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The Types of Bibionidae (Diptera) in the Naturhistorisches Museum, Wien *)

By D. Elmo Hardy

Professor of Entomology

University of Hawaii

Honolulu, Hawaii

(Mit 4 Textabbildungen)

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One of the most important collections of Bibionidae in European museums is present in the Naturhistorisches Museum, Wien. I had an opportunity to study this material in 1960—61 and to prepare notes and descriptions on the types. Many of the species, especially in the old collections of Wiedemann and Schiner, were based upon syntype series and I have designated lectotypes for these.

I am grateful to Prof. Dr. Max Beier for the kind cooperation given me while working at the Museum.

Types of the following authors are present in the collection: B. A. GIMMERTHAL; O. DUDA; H. LOEW (neotype by F. W. EDWARDS); D. E. HARDY; J. W. MEIGEN; I. R. SCHINER; C. R. W. WIEDEMANN; and J. W. ZETTERSTEDT. The species are treated in their correct combinations.

Penthetria motschulskii (GIMMERTHAL)

Crapitula motschulskii GIMMERTHAL, 1845: 330.

The type male is in good condition except that only one leg (right middle) remains. This is a *Penthetria* resembling *japonica* Wiedemann except that it is slightly smaller, vein M1 is not joined with the r-m crossvein and M1+2 extends beyond the crossvein, also the male genitalia are distinctive (Hardy and Takahashi: 1960: 391, figs. b-c). The genitalia of the type have not been dissected but my concept of this species appears to be correct and the description in the above cited reference is adequate.

The type is labeled "Russland, Alte Sammlung, Schiner, 1869."

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The collection also contains one specimen from "N. Mongolia, Leder, 1892," seven labeled "Schrenk Amurgebiet, 1854—55" and three labeled "Transbaik Pjestschanka..., VII—18."

Plecia confusa Loew, 1858: 109

This was a change of name for *P. ruficollis* Fabricius, 1805, as distinguished from *Plecia ruficollis* Fabricius, 1781 (Cape of Good Hope, not Middle America). Loew did not designate a type of *confusa*, no such specimen has been found in any of the European museums. Edwards selected a specimen in the Naturhistorisches Museum, which had been determined as *ruficollis* Fabricius by Wiedemann, as a neotype of *confusa* Loew. The specimen is labeled "Brazil", according to Edwards (notes sent in correspondence to the writer) it was from Bahia. The neotype is a male in rather poor condition. It has been dissected by Edwards and the genitalia are mounted in a drop of balsam on a celluloid card beneath the specimen. The abdomen is glued onto the paper point and only the wings and thorax are intact on the needle. The head and legs are missing.

This species has been adequately described and figured in my revision (1945: 402).

Plecia conjugens (Schiner)

Hesperinus conjugens Schiner, 1868: 23.

This is a *Plecia* and fits in couplet 15 of my revision (1945: 392) with grisea Edwards. It differs from this species by having 10 segments in the antennae of the male, rather than 8; by having the eyes of the male distinctly dichoptic, separated on the front by almost the width of the median ocellus, rather than being holoptic; and by having the rostrum short, scarcely one-half as long as the antenna and the face not produced, scarcely extending beyond bases of antennae. In grisea the rostrum is rather elongate, almost equal in length to the antenna and the face is distinctly produced beyond the bases of the antennae. P. conjugens also appears to be smaller, the type measures 5,0 mm. for the body and 6,5 mm. for the wings. P. grisea measures 6,5—7,5 mm. for the body and 7,0—9,0 mm. for the wings. The male genitalia are probably different, the type has not been dissected and the parts of the genitalia are not clearly visible enough for comparison them. The claspers do not appear to be as prominent as they are in in situ specimens of grisea but these have not been compared.

The type male is from "Novara-R., Rio de Janeiro, Brazil", and is in good condition.

Plecia costalis Wiedemann, 1830: 618.

Four specimens are in the collection, one female is labeled "type" but is obviously a cotype. It is labeled "Coll. Winthem-Cassapawa" (Brazil). These specimens were in Wiedemanns private collection. The type is in the Zoological Museum, Humboldt University, Berlin.

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Plecia gilvipennis HARDY, 1949: 94, figs. 1A-B

The type, allotype and three paratypes are present from Sikora, Madagascar.

Plecia impensa HARDY, 1957: 238, figs. 1-2

Type male from BILIMEK, Mexico.

Plecia imperialis Schiner, 1868: 22

The collection contains 13 females and 1 male from LINDIG, Venezuela, 1864. All labeled type. I have designated the male specimen as a lectotype.

My treatment of this species (1945: 411, figs. 145 a—b) is adequate except that the costal margin is brown rather than black. The key to the species on papers 392 and 393 should be modified slightly. The second part of couplet 20 should read: "Wings chiefly brown to black fumose, or at least dark brown along the costal margin," and the second portion of couplet 23 chould read: "costal margin dark brown to blackish."

It should be noted that *imperialis* SCHINER is the first available name for *costalis* Walker, 1856: 422, nec Wiedemann, 1830: 618 (Ref. Hardy, 1956: 86). Also that the original description gave the type locality as Colombia. Apparently at the time of the Reise Novara Expedition, Venezuela was included with in the boundaries of Colombia.

Plecia madagascariensis HARDY, 1949: 95, figs. 2A-B

Type male and one paratype from Sikora, Madagascar.

Plecia platystylus HARDY, 1957: 239, figs. 3-4

The holotype male and allotype female labeled "Venezuela, 1857" are mounted on the same pin.

Plecia similis Rondani, 1850: 193

Plecia minor Jaennicke, 1867: 318

A series of eleven specimens in the old collection from Brazil were determined as $P.\ minor$, apparently by Jaennicke. These are simils Rondani and confirm this synonymy.

Plecia tenebrosa Hardy, 1958a: 215, figs. 26a-b

Type male and one male paratype from Java, coll. Winthem.

Plecia zernyi HARDY, 1952: 89, figs. 12a-c.

Type male and two male paratypes from "Mitomoni, Nyassa-See, Randberge o. v., Mbanba-Bai" (Africa).

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Bibio caucasicus Duda, 1930: 48

The type male is in the collection "Caucasus Araxesthal, Reitter, 89". It is in excellent condition.

This species fits near *Bibio reticulatus* Loew. It is differentiated by having only six segments in the flagellum of the antennae, by the dark brown costal cell and the small, rather inconspicuous stigma. In *reticulatus* the costal cell is hyaline and the stigma is large (normal in size for most *Bibio*). The short palpal segments of *caucasicus* also appear to be distinctive. The last two segments are scarcely one-half longer than wide and each is equal to slightly less than the length of the first flagellar segment of the antenna. In the specimens of *reticulatus* which I have examined the last two segments of the palpus are rather slender, approximately $2\frac{1}{2}$ times longer than wide and almost equal in length to the combined lengths of the first two flagellar segments.

Bibio clavipes Meigen, 1818: 317

Bibio dorsalis Meigen, loc cit, page 318 is a synonym. Meigen described the male as clavipes and the female as dorsalis. One female is in the collection labeled "dorsalis collection Wiedemann" and containing another handwritten label "B. dorsalis mihi, hirtea dors. Mgl. Austria". It is also labeled "type". This is apparently Meigen's type of dorsalis. It fits well with the other female specimens of clavipes in the collection. The female is obviously quite variable in coloration. The thorax of the type is predominantly rufous with three broad, black vittae down the mesonotum. Specimens vary from those which have the thorax entirely black except for the humeral ridges to those which have the thorax entirely rufous except for a faint indication of a brown median vitta.

Bibio dispar Schiner, 1868: 20

Two males and two females are in collection labeled "Lindig,1864, Venezuela," each is labeled type. I have selected one male as the lectotype. My concept of this species is apparently correct (Hardy, 1953: 347).

Note: Schiner in the original gave the type locality as Colombia.

Bibio femoratus Wiedemann, 1820: 35 and 1821: 35

The type female is in fairly good condition except that only two legs (one front and one middle) remain and the antennae are lost. This specimen contains the label "femorata collection Wiedem". My concept of this species (Hardy, 1945: 463 and 1958b: 16) is correct. It should be noted, however, that the Wiedemann "1828: 79" was not correct.

Bibio fulvicollis fulvicrus Duda, 1930: 54

This was described by Duda as "fulvicrus n. sp. oder var. von fulvicollis GIMM." DUDA differentiated it by fulvicrus having 7 segments in the flagellum while fulvicollis is supposed to have only 6 distinct segments, also by the tibiae and tarsi of the female being yellow-red rather than black and the tibiae and tarsi of the male being not entirely black, more or less dark vellowbrown. I see no differences in the antennae of the two, the seventh segment of the flagellum is small, joined rather closely to the sixth and not clearly differentiated in either. The legs of the males show some variation in coloration. The tibiae and basal segments of the tarsi vary from yellow, tinged slightly with brown in one specimen, about half and half brownish yellow in another, and predominantly brown, tinged lightly with yellow in the third specimen. The tibiae and tarsi are dark reddish brown, tinged faintly with black in the two males of fulvicollis which I have examined. The three females of fulvicollis which I have studied have the tibiae and tarsi brown. The four female specimens of fulvicrus on hand have the tibiae and tarsi predominantly rufous, tinged with brown only at the apices of the segments. This is the only character which I find to separate these and I doubt that this is more than a subspecies of tulvicollis.

Two males and one female are present "labeled Transbaik, Pjestschanka b. Tschita, H. Fried m. VI. 1/8" and one male and three females "N. Mongolei, Leder 92". All are labeled type. I have selected one male from Transbaik as a lectotype.

Bibio tulvipes (Zetterstedt)

Hirtea tulvipes Zetterstedt, 1838: 799 .

Two males and two females are in the collection labeled with what appears to be "St. Elvio VIII—88". One male specimen contains a label "umbellatarum Zett.". All contain red type labels. These obviously were not from Meigen's type series and I am not sure whether or not they were from the type series of umbellatarum Zetterstedt. These do not seem to be part of the series mentioned by Duda (1930: 54), he gives no mention of this locality. It is not indicated who might have put these specimens under fulvipes. I am not designating a lectotype since there is no way of knowing whose specimens (or species) they represent.

Bibio graecus Duda, 1930: 59 new combination

In the original Duda recorded five males and one female from "Parnass, Griechenland". This series is in the collection labeled "Parnass Oertzen, Gar. graecus, det. Duda". Each specimen contains a type label. I have selected one male as a lectotype.

Duda described this as a variety of hortulanus but allied this species to marci because of the all black pile of th thorax of the male and separated it

by having pale pile on the sides of the anterior portion of the abdomen. He also said the males are very difficult to separate from *siculus* (the females of the above mentioned species are very distinctive). The specimens have the anterior portion of the wing including cell R and the upper portion of cell R5 pale brown fumose and the posterior portion of the wing is infuscated with pale yellow-brown. The thorax is entirely black haired. The abdomen has gray hairs on the sides.

I am raising this to species rank because of the distinctive coloration of the wing in combination with the black body pile.

Bibio handlirschi Duda, 1930:56

The collection contains 14 specimens all labelled type, 10 males and 4 females, from the following localities: Two males, "Austr. inf. Donauauen, 1. 5. 84. and 15. 5. 81 HANDL." (HANDLIRSCH); "one specimen, Austr. inf. Wien, 6. 5. 79. Mik." Two specimens labelled "Prater", one collected 20. 5. 81 by Becher and one collected 10. 5. 1841 by Egger; two specimens labeled "Kaufm."; one, "Morea Cumani, Brenske, Mik." Five labeled 25. 466. "Bgst" (Bergenstamm) and one labeled "26489, Bgst." I have picked one male labeled "Austr. inf. Donauauen. 15. 5. 81 (Handlirsch)" as the lectotype. Two specimens have been determined in the collection as albipennis Meigen by Handlirsch.

This species is readily differentiated from nigriventris Haliday, 1833 (syn. of albipennis Meigen, 1830, nec albipennis Say, 1823) by having 7 distinct segments in the flagellum of the antenna, rather than 5; as well as by other characters as given by Duda. One of the characteristic features of handlirschi is that the integument of the mesonotum is finely shagreened, this is especially noticeable on the sides. For more complete details refer to Duda, page 56.

Bibio hortulanus (LINNAEUS)

Tipula hortulana Linnaeus, 1758: 588.

Bibio hortulanus var. hispanicus Duda (1930: 58), new synonym of B. hortulanus.

Duda indicated that variety *hispanicus* fits between *hortulanus* s. str. and *marci* Linnaeus.

The only point that I can see that Duda might have used for separating hispanicus from typical hortulanus is that the scutellum has all black pile rather than having some white pile intermixed. This is a variable character and I do not consider this of even varietal importance. The scutellum is predominantly black haired in this species, in some specimens the pile is entirely black and in others just the tips of the hairs on the sides will be gray. Duda said that the females differed by having the wings more intensely brown fumose on the front margins. I see no difference at all in the wing coloration.

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Three males and one female are in collection from "Madrid, Escorial". All are labeled "type". I have selected one male as a lectotype.

Bibio imitator Walker, 1834: 470

Bibio helioscopes Schiner, 1868: 20.

SCHINER'S type male, labeled "Novara R., Sydney", is in good condition. This is a typical *B. imitator* Walker and confirms the synonymy with that species.

Bibio lanigerus Meigen, 1818: 317

One male is in collection labeled "type laniger" with a second word which appears to be "Lusitan.". I cannot be sure that this is the actual type. The only data which Meigen gave in the original was that the species was from Portugal and the specimen was from the Hoffmannsegg collection.

Duda has treated this species adequately (1930: 61). The specimen above may be the one Duda mentioned having been determined by Schiner as "laniger" from Holland.

Bibio nigropilosus Duda, new combination (fig. 1)

Bibio hortulanus var. nigropilosus Duda, 1930:60.

The collection contains two cotypes, one male, one female, from "Ober. Murgab., IV—87. Reitter, 1894, Turkmenien", and also two female specimens containing the same data but labeled by Duda as "female? *nigropilosus*". I have designated the male as the lectotype.

I am raising this to species rank on the basis of the characters of the male. It is readily differentiated from *hortulanus* by the brown posterior veins of the wing and by the all-black pile on the thorax. The last segment of the palpus is about two times longer than wide. The hind leg of the type is as in figure 1. The body of the male measures 5,7 mm. I am unable to differentiate the females from *hortulanus* and am not sure that this series was correctly associated with the male.

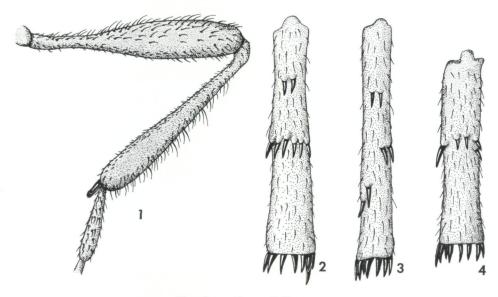
Bibio rufithorax WIEDEMANN, 1828: 78

The type female is in the collection. It is in rather good condition and labeled "Pennsylvanian, rufithorax, coll. Winthem". My concept of this species is correct (1945: 483, 1 figs. 201 a—f; 1958: 19, figs. 19 a—c).

Bibio superfluus Schiner, 1868: 20

Two females are in collection from LINDIG, 1864, Venezuela. Each is labeled type. I have selected one as the lectotype. The original description gave the type locality as Colombia ("Columbien").

This is a moderately large species characterized by having the thorax of the female entirely rufous, the legs entirely dark reddish brown to black, and the wings brown fumose. The following notes are based on the type. The inner spur of front tibia is short, scarcely one-fifth to one-fourth as long as the outer. The hind tarsi are slender. The basitarsus is almost two-fifths as long as the tibia. The spurs of the hind tibia are rather slender. The flagellum of the antenna has 7 distinct segments. The heat is not produced beyond the bases of the antennae and scarcely beyond the eye margins. The front is entirely dull black and almost bare except for a few short hairs on the upper median portion. The portion of the head behind the eyes is almost equal in length to the eye. The palpi are moderately slender. The apical segment is about three times longer than wide. The anterior portion of the wing is dark brown fumose. The stigma is almost concolorous with the membrane. The posterior portion is light brown and the posterior veins are brown, distinctly darker than the membrane. Veins M2 and M3+4 evanesce before reaching the wing margin. The costa ends slightly beyond the apex of Rs. The r—m crossvein is about equal in length to the base of Rs. The abdomen is dark brown.



Explanation of figures

- 1. Bibio nigropilosus Duda, hind leg.
- 2. Dilophus pictus Schiner, front tibia.
- 3. D. lucifer Schiner, front tibia.
- 4. D. rubiginosus Duda, front tibia.

Length: Body 9,75 mm.; wings, 11,0 mm.

Six additional females and two males are in the collection labeled Colombia, Brazil, Paraguay, and one labeled Mexico (female). The vary somewhat in size. The smallest measures 6,4 mm. for the body and 8,0 mm. for the wing. The two males under this name are considerably smaller than the females.

They are labeled "Siebric, Paraguay, S. Bernardino". They measure 6,5 to 7,5 mm. for the body and 5,8—6,4 mm. for the wings. The males are entirely black except for the yellow humeral ridges and are characterized by the rather dark brown fumose wings. The entire wing is rather intensely fumose, darker brown along the anterior portion. The posterior veins are brown and veins M2 and M3+4 do not reach the margin. The thorax is entirely pale yellow pilose and the abdomen is predominantly so. The antenna contains 7 segments. The last two are rather closely joined. The last segment of the palpus is 3 times longer than wide. The hind femur is club-shaped. The basal half is attenuated. The hind tibia is shorter than the femur. The apical spurs are slender, sharp-pointed. The hind tibia is not swollen, moderately slender, approximately one-third as long as the tibia and about equal in length to the next two tarsal segments. The mesonotum is shining black, not distinctly rugose.

Bibio turcmenicus Duda, new combination

Bibio hortulanus var. turcmenicus Duda, 1930: 60.

The collection contains three males and seven females labeled "Sary Yasi III. 87, Reitter, 1894, Turcmenia". All are labeled "type". I have selected one male as a lectotype.

The males are readily differentiated from other species of the *hortulanus* complex by having the posterior veins colored pale brown and the pile of the thorax, abdomen, and coxae yellow-white. It is a comparatively small species, the smallest of the *hortulanus* complex. Duda measured the body as 5,0 mm. The specimens vary from 5,0 mm. to 5,7 mm. for the body and 4,65 mm. to 5,0 mm. for the wings.

The male body is entirely shining black with the exception of the yellow humeral ridges. The body pile is predominantly yellow-gray and is rather short. The last segment of the palpus is about three times longer than wide. The hind tibiae are moderately haired, the longest of the dorsal hairs are approximately equal in length to the width of the segment. The hind metatarsi are slender, approximately one-third as long as the tibiae. The wings are brown along the costal margin, the anterior portion including cell R is pale yellow-brown. The posterior veins are yellow-brown, distinctly darker than the membrane. The r—m crossvein is very short, about one-fifth as long as the basal section of Rs.

The females differ from most species of this complex by having the wings entirely infuscated, lacking the white apex. In this regard, they apparently fit near rufiventris (Duda) (= "hortulanus var. japonicus" Duda 1930: 59) and hortulanus major Duda, 1930: 59, but differ by being much smaller. The upper half of the front is finely rugose and the last palpal segment is about two times longer than wide. The wing coloration is rather similar to that of the male except that the wings are more intensely infuscated with yellow-brown.

Bibio varipes Meigen, 1830: 317

One male in the collection labeled "varipes, coll. Winthem" and containing a "type" label is apparently Meigen's type. It is in excellent condition except that one front leg is broken off. Duda's treatment of this species (1930: 70) seems to be adequate, he gave the reference, however, as "1818".

Bibio xanthopus WIEDEMANN, 1828: 80

The type female is in good condition except that the two hind legs and one middle leg are lost and part of the abdomen is broken. It is labeled "New York, collection Winthem." This fits my concept of the species (Hardy, 1945: 491, and 1958b: 22). The type has the inner spur of the hind tibia slightly over half as long as the outer, approximately three-fifths as long.

Dilophus lucifer Schiner, 1868: 18 (fig. 2)

Type female in good condition. "LINDIG 1864, Venezuela" — the locality was given as "Columbien" in the original.

A moderately large species. The thorax is predominantly rufous, the portion in front of the combs is brown and the scutellum is brown. The head is black, the rostrum is not produced beyond the bases of the antennae and is scarcely over half as long as the eye. The two basal segments of the antennae are yellow-brown, the flagellum is black and contains 10 segments. The anterior thoracic comb is distinctly divided into two sets containing 7 teeth on each side. The separation between the combs is equal in width to three or four of the teeth. The legs are dark brown to black, tinged with rufous on the femora and coxae. Each front tibia has three sets of spines: two spines situated near basal one-forth of the segment and six or seven located at the middle (fig. 2) (one leg has six spines and one has seven). The tibial spur is comparatively large, about twice as large as the apical spines. The abdomen is velvety brown. Wings light brown fumose, darker along the costa. The stigma is dark brown.

Length: Body and wings, 9,6-9,9 mm.

Dilophus pallens (BLANCHARD)

Acanthocnemis pallens Blanchard, 1852: 357.

The female specimen which Schiner (1868: 19) recorded as pallens "aus Columbien" has the front legs broken off and cannot be definitely placed. It may possibly be the female of D. pictus Schiner although the rostrum is greatly produced, nearly half again as long as the eye and about equal in length to the head measured from the front margin of the eye to the hind part of the head. Blanchard's type should be checked carefully, it is possible that pictus is a synonym of pallens. The head of the male of pictus, however, is not elongated, the rostrum extends scarcely beyond the bases of the antennae and in this regard it is probably distinct.

Dilophus pectoralis WIEDEMANN, 1828: 76

Three females labeled "type" from Montevideo, Brazil. I have selected one as lectotype. Three males are present in the Wiedemann collection which also contain the same data. These had been labeled "thoracicus" by Wiedemann. They were not labeled type. The collection also contains a series of females labeled "Brasilia, coll., Winthem".

Female thorax all rufous. The rostrum is elongate, about equal in length to the lower portion of the compound eye and approximately equal in length to the antenna. The front and middle coxae and femora are predominantly rufous, the latter have black tips. The legs are otherwise black. Two sets of spines are present on front tibia with five or six spines in a row just above the middle of the segment. The apical spur is nearly twice as large as the apical spines. The wings are moderately dark brown fumose. The mesonotum of the male is predominantly rufous, black on the anterior portion and down the middle, sometimes the black median marking extends the full length of the mesonotum, dividing off two large red spots. Thorax and legs otherwise black.

Dilophus pictus Schiner, 1868: 19 (fig. 3)

Type male "Lindic, 1864, Venezuela" in good condition. The original description gave the type locality as Colombia ("Columbien"). The thorax is entirely yellow to rufous except for a brown area in front of the anterior comb and for a brown vertical stripe extending over the sternopleuron and the mesopleuron. Legs almost all yellow, brown to black at the apices of the tarsi. The spines of the front tibia are arranged in four rather distinct sets (fig. 3): two near basal one-third of segment, two at middle, two at apical one-fourth, plus the apical set. The apical spur is approximately equal in length to the spines. The antenna is almost all yellow, tinged slightly with brown at the apex. The flagellum appears to be seven segmented although the apical portion probably consists of two fused segments. The rostrum is slightly produced beyond the bases of the antennae. The knobs of the halteres are brown. The abdomen is dark brown to black. The wings are lightly infuscated, the stigma is brown. The costa ends about two-fifths the distance between the apices of Rs and vein M1+2.

A moderately small species. Body 3,7 mm.; wings 3,3 mm.

Dilophus pusillus WIEDEMANN, 1828: 77

Type female in good condition from Pennsylvania, "coll. WINTHEM". This is a synonym of D. stigmaterus SAY, 1823: 78. The type fits in all details.

Dilophus rubiginosus Duda, 1930: 35 (fig. 4)

Type female labeled "SCHRENK, Amurgebiet, 196". (SIBERIA). In good condition except that the antennae are broken off and the extreme wing tips are broken.

Duda's description is adequate. This is an almost all rufous species, discolored with brown on the head and with black at the apices of the tarsi. The front tibia has 5 spines near the middle of the segment (fig. 4). Duda recorded only 4 spines. The rostrum is scarcely developed beyond the bases of the antennae and is about one-half as long as the eye. The halteres are yellow, tinged faintly with brown at their apices. The body and wings measure 5,1-5,35 mm.

Dilophus strobli Duda, 1930: 36

Type male labeled "Lyon, Coll. WINTHEM". In fair condition, some of the legs are missing and the genitalia have been broken off. This species has been adequately treated by DUDA.

Dilophus tapir Schiner, 1868: 18

Two female specimens labeled "LINDIG, 1864, Venezuela" are marked "type". I have selected one of these as a lectotype.

An entirely polished black species with the rostrum produced distinctly beyond the bases of the antennae and equal or slightly longer than the eye, and with the wings dark brown fumose, darker along the anterior margin. Two sets of spines are situated on the front tibia; five spines are in the middle set. The spur is slightly larger than the apical spines.

Length: Body, 7,1-7,45 mm.; wings, 8,15-8,5 mm.

Dilophus tenuis Wiedemann

The original is in Meigen, 1818: 308. He quotes the description from Wiedemann.

The type male is in excellent condition and is labeled "Lusitan., Coll. Winthem. tenuis det Wied.".

It is differentiated from *strobli* by the thickened hind tibiae and basitarsi, and by having the rostrum distinctly developed beyond the bases of the antennae. The species has been adequately treated by Duda (1930: 37).

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