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A CONTRIBUTION TO THE STUDY OF
THE GENUS *SPHAEROCERA* LATREILLE
IN CENTRAL AND SOUTH AMERICA
(DIPTERA: SPHAEROCERIDAE)

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The latest revision of the American flies of the genus *Sphaerocera* Latreille (Malloch, 1925) records only one species of this genus from south of Panama: *S. flavicoxa* Malloch from Brazil and Costa Rica. Malloch records four species (*S. flaviceps* Malloch, *S. pallipes* Malloch, *S. bimaculata* Williston, and *S. varipes* Malloch) from Central America and the West Indies. Spuler erected a subgenus *Parasphaerocera* for *S. bimaculata* Williston that Malloch did not accept because it was founded principally on a color character to which two species, *S. annulicornis* Malloch and *S. pallipes* Malloch, though allied to the others, were an exception. In a re-examination of the genus, however, I find that there are four distinct groups, each with four or more species, and it is probably convenient to treat each group as a subgenus.

Key to Subgenera of *Sphaerocera* Latreille

1. Scutellum with, at most, one basal marginal tooth on each side. Mesoscutum with rows of minute bristles. Abdominal sternites nearly always more or less reduced, especially in female. Hindtibia with or without apical spur 2

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- Scutellum with six or more denticles along posterior margin. Mesoscutum with rows of warts. Abdominal sternites broad. Hindtibia with apicoventral spur. Face with central elevation that forms a sharp lower boundary to the antennal foveae 3
2. Face not elevated below, antennal foveae not sharply defined. Abdomen without dorsal pale spots Subgenus *Sphaerocera* Latreille 1804, Type by subsequent monotypy, *Sphaerocera curvipes* Latreille, 1805. (Other species: *S. monilis* Haliday, 1836; *S. flaviceps* Malloch, 1925; *S. jeanneli* Richards 1938; *S. wittei* Vanschuytbroeck, 1948; *S. ruandana* Vanschuytbroeck, 1948; *S. longipes* Richards, 1951.)
- Face elevated so that the antennal foveae are well defined below by a sharp keel. Abdomen usually with two large whitish spots.
- Subgenus *Parasphaerocera* Spuler, 1924
- Type by original designation, *Sphaerocera bimaculata* Williston, 1896. (Other species: *S. annulicornis* Malloch, 1913; *S. pallipes* Malloch, 1914; *S. flavicoxa* Malloch, 1925; *S. nigrifemur* Malloch, 1925; *S. varipes* Malloch, 1925; *S. striata* Malloch, 1925; *S. galapagensis* Curran, 1934; and the new species described below.)
3. Vein M_{1+2} and, to a less extent, R_{4+5} strongly bent forward. Mesoscutum uniformly covered with warts, longitudinal bare lines indistinct or absent.

Subgenus *Lotobia* Lioy, 1864

Type by monotypy, *Borborus pallidiventris* Meigen, 1830. (Other species: *Sphaerocera simia* Séguy, 1933; *S. arcuata* Séguy, 1933; *S. kivuenis* Vanschuytbroeck, 1948; *S. rutshuruensis* Vanschuytbroeck, 1948; and seven species described by Vanschuytbroeck in 1959.)

Veins M_{1+2} and R_{4+5} not bent forward. Mesoscutum with rows of warts and wide bare spaces in between some of the rows.

Subgenus *Ischiolepta* Lioy, 1864

Type by monotypy, *Borborus denticulatus* Meigen, 1830=*Sphaerocera nitida* Duda, 1923. (Other species: *Sphaerocera pusilla* (Fallén, 1820); *S. scabricula* Haliday, 1836; *S. vaporariorum* Haliday, 1836=*S. parapusilla* Duda, 1923; *S. orientalis* de Meijere, 1908; *S. scabra* Spuler, 1924; *S. jansseni* Vanschuytbroeck, 1948; *S. flava* Vanschuytbroeck, 1951; *S. dura* Vanschuytbroeck, 1959; *S. kifaruensis* Vanschuytbroeck, 1959; *S. crenata* (Meigen, 1838)=*S. coronata* (Zetterstedt, 1838); *S. paracrenata* Duda, 1923; *S. falcozi* Duda, 1921; *S. micropyga* Duda, 1923. The last four species form a separate subgroup.)

Subgenus *Parasphaerocera* Spuler, 1924

This subgenus appears to be exclusively American and it now appears that the species, though superficially similar to one another, are really very numerous. When I was in Berkeley in 1961, I was able to study a long series of males and females from one locality in Ecuador, a series that was preserved in the collection of the California Academy of Sciences (CAS). At first, the series seemed to consist of one species, but more careful study showed that there were three. In order to discover the relationship of these species with the supposedly common Central American species, *S. bimaculata* Williston, I borrowed all the specimens resembling that species in the collection of the U.S. National Museum (USNM). Through the kind help of Dr. J. F.

Gates Clarke and Mr. Curtis Sabrosky, 27 specimens were sent to me. Careful study showed that 9 species were represented among a random distribution of males and females. Malloch first pointed out that the reduced sternites of this group provide specific characters. It seems that they provide by far the most important characters and require careful study in every form. Unfortunately, the type of reduction seems to be quite different in the two sexes, which are very difficult to associate. In some species the structure of the prosternum is a guide. The presence or absence of a minute anteroventral spur on the hindtibia is less useful than Malloch supposed because it may vary in size and, in some species, is difficult to detect. The nomenclature of the parts of the genitalia is the same as in Richards (1961). The new species described below are compared with *S. ecuadoria*, new species, rather than with *S. bimaculata* Williston because only in the former is a long series of both sexes available. Single specimens were examined of what appear to be six other species, but their characters are largely minor deviations from those of the species that are described.

New Species Allied to *Sphaerocera bimaculata* Williston

Sphaerocera (*Parasphaerocera*) *ecuadoria*, new species

Males and females. Black, dull, mesoscutum and pleuron only slightly more shining; antennae brown; mentum and palpi testaceous; legs pale yellow brown, tarsi and apices of femora slightly darker. Abdomen with two large pale spots. Halteres yellow. Wings hyaline, venation brown. Length 2.5–3.0 mm.

Lower face forming a flat trapeziform plate (fig. 7), coming up to a point between the antennae; area of lunula also raised into a flat triangular plate whose point meets that of the lower face at about the lowest point of the antennal attachment; antennal foveae thus sharply defined by a keel that is especially high internally and ventrally. Buccae not striate except rather indistinctly posteriorly. Arista four times as long as antenna with very short pubescence. Dorsum of head very dull, no proper bristles. Prosternum (fig. 6) in the form of a linear projection, about half as long as width of forecoxae, from the triangular depression in front of the mesosternum. Mesoscutum with some scaly tomentum and four indistinct rows of very short bristles (corresponding approximately to dorsocentrals and acrostichals), a few further, more lateral, bristles, irregularly placed. Scutellum with a small denticle on each side, where the hindmargin curves around to become transverse, dorsal surface almost bare. Legs thick, especially in the ♂, hindfemur twice as thick as midfemur. Hindtibia with a small black anterior apical spur, shorter than one-

quarter the apical width of tibia, spur smaller and paler in the female. Hindbasitarsus longer than the second segment but not as long as 2+3. Abdomen with tergal plates 1+2, 3, and 4, each slightly increasing in size; pale spots (fig. 1) caused by desclerotization of cuticle, lying across the boundaries between 1+2=3, and 3=4; anterior spot oval, posterior one pointed laterally, both well separated from the margin. Female with segments after 4 (figs. 2, 3) often retracted but tergite 5 sometimes visible as a narrow transverse plate; sternites (fig. 3) very reduced, 1+2 rather small and transverse, 3 somewhat longer than broad, weakly dumbbell shaped (or in the Chilcales specimen, diamond shaped), 4 very long and narrow, more than four times as long as broad, side margins sinuate; sternite 5 transversely crescentic; spiracles 1-4 in the membrane laterally (1 hard to see and very close to the thorax), 5 in the membrane between the fifth sternite² and tergite; cerci oval with short bristles. Male with tergite 5 relatively large, somewhat better developed on the right, tergites 6 and 7 visible on the left side; genitalia (figs. 4, 5) large; ninth segment not emarginate for the reception of the cerci and the anal orifice; cerci loosely attached to the ninth segment, emargination between them shallow, flat bottomed; gonapophyses absent, lateral lobes of forked plate short and broad, lying at the sides of the cerci; forceps long, narrow, pointed, curved upward, yellowish with rather long bristles on the inner sides; aedeagus with a basal stalk that expands distally and is angularly truncate, distally with an apical loop-like sclerite, each side of which is a lateral lobe; sternites 1+2 (fig. 4) represented by three small plates, the central one transverse and bigger than the other two; sternite 3 transverse with a moderately long and broad rounded posterior extension; sternite 4 very transverse, narrowed laterally; sternite 5 even more transverse with a central desclerotized area; sternites 3 and 4 with some longish bristles.

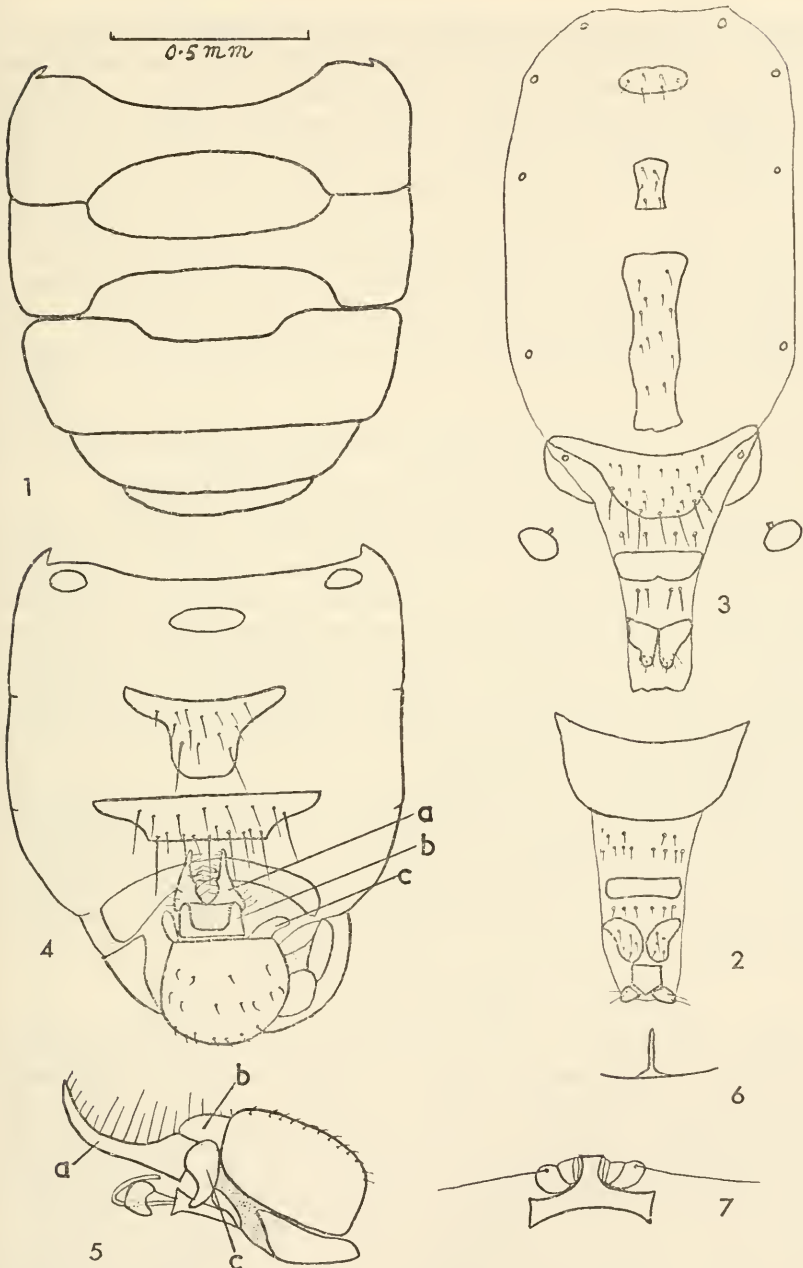
Ecuador: Los Rios, Pichilingue, elev. 40 m., Feb. 2, 1955, 20 ♂ 18 ♀ (including holotype ♂ and ♀ allotype), E. S. Ross and E. I. Schlinger, CAS; further paratypes, Guayas, Naranjal, December 1955, ♀, Chilcales, Aug. 1, 1955, ♀, R. Levi-Castillo, USNM.

Some paratypes in my collection, including 1 ♂, 1 ♀, macerated and in alcohol. The females and males are associated because they were the common type in the locality with the same type of prosternum.

Sphaerocera (Parasphaerocera) trapezina, new species

Males and females. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Size on the average slightly smaller.

² Young (1921, p. 260) found seven spiracles in *Copromyza* (= *Borborus*) *equina* Fall. I could find only five in *C. sordida* Zetterstedt, ♂.



FIGURES 1-7.—*Sphaerocera ecuadoria*, new species: 1, Dorsal view, ♂ abdomen. 2, Dorsal view, ♀ abdomen, tergite 5 to end extended. 3, Ventral view, ♀ abdomen, distal part extended, spermathecae drawn at sides. 4, Ventral view, ♂ abdomen: *a*, forceps; *b*, cerci; *c*, lateral lobe of forked plate. 5, Genitalia, ♂, from the right: *a*, forceps; *b*, cerci; *c*, lateral lobe of forked plate. 6, Prosternum, ♂. 7, Facial plate, ♂.

Anterior abdominal spot somewhat smaller, separated by half its own width from the margin. Prosternum slightly wider, especially posteriorly, and somewhat shorter. Hindtibia with anterior apical spur very minute, almost obsolete. Male genitalia (figs. 8, 9) large, ninth segment feebly emarginate to receive the cerci. Cerci loosely articulated to the ninth segment with a deep U-shaped emargination between them. Lateral lobes of forked plate narrower and more pointed at the apex. Forceps long, narrow, pointed, curved downward, pale yellow with denser, shorter bristles. Aedeagus generally similar but basal stalk blunter, apical part produced into a strong proximal angle, lateral lobe less developed. Sternites 1+2 (fig. 8) represented by three small plates, the central one very small, smaller than the other two (sometimes rather longer and more transverse than in fig. 8); sternite 3 trapeziform, posterior extension shorter and wider than in *S. ecuadoria*; sternite 4 very transverse, not narrowed laterally, sides nearly straight; sternite 5 rather irregular with a considerable central membranous emargination; sternite 3 almost bare, sternite 4 with some long bristles. Female (fig. 10) with sternites 1+2 often represented by a very small transverse sclerite, sometimes absent; sternite 3 usually absent, sometimes represented by a sclerotized dot; sternite 4 about two and one-half times as long as its greatest width, drop shaped, narrower anteriorly than posteriorly, where it is rounded, exact shape a little variable; sternite 5 transversely crescentic, about as in *S. ecuadoria*.

Ecuador: Los Rios, Pichilingue, elev. 40 m., Feb. 2, 1955, 5 ♂, 8 ♀ (including holotype ♂ and allotype ♀), E. S. Ross and E. I. Schlinger, CAS. Paratypes: Ecuador: Los Rios 27 mi. SW. Quevedo, elev. 50 m., Feb. 5, 1955, ♂, Ross and Schlinger, CAS; Guayas, Naranjal, December 1955, ♂, R. Levi-Castillo, USNM. Some paratypes, including one macerated ♂, are in my collection.

Sphaerocera (Parasphaerocera) tertia, new species

Male. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Length about 2.6 mm. Prosternum slightly wider with indications of a transverse basal piece from which the linear projection arises. Abdominal spots broader and the posterior one also longer, about as *S. trapezina*. Genitalia (figs. 11, 12) large, ninth segment feebly emarginate for the reception of the cerci; cerci loosely attached to the ninth segment, emargination between them deep and almost V-shaped; basal lobes of forked plate longer and more pointed than in *S. ecuadoria*; forceps long, narrow, pointed, yellow, curved downward more strongly than in *S. trapezina*, with numerous setae; aedeagus with a short basal stalk bearing finger-shaped processes on each side, distally with a double lateral lobe on each side and

a looplike apical piece; sternites 1+2 (fig. 11) represented by three small plates, all about the same size, the central one usually very transverse; sternite 3 angularly dumbbell shaped but narrower posteriorly than anteriorly, the exact size and shape varying very little; sternite 4 very transverse, approximately rectangular, with a few short bristles; sternite 5 irregular, with a central membranous emargination.

Ecuador: Los Rios, Pichilingue, elev. 44 m., Feb. 2, 1955, holotype and paratype, ♂, Ross and Schlinger, CAS. Paratypes: Panama Canal Zone: Summit, September 1946, ♂, N. H. L. Krauss, USNM. Costa Rica: San Mateo, Higuito, ♂ macerated, Pablo Schild, USNM. Mexico: Vera Cruz, Cordoba, Apr. 13, 1908, ♂, Dr. A. Feynes, USNM.

One of the Los Rios specimens is in my collection.

Sphaerocera (Parasphaerocera) chimborazo, new species

Males and females. Generally like *S. ecuadoria*, new species, but differs as follows: Legs slightly darker though still yellow brown. Size slightly larger, length at least 3.0 mm. Facial plate raised into a convex rounded boss, quite conspicuous in profile. Prosternum consisting of a small posterior triangle, of which the tip is rounded in the female, linear projection scarcely sclerotized. Legs somewhat longer and less thickened, even in the ♂, hindtibial spur scarcely detectable; ♂ forefemur with a row of short outstanding ventral bristles on proximal half. Abdominal spots somewhat larger. Male genitalia rather large, with tergite in profile somewhat angularly produced, evidently somewhat angularly emarginate, but most of the structures hidden; sternites 1+2 (fig. 13) represented by a single pear-shaped central spot; sternite 3 narrowly rectangular, very slightly widened at each end; sternite 4 generally rectangular, slightly widened posteriorly, about twice as long as broad, produced spout-like beneath the genitalia; sternite 5 hidden. Female with anterior abdominal spot more produced at sides posteriorly than in male; sternite 1+2 (fig. 14) as in ♂, sternite 3 not sclerotized, sternite 4 more than twice as long as broad, somewhat narrowed at each end, sternite 5 trapeziform, anterior and posterior margins straight, sides somewhat concave; cerci oval, yellowish, with a moderate dorsal and apical bristle.

Ecuador: Chimborazo, Bugna, holotype ♂, allotype ♀, R. Levi-Castillo, USNM type no. 66592.

The sexes easily can be associated in this species by the structure of the face and prosternum.

Sphaerocera (Parasphaerocera) bimaculata Williston

Sphaerocera bimaculata Williston, 1896, Trans. Ent. Soc. London, p. 435.

This species was described from St. Vincent; two females, both marked as co-types, are in the British Museum collection (BM), together with another female from Grenada. I have no reliable evidence at present that the species occurs elsewhere; all older records from Florida and Central America require confirmation.

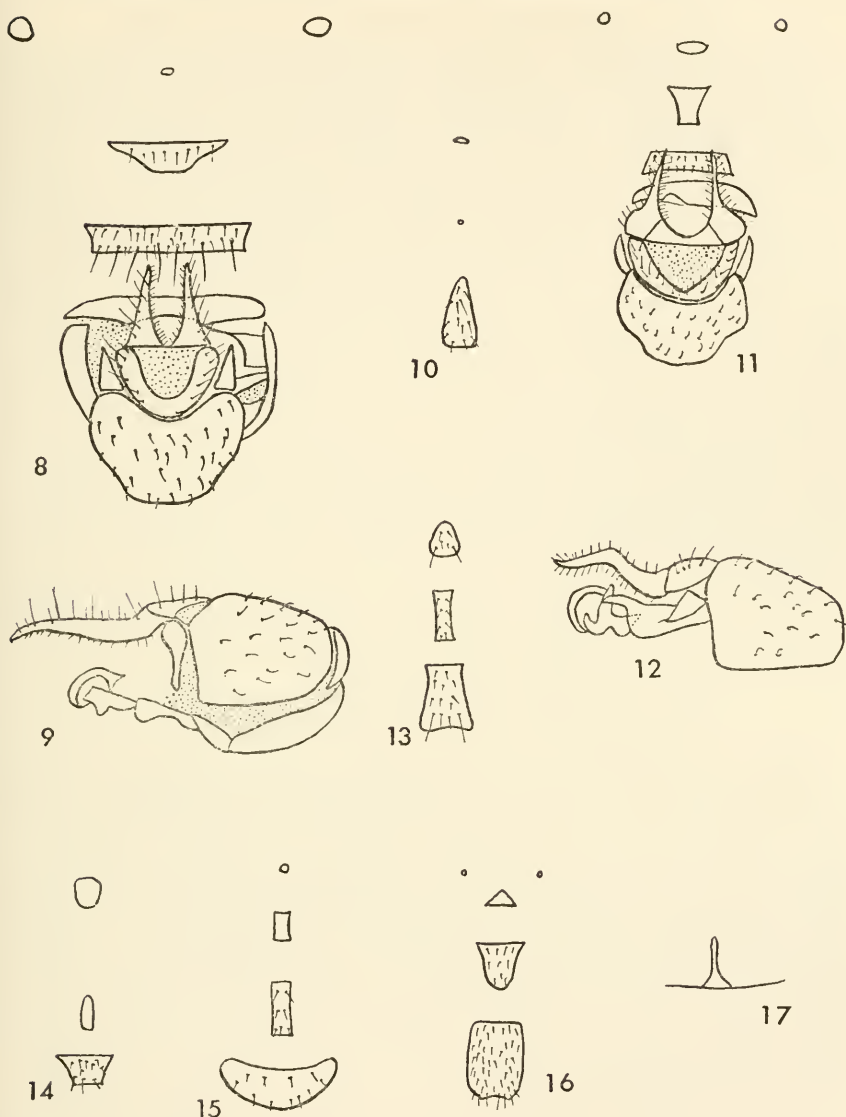
Female. Close to *S. ecuadoria*, new species, but differing as follows: Legs uniformly bright yellow brown. Size slightly smaller. Abdominal pale spots larger, both wider and longer. Prosternum with a narrow very transverse posterior piece, almost fused with the mesosternum, and a short almost linear anterior process, which in one ♀ is hardly sclerotized. Hindtibial spur very small indeed. Hindbasitarsus a fraction larger. Sternites 1+2 (fig. 15) represented by a minute sclerotized point; sternite 3 small, subrectangular, three times as long as broad; sternite 5 subrescensitic; cerci yellow, each with about 6 rather long hairs.

Windward Islands: St. Vincent, 2 ♀ co-types, H. H. Smith; Grenada, Balthazar, ♀, H. H. Smith, BM.

Among the *S. bimaculata* are 1♂ and 1♀ (latter headless) also from Balthazar but apparently belonging to *Sphaerocera* (s.s.) species. The abdomen has no pale spots; the face is partly orange, the antennal foveae rather deep, with a distinct prominence below, on which stands a short but rather stout bristle; ventral hindtibial spur long but weak and rather hairlike. A female close to *S. bimaculata* but apparently different comes from Panama Canal Zone (Barro Colorado Island, July 16, 1923, R. C. Shannon). In it the sides of sternites 3 and 4 are straight, not sinuous, and sternite 4 is considerably longer.

Sphaerocera (Parasphaerocera) levicastilli, new species

Male. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Coxae and femora whitish, apical third of femora, tibiae, and tarsi light brown. Prosternum (fig. 17) consisting of a small equitriangular plate attached to the mesosternum with a narrow projection forward nearly twice as long as plate. Legs not thickened, hindtibiae with no anteroventral spur. Male genitalia large, with tergite rather distinctly emarginate to receive the cerci, which are separated by a deep V-shaped emargination; details of genitalia concealed. Sternites 1+2 (fig. 16) consisting of two round sclerotized dots and a small triangular plate; sternite 3 subtriangular, narrowing posteriorly but posterior end rounded, length less than twice the proximal width; sternite 4 subtriangular, quite wide, less than twice as long as wide, posterior end slightly narrowed before apex and weakly emarginate; sternite 5 almost completely hidden, transverse.



FIGURES 8-17.—*Sphaerocera trapezina*, new species: 8, Abdominal sternites and genitalia, ♂. 9, Genitalia, ♂, from the right. 10, Abdominal sternites 1-4, ♀. *Sphaerocera tertía*, new species: 11, Abdominal sternites and genitalia, ♂. 12, Genitalia, ♂, from the right. *Sphaerocera chimborazo*, new species: 13, Abdominal sternites 1-4, ♂. 14, Abdominal sternites 1-4, ♀. *Sphaerocera bimaculata* Williston: 15, Abdominal sternites 1-5, ♀. *Sphaerocera levicastilli*, new species: 16, Abdominal sternites 1-4, ♂. 17, Prosternum, ♂.

Ecuador: Chimborazo, Naranjapata, Chilicay, June 16, 1955, ♂ holotype and paratype, R. Levi-Castillo, USNM type no. 66593.

Sphaerocera (Parasphaerocera) shannoni, new species

Male. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Legs pale yellow brown, neither tibiae nor apices of femora, appreciably darker. Abdominal pale spots somewhat smaller. Prosternum consisting of a very small transversely triangular plate with a narrow but not quite linear projection forward for a moderate distance. Legs, especially femora, considerably thickened, hindtibiae with no anteroventral spur. Male genitalia large, ninth tergite not emarginate to receive the cerci, which are obliquely truncate at the apex and separated by a deep U-shaped emargination; forceps yellow, bristly, and curved upward as in *S. ecuadoria*, rest of genitalia concealed. Sternites 1+2 (fig. 18) consisting of two small dots and a small transversely oval plate; sternite 3 broadly subtriangular but with posterior margin rounded, anterior margin and sides somewhat concave (especially in the type); sternite 4 trapeziform, anterior and the considerably shorter posterior margin straight, sides concave, the sternite twice as wide as the third; sternite 5 somewhat asymmetrical, strongly transverse.

Venezuela: San Esteban, Jan. 1-6, 1940, holotype ♂, P. Anduze. Panama Canal Zone: Barro Colorado Island, July 9, 1923, paratype ♂, R. C. Shannon, USNM type no. 66594.

Sphaerocera (Parasphaerocera) amphora, new species

Female. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Legs whitish yellow, apical third of femora and all tibiae somewhat darker. Prosternum with a very narrow transverse plate attached to the mesosternum, anterior extension so narrow and feeble as to be scarcely visible. Legs rather long, femora slightly thickened, anteroventral spur on hindtibiae rather strong. Pale spot on abdomen slightly larger, particularly in the longitudinal direction. Sternites 1+2 (fig. 19) represented by a very small, distinctly transverse sclerotized spot; sternite 3 absent, but a minute black spot is just visible; sternite 4 elongate, somewhat narrowed at each end, widest three-quarters of length from anterior margin, nearly four times as long as broad; sternite 5 rather widely crescentic; cerci each with two long, almost straight bristles; 4 spiracles visible in the very wide, white abdominal membrane.

Ecuador: Chimborazo, Linje, July 1955, ♀ holotype; Bugna, ♀ paratype, R. Levi-Castillo, USNM type no. 66596.

Sphaerocera (Parasphaerocera) xiphosternum, new species

Female. Resembles *S. ecuadoria*, new species, very closely but differs as follows: On the average, slightly smaller. Legs whitish yellow, apical third of femora and all tibiae somewhat darker. Pro-

sternum with a very transverse obtusely triangular plate attached to the mesosternum, anterior extension short and narrow but not really linear except in one specimen from Higuito. Legs slightly thickened, hindtibiae with a very small anteroventral spur. Pale spots on abdomen about the same. Sternites 1+2 (fig. 20) represented by a very small circular black sclerotized dot; sternite 3 normally represented by pale membrane only, but by a small elongate dot in specimen from Albrook Field; sternite 4 rather elongate, considerably narrowed at each end, widest at three-quarters of length from anterior margin, about three times as long as broad or, in the Panama specimens, somewhat less; shape of posterior end varying in Costa Rica specimens from rounded truncate to rounded pointed; in Panama specimens the sternite is considerably wider posteriorly and more narrowed anteriorly; sternite 5 rounded crescentic, not very strongly transverse; cerci each with two rather short, straight bristles.

Costa Rica: San Mateo, Higuito, holotype and paratype ♀, Pablo Schild. Paratypes: Costa Rica, ♀, Schild (determined to be *S. bimaculata* Williston by Malloch). Panama Canal Zone: Albrook Field, June 19, 1952, ♀, F. S. Blanton. Panama: Darien Province, Patino Point, July 12, 1952, ♀, F. S. Blanton, USNM type no. 66595.

This set of five females is somewhat variable but perhaps all may belong to one species. The female from Albrook Field has a large mite attached to the underside of the mouth parts.

Sphaerocera (Parasphaerocera) musiphila, new species

Male. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Legs yellowish white, apical third of femora and all tibiae slightly darker, femora strongly thickened, anteroventral spur of hindtibia very small. Prosternum with a transverse triangular plate attached to the mesosternum, anterior extension of moderate length, almost linear. Sternites 1+2 (fig. 21) represented by a strongly transverse central dot and lateral dots that also are transverse; sternite 3 trapeziform, almost as broad as long, anterior margin straight, sides converging posteriorly, slightly concave, posterior margin also slightly concave; sternite 4 transverse, more than twice as wide as long, trapeziform with posterior margin shallowly emarginate, sides straight, diverging posteriorly; sternite 5 almost rectangular, much larger than 4, about four times as wide as long; genitalia with ninth tergite somewhat hollowed out on each side, emarginate to receive the cerci, which are separated by a wide V-shaped emargination.

Panama: bananas, Sept. 8, 1932, holotype ♂, CAS.

Sphaerocera (Parasphaerocera) transversalis, new species

Male. Resembles *S. ecuadoria*, new species, very closely but differs as follows: Size slightly smaller. Facial plate (fig. 23) considerably shorter in longitudinal direction, more transverse. Legs yellowish white, apical third of femora and all tibiae slightly darker, femora scarcely thickened, anteroventral spur of hindtibia hardly developed. Prosternum at surface entirely membranous. Abdominal pale spots distinctly larger, tergite 5 with a narrow white membranous area both anteriorly and posteriorly. Sternites 1+2 (fig. 22) represented by a rounded rectangular plate that is just transverse, no lateral dots; sternite 3 rectangular with posterior corners slightly rounded, about one and one-half times as long as broad; sternite 4 rather small, rectangular, not quite twice as wide as long; sternite 5 partly concealed beneath 4, not much wider; genitalia with ninth tergite bearing a small central knob, somewhat emarginate to receive the cerci, which are separated by a U-shaped emargination.

Ecuador: Guayas, Cuatro Hermanitos Experimental Farm, Feb. 28, 1955, holotype ♂, R. Levi-Castillo, USNM type no. 66598.

Sphaerocera (Parasphaerocera) lepida, new species

Female. Resembles *S. ecuadoria*, new species, but differs as follows: Facial plate more transverse. Legs yellowish white, apical third of femora and four hindtibiae somewhat darker, foretibiae blackish, anteroventral spur of hindtibia very small. Prosternum (fig. 25) shaped somewhat like a spearhead, sides angularly widened anteriorly where there is a narrow forward projection. Abdominal pale spots very large, tergite 5 divided centrally by a pale line. Sternites 1+2 (fig. 24) represented by an almost square central plate, not very small; sternite 3 considerably smaller, longer than broad; sternite 4 narrowed anteriorly, straight posteriorly, about twice as long as wide; sternite 5 almost rectangular, sides hardly rounded, cerci concealed.

Panama Canal Zone: Fort Kobb, Camaron, July 17, 1952, holotype ♀, F. S. Blanton, USNM type no. 66597.

Sphaerocera (Parasphaerocera) transversa, new species

Female. Close to *S. lepida*, new species, but evidently distinct. Legs whitish yellow, apices of femora slightly darker; hindtibia with no anteroventral spur. Abdominal pale spots relatively small, anterior one with sides straight, posterior margin slightly convex, posterior one oval with lateral ends pointed. Sternites 1+2 represented by a rectangular transverse plate nearly twice as wide as hindfemur; sternite 4 somewhat more than twice as long as wide, posterior margin straight, sides slightly convergent anteriorly, anterior margin rounded;

sternite 5 trapeziform, sides straight, as long as anterior width.
Panama: bananas, Sept. 11, 1932, holotype ♀, CAS.

Sphaerocera (Parasphaerocera) dissecta, new species

Female. Allied to *S. bimaculata* Williston but evidently distinct. Legs whitish yellow; hindtibia with no anteroventral spur. Facial plate almost an equilateral triangle. Abdominal pale spots very large, square; tergite 5 consisting of two small oval plates separated by white membrane. Sternites 1+2 represented by a diamond-shaped spot not quite as wide as hindfemur, angles directed anteroposteriorly, other two laterally; sternite 3 small, width slightly greater than that of hindtibia, anterior margin rounded, posterior margin straight; sternite 4 more than twice as long as wide posteriorly, anterior margin rounded, posterior margin straight, sides somewhat convergent forward; sternite 5 rounded, crescentic, transverse.

Panama: bananas, Sept. 22, 1932, holotype ♀, CAS.

Other Species of Subgenus *Parasphaerocera*

I have placed near *S. bimaculata* Williston those species of the subgenus that have both pale abdominal spots and entirely pale legs. There are a number of other species that have either the femora more or less blackened or the abdominal spots very reduced or absent.

Sphaerocera (Parasphaerocera) varipes Malloch

Sphaerocera varipes Malloch, 1925, Proc. Ent. Soc. Washington, vol. 27, p. 121.

Malloch described this species from 5 females from Costa Rica, San Mateo, Higuito, and I have examined the holotype. As far as I can make out, there is only one species in which the femora are half black. This is redescribed below:

Males and females. Black; antennae and legs yellow brown, coxae and proximal half of femora black, trochanters pale. Abdominal pale spots somewhat larger than in *S. ecuadoria*, new species, their margins rather rounded. Length 2.5–3.0 mm.

Facial plate flattened, transversely trapeziform. Prosternum consisting of a small transverse triangular plate attached to the mesosternum, anterior extension of moderate length, not quite linear. Femora distinctly thickened in the male, hindtibia with no anteroventral spur. Three anterior abdominal spiracles forming distinct black spots in the white sternal membrane. Male with sternites 1+2 (fig. 26) represented by a small oval central dot; sternite 3 rather small, about twice as broad, somewhat rounded at each end and slightly narrowed posteriorly; sternite 4 slightly broader than long, subrectangular, posterior margin straight, sides and anterior margin slightly

rounded; sternite 5 short, very transverse; genitalia rather small, ninth tergite emarginate to receive the cerci, which apparently are separated by a rather narrow V-shaped membranous area. Female with sternites 1+2 (fig. 27) represented by a small oval central plate; sternite 3 not sclerotized; sternite 4 almost parallel sided, slightly narrowed posteriorly, where it is somewhat rounded, about three times as long as broad; sternite 5 somewhat widely crescentic, cerci hidden.

Specimens examined: Costa Rica: San Mateo, Higuito, ♀ type, P. Schild; San José, July, ♀, H. Schmidt, USNM. Panama: bananas, Aug. 25 and Sept. 22, 1932, 2 ♂, CAS.

In the collection of the USNM are eight more females that seem to belong to the same species; they come from Costa Rica, Honduras, San Francisco ex Guatemala, and one definitely from the United States—Georgia: Savannah, Oct. 12, 1953, privy trap, J. W. Kilpatrick.

Sphaerocera (Parasphaerocera) pallipes Malloch

Sphaerocera pallipes Malloch, 1914, Ent. News, vol. 25, p. 31.

This species was described originally from Panama: Buena Ventura, May 19, 1911, ♀, USNM. I have examined the type. The species and its allies resemble those of the subgenus *Parasphaerocera* but lack or, in one form described below, almost lack the pale abdominal spots, the tergites being uniformly dark and sclerotized. Malloch (1925, p. 121) states he has seen many additional specimens from Panama, but, as I have now seen three forms (at least two species) of this group, I feel that the material should be re-examined. I did not find a long series in the USNM.

Redescription of type: Female. Legs yellow brown, hindtibia without anteroventral spur. Size somewhat smaller than *S. ecuadoria*, new species. Sternites 1+2 represented by a plate that is rather narrowly pear shaped; sternite 3 narrow, almost linear; sternite 4 long trapeziform, narrowing posteriorly, about twice as long as anteriorly broad; corners not rounded. Abdomen entirely black dorsally.

Sphaerocera (Parasphaerocera) guttula, new species

Female. Black; antennae pale brown; legs pale yellow brown. Abdomen with very small transverse pale spots; one-fifth as wide as tergites, length about equal to width of hindtibia. Length about 2.5 mm.

Facial plate almost flat, trapeziform. Prosternum with a small transverse triangular posterior area that is produced anteriorly into a short gradually narrowing extension. Hindtibia with no anteroventral spur, femora slightly thickened. Tergite 5 very transverse posteriorly rounded. Sternites 1+2 (fig. 28) represented by a nearly square plate, width not quite twice that of hindfemur; sternite 3



FIGURES 18-28.—*Sphaerocera shannoni*, new species: 18, Abdominal sternites 1-5, ♂. *Sphaerocera amphora*, new species: 19, Abdominal sternites 1-5, ♀. *Sphaerocera xiphosternum*, new species: 20, Abdominal sternites 1-5, ♀, sternite 4 shown for each of three specimens: a, Higuito; b, Albrook Field; c, Patino Point. *Sphaerocera musiphila*, new species: 21, Abdominal sternites 1-4, ♂. *Sphaerocera transversalis*, new species: 22, Abdominal sternites 1-4, ♂. 23, Facial plate, ♂. *Sphaerocera lepida*, new species: 24, Abdominal sternites 1-5, ♀. 25, Prosternum, ♀. *Sphaerocera varipes* Malloch: 26, Abdominal sternites 1-4, ♂. 27, Abdominal sternites 1-4, ♀, sternite 3 completely desclerotized. *Sphaerocera guttula*, new species: 28, Abdominal sternites 1-4, ♀.

almost oval but posterior margin somewhat truncate, length two-thirds, width one-half that of sternites 1+2; sternite 4 nearly square, much like sternites 1+2; sternite 5 trapeziform, sides straight, converging posteriorly, anterior and posterior margins nearly straight; cerci each with about three straight moderately long hairs.

Panama Canal Zone: Erwin Island, July 18, 1923, holotype ♀, R. C. Shannon (received in exchange from Mr. Curtis Sabrosky as *S. pallipes* Malloch, now in the British Museum).

Sphaerocera (Parasphaerocera) annulicornis Malloch

Sphaerocera annulicornis Malloch, 1913, Proc. U.S. Nat. Mus., vol. 44, p. 363.

I have one female of this species (Missouri: Shrewsbury, Aug. 17, 1949, W. Downes, received from Mr. Curtis W. Sabrosky). It seems to agree with Malloch's description.

Female. Black; antennae brown; legs black, apices of femora, tibiae, and tarsi somewhat paler. Abdomen with two small transverse, laterally pointed pale spots, about half as wide as the tergites, and posterior one as long as width of hindfemur, anterior one not so long. Length nearly 3.0 mm.

Facial plate nearly flat, trapeziform. Hindtibia with no spur, femora slightly thickened. Prosternum with a very transverse posterior area, anterior extension short, almost linear. Tergite 5 separated from 4 by a wide white membrane, transverse, forming a somewhat curved, hoodlike cover to the fifth sternite; sternites 1+2 very transverse, subcrescentic, about half as wide as abdomen, bearing two longish bristles; sternites 3 and 4 not sclerotized; sternite 5 transversely subcrescentic, fitting closely against the tergite.

Sphaerocera (Parasphaerocera) flavicoxa Malloch

Sphaerocera flavicoxa Malloch, 1925, Proc. Ent. Soc. Washington, vol. 27, p. 121.

I have one male paratype of this species (Costa Rica: San Mateo, Higuito, Pablo Schild, received through Mr. Sabrosky). It is allied to *S. pallipes* Malloch, but the facial plate is much more transverse.

Female. Black; antennae brown, legs pale yellow brown. Abdomen with two very small transverse pale spots, the first hardly traceable, the second one-fifth the width of the abdomen and hardly as long as basal width of hindtibia. Length somewhat more than 2.0 mm.

Facial plate flat, forming a very transverse small triangle with its sides somewhat concave. Hindtibia with a very small black anteroventral spur, femora slightly thickened. Prosternum with a transverse posterior area and a short linear anterior extension. Fifth tergite transverse, posterior margin nearly straight. Sternites 1+2 represented by dots at extreme sides and a transversely oval central plate about as wide as hindfemur; sternite 3 subtrapeziform with anterior margin straight, sides slightly concave, posterior margin somewhat rounded, half as wide again as 1+2, transverse, about one and one-half times as broad in the middle as long; sternite 4 subrectangular, nearly twice as broad as long; sternite 5 slightly visible, very transverse; genitalia rather large, tergite 9 not emarginate to receive the cerci, which are separated by a narrow U-shaped emargination.

Key to Species of Subgenus *Parasphaerocera* Spuler³

1. Abdomen dorsally with no pale spots or with very small ones, much less than half as long or half as wide as a tergal plate 2
 Abdomen dorsally with two large pale spots, at least two-thirds as wide or as long as a tergal plate 5
2. Legs mainly black. Neither sternite 3 nor 4 sclerotized. Abdomen with two small pale spots (U.S.A.) . . . *Sphaerocera annulicornis* Malloch, 1913, ♀
 Legs entirely pale. Sternites 3 and 4 represented by at least small plates . . 3
3. Facial plate in form of a small, very transverse triangle. Abdomen with two small pale spots. Sternites (♂) 1+2 with a small oval central plate, sternite 3 transverse, rounded posteriorly, sternite 4 subrectangular (Costa Rica and, apparently, Brazil) *S. flavicoxa* Malloch, 1925
 Facial plate trapeziform, not so transverse (only ♀ seen) 4
4. Abdomen with two small pale spots. Sternites 1+2 large, subrectangular, sternite 3 smaller, oval, sternite 4 square, sternite 5 trapeziform (Panama) *S. guttula*, new species
 Abdomen entirely black dorsally. Sternites 1+2 small, pyriform, sternite 3 narrow, sublinear, sternite 4 trapeziform, narrowed posteriorly, longer than broad (Panama) *S. pallipes* Malloch, 1913
5. Femora with at least the basal half black 6
 Femora pale yellow, at most the distal part slightly browner or, in one species, the foretibiae dark 8
6. Femora with distal half sharply pale. Sternite 3 small, pyriform, twice as long as broad in ♂, not sclerotized in ♀; sternite 4 subrectangular, in ♂ rather wider than long, in ♀ three times as long as broad (Central America and U.S.A.) *S. varipes* Malloch, 1913
 Femora black, apices narrowly pale (not seen, separation after Malloch) . . 7
7. Venter of ♀ with two sclerotized plates. Cheeks closely striate in middle (Florida) *S. striata* Malloch, 1925
 Venter of ♀ with three sclerotized plates. Cheeks not striate in middle (Maryland) *S. nigrifemur* Malloch, 1925
8. Males 9
 Females 15
9. Sternite 4 not transverse, sternite 5 concealed. Ninth tergite emarginate, cerci separated by deep V-shaped emargination. Prosternum with small triangular plate with a narrow anterior projection (Ecuador) . . . 10
 Sternite 4 distinctly transverse 11
10. Facial plate raised into a rounded convex boss. Sternite 3 parallel sided. *S. chimborazo*, new species
 Facial plate flat. Sternite 3 clearly narrowed posteriorly. *S. levicastilli*, new species
11. Sternite 3 transverse, widely trapeziform with posterior margin slightly concave; sternite 4 about six times as wide as long (Ecuador). *S. trapezina*, new species
 Sternite 3 not transverse 12
12. Sternites 3 and 4 rectangular (Ecuador) . . . *S. transversalis*, new species
 Sternite 3 clearly not rectangular 13

³ *S. galapagensis* Curran, 1934, runs down in this key to *S. varipes* Malloch and cannot be distinguished from it by any character mentioned in the description.

13. Sternite 3 trapeziform, about as long as posteriorly broad, sides and posterior margin slightly concave (Panama) . . . *S. musiphila*, new species
 Sternite 3 broadly subtriangular, rounded posteriorly, one-half to one-third as wide as sternite 4 14
 Sternite 3 very small, not more than one-quarter as wide as sternite 4, elongate with concave sides, dumbbell shaped; sternite 4 five or six times as wide as long (Panama, Ecuador) *S. tertia*, new species
14. Sternite 4 about four times as wide as long; sides of sternite 3 strongly concave, sternite 2 small (Ecuador) *S. ecuadoria*, new species
 Sternite 4 about two and one-half to three times as wide as long. Sides of sternite 3 weakly concave, sternite 2 much narrower (Panama and Venezuela) *S. shannoni*, new species
15. Facial plate with a rounded convex boss. Prosternum with a posterior triangular plate and a disconnected linear piece. Posterior pale abdominal spot with a linear extension to the margin. Sternites 1+2 relatively large, sternite 3 not sclerotized, sternite 4 small and elongate, sternite 5 angular, trapeziform (Ecuador) *S. chimborazo*, new species
 Facial plate flat 16
16. Sternite 3 completely unsclerotized. Sternite 5 more or less rounded crescentic 17
 Sternite 3 with a distinct, even if small, plate 18
17. Prosternum anteriorly narrow but not strictly linear. Sternite 4 smaller, clearly narrowed posteriorly; sternites 1+2 a circular dot; sternite 3 absent, or, rarely, represented by a minute sclerotized dot (Panama, Costa Rica, Mexico) *S. xiphosternum*, new species
 Prosternum with a very transverse posterior sclerotization, anteriorly not visible above surface. Sternite 4 longer and less distinctly narrowed posteriorly; sternites 1+2 transverse (Ecuador). *S. amphora*, new species
18. Sternite 4 long, fully four times as long as broad; sternite 5 rounded crescentic (Ecuador) *S. ecuadoria*, new species
 Sternite 4 not very long, at most three times as long as broad 19
19. Sternite 2 large, rectangular; sternite 5 angular, sides straight 20
 Sternite 2 dotlike or, if slightly larger, diamond shaped; sternite 5 rounded crescentic 21
20. Facial plate unusually transverse. Prosternum large subtriangular. Foretibia black. Abdominal pale spots very large. Sternite 4 rectangular with anterior end almost pointed (Panama) . . . *S. lepida*, new species
 Facial plate normal as in figure 7. Foretibia pale. Abdominal pale spots smaller than usual. Sternite 4 subrectangular, rounded and somewhat narrowed anteriorly (Panama) *S. transversa*, new species
21. Abdominal pale spots square, very large; tergite 5 divided centrally by a pale line. Sternite 2 diamond shaped, angles pointing anteriorly and posteriorly, nearly as wide as hindfemur; sternite 3 with posterior margin straight, anterior end rounded, not quite as wide as hindtibia; sternite 4 with posterior margin straight, sides considerably convergent anteriorly where it is rounded (Panama) *S. dissecta*, new species
 Abdominal pale spots rounded; tergite 5 not divided by a pale line. Stergite 2 dotlike or rectangular. Prosternum with a short very transverse piece posteriorly and a narrow anterior extension 22

22. Sternite 3 dotlike, sternite 4 pyriform. Anterior part of prosternum wider. Abdominal pale spot as *S. ecuadoria*, new species (Ecuador).
S. trapezina, new species
 Sternite 3 small but rectangular, sternite 4 rectangular, nearly three times as long as broad. Abdominal pale spots larger (St. Vincent and Grenada B.W.I.) *S. bimaculata*, Williston

The Association of Acarina with Subgenus *Parasphaerocera*

Four of the males and six of the females of *S. (P.) ecuadoria* had a large mite hanging beneath the mentum. All the mites were attached with their heads by the foramen of the fly and with their dorsum directed downward. One of the mites was determined by Mr. E. Lindgren as *Macrocheles* sp. aff. *insignitus* Berlese. A specimen of *S. (P.) xiphosternum* from Panama, Albrook Field, had a similar mite on its mentum.

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