Kahl, Hugo. 1917

Notes upon the genus *Leucophenga* Mik (Diptera) with description of some new species from South America, West Africa, and the Philippine Islands

Annals of the Carnegie Museum. 11 (3-4): 364 - 393.

P. 364 genus *Leucophenga* Mik. 1886. Wien. Entom. Zeitg., V Jahrg.: 317.
for European *Drosophila maculata* Dufour, 1839.
Ann. des Scienc. Natur., 2e Série, Tome XII Zool.: 50 figs 1-7.

Costa reaching only to the apex of the third vein. Mik did not mention about chaetotaxy

"Dufour described the imago, puparium, and nymph (1839) and later the larva (1845. Mém. Soc. Lille. 1845: 201-208)

Schiner first separated the spp of Drosophila into two groups 1864

gr. 1. C. reaches only to 3rd vein — single sp. *maculata*

gr. 2. ... (costa) ~~(Berl. Ent. Zeitschr. VI. : ...)~~
Fauna Austriaca (Diptera), II: 275.

Strobl 1893 (Wien. Entom. Zeitg XII Jahrg: 283, with foot-note)
discovered another European sp. a ♀ from Styria, Leucophenga quinquemaculata Strobl 1893

Chaetotaxy = type Leucophenga, & Scaptomyza etc.

[illegible] Drosophilidae [illegible] *Stegana*, *Phortica*, *Drosophila*.

Scaptomyza [illegible], *Dros. [illegible]* [illegible] 1862 (Berl. Ent. Zeitschr. ...
& *D. [illegible]* Williston, 1896, (Trans. Ent. Soc. Lond. 1896 ...
in [illegible] Diptera of St. Vincent

Zaprionus vittiger Coq. 1901. Proc. U.S. N. Mus 24: 31 ...
article [illegible] published in 1901)

and in *Leucophenga* [illegible]

Strobl .. footnote = 4/K

Leucophenga Mik schon von Schiner (Collect. Schin in Litt) als Argyrolampra von Drosophila getrennte Gattung zeichnet sich durch die zwischen de ? und e. besonders auffallend dünnere Randader aus. ..... könnte ich weder von meinen 9 Examplaren de maculata, noch von meiner neuen Art (quinquemaculata) behaupten:

ferner durch den Silberflanz des männlichen Thoraxrückens: sesonders aberdadurch, dass die Stirn mur I mittlere Randborste und knapp hinter ihr, etwas näher dem Auge, eine ebenso grosse besizt; es fehlt also die 3., hintere Randborste der echten Drosophilen (z.B. unimaculata, transversa, Kphalerata, funebris); bei einigen Drosophila= Arten (costataZett., nigrimana Mg.) steht die vordere Randborste ganz nahe denFühlern, bei den übrigen ungefähr in der Sternmitte."

All the spp of Leucophenga described below have threee strong front-orbitalbristles with the uppermost one nerarer the vertex thanin the true Drosophila, or at least midway between the inner vertical and the lower reclinate brisles, except in L. goodi sp. nov. from Kamerun, in which the upper reclinate bristle is distinctly nearer to thelower reclinate than to the inner vertical.

I am almost inclined to suspect that Strobl has overlooked the third or uppermost fronto-orbital, considering it one of the vertical bristles.

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Leucophenga, Phortica, and Stegana have three strong front-orbitals; weak, hair-like postverticals, except in L. ambigua sp. nov., and the posterior pair of acrostichals well developed.

Drosophila has two strong fronto-orbitals and a third small to very minute one between them(p.366, which is closer to proclinate and situated somewhat nearer the eye:setula), postverticals strongly deve loped, while the posterior acrostichals can usuallu not be differentiated from the minute setulae of the mesonotum.

Scaptomyza Hardy (graminum Fallén, adusta Loew etc.) leafminers, long, narrow wings, acrostichals in few, regular rows, occiput convex (not concave) and the two dorsocentrals far apart.

Chymomyza Czerny: wings quite long and narrow, legs rather long, mesonotum not so convex as in Drosophila, postberticals extremely minute, hair-like: no prescutellars, three strong front-orbitals, proclinate pair strongly converging, lowerest reclinte closer to the eye and quite near the anterior border of the front, the proclinate is situated some distance above and inward of this loer relinate, front with its sides strongly diverging upwards, face comparatively narrow.

p.369 Genus Leucophenga Mik

Generic charactersShape of head, thorax and abdomen as in true Drosohila and Phortica, but the concavity of the upper occiput apparently ~~more evident than in~~ Drosophila and in this respect more like Phortica.

Wings rather broadly ovate, more or less distincly pointed (indistinctly-so in L. ambigua sp. nov.) , costa reaching only to the apex of the
370 third longitudinal vein, alula developed; discal and second basal cells united, Face not nasute. three strong fronto-orbital bristles, post-verticals exceedingly minite, strongly convergent (slightly so in L. argenteofasciata sp. nov.) or decussate at tips ♀ in L. ambigua sp. nov., the postoverticals are strongly developed), prescutellars well-develped, however, shorter than the posterior dorso-central.
one humeral (except in L. ambigua) two supra-alars, the posterior strong, two postalars, posteriors very minute (except in L. ambigua). Scutellum bare, except four marginal scutellar bristles. Acrostichals rows indistinct.

p.371. Key to the species of Leucophenga Mik described below.

1. Postvertical bristles minute, hairlike. .....2.
Postvertical bristles very strong,: wings without spots: 2nd vein straight. .....ambigua sp. nov.

2. 2nd vein distintly curved apically: wings with brown spots; abdomen without black spots. .....3.
Second vein straight, or indistincly curved; wings with or without spots; abdomen with or without black spots. .....5.

3. Wings with a basal and apical spot and an irregular median band, spots and band brown; abdomen blackish with a silvery band. .....
.....argenteo-fasciata sp. nov.
Wings with brown, separate spots at base, on apex of 2nd vein, and on anterior and posterior cross-veins. .....4.

4. Spot on apex of 2nd vein longitudinally oblong; apex of 3rd vein brown; abdomen slivery white, length 2.5mm. ..argenteiventris sp. nov.
Spot on apex of 2nd vein longitdinally oblong; apex of 3rd vein brown; abdomen yellowish (univolored?0; length 3mm. ..hasemani sp.nov.
Spot on apex of 2nd vein spherical; apex of 3rd vein yellow, not infuscated; abdomen blackish brown with yellow spots; length 3mm. ...
.....maculosa Coquillett.

5. Wings from base with two diverging brown stripes; second vein straight. .....bistriata sp. nov.
Wings otherwise marked. .....6.

6. Abdomen yellow with black spots in longitudinal series. ....7.
Abdomen otherwise marked. .....8.

7. Wings with two brown spots, one at base and one at apex of marginal cell. .....quadrimaculata Walker.
Wings hyaline without spots. .....ornativentris sp. nov.

8. Abdomen blackish, base and apex pale yellow, wings subhyaline, brown along costa. .....goodi sp. nov.
Abdomen blackish, unicolored; wings mostly brown anteriorly; second vein straight. .....brunneipennis sp. nov.

...EC.
...ICORADA

p.386 9. Leucophenga bistriata sp. nov.

Diagnosis: Head and antennae yellow; upper occiput black; front, face, and third antennal joint with grayish white bloom; palpi large, leaf-like, black. Mesonotum dark brown-red. Pleura yellow with 2 brown spots. Scutellum blackish brown on basal two-thirds, yellowish white on apical thid. Legs yellow. Halteres yellowish white. Abdomen black with yellowish base, but its extreme apex and a transverse basal band on third segment whitish. Wings hyaline with two brown, longitudinal, diverging stripes from base, one costal, the other median; second vein straight apically; the distance between anterior and posterior cross-veins distinctly shorter than first section of third vein. Length 3mm, (or a little less).

Habitat: Philippine Islands, Mindanao, 1 ♂?, Carn Mus. Acc. No. 5030.

p.388 This species is easily distinguished from any known species of Leucophenga by the markings of the wings and by the comparative length between the first section of third vein and the distance betwwen anterior and posterior cross-veins.

10. Leucophenga goodi sp. nov.

Diagnosis: Head and antennae yellow; upper occiput black; palpi black. Mesonotum dark brown, shining, anteriorly with a broad, longitudinal uyellow mark, which extends a little beyond the transverse suture. Scutellum opague, dark brown, with the extreme apex yellow. Legs yellow. Halteres yellowish white. Abdomen black, with basal half above and apex yellow. Wings grayish hyaline with costal and marginal cells fuscous brown; second vein straight. Length 2mm.

Palpi black.

p.389 Habitats: West Africa, Cameroons, Lolodorf, Nov. 1, 1913, 1 ♂, collected by A. I. Good. Carn. Mus. Acc. No. 5263.

This is the smallest species of Leucophenga before me

11. Leucophenga ambigua sp. nov.

Diagnosis: Head yellow with upper occiput black; upper half of front-orbital region, ocellar spot, face, and third antennal joint grayish ~~brown~~ pollinose. Palpi yellow, not prominent. Mesonotum and scutellumbrown-red. Legs pale yellow. Halteres yellow. First and second

p.390 segments of abdomen yellow, third, fourth, land fifth segments black, with narrow yellow basal bands interrupted in the middle with black. Wings fuscous hyaline, the fuscous more pronounced in the anterior half; second vein perfectly straight. Postvertical bristles very strong. Length 4.5mm.

p.391. Habitat: Cameroons, West Africa, 8 specimens colt. at Lolodorf, Oct. 29, 1913, by A I. Good. Carn. Mus. Acc. No. 5264: 7 designated as paratypes each have 5266.

This sp. is indeed an anbiguous Leucophenga and I refer it to this genus because the costa reaches only to the apex of the third vein; its strong postverticals are those of Drosophila. The corss-vein separating the discal and second basal cells is distinct in Phortica and Stegana, but missing or obliterated in L. Dros. Scapt. and other genera.

XII. NOTES UPON THE GENUS LEUCOPHENGA MIK (DIPTERA) WITH DESCRIPTIONS OF SOME NEW SPECIES FROM SOUTH AMERICA, WEST AFRICA, AND THE PHILIPPINE ISLANDS.

By Hugo Kahl.

The genus *Leucophenga* was established by Professor Mik[1] for the European *Drosophila maculata* Dufour[2] and he felt justified in doing so, because the costa reaches only to the apex of the third vein; he does not mention anything about the chætotaxy, but remarks: "Schon Léon Dufour hielt die Art für den Typus einer eigenen Gattung." Dufour described the imago, puparium, and nymph[2] and later the larva.[3] Schiner first separated the species of *Drosophila* into two groups with reference to the length of the costa and includes in the first group the single species *Drosophila maculata* Dufour with costa reaching only to third vein.[4] In 1893 Professor Strobl discovered another European species, a female from Styria, and named it *Leucophenga quinquemaculata*[5] and in his specific description he touches upon the chætotaxy as follows: "Beborstung des Thorax und Schildchens genau wie bei *maculata;* ebenfalls 2 Sternopleural, 4 Schildchenborsten, etc." Two sternopleural and four scutellar bristles apparently belong to all the species of *Drosophilinæ*, at all events they occur in all the species before me of the genera *Stegana*, *Phortica*, *Drosophila*, and *Scaptomyza*, in *Drosophila amœna* Loew[6] and *Drosophila procnemis* Williston,[7] in *Zaprionus vittiger* Coquillett[8] and in

[1] *Wien. Entom. Zeitg.*, V Jahrg. (1886), p. 317.

[2] *Ann. des Scienc. Natur.*, 2e Série, Tome XII, Zoöl. (1839), p. 50, figs. 91–98.

[3] *Mém. Soc. Lille*, 1845, p. 201–208.

[4] *Fauna Austriaca* (Diptera), II (1864), p. 275.

[5] *Wien. Entom. Zeitg.*, XII Jahrg. (1893), p. 283 with footnote.

[6] *Berl. Ent. Zeitschr.* ("Dipt. Amer. Septentr. Indig.," Cent. II, 96), VI (1862), p. 230.

[7] *Trans. Entom. Soc. London* ("On the Diptera of St. Vincent"), 1896, p. 412.

[8] *Proc. U. S. N. Mus.*, XXIV (1902), pp. 31–32, but the article concerned was published Sept. 27, 1901). There are in the Carnegie Museum two specimens of *Zaprionus vittiger* Coquillett from Lolodorf, Kamerun, taken Oct. 29 and Nov. 1, 1913, by Rev. A. I. Good. There are three fronto-orbital bristles, of which the proclinate and largest one is situated unusually far below the lower reclinate, which

Leucophenga. *Blæsochætophora* Czerny, *Cyrtonotum* Macquart, and *Astœinæ* Loew I do not 'include 'in the discussion.' Professor Strobl in a footnote to the article cited adds another character to the genus, which is very important, as it does not agree with my studies of the species of *Leucophenga* at my disposal, and I herewith copy his note: "*Leucophenga* Mik, Wiener Entomolog. Ztg., 1886, pag. 317. Diese schon von Schiner (Collect. Schin. i. Litt.) als *Argyrolampra* von *Drosophila* gesonderte Gattung zeichnet sich durch die zwischen der 3. und 4. Längsader auffallend dünnere Randader aus, dass die Randader nach der 3. Längsader aber ganz erlösche, könnte ich weder von meinen 9 Exemplaren der *maculata*, noch von meiner neuen Art behaupten; ferner (*maculata*, wahrscheinlich auch *quinquemaculata*) durch den Silberglanz des männlichen Thoraxrückens; besonders aber dadurch, dass die Stirn nur 1 mittlere Randborste und knapp hinter ihr, etwas näher dem Auge, eine ebenso grosse besitzt; es fehlt also die 3., hintere Randborste der echten Drosophilen (z. B. *unimaculata*, *transversa*, *phalerata*, *funebris*); bei einigen *Drosophila*- Arten (*costata* Zett., *nigrimana* Mg.) steht die vordere Randborste ganz nahe den Fühlern, bei den übrigen ungefähr in der Stirnmitte." All the species of *Leucophenga* described below (as well as the North American *L. quadrimaculata* Walker and *L. maculosa* Coquillett) have three strong fronto-orbital bristles with the uppermost one nearer the vertex than in the true *Drosophila*, or at least midway between the inner vertical and the lower reclinate bristles, except in *L. goodi sp. nov.* from Kamerun, in which the upper reclinate bristle is distinctly nearer to the lower reclinate than to the inner vertical. In the true *Drosophila* there are also three fronto-orbitals, two of which are strong, with a lower one proclinate, an upper reclinate, and between them, or at the level with the proclinate, a small or even exceedingly minute (rarely

is a little nearer to the upper reclinate than to the proclinate; two noto-pleurals (Coquillett calls them "posthumerals" after Osten-Sacken); prescutellars not differentiated from the quite strong setulæ of mesonotum; one well-developed presutural (Coquillett calls this bristle erroneously "the anterior one" of five supra-alars); the supra-alars and postalars (Coquillett's "supra-alar bristles") situated as in *Leucophenga*; the anterior supra-alar small, but differentiated from the setulæ of mesonotum; the posterior postalar quite well developed; third antennal joint (present in one of my specimens only) not so long as given by Coquillett for his specimens, but appears hardly longer than wide; the postverticals well developed, converging; the costa broken through twice, as is the case in *Drosophilinæ*. That my determination is correct there can be no doubt, although the localities are very distant (Coquillett's specimens came from Cape Colony).

strong[9]) reclinate bristle, which is closer to the proclinate bristle and situated somewhat nearer the eye; this minute bristle, or setula, is more or less evident for instance in *D. melanogaster* Meigen (= *ampelophila* Loew and *uvarum* Rondani); and in *D. repleta* Wollaston (= *punctulata* Loew and *adspersa* Mik) it is very distinct. In *D. quinaria* Loew it is very minute and in *D. dimidiata* Loew[10] this setula is exceedingly minute, but yet distinct from the orbital row of minute hair-like setulæ. I have seen neither *L. maculata* Dufour nor *L. quinquemaculata* Strobl of Europe and to therefore contradict the statement by so eminent a dipterologist as Professor Strobl, that these two species have only two fronto-orbital bristles and that they do not possess the third or upper fronto-orbital bristle, might seem perhaps presumptuous, but, as Professor Strobl does not mention the vertical bristles, I am almost inclined to suspect that he has overlooked the third or uppermost fronto-orbital, considering it one of the vertical bristles; it would, indeed, be a very peculiar fact that the two European species should have only two fronto-orbitals, while the third or uppermost fronto-orbital, which is always strong in *Drosophilinæ*, should be missing, whereas the many species of *Leucophenga* before me from very distant localities all have three strong fronto-orbitals. Whether or not my suspicion is correct concerning the statement of Professor

[9] *Drosophila obesa* Loew from Texas is described by its author as having three strong fronto-orbital bristles: "fronte latissima præter setas verticis utrinque setis tribus validis armata" (*Berl. Ent. Zeitschr.*, XVI (1872), p. 102 (Cent. X, 85).

[10] *Berl. Ent. Zeitschr.*, VI, 1862, p. 230 (Cent. II, 95). *Drosophila dimidiata* appears not to have been recorded since Professor Loew described it from Illinois. I have captured it on several occasions on windows and on tree-fungi at Pittsburgh, Pennsylvania, the first time Aug. 18, 1906, and in later years during all the months from July 20–Oct. 21; it is a true *Drosophila*. As the original description does not touch upon the chætotaxy I use this occasion to do so and to add a few other remarks. It is a beautiful species with eyes in life of a pure and clear, rather prettily dark purple color (in the field I wrote on two specimens "Eyes crimson"); face with a prominent carina; thorax strongly convex; scutellum convex; abdominal black marks variable; the lower reclinate fronto-orbital bristle exceedingly minute; the postverticals well developed, touching at tips; a second quite well-developed humeral; the presutural and the anterior supra-alar well developed, though much smaller than the posterior supra-alar and anterior postalar bristles; the posterior postalar minute, but distinct; the anterior dorso-central very minute, situated unusually near the strong posterior one and easily overlooked; prescutellar pair not developed, that is, not differentiated from the setulæ of mesonotum; the lateral pair of scutellar bristles only about half the size of the decussate apical pair.

Strobl, those who have access to the European species can determine,[10a]

The chætotaxy of the genera of the *Drosophilinæ* is much alike with modification in size of certain groups of bristles. Thus *Leucophenga*, *Phortica*, and *Stegana* have three strong fronto-orbitals; weak, hair-like postverticals, except in *L. ambigua sp. nov.*; and the posterior pair of acrostichals well developed. *Drosophila* has two strong fronto-orbitals[9] and a third small to very minute one between them, postverticals strongly developed, while the posterior acrostichals can usually not be differentiated from the minute setulæ of the mesonotum. In a small species of a true *Drosophila* from Bolivia before me the hindmost pair of acrostichals (prescutellar pair) is quite differentiated, but yet the postverticals are strong, even for so small a species. *Drosophila graminum* Fallén, *adusta* Loew, and several allied species have properly been placed in a separate genus, *Scaptomyza* Hardy, both on account of the habits of their larvæ as leafminers, and of their long, narrow wings, their wing-venation, acrostichals in few, regular rows, occiput convex (not concave) and the two dorso-centrals far apart. Czerny has erected the genus *Chymomyza* for *D. costata* and *D. fuscimana;* and the American species *D. amœna* Loew and *procnemis* Williston should be referrred to this genus. Both species are more active in their motions than true *Drosophila*, and I have often observed them during their walk on windows moving their wings in the manner of Sepsids and Ortalids. Their wings are quite long and narrow; legs rather long; mesonotum not so convex as in *Drosophila*; postverticals extremely minute, hairlike; no prescutellars; three strong fronto-orbitals, two of which are reclinate, one proclinate (the proclinate pair strongly converging); the upper reclinate about the middle of front and the lowermost reclinate situated closer to the eye and quite near the anterior border of the front; the proclinate bristle is situated some distance above and inward of this lower reclinate bristle, which on account of its nearness to the eye corresponds with the middle fronto-orbital (the lower reclinate) in the other genera; front with its sides strongly diverging upwards, and face comparatively narrow.

[10a] After this article was ready to go to press I discovered that I had overlooked the fact that Becker has added a third species of *Leucophenga* to the European fauna, *L. leucostoma*, from Hungary, which he describes in the *Annales Historico-Naturales Musei Nationalis Hungarici*, Vol. VI, 1908, p. 320. As I do not at present have access to his description, I am unable to state whether he has dealt with the chætotaxy of this and the other European species and has confirmed or refuted the statements of Professor Strobl concerning the fronto-orbital bristles.

Drosophila costata Zetterstedt[11] and *D. nigrimana* Meigen[12] may belong in the same group as *amœna* and *procnemis*, judging from the statement by Professor Strobl above cited that they have the lowermost fronto-orbital situated very near the antenna and closer to the eye (he does not mention the directions of the bristles); *D. costata* has the evident black costa and black front legs much as in *procnemis*, but the latter has the last four joints of front tarsi whitish. *D. procnemis* has eyes in life pale, rather than dark, purplish, with a slightly shining reflection of green or bluish green in certain lights, especially below. I have taken this species at sap on trunks of *Robinia pseudacacia* Linnæus together with *Aulacigaster rufitarsis* Macquart and *Traginops irrorata* Coquillett and on windows, at Lawrence, Kansas; on windows at Urbana, Illinois; and at sap of trunks of *Acer rubrum* Linnæus together with the same species as above of *Aulacigaster* and *Traginops* and on windows at Pittsburgh, Pennsylvania. There is a specimen of *D. procnemis* in the Carnegie Museum from Chapada, Matto Grosso, Brazil, collected in Oct., by H. H. Smith (Carn. Mus. Acc. 2966). It is absolutely identical with North American specimens, and though by an accident it has been quite broken up, enough still remains to clearly identify it beyond a doubt. *Drosophila amœna* Loew is a common North American species with eyes in life quite light blood-red; I have taken this pretty species on windows and at sap on trunks of different trees at Lawrence, Kansas, at Urbana, Illinois, at Pittsburgh and Ohio Pyle, Pennsylvania; and there are specimens in the Carnegie Museum from Westmoreland Co., Pennsylvania, and Cheat Mts., W. Va., collected by H. H. Smith.

Before giving the characters of *Leucophenga* I desire to explain certain terms used, not as new expressions, but that there may not be the slightest misconception of my definitions.

Supra-alar bristles (anterior supra-alar bristles of Osten-Sacken[13]): I designate as such those along the upper edge of the supra-alar cavity, anterior to the transverse ridge (alar frenum of Osten-Sacken[13])

Post-alar bristles (posterior supra-alar bristles of Osten-Sacken):[13] I thus designate those on the post-alar callus, with the *strong anterior bristle* situated at the top of the transverse ridge (alar frenum), which divides the supra-alar cavity, and the *posterior bristle* close to the

[11] *Dipt. Scandin.*, VI (1847), p. 2552.

[12] *System. Beschr. Europ. Zweifl. Ins.*, VI (1830), p. 87.

[13] *Trans. Ent. Soc. London*, 1896, Part III, p. 413.

scutellar bridge, usually very minute and easily overlooked in the *Drosophilinæ*, though sometimes quite well developed, as for instance in *Stegana coleoptrata* Scopoli and *Leucophenga ambigua* sp. nov. In the *Drosophilinæ* the post-alar callus is ill-defined, but in the *Diptera Calyptrata*, for instance the *Tachinidæ*, it is well-developed, and it is distinctly seen that the bristle at top of the transverse ridge belongs to the post-alar callus. Osten-Sacken in his masterly work on chætotaxy[13] calls these two groups of bristles only *supra-alars* in the *Diptera Acalyptrata*, but I have preferred to designate them by separate names as above; if, however, the expression *supra-alars* alone is used for these two groups of bristles, then it is necessay to clearly define their position, and it is not sufficient to merely say "two, three, etc. supra-alars present," because it is of no small importance to know whether or not there exist any bristles, large or minute, between the one at the top of the transverse ridge, mentioned above, and the scutellum, inasmuch as some genera have a bristle there, while others do not. For instance the genus *Sepedon* has none there, the genus *Tetanocera* has one (both genera belong to the *Sciomyzidæ*).

Prescutellar bristles: I have preferred to retain this expression for a well-developed pair of posterior acrostichals, usually situated somewhat nearer the scutellum than are the posterior pair of the dorsocentral bristles.

First segment of abdomen: I apply this term to the small segment below the basal declivity; in designating the color of the abdomen it is necessary to define it from the second segment, which is the first large segment.

Genus LEUCOPHENGA Mik.

Generic characters: Shape of head, thorax and abdomen as in true *Drosophila* and *Phortica*, but the concavity of the upper occiput apparently more evident than in *Drosophila* and in this respect more like *Phortica*. Wings rather broadly ovate, more or less distinctly pointed (indistinctly so in *L. ambigua sp. nov.*) with the *costa reaching only to the apex of the third longitudinal vein*, ultimate section of fourth vein gradually thinner towards apex (*L. ambigua sp. nov.* somewhat

Note: The exotic species at my disposal were received more or less improperly packed in pill-boxes, and I have for that reason used the greatest caution in defining the characters, and it has even been necessary to omit some, which I might otherwise have employed. The types of *L. argenteo-fasciata* and *L. ambigua* were received pinned and *L. bistriata* glued to a card.

of an exception); costa broken through twice, immediately beyond the humeral cross-vein and before the apex of the first vein; alula developed; discal and second basal cells united, yet the place of the missing, separating cross-vein is indicated by some color or transparency, but it is not a cross-vein as in *Phortica* and *Stegana*. Face not nasute. Oral vibrissæ present; *three strong fronto-orbital bristles*, the lowermost proclinate, the two upper ones reclinate; the lower reclinate bristle is situated near the proclinate and slightly closer to the eye; the upper reclinate is removed towards the vertex or about midway between the lower reclinate and the inner vertical bristles and not below the level of the lower ocellus (except in *L. goodi sp. nov.*, where the upper reclinate is distinctly nearer to the lower reclinate than to the inner vertical and seemingly slightly below the level of the lower ocellus); two diverging verticals (that is two pairs of verticals, the inner pair converging, the outer pair diverging); two postverticals, exceedingly minute, hairlike, strongly convergent (slightly so in *L. argenteo-fasciata sp. nov.*) or decussate at tips (in *L. ambigua sp. nov.* the postverticals are strongly developed); one pair of strong, proclinate, and divergent ocellars; two posterior dorso-centrals, the hindmost one of which is the strongest; one pair of well-developed prescutellars, much weaker and shorter, however, than the posterior dorso-central; one humeral (except in *L. ambigua sp. nov.*); two strong notopleurals; one presutural, usually small; two supra-alars, the posterior strong, the anterior small, situated closely behind the transverse suture and apparently lower down; two postalars, the anterior strong, of the size of the posterior supra-alar and situated at the top of the transverse ridge which divides the supra-alar cavity, the posterior postalar very minute (except in *L. ambigua sp. nov.*), situated exterior to, but near the anterior end of the scutellar bridge; two diverging sterno-pleurals, the anterior weaker and situated at the sterno-pleural suture, the posterior situated a little lower down; four marginal scutellar bristles; otherwise the scutellum is bare. Mesonotum covered with minute setulæ in indistinct rows. Sterno-pleura with small hairs placed somewhat in a row from the anterior sterno-pleural bristle downwards (in *L. ambigua sp. nov.* some besides are irregularly scattered); otherwise the metathoracic and pleural regions are bare. Abdomen covered with small setulæ, and a row of longer setulæ before the apical margin of each segment. Front in the middle with minute hairs, apparently in two rows extending from the antennæ towards the ocelli, and a row

of equally minute, but stiff, setulæ close to the eye from the lower edge of the front to the lower reclinate fronto-orbital bristle (or sometimes beyond it). In *L. ambigua sp. nov.* the central rows are not so placed, but apparently in three transverse rows, as minute black setulæ.

KEY TO THE SPECIES OF LEUCOPHENGA MIK DESCRIBED BELOW

1. Postvertical bristles minute, hairlike.....2
   Postvertical bristles very strong; wings without spots; second vein straight. *ambigua* sp. nov.
2. Second vein distinctly curved apically; wings with brown spots; abdomen without black spots.....3
   Second vein straight, or indistinctly curved; wings with or without spots; abdomen with or without black spots.....5.
3. Wings with a basal and apical spot and an irregular median band, spots and band brown; abdomen blackish with a silvery band.....*argenteo-fasciata* sp. nov.
   Wings with brown, separate spots at base, on apex of second vein, and on anterior and posterior cross-veins.....4.
4. Spot on apex of second vein longitudinally oblong; apex of third vein brown; abdomen silvery white; length 2.5 mm.....*argenteiventris* sp. nov.
   Spot on apex of second vein longitudinally oblong; apex of third vein brown; abdomen yellowish (unicolored?); length 3 mm.....*hasemani* sp. nov.
   Spot on apex of second vein spherical; apex of third vein yellow, not infuscated; abdomen blackish brown with yellow spots; length 3 mm. .*maculosa* Coquillett.
5. Wings from base with two diverging brown stripes; second vein straight. *bistriata* sp. nov.
   Wings otherwise marked.....6.
6. Abdomen yellow with black spots in longitudinal series.....7.
   Abdomen otherwise marked.....8.
7. Wings with two brown spots, one at base and one at apex of marginal cell. *quadrimaculata* Walker.
   Wings hyaline without spots.....*ornativentris* sp. nov.
8. Abdomen blackish, base and apex pale yellow; wings subhyaline, brown along costa.....*goodi* sp. nov.
   Abdomen blackish, unicolored; wings mostly brown anteriorly; second vein straight.....*brunneipennis* sp. nov.

1. Leucophenga argenteo-fasciata sp. nov.

Diagnosis: Head and antennæ yellow, palpi large, black. Mesonotum and scutellum brown-red; legs and halteres yellow. Abdomen above black with a silvery-white transverse band. Wings yellowish hyaline with a large basal and apical spot and a median transverse band, all dark brown, second vein gently curved on its apical half. Length 3.5 mm.

Description: Head with front almost orange-yellow, in certain oblique lights white, and the fronto-orbital stripes concolorous; front as high up as the upper fronto-orbital bristle of almost equal width, rather broad, one-third as wide as the head and with the median rows of hairs yellow; antennæ and lower occiput pale yellow; the upper concave occiput blackish with the orbits broadly yellow; face grayish white with a very slight, transversely convex carina; third joint of antennæ almost twice as long as wide, evenly rounded at apex; arista with basal half yellow, the apical half and the rays dark brown; the rays about eight above and about four below; palpi prominent, quite broad, black with small setulæ on lower side to apex; cheeks extremely narrow, hardly perceptible.

Mesonotum and scutellum rather dark brown-red, very slightly shining, the former with its minute setulæ changing to red or black in different lights. The scutellum strongly convex, its apical margin and underside yellow; metathorax shining, dark honey-yellow; the pleura pale brownish red; legs yellowish, the anterior pair somewhat paler; middle and posterior tibiæ, at least, with a minute pre-apical bristle, differentiated from the very minute tibial setulæ; halteres yellow.

Abdomen with dorsum opaque black, slightly shining apically, the small black setulæ appearing in certain lights pronouncedly reddish, especially on the apical segments; the small first segment and venter yellow, the latter with some rather long hairs on each segment; second dorsal segment with a black, transverse spot at each corner of the yellow base and behind it a transverse black band, the anterior edge of which is concave in the middle and its posterior border reaching as far as the pre-apical row of the longer setulæ, behind which row the segment is silvery-white; the base of the third segment is narrowly white, and silvery in certain lights; the hypopygium is reddish brown.

Wings distinctly pointed, yellowish hyaline; the yellowish more evident on the anterior half, the hyaline on the posterior half; a light brown spherical spot on anal vein; a large spot at base and apex and a transverse band between them, all dark brown; the outlines of the two large spots and the crossband are as follows: beginning at the apex of the first vein, *the outline of the brown basal spot* follows the first vein to the junction of the second and third veins, crosses the first basal cell into the middle of the discal cell, along the middle of which it extends to a little beyond the anterior cross-vein, then parallel with this cross-vein to the third vein, following it to the anterior cross-vein, whence it runs straight to the second vein and thence obliquely to the apex of first vein; *the outline of the brown apical spot* begins at costa a little beyond the apex of second vein, runs slightly concave to the third vein and thence to the apex of third vein in an evenly convex curve, reaching posteriorly beyond the middle of the first posterior cell, and is bordered anteriorly by the costa; the brown of this spot is diluted in the region of the costa and becomes more intense along the third vein; *the median transverse band* is apparently made up of two spots, the anterior one large, oval, directed longitudinally with its tip towards the apex of the wing, the posterior one is transverse scarcely half as wide as the former, and both spots join each other broadly in the middle of the first posterior cell; the outline of the band runs from apex of second vein in an oblique, convex curve, inwards to the middle of first posterior cell, then outwards in a convex curve across the fourth vein, continuing in a slightly concave curve to the apex of the fifth vein; the inner outline of the band begins at the middle of the penultimate

section of the costa, runs in a slightly convex curve to the middle of first posterior cell, then in a gentle convex curve to the fifth vein, where the outline runs a little inwards and across the fifth vein to its apex; the posterior cross-vein is equally surrounded on each side by the posterior portion of this band.

The third longitudinal vein ends in the very apex of the distinctly pointed wing; second vein curves gently and distinctly on its apical half; the distance between the tips of the second and third veins at least two and a half times the distance between the tips of third and fourth veins, which are almost parallel in their apical portion; first posterior cell slightly wider at the middle than at apex (a usual occurrence in *Drosophilinæ*); the distance between anterior and posterior cross-veins is one half longer than the first section of the third vein; the posterior cross-vein about the length of, or slightly longer than, the ultimate section of fifth vein; anal vein strong, straight, stops almost abruptly, reaching about halfway towards the posterior margin of the wing; veins black, the thinned apical portion of fourth vein yellowish, and the fifth vein through the hyaline part appears reddish yellow.

The fronto-orbital, vertical, and ocellar bristles of almost equal size; the upper reclinate fronto-orbital is distinctly nearer to the inner vertical than to the lower reclinate, and only slightly higher up than the lower ocellus; the uppermost pair of the occipito-orbital fringe of setulæ lengthened, appearing as a small pair of diverging posterior verticals; the postverticals minute, but distinct and very slightly converging; a small seta near the eye on the lower occipital orbit distinctly differentiated from the setulæ of the orbital fringe; between the two sternopleural bristles is seen a very minute setula; the anterior dorso-central bristle is much shorter and weaker than the posterior one, and of the size of the prescutellar pair, which is situated distinctly nearer the scutellum than the strong posterior dorso-central bristle, and the distance between the prescutellars is distinctly less than the distance between either of them and the nearest posterior dorso-central; the four scutellar bristles, of the same strength as the posterior dorso-central, with the apical ones converging and with the lateral ones a little longer, diverging; the posterior postalar minute, but distinct; the anterior supra-alar and the presutural of same size, small, but distinctly differentiated from the setulæ of mesonotum. All bristles black.

Habitat: Brazil, Santarem, 1♂, Coll. H. H. Smith, Carn. Mus. Acc. 2966. Type in Carnegie Museum, Pittsburgh.

2. **Leucophenga brunneipennis** sp. nov.

Diagnosis: Head yellow with upper occiput mostly blackish; palpi black. Mesonotum and scutellum dark brown-red; legs yellow. Abdomen with dorsum black. Wings anteriorly dark brown, fuscous posteriorly; posterior cross-vein broadly surrounded by dark brown; second vein straight to costa. Length 3 mm. or a little less.

Description: Head with front reddish yellow, somewhat brownish at vertical portion and with the orbital stripes concolorous with the rest of front, which is rather narrow, less than one-third the width of head, of equal width of the face from the oral vibrissæ to the upper reclinate fronto-orbital bristle; lower occiput pale

yellow, the upper concave occiput blackish with the orbits narrowly yellow; face light yellowish white or yellowish gray, with a very slight, transversely convex carina; cheeks extremely narrow, hardly perceptible; (antennæ are missing). The mouthparts were demolished and not recognizable, but one of the palpi was still loosely attached and before it was lost together with the rest of the mouthparts, the writer made the following note: "palpi black, apparently cylindrical, clothed with short hairs, not conspicuous in size."

Mesonotum and scutellum dark brown-red, almost opaque, the former with the minute setulæ black, the latter strongly convex. Under side of scutellum and metathorax reddish yellow, shining, with the sides of the latter at base of wings fuscous; the pleura lighter than the mesonotum, but not conspicuously so; legs yellow with a brownish tint; the middle and posterior tibiæ with a minute pre-apical setula (halteres are missing).

Abdomen black, slightly shining on basal two-thirds, very shining on the last segments (may be the whole abdomen is very shining in well-preserved specimens); the small first segment and venter brownish yellow; sides of second segment dark honey-brown.

Wings quite distinctly pointed, dark brown on anterior half, fuscous on the posterior half and with the posterior cross-vein broadly and conspicuously bordered with deep brown, which color extends into the first posterior cell and below widens a little along both sides of fifth vein, reaching its apex; the dark brown and the fuscous hyaline is limited by the fourth vein and the brown encroaches upon the discal cell along the first section of fourth vein; there is a fuscous hyaline, transverse dash from the base of the first posterior cell, which dash, gradually narrowed, reaches the marginal cell slightly beyond the second vein; apex of the submarginal cell along the costa also fuscous hyaline; first posterior cell along the fourth vein and at its apex narrowly fuscous hyaline, except the deep brown at posterior cross-vein; second posterior cell the most diluted space of the wing and the darkest brown of the wing surrounds the posterior cross-vein.

The third longitudinal vein ends at the apex of the pointed wing; second vein in its apical two-thirds straight; the distance between the tips of second and third veins hardly two and one-third times the distance between the tips of third and fourth veins, which are parallel in their apical course; the first posterior cell is only very slightly wider at its middle than at its apex; the distance between the anterior and posterior cross-veins is hardly more than one-third longer than the first section of third vein; posterior cross-vein slightly longer than the ultimate section of fifth vein; the anal vein does not stop abruptly, but continues as a curved fold nearer the posterior margin; veins blackish brown, with the thinned apical portion of fourth vein diluted.

The fronto-orbital, vertical, and ocellar pair of bristles of almost equal size, with the upper reclinate fronto-orbital and the outer vertical bristles a little more robust; the upper reclinate situated slightly nearer to the inner vertical than to the lower reclinate and a little higher up than the lower ocellus; an upper pair of setulæ of the occipito-orbital fringe a little larger and diverging; postverticals very minute, hair-like, strongly convergent, touching at tips; on lower occipital orbit near the eye a small weak setula, differentiated, however, from the minute setulæ of the orbital fringe. The anterior dorso-central is much shorter than the posterior dorso-

central bristle and about the size of the prescutellar bristles, which are situated nearer the scutellum than the strong posterior dorso-central, and with the distance between them much closer than between either of them and its nearest posterior dorso-central. The scutellar bristles strong, the apical pair decussate, the lateral pair divergent and slightly longer. The posterior postalar bristle very minute; the anterior supra-alar and the presutural bristles rather minute, but distinctly differentiated from the setulæ of mesonotum. Some of the hairs on the humeral callus are longer and setula-like. All the bristles are black.

Habitat: Bolivia, Las Juntas, Dec., 1913. 1♂, Coll. José Steinbach, Carn. Mus. Acc. 5081. Type in Carnegie Museum, Pittsburgh.

3. **Leucophenga hasemani** sp. nov.

Diagnosis: Head, antennæ, and palpi yellow, the latter conspicuously enlarged, compressed; upper occiput with a large, central, trifid, blackish mark. Mesonotum and scutellum light reddish yellow, opaque, the former with a thin whitish gray bloom in certain lights. Legs pale yellow. Ground-color of abdomen brownish yellow. Wings yellowish hyaline with two dark brown costal spots, one near the base, the other oval, lying longitudinally on apex of second vein; anterior and posterior cross-veins bordered with dark brown; apex of third vein and its surroundings fuscous; second vein distinctly curved at apex. Length 3 mm.

Description: Front of head opaque yellow; orbital stripes gray, in certain lights grayish white, which color seems more pronounced on the orbital stripes and ocellar region, but immediately above the antennæ the color is almost orange-yellow. Front quite broad, a little more than one-third the width of head, of equal width with the face from the oral vibrissæ to the upper reclinate fronto-orbital bristles. Face and lunula slightly whitish, the former slightly carinate between the antennæ. The upper occiput gently concave, yellow, with three basally connected oblong, dark brown spots, the middle one of which is a little lighter. Third antennal joint pale yellow, hardly longer than wide; arista with its rays brown, base yellow; the rays about six above and about three below. The palpi yellow, broad, compressed, conspicuously enlarged, with very minute setulæ below. Cheeks very narrow.

Mesonotum and scutellum light reddish yellow, the former in front darker in color; the latter paler in color and more yellowish. Scutellum very gently convex, apex pale. Mesonotum in certain lights, especially in front, showing a thin whitish gray bloom. Its minute black setulæ, some of which in certain lights appear reddish yellow, form about eight rows between the dorso-central bristles. Humeri, notopleura, and pleura paler. Legs pale yellow; tibiæ with a minute pre-apical bristle, or setula. Halteres yellow.

Abdomen with a distinct black spot on each anterior corner of second dorsal segment. The abdomen is in such condition that the colors cannot be satisfactorily

defined. The ground-color appears brownish yellow, but I suspect that in fresh and mature specimens there may be some dark marks.

Wings a little pointed, yellowish hyaline; a dark brown spot at base from the costa to fourth vein, covering the extreme apex of costal cell, base of marginal and submarginal cells, and the middle of first basal cell; an oval spot of same color along apex of second vein, covering the entire apex of marginal cell and extending into the middle of submarginal cell; the anterior cross-vein narrowly, the posterior one quite broadly, bordered with dark brown; apical portion of third vein distinctly infuscated and the infuscation extending over the apex of the submarginal cell, though diluted. Third vein ends exactly at the apex of the slightly pointed wing; second vein rather strongly curved at apex; the distance between the tips of second and third veins about twice the distance between the tips of third and fourth veins; first posterior cell hardly wider at middle than at apex; the distance between anterior and posterior cross-veins hardly one-fourth longer than the first section of third vein; the posterior cross-vein about the length of the ultimate section of fifth vein; anal vein quite strong, reaching slightly over halfway towards posterior margin; fourth vein thinned in its apical portion; costa fuscous, veins otherwise yellowish, but blackish where the brown marks are situated; the vein closing the anal cell also blackish.

The fronto-orbital, vertical, and ocellar bristles of almost equal size; the upper reclinate fronto-orbital appears to be only midway between the inner vertical and the lower reclinate and only slightly higher up than the lower ocellus; the uppermost setula of the occipito-orbital fringe is lengthened and diverging from the other setulæ of that fringe; postverticals minute, strongly convergent, touching at tips; on lower occipital orbit a small bristle-like setula, distinctly differentiated from the small setulæ of the occipito-orbital fringe; between the two diverging sternopleural bristles a minute setula; the anterior dorso-central bristle a little weaker than the posterior one and of almost equal size with the prescutellar pair, which are situated almost on a level with the posterior dorso-central; the presutural bristle shorter than the notopleurals, but almost as strong; the anterior supra-alar weak; the posterior postalar minute; the two apical scutellar bristles are decussate in the specimen. The bristles appear in certain lights more or less yellow, expecially the lower fronto-orbitals, humeral, noto- and sterno-pleurals. Along the exterior side of middle coxæ a row of yellowish, bristly hairs, the uppermost the strongest.

Habitat: Brazil, Espirito Santo, Munez Freire, June 17, 1908, Collected by J. D. Haseman, Carn. Mus. Acc. 3579. Type in Carnegie Museum, Pittsburgh. The species is dedicated to my friend, the intrepid explorer, Dr. J. D. Haseman.

There is an extreme resemblance between this species and *L. maculosa* Coquillett[14] and I was strongly inclined to refer it to the latter species, which I had before me from Kansas, Illinois, and Pennsylvania, but considering the differences between the unique Brazilian specimen and *maculosa*, although they appear slight, I have preferred

[14] *Proc. Acad. Nat. Sc. Philadelphia*, 1895, p. 317.

to designate it as distinct, until more material may decide whether they actually are distinct or identical. It seems that the two reclinate fronto-orbital and the inner veritcal bristles in *hasemani* are more equidistant, whereas in *maculosa* the upper reclinate is distinctly nearer to the inner vertical than to the lower reclinate; the brown basal wing-spot in *hasemani* is angulated outwardly, whereas in *maculosa* the exterior outline of this spot is straight; the spot at apex of second vein in *hasemani* is oval along the wing and its brown color borders the second vein, in the submarginal cell, to its apex, whereas in *maculosa* this spot is round with the brown color crossing the second vein at some distance from its apex into the submarginal cell; the distinct infuscation of the apical portion of third vein in *hasemani* is missing in the specimens of *maculosa* before me. Coquillett would not have failed to mention this infuscation if it had existed in the type. The condition of the abdomen of *hasemani* is such, that a fair comparison with the spotted abdomen of *maculosa* is out of the question.

4. Leucophenga maculosa Coquillett.

Drosophila maculosa COQUILLETT, Proc. Acad. Nat. Sc. Philadelphia, 1895, p. 317.
Drosophila maculosa JOHNSON, Entom. News, Philadelphia, 1904, p. 162.
Drosophila maculosa JOHNSON, Bull. Am. Mus. Nat. Hist., XXXII, 1913, p. 88.

To Coquillett's description the following notes may be added, taken from specimens which the writer most certainly considers identical with *maculosa:*

Palpi much enlarged, compressed, yellow. Wings as in *L. hasemani*, but the spot on apex of second vein is round and does not definitely fill out the extreme apex of the marginal cell. Third vein yellow, not infuscated on apex, as in *L. hasemani*. The chætotaxy is the same as in *hasemani*, but the upper reclinate bristle is nearer to the inner vertical than to the lower reclinate and placed higher up than the lower ocellus. Thorax and scutellum rather reddish yellow, the latter with apex pale. The apical scutellar bristles are decussate, the lateral pair divergent. Abdomen may be very slightly, if at all, shining in life; the small first segment[15] yellow, the second segment yellow, except a small black spot above at each anterior corner, the three or four following segments, as seen from above, each with a pair of yellowish spots at base, larger and somewhat triangular on the third, smaller and rounded on the two or three following segments, and besides these yellow spots, the same three or four segments have each a large yellow spot near the lateral margins, but not seen from above. Compare with *hasemani*.

[15] What Coquillett calls "first segment" of abdomen the writer has, for reasons given above, preferred to designate as *first and second* segments, and Coquillett's second corresponds with the writer's third, etc.

The type is from Florida. Mr. Johnson records it from Florida and New Jersey. The writer has taken it on windows and reared it from the same mushroom as *L. quadrimaculata* (see under that species) at Urbana, Illinois, and also has taken it on windows at Lawrence, Kansas, and Pittsburgh, Pennsylvania.

By a mere slip of the pen Mr. Johnson places *Drosophila vittata* Coquillett in the genus *Leucophenga*, instead of *Drosophila maculosa* Coquillett (Bull. Am. Mus. Nat. Hist., XXXII, p. 88 (1913)).

5. Leucophenga argenteiventris sp. nov.

Diagnosis: Head and antennæ yellow. Palpi honey-yellow, compressed, quite large. Mesonotum and scutellum opaque, light reddish, densely covered with a white bloom. Legs pale yellow. Abdomen silvery white. Wings yellowish hyaline with two dark brown costal spots, one near the base, the other longitudinally oval on apex of second vein; anterior and posterior cross-veins bordered with dark brown; apex of third vein fuscous and bordered by same color; second vein slightly curved at apex. Length 2.5 mm.

Description: Head with front yellow and orbital stripes grayish. The front immediately above the antennæ is more orange-colored and its width is about one-third of the head. Face whitish yellow with a slight carina near the antennæ. The upper concave part of occiput blackish, with orbits narrowly, but along vertex widely, yellow. Third antennal joint pale yellow, rather short, hardly longer than wide. Arista yellow at base, otherwise together with its rays blackish brown. The rays are apparently six above, three or four below. Palpi (in the specimen) deep yellow, compressed, and quite large. Cheeks very narrow.

Mesonotum and scutellum opaque, pale yellowish red, and, as seen from front, covered with a white bloom, which is particularly in evidence on the distinctly convex scutellum. Mesonotum with the minute black setulæ in eight rows between the anterior pair of dorso-central bristles. Scutellum with pale margin. Humeri, notopleura, and pleura opaque, paler than the rest of thorax. Legs rather pale yellow; tibiæ with a minute preapical setula. Halteres yellow.

Abdomen darker in ground-color than mesonotum, brown-red, with the setulæ black. Viewed from front or side the abdomen is silvery white, best shown on segments two, three, and four. The extreme apex of abdomen is yellow. (The apical segments show some blackish or dusky in the specimen, but this may be caused by deterioration).

Wings a little pointed, yellowish hyaline, with the yellowish becoming gradually hyaline posteriorly; a dark brown spot at base from costa to fourth vein and covering extreme apex of costal cell, bases of marginal and submarginal cells, and middle of first basal; an oval spot of same color along apex of second vein, covering apex of marginal cell and extending about two-thirds into the submarginal cell; anterior cross-vein narrowly and posterior cross-vein quite broadly bordered with dark brown; apex of third vein and its immediate surroundings infuscated, this color in a diluted form extending into the apex of the submarginal cell.

Third vein ends in the slightly pointed apex of the wing; second vein curved at apex (apparently less so than in *hasemani*); distance between tips of second and third veins about twice the distance between tips of third and fourth veins; first posterior cell hardly wider at middle than at apex; the distance between anterior and posterior cross-veins hardly one-fourth longer than first section of third vein; posterior cross-vein about the length of the ultimate section of fifth vein; fourth vein thin in its apical course; costa fuscous, other veins yellowish, but blackish where the brown marks cover them; vein closing the anal cell blackish.

The fronto-orbital, vertical, and ocellar bristles of almost the same size, the latter only slightly weaker; the upper reclinate fronto-orbital bristle nearer to the inner vertical than to the lower reclinate and distinctly higher up than the lower ocellus; the uppermost setula in the occipito-orbital fringe is longer than and divergent from the other setulæ in the fringe (this may be a feature common to all species); postverticals minute, strongly convergent, touching at tips; lower occipital orbit with the usual setula, differentiated from the other setulæ in the lower occipito-orbital fringe; between the two diverging sternopleural bristles a minute setula; the anterior dorso-central bristle slightly weaker than the posterior one and of the same size as the prescutellar pair, which are situated on a level with the posterior dorso-central; the presutural and anterior supra-alar of almost the same size and distinct, though weaker than the humeral and notopleurals; the posterior postalar distinct, the two apical scutellar bristles decussate (in the specimen), the lateral ones diverging. As in *hasemani* the bristles appear in certain lights yellow, or yellowish brown, particularly the lower fronto-orbitals, humerals, and notopleurals; on middle coxæ a yellowish brown bristle.

Habitat: Bolivia, Province del Sara, 350 meters above sea-level. The type is a female, unique, collected by José Steinbach, Carn. Mus. Acc. No. 5080.

The species is very close to *hasemani* and the description of one is almost a duplicate of the other, but this species is much smaller, and the pronounced white bloom of the mesonotum and scutellum and the silvery white abdomen serve to distinguish it.

For those who at some future time may desire to study the type of *argenteiventris* I must state, that after I had taken the description of the color, I relaxed the specimen on damp sand, so that I might study the venation of the wings, which were folded under the abdomen, but in doing so the moisture entirely effaced the clear white bloom of the mesonotum and scutellum and the silvery white of the abdomen, so that the type, as it stands, does not conform to the above description. It is important to remember this.

6. **Leucophenga ornativentris** sp. nov.

Diagnosis: Head yellow with upper occiput mostly blackish, antennæ and palpi yellow, the latter neither enlarged, nor projecting.

Mesonotum and scutellum reddish, slightly shining. Legs and halteres yellow. Abdomen yellow, with dorsal black spots in three longitudinal series, confluent on third segment, the dorsal lateral margins broadly bordered with black from third segment to apex. Wings almost hyaline without spots; second vein almost straight at apex. Length slightly over 2 mm.

Description: Head with front, vertex, and basal joints of antennæ yellow; the color of the fronto-orbital stripes not differentiated (in the specimen) from that of the front; the ocellar spot black, grayish pollinose; third antennal joint and the face, which is not carinate, pale yellow, with a whitish gray pollen; front about one-fourth, or slightly more, as wide as head, of equal width throughout and with the face; third antennal joint hardly longer than wide, about the length of the two basal joints together; arista yellow at base, the remainder together with the rays blackish, five above and three below, alike in both antennæ; occiput with lower half yellow, the upper half, which is concave blackish, with the orbits narrowly, and a large spot at vertex, yellow; cheeks exceedingly narrow; palpi yellow, not projecting.

Mesonotum and the gently convex scutellum brownish yellow, slightly shining, the former with the minute setulæ blackish brown, in certain lights yellowish; metanotum honey-yellow; humeri and pleura pale yellowish. Legs pale yellow with the knees and last tarsal joint almost imperceptibly honey-yellow; tibiæ with a minute pre-apical bristle. Halteres yellow.

Abdomen brownish yellow, with the minute first and the second segments unicolorous; third, fourth, and fifth dorsal segments, each with three transversely placed black spots, resting on the apical margins; on the third segment the spots are large, coalescent on apical third, and covering the greatest portion of the segment as viewed from above; the median spot rectangular, reaching from base to apex, the two side-spots convex anteriorly and not quite reaching the base of the segment (the left side-spot lightly reaches following the apex of second segment); through the convexity of these two side-spots a yellow triangular enclosure is formed on each side at base of the median rectangular spot; fourth segment has the median spot almost rectangular, reaching the extreme base of the segment, and on each side of it and widely separated from it a rounded spot, not quite reaching the middle of the segment; the black marks of the third segment together with the median spot of the fourth form the shape of a Maltese cross; fifth segment with the three spots of about equal size, the median longitudinally oblong, all reaching scarcely midway towards the base of the segment; besides these spots seen from above, the lateral margins of dorsal segments four, five, and six are broadly bordered with black, which forms an uninterrupted band from apex of third segment; on fourth segment this band is acutely widened to the apex of the segment, and on fifth segment this band is narrowly separated from the dorsal side-spots. (Abdomen, including the black marks, slightly shining in the specimen.)

Wings somewhat yellowish hyaline, with merely a trace of grayish on costa and at extreme bases of marginal and submarginal cells. The third vein ends in the slightly pointed apex of the wing; the second vein is very slightly curved at apex; the distance between the tips of second and third veins about two and one-third

times the distance between tips of third and fourth veins, which are almost parallel in their apical course, but by no means diverging; distance between anterior and posterior cross-veins about one-third longer than the first section of third vein; posterior cross-vein at right angle with fourth vein and at least one-third shorter than the ultimate section of fifth vein; ultimate section of fourth vein, which is much thinned and pale in its apical course, hardly less than two and one-half times the length of the penultimate section.

The fronto-orbital, vertical, and ocellar bristles of almost the same strength; the two reclinate fronto-orbitals and the inner vertical almost equidistant, but the upper reclinate bristle is evidently not as near to the lower reclinate as to the inner vertical bristle; the upper reclinate (the uppermost fronto-orbital) situated as far down as the lower ocellus; postverticals very minute, slightly cruciate; on lower occipital orbit a small seta, differentiated from the setulæ of the occipito-orbital fringe; a minute setula between the two sternopleurals; the anterior dorso-central small, not larger than the prescutellar pair, which is situated slightly nearer to the scutellum than the posterior dorso-central; the presutural and the anterior supra-alar weak; posterior postalar very minute; the distance between the two apical bristles of scutellum not less than either of them to the nearest marginal bristles; all the bristles and the minute setulæ black, in certain lights with yellowish brown reflection, except the apical setæ of the abdominal segments, which retain the black color.

Habitat: Bolivia, Province del Sara, 350 meters above sea-level. Type, a male, collected by José Steinbach, Carn. Mus. Acc. No. 5080.

There are in the collection of the Carnegie Museum five other specimens from the same locality as the type (one dated Nov., 1912) and four from Las Juntas, Bolivia, Dec., 1913, all bearing the label Carn. Mus. Acc. No. 5081, and all collected by Mr. José Steinbach. They vary in the extension of the black marks on the dorsum of abdomen. Two specimens, one labelled as is the type, the other from Las Juntas, agree best with the type in the abdominal markings, but both have the median spot on fifth segment extended to the apex of fourth segment and the two large side-spots on third segment do not extend so close to the base. One specimen from Las Juntas has the side-spots of third segment coalescing in their entire width with the median spot. Two specimens, one from Las Juntas and the other labelled as is the type, and dated Nov., 1912, have the spots separated and not at all coalescing. Three specimens, labelled as is the type, and one from Las Juntas have the side-spots of fourth segment indicated merely by a small brown dash or dot, the side-spots of the third segment more coalescent with the median spot in three of them, but in the fourth (from Province del Sara) the whole of the third segment above is black and shows some black on each side of the second segment. The rays

of the arista as seen in eight of the specimens are six above, four or three below. In life the abdomen may be slightly shining, with the black markings opaque, and the mesonotum provided with a thin whitish bloom. Unfortunately the specimens were packed in small pill-boxes in such a way, that they could not be handled before being slightly relaxed, and the exact color may through this process have been damaged, as in my experiment with the type of *L. argenteiventris*. The celebrated French biologist, Léon Dufour, reared and described *L. maculata* of Europe and found that in some specimens the abdominal spots were coalescent and in others showing an extra spot on second segment.[16] Similar variations in *L. ornativentris* may be expected.

L. ornativentris agrees in many respects with the description of *L. frontalis* Williston, from St. Vincent, West Indies,[17] but is distinguished by its shorter antennæ, its broad black uninterrupted band on the lateral margins of the dorsum of abdomen, and by the comparative length of the ultimate and penultimate sections of fourth vein. The abdominal markings are also much like those of *Drosophila pulchra* Schiner from South America,[18] but this species is not a *Leucophenga*, as Schiner would certainly not have failed to mention that the costa reached to third vein only, as in his next species, *Drosophila insulana*, which is a *Leucophenga*.

7. Leucophenga sp.

There is in the collection of the Carnegie Museum a specimen of *Leucophenga*, captured by Dr. J. D. Haseman at Sapucay, Paraguay, April 4, 1909, and bearing the label Carn. Mus. Acc. No. 3793. It is very much like *ornativentris*, but although the differences seem great enough I hesitate to give it a name, as it is immature and somewhat shrunken. The differences from *ornativentris* are a light brownish dash on apex of costal cell, extending through the bases of marginal and submarginal cells into first basal cell. The apical half of the second vein is bordered with light brownish; the ultimate section of fourth vein seems to be not more than twice the length of the penultimate section; the posterior cross-vein is not at right angles with the fourth vein, but runs obliquely outwards to the fifth vein; the third and fourth veins seem to be slightly divergent at apex, making the

[16] *Ann. des Science. Nat.*, 2e Série, Zoöl. Tom. XII, 1839, p. 51.
[17] *Trans. Ent. Soc. London*, 1896, Part III, p. 413.
[18] *Diptera, Reise der Novara*, 1868, p. 239.

first posterior cell rather wider at apex than at middle, but at any rate not narrower. In *ornativentris* the reverse is the case, the cell being slightly narrower at apex than at middle. In the specimen from Sapucay the third and fourth veins have a tendency to divergency, in *ornativentris* to convergency; the second vein seems straighter at apex than in *ornativentris*; the third antennal joint is a little longer, with the rays of the arista seven above and four below (seen only in one antenna); the extraordinary narrowness of the front is, no doubt, to be ascribed to its immature condition; the black spots on third abdominal segment are separated, the median spot not quite reaching the base and the two side-spots only halfway towards the base of the segment. *Drosophila pulchra* Schiner has also an oblique posterior cross-vein, but, as stated above under *ornativentris*, *D. pulchra* is not a *Leucophenga*.

There is in the collection of the Carnegie Museum still another specimen of *Leucophenga* captured by Dr. J. D. Haseman at Bom Fim, Bahia, Brazil, Nov. 20, 1907, and bearing the label, C. Mus. Acc. No. 3441. It is much mutilated, with only the left wing present and even this with the apex missing, so that the course of the costa cannot be ascertained. From its chætotaxy, I am, however, perfectly convinced that it is a *Leucophenga*, closely allied to the species from Sapucay. It is larger and more robust than the specimen from Sapucay, but with the same pattern of abdomen, arista with seven rays above and four below, alike in both antennæ, the veins of the wing the same as far as can be seen, but the brownish dash at base of wing is more extended, and the whole marginal cell is tinted with light brownish, which extends in a diluted form into the apical portion of the submarginal cell.

I mention these two specimens above partially described for the sake of others, who may be fortunate in possessing specimens from those regions in perfect condition.

8. **Leucophenga quadrimaculata** Walker.

Drosophila quadrimaculata WALKER, Insecta Saundersiana, Vol. I, Diptera, 1856, p. 410.

Drosophila quadrimaculata JOHNSON, Proc. Acad. Nat. Sc. Philadelphia, 1895, p. 339, and in Insects of New Jersey, 1900, p. 695.

Leucophenga quadrimaculata JOHNSON, Bull. Am. Mus. Nat. Hist., XXXII, 1913, p. 88.

Head yellow; upper occiput concave, black, except its narrowly yellow orbit. Antennæ yellow, lightly grayish pollinose, with the

third joint hardly twice as long as wide and its arista, blackish apically and yellow at base, with at least six blackish rays above and four blackish ones below. The face has the grayish color of the antennæ and is very slightly keeled. Palpi yellow, not enlarged, or projecting; ocellar spot black, with grayish pollen. Mesonotum and scutellum rather light reddish brown, very lightly grayish-white pollinose in certain lights, the extreme apex of the latter yellowish. Pleura lighter than the mesonotum, and with the grayish-white pollen more in evidence. Legs pale yellow. Halteres yellow. Abdomen brownish yellow with black spots on all the dorsal segments, except the small first segment; these spots are placed in longitudinal, interrupted rows. The small first segment yellowish; the second segment with a large spot on each side, but at a considerable distance from the side-margin; third segment with a single spot in its middle, rectangular in shape and extending from base to apex, fourth segment with three large spots of almost equal size and larger than the spot on third segment, the side-spots with convex outline, the median spot almost quadrate, extending the whole length of the segment and twice as wide as the spot on the third segment; fifth segment with a narrow median longitudinal spot and on each side of it a small round spot near the apical margin; the following segments with black on each side. Besides the spots mentioned the extreme side-margins of dorsal segments four, five, etc. are broadly bordered with black, forming an uninterrupted stripe to apex of abdomen. Venter yellow.

Wings somewhat yellowish hyaline with two light brown costal spots, one transversely from apex of first vein, the other, better defined, in apex of marginal cell and extending across the apical portion of second vein. The costa extends only to the apex of the third vein, which ends in the very apex of the slightly pointed wing. Second vein with a very slight curvature at apex. The distance between the tips of second and third veins about two and one-third the distance between the tips of the third and fourth veins, which are almost parallel in their apical course. The distance between anterior and posterior cross-veins about one-third longer than the first section of third vein. Posterior cross-vein at right angles with fourth vein and about one-third shorter than the ultimate section of fifth vein. The ultimate section of fourth vein, which is very thin and pale in its apical course, is not more than two and one third times the length of the penultimate section.

The chætotaxy is as described above for the genus *Leucophenga*; the fronto-orbital, vertical, and ocellar bristles of same strength. The upper reclinate bristle appears to be very slightly nearer to the inner vertical than to the lower reclinate and situated slightly higher up than the lower ocellus. Postverticals very minute, slightly cruciate at tips; lower occipital orbit with a small seta, differentiated from the setulæ or ciliæ in the occipito-orbital fringe; the uppermost setula in that fringe is longer than, and diverging from, the others; a very minute setula between the two sternopleural bristles; the anterior dorsocentral is very small, hardly as large as the prescutellar pair, which is situated a little nearer to the scutellum than is the posterior dorsocentral; the presutural and anterior supra-alar small, but distinct; posterior post-alar minute, but distinct; the distance between the apical, decussate bristles of scutellum not less than the distance from either of them to its nearest lateral bristle; the lateral bristles of scutellum are diverging; bristles and setulæ black. Veins brownish, the color more intense at the brown spots; apical portion of fourth vein light. Length 2.5 to almost 3 mm.

The species is widely distributed. Walker simply records it "United States." The writer has taken it on windows and reared it from a mushroom of the family *Agaricaceæ* at Urbana, Illinois, 1893, and on windows at Lawrence, Kansas, and Pittsburgh, Pennsylvania. At the latter place also by sweeping in grassy, springy places the writer found it very abundant together with *Scaptomyza graminum* and *adusta* and the beautiful *Ephydrid, Hydrellia formosa* Loew, on the moist lawns at Hotel Rainier, Ohio Pyle, Fayette Co., Pa., associated with the more abundant *Hydrellia formosa* Loew. There are specimens in the Carnegie Museum from Westmoreland Co., Pa., collected by H. H. Smith and Rev. P. Modestus Wirtner, and from Cheat Mts., W. Va. and Green Co., N. Y., collected by H. H. Smith. Mr. C. W. Johnson records it from New Jersey and Florida.

Many years ago, while a member of the Faculty of the University of Kansas, the writer made the following marginal note on *Drosophila quadrimaculata* Walker in his copy of "Insecta Saundersiana": "Can this be a *Leucophenga?*" As Walker does not mention the length of costa, the writer's suspicion was only expressed on account of the spotted abdomen and the two costal spots of the wings, which agreed with a species of *Leucophenga* from Illinois and Kansas, which he had labelled **n. sp.**, and the writer's statement to Professor Aldrich

in his Catalogue of North American Diptera, 1905, p. 639 regarding the occurrence of the genus *Leucophenga* in North America was based on his supposed n. sp. and not on his suspicion that it was identical with Walker's species. When Mr. Johnson rediscovered and recorded Walker's species from New Jersey and Florida in 1895 and 1900 under the genus *Drosophila* the writer became doubtful as to his above mentioned "marginal note," but when Mr. Johnson in 1913 placed Walker's species in the genus *Leucophenga*, then the writer became doubtful about his supposed n. sp. and sent a specimen to Mr. Johnson asking whether it agreed with his conception of Walker's species and the specimen was returned with an affirmative answer. The writer is now absolutely as fully convinced as the eminent dipterologist, Mr. C. W. Johnson himself, that it is the true *Drosophila quadrimaculata* Walker and thus a *Leucophenga*, and to clear any doubts the writer has deemed it advisable to redescribe it, as has been done above.

The species has much resemblance to *frontalis* Williston and *ornativentris, sp. nov.*, but differs from them in having spotted wings and a different maculation of the abdomen.

9. **Leucophenga bistriata** sp. nov.

Diagnosis: Head and antennæ yellow; upper occiput black; front, face, and third antennal joint with grayish white bloom; palpi large, leaf-like, black. Mesonotum dark brown-red. Pleura yellow with two brown spots. Scutellum blackish brown on basal two-thirds, yellowish white on apical third. Legs yellow. Halteres yellowish white. Abdomen black with yellowish base, but its extreme apex and a transverse, basal band on third segment whitish. Wings hyaline with two brown, longitudinal, diverging stripes from base, one costal, the other median; second vein straight apically; the distance between anterior and posterior cross-veins distinctly shorter than first section of third vein. Length 3 mm. (or a little less).

Description: Head with front and antennæ yellow, the former and third antennal joint in certain lights revealing as also the face a grayish white pollen, leaving only the basal joints of the antennæ and the immediate vicinity above them yellow. Front about one-fourth the width of head, of equal width, or very little wider at lower ocellus than at base. The upper strongly concave occiput blackish, with a yellow spot at vertex. The third antennal joint one and one-half as long as wide; the black arista with seven rays above and four below (observed in left antenna only). Face not carinate. Palpi prominent, broad, leaf-like, black, with a minute setula at apex. Cheeks extremely narrow.

Mesonotum slightly shining, quite dark brown-red, with a fuscous dash at humerus. Humeri, notopleura, and pleura yellowish, with a spot on mesopleura and upper border of sternopleura fuscous. Scutellum above opaque black, with the slightly shining apical third yellowish white; honey-yellow below. Metathorax honey-yellow. Legs pale yellow with the knees of the middle and posterior pairs slightly brownish yellow, and the tibiæ of the hind legs (the only pair exposed for examination) with a minute pre-apical seta. Halteres yellowish white.

Abdomen black, shining, with the small first segment, the narrow basal edge and broad lateral margins of second dorsal segment, yellow. The yellow at base and lateral margins is separated from each other by the projecting black of the segment. Extreme apex of abdomen whitish; basal third of third segment whitish yellow, in certain lights silvery white, and extending across the entire width of the segment. Venter with the base, at least, yellow (the apical portion is concealed by the dorsal segments).

Wings somewhat grayish hyaline, with two dark brown, longitudinal, diverging stripes from base of wing, the anterior costal stripe, covering the entire marginal cell, except a light streak along basal portion of second vein; the posterior or median stripe, connected at base with the anterior or costal stripe, covering the first basal cell, except its apex anteriorly, and rather broadly continuous along fourth vein to the posterior cross-vein, encroaching lightly upon this cross-vein and upon the basal portion of the ultimate section of the fifth vein; apex of the submarginal cell broadly bordered with diluted brown; costal cell lighter.

The third vein ends at the very apex of the distinctly pointed wing; second vein straight in its apical half; the distance between the tips of second and third veins scarcely twice the distance between the tips of third and fourth veins, which are almost parallel in their apical course; the distance between anterior and posterior cross-veins distinctly shorter than first section of third vein; anal vein reaching more than halfway towards border of wing; fourth vein thin and pale in its apical course; costa and other veins blackish brown, but basal portion of ultimate section of third vein, basal two-thirds of penultimate section of fifth and apical portion of fourth veins, yellowish.

The fronto-orbital, vertical, and ocellar bristles of equal strength; the upper reclinate fronto-orbital is distinctly nearer to the inner vertical than to the lower reclinate fronto-orbital, and situated higher up than the lower ocellus; the uppermost setula in the occipito-orbital fringe is longer than, and diverging to, the other setulæ in the fringe; lower occipital orbit with a small bristle-like setula, distinctly differentiated from those in the occipito-orbital fringe; postverticals small and hair-like, but distinct, strongly converging and touching at tips; between the two sternopleurals (of the posterior one only the scar remains) a minute setula; of the dorso-central bristles the anterior is shorter and weaker, and of the same size as the prescutellar pair, which is situated slightly nearer the scutellum than is the posterior dorso-central; the presutural is minute; the anterior supra-alar is small, but distinctly differentiated from the setulæ of mesonotum (of the posterior postalars only the minute scars remain); of the four scutellar bristles the apical pair (probably strongly convergent in life) is situated on the yellowish white portion and the other pair on the dark portion of the scutellum; all bristles and setulæ black.

Habitat: Philippine Islands, Mindanao, one male?, Carn. Mus. Acc. No. 5030.

This species is easily distinguished from any known species of *Leucophenga* by the markings of the wings and by the comparative length between the first section of third vein and the distance between anterior and posterior cross-veins.

10. Leucophenga goodi sp. nov.

Diagnosis: Head and antennæ yellow; upper occiput black; palpi black. Mesonotum dark brown, shining, anteriorly with a broad, longitudinal, yellow mark, which extends a little beyond the transverse suture. Scutellum opaque, dark brown, with the extreme apex yellow. Legs yellow. Halteres yellowish white. Abdomen black, with basal half above and apex yellow. Wings grayish hyaline with costal and marginal cells fuscous brown; second vein straight. Length 2 mm.

Description: Front yellow, almost one-fourth the width of head. Upper occiput apparently wholly blackish, except a small, yellow spot at vertex (the face can not be well examined on account of some mould). Third antennal joint a little longer than wide and slightly infuscated; arista black with about five rays above and three below. Palpi black, not prominent. Cheeks very narrow.

Mesonotum (slightly shining) and scutellum (opaque in the specimen) dark brown. The mesonotum in the middle from the blackish spot at neck to a little beyond the transverse suture broadly brownish yellow. The scutellum on apical portion and below honey-yellow and on its sides at base blackish. Sides of mesonotum honey-yellow. Pleura yellow with the dark brown on metathorax extending over the sternopleura. Legs pale yellow with the apical portions of middle and hind femora and tibiæ and their tarsi honey-yellow; middle and hind tibiæ, at least, with a very minute pre-apical setula. Halteres yellowish white.

Abdomen black, very slightly shining; with the small first segment entirely, and the second and third (as seen from above), apex of fifth narrowly, and apex of abdomen pale yellow. I am not certain about the color of the venter on account of the folding of the dorsal segments, but I perceive some yellow. The yellow basal segments appear in certain lights silvery.

Wings grayish hyaline with costal and marginal cells light fuscous brown, which extends in diluted tint on apical half of the submarginal cell; extreme base of marginal cell hyaline. The third vein ends at the apex of the slightly pointed wing; second vein almost straight; the distance between tips of second and third veins more than two and one-half the distance between tips of third and fourth veins, which are almost parallel in their apical course, but by no means diverging; the distance between anterior and posterior cross-veins is one-third longer than first section of third vein; the posterior cross-vein is not more than two-thirds of the ultimate section of fifth vein; ultimate section of fourth vein is not quite two and one-half the length of the penultimate section; anal vein reaches hardly half-way towards the border of the wing; fourth vein thin in its apical course; veins brown, but the penultimate section of fifth vein more brownish yellow.

The fronto-orbital, vertical, and ocellar bristles are about of the same size, but the lower reclinate fronto-orbital is slightly the weakest and the inner vertical the

strongest; the upper reclinate fronto-orbital bristle is quite remote from the vertex and distinctly nearer to the lower reclinate than to the inner vertical and slightly lower down than the lower ocellus; postverticals very minute, strongly convergent; the anterior dorso-central bristle is weaker and much shorter than the posterior and of same size as the prescutellar pair, which are situated a little nearer to the scutellum than is the posterior dorso-central; the minute presutural is difficult to distinguish from the setulæ of mesonotum; the anterior supra-alar minute; the posterior post-alar very minute (seen distinctly, however, on the left side of the specimen); of the four scutellar bristles the apical pair are missing, but the scars left indicate their existence; bristles and setulæ black.

Habitat: West Africa, Cameroons, Lolodorf, Nov. 1, 1913, one male, collected by A. I. Good. Carn. Mus. Acc. No. 5263.

This is the smallest species of *Leucophenga* before me and is dedicated to my friend, Rev. A. I. Good, through the efforts of whom and his distinguished father, the late Dr. A. C. Good, Dr. W. J. Holland, Director of the Carnegie Museum, has been enabled to so greatly extend our knowledge of the insect fauna of West Africa.

There are in the collection two other specimens taken by Rev. A. I. Good, Oct. 29, 1913, at the same locality as the type of *L. goodi*, but they are in too poor condition to be properly defined; both are a little larger than *goodi*. One of the specimens (with antennæ and left wing lost) has the mesonotum shining, brownish yellow, with dark brown at neck, and a large spot at the humerus and a large spot before the scutellum dark brown; scutellum shining; metathorax very shining, dark brown; the scutellum yellow below, the brown extends very little on the sides; abdomen has the second and third segments black; the color of the wing appears more intense than in *L. goodi*; face hardly carinate (this could not be examined in *L. goodi*). In the second specimen the head is too defective for description; mesonotum and scutellum brown-red, the former unicolor without any darker maculation, the latter with its base narrowly darker; abdomen as in the former specimen and so also the wings, but the third and fourth veins appear to be slightly diverging, which could not be clearly defined in the former specimen as its wing is folded a little longitudinally.

11. Leucophenga ambigua sp. nov.

Diagnosis: Head yellow with upper occiput black; upper half of fronto-orbital region, ocellar spot, face, and third antennal joint grayish pollinose. Palpi yellow, not prominent. Mesonotum and scutellum brown-red. Legs pale yellow. Halteres yellow. First and

second segments of abdomen yellow, third, fourth, and fifth segments black, with narrow yellow basal bands interrupted in the middle with black. Wings fuscous hyaline, the fuscous more pronounced in the anterior half; second vein perfectly straight. Postvertical bristles very strong. Length 4.5 mm.

Description: Front broad, about one-third the width of head, and its sides slightly diverging upwards. Fronto-orbital region gray, wide at vertex, gradually narrowed below and reaching only to immediately below the lowermost fronto-orbital bristle. Ocellar triangle gray, rest of front brownish yellow, but in certain lights the whole front appears gray. Front provided with minute black hairs, apparently placed in transverse rows, and with minute, black, orbital setulæ close to the eye from the lower reclinate fronto-orbital bristle to the lower edge of front. Face yellow, grayish pollinose, with a very slight, transversely convex carina. Antennæ yellow with third joint, except its base, grayish pollinose and about one and a half as long as wide; arista black, yellow at base, with seven rays above and four below (alike in both antennæ). Palpi yellow, not at all prominent. Upper occiput black with the vertical border and a spot in the middle yellow. Cheeks narrow. Mesonotum and scutellum a little shining, dark brown-red, in certain lights with a light yellowish, silky bloom. Mesonotum with the minute setulæ black. The scutellum with the extreme apex and underside pale yellowish. Metathorax and pleura lighter brown-red, in certain lights with a thin, grayish lustre. Sternopleura with some scattered minute hairs besides the row of minute hair-like setulæ, which runs from the anterior sternopleural bristle downwards. Legs yellow; middle and posterior tibiæ with a small, but distinct, preapical bristle. Halteres yellow.

Abdomen blackish, slightly shining on the basal, but more so on the apical segments. The small first segment entirely, and the second segment, except a black dot on each anterior corner and its extremely narrow black apical border, yellow; on each of the third, fourth and fifth segments a narrow, basal yellow band, interrupted with black in the middle (most widely on fifth segment) the bands not reaching the lateral margin. Venter yellow.

Wings fuscous hyaline, the fuscous more intense anteriorly, especially in costal and marginal cells.

The third vein ends at the very apex of the almost imperceptibly pointed wing; the second vein runs perfectly straight to the costa; the distance between the tips of second and third veins about two and a half times the distance between the tips of third and fourth veins, which are parallel in their apical course, and, as the third vein is only gently curved forwards, the first posterior cell is only a little narrower at apex than at middle; the distance between anterior and posterior cross-veins is one-third longer than the first section of third vein, and less than one-half of the length of the ultimate section of fourth vein; posterior cross-vein a little shorter than the ultimate section of fifth vein; anal vein long, reaching fully two-thirds of the distance to the hind margin of the wing; fourth vein not so unusually thin in its apical course as in the other species before me; all veins brown, none conspicuously lighter.

Oral vibrissæ strong; the fronto-orbital, ocellar, vertical and postvertical bristles

are all strong; the upper reclinate fronto-orbital is the longest and strongest bristle of the head and situated midway between the inner vertical and the lower reclinate fronto-orbital and a little higher up than the lower ocellus; the outer vertical bristle is stronger than the inner one, which is of the size of the lower reclinate fronto-orbital, and this latter bristle is situated further from the proclinate fronto-orbital than in any of the previous species; behind the regular pair of strong ocellar bristles are seen two pairs of minute, proclinate setulæ; the postvertical bristles strong, decussate, but smaller, however, than any one of the fronto-orbital, vertical, or ocellar bristles; one of the setulæ of the lower occipito-orbital fringe is more robust and bristle-like; the uppermost setula of the occipito-orbital fringe is stronger and diverging from the other setulæ in the fringe; along the posterior oral margin two small, distinct bristles, far apart from each other; the usual very minute setula between the sternopleural bristles present; the anterior dorso-central bristle only one-half the size of the posterior but of the same size as the prescutellar pair, which is situated hardly closer to the scutellum than is the posterior dorso-central; on the humerus there are, besides the minute, hair-like setulæ, two or three bristles, the middle one of which is the longest, but not as long or strong as the noto-pleurals; the presutural and the anterior supra-alar distinct, well developed, and of the size of the longest humeral; the posterior postalar is well developed; the apical pair of scutellar bristles cruciate, the lateral pair diverging and longer than the former; the apical scutellar bristles are much closer to each other than either of them to its nearest lateral bristle; two very minute and delicate prothoracic setulæ may be detected immediately above the front coxæ; all bristles and setulæ black.

Habitat: Cameroons, West Africa, eight specimens collected at Lolodorf, Oct. 29, 1913, by A. I. Good. The type bears the label Carn. Mus. Acc. No. 5264; seven designated as paratypes each have the label Carn. Mus. Acc. No. 5266.

This species is, indeed, an ambiguous *Leucophenga*, and I refer it to this genus, because the costa reaches only to the apex of the third vein; its strong postverticals are those of *Drosophila*. The cross-vein, separating the discal and second basal cells, is distinct in *Phortica* and *Stegana*, but missing, or obliterated in *Leucophenga*, *Drosophila*, *Scaptomyza*, and other genera. Instead of the cross-vein there is a more or less distinct, transparent, or pale, mark, which even extends across the first basal cell and this mark follows the bend of the wing; in *ambigua* this mark is more pronounced and has in certain lights almost the appearance of a cross-vein.

It is worth while to call attention here to the fact that the two following species, originally described as *Drosophila* belongs to the genus *Leucophenga*.

12. **Leucophenga insulana** Schiner.

Drosophila insulana SCHINER, Reise der Novara, Diptera, (1868) p. 240; from "Milu (einer der Nikobaren)."

Dr. Schiner says that it is "eine echte Drosophiline" and adds "die Randader nur bis zur Mündung der Cubitalader reichend; die Flügelspitze durch eine etwas vorgezogene Ecke deutlich markirt." Schiner's definitions clearly point out that it belongs to the genus *Leucophenga*.

13. Leucophenga frontalis Williston.

Drosophila frontalis WILLISTON, "On the Diptera of St. Vincent (West Indies)," Trans. Ent. Soc. Lond. 1896, Part III, p. 413. Professor Williston states definitely: "the costal vein terminates at the tip of the third vein."

Leucophenga frontalis WILLISTON, "Manual of North American Diptera," 1908, p. 302 in footnote to *Leucophenga*: "Including such species as *Drosophila frontalis* and perhaps others described as *Drosophilæ*."

The following observations are here incorporated as they relate to forms, one of which might be confounded with Leucophenga and the other may turn out actually to belong to this genus.

Drosophila ornatipennis Williston, "On the Diptera of St. Vincent West Indies)," Trans. Ent. Soc. Lond., 1896. Part III, p. 407, Pl. XIII, fig. 151, wing.

The broad, almost ovate, at apex distinctly pointed maculated wing as given in fig. 151 is very suggestive of a *Leucophenga*, but any doubt that could possibly arise, has been removed by Professor Williston himself in his Manual of North American Diptera, 1908, p. 300, fig. 5, where, no doubt, the reproduction of the wing of *ornatipennis* is used in illustrating the wing of a *Drosophila*, and he points out definitely in this fig. 5 that *the costa reaches the apex of the fourth vein*, though this fact is far from being clear in the original fig. 151. Among the large number of not less than twenty-two new species of *Drosophila* described in the "Diptera of St. Vincent," we need not search for any species belonging to *Leucophenga*, except *frontalis*, for the distinguished author would have pointed out that fact, if the termination of the costa had shown any difference from typical *Drosophila*.

Drosophila gigantea Thomson. Kongl. Svenska Fregatten Eugenies Resa etc. Diptera, p. 596 (1868).[19]

[19] OSTEN SACKEN in his Catalogue of Diptera of N. Amer., 1878, on p. xliii gives this footnote: "Brauer, Bericht über die wissenschaftlichen Leistungen, etc. für 1868, contends, that although the title-page bears the year 1868, the volume was actually issued only in 1869; this, in order to secure the priority of the volumes of the Novara Expedition, which appeared in 1868."

CZERNY in *Wien. Ent. Zeitg.*, XXII, 1903, p. 126, footnote: "Nach Brauer" etc., "erschien Thomsons Werk erst im Jahre 1869."

ALDRICH in his Catalogue of N. Amer. Diptera, 1905, ignores the statements of the late Professor Brauer and the same has been done by Bigot, Van der Wulp, Kertész, Speiser, Hendel etc., and I find myself alone affected by Osten Sacken's footnote, I have recorded Thomson's work as published 1869 in my paper on *Mixogaster* and *Ceria* in *Kansas Univ. Quart.*, Vol. VI, No. 3, July, 1897, p. 141.

This species is recorded as from Buenos Aires. Notwithstanding its extraordinary size "*fere 6 mill.*" there is nothing in the description to show that it does not belong to the *Drosophilinæ*, except possibly the statement "*Thorax . . . seris dorsalibus nullis, lateralibus et basalibus distinctis.*" If Thomson by "*dorsalibus*" means the anterior portion of the mesonotum and by "*basalibus*" the posterior portion of the same, then the position of the species in the *Drosophilinæ* is evident. But some of his other statements would indicate that it is a *Leucophenga*, for instance: "*occipite excavato*"—"*fronte . . . utrinque setis 3 nigris prædita*"—"*nervis costali cum ramo submarginali cubiti in ipso apice alæ conjuncto.*" If it actually belongs to the *Drosophilinæ*, this latter statement would refer it to the genus *Leucophenga*. Should the type still be in existence in Stockholm, or elsewhere, it would be easy for a competent dipterologist to decide the matter.