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Comments on the Mayfly Genus *Campylocia* with a Description of a New Species (Euthyplociidae: Euthyplociinae)

LEWIS BERNER¹ and THOMAS B. THEW²

ABSTRACT: The status of the mayfly genus *Campylocia* is reviewed and its relationship to *Polyplocia* discussed. Although the two genera are obviously closely related, they can be separated by the use of venational and tarsal differences. *Campylocia dochmia*, a new species from Brazil is described.

Several years ago a small collection of mayflies was sent to the senior author by Dr. M. A. V. D'Andretta, Departamento de Zoologia, Secretaria da Agricultura, São Paulo, Brazil. Included in the lot was a series of specimens, mostly males, of *Campylocia* which represents a new species. To clarify our understanding of the new form, it was necessary for us to make a careful study of available specimens of *C. anceps*, a closely related species. Dr. P. J. Darlington, Museum of Comparative Zoology, Harvard College, and Dr. Willis Gertsch, American Museum of Natural History, have kindly loaned us their specimens of *Campylocia*. Further, Mr. D. E. Kimmins, British Museum (Natural History), furnished us with a sketch of the genitalia of *C. anceps* prepared from the holotype and later used in his study of Ephemeroptera types (1960).³

Campylocia was first described by Needham and Murphy (1924), and the species, *Euthyplocia guntheri* Navás, 1920, *ampla* n. sp., *anceps* Eaton, 1883, and *burmeisteri* Hagen, 1888, were assigned to it. Subsequently, Gros and Lestage (1926) reviewed the family, erecting a new genus, *Longinella*, for *guntheri* Navás, 1920, and although they showed the species *burmeisteri* in their key to the species of *Campylocia*, they did not list it in their table of genera and species of the Euthyplociidae. Ulmer (1932, 1939, and 1942) considered the genus at some length, pointing out that the position of *burmeisteri* was still not clear but that he (1942, p. 104) would consider it to be a synonym of *anceps* ("Ich halte *Burmeisteri* für identisch mit *anceps*."), a conclusion which we accept. He requested Mr. Nathan Banks' permission to examine Hagen's type in the collection of the Museum of Comparative Zoology, but received no reply. We have been privileged to see this specimen of Hagen's, which has attached to it the following note in Hagen's handwriting: "Not named by Eaton. Forceps figure plate IV. f 7d. It is the third single male he saw." Hagen's specimen belongs to the new species we are describing below.

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³ Mr. Kimmins wrote to us with reference to the wings of *C. anceps*, "I have compared the wings of the type with Eaton's figure and consider that he has drawn them accurately."

In 1932 Ulmer concluded that *Longinella* Gros and Lestage = *Campylocia*, thus properly establishing the generic placement of *guntheri* Navás. Further, Ulmer (1942) synonymized *intercalata* Banks, 1918, *guntheri*, and *ampla* Needham and Murphy with *anceps*. No other species have been described in the genus since that date. *C. sikorai* (Vayssière) from Madagascar is retained in the genus by Demoulin (1952).

The most recent review of *Campylocia* is given by Demoulin (1952 and 1953) in which he presents a key to the subfamily *Euthyplociinae*. He differentiates *Campylocia* from *Polyplocia* Lestage, 1921, by claiming that in the mesothoracic wings the bifurcation of MA is clearly beyond that of Rs in *Campylocia* while in *Polyplocia* the bifurcation is practically at the same level. Further, he characterizes both genera as having four-segmented tarsi on the meso- and metathoracic legs. In his discussion of *Campylocia*, he shows that the venation in the wings of *C. anceps* is highly variable in the development of the marginal intercalaries of the radial, anterior median, and posterior median spaces. He cites Ulmer (1939) as doubting the position of the forking of MA and Rs being of any significance in separating the two genera and states that he is in agreement with this conclusion. However, he does believe that the position of the two cubital intercalaries are of much greater value in separating the two genera. In *Polyplocia* the cubitals join CuP, but in *Campylocia* only the longer joins CuA and is generally separated from CuP by at least a sigmoidal vein.

A careful study of our new species clearly indicates that Ulmer is correct in his doubts about the position of the forking of Rs and MA, as in the forewings of our form it occurs at the same level. This character is therefore no longer of use in differentiating *Campylocia* from *Polyplocia*, and if the two genera are really distinct, the only venational characteristic which will serve to separate them is that pointed out by Demoulin and described above.

Ulmer's (1942) detailed analysis of the venation of *C. anceps* clearly shows the degree of variability that is found in the forewing of this species. Our studies of Spieth's specimens reveal that the venational variations are consistent with Ulmer's drawings, especially with reference to the presence of one or two cubital intercalaries. Specimens, apparently taken at the same place and same time, show either one or two of these veins. Where there is a single intercalary it is attached to CuA, while if the second is present it is attached to the first and longer of the two. We have also noted that the forking of Rs and MA is variable as to the distance MA forks distally to Rs. In some of the American Museum specimens, the level of forking is separated by less than the distance of one crossvein from another while at the opposite extreme the forking may be as many as three crossveins apart.

In every available specimen of the species described below as *C. dochmia*, the forks of Rs and MA are virtually at the same level.

Whether this character alone would be of sufficient value to separate this species from *anceps* is questionable.

The metathoracic wing of *Campylocia* has IMP attached to MP₁, CuA, or unattached. Generally MP₂ is attached to CuA and does not fork with MP₁. Again, because of the variability of these veins it may not be correct to use their points of attachment as a generic characteristic. Ulmer's (1939) and Demoulin's (1952) drawings of hindwings of *Polyplocia* show that IMP is attached to MP₂ and MP has normal forking.

While studying the legs of *C. dochmia*, we discovered that the tarsi of the mesothoracic legs are five-segmented rather than four, as claimed by Demoulin for *Campylocia* and *Polyplocia* in his key to the genera. To establish the constancy of this characteristic, we have examined legs from several specimens of *C. anceps* (one of the specimens described as *C. intercalata* by Banks, and several specimens from British Guiana and Surinam which had been studied by Spieth, 1943) and in every case the midtarsus was consistently five-segmented. Whether the discrepancy in the number of tarsal segments on the mesothoracic legs can be used as a further means of distinguishing these two closely related genera must await a study of specimens of *Polyplocia*.⁴

The genitalia of *C. anceps* have been figured by several authors with some apparent differences. The illustration published by Kimmins (1960) should establish with certainty the species with which Eaton was working. Spieth's drawings, made from specimens collected in Venezuela and Surinam, show more details of the genitalic structures. The dome-shaped subanal plate in Spieth's drawing is also variable and the posterior edge of this structure may range from being almost truncate to as curved as illustrated by him. In *C. dochmia* the posterior edge of the subanal plate is broadly truncate and slightly emarginate. The penes of the two species are distinctive, those of *dochmia* having medial lobes that are lacking in *anceps*. A comparison of the genitalia of *dochmia* with Eaton's (1883) figure 7d, Plate IV, leads us to believe that he was dealing with the same forms we are describing below. Although details are lacking in this illustration, the shape of the subanal plate, as he shows it, is very similar to that of *dochmia*.

Table 1 shows that both males and females of *C. dochmia* are generally larger than *C. anceps*. Measurements of *dochmia* were difficult to make because of the way in which the specimens were preserved. The wings were crumpled when the insects were placed in alcohol by packing the whole series in a single vial. Attempts to straighten them for measuring almost always resulted in tearing the

⁴Dr. Demoulin (personal correspondence, February 15, 1961) has kindly re-examined his specimens of *Polyplocia* and confirmed that the second leg has four movable segments. Segment one is not defined on the dorsal surface of the tarsus and is fused to the tibia on the ventral side. Obviously it is not movable.

membrane. The posterior part of the abdomen of the females is recurved over the back so that their body length cannot be measured with any degree of accuracy.

TABLE I.—A comparison of the size of *Campylocia anceps* and *C. dochmia* (all measurements in millimeters)

	Wing		Body		Caudal filaments	
	Male	Female	Male	Female	Male	Female
<i>C. anceps</i> *	10-14.5	15-32	11-12	22-26	35	
<i>C. anceps</i> **	13-22	34	12-20		55	
<i>C. dochmia</i>	19-22.5	31-35	15-22	22?	52-62	56-64

* Measurements given by Spieth (1943).

** Measurements given by Ulmer (1942). He lists the wing length of only the largest female.

Campylocia dochmia, sp. nov.

MALE

Measurements.—Body-15.0-22.0 mm; forewing-19.0-22.5 mm; hindwing-8.5-9.5 mm; caudal filaments-52-62 mm.

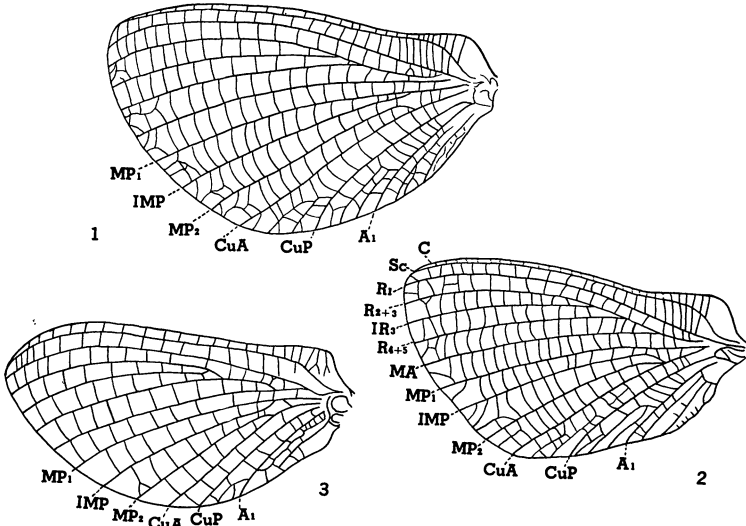
Head.—Purplish brown; vertex between compound eyes heavily shaded with black and with margins and paramedian longitudinal ridges deep purple; occiput light brown with extreme lateral areas and posterior margin suffused with dark purple and with two dark paramedian longitudinal stripes; face and vestigial mouth parts yellowish white, marked with purple. Antennal scape yellow, shaded with purple; pedicel light brown, with several purple longitudinal stripes; flagellum light brown, except whitish near base. Ocelli pale, ringed with deep purple at base. Compound eyes black and placed on stalk-like projections from vertex.

Thorax.—Light brown, with general suffusion of dark purple. Pronotal maculation composed of two areas; anterior one-fourth light brown, suffused with purple, with two small rounded indentations into lateral areas of second, darker area; anterior margin dark; posterior three-fourths of pronotum light purplish brown, with lateral and anterolateral margins dark and with dark transverse stripe on each side paralleling the posterior margin, but some distance from it; from each lateral indentation of first area to this transverse stripe, an oblique lighter area, bounded with purple-brown, which combines with transverse stripe where they meet to form black-brown oblong mark; median area pale, bound with dark brown, which is especially heavy anteriorly, where it is stippled with light brown; immediately lateral to this pale area anteriorly and adjacent to oblique light area, a small light brown triangle, finely bordered with purple; pleura light brown, marked with brown; prosternum yellow-white, suffused with very light purple and with sutures marked with dark purple. Mesonotum light brown, with general purplish suffusion and with

sutures purple; prescutellar and posterior paramedian sutures dark purple; scutellum light brown; triangular area of light brown present on posterolateral areas of scutum; pleura light brown, marked with dark purple, especially around wingbase and coxae; upper anterior region purple, stippled with light brown; mesosternum light brown, suffused with darker brown and with sutures purple; basisternum white, with mediolateral and posterolateral light brown blotches; immediately lateral to the posterior pair, a pair of purple blotches (outside of basisternum). Metanotum light yellow-brown, with median area hyaline and with posterior margin and posterolateral sutures dark purple; pleura and sternum as in mesothorax, except upper anterior region of pleura light brown.

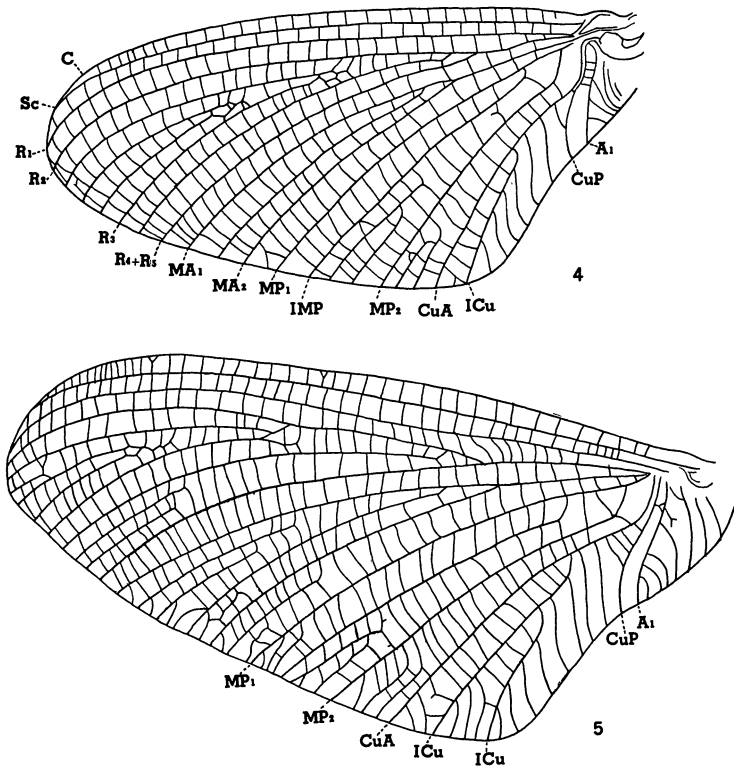
Wings.—Translucent, with purplish tinge, which is especially heavy in costal and subcostal interspaces in forewing. Longitudinal veins light purple; crossveins purplish. Venation as in Figs. 1, 2 and 5.

Legs.—Measurements: foreleg-16.3 mm; femur-4.5 mm; tibia-5.8 mm; tarsus-I-0.4 mm, II-2.1 mm, III-1.3 mm, IV-1.2 mm, V-1.0 mm; midleg-7.7 mm; femur-3.5 mm; tibia-3.1 mm; tarsus-1.1 mm; hind-



Figs. 1-3.—Hindwings of *Campylocia*. 1. *C. dochmia* with IMP attached to MP_1 and MP_2 attached to Cu A. 2. *C. dochmia* with both IMP and MP_2 attached to Cu A. 3. *C. anceps* from Surinam.

leg-8.2 mm; femur-4.3 mm; tibia-3.0 mm; tarsus-0.9 mm. Coloration: foreleg dark purplish brown; femur and tibia with dark longitudinal streaks; tarsal joints whitish and tarsal claws yellow. Mid- and hind-legs similar, except femur shaded with lighter purple. Legs and tarsal claws, as in Figs. 8a, c, e and 8b, d, f.



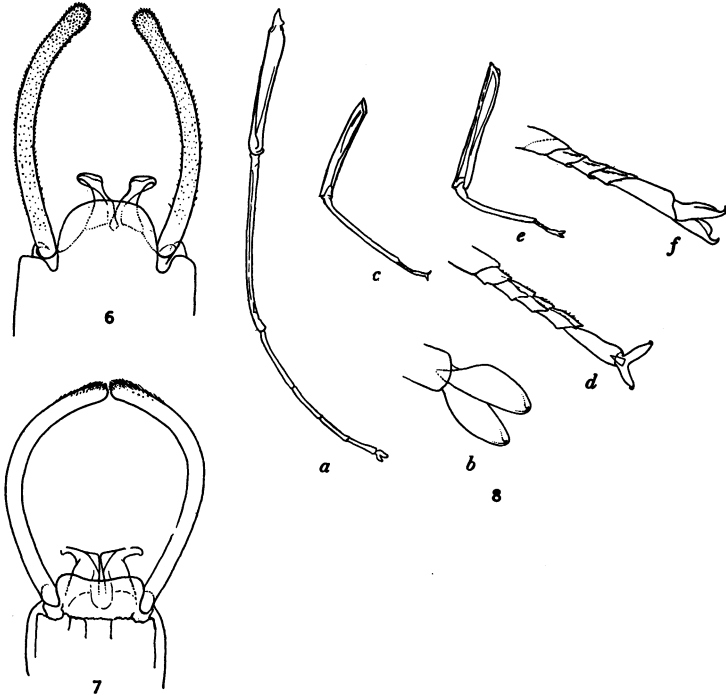
Figs. 4-5.—Forewing of *Campylocia*. 4. *C. anceps* from Surinam.
5. *C. dochmia*.

Abdomen.—Tergites purplish brown, stippled with pale brown and with median stripe, which is hyaline on anterior segments; anterior margin whitish, posterior pale brown; paramedian light, oblique stripe pointing to posterolateral corners, the extreme anterior and posterior ends of which are paler and thus appear as spots; oblique pale stripe arising from anterolateral corners and pointing inward, from the ends of which several very narrow, vine-like lines proceed medially; also, a small pale spot adjacent and slightly lateral to terminal end of this stripe; tergite 9 darker and with markings reduced; tergite 10 slightly paler than 9, with median and lateral stripes of pale brown and with dark brown oblique stripe arising from blackish area adjacent to anterior end of lateral stripes and ending at posterior end of median stripe; posterior margin brownish hyaline. Posterior margin of tenth tergite deeply incised producing broadly rounded median lobe and smaller lateral lobes separated by pale brown grooves. Pleura brownish, with dark brown spiracular markings. Venter pale brown hyaline, generally suffused with brown

laterally, which gradually becomes heavier and more inclusive posteriorly; posterior margin finely bordered with light brown.

Genitalia.—Yellowish white, tinged with purple, as in Fig. 7; forceps shaded with purple.

Caudal filaments.—Purplish, darker basally; joints pale.



Figs. 6-8.—Genitalia and legs of *Campylocia anceps* and *C. dochmia*. 6. Genitalia of *C. anceps* from Venezuela. 7. Genitalia of *C. dochmia*. 8. Legs of *C. dochmia*. a. foreleg, b. tarsal claws of foreleg, c. middle leg, d. tarsus of middle leg, e. hindleg, f. tarsus of hindleg.

FEMALE

Similar to male, with the following exceptions:

Measurements.—Body-22.0 mm?; forewing-31.0-35.0 mm; hindwing-13.8 mm; caudal filaments-56-64 mm. Pronotum with first light colored area extremely reduced; posterior area darker than in male, but with substantially the same pattern. Abdomen with same general maculation as male, but darker.

Holotype, male.—Brazil, Est. Minas Geraes, Sapucaí-mirim (Cidade Azul-1400 mts.), Trav. F°. Nov. 5, 1953. C. Gans and S. Medeiros, collectors. Taken at light and preserved in alcohol. No. 3362.0, University of Florida Collections.

Allotype, female.—Same data as for holotype. No. 3362.0, University of Florida Collections.

Paratypes.—21 males, 1 female. Same data as for holotype. 14 males, 1 female in the University of Florida Collections; 2 males in the collection of Thomas B. Thew; 3 males in collection of Dr. George Edmunds, University of Utah; 2 males in collection of Departamento de Zoologia, Secretaria da Agricultura, São Paulo, Brazil.

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