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## On the status of *Cyrtopogon flavimanus* (MEIGEN, 1820) (Diptera, Asilidae)

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Specimens of *Cyrtopogon flavimanus* (MEIGEN, 1820) and *Cyrtopogon maculipennis* MACQUART, 1834, from Switzerland give evidence that *C. flavimanus* has to be considered as *bona species*.

Keywords: Asilidae, *Cyrtopogon flavimanus*, Swiss fauna, systematic status.

### INTRODUCTION

*Cyrtopogon flavimanus* was described by MEIGEN (1820:271) in the genus *Dasyopogon* and cited afterwards in several faunistical papers, e.g. from Austria (SCHINER, 1862:134), from France (SÉGUY, 1927:81), from Poland (TROJAN, 1970:58) as well as in the large volumes of "Die Fliegen der paläarktischen Region" (ENGEL, 1930:326) and "Flies of the European part of USSR" (RIKHTER, 1988:797). In the "Catalogue of Palearctic Diptera" (LEHR, 1988:237), however, this species was entered as a (senior) synonym of *Cyrtopogon maculipennis* (MACQUART, 1834:298). To our knowledge, there is no paper giving a morphological analysis which this synonymization could be based on.

In the present paper we intend to clear the status of both species on the basis of new specimens from the Bern Museum, in addition to specimens checked earlier (WEINBERG & BÄCHLI, 1984).

### MATERIAL AND METHODS

The following specimens kept in the collections of the Naturhistorisches Museum Bern (NMB) and the Zoological Museum Zürich (ZMZ) have been analyzed:

*Cyrtopogon flavimanus*: 1 ♂, Klosters GR, 1917; 1 ♀, Riederalp VS, 1976 (both ZMZ); 1 ♂, Mürren BE, 23.VII.1907, DÄNIKER (genitalia pin-mounted); 2 ♂♂, S-chanf GR, 11.VII.1917, 5.VIII.1920, DÄNIKER; 1 ♀, S. Bernardino GR, 23.VIII.1937, GANSSER-BURCKH.; 1 ♀, Versam GR, 9.VII.1898; 1 ♀, Nante TI, 21.VIII.1950, GANSSER-BURCKH.; 1 ♂, Evolène VS, 7.VII.1908; 2 ♂♂, 1 ♀, Ferden VS, 24.VIII.1930, Näf; 1 ♂, Les Haudères VS, 2.VII.1925, STECK; 1 ♂, Kippel VS, 28.VI.1918, STECK; 1 ♂, Randa VS, 2.VII.1926, DÄNIKER; 1 ♀, Saas VS, 18.VII.1912, DÄNIKER (genitalia pin-mounted); 1 ♀, Saas VS, 22.VII.1915; 1 ♀, Zermatt VS, 21.VII.1915, DÄNIKER (genitalia pin-mounted); 1 ♂, Zermatt VS, 20.VII.1915, DÄNIKER; 1 ♀, Zermatt VS, 7.VIII.1916, DÄNIKER (all NMB).

*Cyrtopogon maculipennis*: 6 ♂♂, Lenzerheide GR, 1899; 1 ♂, Klosters GR, 1917 (all ZMZ); 1 ♀, Zermatt VS, 11.VIII.1916, DÄNIKER (genitalia pin-mounted); 1 ♂, Mürren BE, 25.VII.1911, DÄNIKER (genitalia pin-mounted); 2 ♂♂, Passo della Forcola GR, 9.VII.1906, STECK; 1 ♂, 1 ♀, S-chanf GR, 1.VIII.1918, 2.VIII.1918, DÄNIKER; 1 ♂, S. Bernardino 15.VII.1937, GANSSER-BURCKH.; 1 ♂, S. Bernardino, 24.VII.1945, DE GHICA; 2 ♀♀, Somvix GR, 9-10.VII.1910; 1 ♂, Val Piora TI, 27.VII.1957, GANSSER-BURCKH.; 1 ♀, Arolla VS, 25.VII.1914, DÄNIKER; 1 ♀, Kippel VS, 28.VI.1904, STECK; 6 ♂♂, Saas VS; 4 ♂♂, 24.-28.VII.1912, DÄNIKER; 1 ♂, Saas VS, 24.VII.1912, DÄNIKER (genitalia pin-mounted); 1 ♀, Zermatt VS, 22.VII.1915, DÄNIKER (genitalia pin-mounted); 1 ♀, Zinal VS, 31.VII.1943 (all NMB).

Preparations of genitalia were made as mentioned by WEINBERG & BÄCHLI (1993). Some morphological terms are based on McALPINE (1981).

## RESULTS

In spite of some variability in the external morphology, we have found a series of characters enabling the distinction between two series of flies which we have identified as *C. flavimanus* and *C. maculipennis*. To complete the existing descriptions, we give a synoptic table containing the sexually dimorphic characters (Tab. 1) which easily allow a separation of the two species.

Tab. 1. Synoptic comparison of some characters of the external morphology of *Cyrtopogon flavimanus* (MEIGEN) and *C. maculipennis* (MACQUART).

Character	<i>Cyrtopogon flavimanus</i>	<i>Cyrtopogon maculipennis</i>
flagellomere 1	almost as long as scape and pedicel together	1.5 times length of scape and pedicel together
length of flagellomere 2	♂: $\frac{3}{4}$ of flagellomere 1 ♀: $\frac{1}{2}$ of flagellomere 1	♂ ♀: $\frac{1}{4}$ of flagellomere 1
gibbosity	most prominent at the upper half, its height at the antennal base is less than half the length of the scape; covered with short, straight, white hairs on both sides, black hairs on the middle, longer at the upper side, in frontal view looking like a dark patch on a white field	most prominent at the middle, its height at the antennal base is equal to this base; covered with long yellow-white hairs oriented to the proboscis, fine black hairs on sides and on top
wings	♂ ♀: smoke gray in the anterior part and between the base of discal cell and apical half	♂: clear at base, then milky to the middle, and with brown apex and a spot of the same colour, but lighter, between $cu_2$ and the half of the vein $an_1$ , the milky colour between the dark zones is obvious ♀: light smoke grey on the apical half
legs	♂ ♀: tibia black, tarsus yellow, last tarsomere with dark apex  ♂: fore basitarsus straight, as long as all the following tarsomeres together ♀: fore basitarsus normal, as long as the following 3 tarsomeres together	♂ ♀: tibia and tarsus red, dark only at the apex of tibia and the last tarsomere fore basitarsus normal, as long as the following 2 tarsomeres together

The differences found, particularly those in the shape of the genitalia, as mentioned below in detail, are considered to be constant enough for characterizing two different taxa. Therefore, the two species mentioned can no longer be kept in synonymy and the status as a bona species for *C. flavimanus* is re-established.

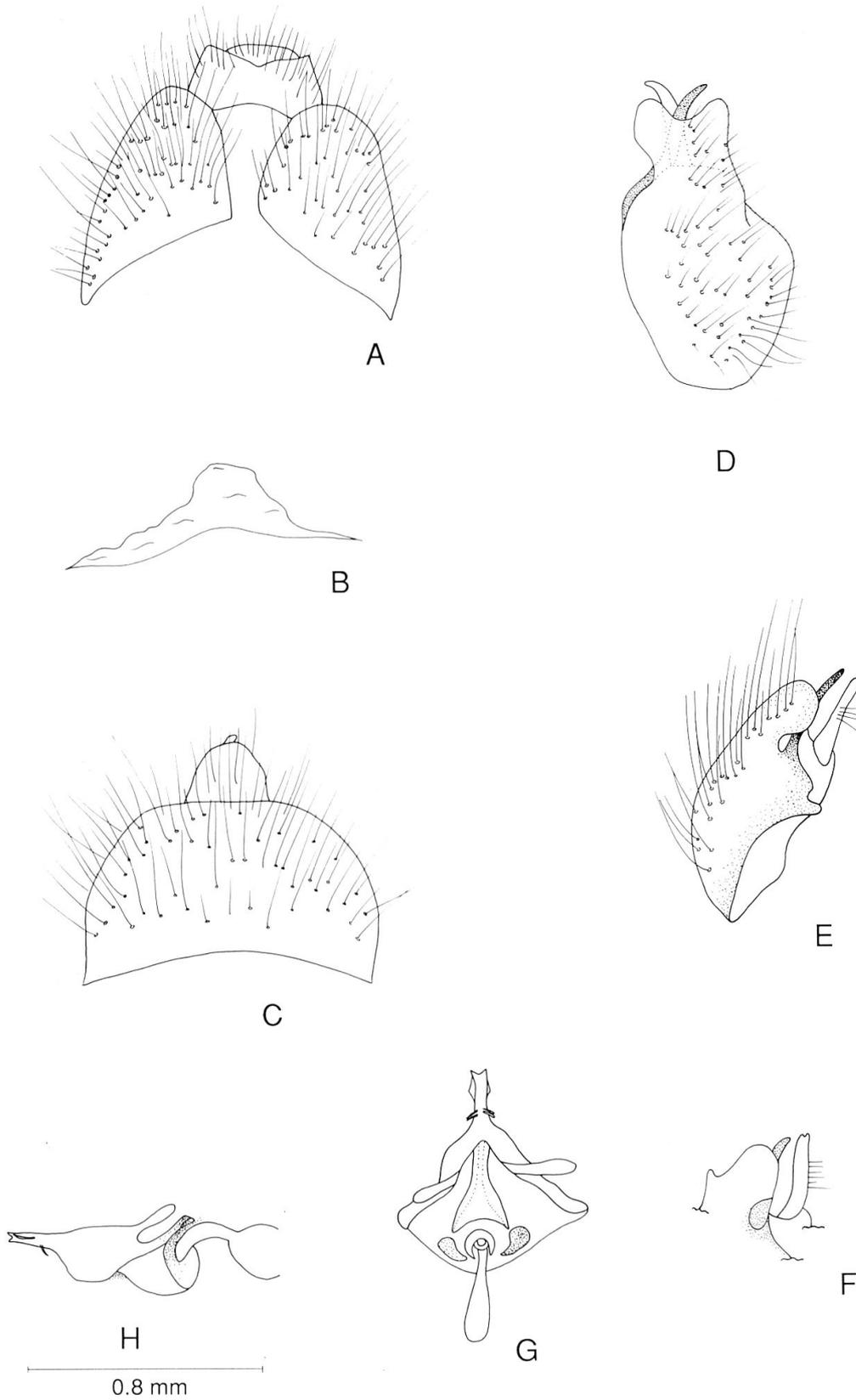


Fig. 1. *Cyrtopogon flavimanus*: Epandrium with cerci and anal plate (A); hyandrium, looked on top (B); hyandrium, dorsal view (C); gonopod, dorsal view (D); gonopod, lateral view (E); apex of gonopod (F), aedeagus, dorsal view (G), aedeagus, lateral view (H).

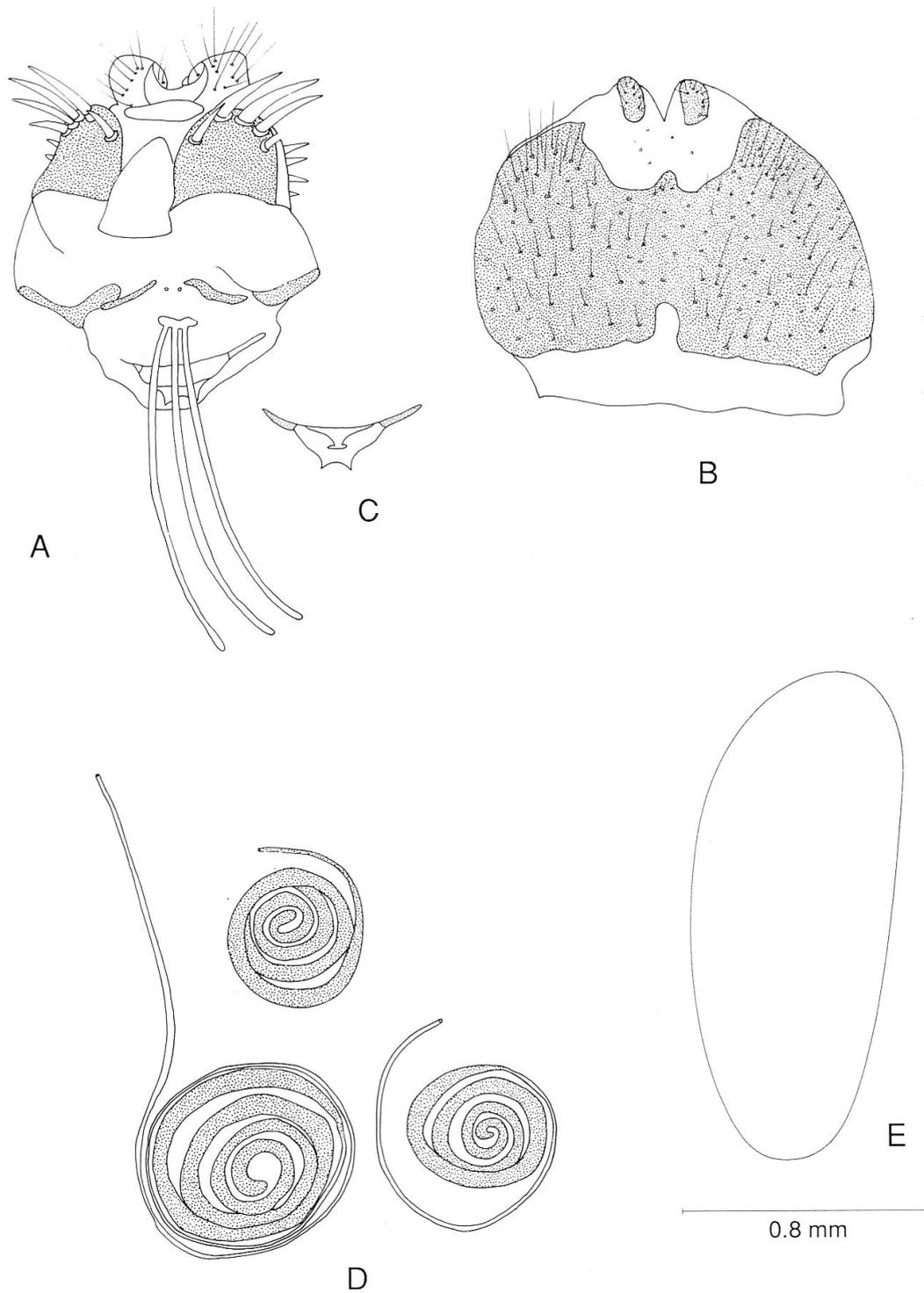


Fig. 2. *Cyrtopogon flavimanus*: Ovipositor (A); hypogyne (B); gonapodema, dorsal view (C); spermathecae, lateral view (D); egg (E).

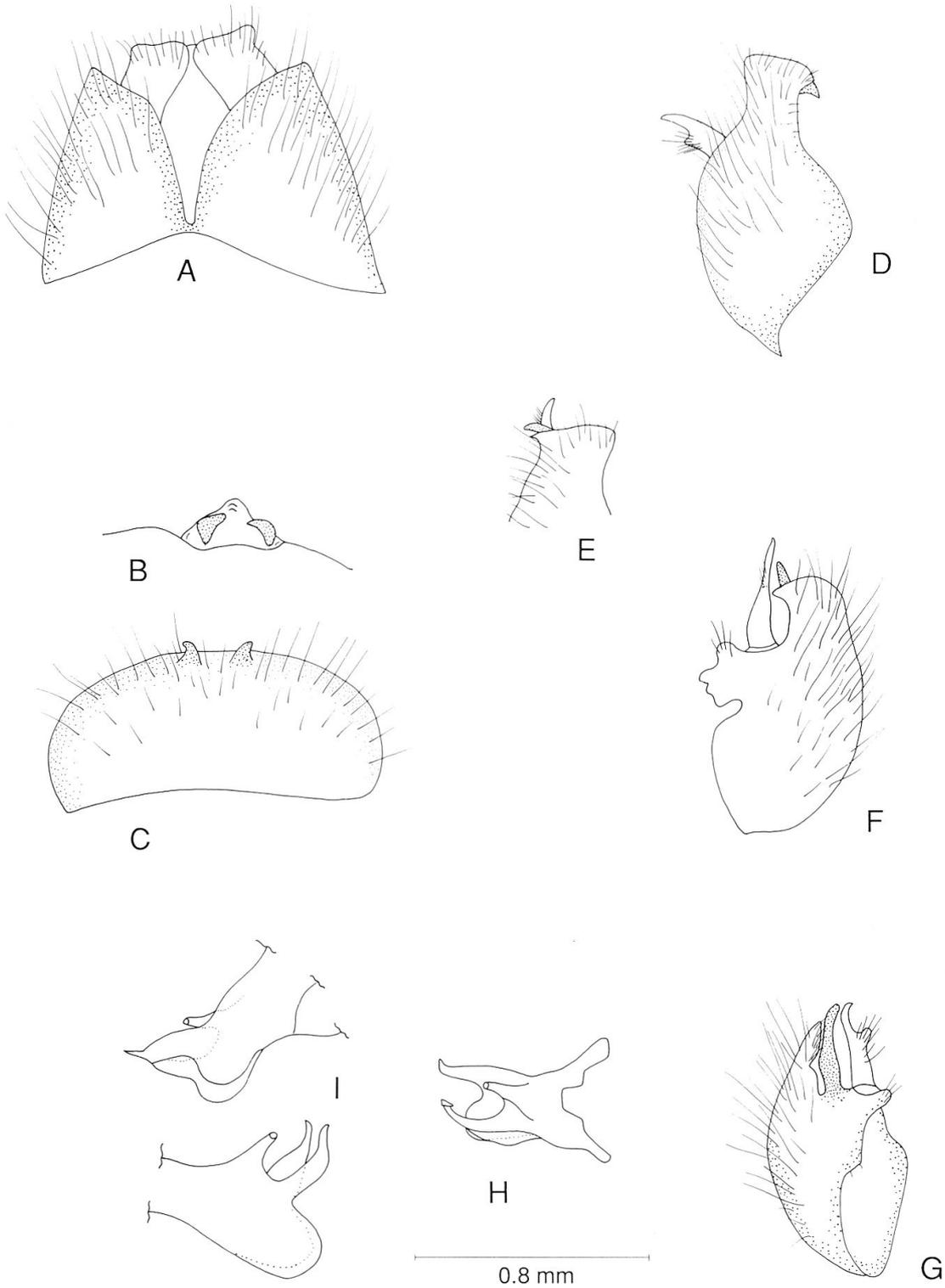


Fig. 3. *Cyrtopogon maculipennis*: Epandrium with cerci and anal plate (A); hypandrium, looked on top (B); hypandrium, dorsal view (C); gonopod, dorsal view (D); apex of gonopod (E); gonopod, latero-dorsal view (F); gonopod, latero-ventral view (G); aedeagus, dorsal view (H); aedeagus in two lateral views (I).

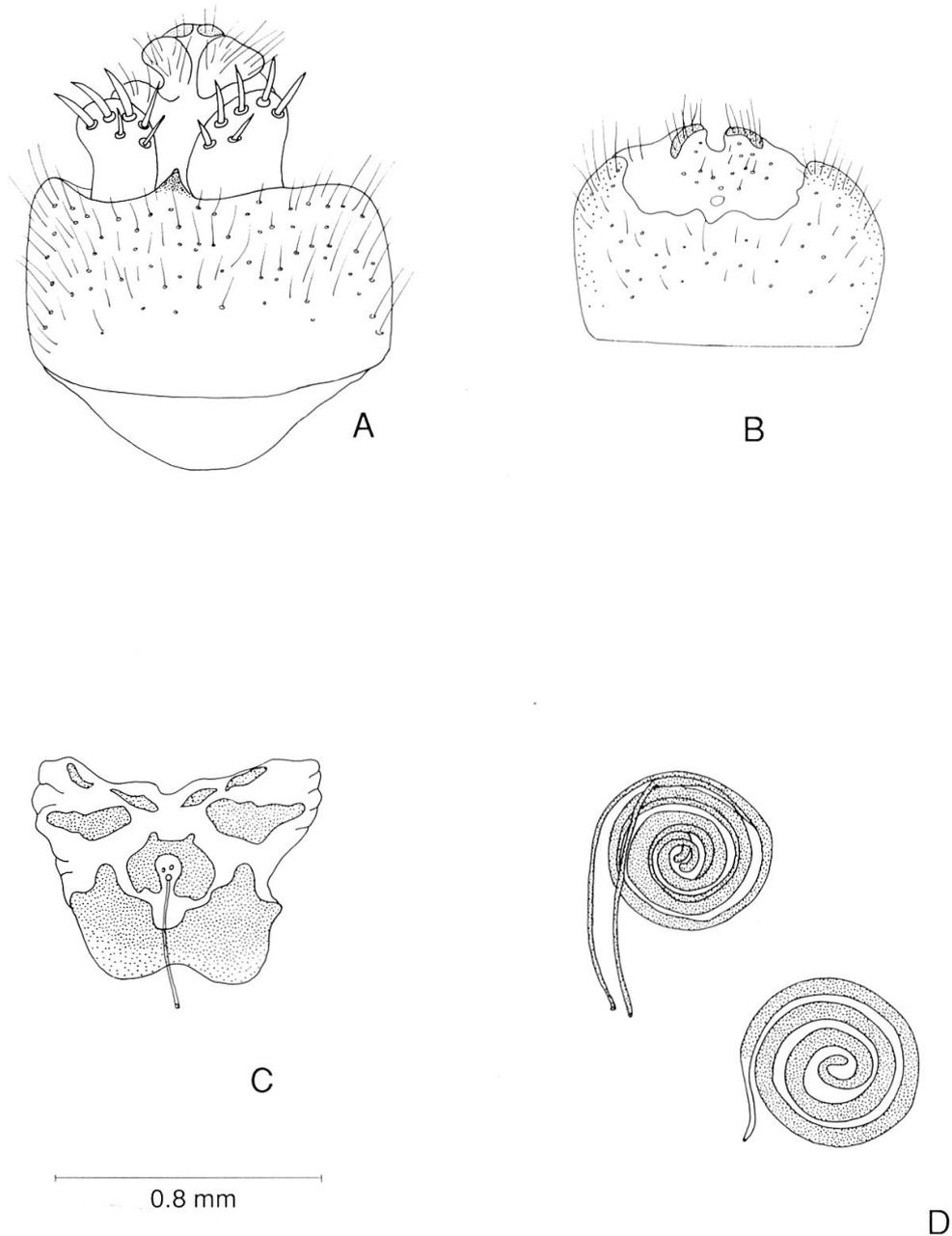


Fig. 4. *Cyrtopogon maculipennis*: Ovipositor (A); hypogyne (B); gonapodema, dorsal view (C); spermathecae, lateral view (D).

#### *Important differences in the genitalia*

In *Cyrtopogon* the epandrium is divided. The two parts are triangular with pointed apex in *C. maculipennis* (Fig. 3A), with rounded apex in *C. flavimanus* (Fig. 1A). Other differences were found in the apex of the hypandrium which is hooked on top in *C. maculipennis* (Figs 3B) and prominent, not hooked in *C. flavimanus* (Fig. 1B), and in the apex of the gonopodes (Figs 1D, 3D).

In *C. flavimanus*, the apex of the basistyle (Fig. 1D) shows 2 processes and a distinct concavity. The inner projection is laterally flattened and pointed at apex. The dististyle (Fig. 1E, F) has the same shape as the inner projection of the basistyle but is not strongly chitinized and is opposite.

In *C. maculipennis*, the apex of the basistyle (Fig. 3D) is straight, with the inner projection laterally flattened and pointed at apex, not much differing from *C. flavimanus*. The dististyle (Fig. 3G) shows 2 apical processes, the short one is haired.

The aedeagus also differs from one species to the other. In *C. maculipennis* (Figs 3H, I) it is broadened in the apical half, medially tubular, basally with two lateral, long, basally largely humped processes with pointed ends, in *C. flavimanus* (Figs 1G, H) it is conical with narrow apical half and with 6 denticules on it.

The ovipositors of both species differ in the number of the acanthophorite spines (Figs 2A, 4A), the density of the chitinization of the hypogyne (Figs 2B, 4B) as well as in the shape of the gonapodema (Figs 2C, 4C), in relation to the shape of the aedeagus.

#### DISCUSSION

In the first Palearctic Diptera Catalogue, BEZZI (1903:127) gave the female of *C. flavimanus* as a synonym of *C. maculipennis*, and he was followed in this view by SÉGUY (1927:84), ENGEL (1930:331) and HULL (1962:172). But both SÉGUY (1927) and ENGEL (1930) considered *C. flavimanus* as *bona species*, and they gave figures of the head profile to illustrate the shape of the gibbosity and also of the tarsus of the foreleg, which are both good characters. The differences in the shape of the gibbosity between the two species were also illustrated by TROJAN (1970:57).

What might have produced confusion is the sexual dimorphism existing in the two species: In the "Fauna Austriaca", SCHINER (1862:134-135) put both species in antithesis based on the wing colours, but without mentioning the sexual dimorphism of this character in *C. maculipennis*. In the "Palearctic Asilidae", ENGEL (1927:323-324) gave separate characters for the determination of males and females of *C. maculipennis*, giving as antithesis of the female of *C. maculipennis* the male and female of *C. flavimanus*. He described and figured the male of *C. flavimanus*, precised the wing coloration of both sexes and mentioned that the female of *C. maculipennis* does not show an evident spot on the wing which is the character of *C. flavimanus*.

In spite of these characteristics which clearly plead for the existence of two separate species, LEHR (1988) considered them as synonyms and erroneously invalidated the older name.

#### ACKNOWLEDGEMENTS

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