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Article

Chaetocladius marocanus sp. n., a new crenophilic species occurring in the Mediterranean Rif of Morocco (Diptera, Chironomidae, Orthocladiinae)

Joel Moubayed* & Kawtar Kettani**

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

**Laboratory of Ecology, Systematics and Conservation of Biodiversity (LESCB), URL-CNRST n°18, FS, Abdelmalek Essaâdi University, Tetouan, Morocco; kettani.ka@gmail.com

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ABSTRACT

Chironomidae collected in the waterfall of Chrafate, NW-Morocco (Rifian Chain, Morrocan Rif, alt. 860 m) revealed the presence of a new *Chaetocladius* species: *C. marocanus* sp. n. Based on some unusual morphological characters (shape of inferior volsella, virga and gonostylus), the new species appears to key directly in the *laminatus*-group of species. Nevertheless, the new species is separated from other congeners by a combination of distinctive characters: palpomere 3 with 4 spatulate sensilla coeloconica; tergite IX densely covered with macrotrichia, dorsal hump well developed; anal point triangular, bearing macrotrichia, with sharp apex; virga composed of 5 separate spines including 3 located medially and 2 S-shaped placed laterally; inferior volsella bilobed, proximal part nose-like, distal part low pouch-like shaped; gonostylus arched, crista dorsalis consists of 2 separate lobes, one large located proximally and one shorter located apically.

Keywords: taxonomy, new species, conservation

Chaetocladius marocanus sp. n., une espèce crénophile connue du Rif méditerranéen marocain (Diptera, Chironomidae, Orthocladiinae)

RÉSUMÉ

Des collectes de Chironomidae dans la cascade de Chrafate, NW-Maroc (Chaîne Rifaine, Rif marocain, alt. 860 m) ont révélé la présence d'une nouvelle espèce de *Chaetocladius* : *C. marocanus* sp. n. Sur la base de certains caractères morphologiques inhabituels (forme de la volselle inférieure, de la virga et du gonostyle), la nouvelle espèce se place dans le groupe *laminatus*. Toutefois, *C. marocanus* sp. n. se distingue d'autres congénères par les caractères suivants: palpomère 3 pourvu de 4 sensilla coeloconica en forme de spatule; tergite IX densément couvert de microtriches et muni d'une expansion dorsale ; pointe anale triangulaire, munie de macrotriches, apex pointu ; virga composée de 5 épines séparées, dont 3 médianes et 2 latérales en forme de S ; volselle inférieure bilobée, partie proximale en forme de nez, partie distale en forme de poche ; gonostylus arqué, crista dorsalis composée de lobes séparés, un lobe proximal plus large et un apical plus petit.

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Mots-clés : taxonomie, nouvelle espèce, conservation

1. Introduction

Faunal data on the known *Chaetocladius* species Morocco (AZOUZI & LAVILLE 1987, AZOUZI et al. 1992, KETTANI & LANGTON 2011, 2012, SÆTHER & SPIES 2013, KETTANI & MOUBAYED-BREIL 2018, KETTANI et al. 2022), show that only seven *Chaetocladius* species are currently reported from Morocco.

2. Material and methods

The studied male adults were collected using a sweep net in the Rifian Chain (waterfall of Chrafate, NW-Morocco alt. 860 m), which includes the most mountainous region of northern Morocco. 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 marocanus sp. n. Moubayed

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Material examined

Holotype. **Morocco**. One male pharate adult, leg. K. Kettani. Moroccan Rif Mountains at Jbel Bouhalla (NW-Morocco), Waterfall of Chrafate, upper basin of Sebou River (Photo 2), Province of Chefchaouen (35.0666134 N; -5.1075589 W), altitude 860 m, 02.IV.2018. Environmental data: calcareous water; conductivity 659 µS/cm; pH 7.2; dissolved oxygen 5.9 mg/L; annual mean temperature 8.2 °C.

Paratypes (leg. K. Kettani). One male adult; same locality and data as for holotype.

Holotype, male adult mounted on one slide, is deposited in the collections of the 'Naturéum, Muséum cantonal des sciences naturelles, département de Zoologie, Palais de Rumine, Place de la Riponne 6, CH-1014 Lausanne, Suisse'. (GBIFCH01224302). Remaining paratype is deposited in the collection of the senior author.

Etymology. The name '*marocanus*' of the new species refers to the country of Morocco, where the type material of *C. marocanus* sp. n. was collected.

Diagnostic characters

C. marocanus sp. n. keys directly in the *laminatus*-group based on the unusual shape of both inferior volsella and virga. The nearest species are: *C. dissipatus* (Edwards, 1929) and *C. berythensis* Moubayed & Langton 2019. Nevertheless, the new species is separated from other congeners by the following combination of characters: clypeus semi-circular, with 7 setae in 3 rows; palpomere 3 bearing 4 spatulate sensilla coeloconica; lobes of antepronotum in contact; tergite IX densely covered with macrotrichia, dorsal side with a distinct well developed hump; anal point triangular, bearing macrotrichia, with sharp apex basal margin with numerous setae in one row; virga composed of 3 separate spines including 3 fused placed medially and 2 S-shaped placed laterally; inferior volsella bilobed, proximal part nose-like with rounded apex, anterior and posterior margin with stout short setae, caudal part pouch-like shaped covered with fine short setae; gonostylus arched, anterior side with short orally directly fine setae, posterior margin bearing a stout seta inserted on a typical expansion; crista dorsalis composed of 2 separate parts, one large located proximally and one shorter located distally.

Male adult

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

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR
PI	1065	985	410	265	180	120	110	0.42
PII	845	980	370	250	190	120	115	0.38
PIII	1040	1060	615	356	270	160	130	0.58

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

Medium to big sized species. Total length 3.80 mm. Wing length 2.15 mm. General colouration brownish. Head dark brown, thorax brown to dark brown including mesonotal stripes; legs brownish; anal segment contrasting brown to dark brown.

Head. Eyes bare, frontal tubercle absent. Temporals 12 including 9 inner and 3 outer verticals, inner temporal inserted in 1-2 rows. Antenna 13-segmented, 1040 μm long, ultimate flagellomere 660 μm long, distinctly clubbed, with dense sensilla chaetica; antennal groove beginning on segments 2; AR 1.74. Clypeus (Fig. 1A) semi-circular, bearing 7 setae in 5 rows. Palp 5-segmented, segments not fused; palpomere 3 (Fig. 1B) with 4 spatulate sensilla coeloconica. Thorax. Lobes of antepronotum (Fig. 1C) markedly thin at base and clearly gaping, lateral antepronotals 14 (7 on each side); acrostichals 17 in 1-2 rows; dorsocentrals 12 in 1-2 rows; prealars 5 uniserial. Scutellum with 10 setae in one row (5 placed on each side of the transverse midline). Wing. Brachiolum with one seta; membrane with dense coarse punctuation; subcosta ending before fork of Cu; distribution of setae on veins: R_1 21; R_{2+3}, 2; remaining veins bare; squamal fringe with 13 setae in 1-2 rows. Legs. Sensilla chaetica, present on tarsomeres ta_1-ta_5 and tibiae of PI-PII, only present on tarsomeres ta_1-ta_5 of PIII. Length (in μm) and proportions of prothoracic, mesothoracic and metathoracic legs (n = 1, paratype) as in Table I.

Abdomen. Hypopygium in dorsal view as in Fig. 1D and Photo 1. Tergite IX broadly semi-circular, posterior margin rounded, median and caudal areas densely covered with macrotrichia, dorsal side bearing a distinct hump as shown in Fig. 1F. Anal point (Figs 1D, F) 65 μm and 30 μm maximum width at base; distinctly triangular, with sharp apex; densely covered with macrotrichia basal margin bearing a row of short setae. Laterosternite IX with 10 setae (5 on each side). Apodemes; transverse sternapodeme moderately arched, lateral expansion broadly triangular; phallapodeme nearly sickle-like. Virga (Fig. 1E) composed of 5 separate spines including: 3 medially, consisting of 3 short fused spines, 2 S-like shaped placed laterally. Gonocoxite including inferior volsella 250 μm long and 100 μm maximum width, inner ventral margin with 9 strong setae. Inferior volsella (Figs 1D, G) 35 μm, markedly bilobed, proximal part nose-like with rounded apex, anterior and posterior margin with stout short setae, caudal part consists of a pouch-like covered with fine short setae. Gonostylus 85 μm long, about 25 μm maximum width; anterior side densely covered with fine short orally directed setae; posterior side rounded, not projecting, with one pre-apical seta inserted on a small expansion; crista dorsalis well developed, composed of 2 lobes: proximal one occupying about 50 % of the anterior side, distal one shorter located pre-apically; megaseta well developed, with rounded apex. HR (GC/GS), 2.41; HV (TL/GSX10), 4.47.

Pupal exuviae and larva: unknown.

4. Remarks

The nearest *Chaetocladius* species to *C. marocanus* sp. n. are:

- *C. dissipatus* (Edwards, 1929) as figured in BRUNDIN (1947, Fig.47) and LANGTON & PINDER (2007);

- *C. berythensis* Moubayed & Langton, 2019 as illustrated in MOUBAYED & LANGTON (2019, Fig. 1I).

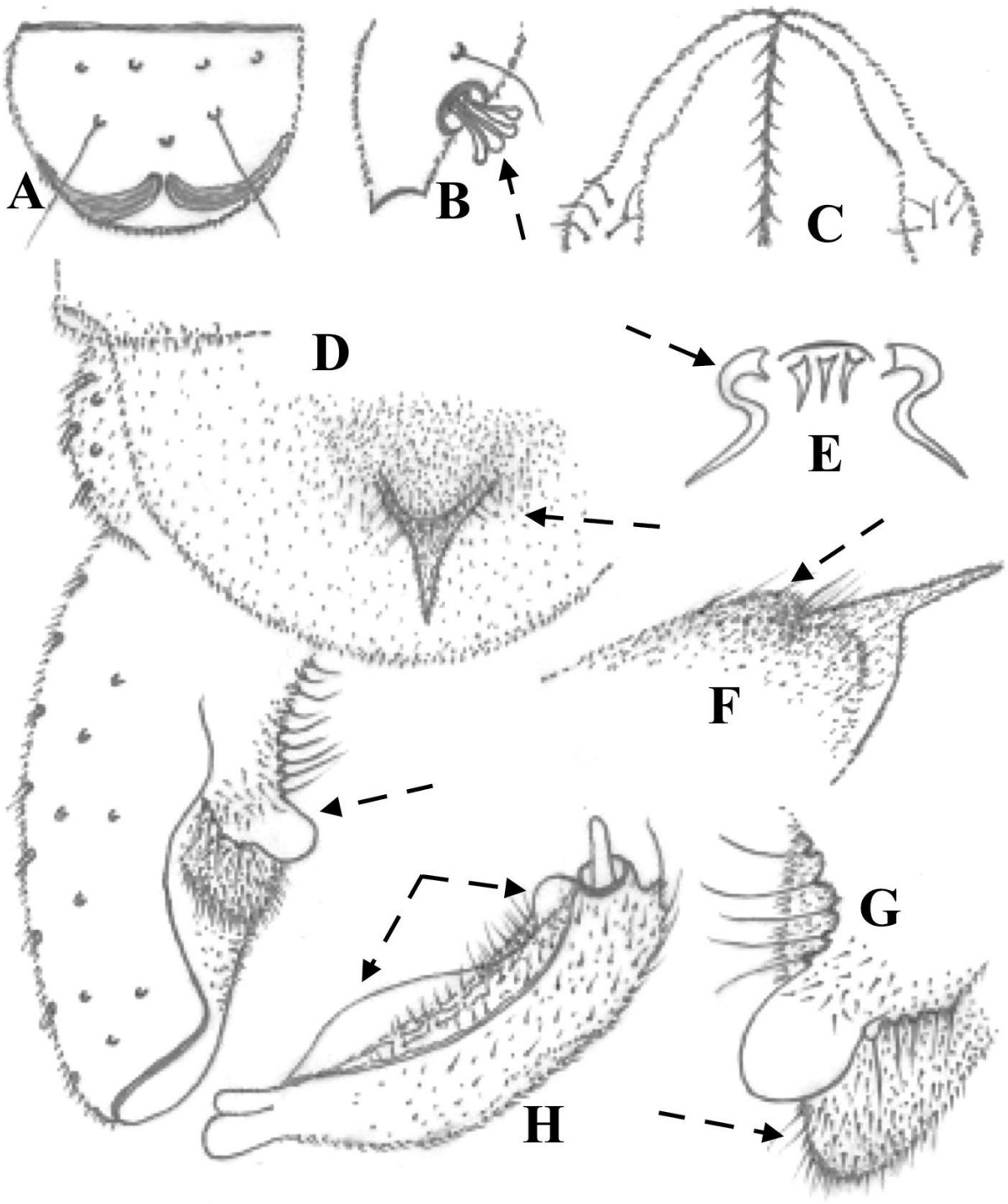


Figure 1. Male imago of Chaetocladius marocanus *sp. n. Clypeus* (*A*)*; palpomeres 3, distal part* (*B*)*; antepronotum with acrostichals* (*C*)*; hypopygium, dorsal* (*D*)*; virga* (*E*)*; anal point, lateral* (*F*)*; inferior volsella, right side* (*G*)*; gonostylus* (*H*)*. The arrows indicate some distinctive characters.*

Figure 1. Imago mâle de Chaetocladius marocanus *sp. n. Clypéus* (*A*) *; palpomère 3, partie distale* (*B*) *; antépronotum et soies acrostichales* (*C*) *; hypopyge, vue dorsale* (*D*) *; virga* (*E*) *; pointe anale, vue latérale* (*F*) *; volselle inférieure, côté droit* (*G*) *; gonostyle* (*H*)*. Les flèches indiquent quelques caractères distinctifs.*



Photo 1. Male imago of Chaetocladius marocanus *sp. n. Hypopygium in dorsal view.*

Photo 1. Imago mâle de Chaetocladius marocanus *sp. n. Hypopyge en vue dorsale.*

However, the new species is distinguished, in particular, by its differently shaped inferior volsella and gonostylus.

As reported by KETTANI & LANGTON (2011, 2012), KETTANI & MOUBAYED-BREIL (2018), KETTANI et al. (2022) only seven *Chaetocladius* species are hitherto recorded in Morocco: *Chaetocladius acuticornis* (Kieffer, 1914); *C. dentiforceps* (Edwards, 1929); *C. dissipatus* (Edwards, 1929); *C. melaleucus* (Meigen, 1818); *C. perennis* (Meigen, 1830); *C. piger* (Goetghebuer, 1913) and *C. vitellinus* (Kieffer & Thienemann, 1908). Consequently, the description of *C. marocanus* sp. n. increases the total number of known species to eight from this country.

5. Ecology and geographical distribution

Male adults of *C. marocanus* sp. n. species were collected in the waterfall of Chrafate in Morocco Rif Mountains which flows through a *Quercus suber* forest (Photo 2) and where the lotic habitats are enriched with emerged and submerged bryophytes, which are considered to be microrefugia and hotspots of diversity and therefore deserve much greater consideration, protection and preservation. Emergence recorded during April.

The new species is considered as a rheophilic element confined to lotic aquatic habitats and appears to belong to the crenophilous community of species as documented by LINDEGAARD (1995).

Geographical distribution of *C. marocanus* sp. n. is currently known to its type locality at the waterfall of Chrafate located in the mountainous Rifian Chain of NW-Morocco.

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Photo 2. Type locality of C. marocanus *sp. n. on Waterfall of Chrafate, upper basin of Sebou River* (*02.IV.2018*).

Photo 2. Localité-type de C. marocanus *sp. n. aux cascades de Chrafate, cours supérieur du Sebou* (*02.IV.2018*).

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