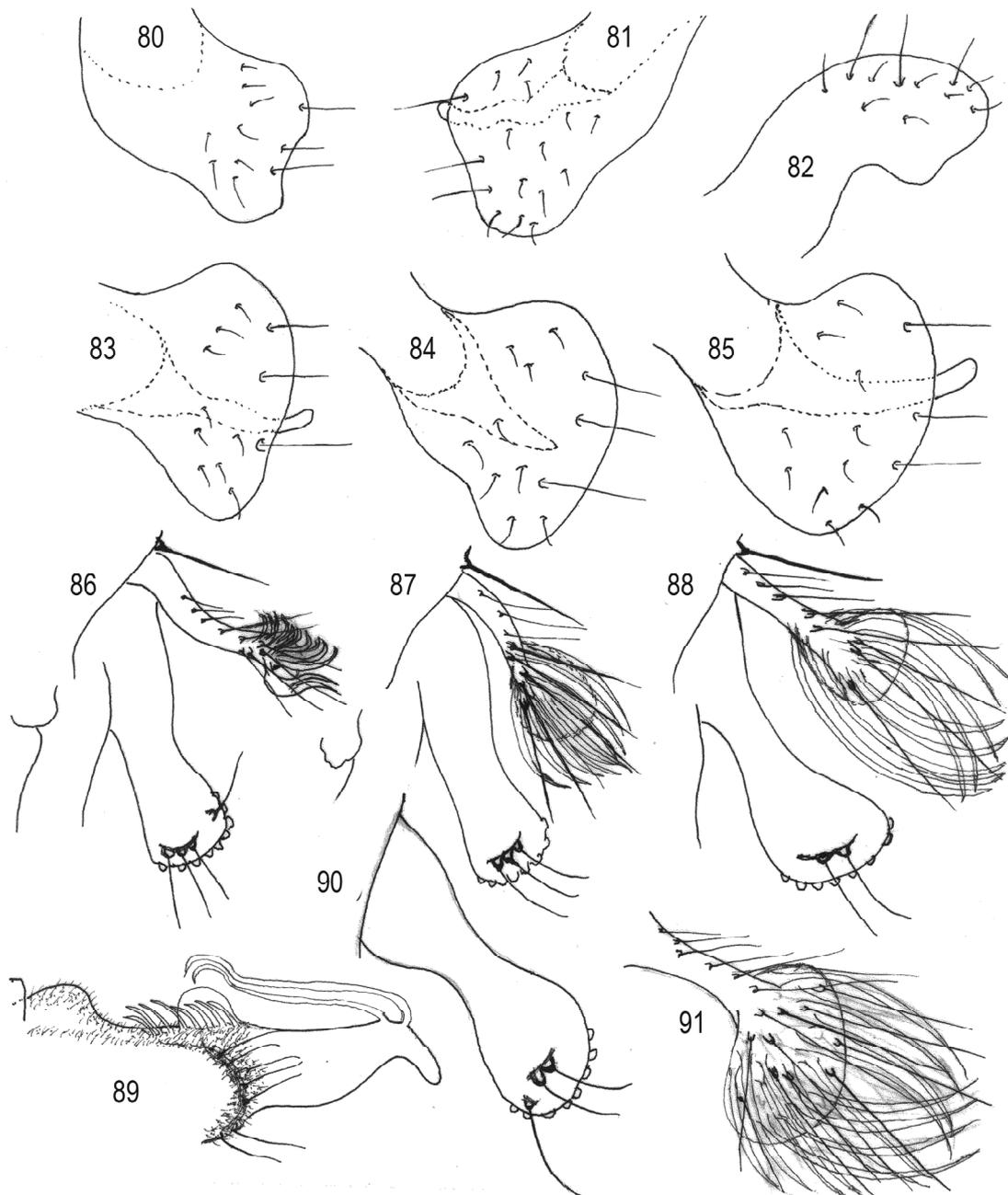
Male pupal exuviae (n = 10, 6 males and 4 females; Figs 92–95, 98–101).

Pupal exuviae of *V. rossaroi* sp.n. key close to those of the *triangularis*-group. Total length 3.90–4.00 mm; cephalothorax and abdomen, successively about 3 and 1 mm long. General colouration pale to transparent. Frontal apotome weakly wrinkled; thorax with dark shading near the base of antennal sheath; median area with a markedly wrinkled small area located close to Dc_1 – Dc_2 ; large granulations present along the anteromedian area and extending close to the thoracic suture; scutal hump absent; field of dense points (visible at 200X) present on distal area located close to Dc_3 – Dc_4 . Abdominal segment transparent except for the anal segment which is brownish; muscles marks blackish and distinctly represented on on segments I–VIII; genital sac transparent.

Cephalothorax as in Figs 92–93, including frontal apotome (Fig. 92), thorax (Fig. 93) and thoracic horn (Figs 94–95). Frontal apotome (Fig. 92) with large but weakly domed tubercles; frontal setae 105–115 μ m long. Thorax (Fig. 93)

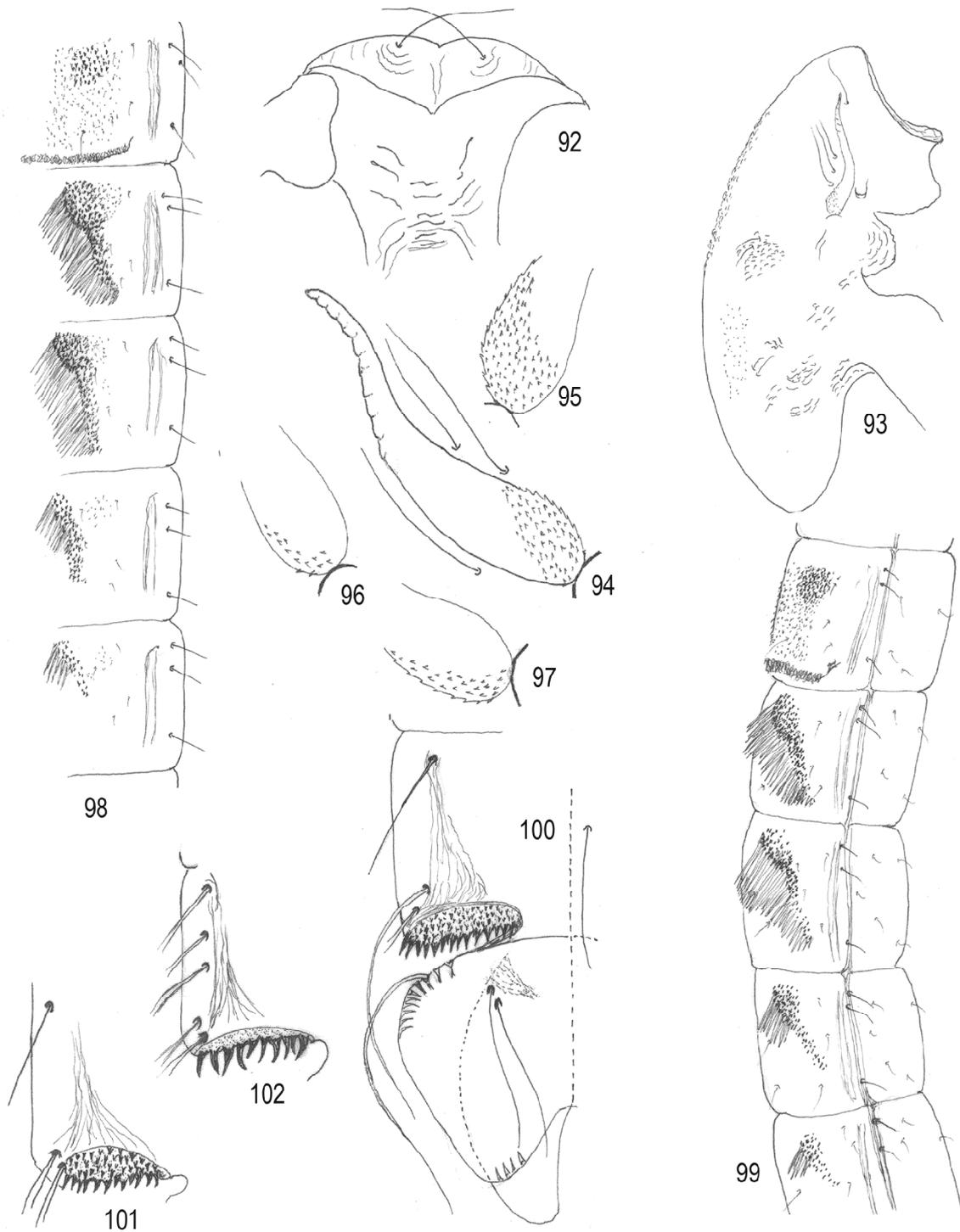
Table 3. *Virgatanytarsus rossaroi* Moubayed-Breil, sp.n. — average length (in μ m) and proportions of legs
Таблица 2. *Virgatanytarsus rossaroi* Moubayed-Breil, sp.n. — средняя длина (в μ m) и пропорции ног

P	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
P _I	860	710	990	470	380	295	140	1.40	2.00	1.59	2.80
P _{II}	950	920	410	210	170	120	80	0.45	3.93	4.56	1.20
P _{III}	915	910	570	360	290	170	110	0.63	2.58	3.20	4.20



Figs 80–91. Male adult of *Virgatanytarsus* spp. *V. rossaroi* sp.n.: superior volsella, ventral (80), dorsal (81), dorsolateral (82). Superior volsella (dorsal) of *V. arduennensis* (83), *V. triangularis* (84), *V. albisutus* (85). Ventral view of median volsella and setiferous ventral lobe of inferior volsella of *V. arduennensis* (86), *V. triangularis* (87), *V. albisutus* (88). *Virgatanytarsus* sp. A: anal point, lateral (89); inferior volsella with setiferous ventral lobe (90), median volsella, dorsal (91).

Рис. 80–91. Имаго самец *Virgatanytarsus* spp. *V. rossaroi* sp.n.: верхний придаток гонококситы вентрально (80), дорсально (81), дорсолатерально (82). Верхний придаток гонококситы дорсально *V. arduennensis* (83), *V. triangularis* (84), *V. albisutus* (85). Срединный придаток гонококситы и сетчатая вентральная лопасть нижнего придатка гонококситы вентрально *V. arduennensis* (86), *V. triangularis* (87), *V. albisutus* (88). *Virgatanytarsus* sp. A: анальный отросток латерально (89); нижний придаток гонококситы с сетчатой вентралью лопастью (90), срединный придаток гонококситы дорсально (91).



Figs 92–102. Pupal exuviae *Virgatanytarsus* spp. *V. rossaroi* sp.n.: frontal apotome (92); cephalothorax (93); thoracic horn and precorneal setae (94); base of thoracic horn (95). Base of thoracic horn *V. arduennensis* (96), *V. triangularis* (97). *V. rossaroi* sp.n.: armament and chaetotaxy of tergites and sternites II–VI dorsal (98); armament and chaetotaxy of tergites and sternites II–VI lateral (99); abdominal segment VIII with lateral anal comb and anal segment of male pupa exuvium (100). Lateral anal comb of *V. rossaroi* sp.n. (101); *Virgatanytarsus* sp. A (102).

Figs 92–102. Экзувии куколок of *Virgatanytarsus* spp. *V. rossaroi* sp.n.: фронтальная апатома (92); головогрудь (93); торакальный рог и прекорнеальные щетинки (94); основание торакального рога (95). Основание торакального рога *V. arduennensis* (96), *V. triangularis* (97). *V. rossaroi* sp.n.: вооружение и хетотаксия тергитов II–VI дорсально (98); вооружение и хетотаксия тергитов и стернитов II–VI латерально (99); сегмент VIII брюшка с латеральным анальным гребнем и анальный сегмент экзувия куколки самца (100). Латеральный анальный гребень *V. rossaroi* sp.n. (101); *Virgatanytarsus* sp. A (102).

with 1 median anteprenotal seta 130 μm long; precorneal setae respectively 125, 127 and 110 μm long; dorsocentrals Dc_1 – Dc_4 nearly sub-equal, about 80–90 μm long; thoracic horn 275–285 μm long, swollen on its 2/3 proximal part, narrowed distally, basal area markedly covered with small spines.

Abdomen (Figs 98–100). Tergite I bare. Posterior transverse row of hooks on tergite II about 40% of tergite width, composed of 120–125 hooklets; anteromedian area bearing a distinct pair of patches of small spines. Armament of tergites II–VI as in Figs 98–99: dorsal (Fig. 98), lateral (Fig. 99). Tergites III–VI with a pair of longitudinal long spines bands: continuous on tergites III–IV, becoming shorter and less spinulated on tergites V–VI. Pairs of long spines on tergites III–VI becoming gradually shorter and less extensive: 22–24 long spines (tergite III); 37–40 (IV); 5–7 (V), 3–4 (VI). Tergites VII–VIII bare. Sternite VIII with pair of long filamentous setae. Lateral setae on segments I–VII: I (1 seta), II–VII (3 setae); posterior seta on segment VII stouter and longer. Segment VIII and anal segment (Fig. 100). Segment VIII with 3–4 lateral setae (mostly 3) including 1 long anterior stout seta 125–130 μm long and 2–3 taeniae. Lateral anal comb of segment VIII (Figs 100–101) 30–35 μm long, 100–110 μm wide, consists of 5–6 rows of spines, including 1 posterior row of 13–15 strong spines (longest spine 18–20 μm long) and 4–5 rows of smaller spines placed above. Anal lobe (Fig. 100) 185–190 μm long, 320–330 μm maximum width, tapering distally, bearing 2 long dorsal setae placed close one to another; fringe with 41–43 taeniae. Genital sac 295–305 μm long, overreaching tip of anal lobe by 100–110 μm .

Larva. Known but not described.

Taxonomic position. Nearest European *Virgatanytarsus* species to *V. rossaroi* sp.n. are: *V. arduennensis* (Goetghebuer, 1922) for the male adult, *V. triangularis* for the pupal exuviae. Main distinguishing characters found in the male adult and the pupal exuviae can be summarized by the following combination of characters:

— in the male adult: projection on proximal part on tergite IX bearing distinctly triangular (Figs 78–79), while is rounded in *V. sp. A* (Fig. 89) or absent to weakly represented in both *V. arduennensis* and *V. triangularis*; superior volsella (Figs 74, 80–82) sub-rectangular to sub-oval with a distinct distal expansion, differently figured in: *V. arduennensis* (Fig. 83), *V. triangularis* (Fig. 84), *V. albisutus* (Fig. 83); digitus sinuous and mostly of equal width, while is narrowed distally in *V. triangularis* (Fig. 84); median volsella with numerous long pointed lanceolate setae rearranged into three groups, is differently illustrated in *V. arduennensis* (Fig. 86), *V. triangularis* (Fig. 87), *V. albisutus* (Fig. 88), *V. albisutus* (Fig. 91); ventral setiferous ventral lobe of inferior volsella consists of 5 stout setae, while is composed of: 4 setae in *V. arduennensis* (Fig. 86), three fused setae in *V. triangularis* (Fig. 87), only 2 setae in *V. albisutus* (Fig. 88) and 3 separate setae in *V. sp. A* (Fig. 90);

— in the pupal exuviae: base of thoracic horn densely toothed (Figs 94–95), less toothed in *V. arduennensis* (Fig. 96) and *V. triangularis* (Fig. 97); anteromedian pair of patches of small spines present on tergite II (Figs 98–99), absent in *V. arduennensis* and *V. triangularis*; longitudinal pair of medium to short spines present on tergites V–VI (Figs 98–99), absent in *V. arduennensis* and *V. triangularis*; lateral anal comb of segment VIII (Figs 100–101), differently figured in *V. sp. A* (Fig. 102), *V. arduennensis* and *V. triangularis*.

Ecology. Large material composed of adults, pharates, pupal exuviae and larvae of *V. rossaroi* sp.n. was collected in

the middle basin of several rivers and streams located in the Maritime Alps (French and Italian side). Nevertheless, the new species is apparently well represented in the middle basin of the Bevera River, which extends between the city of Sospel (SE-France) and the village of Olivetta (NW-Italy). Emergence is recorded from Marsh-April till late September.

Geographical distribution. *V. rossaroi* sp.n. is currently occurring only in the rhithral of some mountain streams located near the French Italian boarder. Its geographical distribution seems likely to be more extended to other pristine streams delimited by the local geographical area of Liguria (particularly its western part).

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