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Article

Chaetocladius montlibanus sp. n., a glacial relict species occurring in karstic springs at the Sannine Mount in Lebanon (Diptera, Chironomidae, Orthocladiinae)

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ABSTRACT

Male adult of *Chaetocladius montlibanus* sp. n. is described based on material collected in glacial karstic springs at the upper basin of the River Beirut (central-Lebanon, Mount Sannine, alt. 1700-1500 m). In the absence of morphological resemblance with any of the known *Chaetocladius* species, *C. montlibanus* sp. n. appears to key in a separate mono-specific group: the *montlibanus*-group. Nevertheless, the new species is separated from the other congeners by a combination of the following distinctive characters: clypeus trapezoidal, bearing 55 setae in 7 rows; palpomere 3 with one pointed sensilla coeloconica; anal point triangular, hyaline, bare, ending with a rounded apex; virga small, bell-like shaped; inferior volsella bilobed to large lobe-like shaped, apex rounded; gonostylus linearly elongate, posterior part rounded; crista dorsalis well developed, bearing distinct striations; megaseta typically truncate. Remarks and some associated species are highlighted.

Keywords: taxonomy, new species, conservation

Chaetocladius montlibanus sp. n., une espèce relique glaciaire de sources karstiques du Mont Sannine au Liban (Diptera, Chironomidae, Orthocladiinae)

RÉSUMÉ

L'adulte mâle de *Chaetocladius montlibanus* sp. n. est décrit à partir d'un matériel collecté dans des sources glaciaires du bassin supérieur de la rivière Beyrouth (Liban central, Mont Sannine, alt. 1700-1500 m). En l'absence de ressemblance morphologique avec d'autres espèces connues de *Chaetocladius*, *C. montlibanus* sp. n. se place dans le groupe *montlibanus,* monospécifique. La nouvelle espèce se sépare d'autres congénères par une combinaison des caractères distinctifs suivants : clypéus trapézoïdal, muni de 55 soies placées en 7 rangées ; palpomère 3 muni d'une sensilla coeloconica pointue ; pointe anale triangulaire, hyaline, glabre et à l'apex arrondi ; virga petite, en forme de cloche ; volselle inférieure bilobée, en forme d'un large lobe, apex arrondi ; gonostylus massivement rectiligne, partie postérieure arrondie ; crista dorsalis bien développée, munie de striations (plis) distinctes ; mégasoie typiquement tronquée. Des remarques et quelques espèces associées sont ajoutées.

Mots-clés : taxonomie, nouvelle espèce, conservation

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1. Introduction

Knowledge provided on the taxonomy, geographical distribution and ecology of the genus *Chaetocladius* Kieffer, 1911 (BRUNDIN 1947, 1956, CASPERS 1987, CRANSTON et al. 1989, MOUBAYED 1989, SÆTHER 1990, MAKARCHENKO & MAKARCHENKO 2004, LANGTON & PINDER 2007, ZELENTSOV 2007, STUR & SPIES 2011, ASHE & O'CONNOR 2012, KOBAYASHI 2012, WANG et al. 2012, SÆTHER & SPIES 2013, LANGTON & ARMITAGE 2015, MAKARCHENKO et al. 2017, MOUBAYED-BREIL 2017, MOUBAYED-BREIL & DIA 2017, ROSSARO et al. 2017, MOUBAYED-BREIL & LODS-CROZET 2018, MOUBAYED & LANGTON 2019, MOUBAYED-BREIL & BITUSIK 2019, LODS-CROZET & MOUBAYED 2024), show that only four *Chaetocladius* species are currently reported from Lebanon, namely: *C. berythensis* Moubayed & Langton 2019; *C. diai* Moubayed-Breil, 2017; *C. melaleucus* (Meigen, 1818) and *C. piger* (Goetghebuer, 1913).

2. Site, material and methods

The studied area is located downstream of the Mount Sannine (alt. max. 2695 m) where periglacial traces were known. The examinated male adults were collected using a sweep net in the upper basin of the River Beirut (Karstic springs of Hammana-Falougha, Mount Lebanon, Lebanon). The examined adults were preserved in 80-85 % ethanol for taxonomic observation 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 that of SÆTHER (1980) and LANGTON & PINDER 2007.

3. Description

Chaetocladius montlibanus sp. n.

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Material examined

Holotype. **Lebanon, central-W, Sannine Mount**. One male adult, leg. J. Moubayed; karstic springs of Hammana-Falougha at Sannine Mount (33°49'31 N, 35°44'0 E); altitude 1700-1800 m, 05.08.2005.

Paratype, one male adult (leg. J. Moubayed), same locality and date as for holotype.

Holotype (one adult) mounted on one slide is deposited (GBIFCH01224303) 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, Suisse'. Remaining paratypes are deposited in the collection of the author.

Etymology. The name '*montlibanus*' of the new species refers to the coastal chain of mountains (Mont Liban, Sannine Mount, Lebanon), where the type-material was collected.

Diagnosis

The new species is easily separated from other congeners by the following combination of characters: clypeus trapezoidal, bearing 56 setae in 7 rows; palpomere 3 with 1 pointed sensilla coeloconica; tergite IX with 2 vertically directed ridges; anal point triangular, hyaline, bare, ending with a rounded apex; virga small, bell-like shaped inserted at the basal junction of gonocoxite; inferior volsella large lobe-like shaped, distinctly bilobed, apical lobe broadly triangular, ending with a rounded apex, distal lobe low pouch-like; gonostylus massive, linearly elongate, posterior part rounded; crista dorsalis well developed, bearing distinct striations; megaseta typically truncate.

Male adult

(n = 2 male adults; Fig. 1A-I)

Large sized species. Total length 3.85 mm. Wing length 2.30 mm. General colouration contrasting brownish to greenish. Head dark brown including, thorax brown to dark brown, mesonotal stripes dark brown; wing pale; legs contrasting brown to dark brown; anal segment contrasting brown to greenish. Head. Eyes bare; in-

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
PI	1075	1180	745	460	390	245	175	0.63
PII	1100	1160	530	315	260	180	160	0.46
PIII	1165	1390	550	330	280	190	185	0.40

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

ner margin bare. Temporals 19 including 16 inner and 3 outer verticals, inner temporal inserted in 1-2 rows. Antenna 13-segmented, 1025 μm long, ultimate flagellomere 650 μm long, distinctly clubbed, with dense sensilla chaetica; antennal groove beginning on segments 3; AR 1.73. Clypeus (Fig. 1A) trapezoidal, bearing 56 setae in 7 rows. Palp 5-segmented, segments not fused; palpomere 3 (Fig. 1B) with one needle-like sensilla coeloconica. Thorax. Antepronotum thin at base, lobes gaping, lateral antepronotals 6; acrostichals 21 in 1-2 rows; dorsocentrals 34 in 1-2 rows; prealars 4 uniserial. Scutellum with 18 setae in 2 rows (2 anterior and 7 posterior placed on each side of the transverse midline; Fig. 1C). Wing. Brachiolum with one seta; membrane with dense coarse punctuation; subcosta ending before fork of Cu; distribution of setae on veins: R_1 18; R_{2+3}, 6; remaining veins bare; squama with 26 uniserial setae. Legs. Sensilla chaetica: present on tarsomeres ta_1-ta_5 of PI-PII; absent on tibiae. Length (in μm) and proportions of prothoracic, mesothoracic and metathoracic legs (n = 1, paratype) as in Table I.

Abdomen. Hypopygium in dorsal and ventral view as in Figs 1D-E (1D, dorsal; 1E, ventral); ventral view (Fig. 1E) with apodemes and virga, tergite IX and anal point are omitted. Tergite IX 65 μm long, about 300 μm maximum width; broadly rectangular, posterior margin nearly straight; median area with 2 distinct ridges, lacking dorsal hump as shown in Figs 1D, G; posterior part with up to 30 dorsal setae placed near the caudal margin (about 15 setae on each side of the anal point). Anal point (Figs 1D, G) about 50 μm as long as wide, hyaline, broadly triangular, with rounded apex; basal margins extended upwardly to join the two dorsal ridges of tergite IX. Laterosternite IX with 14 setae (7 on each side). Apodemes (Fig. 1E), transverse sternapodeme distinctly arched, lateral expansion well developed; phallapodeme sickle-like. Virga (Fig. 1E) small, bell-like shaped, composed of 2 curved spines. Gonocoxite 380 μm long, inner ventral margin with 9 strong setae. Inferior volsella (Figs 1D-F) 70 μm as long as wide; large lobe-like, projecting at a right angle, median area sparsely covered with short curved setae; distinctly bilobed, terminal lobe broadly triangular with a rounded apex, distal lobe low pouch-like. Gonostylus 155 μm long, about 50 μm maximum width, massively shaped, linearly elongate, posterior part rounded and not projecting, with several orally directed fine setae; crista dorsalis well developed, linearly extended, occupying 80 to 90 % of the anterior side of the gonostylus, bearing several specific striations progressively increasing from proximal to distal part; megaseta well developed, typically truncate, occasionally with rounded apex. HR (GC/GS), 2.36; HV (TL/GSX10), 2.48.

Pupal exuviae and larva: unknown.

4. Remarks

Based on a combination of distinctive unusual characters found in the male adult, *C. montlibanus* sp. n. appears to belong to a separate group of *Chaetocladius* species: the *montlibanus*-gr. At present, only four *Chaetocladius* species are recorded from Lebanon (MOUBAYED-BREIL & DIA 2007, 2017): *C. berythensis* Moubayed & Langton 2019; *C. diai* Moubayed-Breil, 2017; *C. melaleucus* (Meigen, 1818) and *C. piger* (Goetghebuer, 1913).

Consequently, the description of *C. montlibanus* sp. n. increases the total number of known species to five from this country.

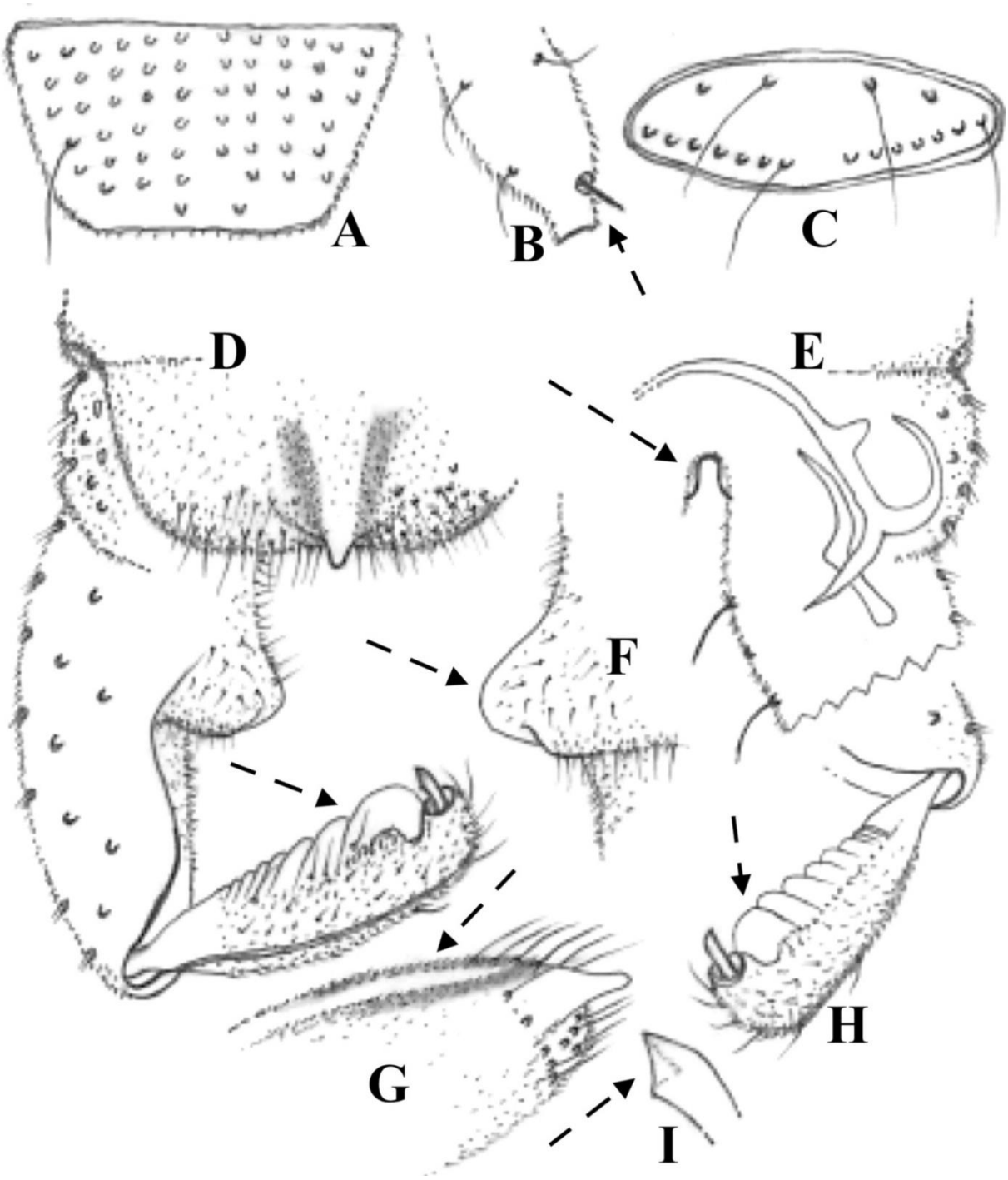


Figure 1. Male imago of Chaetocladius montlibanus *sp. n. Clypeus* (*A*)*; palpomere 3, distal part* (*B*)*; scutellum* (*C*)*; hypopygium, dorsal* (*D*)*; apodemes and virga, ventral* (*E*)*; inferior volsella, right side* (*F*)*; anal point, lateral* (*G*)*; gonostylus in obtuse angle* (*H*)*; megaseta, apex* (*I*)*. The arrows indicate some distinctive characters.*

Figure 1. Imago mâle de Chaetocladius montlibanus *sp. n. Clypéus* (*A*) *; palpomère 3, partie distale* (*C*) *; scutellum* (*C*) *; hypopyge, vue dorsale* (*D*) *; apodèmes et virga, vue ventrale* (*E*) *; volselle inférieure, côté droit* (*F*) *; pointe anale, vue latérale* (*G*) *; gonostyle, angle obtus* (*H*) *; macrosoie, apex* (*I*)*. Les flèches indiquent quelques caractères distinctifs.*



Photo 1. Hypopygium of male adult of C. montlibanus *sp. n.*
Photo 1. Hypopyge du mâle adulte de C. montlibanus *sp. n.*

5. Ecology and geographical distribution

C. montlibanus sp. n. belongs to a rheophilic and crenobiontic relict species inhabiting glacial stenothermic rheocrenes and karstic streams located along the coastal chain of mountains: Mount Lebanon. The new species is known only from its type-locality at Hammana karstic waterfall and springs. Environmental data of water are: typically calcareous water, conductivity > 300 µS/cm; temperature: 4-8 °C during early and late spring to 8-12 °C during early and late summer. Emergence recorded in August.

Associated species encountered in the same localities include: *Boreoheptagyia rotunda* Serra-Tosio, 1983; *Diamesa kasymovi* Kownacki & Kownacka, 1973; *D. khumbugelida* Sæther & Willassen, 1987 (new citation for Lebanon); *D. moubayedi* Makarchenko & Semechenko, 2022; *D. sakartvella* Kownacki & Kownacka, 1973; *D. tonsa* (Walker, 1856); *Pseudodiamesa nivosa* (Goetghebuer, 1928); *Chaetocladius berythensis* Moubayed & Langton, 2019; *C. diai* Moubayed-Breil, 2017; *C. melaleucus* (Meigen, 1818); *C. piger* (Goetghebuer, 1913); *Eukiefferiella fittkaui* Lehmann, 1972; *E. minor* (Edwards, 1929).

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