

## Order Diptera, family Corethrellidae

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### INTRODUCTION

The Corethrellidae, with the only genus *Corethrella* Coquillett, 1902, originally included in the Chaoboridae (phantom midges), nowadays is recognized as a separate family (Wood & Borkent, 1989). *Corethrella* including 97 extant species is distributed worldwide in tropical and subtropical regions (Borkent, 1993, 2008). The genus is also known for 7 fossil species (Borkent, 1993; Poinar & Szadziewski, 2007), with the oldest *C. cretacea* Szadziewski, 1995, from Lower Cretaceous Lebanese amber (Szadziewski, 1995). This genus with a long documented history, dating back to 125–130 mya, had much broader geographical distribution than now, as shown by fossil records (Fig. 1).

Immatures inhabit small water bodies, including bogs, margins of lakes and streams, woodland pools, as well as leaf axils of epiphytic plants, bamboo stems or tree holes (Borkent, 1993, 2008; McKeever & French, 2000). Larvae are predaceous and feed on small aquatic invertebrates, including mosquitoes (Culicidae) and biting midges (Ceratopogonidae); in the case of prey absence they become cannibalistic (McLaughlin, 1990; Mogi & Chan, 1996).

Adult males of *Corethrella* feed on nectar or honeydew, whereas females have biting mouthparts and are haematophagous parasites attracted to calling frogs (*Hyla* spp.) and toads (*Bufo* spp.) (McKeever, 1977; McKeever & French, 2000). Feeding on birds and mammals (Williams & Edman, 1968) has not been confirmed. Since it has been discovered that an acoustic information is sufficient for the precise localization of the calling host, female corethrellids are successfully collected using recorded calls of mating frogs or even artificial, i.e. digitally produced sounds (McKeever & Hartberg, 1980; Bernal et al., 2006). Due to the feeding behaviour, *Corethrella* may have served as vectors of many species of trypanosomes and transmit diseases among frogs (McKeever & French, 2000).

In the Arabian Peninsula only one species is known, *Corethrella buettikeri* Cranston, 1980, reported from a single site in Saudi Arabia (Cranston, 1980). Presently, in a large collection of nematocerans sampled in two localities in the United Arab Emirates, we found further well preserved specimens of the species. The Corethrellidae are for the first time recorded in the United Arab Emirates.

### MATERIALS AND METHODS

The material examined was sampled at light, and with Malaise and water traps. The specimens were mounted in a mixture of Canada balsam and phenol on microscope slides. The material is housed in the Department of Invertebrate Zoology, University of Gdańsk, Poland, and in the United Arab Emirates Invertebrate Collection.

### SYSTEMATIC ACCOUNT

*Corethrella buettikeri* Cranston, 1980

Plates 1–2, Figures 1–19

Specimens examined: Wadi Shawkah, 2♀, 27–28.xi.2006, at light, leg. J.-L. Gattolliat. Wadi Wurayah, 1♂, 3♀, 12–14.iv.2005, Malaise & water traps, leg. T. Pape; 2♂, 2♀, 14.xi–4.xii.2006, Malaise trap, leg. A. van Harten.

Diagnosis: Female labrum slender, with apical sensilla (Fig. 8). Mandible armed with 27–35

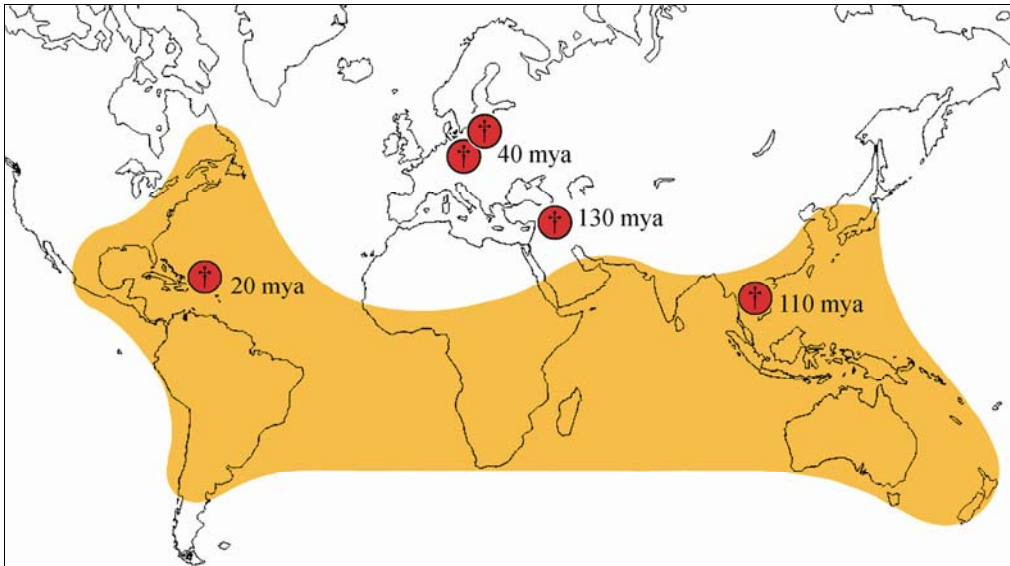


Fig. 1. Distribution of extant and fossil *Corethrella*. †: fossil record, mya: million years ago, 20: Oligocene/Miocene Dominican amber, 40: Eocene Baltic amber, 110: Lower Cretaceous Burmese amber, 130: Lower Cretaceous Lebanese amber.

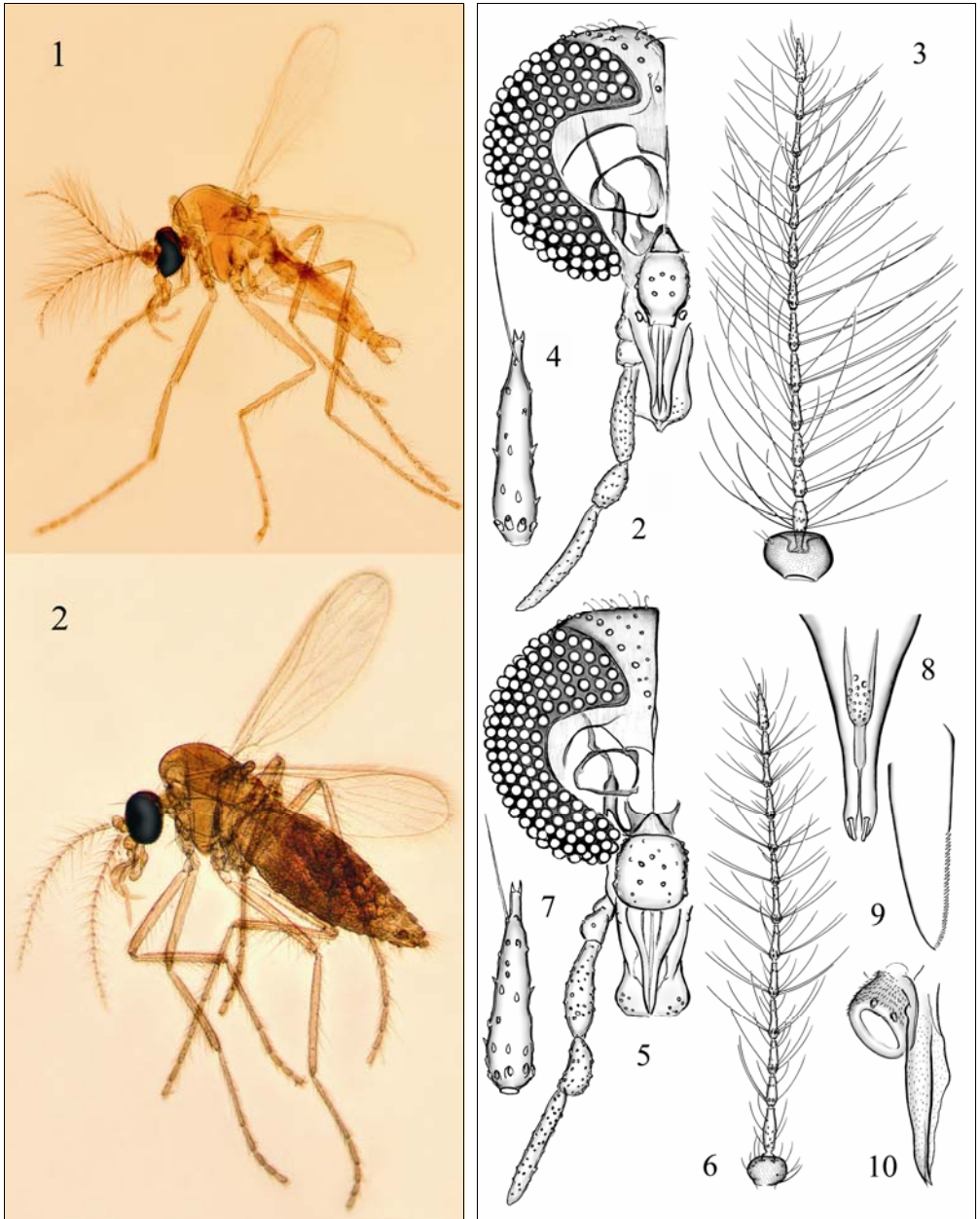
teeth (Fig. 9). Lacinia 130–147  $\mu\text{m}$  long, covered with microtrichia (Fig. 10). Wing of both sexes unmarked (Fig. 11); wing ratio  $\text{Sc-R}_1/\text{R}_1\text{-R}_2$  0.84–1.05 (0.95) in male and 0.69–0.85 (0.76) in female. Claws of fore and mid legs in male long, slightly subequal, each with a long setiform talon (Figs 12, 13); hind leg in male and all legs in female with relatively short, equal, boomerang-like claws and long empodium (Figs 14–17); slender scales present only on hind leg in female (Fig. 18). Male gonocoxite with strongest seta at mid length of median surface; gonostylus with single stout seta at basal third; aedeagus long, reaching or extending posterior margin of anal tergite (Fig. 19).

Description: Adult male ( $n = 3$ , unless otherwise stated). Wing length 0.92–1.02 (0.96) mm.

Colouration. Eyes black, head capsule brownish, remaining parts of the body yellow to pale brown, wings poorly pigmented, transparent (Plate 1).

Head width 382–441  $\mu\text{m}$  ( $n=2$ ). Interocular distance 52–60  $\mu\text{m}$  ( $n=2$ ). Pedicel 123–127 (125)  $\mu\text{m}$  in diameter. Length of antennal flagellomeres 1–13 ( $\mu\text{m}$ ): 91–99 (95), 56–60 (58), 60–67 (64), 64–71 (67), 64–75 (69), 71–79 (75), 67–75 (73), 71–75 (73), 67–75 (71), 64–71 (66), 67–71 (69), 64–67 ( $n=2$ ), 79–83 ( $n=2$ ); terminal flagellomere with double apical tooth (Fig. 4); plume well developed (Fig. 3). Clypeus convex, 83–91 (87)  $\mu\text{m}$  long, 60–64  $\mu\text{m}$  wide ( $n=2$ ), bearing 5–7 strong setae medially and 4–7 weaker lateral setae on each side (Fig. 2). Length of palpomeres I–V ( $\mu\text{m}$ ): 28–32 (30), 40–44 (42), 111–119 (115), 67–79 (71), 151–155 (153).

Thorax chaetotaxy. Acrostichals c. 30 (incl. 16–20 stout and 12–15 fine setae), placed in double irregular row. Median scutal stripes with c. 15 dispersed fine setae. Dorsocentrals 29–36 (15–17 stout and 12–16 weaker setae). Humeral 17–19 (9–12 strong and 7–8 weaker setae). Prealar 20–23 (8–10 strong and 12–13 weaker setae). Dorsocentral, humeral and prealar fields poorly separated. Scutellars 20–22 (8–9 stout and 13–14 fine setae); stout setae placed in regular row, fine setae dispersed.



Plates 1–2. *Corethrella buettikeri* Cranston. 1: Male, total habitus; 2: Female, total habitus. Figures 2–10. *Corethrella buettikeri* Cranston. 2–4: Male. 2: Head; 3: Antenna; 4: Terminal flagellomere. 5–10: Female. 5: Head; 6: Antenna; 7: Terminal flagellomere; 8: Labrum; 9: Mandible, 10: Lacinia and 2<sup>nd</sup> palpomere.

Wing (Fig. 11). Squama fringed with several setae. All veins, excluding distal half of costa, covered with sparse setae. Wing margin, excluding proximal section of costa, with scales of different shape and length, as shown in Figure 11. Sc–R<sub>1</sub> distance 151–179 (167)  $\mu\text{m}$ ; R<sub>1</sub>–R<sub>2</sub> distance 159–179 (171)  $\mu\text{m}$ ; Sc–R<sub>1</sub>/R<sub>1</sub>–R<sub>2</sub> ratio 0.84–1.05 (0.95). RM–forkR<sub>2</sub>R<sub>3</sub> distance 210–250 (226)  $\mu\text{m}$ ; RM–forkM<sub>1</sub>M<sub>2</sub> distance 226–286 (246)  $\mu\text{m}$ ; RM–forkR<sub>2</sub>R<sub>3</sub>/RM–forkM<sub>1</sub>M<sub>2</sub> ratio 0.88–0.96 (0.92).

Legs. Fore tibia bearing strongly curved S-shaped spur with filiform apex; tibial comb consisting of 10–13 setiform teeth (c. 45  $\mu\text{m}$  long). Mid tibia only with 4–5 setae (c. 30  $\mu\text{m}$  long) placed in row instead of typical comb; spur absent. Hind tibia bearing curved spur (c. 40  $\mu\text{m}$  long) and comb consisted of 13–16 setiform teeth (c. 40–45  $\mu\text{m}$  long). Claws as in figs 12–14. Claws of fore and mid legs long, slightly subequal, each with a long setiform talon; claws of hind leg short, equal; empodium long. For length of leg segments and leg ratios see Table 1.

Table 1. Length ( $\mu\text{m}$ ) of leg segments and leg ratios of male *Corethrella buettikeri*.

	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR
P <sub>1</sub>	514–529 (522)	485–522 (507)	426–478 (448)	140–154 (147)	81–88 (85)	66–74 (70)	66–74 (70)	0.88–0.92 (0.89)
P <sub>2</sub>	559–573 (566)	537–566 (551)	360–390 (371)	140–147 (143)	81–88 (85)	66	66	0.64–0.69 (0.67)
P <sub>3</sub>	544–551 (548)	529–566 (551)	419–448 (434)	213–228 (221)	140–154 (147)	103–110 (107)	81–96 (88)	0.76–0.82 (0.79)

Genitalia (Fig. 19). Gonocoxite 119–127 (123)  $\mu\text{m}$  long, with c. 10 stout inner setae arranged along length of median surface; the strongest seta 52–56  $\mu\text{m}$  long. Gonostylus 120  $\mu\text{m}$  long, bearing single stout seta (40–44  $\mu\text{m}$  long) situated at basal 1/3, apical tooth (c. 6–7  $\mu\text{m}$ ) and 4–5 fine subapical setae. Anal tergite with a pair of blunt apicolateral processes. Aedeagus long, reaching or extending beyond posterior margin of anal tergite; triangular, tapering from base to sharply pointed apex.

Adult female (n = 7, unless otherwise stated). Wing length 0.95–1.17 (1.08) mm.

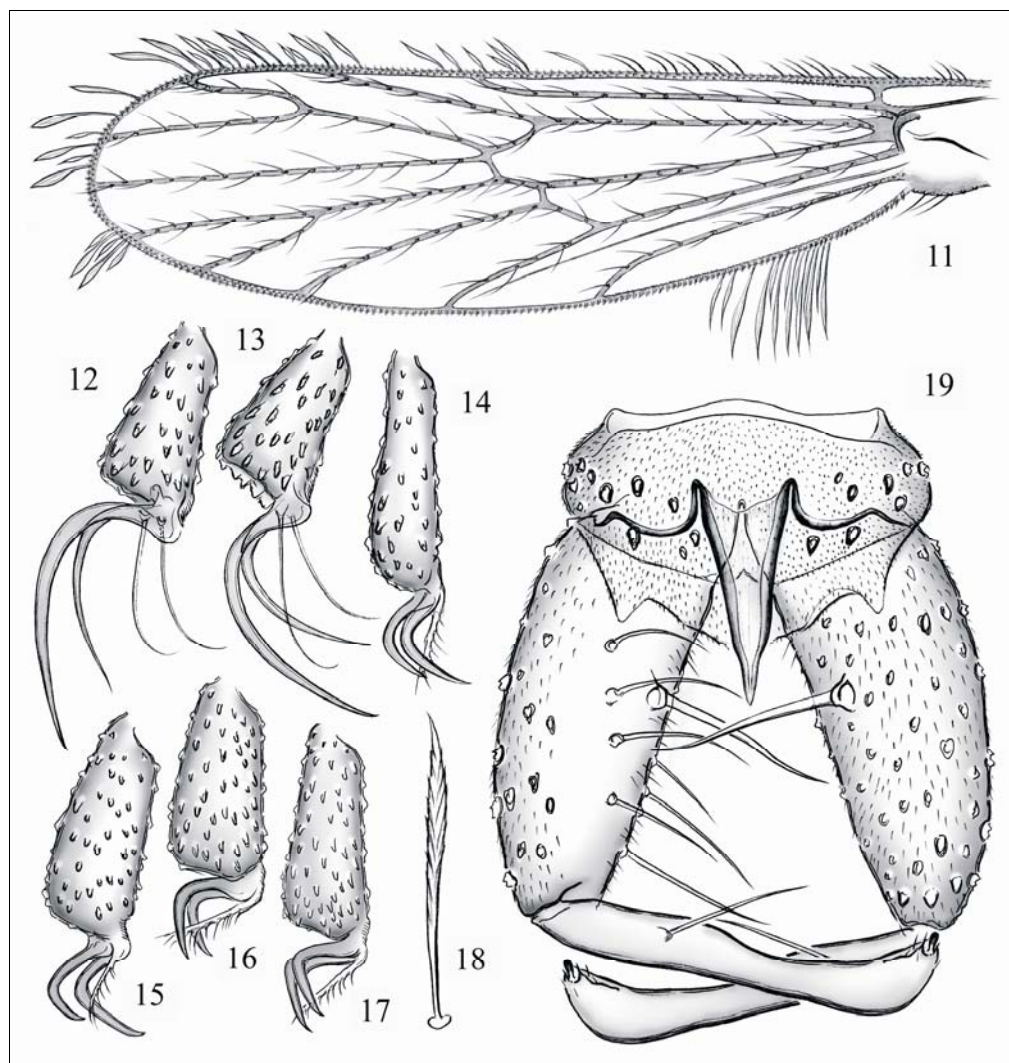
Colouration. As in male or somewhat darker (Plate 2).

Head width 345–397 (375, n=3)  $\mu\text{m}$ . Interocular distance 48–60 (54, n=3)  $\mu\text{m}$ . Pedicel 71–85 (77)  $\mu\text{m}$  in diameter. Length of antennal flagellomeres 1–13 ( $\mu\text{m}$ ): 91–115 (105), 60–71 (65), 67–79 (75), 73–85 (79), 69–83 (77), 67–83 (75), 67–79 (75), 63–79 (73), 62–75 (69), 60–71 (67), 56–67 (64), 56–64 (60), 79–95 (87); terminal flagellomere with double apical tooth (Fig. 7); plume much weaker than in male (Fig. 6). Clypeus convex, 79–91 (85, n=6)  $\mu\text{m}$  long, 83–91 (87, n=3)  $\mu\text{m}$  wide, bearing 5–7 strong setae medially and 5–12 weaker lateral setae on each side (Fig. 5). Length of palpomeres I–V ( $\mu\text{m}$ ): 32–40 (36), 36–47 (40), 107–131 (119), 67–80 (75, n=6), 147–179 (161, n=6). Labrum slender, with apical sensilla (Fig. 8). Mandible armed with 27–35 teeth (Fig. 9). Lacinia 130–147 (139)  $\mu\text{m}$  long, covered with microtrichia (Fig. 10).

Thorax chaetotaxy. As in male.

Wing. Chaetotaxy and venation similar to that found in male, with usual sexual differences in size and general shape. Sc–R<sub>1</sub> distance 187–218 (195)  $\mu\text{m}$ ; R<sub>1</sub>–R<sub>2</sub> distance 238–286 (258)  $\mu\text{m}$ ; Sc–R<sub>1</sub>/R<sub>1</sub>–R<sub>2</sub> ratio 0.69–0.85 (0.76). RM–forkR<sub>2</sub>R<sub>3</sub> distance 210–262 (234)  $\mu\text{m}$ ; RM–forkM<sub>1</sub>M<sub>2</sub> distance 238–298 (264)  $\mu\text{m}$ ; RM–forkR<sub>2</sub>R<sub>3</sub>/RM–forkM<sub>1</sub>M<sub>2</sub> ratio 0.87–0.93 (0.89).

Legs. Fore tibia with strongly curved, S-shape spur with filiform apex (c. 40  $\mu\text{m}$  long); tibial comb consisting of 15–17 setiform teeth (c. 40  $\mu\text{m}$  long). Mid tibia only with 5–6 setae (c. 30



Figs 11–19. *Corethrella buettikeri* Cranston. Male. 11: Wing; 12–14: Claws and 5<sup>th</sup> tarsomere of fore (12), mid (13) and hind (14) leg; 19: Genitalia. Female. 15–17: Claws and 5<sup>th</sup> tarsomere of fore (15), mid (16) and hind (17) leg; 18: Scale of hind tibia.

$\mu\text{m}$  long) placed in row instead of typical comb; spur absent. Hind tibia bearing curved spur (c.  $45 \mu\text{m}$  long) and comb consisted of 16–20 setiform teeth (c.  $45 \mu\text{m}$  long). Several slender tibial scales (Fig. 18) present on hind leg only. Claws similar on all legs; short, equal, strongly curved; empodium long (Figs 15–17). For length of leg segments and leg ratios see Table 2.

Genitalia. As figured by Cranston (1980). Spermatheca with short neck, 48–60 (56)  $\mu\text{m}$  long, 36–46 (42)  $\mu\text{m}$  wide, length/width ratio 1.27–1.50 (1.33).

Table 2. Length ( $\mu\text{m}$ ) of leg segments and leg ratios of female *Corethrella buettikeri* (n=6).

	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR
P <sub>1</sub>	500–588 (566)	470–566 (537)	375–456 (434)	132–162 (151)	88–103 (99)	73–92 (85)	73–81 (77)	0.79–0.82 (0.80)
P <sub>2</sub>	551–684 (639)	559–676 (639)	331–412 (386)	132–169 (154)	88–110 (103)	73–88 (81)	70–85 (77)	0.59–0.62 (0.60)
P <sub>3</sub>	544–669 (636)	514–654 (610)	382–470 (437)	191–235 (224)	132–162 (151)	96–118 (110)	81–92 (88)	0.70–0.74 (0.72)

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