

Article

Description of *Heleniella assiana* sp. n. from the upper basin of the River Assi in Lebanon (Diptera, Chironomidae)

Joel Moubayed

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

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ABSTRACT

A large material of Chironomidae composed of adults, pupae, and larvae, collected in the upper basin of the River Assi (= River Orontes, north-eastern Lebanon), revealed the presence of a new *Heleniella* species. In this paper, only the male adult of *H. assiana* sp. n. is diagnosed and described. Distinctive pertinent specific characters include in particular: number and distribution pattern of setae on postnotum; unusual shape of virga, sternapodeme, phallapodeme and inferior volsella. At present, two *Heleniella* species were known from Lebanon, namely *H. ornatcollis* (Edwards, 1929) and *H. serratosioi* Ringe, 1976. Consequently, the description of the new species increases the total number of species to three from this country.

Keywords: taxonomy, new species, *Heleniella ornatcollis* (Edwards, 1929), conservation

Description d'*Heleniella assiana* sp. n. du bassin supérieur de la rivière Assi au Liban (Diptera, Chironomidae)

RÉSUMÉ

Un important matériel de Chironomidae composé d'adultes, de nymphes, d'exuvies nymphales et de larves, collecté dans le bassin supérieur de la rivière Assi (= Orontes, nord-est du Liban) a révélé la présence d'une nouvelle espèce appartenant au genre *Heleniella*. Dans ce travail, seul l'adulte mâle d'*H. assiana* sp. n. est diagnostiqué et décrit. Les caractères distinctifs spécifiques les plus pertinents incluent en particulier : le nombre et la distribution de soies sur le postnotum ; la forme inhabituelle de la virga, du sternapodème, du phallapodème et de la volselle inférieure. La description d'*H. assiana* sp. n. porte à trois le nombre total d'espèces du genre *Heleniella* pour le Liban, avec *H. ornatcollis* (Edwards, 1929) et *H. serratosioi* Ringe, 1976.

Mots-clés : taxonomie, nouvelle espèce, *Heleniella ornatcollis* (Edwards, 1929), conservation

1. Introduction

Based on some published knowledge on the taxonomy, geographical distribution and ecology of the genus *Heleniella* Gowin, 1943 (BRUNDIN 1956, REISS 1968, RINGE 1976, MOUBAYED & LAVILLE 1983, CRANSTON et al. 1989, MOUBAYED & DIA 1993, ANDERSEN & WANG 1997, LANGTON & PINDER 2007, ASHE & O'CONNOR 2012, MOUBAYED-BREIL & DIA 2007, SÆTHER & SPIES 2013, MOUBAYED-BREIL & ASHE 2016, MOUBAYED-BREIL & LODS-CROZET 2016, MOUBAYED-BREIL & GAULTIER 2018), currently there are six reported *Heleniella* species from Europe: *H. dorieri* Serra-Tosio, 1966; *H. extrema* Albu, 1972; *H. gaultieri* Moubayed-Breil, 2018; *H. helvetica* Moubayed-Breil & Lods-Crozet, 2016; *H. ornaticollis* (Edwards, 1929); *H. serratosioi* Ringe, 1976. The genus is represented in Lebanon only by two species: *H. ornaticollis* and *H. serratosioi*.

Among the six previously cited species, *H. ornaticollis* represents the nearest related species to *H. assiana* sp. n. based on some morphological common characters found in the male adult. However, the new species can be separated from other related members of *Heleniella* genus by the following combination of characters: chaetotaxy of the postnotum; anal point small and drop-like; virga consists of two separate long rods projecting downwards; transverse sternapodeme with a well-developed lateral horn-like projection; inferior volsella large lobe-like strongly projecting downwards; crista dorsalis well developed.

In this paper, the male adult of *H. assiana* sp. n. is diagnosed and described based on material collected in rheophilic habitats delimited by the upper basin of the River Assi (= River Orontes, N-E Lebanon).

2. Material and methods

Material composed of male pharates and pupal exuviae of *H. assiana* sp. n. were collected using some standard methods: sweep net for adults; Surber net for larvae and pupae; Brundin drift

nets for drifted pupae and pupal exuviae floating on the surface of the water. The studied material is collected in lotic habitats extended along the middle basin of the River Assi (north-eastern Lebanon, Photo 3). The type-material was preserved in 80-85% ethanol for the taxonomic examination and description. Information on the methodology of mounting and conservation of the type-material is provided in MOUBAYED et al. (2024). Morphological terminology and measurements follow those of SÆTHER (1980) and LANGTON & PINDER (2007) for the imagines.

3. Description

Heleniella assiana sp. n.

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Material examined

Holotype. Lebanon. One male adult, karstic upper basin of the River Assi (= Orontes) at Hermel city, N-E Lebanon (Photo 3); 34.3989° N, 36.3904° E; alt. 765 m. Typology of aquatic and bordering habitats as provided in MOUBAYED 2025 for *Pseudosmittia mediterranea* Moubayed, 2025; calcareous water, temperature 8-12 °C; 17.V.1982.

Paratypes (leg. J. Moubayed). Seven male adults, same locality and date as for holotype.

Holotype (mounted on one slide) is deposited (GBIFCH01224298) in the collections of the 'Naturéum, Muséum cantonal des sciences naturelles, Department of Zoology, Palais de Rumine, 6 place de la Riponne, CH-1014 Lausanne, Switzerland'.

The paratypes are deposited in the collection of the author.

Etymology: the name "*assiana*" of the new species refers to the river named Assi, which is located in Lebanon, where the type-material was collected.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR
PI	550	510	260	140	100	110	110	0.51
PII	515	520	250	135	110	65	70	0.48
PIII	535	620	310	150	135	75	70	0.50

Table I. *Heleniella assiana* sp. n., Leg ratio of the male adult (n = 1, holotype). "LR = Length of tarsomere ta₁ divided by length of tibia (ti)".

Diagnostic characters

H. ornaticollis (Edwards, 1929) is the nearest *Heleniella* species to *H. assiana* sp. n., as figured in both BRUNDIN (1956, Fig. 107) and LANGTON & PINDER (2007, Fig. 161 A) and Photo 2. However, the new described species can be easily separated from other related species, in particular from *H. ornaticollis* on the basis of the following pertinent combination of characters: postnotum with 11 setae; virga consists of two not fused thick rods with forked ending; transverse sternapodeme with a distinct horn-like projection; phallapodeme typically thin and crotchet-like at base; anal point small and drop-like shaped; inferior volsella large lobe-like shaped, rounded apically.

Male imago

(n = 7; Fig. 1A-D; Photo 1)

Medium sized *Heleniella* species. Total length 2.55 mm. Wing length 1.35 mm. General colouration dark brown to brownish. Head, antenna, thorax and anal segment brown to dark brown; legs brownish; abdomen brown, anal segment dark brown.

Head. Eyes densely pubescent, inner eye margin bare; temporals consist of 19 setae including 17 inner and 2 outer verticals. Clypeus trapezoidal. Palp 5-segmented; sensilla clavata present on distal part of palpomere 3. Antenna 13-segmented, about 350 μm long; antennal groove clearly visible, beginning on segments 3 and reaching ultimate flagellomere; last flagellomere 150 μm long, well-clubbed apically, with sensilla chaetica apically; AR 0.75. Thorax. Scutellum densely covered with setae; postnotum (Fig. 1A) with 11 setae (on each side) including: 6 on anterior part in 2 rows and 5 on lateral side. Wing. Brachiolum with one seta; squama bare. Legs.

Length (μm) and proportions of prothoracic (PI), mesothoracic (PII) and metathoracic (PIII) legs as in table 1.

Abdomen. Hypopygium in dorsal and ventral (Fig. 1 and Photo 1), sternapodeme and coxapodeme omitted in ventral view. Tergite IX semi-circular, posterior margin with one single row of short setae, in one row. Anal point (Fig. 1B, Photo 1D) very small to vestigial to μm long, drop-like. Sternapodeme bearing a distinct and markedly specific lateral horn projection as figured in Photo 1B. Phallapodeme (Fig. 1D, Photo 1C) about 80 μm long, linearly elongate, thin crotchet-like medio-basally. Virga (Fig. 1B-C, Photo 1A) about 85 μm long, atypical long inverted U-like shaped, consists of 2 separate long rods projecting downwards, not reaching posterior part of tergite IX, ending with 2-3 fine filaments apically. Gonocoxite about 130 μm , inner margin not sinuated. Inferior volsella (Fig. 1) about 30 μm as long as wide, large lobe-like, rounded apically and projecting downwards, apex densely covered with short setae. Gonostylus (Fig. 1, Photo 1F) about 75 μm long (*ornaticollis* and *serratosioi* type as in Photo 2), anterior and posterior margin bearing several stout setae; crista dorsalis present on proximal part, large lobe-like covering about 80 % of the anterior side; megaseta well developed, inserted apically. HR, 1.73; HV, 3.4.

Pupal exuviae and larva: known but not described.

4. Remarks and differential diagnosis

H. assiana sp. n. belongs to the subgroup of *Heleniella* species including in particular *H. orna-*

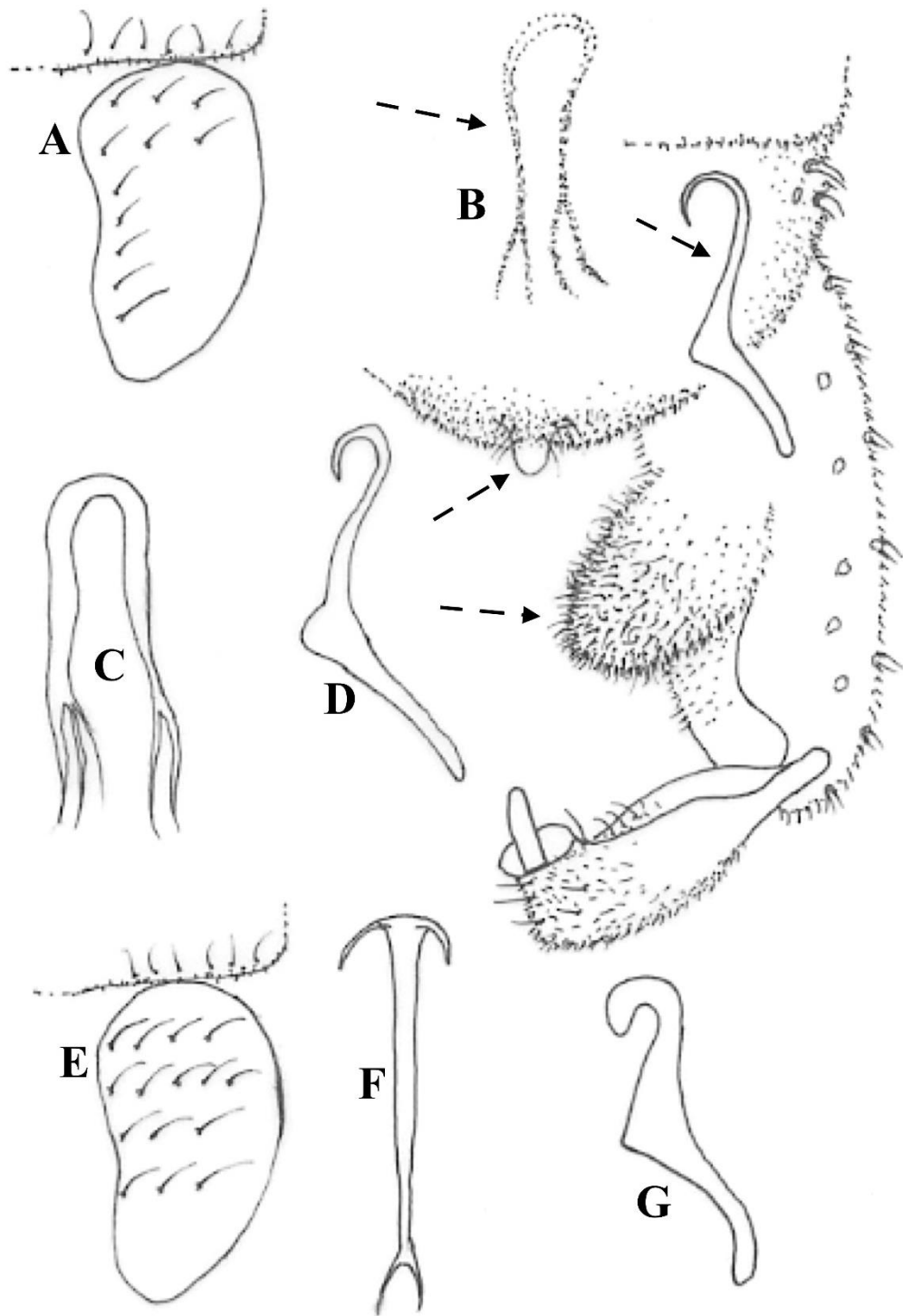
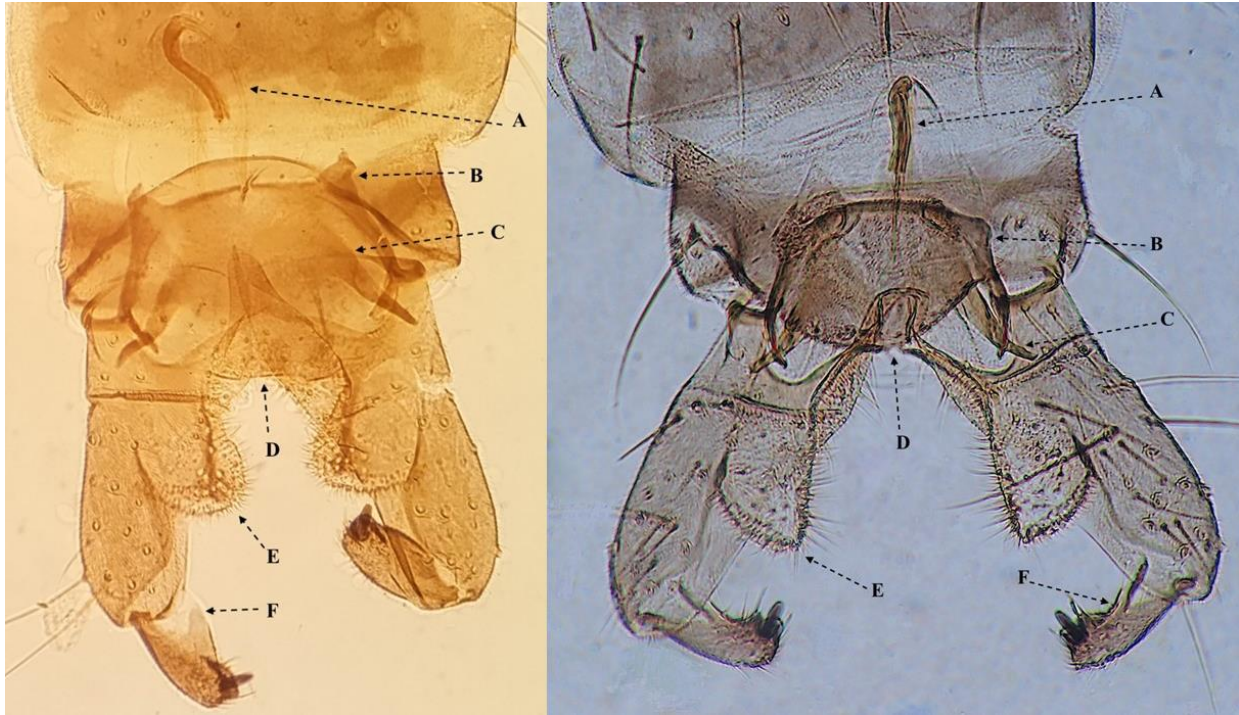


Figure 1. Male adult of *Heleniella* spp. *H. assiana* sp. n. (A-D): postnotum, (A); hypopygium in dorsal and ventral views (B); virga (C); phallapodeme (D). *H. ornaticollis* (E-G): postnotum (E); virga (F); phallapodeme (G); Arrows indicate some distinctive characters.

Figure 1. Adulte mâle d'*Heleniella* spp. *H. assiana* sp. n. (A-D) : postnotum (A) ; hypopyge, vue dorsale et ventrale (B) ; virga (C) ; phallapodème (D). *H. ornaticollis* (E-G) : postnotum (E) ; virga (F) ; phallapodème (G). Les flèches indiquent quelques caractères distinctifs.



Photos 1-2. Hypopygium in dorsal view of *Heleniella* spp. Photo 1 (left): *H. assiana* sp. n.; Photo 2 (right): *H. ornatcollis*, Ardennes, north-eastern France -photo G. Coppa.

Photos 1-2. Hypopyge en vue dorsale d'*Heleniella* spp. Photo 1 (gauche) : *H. assiana* sp. n. ; Photo 2 (droite) : *H. ornatcollis*, département des Ardennes, nord-est France - cliché G. Coppa.

ticollis and *H. serratosioi*, which are characterized by the markedly single rod vertically elongated virga and the projecting sub-rectangular inferior volsella. Atypical morphological characters found in the male adult can be compared to those of *H. ornatcollis*, which is considered as the nearest *Heleniella* species to *H. assiana* sp. n. on the basis of some pertinent characters as figured in BRUNDIN (1956, Fig. 107), LANGTON & PINDER (2007, Fig. 161A) and Photo 2, which is produced after a mounted hypopygium in dorsal view of a specimen kindly collected in the Ardennes region (N-E France) by G. Coppa.

- Postnotum with 11 setae placed in a specific distribution pattern (Fig. 1A), is differently figured in *H. ornatcollis* (Fig. 1E) and bearing 15 setae in 4 rows;

- Virga (Fig. 1BC, Photo 1A) not reaching posterior margin of tergite IX, consisting of 2 long inverted-U shaped rods ending with 2-3 forked filaments; composed of one single linear rod

forked apically in *H. ornatcollis* (Fig. 1F, Photo 2A);

- Sternapodeme with a distinct lateral horn-like (Photo 1B), is otherwise figured in *H. ornatcollis* (BRUNDIN 1956, Fig. 107; LANGTON & PINDER 2007, Fig. 161A) and Photo 2B;

- Phallapodeme (Fig 1B, D; Photo 1C) linearly thin with basal crotchet-like, is much thicker and less long in *H. ornatcollis* (Fig. 1C, Photo 2C);

- Anal point (Fig. 1B, Photo 1D) present, markedly drop-like shaped with several short setae placed at base; is usually present, cup-like shaped in *H. ornatcollis* as figured in BRUNDIN (1956, Fig. 107) and Photo 2D;

- Inferior volsella (Fig. 1B, Photo 1E) broad lobe-like shaped with rounded apical margin, is nearly to entirely broadly sub-triangular to sub-rectangular with pointed apical margin in *H. ornatcollis* as illustrated in BRUNDIN (1956, Fig. 107), LANGTON & PINDER (2007, Fig. 161A) and Photo 2E;

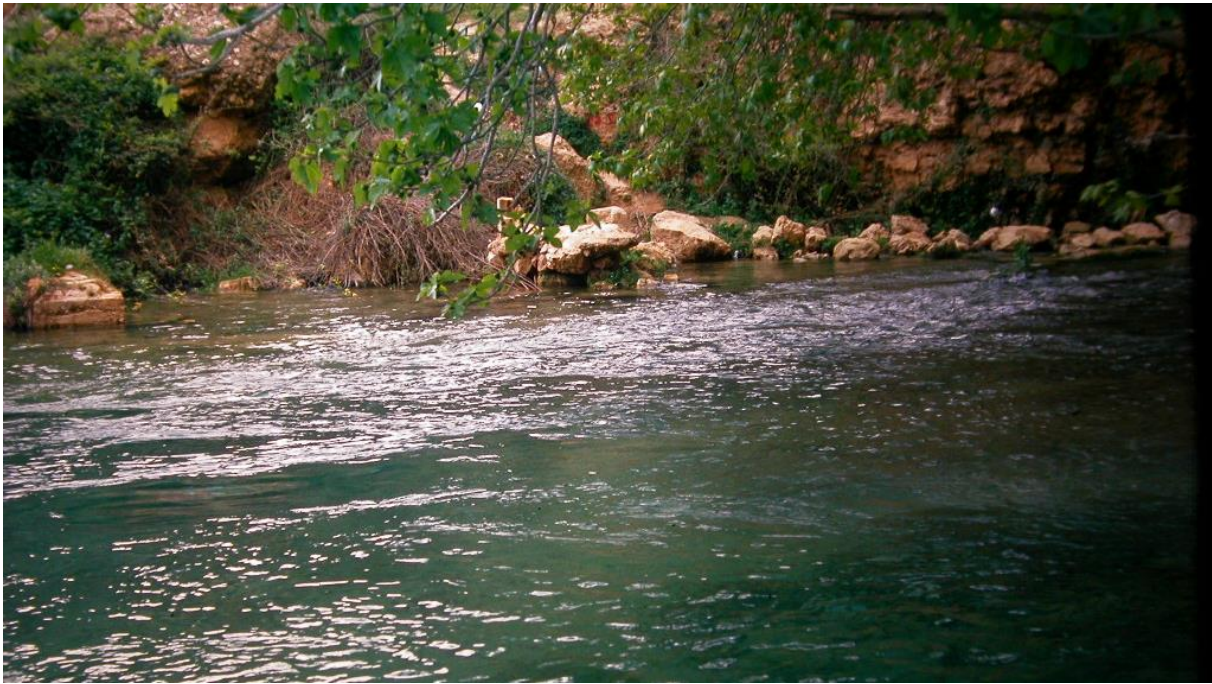


Photo 3. Type-locality of *H. assiana* sp. n.: upper stream of the River Orontes (Lebanon) (Photo J. Moubayed).

Photo 3. Localité-type de *H. assiana* sp. n. : cours supérieur de l'Oronte (Liban) (Cliché J. Moubayed).

- *Gonostylus* (Fig. 1B, Photo 1F) bearing a large *crista dorsalis*, which is entirely absent in *H. ornaticollis* as in BRUNDIN (1956, Fig. 107), LANGTON & PINDER (2007, Fig. 161A) and Photo 2F.

To date, there are six reported species from Europe (SÆTHER & SPIES 2013): *H. dorieri*, *H. extrema*, *H. gaultieri*, *H. helvetica*, *H. ornaticollis* and *H. serratosioi*. Only two were hitherto known from Lebanon: *H. ornaticollis* and *H. serratosioi*. Consequently, the description of *H. assiana* sp. n. increases the total number to three from this country.

5. Ecology and geographical distribution

Larvae of *H. assiana* sp. n. are typically rheophilic, stenothermic, crenophilous and strictly confined to calcareous and karstic cold water. Its type-locality is currently restricted to the upper basin zone of the River Assi, which is located in north-eastern area of Lebanon (Photo 3), Bekaa plain. Enriched shaded lotic habitats with aquatic

and subaquatic plants represent exclusively the favourable microhabitats for larval populations. Emergence period: early to late spring. Therefore, the new species appears to belong to the large community of crenobiontic and crenophilous species as documented by LINDEGAARD (1995).

Occurrence of *H. assiana* sp. n. in such pristine habitats indicates that it is more widespread in other similar zones of streams and Rivers located in southeastern Europe and over the Mediterranean sub-region, namely Turkey and Greece. However, the new species appears to belong to a circum-mediterranean biogeographic representative if confirmed by future knowledge. The new species is considered to be biogeographic local representative, which deserves greater consideration and conservation measures.

Associated species encountered in the same locality as *H. assiana* sp. n. include: *Paramerina cingulata* (Walker, 1856); *P. vaillanti* Fittkau, 1962; *Boreoheptagia legeri* (Goetghebuer, 1933);

Potthastia gaedii (Meigen, 1838); *Chaetocladius acuticornis* (Kieffer, 1914); *C. melaleucus* (Meigen, 1818); *C. piger* (Goetghebuer, 1913); *Corynoneura coronata* (Edwards, 1924); *Cricotopus ornatus* (Meigen, 1818); *C. levantinus* Moubayed & Ashe, 2011; *Eukiefferiella brehmi* Gowin, 1943; *E. coerulescens* (Kieffer, 1926); *E. graeci* (Edwards, 1929); *E. minor* (Edwards, 1929); *Heleniella serratosioi* Ringe, 1976; *Metriocnemus eurynotus* (Holmgren, 1883); *M. hirticollis* (Staeger, 1839); *Micropsectra atrofasciata* (Kieffer, 1911); *Orthocladius pedestris* Kieffer, 1909; *O. thienemanni* Kieffer, 1906; *Parametriocnemus stylatus* (Sparck, 1923); *Paraphaenocladius pseudirritus* Strenzke, 1950; *Paratrichocladius rufiventris* (Meigen, 1830); *Pseudosmittia mediterranea* Moubayed, 2025; *Rheocricotopus effusus* (Walker, 1856); *R. chalybeatus* (Edwards, 1929); *R. glabricollis* (Meigen, 1830); *R. fuscipes* (Kieffer, 1909); *Rheotanytarsus curtistylus* (Goetghebuer, 1925); *Thienemannia libanica* Laville & Moubayed, 1985 and *Thienemanniella clavicornis* (Kieffer, 1911).

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