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The oldest fossil *Corethrellidae* (*Diptera*) from Lower Cretaceous Lebanese amber

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Abstract. *Corethrella cretacea*, the oldest new fossil species of *Corethrellidae* from Lower Cretaceous Lebanese amber (125-130 Ma) is described and illustrated. *Fossicorethrella*, a new subgenus of *Corethrella* including the new species is proposed. The fossil represents a phylogenetic lineage forming the sister group of all other, living and fossil, members of the genus.

Key words: *Diptera*, *Corethrellidae*, fossil, Cretaceous, Lebanese amber.

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The *Corethrellidae* is a small family with the single genus *Corethrella* which was previously included in the *Chaoboridae*. At present, the group including 62 extant species is of pantropical distribution. The haematophagous females feed on frogs.

Fossil species have been described from Miocene Saxonian amber (*Corethrella prisca* BORKENT & SZADZIEWSKI, *C. miocaenica* SZADZIEWSKI et al.) and from Miocene/Oligocene Dominican amber (*C. nudistyla* BORKENT & SZADZIEWSKI). BORKENT & SZADZIEWSKI (1992) suggested, that the discovery of Mesozoic fossils was expected within the family. And actually, during my visit to the Staatliches Museum für Naturkunde in Stuttgart, among inclusions of biting midges from Lower Cretaceous Lebanese amber (125-130 Ma) I found one male which is the oldest fossil within the *Corethrellidae*.

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Genus *Corethrella* COQUILLETT, 1902
Fossicorethrella subg. n.

Type-species *Corethrella cretacea* sp. n., by present designation.

D i a g n o s i s. Males can be easily distinguished by having all tarsi with long filamentous empodium; claws of fore leg equal, armed with basal inner tooth and outer claw with a long slender talon; gonostyli enlarged distally and armed with apical spine, gonocoxite with stouter spines on distal portion, 5th tarsomeres slender with subbasal ventral swelling. The shape of empodium is unique within the *Culicomorpha*.

Corethrella (*Fossicorethrella*) *cretacea* sp. n.

D e s c r i p t i o n. ♂. – Specimen with only basal portion of wings preserved (Fig. 10). Body without distinct pigmentation, uniformly pale brown; length from frons to end of genitalia about 1.6 mm.

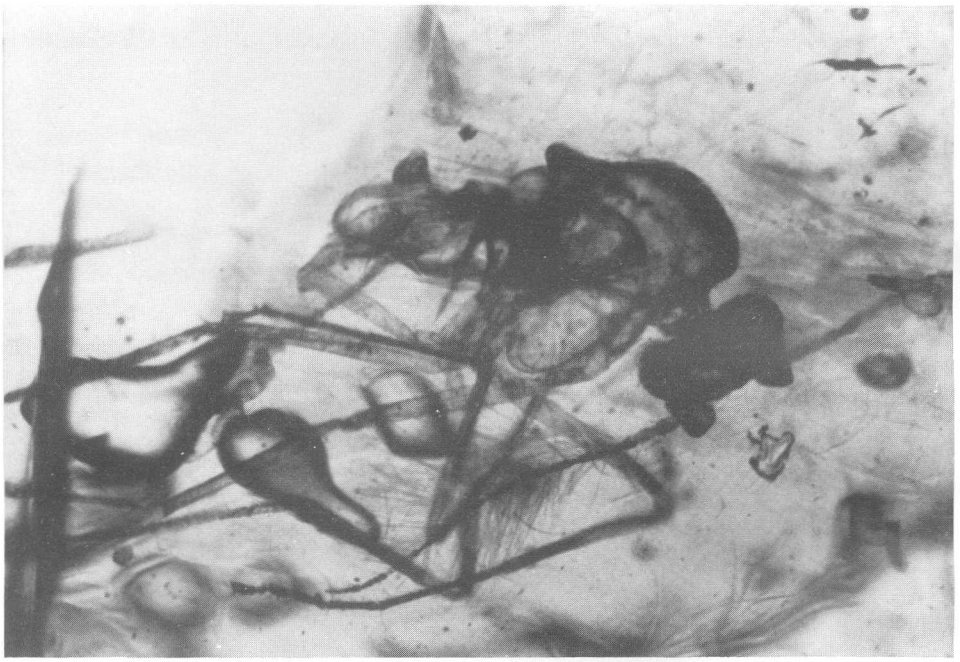


Fig. 10. *Corethrella cretacea* sp. n., photograph of male.

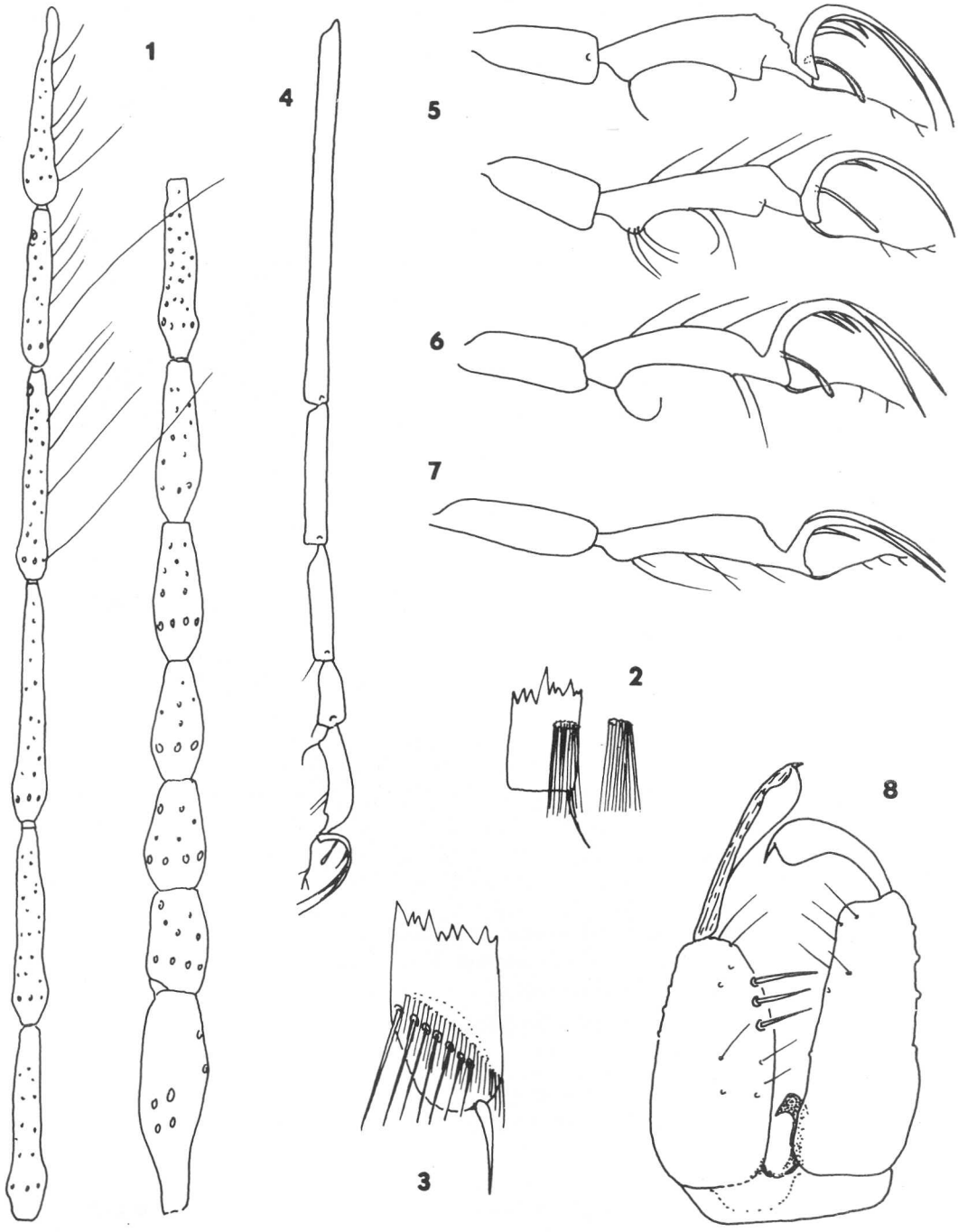
Flagellum composed of 13 units, length 983 μ. Lenghts of flagellomeres as follows (in μm): 96-44-48-52-60-68-76-80-88-106-94-68-88. Plume indistinct, typical of the genus; sensilla coeloconica not visible; flagellomere 13 apically rounded (Fig. 1). Proboscis slender, moderately long, apex seems to be slightly bent forward. Palpi almost invisible.

Katepisternum and anepimeron II bare, without distinct setae. Scutellum with rounded apex. Proximal portion of preserved wing membrane without setae or scales, covered with distinct microtrichia; the preserved setae on veins normal, not scale-like; costal vein visible on preserved caudal margin which indicates that it completely surrounds the wing.

Legs long and slender. Fore tibia with slender spur and a row of fine hairs (Fig. 2). Hind tibia with stout spur and tibial comb composed of 7 spines (Fig. 3). First tarsomere much longer than second one (Fig. 4). Tarsomeres 5 long and slender, with a subbasal ventral swelling (tubercle) bearing some long setae on fore and middle legs (Figs. 5-7). All tarsi with long filamentous empodium bearing some short branches and 2 long, equal claws; each claw armed with long basal inner tooth; outer claw of fore and middle legs with long slender talon (Figs. 5, 6); outer claw of hind leg lacking a talon (Fig. 7).

Terminalia rotated 90 between 8 and 7 abdominal segments. Segment 9 small with narrow sternite (Fig. 8). Gonocoxite with 3 markedly thick medioventral spines on distal portion. Gonostylus with slender base and swollen apex bearing apical spine. Aedeagus hardly discernible, probably with sharp claw-like apex.

♀. – Unknown.



Figs 1-8. *Corethrella cretacea* sp. n., male; 1 – flagellum, 2 – apex of fore tibia, 3 – apex of hind tibia, 4 – tarsus of fore leg, 5-7 – 4th and 5th tarsomeres of fore (5), middle (6) and hind leg (7), 8 – ventral aspect of genitalia.

T y p e m a t e r i a l. Holotype in Lower Cretaceous Lebanese amber (Neocomian, Hauterivian Stage, 125-130 Ma), mounted in artificial resin. No. C 61/12, leg. D. SCHLEE, Staatliches Museum für Naturkunde, 70191 Stuttgart, Rosenstein 1, Germany.

D i s c u s s i o n. Some subgenera were proposed within *Corethrella* (BORKENT 1993). The cladistic analysis of male characters showed that two lineages could be defined within the genus which corresponded the subgenera *Notocorethrella* BELKIN (incl. extant *C. novaezealandiae* TONNOIR) and *Corethrella* s. str. (all other species) (BORKENT & SZADZIEWSKI 1992). Further finding the fossil *C. miocaenica* (SZADZIEWSKI et al. 1994) showed that it belonged to the clade represented by *C. novaezealandiae*. The new species represents the phylogenetic lineage which forms a sister group of all other members of the genus (Fig. 9).

The following characters are used to delineate the phylogenetic relationships within the *Corethrella* (Fig. 9).

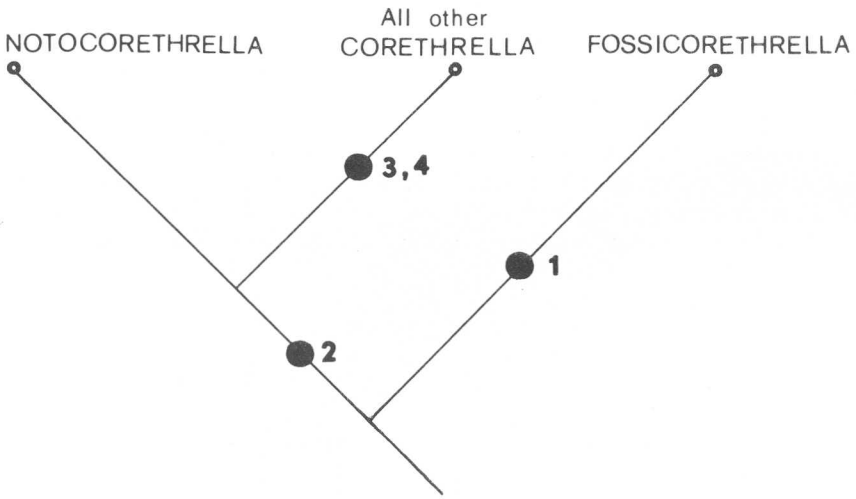


Fig. 9. Phylogenetic relationships among *Corethrella.*

1. Empodium short and stout with long branches (plesiomorphic); empodium long, filamentous, with short branches (apomorphic). The filamentous long empodium with some short branches is an unique character state within *Culicomorpha.*

2. Tarsomere 5 of male long and slender (plesiomorphic); tarsomere 5 of male short and stout (apomorphic).

The derived condition is present in males of all *Corethrella* other than *C. cretacea.* Within the superfamily *Culicoidea* that character state seems to be unique, because in all groups 5th tarsomeres are more or less elongated.

Within the *Corethrellidae* the elongated 5th tarsomere with basal or subbasal ventral swelling bearing some stronger setae is found only in the new species. However, the subbasal ventral swelling of 5th tarsomere appears and disappers in some lineages of the superfamily and is difficult to interpret. I found it in males of some extant *Dixidae* on fore and middle legs (for example *Dixella aestivalis* (MEIGEN), *Dixa submaculata* EDWARDS, *D. puberula* LOEW), on fore or fore and middle legs of some *Culicidae* (for example *Culex pipiens* (L.) on fore legs, *Culiseta annulata* (SCHRANK)

on fore and middle legs). Similarly shaped 5th tarsomere is found also in fossil males of *Chaoboridae* [*Praechaoborus tugnuicus* KALUGINA (mid- or hind leg) (KALUGINA & KOVALEV 1985) from Jurassic deposits of Siberia; *Mochlonyx sepultus* MEUNIER from Baltic amber (HENNIG 1966)]. The latter species has basal ventral tubercle covered with setae, and the claw with inner tooth and a basal long talon.

3. Claws of male fore leg equal in size (plesiomorphic); one claw of male fore leg distinctly smaller than the other (apomorphic). The character state discussed by BORKENT & SZADZIEWSKI (1992).

4. Male outer claw with long basal talon (plesiomorphic); outer claw simple (apomorphic).

The male of the new species and *Notocorethrella* have long, equal claws and the outer claw with a long talon on fore legs which seem to represent the plesiotypic condition within the *Corethrellidae*. Interpretation of that character state is not unambigous. The talon is widely distributed within *Culicidae*, *Chaoboridae*, and even in some *Leptoconops* SKUSE of *Ceratopogonidae*.

I cannot find synapomorphy for the subgenus *Notocorethrella*. The males have broad gonostyli (rather plesiomorphy, difficult to interpret), and rounded (*C. novaezealandiae*) or pointed (*C. miocaenica*) apical flagellomere. The latter character state interpreted as important in the cladogenesis by BORKENT & SZADZIEWSKI (1992) I interpret as homoplastic as it is in conflict with character states found in claws. The apical prolongation of terminal male flagellomere bearing 2 apical sensilla is not unique as BORKENT & SZADZIEWSKI (l.c.) suggested as it is present probably in all *Culicidae* (SZADZIEWSKI et al. 1994). It is possibly to suggest the opposite direction of polarity, i.e. that in *Fossicorethrella* and *C.* (*Notocorethrella*) *miocaenica* the apical prolongation is reduced.

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