CONTRIBUTIONS IN SCIENCE

REVISION OF THE NEW WORLD SPECIES OF OPACIFRONS DUDA (DIPTERA, SPHAEROCERIDAE, LIMOSININAE)

S. A. MARSHALL AND R. LANGSTAFF
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REVISION OF THE NEW WORLD SPECIES OF OPACIFRONS DUDA (DIPTERA, SPHAEROERIDAE, LIMOSININAE)

S. A. MARSHALL\textsuperscript{1,2} and R. LANGSTAFF\textsuperscript{1}

ABSTRACT. The genus Opacifrons Duda is redefined and revised for the New World. Keys and descriptions are given for the 17 New World Opacifrons species, and the Hawaiian species O. aequalis (Grishaw) is diagnosed in the key. The phylogeny of the New World, Pacific, and Palaeartic species is discussed. Leptocera (Opacifrons) collesi Richards and Leptocera (Opacifrons) wheeleri Spuler are recognized as new synonyms of Opacifrons maculifrons (Becker). Limosina impudica Duda is recognized as a new synonym of Opacifrons orbicularis (Becker), new combination. Opacifrons bisecta (Malloch), Opacifrons convexa (Spuler), and Opacifrons orbicularis (Becker) are proposed as new combinations, and the following species are described as new: Opacifrons brevisylus, cubita, distorta, inornata, obunca, pavicula, quadrispinosa, quarta, redunca, simplisterna, spatulata, and triloba.

INTRODUCTION

Opacifrons Duda 1918 is a cosmopolitan genus usually associated with shoreline debris and similar accumulations of moist detritus. Like many other sphaeroerid flies, they are poorly known and in need of revision. The genus as currently defined is diagnosed on the basis of a combination of four characters: the scutellum has only four marginal bristles, there are no presutural dorsoventral bristles, the midbasitarsus has an enlarged ventral bristle, and there is no enlarged apicoventral bristle on the midtibia. New World species of Opacifrons differ from the superficially similar genus Pseudocollinella Duda 1924, previously included in Opacifrons (see Marshall and Smith 1993), in having only postsutural dorsoventral bristles and in lacking a proximal posterodorsal bristle on the midtibia.

Most species of Opacifrons belong in a clearly monophyletic group related to the type species [O. coxata (Stenhhammar 1854)] and here referred to as the coxata-clade. Males in the coxata-clade have two prominent, thick bristles arising from the middle of the subanal plate, and females have two broad, flattened apical bristles on each cercus. The coxata-clade includes all New World Opacifrons except O. maculifrons (Becker 1907) and also includes O. breviscunda Papp 1991 and O. pseudimpudica (Deeming 1969) from the Oriental region and O. coxata (Stenhhammar), O. moravica (Roháček 1975), and O. elbergi (Papp 1979) from the Palaeartic.

Opacifrons maculifrons and a very closely relat-ed species from Hawaii, O. aequalis Grishaw (1901), form a distinct group of dubious relationship to other Opacifrons. Although the maculifrons group is treated here as the sister group to the coxata-clade, the evidence for this relationship is weak, and most of the similarities between these groups are plesiomorphies. It is possible that the maculifrons group will eventually be linked to some other sphaeroerid genus, probably of Oriental or Afrotropical affinity. The European species O. digna (Roháček 1982) probably belongs to the maculifrons group (see Fig. 101).

In addition to the above species, several other Palaeartic, Oriental, Afrotropical, and Pacific species might belong in Opacifrons. The Oriental species O. cederholmi Papp 1991, O. niveohaltera (Duda 1925), and O. dupliciseta (Duda 1925) and the Afrotropical species O. gheseigerei Vanschuytbroek 1951 and O. rubrifrons (Vanschuytbroek 1950) have not been examined in the course of this work, but at least O. cederholmi and O. dupliciseta probably belong in the maculifrons group. Leptocera mirabilis Papp 1973 from Mongolia, treated as an Opacifrons by Roháček (1982), does not appear to belong in the genus as here defined, but it is left in Opacifrons pending revisionary work on the east Palaeartic and Oriental species of the genus. The European species O. parvicornis (Duda 1918) is known only from females, but probably belongs in Opacifrons. The Australian species Leptocera difficilis Richards 1973 and Leptocera nasalis (Richards 1973) were originally described in the subgenus Pseudocollinella, which was treated as part of Opacifrons from the time Opacifrons was raised to the generic level by Papp (1984) until Pseudocollinella was restituted as a separate genus by Marshall and Smith (1993). Both of these Aus-

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Australi an species are known from females only, and neither belongs in *Opacifrons* as here defined.

**METHODS**

Most specimens were preserved in alcohol then dried using a critical point drier prior to point-mounting. Since the most useful characters for identification and classification of *Opacifrons* are characters of the male and female terminalia, whole abdomens were routinely removed and cleared in hot lactic acid. Cleared abdomens were stored in glycerin in capsules pinned under the specimens. Morphological terminology essentially follows McAlpine (1981), with some changes following Cumming et al. (1995), Wheeler (1995), and Cumming and Sinclair (1996). The term subependrial sclerite is used for the sclerite previously called sternite 10 of the male abdomen, and the terminal sternite and tergite of the female abdomen are called sternite 10 and tergite 10 (Figs. 5 and 7) instead of hypoproct and epiproct as in McAlpine (1981). Cumming et al. (1995) and Wheeler (1995) used the term gonostylus for the structure referred to in McAlpine (1981) and most North American sphaeroeroid literature as the paramere. The use of the term gonostylus for a structure previously called a paramere has caused some confusion because the term gonostylus has been used by European sphaeroeroid workers to refer to the lateral clasper called the surstylus by most North American workers (as in McAlpine 1981). Furthermore, Cumming and Sinclair (1996) argue that the gonostylus sensu Cumming et al. (1995) are probably not homologous with the gonostylus of lower Diptera, so we now follow Cumming and Sinclair (1996) and Pollet and Cumming (1998) in using the neutral term gonopodite (as in Hennig 1958) for the “parameres” sensu McAlpine (1981). Taxonomically important structures of the male terminalia, including the gonopodites (parameres or gonostylus of previous papers), are labeled in Figure 1.

Material was examined from the following collections (abbreviations in parentheses): American Museum of Natural History, New York, U.S.A. (AMNH); Australian National Insect Collection, Canberra, Australia (ANIC); Academy of Natural Sciences, Philadelphia, U.S.A. (ANS); California Academy of Sciences, San Francisco, U.S.A. (CAS); Carnegie Museum of Natural History, Pittsburgh, U.S.A. (CMNH); Canadian National Collection, Ottawa, Canada (CNC); University of Guelph, Guelph, Canada (GUE); Instituto Nacional de Biodiversidad, San Jose, Costa Rica (INBIO); Natural History Museum of Los Angeles County, California, U.S.A. (LACM); Zoological Institute, Lund, Sweden (LUND); Museo Nacional, Rio de Janeiro, Brazil (MNR); Museo del Instituto de Zoología Agrícola, Maracay, Venezuela (MIZA); Muséum National d’Histoire Naturelle, Paris, France (MNHN); Royal Ontario Museum, Toronto, Canada (ROM); Snow Entomological Museum, University of Kansas, Lawrence, U.S.A. (SNOW); Staatliches Museum für Naturkunde, Ludwigburg, Germany (SMN); The National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (USNM).

**Opacifrons** Duda 1918

**Limosina** (Opacifrons) Duda, 1918: 22. Type species *Limosina coxata* Stenh. 1854: 396.

**Leptocera** (Opacifrons) Duda, Spuler, 1924: 121.

**Opacifrons** Duda, Papp, 1984: 88.

**GENERIC DESCRIPTION.** Length ca. 1.7–2.7 mm; heavily pruinose, body mostly dark brown to black; lower frons usually reddish brown; frons with a velvety black M-shaped area surrounding pruinose areas. Interfrontal bristles in 3–4 small, subequal pairs, upper 2 or 3 pairs usually long. Inner orbital bristles well developed, sometimes very large (of *O. maculifrons* group). Eye 2.4–3.4× genal height. Postocular bristles absent (usually) or divergent (*O. maculifrons* group). Scutum with 2 large postaerial dorsoventral bristles, each preceded by 1 or 2 enlarged setae. Katepisternum with 1–2 minute or small anterior dorsal bristles and a large posterdorsal bristle usually reaching about half way to wing base. Midtribia of male with a ventral row of short, stout bristles over almost entire length; midtribia of female with slightly enlarged preapical bristles only. Dorsal surface of midtribia with 1 proximal anterodorsal bristle (plus a proximal posterdorsal bristle in some Old World species of uncertain placement), 1 distal anterodorsal bristle, 1 distal dorsal bristle, and 2 distal posterdorsal bristles (upper one small; absent in *O. maculifrons* group). Midtribia with two anterior bristles distally. First tarsomere of midleg with a stout midventral bristle. Hind tibia usually with a small, stout, straight apical ventral bristle; dorsal surface sometimes with a long, thin bristle. Second costal sector usually 0.8–1.1× third (longer in *O. maculifrons* group) costa bypassing tip of R4+5 by 1–4 vein widths; wing usually lightly infuscated. Halter entirely pale or with knob slightly darkened.

Male abdomen. Sternite 5 modified posteromedially, usually with a prominent bilobed or trilobed margin. Sternite 6 simple, narrow, and dark. Eparandrum uniformly setose. Surstylus small, without prominent bristles. Subanal plate broad, each half usually concave with a very large, stout bristle centrally; ventral part bilobed, each lobe weakly notched with two small apical bristles (stout bristle lost in *O. inornata* and *O. moravi ca*, subanal plate simple and with only small setae in *O. maculifrons* group). Hypandrium complete although weakened medially in most species, without anterior development (apodeme absent, as in Fig. 16) except in *O. maculifrons* group (Fig. 40); pregonite (= suspensory sclerite, between hypandrium and anterobasal lobe of postgonite) large, elongate. Postgonite variable, usually with a prominent posterior lobe near base (posterior lobe absent in *O. maculifrons* group). Basiphallic of most species with a very large basal opening flanked by two lateral lobes and sometimes by a single distal lobe; basiphallic in *O. maculifrons* group with a small basal opening and a long, broad, flat epiphallus; distiphallic broad, setulose, dorsally mostly membranous but with 2 weak lateral sclerites, ventrally with a bilobed sclerite. Subependrial sclerite simple, transverse.

Female abdomen. Tergite 8 bare and shining, partially or completely divided medially. Tergite 10 divided longitudinally, each half usually bare, shining, with a small bristle (tergite 10 entire and se-
tulose in *O. maculifrons* group). Cercus usually bare and concave dorsally, apically with 2 flat bristles (cercus with only thin bristles in *O. maculifrons* group). Sternite 8 absent or greatly reduced; sternite 10 well developed. Spermathecae (3) usually spherical or nearly so, surface smooth or sculptured, ducts usually short.

**COMMENTS.** With the exception of the *O. maculifrons* group, *Opacifrons* is an extremely uniform genus. Chaetotaxy of the hind tibia, head and halter color, and relative lengths of the second and third costal sectors are among the few nongenitalic characters allowing separation of the species. Several genitalic characters vary widely between species.

**SIMILAR GENERA.** *Opacifrons* has been previously confused with *Pseudocollinella*, which differs in having three dorsoentral bristles, a proximal posterodorsal midtibial bristle, and a preapical ventral midtibial bristle. *Pseudocollinella* is part of a monophyletic group including *Phbitia, Rachispoda, and Leptocera* (Marshall and Smith 1992), and that group is treated here as the sister group to *Opacifrons*. Possible synapomorphies between *Opacifrons* and the group of genera related to *Pseudocollinella* include the presence of a large ventral bristle on the midbasitarsus (lost in most *Phbitia, also present in Chaetopodella*), a reduced female sternite 8, and a strongly developed subanal plate. Generic interrelationships in the Limoisininae have not been adequately assessed, so this sister group relationship is tentative.

**PHYLOGENY AND DISTRIBUTION.** A phylogeny for the New World and Pacific *Opacifrons* was generated using the i.e. procedure of the parsimony program Nenng68 (Farris 1988) and the character matrix in Table 1. *Pseudocollinella* and the related genera *Leptocera, Rachispoda, and Phbitia* (see above) were treated together as the sister group, with both this group of genera and the *maculifrons* group of *Opacifrons* considered when polarizing characters within the *Opacifrons* clade. Several characters used to define the *coxta* clade, which includes all but one of the New World *Opacifrons*, are unique characters of unequivocal polarity irrespective of outgroup choice. The Palearctic species *O. digna, O. coxta, O. moravica*, and *O. elbergi* were not examined as part of this study, but were added to the matrix based on published descriptions.

With the states of character 20 treated as unordered, 22 trees of equal length were generated (length = 37 steps, consistency index = 81, retention index = 92); ordering the states of character 20 resulted in an identical 22 trees with different statistics (length = 38 steps, consistency index = 78, retention index = 91). The Nelson consensus tree for both analyses was the same (Fig. 101a).

As shown by the Nelson consensus tree (Fig. 101a), most of the differences between the 22 trees centered around the placement of the four species *O. convexa, O. coxta, O. moravica*, and *O. elbergi*, although these species come out as a monophyletic group on more than half (12 out of 22) of the equal-length trees. The characters supporting the monophyly of this group, especially character 14 (unusually shaped epiphallus) seem to be unequivocal interpretation, and a group including these four species is recognized here as the coxta-group (Fig. 101). There are several equally supported arrangements of these four species, and although the relationships indicated on Figure 101 represent only one of the equally parsimonious phylogenies for the group, it is the phylogeny which seems to be supported by the "best" characters, such as the unique male sternite 5 shared by *O. elbergi* and *O. convexa*. The only other significant difference between our summary phylogeny (Fig. 101) and the consensus tree (Fig. 101a), and the only respect in which our summary tree differs from all of the computer-generated trees, is in the placement of *O. inornata*. All of the minimum-length trees had *O. inornata* outside the *qua* group, independently developing the large sternite 4 (character 8) characteristic of that group. Moving *O. inornata* into the *qua* group (Fig. 101) lowered the consistency index to 75 and the retention index to 89 and replaced the postulated homoplasy in sternite 4 with independent loss of the large bristles of the subanal plate (character 12) and independent origin of a divided female tergite 10 (character 24). We prefer the latter, less parsimonious, tree because medial weakening of tergite 10 is a trivial character, subject to frequent homoplasy throughout the Sphaeroceridae, and loss of the large subanal bristles seems to be much more likely than homoplasious development of an enlarged male sternite 4 that completely overlaps sternite 5. The latter character is unique to *Opacifrons*, whereas bristle loss occurs frequently in many lineages. Figure 101 therefore differs from the computer-generated trees in the placement of *O. inornata* in the *qua* group.

Species of the New World *Opacifrons* fall into two distinct monophyletic clades (Fig. 101). The *maculifrons* group includes the cosmopolitan *O. maculifrons* and the very closely related Hawaiian *O. aequalis*. The Palearctic species *O. digna* is also tentatively included in the *maculifrons* group. The *maculifrons* group forms the sister group to the rest of the genus, which is a distinctive and well-supported clade including four species groups: the *coxta*, *orbicularis*, *bisecta*, and *qua* groups.

The *coxta* group, characterized primarily by the distinctive, epiphallus-bearing basiphallus, includes a single, easily recognized species (*O. convexa*) in the New World and also includes three Palearctic species (*O. moravica, O. elbergi*, and *O. coxta*). The distribution of *O. convexa* is boreomontane.

The *qua* group is characterized by a strongly developed male sternite 4 that overlaps sternite 5. Three of the four species in the group are very closely related Neotropical species, but one species (*O. inornata* from Brazil) is highly autopomorphic,
Table 1. Character state distribution for *Opacifrons* of the Palearctic, Nearctic, Neotropical, and Pacific regions (excluding species known only from females).

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</table>

Excluded species

*Opacifrons parvicornis* (Duda) Europe, female only; *Opacifrons niveoholterata* (Duda), Oriental; *Opacifrons breviscunda* Papp, Oriental; *Opacifrons cederholmi* Papp, Oriental; *Opacifrons dupliciseta* (Duda), Oriental; *Opacifrons ghesquieri* Vanschuybroek, Afrotopical; *Opacifrons mirabilis* (Papp), Mongolia, placement uncertain; *Opacifrons pseudomimipcura* Deeming, Oriental; *Opacifrons rubrifrons* (Vanschuybroek), Oriental.

Character list (plesiomorphic states in brackets)

1. Inner orbital bristles enlarged (inner orbitals minute or absent)
2. Postocular bristles absent (postocular bristles present)
3. Head with silver pollinose spots (head without pollinose spots)
4. Arista very short (arista much longer than head)
5. Mid Tibia with 2 distal anterodorsal bristles (tibia with 1 distal anterodorsal bristle)
6. Hind tibia with a long exerted dorsal bristle (hind tibia with uniformly small bristles)
7. Sternite 5 of male prominent posteromedially and bi- or trilobed (posteromedial part of sternite 5 not prominent)
8. Sternite 4 of male greatly expanded, covering most of sternite 5 (sterntite 4 not expanded over sternite 5)
9. Sternite 5 of male not prominent posteromedially but with long posteromedial lobes (posteromedial part of sternite 5 without long lobes or with a single long process)
10. Long posteromedial lobes of sternite 5 incurved (posteromedial lobes of sternite 5 not incurved)
11. Sternite 5 with clear spots (sternite 5 without clear spots)
12. Male subanal plate with large spine on each side (subanal plate with only thin bristles)
13. Postgonite with prominent posterior lobe (posterior surface of postgonite without prominent lobe)
14. Basiphallus with large distal epiphallus (distal part of basiphallus without prominent process)
15. Basiphallus with a proximal, dorsoventrally flattened epiphallus (proximal part of basiphallus without prominent process)
and its inclusion in this group lowers the consistency index of the cladogram. The rest of the *quarta* group includes a Brazilian species (*O. cubita*), a species widespread from the Antilles and Central America south to Argentina (*O. quarta*), and a species ranging from Mexico south to Ecuador (*O. simpisterna*).

The *orbicularis* group is an entirely South American group of closely related species. *Opacifrons orbicularis*, the sister species to the rest of the group, is distributed from Argentina north to Venezuela, but the rest of the group includes a Brazilian species (*O. spatulata*) and a group of three species from the Andes.

The *bisecta* group is largely Central American, with most species known from Costa Rica and the basal lineages known only from Costa Rica. One species (*O. bisecta*) extends from Costa Rica north to British Columbia, while the closely related *O. pavicula* is described from Argentina.

KEY TO THE NEW WORLD AND PACIFIC SPECIES OF *OPACIFRONS*

1 Head with 2 distinct silvery tomentose spots dorsally. Arista very short, less than head height. Inner orbital bristles almost as long as orbital bristles. Subanal plate of male unmodified, with only small bristles (Fig. 41). Pacific and Holarctic. (*maculifrons* group) ........ 2

- Head black with extensive areas of dull pollinosity, dorsally without silvery spots. Arista longer than head height. Inner orbital bristles small, less than half as long as orbital bristles. Subanal plate with stout spurs as in Figure 3 (lost in one Neotropical and one Palaearctic species). Widespread. (*coxata*-clade: most *Opacifrons*, including the New World species groups keyed below, and the Old World *coxata* group) ....................... 3

2 Anterior lobe of male cercus almost parallel-sided, as long as posterior lobe (Fig. 40). Widespread .... *Opacifrons maculifrons* (Becker)

- Anterior lobe of male cercus expanded distally, shorter than posterior lobe (Fig. 46). Hawaii ....... *Opacifrons aequalis* (Grimshaw)

3 Sternite 5 of male with a single, narrow, strongly developed posteromedial lobe (Fig. 19). Tergites 6 and 7 of female completely divided (Fig. 21). Nearctic .... *Opacifrons convexa* (Spuler)

- Sternite 5 of male broadly expanded posteromedially, almost always bilobed (as in Figs. 25, 30). Tergites 6 and 7 of female divided (Fig. 6). Widespread ............... 4

4 Sternite 4 of male strongly modified, overlapping sternite 5 (Fig. 75). Hind tibia usually with an exerted dorsal bristle. (*quarta* group) ... 5

- Sternite 4 of male unmodified, not extending over sternite 5. Hind tibia with only small bristles ............... 8

5 Hind tibia with only uniformly small dorsal bristles. Subanal plate with only small bristles. Sternite 5 of male short, with long, widely separated posterior lobes (Fig. 35). Legs yellow to pale brown. Costa Rica to Brazil ....... *Opacifrons inornata*, new species

- Hind tibia with one exerted dorsal bristle much longer than other tibial bristles. Subanal plate with large spurs. Sternite 5 with short posteromedial lobes (Fig. 75). Legs usually brown ............... 6

6 Posteromedial lobes of male sternite 4 prominent, triangular, and widely separated (Fig. 75). Exserted bristle of hind tibia strongly developed, twice as long as tibial width at bristle base. Guatemala to Argentina ....... *Opacifrons quarta*, new species

- Posteromedial lobes of male sternite 4 rounded; sessile or almost sessile (Fig. 83). Exserted bris-
tle of hind tibia weakly developed, less than 1.5× tibial width.

7 Posteromedial lobes of male sternite 5 sessile, separated by less than their widths (Fig. 83). Surstylus very narrow, not bilobed at posterior end. Subanal spurs straight (Fig. 82). Mexico, Costa Rica, Venezuela, and Ecuador

Post teromedial lobes of sternite 5 short but distinct, separated by more than width of lobe (Fig. 25). Posterior lobe of surstylus subquadrate, apically bilobed (Fig. 26). Subanal spurs conspicuously bent at middle. Brazil

- **Opacifrons cubita**, new species

8 Sternite 5 of male with 2 long, widely separated posteromedial lobes; lobes at least ¼ as long as sternite (Fig. 54). Sternite 7 of female with a strong posteromedial cleft (Fig. 55) (orbitically group)

- Sternite 5 with entire posteromedial area bulging, area usually divided into 2 or 3 lobes each less than ¼ as long as sternite (Fig. 4). Sternite 7 of female convex, without large cleft (Fig. 5). (biscuta group)

9 Posteromedial lobes of male sternite 5 prominent, dark, narrowly triangular, and directed posteriorly (Fig. 54). Posterovernal part of surstylus almost equal to postero dorsal part of surstylus (Fig. 52). (Venezuela to Argentina)

- **Opacifrons orbicularis** (Becker)

- Posteromedial lobes of sternite 5 quadrate (Fig. 90) or strongly bent or angled medi ally (Fig. 30). Posterovernal part of surstylus narrow, much longer than postero dorsal part (Fig. 31)

10 Posteromedial lobes of male sternite 5 broad and truncate (Fig. 90). Posterior part of surstylus deeply bilobed, with ventral lobe long and very narrow (Fig. 88). Brazil

- **Opacifrons spatulata**, new species

- Posteromedial lobes of sternite 5 tapered; bent or recurved medi ally (Fig. 30). Posterior part of surstylus not deeply bilobed, upper part small

11 Posteromedial lobes of male sternite 5 asymmetrical, inner part of right lobe deflexed ventrally (Fig. 30). Argentina

- **Opacifrons distorta**, new species

- Posteromedial lobes of male sternite 5 symmetrical

12 Posteromedial lobes of male sternite 5 medi ally recurved, with apical parts directed anteromedially (Fig. 80). Eye height more than 3.0× gen al height. Gena usually luteous or pale brown. Second costal sector 0.8× third. Ecuador

- **Opacifrons redo nca**, new species

- Posteromedial lobes of sternite 5 directed medi ally, not recurved (Fig. 49). Eye height less than 2.8× gen al height. Gena dark brown to black. Second and third costal sectors subequal. Ecuador

- **Opacifrons obunca**, new species

13 Subanal plate of male with 4 stout bristles (Fig. 68). Costa Rica

- **Opacifrons quadripinna**, new species

14 Surstylus short, subquadrate, with 2 equally short lobes posteriorly (Fig. 9). Costa Rica

- **Opacifrons brevis tylus**, new species

15 Posteromedial lobes of male sternite 5 quadrate, outer lobes separated by several times their width, middle lobe strongly deflexed but well differentiated (Fig. 97). Ecuador

- **Opacifrons triloba**, new species

- Lobes of sternite 5 triangular, width at base not much less than distance between tips of lobes; middle lobe less well developed than outer lobes (Fig. 4). Widespread in New World

16 Posteromedial part of male sternite 5 relatively narrow and dark, with clearly delineated clear spots and a strong, deflexed middle lobe (Fig. 61). Posterior lobe near postgonite base strongly developed. Costa Rica to Argentina

- Posteromedial part of sternite 5 relatively wide and pale, with broad, diffuse clear spots and a small, weakly deflexed middle lobe (Fig. 4). Posterior lobe near postgonite base weakly developed. British Columbia to Costa Rica

17 Posterovernal lobe near postgonite base elongate and acute. Argentina (Fig. 65)

- **Opacifrons pavi cula**, new species

- Posterovernal lobe of postgonite base short,quadrate, and weakly bifid (Fig. 58). Costa Rica

- **Opacifrons para bicta**, new species (Species treatments follow alphabetically.)

**SPECIES ACCOUNTS**

**Opacifrons bisecta** (Malloch), new combination

Figures 1–7

**Leptocera bisecta** Malloch 1914: 20.

**Leptocera (Limosina) bisecta** (Malloch), Richards 1967: 13.

**Leptocera (Opacifrons) coxata** Stenhammar, Spuler 1924: 129 (misidentification).

**DESCRIPTION.** Length ca. 2.0–2.5 mm; heavily pruinose, body mostly dark brown to black; lower frons reddish; face, antennae, and gena dark; leg bases and halter stem pale, at least basal part of halter knob slightly darkened. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 2.5× gen al height. Katepisternum with 2 minute anterodorsal bristles and a large postero dorsal bristle reaching half way to wing base. Second costal sector 0.8× third, wing lightly infuscated.

Male abdomen. Sternite 5 with two posteromedial lobes, area between them forming a posteromedial notch about as deep as wide, middle part of
notch with a weak, ventrally deflexed lobe. Surstylus triangular in general shape, with an elongate, acute, posterovertral lobes. Postgonite complex, with a prominent transverse ridge on outer surface, a small posterobasal lobe, and a short, narrow apical lobe. Basal part of basiphallus quadrilateral in lateral view, with the upper two faces of the square open and comprising the basal opening, distally with a short neck.

Female abdomen. Tergite 6 unmodified. Tergite 7 darkly pigmented, with a small posteromedial notch. Tegrite 8 bare and shining, divided into two dark sclerites, dorsomedial parts tapered. Tergite 10 divided longitudinally, each half bare, shining, with a long, thin bristle. Cercus bare and concave dorsally, apically with 2 flat bristles. Sternite 7 large, convex posteriorly, with a medial pale area; sternite 8 absent; sternite 10 large, bare, trilobed anteriorly. Spermathcae spherical, surface smooth, sclerotized parts of ducts slightly shorter than spermathcal body.

**TYPE MATERIAL.** Holotype (♂, ANSP, #6032) and 2 paratypes (♀, #s6032.2, 3): COSTA RICA: Cartago, 12.xii.1909, sweeping over muddy road, P.P. Calvert. Other paratypes: COSTA RICA: Cartago, swept over mud, 10.x and 21.x.1909; 19.ii and 3.i.1910, P.P. Calvert (♂, ♀, ANSP); La Carpintera, 4.xii.1909, P.P. Calvert (♂, ANSP #6032.4).

**OTHER MATERIAL EXAMINED.** (ca. 250 specimens). (CNC) CANADA: British Columbia. UNITED STATES: Arizona, California, New Mexico, Oregon, Texas, Utah, Washington. MEXICO: Morelos, Mexico, Baja California, San Luis Potosi, Sinaloa, Chiapas. GUATEMALA: San Marcos, San Lorenzo. COSTA RICA: Monteverde, Cartago.

**COMMENTS.** Although this species seems impossible to distinguish from the partially sympatric *O. convexa* based on characters of the head or thorax, male and female abdominal characters are easily seen and differ widely between these species. *Opacifrons bisecta* is even more similar to other members of the primarily Neotropical *O. bisecta* complex, from which it differs most obviously in surstylus shape and details of sternite 5 of the male. *Opacifrons bisecta* is a western Nearctic–Central American species that is primarily southwestern in
the Nearctic part of its range. The northern part of its range overlaps that of the boreal and boreo-
montane *Opacifrons convexus*, but it has been in-
frequently collected in the north. We have seen only
three Canadian specimens of *O. bisecta*, one from
a slash pile on the Queen Charlotte Islands, and
two from the coastal forest in Vancouver (all GUE).

**Opacifrons brevistylus**, new species

*Figures 8–14*

**DESCRIPTION.** Length ca. 3.0 mm; heavily pru-
inose, body mostly dark brown to black; lower
frons, gena, face, and first flagellomere reddish
brown; halter knob grey; stem yellow. Interfrontal
bristles in 3 small, equal pairs. Eye 3× genal height.
Katepisternum with a minute anterodorsal setula
and a posterodorsal bristle reaching half way to
wing base. Second costal sector 0.8× third, wing
lightly infuscated.

Male abdomen. Posteroentral part of sternite 5
trilobate, middle lobe inconspicuous and deflexed
ventrally. Surstylus subquadrate, shining black dor-
sally and luteous posteroventrally, with a short,
sharply tapered posteroventral lobe. Postgonite
complex, with 2 posterior lobes and a parallel-sided
apical lobe. Basiphallus with a quadrate basal part
and a very long, cylindrical, distal neck; distiphallus
bulbous, setulose, dorsally mostly membranous,
ventrally with a trilobed sclerite.

Female abdomen. Tergite 6 unmodified; tergite 7
pale anteromedially and notched posteromedially;
tergite 8 shining, completely divided, with long thin
ventral arms. Tergite 10 large, with a thin longitudi-
nal pale strip and a thin bristle on each half. Cercus
short, with 2 pale, flat, subequal apical bristles.
Sternite 7 large, dark, with a weak posteromedical
notch. Sternite 8 absent or represented by a small
hyaline sclerite. Sternite 10 bare except at margins,
with a deep triangular anterior notch. Spermathe-
cae with reticulate surface and tapered neck, scler-
otized parts of ducts as long as spermathecal body.

**TYPE MATERIAL.** Holotype (♂, INBIO) and 14
paratypes (10♂, 4♀, CNC, INBIO, GUE): COSTA
RICA: San Jose: San Gerardo de Dota, 93°3′N,
8°48′W, near trail, 2400–260 m, 8–9.viii.1995,
S.A. Marshall. Other paratypes: COSTA RICA:
San Jose, Rio Humo below Cerro Vueltas, 2850 m,
31.iii.1985, screen sweeps in broadleaf understory
in cloud forest, L. Massner, CR-03 (5♂, 4♀, CNC);
Cerro de la Muerte, 3200 m, 4.iv.1985, pan traps,
H. Goulet, L. Massner (1♂, CR-08, CNC); Hwy 2,
km 95, 3200 m, 83°44′W, 9°36′N, Cerro del Muer-
te, 1-7.iii.1985, H. Goulet, L. Masner (1♂, CR-18, CNC); Braulio Carillo National Park, 11.iv.1985, 1400–1500 m, cool moist river bed, selva premontana screen sweeps, H. Goulet, L. Masner (1♂,GUE).

COMMENTS. This species can be separated from close relatives by its short surstylus (thus the name brevistylus) and larger average size. The deeply incised sternite 10 distinguishes the female of brevistylus from other members of the group, which have sternite 10 anteriorly trifoliated. Members of this complex are very similar in external characters.

**Opacifrons convexa** (Spuler), new combination

**Figures 15-22**

**Leptocera (Opacifrons)** convexa Spuler, 1924: 130, fig. 9; Richards, 1965: 722.

DESCRIPTION. Length ca. 2.0 mm; heavily pruinose, body mostly dark brown to black; lower frons and face reddish brown. Halter entirely pale. Interfrontal bristles in 3–4 small pairs, middle pair(s) longest. Eye 3× genal height. Katepisternum with a minute anterodorsal setula and a posterodorsal bristle reaching over half way to wing base. Second costal sector 0.8× third, wing lightly infuscated.

Male abdomen. Sternite 5 with a prominent, narrow, postero medial lobe projecting posteroventrally and tapered and curved apically; sternite with clear patches near base of lobe. Surstylus almost triangular, projecting dorsally into cleft before subanal plate, with a broad anterior lobe and a tapered posterior lobe ending in a broad, flat, pale bristle. Postgonite with weak postero basal lobe; apically bent anteriorly and tapered. Basiphallicus with the usual paired postero dorsal lobes but unlike congeners in having a long, broad, central lobe (epiphallus) just above the short distal neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with two lateral sclerites.

Female abdomen. Tergite 5 with a conspicuous postero medial pale notch; tergites 6, 7, and 8 completely divided dorsally. Tergite 10 longitudinally divided into 2 concave, shining plates, each with 1 or (rarely) 2 fine bristles. Ceri short, shining, dorsally concave, each with 2 large, flat, pale apical bristles. Sternite 7 unmodified; sternite 8 absent or reduced to a hyaline sclerite; sternite 10 deeply incised anteromedially and pale postero medially, thus appearing as two shining, triangular sclerites.


COMMENTS. *Opacifrons convexa* has a distinctive male sternite 5 dissimilar from other New World species but similar to the Palaearctic *Opacifrons elbergi* (Papp). The basiphallus of *O. convexa* has an epiphallus unlike other New World species, but similar to that of *O. coxata* and other Old World species. *Opacifrons convexa* and *Opacifrons*
elbergi are probably sister species within a species group also containing the Palaeartic species *O. moravica* and *O. coxata*.

Although *O. convexa* is easily recognized by male or female abdominal characters, based on nonabdominal characters, it is virtually indistinguishable from *O. bisecta*, with which it is sympatric in western North America. *Opacifrons bisecta* is primarily a southwestern species in North America and *Opacifrons convexa* is primarily transboreal, but the ranges of these species overlap where *O. convexa* occurs at high elevations in the southwest, and *O. bisecta* occurs as far north as British Columbia in coastal forests.

**Opacifrons cubita**, new species

Figures 23–26

DESCRIPTION. Length ca. 2.3 mm; heavily pruinose, body mostly dark brown to black; lower frons and face reddish brown; first flagellomere black. Interfrontal bristles in 4–5 pairs, upper 3 pairs long, almost cruciate. Eye 3.5× genal height. Hind tibia with a thin distal dorsal bristle as long as tibial width. Katepisternum with a minute anterodorsal setula and a small posterodorsal bristle reaching less than half way to wing base. Second costal sector 1.1× third, wing lightly infuscated.

Male abdomen. Sternite 4 twice as long as sternite 5, posteromedial part weakly bilobed and overlapping sternite 5, lobes dark, setulose, almost sessile, and widely separated; sternite 5 weakly trilobate, middle lobe inconspicuous and deflexed ventrally. Surstylus pale, lobate, slightly tapered, and bilobate posteriorly. Postgonite with 1 prominent posterior lobe; distally narrow and tapered. Basiphallus short, with 3 lobes flanking large basal opening, no distal neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female unknown.

**TYPE MATERIAL.** Holotype (♂, MNR) and 3 paratypes (♂, GUE): BRAZIL: Rio de Janeiro, Ter...

COMMENTS. The specific name of this species refers to the peculiar right-angle bend in the large subanal bristle of this species.

**Opacifrons distorta**, new species

**Figures 27-31**

DESCRIPTION. Length ca. 2.3 mm; heavily pruinose, body dark brown; lower frons, face, legs, and lower half of first flagellomere reddish to yellow; gena much darker than face. Halter entirely pale. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 2.5 genal height. Kategisternum with 2 minute anterodorsal bristles and a large posterodorsal bristle reaching half way to wing base. Second costal sector 0.9 third, wing lightly infuscated. Hind tibia with dorsal bristles uniformly small.

Male abdomen. Sternite 5 with 2 prominent posteromedial lobes, inner surface of right lobe bent ventrad (this conspicuous asymmetry is identical in both male types). Surstylus with a long, thin posteroventral lobe. Postgonite with posterior lobe at base, broad near middle, then abruptly tapered near apex. Basiphallus with a quadrate basal part and a long distal neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female unknown.

**TYPE MATERIAL. Holotype (♂, GUE) and 1 paratype (♂, GUE): ARGENTINA: Salta, Cañada la Gotera, 15 km W Chicoana, 16–28. ii. 1992, forest remnant, S.A. Marshall.**

COMMENTS. *Opacifrons distorta*, so named for the apparently distorted or twisted posterior margin of the male sternite 5, is most similar to the northern Andean species *O. obuncia*. *Opacifrons distorta* has a much longer surstylus and shorter, twisted lobes on male sternite 5.
Opacifrons inornata, new species
Figures 32–38

DESCRIPTION. Length ca. 1.9 mm; heavily pruinose, body mostly pale brown; lower frons reddish brown; face yellow; first flagellomere reddish. Halter pale. Interfrontal bristles in 4–5 pairs, upper 4 pairs long, almost cruciate. Eye 3.0 genal height. Hind tibia with dorsal bristles uniformly small. Kaeptirsternum with a minute anterodorsal setula and a small posterodorsal bristle reaching half way to wing base. Second costal sector 1.1 third, wing clear, veins yellow.

Male abdomen. Sternite 4 enlarged, overlapping sternite 5 with 2 triangular lobes. Sternite 5 with 2 widely separated, quadrate posteromedial lobes, area between them forming a notch twice as wide as deep. Surstylus elongate, triangular. Subanal plate broad, each half concave with small ventral bristles only and separated from epandrium by a deep ventral cleft extending almost to posterior margin of epandrium. Postgonite simple, narrow. Basiphallus short, with large basal and distal openings; distiphallus bulbous, setulose, mostly membranous but with 2 broad lateral sclerites.

Female abdomen. Tergite 6 uniformly pigmented; tergite 7 with pale median area and a posteromedical notch; tergite 8 completely divided dorsally with tapered ventral arms. Tergite 10 broad, with a posteromedical notch and a raised, deflexed, transverse anterior portion and 2 small bristles. Cercus short, with 2 short, flat, pale apical bristles. Sternite 8 large, with a posteromedical notch. Sternite 10 almost divided medially, anterior part of division wide. Each spermatheca elongate, with a wrinkled surface and tapered base, duct slender, sclerotized part much shorter than spermathecal body.


COMMENTS. Although recognizable as part of the O. quarta group on the basis of the strongly modified sternite 4, O. inornata is highly autopomorphic and one of the most distinctive species in the genus. The name refers to the loss of the large subanal bristles which characterize most congeners.

Opacifrons maculifrons (Becker)
Figures 39–46

Limosina maculifrons Becker, 1907: 374.
Limosina (Opacifrons) maculifrons Becker, Beshovski, 1968: 42 (5 figs.).
Leptocera (Opacifrons) collessi Richards, 1973: 320, NEW SYNONYM
Leptocera (Opacifrons) wheeleri Spuler, 1924: 128, 
NEW SYNONYM 
Opacifrons maculifrons (Becker), Papp, 1984: 88.

DESCRIPTION. Body length 2.3–3.0 mm; body 
black, heavily pollinose except shining scutum and 
scutellum; ocellar triangle raised, flanked by 
conspicuous silvery tomentose patches extending from 
occiput to level of anterior ocellus; face and gena 
silvery, tarsus of midleg luteous; halter pale. Four 
short, equal interfrontal bristles; 2 orbital bristles 
and 2–4 long, excline upper orbital setulae; 
divergent postcellar bristles distinct. Eye 2.0× as 
high as gena; arista exceptionally short, 1.7–2.0× 
length of rest of antenna; anterior genal bristle 
slightly longer than vibrissa. Midtibia with an 
anterodorsal bristle proximally, distally with a pos-
terodorsal, anterodorsal, and dorsal bristle. Wing 
lightly infuscated, third costal sector 0.6–0.8× as 
long as second; costa ending at tip of R4+5.

Male abdomen. Sternite 5 bilobed postermemi-
ally, each lobe with 3–4 stout setae on inner surface 
and 4–6 stout setae on ventral surface. Synsternite 
6+7 simple ventrally. Epandrium uniformly setose. 
Subanal plate complete, setulose medially and with 
small bristles laterally; cerci broadly rounded, con-

cav, setose. Surstylus strongly bilobed, with a stout, 
triangular inner lobe and a narrow, rounded, 
distally setose outer lobe. Postgonite strongly bent me-
dially, abruptly tapered distally. Basiphallus strongly 
flattened dorsoventrally, scooped-shaped, posterior 
corners strongly produced and curled ventrally. 
Distiphallus strongly flattened dorsoventrally, with 
bilobed upper and lower parts.

Female abdomen. Tergite 8 deeply notched pos-
teromedially, each half with a transverse row of 
bristles at middle. Tergite 10 large, entirely setulose, 
longitudinally divided by a median pale strip, with 
2 bristles. Cercus short, strongly tapered, bare and 
concave on inner surface, apex with 2 strong, pale 
bristles. Sternite 8 greatly reduced, probably rep-

represented by a short, transverse sclerite along the posterior margin of sternite 7. Sternite 10 well developed, posteromedially convex, posteriorly with a wide concave area; a finger-like sclerotized invagination present anterior to sternite 10. Spermathecae spherical, weakly tuberculate, sclerotized parts of ducts short.


**Comments.** Opacifrons maculifrons is easily identified by the brilliant silver spots on top of its head, although the visibility of these shining spots differs as light strikes them from different angles. This species was thoroughly redescribed and illustrated by Beshovski (1968). Richards (1973) compared Australian specimens of this group with Beshovski's redescriptions, concluding that the Australian specimens represent a different species. Richards did not fully compare the male genitalia, which we find to be identical in material from New Zealand, Australia, eastern North America, and western North America and as accurately illustrated by Beshovski. Richard's comments on the female genitalia are curious, as he states that the cercus of *O. collesi* have only a single stout bristle and the cercus of *maculifrons* has a long straight bristle and one finer one outside it. All specimens examined in this study have two or three long, straight, equal, and slightly flattened apical cercal bristles. Sometimes the two apical bristles stick together, giving the appearance of a single bristle, and in specimens with three long bristles, the outer bristle is weaker than the other two. There is thus no basis on which to place the Australian material in a different species from the north temperate specimens. This is somewhat surprising given that the very similar Hawaiian *Opacifrons aequalis* (Grimshaw) does seem to be a distinct species and can be separated from *O. maculifrons* by the differently shaped surstylus. *Opacifrons aequalis* (Grimshaw 1901) was described on the basis of male and female specimens from Hawaii [Oahu, Kawaiola Creek, April 1893 (BMNH, not examined)]. It has since been recorded from Hawaii, Kauai, Lanai, Maui, and Molokai (Tenorio 1968), and we have examined specimens from Hawaii, Kauai, and Oahu.

Although *O. maculifrons* differs from most other *Opacifrons* species in many conspicuous characters, such as the short arista, shining scutum, simple subanal plate, bilobed surstylus, setulose tergite 10, and large inner orbital bristles, it is included in *Opacifrons* because of similarities in thoracic chaetotaxy, leg chaetotaxy, and shape of the female abdominal sclerites.

**Biology.** Many of the specimens of *O. maculifrons*, including the holotype of *O. collesi*, were collected in rotting lakeside vegetation. This is the most common sphaerocerid species in vegetation washed up along the shores of Lake Huron, and much of the type series of *O. collesi* was collected in rotten lakeside vegetation in Australia. *Opacifrons maculifrons* thus seems to be a characteristic freshwater wrack species throughout its range.

**Opacifrons obunca, new species**

**Figures 47–50**

**Description.** Length ca. 2.1 mm; heavily pruinose, body mostly dark brown; lower fronts, face, and legs reddish to yellow; genu much darker than face; halter entirely pale. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 2.5× genital height. Katepisternum with 2 minute anterodorsal bristles and a large posterdorsal bristle reaching half way to wing base. Second costa sector equal to third, wing lightly infuscated.

Male abdomen. Sternite 5 with 2 prominent postero medial lobes, each directed medially at apex, area between them forming an almost-closed oval. Surstylus subquadrate, with a short, apically bifid posteroventral lobe. Postgonite with a quadrate basal part and a broad, distally tapered, apical lobe.

**Contributions in Science, Number 474**

Marshall and Langstaff: Revision of *Opacifrons*

Basiphallus with a quadrate basal part and a long, cylindrical, distal neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female abdomen. Tergite 7 with a deep median posterior notch; tergite 8 completely divided. Tergite 10 bare, shining, divided longitudinally into slightly concave plates, each with a single setula. Sternite 7 large, with a broad, quadrate, posteromedial cleft; sternite 8 reduced to a small, central, hyaline sclerite. Sternite 10 shining black, bare except for posterior margin and pale, setulose anteromedial part. Spermathecae oval, surface reticulate, sclerotized parts of ducts shorter than body.

TYPE MATERIAL. Holotype (♂, CNC) and 24 paratypes (15♂, 9♀): ECUADOR: Tarqui, 2800 m, Azuay, 10.i.1965, L. Peña. Paratypes: ECUADOR: Zamora-Chinchipe, 36 km NW Zamora, 2730 m, 29.x.1987, cloud forest subparamo habitat, R. Davidson et al. (1♂ CMNH); Tarqui, S. Isabel Rd., 2200–2800 m, Azuay, 10–13.i.1965, L. Peña (2, CNC); Carchi, El Angel, 2700m, 23–25.vi.1965, L. Peña (2, CNC).

COMMENTS. The species name is from the Latin *obuncus*, meaning bent-in or hooked, in reference to the incurved lobes of the male fifth sternite.

The relatively small eyes of this species, along with the distinctive male and female genitalia, distinguish it from the related *O. orbicularis* and *O. reducta*.

**Opacifrons orbicularis** (Becker), new combination

Figures 51–57

*Limosina orbicularis* Becker 1919: 182.

*Leptocera (Limosina) orbicularis* (Becker), Richards 1967: 15.

*Leptocera (Opacifrons) impudica* Duda 1925: 70, NEW SYNONYM

DESCRIPTION. Length ca. 1.8–2.2 mm; heavily pruinose, body mostly light brown; lower frons, face, and legs reddish to yellow; gena much darker than face; halter entirely pale. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 3.1–3.3 × genal height. Katepisternum with 2 minute anterodorsal bristles and a large posterodorsal bristle reaching half way to wing base. Second costal sector 0.9 × third, wing lightly infuscated.

Male abdomen. Sternite 5 with 2 prominent, triangular posteromedial lobes. Surtstylus subquadrat,
with a short, apically bifid posteroventral lobe. Postgonite with a quadrate basal part and a simple, tapered apical lobe. Basiphallus with a quadrate basal part and a very long, cylindrical, distal neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female abdomen. Tergite 7 with a deep median posterior notch; tergite 8 completely divided. Tergite 10 bare, shining, divided longitudinally into slightly concave plates each with a single setula. Sternite 7 large, with postero-medial cleft; sternite 8 reduced to a small, central, hyaline sclerite. Sternite 10 shining, bare, with an elevated, truncate antero-medial part. Spermatotheca oval, surface reticulate, sclerotized parts of ducts shorter than body.

TYPE MATERIAL.

Lectotype of Limosina orbicularis Becker (♂, MNHN, genitalia cleared and examined) "MUSEUM PARIS EQUATEUR, Cuenca, Dr. G. RIVET, 1905; Limosina orbicularis B., Det Becker". (Specimen has fungal hyphae over much of body. Abdomen is cleanly removed, all legs and bristles appear to be intact.) The lectotype, here designated, is one of 2 males and 1 female from Ecuador in the original type series. Both males are from Cuenca, 2532 m; the female (not examined) is from El Pelado, 4151 m.

Lectotype of Leptocera (Opacifrons) impudica Duda 1925. (♂, SMN, genitalia cleared and examined) PERU: Cusco, ii. 05, 3200-4200 m. "Opacifrons impudica" det. Duda and "Archicollinella impudica" (labels affixed later by an unknown individual). The lectotype, here designated, is one of two male specimens examined by Duda.

Opacifrons parabisecta, new species


DESCRIPTION. Length ca. 2.0—2.5 mm; heavily pruinos, body mostly dark brown to black; lower frons, face, entire gena, and first flagellomere reddish brown; halter entirely pale. Interfrontal bristles in 3-4 small, equal pairs. Eye 3 × genal height. Katepisternum with a minute anterodorsal setula and a posterodorsal bristle reaching half way to wing base. Second costal sector 0.8 × third, wing lightly infuscated.

Male abdomen. Sternite 5 with a prominent posteromedial section separated from main part of sternite laterally and anterolaterally by clear sections; posteromedially tripartite, middle lobe broader than lateral lobes but deflexed ventrally unlike lateral lobes. Sterylus with elongate, tapered, posteroventral lobe. Postgonite with a broad basal part and a narrow distal part. Basiphallus quadrate basally, with the upper two faces of the square open and comprising the basal opening, distally with a short neck; distiphallus bulbous, setulose, dorsally with a distally bilobed main sclerite flanked by 2 subquadrate sclerites, ventrally with a bilobed sclerite.

Female abdomen. As described for O. triloba.

**TYPE MATERIAL. Holotype (♂, INBIO) and 1 paratype (♀, GUE); COSTA RICA: Puntarenas: Monteverde, 1500-1800 m, 24-27.ii.1991, sweeping trails, B.J. Sinclair. Other paratypes: COSTA RICA: Puntarenas: Monteverde, cloud forest, 1500 m, ii.1980, W. Mason (♂, 2♀, CNC); Monteverde, 27.ii.1991, H. and A. Howden (♂, GUE); Mont-
teverde, 1520 m, 23–30.vii.1983, flight intercept trap, D. Lindeman (2♂, GUE); San Jose, Zurqui de Moravia, 1600 m, v.1989, P. Hanson, Malaise trap (3♂, GUE, INBIO); Alajuela, Rio Peñas Blancas, 700 m, 18.viii.1986, L. Masner (3♂, 1♀, CNC, CR-04).

COMMENTS. Opacifrons paraibicus was named for its close similarity to O. bisecta, from which it differs most obviously in the broad, ventrally deflexed middle lobe on the male sternite 5. Opacifrons paraibicus also differs from O. bisecta in its distally narrow postgonite, short basiphallus, and dorsally sclerotized distiphallus. Opacifrons paraibicus is very similar to O. pavicula, from which it differs most obviously in having a short, broad basal lobe on the postgonite. No differences were noted in the female terminalia and, as is usual for this species group, no reliable nonsexual diagnostic characters were noted.

Opacifrons pavicula, new species
Figure 65

DESCRIPTION. As described for O. paraibicus, but postgonite markedly different, with an acute posteromedial lobe.


COMMENTS. Opacifrons pavicula is very similar to O. paraibicus, from which it differs most obviously in having a long, acute basal lobe on the postgonite. The specific epithet is from the Latin for “rammer.”

Opacifrons quadrispinosus, new species
Figures 66–72

DESCRIPTION. Length ca. 2.0 mm; heavily pruinose, body mostly light brown; lower frons, face, and first flagellomere reddish brown; halter stem yellow, knob brown. Interfrontal bristles in 4–5 pairs, upper 3 pairs long, almost cruciate. Eye 3× genal height. Katepisternum with a minute anterodorsal setula and a posterodorsal bristle reaching half way to wing base. Second costal sector 1.1× third, wing lightly infuscated. Male abdomen. Posteromedial part of sternite 4 strongly bilobed and overlapping sternite 5, lobes widely separated; sternite 5 trilobate, middle lobe inconspicuous and deflexed ventrally. Surstylus pale, lobate, slightly tapered and bilobate posteriorly. Subanal plate broad, each half concave with a very large, stout bristle centrally; ventral part bilobed, each lobe with two small apical bristles. Postgonite with one prominent posterior lobe, a sinuate posterior surface, and a tapered apical lobe. Basiphallus short, basal opening flanked by 2 lateral and 1 distal lobe; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with stout basal sclerites and a short bilobed sclerite.

Female abdomen. Tergites 6 and 7 unmodified; tergite 8 completely divided, with long, thin ventral arms. Tergite 10 large, with a thin longitudinal pale strip and 2 minute dorsal bristles. Cercus short, with 2 pale, flat, subequall apical bristles. Sternite 7 large, dark, with a weak posteromedial notch. Ster-
nite 8 absent or represented by small hyaline patches only. Sternite 10 large, bare except at margins, with a deep triangular anterior notch and densely setose posterior margin. Spermathecae elongate, with smooth surface and tapered neck, sclerotized parts of ducts much shorter than spermathecal body.


caying vegetation, 23.iv.1988, S.A. Marshall (1♂, 2♀, GUE).

**COMMENTS.** This species is easily recognized by its long hind tibial bristle and well diagnosed by its highly modified male abdomen. *Opacifrons quarta* is widespread and sympatric with many other species of *Opacifrons*, and specimens have been collected at the same time and place as several species of *Opacifrons* outside the *quarta* group (*O. triloba, O. bisecta, O. brevistylus, O. orbicularis*, and *O. distorta*) and one member of the *O. quarta* group (*O. simplisterna*). *Opacifrons quarta* is often very abundant in half-submerged leaf litter washed up against rocks and logs in small rivers. This species has been named *O. quarta* because it was treated under the manuscript name “*Opacifrons species 4*” for several years.

**Opacifrons redunda**, new species

**Figures 77–81**

**DESCRIPTION.** Length ca. 2.1 mm; heavily pruinose, body mostly dark brown; lower frons, face, antennae, anterior part of gena, and legs reddish to yellow; halter entirely pale. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 3.4× genal height. Katepisternum with 2 minute anterodorsal bristles and a large posterodorsal bristle reaching less than half way to wing base. Second costal sector 0.8× third, wing lightly infuscated.

**Male abdomen.** Sternite 5 with 2 prominent posteromedial lobes, each directed medially then bent anteriorly at apex. Surstylus subquadrate, with an elongate posteroventral lobe. Subanal plate broad, each half concave with a very large, stout bristle centrally; inner ventral corner of each half with 2 small bristles. Postgonite with a quadrate basal part and a gradually tapered distal part. Basiphallus quadrate basally, distally with a long, cylindrical neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

**Female abdomen.** Tergite 6 with a shallow median posterior notch; tergite 7 with a longitudinal medial pale area, tergite 8 completely divided. Tergite 10 bare, shining, divided longitudinally into slightly concave plates, each with a single setula.

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Sternite 7 large, with narrow, somewhat keyhole-shaped posteromedial pale area; sternite 8 reduced to a small, central, hyaline sclerite. Sternite 10 shining black, bare except for posterior margin. Spermasthecae oval, surface reticulate, sclerotized parts of ducts shorter than body.


COMMENTS. Opacifrons redunca is named for the diagnostic strongly recurved posteromedial processes of the male sternite 5. Most specimens of this species have a paler face and gena than related Opacifrons, but they are difficult to reliably identify without recourse to genitalia.

Opacifrons simplisterna, new species
Figures 82–86.

DESCRIPTION. Length ca. 2.3 mm; heavily pruinos, body mostly dark brown to black; lower frons and face reddish brown; first flagellomere black; halter pale brown to yellow. Interfrontal bristles in 3–4 pairs, upper 3 pairs long, almost cruciate. Eye 3.0× genal height. Katepisternum with a minute anterodorsal setula and a small posterodorsal bristle reaching less than half way to wing base. Second costal sector 1.1× third, wing lightly infused.

Male abdomen. Sternite 4 twice as long as sternite 5, posteromedial part weakly bilobed and overlapping sternite 5, lobes dark, setulose, almost sessile and separated by less than the width of one lobe; sternite 5 with 2 small, close posteromedial
lobes. Surstylus pale, lobate, very narrow. Postgonite with one prominent posterior lobe; distally narrow and tapered. Basiphallus short, basal opening flanked by 2 lateral and 1 distal lobe; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female abdomen. Tergites 6 and 7 unmodified; tergite 8 completely divided, with long thin ventral arms. Tergite 10 large, with a thin longitudinal pale strip and 2 small dorsal bristles. Cercus short, with 2 pale, flat, subequal apical bristles. Sternite 7 large, dark, with a weak postero medial notch. Sternite 8 absent or represented by small hyaline patches only. Sternite 10 large, bare except at margins, with a deep triangular anterior notch and densely setose posterior margin. Spermathecae elongate, with smooth surface and tapered neck, sclerotized parts of ducts much shorter than spermathecal body.


**COMMENTS.** *Opacifrons simplisterna* is named for the large but relatively simple sternite 4 of the male.

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**Opacifrons spatulata, new species**

Figs 87–93

**DESCRIPTION.** Length ca. 2.1 mm; heavily pruinose, body mostly dark brown; lower frons, lower face, part of first flagellomere, and legs reddish to yellow; halter entirely pale. Interfrontal bristles in 3–4 small, subequal pairs, middle 2 pairs slightly longer. Eye 3.4 × genal height. Katepisternum with 2 minute anterodorsal bristles and a large posterdorsal bristle reaching less than half way to wing base. Second costal sector 0.8 × third, wing lightly infuscated.

Male abdomen. Sternite 5 with 2 prominent, quadrate posterior medial lobes. Surstylus subquadrate, with a narrow, parallel-sided, long posteroventral lobe. Postgonite with a quadrate basal part and a tapered distal part. Basiphallus somewhat quadrate basally, basal opening very large, distally with a cylindrical neck; distiphallus bulbous, setulose, dorsally mostly membranous, ventrally with a bilobed sclerite.

Female abdomen. Tergite 6 uniformly pigmented; tergite 7 with pale median area, broadest anteriorly; tergite 8 completely divided dorsally with tapered ventral arms. Tergite 10 shining black, with a pale median strip. Cercus short, with 2 short, flat, pale apical bristles. Sternite 8 with a distinctive median pale area, closed anteriorly, with a narrow posterior opening flanked by dark, toothed, lobes. Sternite 10 large, bare except at posterior margin, concave. Each spermatheca with reticulate surface and tapered base, duct slender, sclerotized part shorter than spermathecal body.

**TYPE MATERIAL.** Holotype (≠,GUE) and 2
paratypes (2♂,1♀,GUE): BRAZIL: Rio de Janeiro, Teresopolis, swept near river, 1200 m, 13.iii.1990, S.A. Marshall. Paratypes: BRAZIL: Rio de Janeiro: Teresopolis, 1300-1700 m, 25.i.1990, sweep, S.A. Marshall (1♀,MNR); 10 km S Nova Friburgo, Sitio Edelweiss, 27.i.1990, S.A. Marshall (1♂,1♀,GUE); Sao Paulo: Sao Jose do Barreiro (Serra da Bocaina), 1650 m, Malaise trap, 1.1969, M. Alvarenga (1♀,2♂,MNR); Fazenda Pau D'Alho, 80 km NW Sao Paulo, 28-29.x.1972, R.V. Peterson (1♀,CNC); Parana, E of Curitiba, swept near creek debris, 8.ii.1990, S.A. Marshall (1♂,1♀,GUE); Ponta Grossa, swept along road, 800 m, 8.ii.1990, S.A. Marshall (1♀,GUE); Curitiba, sweep in forest on university campus, 10.ii.1990, S.A. Marshall (1♀,GUE); Nova Teutonia, 300-500 m, viii.1962, Fritz Plauman (2♂,CNC).

COMMENTS. The name spatulata refers to the broad, spatulate lobes of the male sternite 5.

**Opacifrons triloba**, new species

Figures 94-100

DESCRIPTION. Length ca. 1.8-2.0 mm; heavily pruinose, body mostly light brown; lower frons, face, and legs reddish to yellow; gena darker than face; halter entirely pale. Interfrontal bristles in 3-4 small, subequal pairs, middle 2 pairs slightly longer. Eye 3.5 × genal height. Katepisternum with 2 minute anterodorsal bristles and a large posterodorsal bristle reaching half way to wing base. Second costal sector 0.8 × third, wing lightly infuscated.

Male abdomen. Sternite 5 with 2 widely separated, subquadrate postero medial lobes, area between them forming a postero medial notch 3-4 times as deep as wide, middle part of notch with a weak, ventrally deflexed lobe. Surstylus triangular in general shape, with an elongate, acute, posteroventral lobe. Postgonite complex, with large posterior lobe at 1/5 and a transverse ridge on outer surface; apical lobe narrow, tapered. Basiphallus somewhat quadrate basally, basal opening very large, distal part narrow and tubular; distiphallus bulbous, setulate, dorsally mostly membranous but with 2 broad dorsolateral sclerites, ventrally with a short bilobed sclerite.

Female abdomen. Tergite 6 unmodified. Tergite
7 darkly pigmented, with a small anteromedial pale part. Tergite 8 bare and shining, divided into two dark sclerites, dorsomedial parts tapered; ventromedial parts strongly tapered. Tergite 10 divided longitudinally, each half bare, shining, with a small bristle; anterior part of tergite 10 darkened and narrowed. Cercus bare and concave dorsally, apically with 2 flat bristles. Sternite 7 large, convex posteriorly, with a medial pale area; sternite 8 reduced to a small, inconspicuous hyaline sclerite; sternite 10 large, bare, deeply concave anteriorly. Spermathecae spherical, ducts shorter than spermathecal body.

TYPE MATERIAL. Holotype (♂, CNC) and 48 paratypes (20♀, 28♂, CNC); ECUADOR: Tandapi, 40 km SW Quito, 1300–1500 m, 15–21.vi.1965, L. Peña. Other paratypes: ECUADOR: Pichincha: Tinalandia, 9–13.v.1987, L.D. Coote and B.V. Brown, 1120 m, Malaise trap, wet lower montane rain forest (13°10′S, ROM#87006); Carchi, Chical., 1250 m, 00°56′N, 78°11′W, 5.viii.1983, J.E. Rawlins (♂, CMNH); Guayaquil-Quenca Rd., 400–800 m, Canar, 4.iii.1965, L. Peña (3♂, 1♀, CNC); Pichincha, 16 km E Santo Domingo, Tinalandia, 4.v–25.vii.1985, 680 m, rain forest, Malaise-flight intercept trap, S. and J. Peck (3♂, GUE); Pichincha, Santa Elena, nr. Rio Palenque, ii.1983, M.J. Sharkey (1♂, GUE).

COMMENTS. Opacifrons triloba, named for the trilobed postero medial part of male sternite 5, is most similar to Opacifrons parabisecta, from which it differs most obviously in the widely separated, quadrangular postero medial lobes of the male sternite 5.

OTHER NEW WORLD SPECIES PREVIOUSLY PLACED IN OPA CIFRONS

Spuler (1924) redescribed the Costa Rican species Leptocera (Limosina) cartagensis Malloch as Leptocera (Opacifrons) cartagensis (Malloch). This species is known from a single female that has three dorsocentral bristles and a long second costal sector and is smaller than other New World Opacifrons. This species should be treated as of uncertain placement until more material is available.
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LITERATURE CITED


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