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Chironomids with "M-fork". A reevaluation of the wing venation of the *Corynoneura*-group

(Insecta, Diptera, Chironomidae)

By **Ole A. Sæther & Liv Kristoffersen**

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Reexamination of the wing venation in *Corynoneura* Winnertz and *Thienemanniella* Kieffer shows that previous interpretations of the wing venations were mistaken. The clavus consists mainly of R_1, R_{2+3} and the contracted costa; the "false vein" is in reality a reduced R_4 (or R_{4+5}), and M is forked into R_5 or (M_1) and M_{3+4} (or M_2).

Ole A. Sæther and Liv Kristoffersen, Museum of Zoology, University of Bergen, Muséplass 3, N-5007 Bergen.

Introduction

While examining the new genus *Physoneura* Ferrington et Sæther (1995) it was deemed necessary to compare the wing venation of the genus with representatives of the genera *Corynoneura* Winnertz and *Thienemanniella* Kieffer as well as with a new genus, *Tempesquitoneura*, being described by Epler and De la Rosa (1995). The result of this reexamination led to a new interpretation of the wing nervature of these genera.

Material

Specimens of the following species were examined:

Corynoneura carinata Singh et Maheshwari, ♂.
Corynoneura celtica Edwards, ♂.
Corynoneura fittkaui Schlee, ♂.
Corynoneura lacustris Edwards, ♂.
Corynoneura lahuli Singh et Maheshwari, ♂.
Corynoneura lobata Edwards, ♂, ♀.
Corynoneura oxfordana Boesel et Winner, ♂.
Corynoneura scutellata Winnertz, ♂.
Corynoneura taris Roback, ♂.
Corynoneura, spp. nov. 1-5, ♂♂, ♀♀.
Thienemanniella acuticornis (Kieffer), ♂.
Thienemanniella sanctivincenta Sæther, ♂, ♀.
Thienemanniella semifimbriata Sæther, ♂, ♀.
Thienemanniella similis Malloch, ♂, ♀.

Thienemanniella cf. *vittata* Edwards, ♂.
Thienemanniella xena Roback, ♂.
Thienemanniella, spp. nov. 1, 2, ♂.

The wing venation of the *Corynoneura*-group

The wing of the *Corynoneura*-group has been interpreted as having a contracted costa apically fused with R_1 and R_{4+5} forming a so-called clavus, and with a weak false vein continuing from RM towards the apex of the wing (Schlee 1968, Hirvenoja & Hirvenoja 1988, Cranston et al. 1989). There is a distinct sexual dimorphism with the females having a much longer clavus. Except for the upper veins with the clavus the remaining veins often are very indistinct and unclear.

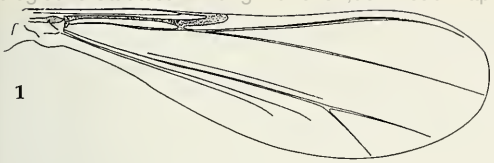
However, a close examination shows that R_{4+5} in the male imagines does not participate in the formation of the clavus as also mentioned by Ferrington & Sæther (1995). The clavus is formed by a thickening of R_1 and probably a R_{2+3} which together with the retracted and thickened costa are forming the clavus. In nearly all chironomids the R fork (FR) carries a sensillum campaniformium and R_{4+5} originates below this sensillum. The so-called "false vein" in the male imagines of the *Corynoneura* group originates at the same position and thus in reality is the R_{4+5} vein. This vein is very weak, but it is strengthened by a vein running parallel and very close to it. This second vein apparently is formed as the upper branch of a forked M vein, i.e. it could be a M_1 vein. The furcation of M in some species is almost impossible to discover as it is very close to RM. This is true for most male imagines of *Thienemanniella* (Figs 8-10). In the male imagines of *Corynoneura*, however, the furcation is distinctly distal to RM (Figs 1-5) making a clear M-fork.

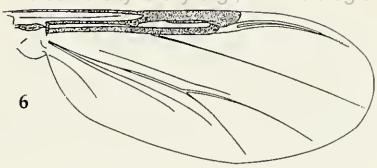
When evaluating the female imagines (Figs 6, 7) a different interpretation becomes more likely. Here, R_{4+5} is thickened basally and continues distally in a thin R_{4+5} vein previously regarded as a false vein. [The male imago of *Physoneura* Ferrington et Sæther (1995, fig. 2) show the same configuration.] In some specimens this vein appears to be split into two veins, presumably R_4 and R_5. This split may have continued down to the base in the course of evolution and then, in *Corynoneura*, being displaced distally along the M-vein. The M according to this interpretation bifurcates into R_5 and M_{1+2}. In most specimens of the *Corynoneura* group (Figs 4, 5, 8, 10; Hirvenoja & Hirvenoja 1988, fig. 3) there is an additional apical "false" vein between R_{4+5} (or R_5) and M. This vein may represent the vestige of M_1.

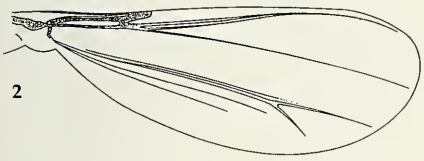
Phylogenetic implications

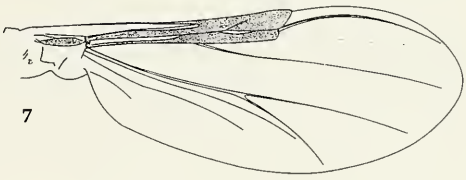
In the chironomid literature there are widely differing opinions about the systematic placement of the *Corynoneura*-group. According to Goetghebuer (1914, 1932, 1939) and Lindeberg (1962) the group may deserve its own subfamily. Goetghebuer regards the group as directly descended from the ancestor of the Orthocladiinae, while Lindeberg proposes to include the group as a tribe (Corynoneurini) together with the tribes Podonomini, Protanypini (Protanypodini) and Tanypodini in a subfamily Tanypodinae. Zavřel (1928), Edwards (1929), Brundin (1956), Schlee (1968), and Sæther (1977) on the other hand agree that the *Corynoneura*-group belongs to the Orthocladiinae. While Zavřel, primarily based on the morphology of the immatures, finds it justified to erect a separate tribe for the group, Edwards, Brundin and Schlee regards the group as directly evolved from the most apomorphic members of the "*Smittia*"-group, particularly *Pseudosmittia* Goetghebuer. Sæther (1977) maintains a somewhat intermediate view. The group forms the sister group of the "*Smittia*"- plus the "*Orthocladius*"-groups of genera, i.e. most of the Orthocladiinae but excluding the most plesiomorphic genera including those with double gonostylus in the male and three seminal capsules in the female.

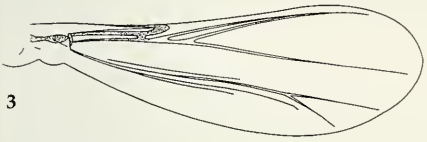
Regarding the M-vein as furcating into M_1 and M_2 would lend support to the theory of Lindeberg, regarding the group as one of the most primitive of chironomids, as it could indicate that the *Corynoneura*-group had maintained the wing venation of the Ceratopogonidae. However, that would also imply that *Corynoneura* was the most plesiomorphic genus of the group and the male imagines of *Corynoneura* as having a more plesiomorphous state of wing venation than the females, since the M-fork here is best developed. All other evidence, however, indicate *Corynoneura* as the most apomorphic, and the females as having a more plesiomorphous wing nervature. If the upper branch of the M-fork

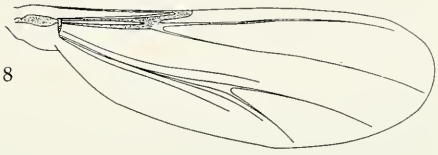


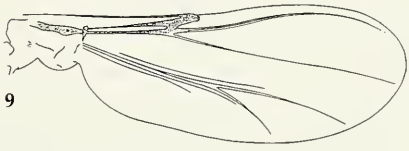


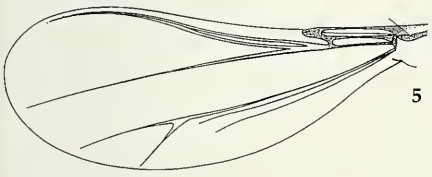












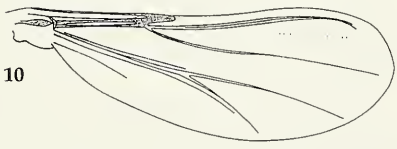


Fig. 1. *Corynoneura*, spec. nov. 2, ♂ wing.
Fig. 2. *Corynoneura lobata* Edwards, ♂ wing.
Fig. 3. *Corynoneura*, spec. nov. 4, ♂ wing.
Fig. 4. *Corynoneura oxfordana* Boesel et Winner, ♂ wing.
Fig. 5. *Corynoneura lacustris* Edwards, ♂ wing.
Fig. 6. *Thienemanniella sanctivincenta* Sæther, ♀ wing.
Fig. 7. *Thienemanniella similis* Malloch, ♀ wing.
Fig. 8. *Thienemanniella xena* Roback, ♂ wing.
Fig. 9. *Thienemanniella semifimbriata* Sæther, ♂ wing.
Fig. 10. *Thienemanniella*, spec. nov. 2, ♂ wing.

is regarded as R_5 with the M-fork being a secondary development originating from a splitting of R_{4+5} into R_4 and R_5, the development would be from *Physoneura* to *Thienemanniella* to *Corynoneura*, with the females having the more plesiomorphous state of wing nervature. This would be in better accordance with other evidence, but do not lend support to any phylogenetic placement of the group since the configuration would be an autapomorphy for the group.

We consider the placement of the *Corynoneura*-group within the Orthocladiinae as well established. However, the only evidences for regarding the *Corynoneura*-group as belonging to the more advanced orthoclads being closely related to *Pseudosmittia* are to be found in the wing venation. The senior author together with Dr. L. C. Ferrington recently has completed a revision of the genus *Pseudosmittia*. There are no species with the same configuration of the R-veins, and no species with indication of an M-fork. However, several species have a straight Cu_1-vein and a very high VR ratio like in the *Corynoneura*-group. There are, however, also several species with less distally placed Cu-fork and a curved or sinuous Cu_1 and these species are more plesiomorphically placed within the genus. The high VR ratios and the straight Cu_1 thus cannot be anything else than parallelism or convergence and give no evidence for regarding the *Corynoneura*-group as related to the most advanced orthoclads. The *Corynoneura*-group show a number of unique synapomorphies not found in any other group. They, however, also show a number of apomorphies also found elsewhere such as the platelike superior volsella of the *Rheocricotopus*-group, the pearls on the pupal wing sheath of the genera near *Heterotrissocladius* Spärck, the caudal hooklets on the pupal tergites (here minute) of the *Cardiocladius*-group and so on. The exact placement of the *Corynoneura*-group cannot as yet be ascertained. The different placements as being closely related to *Pseudosmittia*, as not at all being orthoclads, or as being the sister group of all other orthoclads, however, all are refuted.

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