# Records and Descriptions of North American Crane-Flies (Diptera)[1]

## Part VI. Tipuloidea of Arizona, New Mexico and Trans-Pecos Texas, 1

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### General Account

The attempted long-term survey of the crane-flies of western North America has now been extended to the point where at least a preliminary list of the species inhabiting our southwestern states may be provided. There is no question but that future collecting will add materially to the subjoined record since all such work done in Arizona, New Mexico and western Texas to the present time has been both fragmentary and seasonal to a marked degree.

Arizona and New Mexico provide an unusual range of habitats that are suitable to these flies, despite the fact that the country is chiefly one of sparse rainfall whereas the immature stages of virtually all known species of Tipuloidea require some degree of moist conditions for their development (Alexander, 1920, 1931). Although the intermountain areas of the region are largely semi-desert, the numerous mountain ranges scattered over both of these states attain heights that are sufficient to support a rich forest growth, with many conifers at the higher altitudes, and with abundant mountain streams and other wet situations much favored by these flies. Trans-Pecos Texas is included in this report since there can be no doubt of its affinities with the states to the west. Hinckley (1944) writes concerning the Davis Mountains as follows: "These are geologically a part of the Front Range of the Western Cordilleras, a system which reaches its easternmost extension in the United States within that section of Texas known as the Trans-Pecos Region."

The collections made personally by Mrs. Alexander and the writer are small and insufficient but have been supplemented by further lots of specimens derived from various sources that are mentioned later in this report. In late July 1934, we collected in the vicinity of Taos, in extreme northern New Mexico. In 1942 , a more extended trip included some collecting in the Davis Mountains in Trans-Pecos Texas; in the White Mountains and Sacramento Mountains in south-central New Mexico, and in various selected localities in Arizona, including the Chiricahua and Santa Rita Mountains, in the south-

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References in the text refer to the bibliography at the conclusion of the general account.

In all cases in this report where no collector is given, the specimens were secured by the author. M. M. Alexander—Mrs. Charles P. Alexander.

eastern portion of the state near Tucson; in the beautiful Oak Creek Canyon, close to the geographical center of the state, just south of Flagstaff, and on the Kaibab Plateau, constituting the north rim of the Grand Canyon, in northwestern Arizona. All such collecting was done in May and the first three weeks of June, representing the spring fauna. Due to the extreme porous nature of the soil in many of these places, specifically on the Kaibab Plateau, the streams are very ephemeral, are largely due to the melting of the comparatively heavy winter snows and virtually all had disappeared by mid-June or even earlier.

A brief discussion of the more important collecting stations is given.

*Trans-Pecos Texas.*—The vicinity of Old Fort Davis, in the Davis Mountains, Jeff Davis County, has long been known to be of peculiar richness and interest as regards the fauna and flora. For insects this was emphasized in the general period between 1925 and 1930 by the collections made by Mr. and Mrs. Otto C. Poling. Most of the numerous crane-flies secured by the Polings are in the University of Michigan Collection and were not received by me in time to be included in the present report. A smaller series taken between June 1927 and October 1928 is in the Oregon State Collection, having been purchased by Professor Don C. Mote. Mrs. Alexander and I collected in this vicinity on May 28th and 29th, 1942. The only stream of any permanency, Limpia Creek, rising in the mountains west of the old fort and flowing generally northward, at the time of our visit was abnormally low, with a corresponding paucity of crane-flies. It seems certain that further study of materials from this station will produce several additions to the list.

*New Mexico.*—Collections made at Taos, in the northern part of the state, were taken by us on July 27, 1934. Also in northern New Mexico, the materials taken at the beginning of the present century by Professor T. D. A. Cockerell (Cockerell, 1900-1902) should be noted. These were secured in the Hudsonian life zone on the summit of the range between the Pecos and Sapello Rivers, near the headwaters of the former; this is the main divide between the Rio Grande and Mississippi River systems, at an altitude of approximately 11,000 feet; collections were made here between August 1-4, 1900, and at the end of June 1901. Also taken in this same general vicinity but at a lower altitude, were the interesting specimens taken by the late Henry Skinner (Skinner, 1902-1903), secured in Sapello Canyon, in the vicinity of Beulah, some 30 miles northwest of Las Vegas, San Miguel County, altitude 8,000 feet, August 9-26, 1901. In this same general region, at Jemez Springs, altitude 6,400 feet, numerous insect specimens were taken about 1912-1916 by the veteran insect collector, John Woodgate, these including various Tipulidae. Further, I am greatly indebted to Mr. and Mrs. John L. Sperry for some unusually interesting specimens taken in Frijoles Canyon, in the Bandelier National Monument, just west of Santa Fe.

More to the south, collections made in the White and Sacramento Mountains give the impression of a rich and chiefly untouched crane-fly fauna. Our own collections (May 31-June 1, 1942) are totally inadequate, due to the earliness of the season at these high altitudes (Rio Ruidoso, White Mountains,

altitude 8000 feet; Cloudcroft, Sacramento Mountains, altitude 8000 feet). Published references to these localities include Knaus, 1903, 1904, and Townsend, 1897. The Organ Mountains (Townsend, 1898), between Las Cruces and El Paso, Texas, will undoubtedly yield various interesting Tipulidae, particularly in Fillmore Canyon and at the Dripping Spring, where Cockerell collected the type of *Tipula* (*Lunatipula*) *stalagmites* Alexander, in April 1898.

*Arizona.*—The mountain blocks in southeastern Arizona have long held a peculiar attraction to entomologists. These ranges include particularly the Chiricahuas, Huachucas, Santa Catalinas and Santa Ritas (Bueno, 1937). In 1942, we collected in the Chiricahuas (Rustler Park, 8500 feet, June 4-5) and in the Santa Ritas (Big Rock Camp, Madera Canyon, 5000 feet, June 8-9), securing only a few species of Tipulidae but these of unusual interest and giving the impression of a varied Tipulid fauna. Even at this early date, the small clear stream in Madera Canyon was very low and at a slightly higher altitude had disappeared. On June 7th, we spent a happy day collecting with our long-time friend, Mr. J. R. de la Torre-Bueno, along Sabino Canyon, a mountain stream originating in the Santa Catalinas, near Tucson, and flowing through the desert country frequented by the saguaro cactus.

The richest and most exciting collecting that we found in any of these states was in Oak Creek Canyon, where we camped at the Banjo Bill Forest Camp, altitude 5180 feet, from June 10th to 12th, 1942. Here we enjoyed the companionship of John and Grace Sperry, to whom we are indebted for several of our finest Tipulidae. Oak Creek Canyon will undoubtedly yield many further additions to the list of crane-flies as now known from the state. The beautiful clear mountain stream, Oak Creek, rises just south of Flagstaff, flowing southward through the canyon which is somewhat suggestive of a miniature Grand Canyon. Along the stream are great beds of yellow columbine, *Aquilegia chrysantha* Gray, with many *Mimulus guttatus* DC, *Rumex, Equisetum,* abundant water-cress, and with various lianas, chiefly poison-ivy and woodbine. The tree cover shading the stream is principally Arizona sycamore, *Platanus wrightii* Watson, and box-elder, *Acer negundo* L. At frequent intervals along the canyon are cold springs flowing from the slopes above the stream. Although most of the crane-flies taken were swept from the rank herbage at and near the water's edge, Sperry and I secured a number of interesting species of *Tipula* on the high dry slopes of the canyon above Todd's Lodge, where we collected to an altitude of more than 5500 feet (June 11th). Too late for inclusion in this paper, a further small series from this station was received from Professor George F. Knowlton, collected in May 1945. Upper Sonoran (Upper Austral) Life Zone.

The south rim of the Grand Canyon (Coconino Plateau), typical of the Upper Sonoran Iife Zone, is hot and extremely arid and hence quite unproductive of Tipulidae. The much higher north rim (Kaibab Plateau) presents a marked and pleasing contrast, supporting nearly pure stands of Western Yellow Pine, *Pinus ponderosa* Lawson, with fewer Engelmann Spruce, *Picea engelmanni* Parry, in Engelmann, similarly often growing in pure stands. Also

common are Blue Spruce, *Picea pungens* Engelmann, and White Fir, *Abies concolor* (Gordon & Glendinning). Scattered among such conifers are aspen, *Populus tremuloides* Michx., probably the commonest and most evident single tree species on the plateau. As is discussed later, the plateau lies chiefly in the Transition and Canadian Life Zones but shows a very few indicator plants of the Hudsonian Zone. As was mentioned earlier, even by mid-June, conditions on the Kaibab had become unusually dry, most of the temporary snow-fed streamlets had disappeared, and the relatively few crane-flies found were restricted to specific places. At the Kanabownits Spring, on the road to Point Sublime, on June 19th, a small stream still persisted and a few species of Tipulidae were swept from beds of *Equisetum arvense* L., *Fragaria, Viola* and a labiate growing beneath the spruces. In much dryer conditions, at Bright Angel Point on the North Rim, various species of the genus *Tipula* were found on the evenings of June 17 and 18, flying low over the ground beneath the growth of Western Yellow Pine, White Fir, Oak, and New Mexican Locust, *Robinia neomexicana* Gray, these including the type material of *Tipula* (*Lunatipula*) *kaibabensis* sp. nov.

Arizona has been visited by many entomologists and collectors (Bueno 1937) and certain miscellaneous specimens of Tipulidae that had been secured are to be found in various museums and collections, as discussed later in this report. I wish to express my appreciation to Mr. Douglas K. Duncan for various specimens taken in the state, especially from the Pinal Mountains, in Gila County, and at Pinery Canyon in the Chiricahuas.

*Life Zones.*—Of the seven life zones recognized by Merriam and his followers, no fewer than five occur commonly and are widespread in both Arizona and New Mexico. These have been thoroughly discussed in various references cited in the Bibliography (Bailey, 1913; Ball and others, 1942; Cockerell, 1895, 1897; Jenks, 1931; Dodge, 1936; Merriam & Stejneger, 1890, and others). The paper by Merriam and Stejneger, with its basic conception of the Life Zone theory, is historically the most important. For New Mexico, the Bailey reference is the most complete.

In a consideration of the Tipuloidea, the arid Lower Sonoran (Lower Austral) Zone is of little importance. Only in the Grand Canyon, along Bright Angel Creek at Phantom Ranch, altitude 2200 feet, did we find a few species of crane-flies, all being common and widespread forms. Similarly, the Upper Sonoran (Upper Austral) Zone is of slight importance except in Oak Creek Canyon, as already discussed. The Transition Zone, occupying altitudes between about 6500 and 8000 feet, characterized by Western Yellow Pine, and the Canadian Zone, between altitudes of 8000 and 9500 feet, characterized by Mexican White Pine, *Pinus strobiformis* Engelmann, White Fir, Douglas Fir, *Pseudotsuga taxifolia glauca* Mayr, aspen and many other plant species, are by far the most important zones. On the highest mountains of both states (Arizona: San Francisco Peaks, culminating in Humphreys Peak, altitude 12,611 feet; New Mexico: North Truchas Peak, altitude 13,306 feet), above the limits of the Canadian Zone, are to be found extensive bands of the Hudsonian Zone, characterized by the presence of Engelmann Spruce, the Foxtail Pine,

*Pinus aristata* Engelmann, and various other high altitude forms. On the highest of these mountains, a restricted Arctic-Alpine element occurs. Virtually all of the Tipulidae so far taken in Arizona and New Mexico are from the Upper Sonoran, Transition, Canadian and Hudsonian Zones.

Dice's arrangement of North America into Biotic Provinces (1943) places the area here considered in no fewer than seven of his provinces, the most easterly (Kansan) and western (Mohavian) not being significant as regards the Tipulidae. Of the others, three chiefly Mexican Provinces, the Sonoran, Apachian and Chihuahuan, are very important and are well represented in the southern parts of the states discussed. The greater part of both Arizona and New Mexico are occupied by the Navahonian Province which here attains its greatest extent. In the Taos section of northern New Mexico there is a southern prolongation of the more northern Coloradan Province, eminently characteristic of large sections of Colorado and Wyoming. By Fenneman's classification (1931) of the country into physical divisions, most of the states fall in the major division of Intermontane Plateaus, the northern part being in the Colorado Plateaus Province, the more extensive southern section in the Basin and Range Province. In the Taos section of northern New Mexico, the Southern Rocky Mountains Province of the Rocky Mountain System is represented by its southernmost extension. More than the eastern third of New Mexico is occupied by the Great Plains Province of the Interior Plains, unimportant as regards the Tipulidae.

In concluding the introduction to the present report, I wish to express my continued indebtedness to my wife, companion and loyal helpmate on all of our many collecting trips. Further appreciated help is acknowledged to my good friends, John L. and Grace H. Sperry, and Professor George F. Knowlton, whose cooperation has added materially to the success of the work.

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## Systematic Account

### PTYCHOPTERIDAE

*Ptychoptera lenis* Osten Sacken, 1877.—Summit of range between the Pecos and Sapello Rivers, New Mexico, Hudsonian zone, about 11,000 feet, August 1-4, 1900 (Cockerell, 1902; determined by Coquillett).

### TIPULIDAE

#### TIPULINAE

*Holorusia* (*Holorusia*) *grandis* (Bergroth, 1888) (*rubiginosa* Loew, 1863, *nec Holorusia* (*Ctenacroscelis*) *rubiginosa* Bigot, 1863).—Oak Creek Canyon, Arizona, 5,180 ft., June 10-11, 1942; common, emerging from wet earth at the margins of stream and edges of drainage ditches. Several mating pairs noted hanging in rock crannies and overhangs near the creek.

*Nephrotoma lugens erythrophrys* (Williston, 1893).—Beulah, New Mexico, 8,000 ft., August 9-26, 1901 (*Skinner*); June 29, 1902 (*H. L. Viereck*).

*Nephrotoma occidentalis* (Doane, 1908).—Davis Mountains, Texas, along Limpia Creek, 4,000 ft., May 29, 1942; Big Bend Park, Brewster Co., July 29, 1937 (*Rollin H. Baker*).

*Tipula* (*Trichotipula*) *apache* Alexander, 1916.—New Mexico: Jemez Springs, 6,400 ft., July 12-20, 1915 (*Woodgate*); South Fork of Eagle Creek, White Mts., altitude about 8,000 ft., August 13 (*Townsend*).

**Tipula (Trichotipula) geronimo** sp. nov.—General coloration gray; antennal pedicel yellow, flagellum uniformly black, the segments moderately incised; head above chiefly yellow; praescutum brownish black, with three gray stripes; apex of knob of halteres yellow; femora obscure yellow, the tip narrowly blackened, preceded by a vague clearer yellow ring; wings creamy-white, conspicuously patterned with light and darker brown; macrotrichia of wing cells sparse, restricted to about 15 in outer end of cell $R_5$; *Rs* about two-thirds as long as *m-cu;* abdominal tergites broadly yellow medially, blackened on sides, the outer segments more extensively darkened; male hypopygium having the tergite with a V-shaped notch, the margin with abundant blackened spinous

setae; inner dististyle long and narrow, its outer margin with very long retrorse setae; apex of basistyle with unusually long black setae, forming a loose brush.

♂. Length, about 12 mm.; wing, 14 mm.; antenna, about 5 mm.

Frontal prolongation of head short, brown, sparsely pruinose; nasus elongate, with yellow setae; palpi black, the terminal segment paling to obscure yellow. Antennae of moderate length; scape reddish brown, sparsely pruinose; pedicel yellow; flagellum uniformly black; flagellar segments beyond the first rather strongly incised; longest verticils of the intermediate segments a trifle shorter than the segments. Head with the anterior vertex yellow, the color continued caudad onto the posterior vertex, narrowed behind, ending as a point on the occiput; remainder of posterior vertex brown, pruinose, more clearly so on the posterior orbits; vertical tubercle low and simple.

Pronotum light gray, patterned with brown. Mesonotal praescutum with the ground color brownish black, with three conspicuous gray stripes, the median one split by a capillary dark vitta on its cephalic third only; humeral region chiefly darkened; posterior sclerites of notum dark gray, the scutal lobes

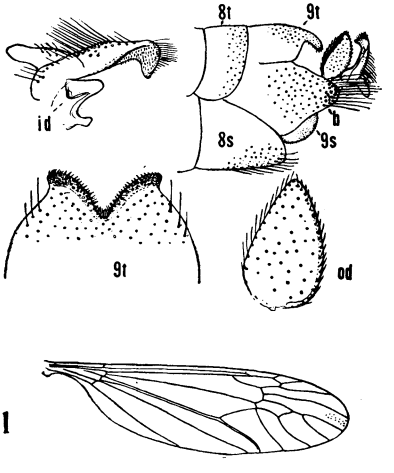


Fig. 1. *Tipula* (*Trichotipula*) *geronimo* sp. nov.; venation and male hypopygium.
(Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

weakly patterned with darker, parascutella darker. Pleura dark plumbeous gray, dorsopleural membrane weakly darkened. Halteres dusky, the base of stem and apex of knob yellow. Legs with the coxae black, sparsely pruinose; trochanters dark brown; femora obscure yellow, the tips narrowly blackened, the amount subequal on all legs; immediately before the black tips with a narrow to scarcely indicated clearer yellow ring; tibiae obscure brownish yellow, the tips narrowly brownish black; tarsi dark brown, passing into black; claws small, simple. Wings (Fig. 1) with the ground color creamy white, conspicuously clouded with dark and paler brown; the darker pattern includes the stigma, all of cell *Sc*, and broad seams over *Cu* and *m-cu*, on the former broadly interrupted by a pale ground area near outer end of cell *M;* paler brown washes in

most of cells *R* and *M* and as broad seams along the veins beyond the cord, most extensive in outer radial field; similar pale brown washes in the cubital and anal cells, the axillary border again more heavily darkened; cell *C* moderately infuscated; obliterative area before cord conspicuous, narrow but intense, barely involving cell $M_3$; a restricted post-stigmal obliterative marking; veins brown, paler in the obliterative areas. Macrotrichia of cells very sparse, restricted to a series of about 15 in outer end of cell $R_5$. Venation: $Sc_2$ ending about opposite two-thirds the length of *Rs*, $Sc_1$ preserved as a weak spur; *Rs* short, arcuated, about two-thirds as long as *m-cu*, the latter in turn about two-thirds the distal section of $Cu_1$; $R_{1+2}$ preserved; cell *1st* $M_2$ gently widened outwardly; petiole of cell $M_1$ shorter than *m*.

Basal abdominal tergite black, restricted yellow on median caudal portion; second to sixth tergites broadly yellow medially, the color becoming more restricted and obscured on the outer segments; lateral portions of tergites broadly black, not quite reaching the posterior borders of the segments which are narrowly gray; outer segments more uniformly brownish black; basal sternites brownish yellow, on the sixth and succeeding segments the lateral portions broadly blackened, most extensively so on sternite eight; basistyle light yellowish brown. Male hypopygium (Fig. 1) with the suture between the tergite, *9t*, with the caudal portion produced, with a deep V-shaped median notch; lateral lobes obtuse or weakly angulated at tips; apical border thickened, set with blackened spinous setae, those near apex of lobe shorter and more abundant; toward base of notch setae more elongate, on disk with more normal setae, these lacking on nearly the cephalic half of sclerite; viewed from the side, tergal lobes appearing slightly decurved at tips. Basistyle, *b*, rather strongly produced but not differentiated into a lobe, as in some allies; apex obtuse, provided with numerous long black setae to form a loose brush. Outer dististyle, *od*, rather broadly flattened, subacute at tip; margins with numerous setae, especially the narrowly thickened cephalic border; remainder of disk with fewer but longer setae. Inner dististyle, *id*, of distinctive shape; long and narrow, the outer border with very long retrorse setae; outer portion of beak with very dense and numerous small setulae; outer basal lobe a compressed-flattened yellow blade. Mid-region of ninth sternite, *9s*, produced into a tumid oval lobe that fills the space caudad of the eighth sternite; surface of lobe with abundant very short delicate setulae. Eighth sternite, *8s*, with its caudal margin subtruncate to evenly rounded, provided with normal setae but without lobes or hair-tufts; posterior and median portions of sternite paler than the remainder.

*Holotype*, ♂, Chiricahua Mountains, Arizona, altitude 8,700 ft., June 5, 1942 (*C. P. & M. M. Alexander*). Taken a short distance below the Barfoot Lookout, resting on trunk of Western Yellow Pine. Several females were noted but could not be captured; flying around the pine boles in a low spiral.

Named for *Geronimo* (1834-1909), one of the most famous of all Amerind chieftains. He was leader of the Chiricahua tribe of Apache Indians, with headquarters close to the type locality of the species. The fly is very different from other regional members of the subgenus. The conspicuously patterned wings and details of the male hypopygium, particularly the basistyle and inner

dististyle, are quite different from all such species, including the one that appears to be most allied, *Tipula (Trichotipula) apache* Alexander 1916.

**Tipula (Trichotipula) retinens** sp. nov.—Size small (wing, female, under 12 mm.); general coloration of mesothorax light gray and yellow, the praescutum with four gray stripes that are very heavily margined with brown to produce five brown lines; frontal prolongation of head polished yellow, with a brown line on either side of median area; terminal segment of palpus paling to yellow; wings whitish subhyaline, very restrictedly patterned with darker, including the conspicuous stigma and paler washes in centers of outer radial cells; no macrotrichia in outer cells of wing; vein $Sc_1$ preserved; abdomen moderately long, chiefly yellow, the tergites and sternites with broken median brown stripes; ovipositor with hypovalves deep, their dorsal margins blackened.

♀. Length, about 14-15 mm.; wing, 11-11.5 mm.; antenna, about 2.3-2.4 mm.

Frontal prolongation of head polished light yellow, patterned with brown on either side of mid-dorsal line; an impressed darkened line on either side of prolongation; nasus conspicuous; palpi dark brown, the terminal segment paling to light yellow. Antennae with scape obscure yellow, weakly darkened beneath; pedicel pale brown; flagellum uniformly blackened; flagellar segments subcylindrical, a little dilated at base but scarcely incised. Head light gray, darker near mid-dorsal line, with a further capillary brown median vitta that is more expanded at apex; vertical tubercle low, with a small raised knob on either side, more conspicuous than in *bituberculata;* head on orbits and beneath more yellowed.

Pronotum yellow, with three brownish gray spots. Mesonotal praescutum with the humeral and lateral borders light yellow, the disk with four gray stripes that are so broadly bordered by dark brown that the latter fills all the interspaces, the median dark vitta not reaching the suture behind; scutum with median area light yellow, the lobes with gray spots that are ringed with brown; scutellum at base narrowly yellow, the remainder gray, with a very conspicuous dark brown median mark that is narrowed in front; parascutella yellow, narrowly infuscated at suture; mediotergite light gray, the lateral borders and a broad central stripe light yellow; pleurotergite light yellow, the ventral katapleurotergite gray. Pleura yellow, conspicuously patterned with gray, including major areas on ventral anepisternum, sternopleurite and meron; dorsopleural membrane yellow, with a dark spot beneath the pseudosutural fovea. Halteres with stem yellow, knob brown, its tip restrictedly yellow. Legs with the coxae gray, the tips yellow, the mid-coxae more extensively brightened; trochanters obscure yellow; femora and tibiae obscure yellow, the femoral tips narrowly but conspicuously dark brown, the tibiae less evidently so; basitarsi brownish yellow, the outer end and remainder of tarsi blackened. Wings whitish subhyaline, very restrictedly patterned with darker, the most conspicuous area being the oval, medium brown stigma; other darkenings include very pale brown washes in centers of cells $R_2$, $R_3$ and $R_5$, with exceedingly vague clouds in outer end of cell *1st A* and near outer end of cell *Cu;* outer medial veins very narrowly bordered by pale brown; cell *Sc* weakly darkened; veins dark brown,

a trifle more brightened in the prearcular field. No macrotrichia in cells of wing, excepting a very few in the stigma of the holotype but not of the paratype; no squamal trichia. Venation: $Sc_1$ preserved, a little shorter than the basal section of $Sc_2$; *Rs* subequal to the long oblique or weakly sinuous *m-cu;* petiole of cell $M_1$ slightly longer than *m*.

Abdomen of moderate length only, when compared with *cahuilla,* about as long as the wing; tergites light yellow, with a broken median brown stripe, these areas being interrupted at the base and apex of the individual segments, the posterior borders being narrowly gray; sternites yellow, the more proximal ones with more extensive median darkenings, particularly the base of second sternite, on outer segments, the sternites more uniformly yellow; a median dark dash on genital sternite, with a further area at base of hypovalvae. Ovipositor with the genital shield brown; cerci moderately compressed, the tips subacute; hypovalves much deeper, the tips subacute, the dorsal border heavily blackened.

*Holotype,* ♀, Coolidge, Pinal County, Arizona, altitude 2,000 ft., April 1 (*D. K. Duncan*). *Paratopotype,* 1 ♀. "On desert flat country, with no nearby mountains."

Although no male is available, I have no hesitancy in describing this fly as new and in referring it to the subgenus *Trichotipula* Alexander, despite the lack of macrotrichia in the wing cells. The relationship to *Tipula* (*Trichotipula*) *beatula* Osten Sacken, *T.* (*T.*) *bituberculata* Doane and *T.* (*T.*) *cahuilla* Alexander, all of California, seems obvious. The thoracic pattern, including the darkened line on the scutellum and the pale central mark on the mediotergite, closely approximates the type of pattern found in *beatula* but otherwise the flies are not particularly close. The retention of vein $Sc_1$ in the present fly is noteworthy, since it is lacking in virtually all other known species of the genus, including the various allies above listed.

*Tipula* (*Bellardina*) *albimacula* Doane, 1912.—Arizona, with no further data (Doane's type).

*Tipula* (*Bellardina*) *pura* Alexander, 1941.—Rio Ruidoso, White Mountains, New Mexico, 7,500 ft., May 31, 1942; along small mountain stream, in shade of Douglas Fir.

*Tipula* (*Bellardina*) *rupicola* Doane, 1912.—Described by Doane from a single male taken in Oak Creek Canyon, Arizona. I secured a number of specimens of a very similar *Bellardina* at this same place, 5,180 ft., June 10-12, 1942, but cannot reconcile the structure of the dististyles of the male hypopygium with Doane's somewhat detailed description. The same species has been taken in New Mexico: Jemez Springs, 6,400 ft., June 7 (*Woodgate*); Frijoles Canyon, Bandelier National Monument, September 8, 1941 (*Sperry*). Comparison with Doane's type will be necessary to verify this determination.

*Tipula* (*Bellardina*) *schizomera* Alexander, 1940.—Dripping Springs, near Austin, Texas, May 17, 1924 (*R. H. Painter*). Described from Chiapas, southern Mexico; known also from southern Utah.

*Tipula* (*Yamatotipula*) *meridiana* Doane, 1912.—Arizona, with no further data (Doane's type). Common in Utah.

*Tipula* (*Yamatotipula*) *vicina* Dietz, 1917.—Frijoles Canyon, Bandelier National Monument, June 18, 1942 (*Sperry*).

*Tipula* (*Oreomyza*) *clathrata* Dietz, 1914.—Jemez Springs, New Mexico, 6,400 ft., August 14, 1913 (*John Woodgate*); part of type material.

*Tipula* (*Oreomyza*) *doanei doanei* Dietz, 1914.—Jemez Springs, New Mexico, 6,400 ft., July-August 1913 (*John Woodgate*); type material.

*Tipula* (*Oreomyza*) *doanei bifida* Dietz, 1914.—Jemez Springs, New Mexico, 6,400 ft., August 9-22, 1913 (*John Woodgate*); types.

*Tipula* (*Oreomyza*) *serta* Loew, 1863 (*albonotata* Doane, 1901).—Frijoles Canyon, Bandelier National Monument, June 19, 1942 (*Sperry*).

**Tipula (Eumicrotipula) chiricahuensis** sp. nov.—Belongs to the *virgulata* group; general coloration of mesonotal praescutum yellowish gray, with four dark brown stripes; antennae (male) relatively long, conspicuously bicolored, the basal flagellar segments yellow with brownish black bases; femora obscure brownish yellow, the tips brownish black, preceded by a vague clearer yellow ring; wings yellowish subhyaline, conspicuously patterned with brown and more whitish subhyaline; abdomen reddish, with three more or less distinct brownish black stripes on the basal tergites; male hypopygium with the caudal margin of tergite having a deep median split, the broad lateral lobes unequally divided into lobules by more shallow sublateral emarginations; a single tripartite dististyle; eighth sternite transverse, the posterior border bearing a small oval lobe.

♂. Length, about 15 mm.; wing, 17-17.5 mm.; antenna, about 5.5-6.2 mm.

♀. Length, about 28 mm.; wing, 20 mm.; abdomen alone, about 23 mm.

Frontal prolongation of head yellowish brown, more pruinose above; nasus distinct; palpi black. Antennae of male relatively long, variable in length, the shortest measurement given above being that of the type; scape, pedicel and first flagellar segment obscure yellow, succeeding six or seven segments with the basal enlargements brownish black, the apical stems conspicuously yellow; outer segments uniformly dark brown or brownish black; terminal segment very reduced; flagellar segments moderately incised, longer than the verticils. Head dark gray, the vertex with three more or less distinct brown lines, the suborbitals wider than the median vitta; front and narrow posterior orbits clear gray; vertical tubercle small and simple.

Pronotum brown, gray pruinose, dark brown medially. Mesonotal praescutum yellowish gray pruinose, with four dark brown stripes; in female, the ground color more strongly yellowed, the stripes more reddish brown but clearly delimited; vestiture of interspaces very small and sparse, scutum brownish gray, the lobes vaguely patterned with darker; scutellum gray pruinose, paler behind, parascutella even darker; postnotum blackened, pruinose, with a more or less distinct dark median stripe. Pleura and pleurotergite gray pruinose; dorsopleural membrane chiefly pale in front, infuscated behind. Halteres with stem yellow, knob infuscated. Legs with coxae brown, gray pruinose; trochanters yellow; femora obscure brownish yellow to pale brown, the tips narrowly

dark brown or brownish black, preceded by a vague clearer yellow ring; tibiae reddish brown, the tips narrowly black; tarsi passing into black; claws simple. Wings (Fig. 2) yellowish subhyaline, conspicuously patterned with brown, the dark color exceeding in amount the pale ground; cell *C* brownish yellow, a little paler than *Sc;* ground areas beyond the stigma in cells $R_2$ and $R_3$; at ends of cells $R_5$ to $M_3$, inclusive, becoming more restricted behind; obliterative band across cell *1st* $M_2$ and adjoining cells and a large spot at two-thirds the length of cell *M* clearer yellowish white; basal portions of cells *R, M, Cu* and the Anals extensively pale; cell *Cu* chiefly pale, variegated by two brown areas at near midlength; cell *1st A* with a more or less evident zigzag pale pattern at near midlength; prearcular field chiefly dark; veins brown, the obliterative sections extensive. In female, the light and dark patterns are even more contrasted. Squama naked. Venation: *Rs* long, about one and one-half times as long as *m-cu;* $R_{1+2}$ preserved; petiole of cell $M_1$ subequal to *m;* cell *2nd A* wide.

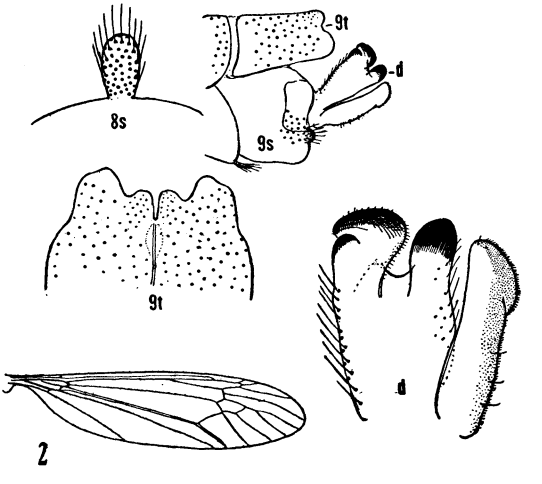


Fig. 2. *Tipula* (*Eumicrotipula*) *chiricahuensis* sp. nov.; venation and male hypopygium. (Symbols: *b*, basistyle; *d*, dististyle; *s*, sternite; *t*, tergite.)

Abdomen reddish, on basal tergites in male with three more or less distinct brownish black stripes, these becoming obsolete beyond the third or fourth segments; posterior borders of outer segments obscure yellow, the extreme lateral borders of tergites broadly pale. In female, abdomen elongate, the outer sternites faintly pruinose. Ovipositor with cerci unusually long and straight, smooth. Male hypopygium (Fig. 2) with the ninth tergite, *9t,* separated from the ninth sternite, *9s;* basistyle more or less rectangular in outline, completely delimited. Ninth tergite, *9t,* entirely pale, large, the total length about equal to the breadth; caudal margin with a deep and narrow median notch; each broad lateral lobe thus formed divided by a broader and shallower notch into a small mesal lobule and a broader and larger outer one; dorsal surface of tergal plate with relatively numerous scattered setae, these becoming very small and delicate on the mesal lobule, lacking on outer margin of lateral lobule.

Ninth sternite divided medially beneath by pale membrane; ventro-mesal angle with a small oval setiferous appendage lying immediately ventrad of the basistyle; cephalic portion of sternite glabrous. Apparently a single dististyle, *d*, the main mass of which terminates in two flattened and blackened lobes, of which the usual beak-like portion is the larger; outer basal lobe, *obl*, a little shorter than the main mass of the style, nearly parallel-sided on more than the basal half, thence weakly dilated, the apex obtuse; outer surface of lobe with an abundance of delicate setulae. Eighth sternite, *8s*, relatively short, transverse; caudal margin bearing a relatively small, short-oval, setiferous median lobe; longest setae of lobe only a little shorter than the appendage itself; main body of sternite without setae.

*Holotype*, ♂, Pinery Canyon, Chiricahua Mountains, Arizona, 6,200 feet, July 22 (*D. K. Duncan*). *Allotopotype*, ♀, pinned with type. *Paratopotype*, 1 ♂, August 7.

I am referring this fly to the subgenus *Eumicrotipula* Alexander, represented by a host of species in Tropical America but not hitherto found north of the Mexican Boundary. Superficially the fly somewhat resembles *Tipula* (*Lunatipula*) *dorsimacula* Walker, 1848.

**Tipula (Hesperotipula) coronado** sp. n.—Belongs to the *streptocera* group; praescutal stripes and centers of scutal lobes polished black; outer cells of wing grayish yellow, with conspicuous pale brown central areas; abdomen with the median tergal stripe entire or nearly so, the sublateral stripes broken into triangles on the bases of tergites three to seven, inclusive; male hypopygium with the tergal notch broadly V-shaped; apex of inner dististyle broadly obtuse; arm of basistyle relatively slender; apex of eighth sternite with the usual two lateral hair brushes, together with a small median group.

♂. Length, about 12.5-13 mm.; wing, 14-15 mm.; antenna, about 4.2-4.4 mm.

♀. Length, about 13-14 mm.; wing, 14-15 mm.

Frontal prolongation of head brownish black; nasus distinct; palpi black. Antennae with the scape, pedicel and first flagellar segment testaceous yellow, succeeding segments dark brown; flagellar segments moderately incised, a little exceeding the longest verticils. Head brownish black, very sparsely gray pruinose, more heavily so on the front and very narrow orbits; anterior vertex moderately wide, about three times the diameter of scape.

Pronotum blackened medially above, paling to obscure yellow on sides. Mesonotum obscure yellow, the praescutum with three very conspicuous polished black stripes, the lateral pair straight; each scutal lobe with a large polished black area; scutellum and mediotergite more brownish yellow to brown, the former even darker medially, the latter with paired blackened areas on posterior third; pleurotergite obscure yellow, the katapleurotergite weakly infuscated, especially near the root of the haltere. Pleura obscure yellow to reddish yellow, the surface polished; dorsopleural membrane yellow. Halteres with stem yellow, knob brownish black. Legs yellow, femora and tibiae with tips very narrowly but conspicuously brownish black to black; tarsi passing into

black; claws toothed. Wings with the ground color grayish yellow, the prearcular and costal fields clearer yellow; stigma oval, dark brown; a small, dark brown cloud over origin of *Rs;* centers of all cells beyond cord and outer ends of the more basal cells with pale brown centers; obliterative areas relatively small and inconspicuous; veins brown, yellow in the brightened fields. Venation: *Rs* relatively long, fully three times the short *m-cu;* $M_{3+4}$ shorter than the basal section of $M_{1+2}$.

Abdomen reddish yellow, the tergites with a broad median black stripe, continuous or more or less broken by the pale posterior margins of the segments, these latter increasing in degree on the outer segments; tergites three to seven, inclusive, each with a conspicuous blackened triangle on basal portion, the outermost one smallest; lateral tergal margins grayish yellow; sternites yellow; hypopygium obscure orange to light castaneous. Ovipositor with the small fleshy valves of the subgenus. Male hypopygium (Fig. 3) with the ninth

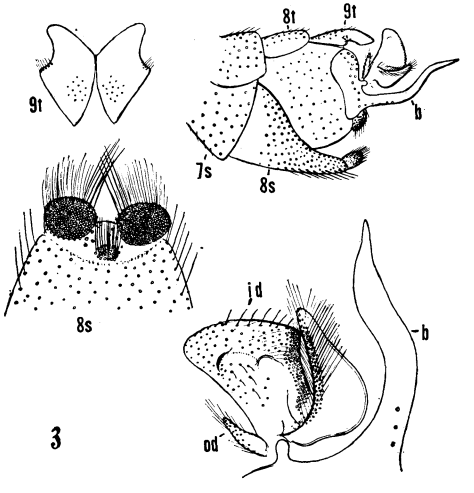


Fig. 3. *Tipula* (*Lunatipula*) *coronado* sp. nov.; male hypopygium.
(Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

tergite, *9t*, small, the posterior half separated from the sternite by a conspicuous suture; basistyle, *b*, long and narrow, its suture delimited but delicate. Ninth tergite, *9t*, viewed from above with a very broad V-shaped emargination, the lateral lobes thus formed strongly divergent, obtusely rounded at tips, glabrous; as in other members of the subgenus, the tergite more or less distinctly divided into a posterior half, as described, and a triangular cephalic portion that is closely united with the sternite; posterior portion of tergite with a few longer setae on lateral margins of lobes and with a few small scattered setulae on disk; cephalic portion of tergite with small but conspicuous setae. Ninth sternite with a small but evident bilobed appendage at its caudo-mesal portion, this fringed with very long conspicuous setae. Basistyle, *b*, with its posterior border produced outwardly into a long slender rod, directed caudad and thence more dorsad, the tip subacute; a very few long setae near base of rod; posterior

margin of basistyle dorsad of this arm bearing a small oval lobe. Outer dististyle, *od,* a small terete dark-colored lobe, narrowed outwardly, provided with elongate setae. Inner dististyle, *id,* massive and compact; outer basal lobe conspicuous, its base and disk glabrous, the margins and apex with long delicate setae. Eighth sternite, *8s,* strongly sheathing, narrowed outwardly, at apex with two semi-detached darkened lobes and a smaller median tuft or brush of setae; lateral lobes with the flattened outer surface densely covered with long crenulate setae that terminate in hairlike points; near mesal portion of each lobe with about six much longer and stronger setae; setae of median tuft relatively long and stout, their outer portions appearing as pale flattened blades.

*Holotype,* ♂, Oak Creek Canyon, Arizona, altitude 5,180 ft., June 10, 1942 (*C. P. Alexander*). *Allotopotype,* ♀, with the type. *Paratopotypes,* numerous ♂ ♀, June 10-12, 1942 (*Alexander & Sperry*).

Named for Francisco Vásquez Coronado, Spanish explorer, whose proposed conquest of the "Seven Cities of Cíbola" and subsequent explorations to the north, 1540-1541, must have gone close to the type locality of the present species. The fly is readily told from the other members of the subgenus *Hesperotipula* Alexander (type, *streptocera* Doane, 1901) by the coloration and, especially, by the structure of the male hypopygium, particularly the ninth tergite and inner dististyle. When Dietz reviewed the species of this group (Ann. Ent. Soc. America, 12:85-94; 1919), he included *translucida* Doane, 1901 (*devia* Dietz) and *pleuracicula* Alexander, 1915 (*monochroma* Dietz), which belong to the subgenus *Lunatipula* Edwards. As now restricted, *Hesperotipula* is a compact group, with relatively numerous species in extreme western North America.

**Tipula (Lunatipula) buenoi** sp. nov.—Size medium (wing, male, not exceeding 15 mm.); mesonotum light gray, the praescutum with four medium brown stripes; pleura and pleurotergite variegated light gray and yellow, the latter color particularly evident behind; femora and tibiae brownish yellow, the tips undarkened; claws (male) toothed; wings weakly tinged with brown, very restrictedly patterned with darker brown, including a vague seam along vein *Cu;* abdominal tergites obscure yellow, with three poorly indicated darker stripes, the lateral borders broadly yellow; male hypopygium with the tergite brown, bordered by light yellow; posterior border broadly emarginate, with conspicuous lateral lobes and a broad median prolongation; inner dististyle with the beak coarsely ribbed longitudinally, the outer basal lobe thin and membranous, scoop-like, the margin produced into a powerful spine; gonapophyses deeply bifid.

♂. Length, about 10-11 mm.; wing, 11-12.5 mm.; antenna, 3.6-4 mm. A paratype male from New Mexico is larger,—Length of body and wing, 15 mm.

♀. Length, about 13-16 mm.; wing, 11-13.5 mm.

Frontal prolongation of head brownish yellow; nasus short; palpi obscure brownish yellow, the terminal segment blackened. Antennae with scape and pedicel light yellow, flagellum black; flagellar segments gently incised, the intermediate segments more strongly so; verticils of the intermediate segments

a little shorter than the segments. Head above light gray, more yellowed behind; a delicate brown median stripe is sometimes evident, extending from the low vertical tubercle onto the posterior vertex.

Pronotum light gray, with three brown spots, the median one more distinct. Mesonotum light gray, the praescutum with four medium brown or reddish brown stripes, the intermediate pair darker, narrowed behind, the median gray vitta correspondingly widened; humeral region of praescutum abruptly light yellow, concolorous with the pretergites and dorsopleural membrane; scutum with median region restrictedly yellow, the posterior lateral angles of the lobes more obscure yellow, the remainder gray, each lobe with two brown areas; scutellum and mediotergite lighter gray, the latter with indications of a capillary dark central vitta; lateral borders of mediotergite and much of the pleurotergite yellow. Pleura light gray, conspicuously variegated with light yellow,

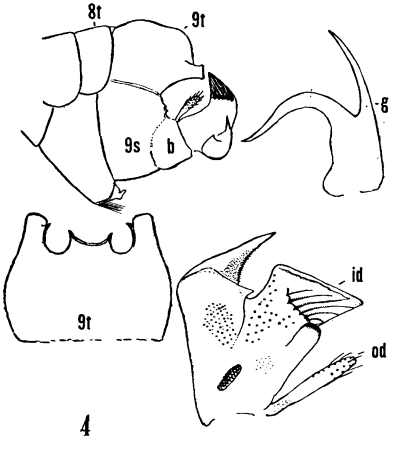


Fig. 4. *Tipula* (*Lunatipula*) *buenoi* sp. nov.; male hypopygium.
(Symbols: *b*, basistyle; *g*, gonapophysis; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

particularly on the mesepimeron and metapleura. Halteres with stem obscure yellow, clearer basally, knob dark brown, indistinctly paler at tip. Legs with coxae gray pruinose; trochanters yellow; femora and tibiae obscure brownish yellow, the tips not darkened; barsitarsi obscure yellow, the tips and remainder of tarsi dark brown; claws (male) toothed. Wings with a weak brownish tinge, the prearcular and costal fields, with the stigma, more saturated yellow to light brown; a broad but vague darkened seam along vein *Cu*, chiefly in cell *M*; obliterative areas poorly indicated; veins brown. Squamal setae elongate. Venation: $Sc_1$ atrophied; *Rs* varying from slightly more than two to about two and one-half times *m-cu*; $R_{1+2}$ strongly preserved; petiole of cell $M_1$ much longer than *m*; *m-cu* at or before the fork of $M_{3+4}$.

Abdominal tergites obscure yellow, gray pruinose, especially on the basal tergites; three poorly indicated darker stripes; lateral borders broadly yellow, delimited internally by the sublateral dark stripes; sternites obscure yellow; hypopygium with tergite chestnut brown, the lobes and borders light yellow; remainder of hypopygium chiefly light yellow, the cephalic portion of the ninth

sternite again darkened. Ovipositor with cerci well-developed, blackened, margins smooth, the tips obtuse; hypovalvae small and weak, yellow. Male hypopygium (Fig. 4) with the tergite, *9t,* moderately enlarged, entirely separated from the sternite, *9s,* by a deep suture; basistyle indicated on its ventral half, the remainder merely depressed. Ninth tergite, *9t,* large, the posterior border broadly emarginate, the conspicuous lateral lobes flattened and truncated at their tips; median area likewise produced into a broad low lobe, the lateral angles of which are produced into small compressed blades that appear as acute points when viewed from above; lateral lobes separated from the median extension by deep rounded notches; on ventral surface of lateral lobes with an acute blackened tooth, normally directed mesad; in cases, a further longer and more slender spine on ventral surface closer to midline, this sometimes lacking. Ninth sternite, *9s,* large, near the cephalic portion on either side with a small flattened glabrous blade that is directed outward; fleshy appendages small, provided with very long setae. Basistyle not produced. Outer dististyle, *od,* small, cylindrical, entirely pale. Inner dististyle, *id,* compact, the beak darkened, triangularly pointed, coarsely ribbed longitudinally; lower beak small; outer basal lobe very large, thin and scoop-like, one angle produced into a strong spine, directed outward and setuliferous almost to the acute apex; in cases, the opposite outer angle of the plate is produced into a second smaller point, this sometimes lacking; sensory area conspicuous, placed near base of style. Gonapophyses, *g,* broad basally, split into two arms, the more mesal one nearly straight, the stronger and more powerful lateral arm a curved horn. Eighth sternite, *8s,* moderately sheathing, at apex with both the low median cushion and the lateral lobes set off from the main body of the sclerite by pale membrane; median cushion weakly divided at midline, provided with two brushes of moderately long setae that are weakly decussate at the midline; lateral lobes irregular in outline, the mesal-apical portion more or less produced into a more flattened blade; apex of lobe unusually glabrous, there being only 5 or 6 scattered setae of various lengths.

*Holotype,* ♂, Coolidge, Pinal County, Arizona, 2,000 ft., April 1 (*D. K. Duncan*). *Allotopotype,* ♀, with the type. *Paratopotypes,* 6 ♂ ♀, with the type. *Paratypes,* 1 broken ♂, Tucson, Arizona, May 1942 (*Bueno*), in porch light of Bueno home; 1 ♂, Valentine, Arizona, May 10, 1945 (*G. F. Knowlton*); 1 ♂, Picacho, Arizona, March 24, 1945 (*G. F. Knowlton*); 1 ♂, Socorro, Socorro County, New Mexico, from the Williston Collection, through Aldrich; U.S.N.M.

This interesting species is named for my good friend, Mr. J. R. de la Torre-Bueno, of Tucson, world authority on the Hemiptera-Heteroptera. I am unable to point out any very closely allied species. The shape of the tergite is somewhat as in the otherwise quite different *Tipula* (*Lunatipula*) *stalagmites* Alexander, 1915.

*Tipula* (*Lunatipula*) *barbata* Doane, 1901.—Southern Arizona, without more exact data, August 1902 (*F. H. Snow*); Univ. Kansas.

*Tipula* (*Lunatipula*) *dorsimacula* Walker, 1848 (*angustipennis* Loew, 1863).—Pinal Mountains, Gila County, Arizona, 8 miles south of Globe, 5,000 ft., along flowing stream in Sulphide Del Rey Canyon (*D. K. Duncan*).

**Tipula (Lunatipula) incisa queres** subsp. nov.—

♂. Length, about 14.5-16 mm.; wing, 14-16.5 mm.; antenna, 4-4.2 mm.

Frontal prolongation of head yellow, sparsely pruinose at base above, relatively stout, subequal in length to remainder of head; no nasus; palpi with basal segment obscure yellow, segments two and three more obscured, the relatively short terminal segment brownish black. Antennae with scape and pedicel yellow; first flagellar segment reddish yellow, weakly darkened at tip, remaining segments black; flagellar segments with basal enlargements moderately developed; longest verticils subequal in length to the segments; first flagellar segment short, about as long as the second. Head yellowish gray, the posterior vertex with a capillary blackened median vitta; vertical tubercle low and ill-defined.

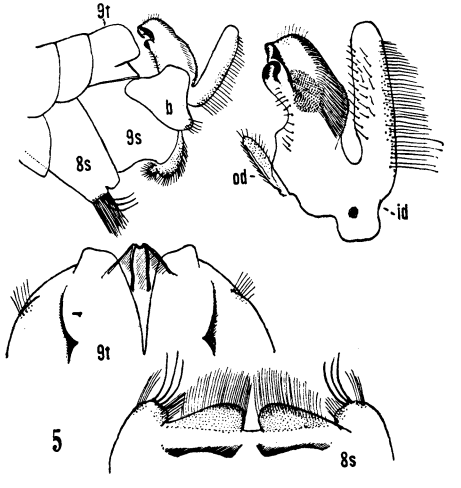


Fig. 5. *Tipula* (*Lunatipula*) *incisa queres* subsp. nov.; male hypopygium.

(Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

Pronotum brownish gray, variegated with slightly darker markings. Mesonotal praescutum gray, with five more or less distinct darker brown lines that represent the borders of the stripes; median stripe more infuscated, with three of the dark lines, including the lateral borders and a much more or less evident median vitta; lateral stripes indicated by a slightly wider brown line; posterior sclerites of notum brownish gray, each scutal lobe with two light brown areas, the median portion of scutum yellow in front. Pleura brownish yellow, very sparsely pruinose; dorsopleural membrane more yellowed. Halteres with stem yellow, knob more infuscated. Legs with coxae pale, sparsely pruinose; trochanters yellow; femora and tibiae yellow, the tips narrowly dark brown; basitarsi obscure yellow, the outer tarsal segments passing into black; claws (male) toothed. Wings brownish gray, restrictedly patterned with brown and whitish subhyaline; prearcular field very pale yellow; cells *C* and *Sc*, especially the latter, deeper yellow; the brown pattern includes the pale brown stigma and restricted darker clouds at tip of *Sc*, origin of *Rs*, over the anterior cord, and a linear cloud in cell *Cu* before midlength; obliterative area before cord exten-

sive, particularly in cells *R* and $R_1$, the color recurring before origin of *Rs* and as a seam backward along vein *M;* a restricted post-stigmal brightening, with other pale areas before and beyond the darkened cloud in cell *Cu;* veins brown, more yellowed in the brightened fields. Venation: *Rs* somewhat less than twice *m-cu;* $R_{1+2}$ entire; petiole of cell $M_1$ subequal to or shorter than *m*.

Abdomen with tergites yellow, with three dark stripes, the median one broader but paler, very narrowly interrupted at the posterior borders of the segments; sublateral dark stripes much broken, best indicated on cephalic half of segments; lateral tergal borders broadly pale; sternites more uniformly yellow; hypopygium relatively large, brownish yellow. Male hypopygium (Fig. 5) having the ninth tergite separate from the sternite; basistyle, *b,* entire. Ninth tergite, *9t,* transverse, the sides deflexed; lateral lobes low and irregular, near the midline somewhat further expanded into a flattened flange, its outer edge obliquely truncate; a broad-based, more sclerotized median tooth that bears two subparallel carinae down the face; on either side of body of sclerite, on ventral surface, with a strong sclerotized supporting flange, near its cephalic portion produced mesad into a strong spinous point. Ninth sternite, *9s,* with the appendage very large and pendant, conspicuously bilobulate, the upper portion large and tumid, with coarse setae, the small apical lobule with a separate grouping of long delicate setae. Basistyle, *b,* large, entire, its upper portion produced dorsad into a low flattened plate or lobe that overlies the bases of the dististyles; posterior lower angle slightly produced into an obtuse lobe that bears a few strong setae. Outer dististyle, *od,* small, the blade slightly expanded. Inner dististyle, *id,* deeply bilobed, the main body with the beak blackened and shaped more or less like an arch or horseshoe, the concave portion adjacent to the suboval blackened lower beak; dorsal crest low, subhyaline, the margin microscopically serrulate, the surface obliquely striate; body of style at base of crest with abundant close-set microscopic areas to produce a more or less tesselated appearance; outer basal lobe erect, directed dorsad, appearing as a flattened elongate lobe that is nearly as long as the style itself, its length exceeding four times its diameter at midlength, the apex glabrous, obtusely rounded; the entire posterior or lower surface of lobe with abundant erect pale setae, those nearest the base longest. Eighth sternite, *8s,* relatively short but sheathing, the apex unusually broad, with short obtuse lateral lobes that are provided with about three major setae and rather numerous smaller normal ones; median portion of caudal border extensive, with two low tumid lobes, lowest on sides, high and steep on their mesal portion adjoining the slight median space; entire lobe densely clothed with long yellow setae.

*Holotype,* ♂, Frijoles Canyon, Bandelier National Mounment, New Mexico, June 19, 1942 (*Sperry*). *Paratopotypes,* 2 ♂♂, June 19-21, 1942.

The subspecific name is that of an Amerind tribe formerly inhabiting the Frijoles Canyon. I am considering this fly as representing a race of *Tipula* (*Lunatipula*) *incisa* Doane, 1901, still known only from the Pacific Northwest. It further appears that *eriensis* Alexander, 1943, and *kansensis* Alexander, 1918, of the Prairie and Central Plains section of North America, should likewise be considered as being races of *incisa.* All of the above have the structure of the male hypopygium generally the same but differ in the colora-

tion of the body and wings. The lack of a nasus in this species is somewhat noteworthy but it may be stated that rather numerous members of the subgenus in the western Nearctic Region are known to lack this structure.

*Tipula* (*Lunatipula*) *polycantha* Alexander, 1942.—Frijoles Canyon, Bandelier National Monument, New Mexico, June 22, 1942 (*Sperry*); type. Oak Creek Canyon, Arizona, 5,180-5,300 ft., June 10-12, 1942 (*Alexander & Sperry*).

*Tipula* (*Lunatipula*) *stalagmites* Alexander, 1915.—Dripping Spring, Organ Mountains, New Mexico, at light , April 23, 1898 (*T. D. A. Cockerell*); type, U.S.N.M. 19,982.

**Tipula (Lunatipula) coconino** sp. nov.—Belongs to the *impudica* group; size medium (wing, male, about 15 mm.); general coloration of thorax gray, the praescutum with four narrow dark brown stripes, the interspaces with black setigerous punctures; femora brownish yellow, the tips narrowly blackened; wings with a brownish tinge, restrictedly patterned with darker brown and whitish subhyaline; abdomen yellow, the tergites with three brown stripes, the median one barely defined, the sublateral pair distinct and but narrowly interrupted; male hypopygium having the tergal canthi moderately long, their tips obtuse, the lateral processes unusually small, appearing as blackened blades; median tergal blade compressed, its apex unusually narrow and pale, without fimbriations; inner dististyle with the outer basal lobe darkened, relatively small, slightly more than one-half the remainder of style; apex of lower beak with microscopic teeth.

♂. Length, about 16 mm.; wing, 15-15.5 mm.; antenna, about 4.2-4.3 mm.

♀. Length, about 19 mm.; wing, 15 mm.

Frontal prolongation of head reddish brown, narrowly darker and pruinose above; a narrow, still darker lateral vitta; nasus long; palpi brownish black, the terminal segment black, relatively short. Antennae with scape and pedicel yellow, flagellum with basal segment brownish yellow, remainder of flagellum black, the segments moderately incised. Head brownish gray, the vertex with a conspicuous capillary black median line.

Pronotum brownish gray, the pretergites and adjacent areas yellowed. Mesonotal praescutum with a broad gray median stripe that is bordered by narrower dark brown stripes that are slightly narrower and more convergent on posterior half; lateral stripes similarly dark brown, relatively narrow; interspaces a little lighter gray, with conspicuous black setigerous punctures, the humeral area a trifle more buffy; posterior sclerites of notum gray, the scutal lobes variegated with dark brown; central portion of scutellum more infuscated. Pleura and pleurotergite gray, the dorsopleural region yellow. Halteres with stem obscure yellow, knob blackened. Legs with the coxae light brown or yellowish brown, sparsely pruinose; trochanters obscure yellow; femora and tibiae brownish yellow, the tips narrowly blackened, the latter more narrowly so; tarsi black, the proximal portions of basitarsi more brightened; claws toothed. Wings with a brownish tinge, cell *Sc* more brownish yellow, more heavily infuscated in outer radial field and as a broad seam along *m-cu;* vein *Cu* not seamed with darker; prearcular field more brightened; stigma large, darker brown; oblitera-

tive areas before and beyond the stigma, the former small, disconnected from a larger mark across cell *1st* $M_2$ into base of cell $M_3$ and adjacent portions of $M_4$; veins brown. Venation: *Rs* about twice *m-cu*.

Abdomen with the first tergite gray pruinose, more infuscated on sides; succeeding segments yellow, the tergites with a narrow but conspicuous, nearly continuous, dark brown sublateral stripe, on the outer segments these narrowly interrupted by pale posterior borders of the segments; a much less distinct and broken median vitta; lateral tergal margins broadly pale; sternites yellow, in the female more darkened medially; hypopygium brownish yellow, patterned with darker brown. Male hypopygium (Fig. 6) with the ninth tergite, *9t*, having the median blade (subtergal process) relatively narrow, compressed, its apex unusually pale and narrow, without fimbriations; canthi appearing as moderately long flattened blades, the tips obtuse and with the margins microscopically crenulate; lateral tergal processes unusually small, appearing as narrow blackened blades, their tips subacute. Ninth sternite with the appendage very strongly bilobed, the major upper portion provided with slender erect black setae, the small suboval lower end with shorter, stout reddish bristles. Outer

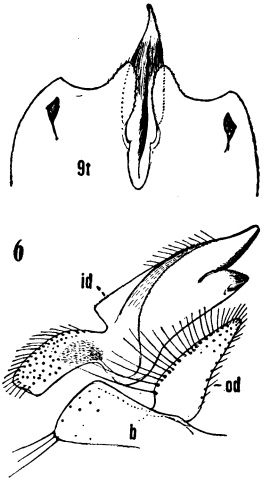


Fig. 6. *Tipula* (*Lunatipula*) *coconino* sp. nov.; male hypopygium.

Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *t*, tergite.)

dististyle, *od*, unusually wide for a member of this group; upper margin fringed with long black setae. Inner dististyle, *id*, with both the beak and lower beak heavily blackened, separated from one another by a V-shaped emargination; apex of lower beak with microscopic teeth; dorsal crest pale, not narrowed and produced posteriorly, the apical portion with a few microscopic denticles; outer basal lobe darkened, relatively small, slightly more than one-half the length of the body of the style, fringed with long conspicuous setae.

*Holotype*, ♂, Williams, Arizona, June 11, 1941 (*J. & G. Sperry*). *Allotopotype*, ♀, pinned with type. *Paratopotype*, 1 ♂.

Most similar to species such as *Tipula* (*Lunatipula*) *mitrata* Dietz, 1921, from which it differs most evidently in the structure of the male hypopygium.

*Tipula* (*Lunatipula*) *diversa* Dietz, 1921.—Silver City, Grant County, New Mexico, May 24-30, 1913; part of type series.

*Tipula* (*Lunatipula*) *dimidiata* Dietz, 1921.—Silver City, Grant County, New Mexico, June 1, 1911; type.

**Tipula (Lunatipula) kaibabensis** sp. nov.—Belongs to the *impudica* group; size medium (wing, male, about 15 mm.); general coloration of thorax gray, variegated with four narrow reddish brown praescutal stripes; abdomen chiefly yellow, with lateral brown dashes on basal tergites; wings light brown, restrictedly patterned with slightly darker brown and more yellowish subhyaline areas, the latter including a small post-stigmal brightening and a relatively inconspicuous band at cord; male hypopygium having tergite with canthi long, their tips obtuse, lateral processes large, heavily sclerotized; median blade compressed, the dorsal surface at apex microscopically fimbriate; basistyle unproduced; inner dististyle with both the beak and lower beak blackened, stout; outer basal lobe relatively small; eighth sternite with an uninterrupted fringe of long yellow setae across the caudal border; from the membrane above the sternite with a slender pale fleshy lobe.

♂. Length, about 13.5-15 mm.; wing, 13.5-15.5 mm.; antenna, about 4.8-5.1 mm.

Frontal prolongation of head subequal to or a little longer than the remainder of head, fulvous yellow, sparsely pruinose at base; nasus lacking or reduced to a microscopic tubercle; palpi with basal two segments yellowish brown, the outer segments brownish black. Antennae with scape and pedicel light yellow; first flagellar segment chiefly yellow, restrictedly patterned with darker on ventral aspect; succeeding segments weakly bicolored, the basal enlargement black, the remainder dark brown, the outer segments more uniformly brownish black; flagellar segments rather conspicuously incised; verticils shorter than the segments. Head above brownish gray, with indications of a capillary darker brown median vitta.

Prothorax pale brown, sparsely pruinose. Mesonotal praescutum with the ground color gray, with four narrow, more reddish brown stripes, the intermediate pair constituting the narrow lateral borders of a broad more brownish gray median stripe, these borders more distinct behind; scutal lobes and bases of the scutellum gray, weakly patterned with reddish brown; mediotergite gray, with a vague central reddish brown line. Pleura brownish yellow, sparsely pruinose, vaguely patterned with somewhat darker areas; dorsopleural membrane yellow. Halteres with stem obscure yellow, knob infuscated. Legs with the coxae pale, sparsely gray pruinose; trochanters yellow; femora yellow, the tips narrowly blackened; tibiae similar with the tips even more narrowly darkened; tarsi at base obscure yellow, the broad tips of basitarsi and remaining segments black; claws (male) toothed. Wings with the ground light brown, restrictedly patterned with slightly darker brown and more yellowish subhyaline areas; prearcular and costal fields more brownish yellow; stigma darker brown; outer radial field somewhat deeper brown than the remainder of ground; obliterative areas including a small but conspicuous post-stigmal spot and a relatively narrow and inconspicuous band at cord, the small spot before stigma more

or less disconnected from the larger posterior portion that crosses cell *1st* $M_2$; a broad pale streak bordering both sides of vein *1st A*, with similar pale streaks near the bases of both anal cells; veins dark brown, more brownish yellow in the brightened fields. Venation: *Rs* about twice *m-cu*; $R_{1+2}$ entire; *m* subequal to petiole of cell $M_1$.

Abdomen yellow; tergites without a median stripe, the lateral vitta broken into small linear sublateral brown streaks on tergites two to six, inclusive, beyond segment two being placed on the basal half or less of each segment; lateral tergal borders broadly pale, the posterior margins narrowly so; sternites yellow, the outer segments somewhat more obscured; hypopygium chestnut yellow. Male hypopygium (Fig. 7) having the ninth tergite, *9t*, with the

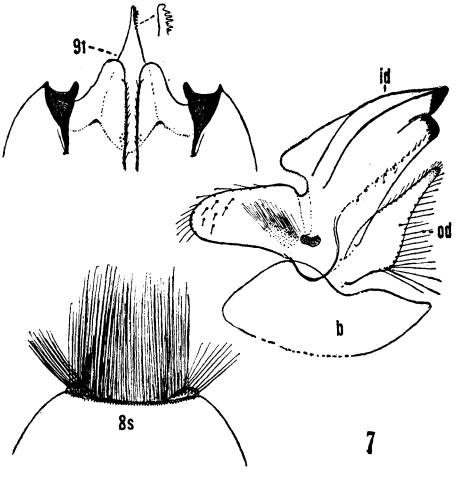


Fig. 7. *Tipula* (*Lunatipula*) *kaibabensis* sp. nov.; male hypopygium.

(Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

median blade (subtergal process) compressed, its dorsal edge near apex with conspicuous fingerlike fleshy lobes or fimbriations; canthi relatively long, the tips broadly obtuse to subtruncate, slightly decurved; space between canthi linear, parallel-sided, very narrow, the margins of the dorsal furrow provided with several coarse setae; lateral tergal processes relatively large, sclerotized, each terminating in a subacute blade. Ninth sternite with the appendage strongly bilobed by a subapical constriction, the small apical lobe with the setae short but much stouter than those of the elongate upper lobe. Basistyle, *b*, with the outer margin unproduced, sinuous or gently emarginate opposite the base of the outer dististyle. Outer dististyle, *od*, with its outer third narrowed, the apex obtuse; lower margin of style with very long setae. Inner dististyle, *id*, with the beak stout, blackened, the apex obliquely truncate; lower beak even deeper, its apex truncate; dorsal crest in front very low but becoming extensively produced behind, the posterior end very pale to almost hyaline, obtuse at apex, the margins microscopically serrulate; outer basal lobe brown, not heavily darkened, of moderate size, about three-fifths as long as the main body of style or a little longer than the outer dististyle; lobe generally parallel-sided, its apex obtuse, near base with the usual dense grouping of long silken setae. Eighth

sternite, *8s,* relatively short, sheathing, the apex very broad and gently emarginate, the entire border fringed with very long yellow setae, not interrupted at midline; at each outer lateral angle with a low cushion that is margined with several similar elongate bristles; from the membrane above outer end of sternite with a slender median pale fleshy lobe that is a little shorter than the fringing setae. It should be noted that this lobe is about as described for *mitrata,* fleshy and tending to shrivel in microscope slide mounts so as to be lost or inconspicuous; it does not have the substance or body of the somewhat comparable appendage in species such as *pellucida* Doane, 1912, or *pyramis* Doane, 1912.

*Holotype,* ♂, Kaibab Plateau, north rim of the Grand Canyon, Arizona, altitude 8,000 ft., June 18, 1942 (*C. P. Alexander*). *Paratopotypes,* 3 ♂♂, June 17-18, 1942 (*C. P. & M. M. Alexander*).

The most similar species is *Tipula* (*Lunatipula*) *mitrata* Dietz, 1921, which shows an evident affinity in the presence of a slender fleshy lobe above the eighth sternite in the male. The present fly differs evidently in the coloration of the body and wings, and in the structure of the male hypopygium, especially of the tergite, including the median blade, canthi and lateral processes, and in the inner dististyle and eighth sternite.

*Tipula* (*Lunatipula*) *mitrata* Dietz, 1921.—Silver City, Grant County, New Mexico, May 26, 1913; type.

**Tipula (Lunatipula) inadusta** sp. nov.—Belongs to the *unicincta* group; general coloration of thorax and abdomen brownish yellow, the praescutum with four very narrow reddish brown stripes; wings with a strong brownish tinge, the prearcular and costal fields, with vein $Cu_1$, clear light yellow; a restricted darker pattern, including the small stigma and vague but broad seams over *m-cu* and distal portions of *Cu;* obliterative band at cord very conspicuous; male hypopygium with the lobes of the tergite relatively broad, the outer apical angle a small spinous point; inner dististyle with the crest produced backward into a pale blade, the posterior end pointed, the outer margin microscopically fimbriate; smaller gonapophyses distinct or separated at bases by membrane; eighth sternite with the lateral lobes terminating in a single large fasciculate bristle; median setae abundant, the outer series not expanded at their tips; median lobe narrow and transverse.

♂. Length, about 17-18 mm.; wing, 19-20 mm.; antenna, about 5-5.1 mm.

♀. Length, about 21-22m m.; wing, 19-20 mm.

Frontal prolongation of head yellow; nasus short and stout; palpi pale brown, the outer two segments somewhat paler. Antennae with scape and pedicel yellow; flagellum very weakly bicolored, the segments light brown, with slightly darkened basal enlargements; outer segments more uniformly darkened. Head yellowish brown, with a slight brown suffusion; vague indications of a capillary brown median vitta on posterior vertex.

Pronotum brown, paler on sides. Mesonotum chiefly brownish yellow, more pruinose laterally, the praescutum with four very narrow and ill-defined reddish brown stripes that are only poorly indicated, the median region of the praescutum in cases gray, in others yellow; posterior sclerites of notum brownish yellow or yellow. Pleura brownish yellow, sparsely pruinose, the anepisternum

a little darker; dorsopleural membrane pale yellow. Halteres with stem yellow, knob darkened, its apex restrictedly yellow. Legs with the coxae yellow, whitish pruinose; trochanters yellow; femora yellow, the tips narrowly but conspicuously blackened; tibiae and basitarsi yellow, the tips even less distinctly darkened; remainder of tarsi dark brown; claws (male) toothed. Wings with a strong brownish tinge, the prearcular and costal fields, together with vein *Cu*, clear light yellow; a restricted darker pattern, including the small stigma and vague but very broad seams over *m-cu* and distal portions of vein *Cu;* a restricted darkening in the vicinity of the arculus; obliterative band before stigma and cord very conspicuous, extending from *C* into the base of cells $M_3$, including also the outer angle of cell *M;* no post-stigmal brightening; veins brown, yellow in the brightened fields. Venation: *Rs* a trifle less than twice *m-cu*.

Abdomen brownish yellow, the tergites with vague indications of a darker median stripe that is narrowly interrupted by the pale posterior borders of the segments; sternites more uniformly yellow; hypopygium chestnut brown. Male hypopygium (Fig. 8) having the ninth tergite, *9t*, with the lobes relatively

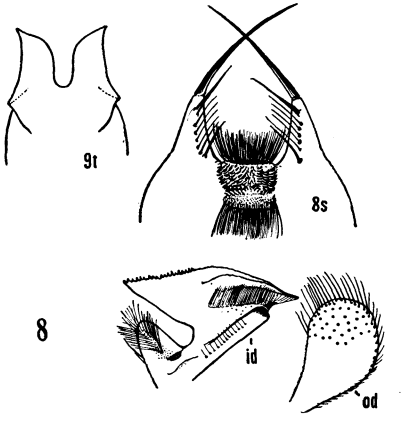


Fig. 8. *Tipula* (*Lunatipula*) *inadusta* sp. nov.; male hypopygium.

(Symbols: *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; t, tergite.)

broad, only slightly narrowed for most of their length, the mesal-apical angle broadly rounded, the outer apical angle a small acute point. Ninth sternite with the appendage large, tumid and obtuse, not at all produced as in *unicincta*. Outer dististyle, *od*, expanded at apex into a large suboval flattened head, provided with long conspicuous setae. Inner dististyle, *id*, with the beak slender, the dorsal and posterior crests strongly produced backward as a pale flattened blade, the posterior end pointed; dorsal margin back from this point with conspicuous fimbriations; outer basal lobe only moderately developed, the tip obtuse, the face with a double crest of long reddish setae. Gonapophyses conspicuous, the short pair slender, separate from one another or interconnected only weakly, not fused into a single median structure as in *bigeminata, diacanthophora* or *spatha*. Eighth sternite, *8s*, moderately sheathing, the lateral lobes terminating in a single large fasciculate reddish bristle; along the inner face of lobe with a series of more ordinary setae, the outermost enlarged but still only

about one-third as large as the terminal bristle; median setae unusually abundant, the posterior group long and delicate, not at all expanded or flattened at their ends; intermediate group of setae forming a matlike pattern of appressed curved bristles; the flaplike lobe is narrowly transverse, the caudal margin and surface fringed with long yellow setae that are longer than the lobe itself.

*Holotype*, ♂, Oak Creek Canyon, Arizona, 5,180 ft., June 10, 1942 (*C. P. Alexander*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 7 ♂♂; 1 ♀, June 25, 1942 (*J. & G. Sperry*).

*Tipula* (*Lunatipula*) *inadusta* is readily told from its closest allies, as *T.* (*L.*) *unicincta* Doane, 1901, by the coloration of the body and, especially, by all details of structure of the male hypopygium, especially the dististyles, gonapophyses, appendage of ninth sternite, and the eighth sternite.

**Tipula (Lunatipula) ruidoso** sp. nov.—Characters as in *inadusta* sp. nov.; general coloration more grayish pruinose; male hypopygium with all details distinct, these including the tergite, inner dististyle, gonapophyses, and eighth sternite.

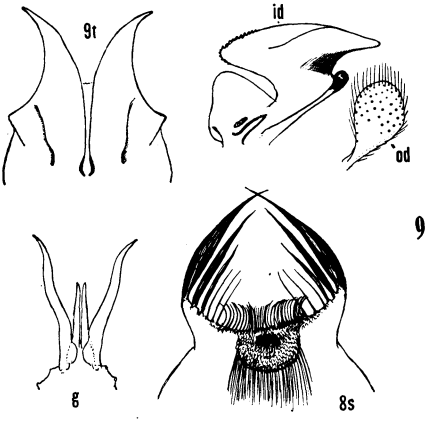


Fig. 9. *Tipula* (*Lunatipula*) *ruidoso* sp. nov.; male hypopygium.

(Symbols: *g*, gonapophysis; *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite.)

♂. Length, about 16 mm.; wing, 20.5 mm.; antenna, about 4 mm.

Nasus short and stout; palpi infuscated, the incisures restrictedly pale; terminal segment uniformly darkened. Mesonotum with the ground color gray pruinose; praescutum with four light brown stripes, the intermediate pair widely divergent in front, converging behind, on the posterior half of the sclerite the ground color between these stripes obscure yellow, replacing the gray. Wing pattern very similar; stigma larger and more evident; obliterative band at cord not or scarcely invading cell *M*.

Male hypopygium (Fig. 9) having the ninth tergite, *9t*, with the lobes unusually narrow, terminating in acute subspinous points. Outer dististyle, *od*, with the expanded apex subcircular in outline. Inner dististyle, *id*, differing in all details: beak stouter; the lower margin with the sclerotized rod narrow, expanded at apex into an oval blackened head or lower beak; apex of posterior crest more obtuse; outer basal lobe much broader, as wide across its base as the

total length. Gonapophysis, *g*, apparently represented only by a single pair of developed rods that represent the usual larger pair of apophyses, these larger and more powerfully constructed than in *inadusta*. Eighth sternite, *8s*, with the lateral lobes shorter and stouter, the apical bristle unusually flattened and expanded, its fasciculate nature well-shown; subterminal seta similarly fasciculate but much smaller; third seta again smaller but still showing a fasciculate nature; remaining setae stout but normal; median lobe much broader, its caudal margin gently convex.

*Holotype*, ♂, Ruidoso, White Mountains, New Mexico, altitude 7,500 ft., May 31, 1942 (*M. M. Alexander*); resting on the trunk of a Douglas Fir.

*Tipula* (*Lunatipula*) *spatha* Doane, 1912.—Doane's unique type was from "Arizona," without further data. One male, near Tucson, Arizona, 2,400 ft., June 9, 1942 (*M. M. Alexander*).

**Tipula (Lunatipula) sanctae-ritae** sp. nov.—Allied to *williamsi;* size small (wing, male, 12 mm.); nasus lacking; head gray, with a darker median vitta on posterior vertex; mesonotum with four entire brown praescutal stripes, the lateral pair with gray centers; femora yellow, the tips narrowly dark brown; wings with a rather strong brownish tinge, very restrictedly patterned with darker brown and with a conspicuous obliterative band before cord; no poststigmal brightening; abdominal tergites obscure yellow, with three brown stripes, the median one especially conspicuous; male hypopygium with the median region of the tergite produced into a broad lobe that is deeply split, the lobes microscopically denticulate; inner dististyle with its outer basal lobe moderately stout, tipped with dense yellow setae; eighth sternite with various groups of setae, including modified ones on the lateral lobes and on a median triangular appendage.

♂. Length, about 12 mm.; wing, 12 mm.

Body desiccated and colors in life probably not exactly as described. Frontal prolongation of head brownish gray above, obscure yellow on sides and beneath; nasus lacking; basal segments of palpi yellow, outer ones broken. Antennae broken. Head gray, darker behind; a darker brownish gray median vitta on posterior vertex; setae and setigerous punctures black.

Pronotum obscure brownish yellow, more or less yellow pollinose. Mesonotal praescutum with the ground color obscure yellow, with four entire brown stripes, the anterior ends of the intermediate pair becoming pale and obsolete; capillary median ground vitta very narrow; lateral stripes broader, each with a gray center; humeral region of praescutum weakly darkened; posterior sclerites of notum gray pruinose, each scutal lobe with two brown areas; a scarcely indicated darker central line on mediotergite. Pleura and pleurotergite pale, with a light gray bloom, apparently the anepisternum and ventral sternopleurite darkened beneath the bloom. Halteres broken. Legs with the coxae pale, whitish pruinose; trochanters yellow; femora yellow, the tips narrowly dark brown; tibiae and basitarsi yellow, the outer tarsal segments darkened. Wings with a rather strong brownish tinge, very restrictedly patterned with darker brown and with a relatively conspicuous obliterative area before cord; besides the stigma, the dark areas include very narrow seams at origin of *Rs*, end of *Sc*,

*m-cu* and the distal section of $Cu_1$; obliterative band before cord extending from before the stigma across the basal half of cell *1st* $M_2$ into the proximal third of cell $M_3$; no post-stigmal brightening; veins pale brown, somewhat more yellowish brown in the prearcular and costal fields. Macrotrichia of veins relatively sparse, especially in outer medial field; several trichia at outer end of $Cu_1$ and *2nd A*. Venation: *Rs* about twice *m-cu;* $R_{1+2}$ entire; $R_3$ strongly sinuous; petiole of cell $M_1$ and *m* subequal, $M_{3+4}$ longer than *m*.

Abdominal tergites obscure yellow, with three brown stripes that are interrupted by pale posterior borders, the median stripe especially conspicuous; lateral tergal borders broadly yellow; sternites and hypopygium yellow. Male hypopygium (Fig. 10) having the ninth tergite, *9t,* with the caudal border

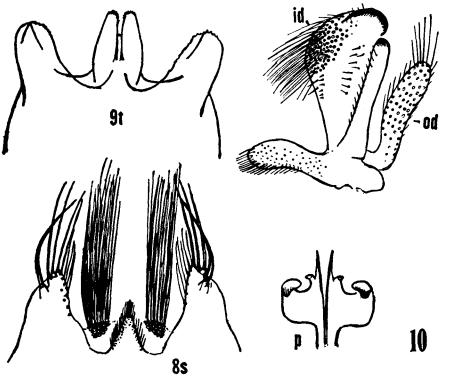


Fig. 10. *Tipula* (*Lunatipula*) *sanctae-ritae* sp. nov.; male hypopygium.

(Symbols: *id,* inner dististyle; *od,* outer dististyle; *p,* phallosome; *s,* sternite; *t,* tergite.)

emarginate, its median region produced into a broad lobe that is further divided for a little less than one-half its length by a narrow split; the lobes thus formed are pale, with conspicuous irregular teeth; lateral tergal lobes broad, their mesal margins microscopically roughened or denticulate. Outer dististyle, *od,* moderately flattened, gently sinuous, provided with abundant black setae, those at apex longest. Inner dististyle, *id,* with the beak blackened, obtuse; lower beak a flattened rod along the ventral margin of style, its tip obtuse; dorsal crest on its outer portion with unusually long and abundant yellow setae that are directed backwards; outer basal lobe flattened, the length about three times the width; tip obtuse, weakly darkened, with a concentration of delicate yellow setae of moderate length. Eighth sternite, *8s,* with the armature unusually complex; lateral lobes flattened, margined with bristles, of which three or four are larger and more powerful, particularly the most basal one; a median triangular lobe that is bordered by strong setae, those at apex more crowded and delicate; in the membrane between the above setal groups a further area bearing unusually long setae, these being the longest on the entire sclerite.

*Holotype,* ♂, Madera Canyon, Santa Rita Mountains, Arizona, altitude 5,000 ft., June 8, 1912 (*C. P. Alexander*); found dead in a spider's web on building at Big Rock Camp.

There are several western Nearctic species of the subgenus that have this same general type of hypopygium. Among these, the present fly is closest to

*Tipula* (*Lunatipula*) *williamsi* Doane, 1909, of California, which is much larger, with the details of coloration and structure of the hypopygium distinct. It should be noted that this latter species has the wings of the female sex subatrophied. In the present fly, the fimbriate central lobes of the ninth tergite are distinctive.

*Tipula* (*Lunatipula*) *macrolabis macrolaboides* Alexander, 1918.—White Mountains, New Mexico, highest summits, altitude 11,092 ft., (*C. H. T. Townsend*); South Fork of Eagle Creek, altitude 8,000 ft., August 13 (*C. H. T. Townsend*).

*Tipula* (*Lunatipula*) *pleuracicula* Alexander, 1915 (*arizonica* Alexander, 1916; *monochroma* Dietz, 1919).—Williams, Arizona, May 29-30 (*H. S. Barber*); U.S.N.M. Other Arizona records include Kaibab Plateau, north rim of Grand Canyon, 8,000 ft., June 17-18, 1942; Oak Creek Canyon, 5,200-5,400 ft., on unusually dry slopes of canyon, June 10-12, 1942 (*Alexander & Sperry*); Peeples Valley, Utah, May 11, 1945 (*G. F. Knowlton*), abundant among blue grass and squirreltail grass beneath the shade of two large trees.

## LIMONIINAE

### LIMONIINI

*Limonia* (*Limonia*) *argenteceps* (Alexander, 1912).—Huachuca Mountains, Arizona, August 1905 (*Henry Skinner*); type.

*Limonia* (*Limonia*) *triocellata* (Osten Sacken, 1859).—Taos Creek, northern New Mexico, 7,500 ft., July 27, 1934; Sapello Canyon, New Mexico, 8,000 ft., August 9-26, 1901 (*Skinner*); Skinner, 1902-1903.

*Limonia* (*Limonia*) *simulans* (Walker, 1848) (*defuncta* Osten Sacken, 1859).—New Mexico: Sapello Canyon, 8,000 ft., August 9-26, 1901 (*Skinner*); Cloudcroft, 8,000 ft., June 1, 1942.

*Limonia* (*Limonia*) *venusta* (Bergroth, 1888) (*negligens* Alexander, 1927).—Frijoles Canyon, Bandelier National Monument, June 19, 1942 (*Sperry*).

*Limonia* (*Dicranomyia*) *brevivena* (Osten Sacken, 1869). Sabino Canyon, Santa Catalina Mountains, at Tucson, June 7, 1942 (*Alexander & Bueno*).

*Limonia* (*Dicranomyia*) *distans* (Osten Sacken, 1859).—Old Fort Davis, Davis Mountains, Texas, August 1928 (*Poling*).

*Limonia* (*Dicranomyia*) *halterata* (Osten Sacken, 1869).—Sapello Canyon, New Mexico, 8,000 ft., August 9-26, 1901 (*Skinner*).

*Limonia* (*Dicranomyia*) *fulva fulvoides* Alexander, 1943.—Kaibab Plateau, north rim of the Grand Canyon, 8,000 ft., June 18-19, 1942; very common, especially the females.

*Limonia* (*Dicranomyia*) *humidicola dampfi* (Alexander, 1925).—Huachuca Mountains, Arizona, along creek in Miller Canyon, 6,400 ft., September 4, 1938 (*E. R. Tinkham*).

*Limonia* (*Geranomyia*) *canadensis* (Westwood, 1835).—Texas: Davis Mountains, along Limpia Creek, 4,000 ft., May 29, 1942. New Mexico: Mescalero Apache Reservation, Sacramento Mountains, 6,000 ft., June 1, 1942. Arizona: Grand Canyon, bottom, at Phantom Ranch, 2,700 ft., June 14, 1942; Wheatfields, near Globe, 3,000 ft., March 29 (*D. K. Duncan*); Oak Creek Canyon, 5,180 ft., June 10-11, 1942; Chiricahua Mountains, 6,000 ft., June 4, 1942; Santa Rita Mountains, 5,000 ft., June 8, 1942.

*Limonia* (*Geranomyia*) *diversa* (Osten Sacken, 1859).—Wheatfields, near Globe, 3,000 ft., March 29 (*D. K. Duncan*); Oak Creek Canyon, 5,180 ft., June 10, 1942; Santa Rita Mountains, Madera Canyon, 5,000 ft., June 8, 1942.

*Limonia* (*Geranomyia*) *ibis* (Alexander, 1916).—One female, Sabino Canyon, Santa Catalina Mountains, Arizona, June 9, 1942. Hitherto known only from the type female from Hot Springs, Arkansas. The present specimen agrees closely with the type, differing in certain details of venation, as the somewhat shorter *Sc* and the distinct retention of the supernumerary crossvein in cell *Sc*.

*Limonia* (*Geranomyia*) *perfecta* (Alexander, 1928).— One male, Wheatfields, near Globe, Arizona, 3,000 ft., March 29 (*D. K. Duncan*). The type was from Tepic, Nayarit, Mexico, altitude 3,069 meters, collected March 14, 1927 (Dampf M. F. No. 1191).

**Limonia (Geranomyia) valverdensis** sp. nov.—General coloration of thorax uniform yellow or fulvous yellow, unpatterned; rostrum brown, about one-half the length of wing; femora and tibiae yellow, unpatterned; wings with a faint yellowish tinge, unpatterned except for the scarcely darker stigma; *Sc* long, $Sc_1$ ending about opposite three-fifths *Rs;* male hypopygium with the caudal margin of the ninth tergite with a V-shaped notch; ventral dististyle fully twice as extensive as the basistyle, with two subequal rostral spines; apex of prolongation stout.

♂. Length, excluding rostrum, about 5.5 mm.; wing, 6 mm.; rostrum about 2.9 mm.

Rostrum relatively long, about one-half the length of wing, brown, somewhat paler at base; palpi dark brown. Antennae with scape yellow; pedicel brown, flagellum brownish black; flagellar segments oval, with short verticils. Head in front obscure yellow; posterior vertex extensively gray, the occiput paling to brownish yellow; anterior vertex narrow, subequal to the diameter of scape, with a small brownish spot on either side at narrowest point.

Pronotum yellow. Mesonotum and pleura almost uniformly yellow or fulvous yellow, unpatterned. Halteres with stem yellow, knob very slightly darkened. Legs with coxae fulvous yellow; trochanters yellow; remainder of legs yellow, the terminal tarsal segments darkened. Wings (Fig. 11) with a faint yellowish tinge, prearcular and costal fields somewhat clearer yellow; stigma scarcely indicated, very pale brown; veins light brown, more brownish yellow in the brightened fields. Venation: *Sc* long, $Sc_1$ ending about opposite three-fifths *Rs*, $Sc_2$ a short distance from its tip; *cell 1st* $M_2$ a little shorter than the distal section of $M_{1+2}$; *m-cu* close to fork of *M;* vein *2nd A* gently sinuous.

Abdomen, including hypopygium, brownish yellow. Male hypopygium (Fig. 12) having the caudal margin of ninth tergite, *9t*, with a V-shaped notch. Basistyle, *b*, small, its total area less than one-half that of the ventral dististyle; ventromesal lobe obtuse at apex. Dorsal dististyle a relatively slender curved rod, its tip acute. Ventral dististyle, *vd*, with the rostral prolongation short, obtuse at tip; rostral spines two, placed close together on outer margin at base of prolongation, without basal tubercles; spines a trifle shorter than the length of the prolongation beyond the outermost spine. Gonapophyses, *g*, pale, mesal-apical lobe flattened, terminating in a small acute point; lateral edge of lobe microscopically crenate. Aedeagus with apical lobes obtuse at tips; surface of aedeagus with microscopic setulae.

*Holotype*, ♂, Devil's River, Valverde County, Texas, May 4, 1907 (*F. C. Pratt*). Although the station is just east of the Pecos River, I am including it in this paper.

*Limonia* (*Geranomyia*) *valverdensis* is most similar to *L.* (*G.*) *vanduzeei* (Alexander, 1916), of the southeastern United States, which, while generally similar in coloration, differs in the shorter rostrum, patterned femora, and in the details of structure of the male hypopygium, particularly the tergite and the ventral dististyle, with its rostral prolongation and spines.

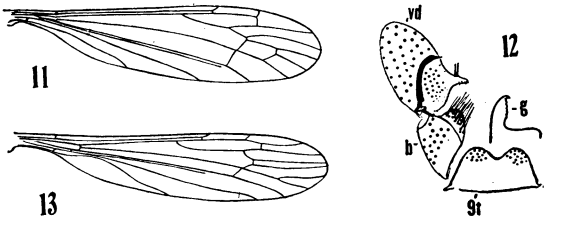


Fig. 11. *Limonia* (*Geranomyia*) *valverdensis* sp. nov.; venation.
Fig. 12. The same; male hypopygium.
Fig. 13. *Orimarga* (*Orimarga*) *sanctae-ritae* sp. nov.; venation.
(Symbols: *b*, basistyle; *g*, gonapophysis; *t*, tergite; *vd*, ventral dististyle.)

*Orimarga* (*Orimarga*) *arizonensis* Coquillett, 1903.—Hot Springs, Yavapai County, Arizona, June 25-26, 1901 (*H. S. Barber*); type.

**Orimarga (Orimarga) sanctae-ritae** sp. nov.—General coloration dark gray, the praescutum with four brown stripes; antennae black; halteres brownish black, the base of the stem restrictedly brightened; legs with the coxae black, pruinose; femora, yellow, the tips blackened, wings with a strong blackish tinge, variegated with still darker areas and whitened streaks along certain of the veins; macrotrichia on outer radial veins; $Sc_1$ ending about opposite midlength of *Rs*; $R_{1+2}$ elongate, nearly three times $R_{2+3}$; cell $M_3$ deep, $M_{3+4}$ about three-fourths as long as vein $M_3$ alone; *m-cu* just before the fork of *M*.

♀. Length, about 6 mm.; wing, 5.8 mm.

Rostrum gray; palpi black. Antennae black throughout; flagellar segments short-oval. Head gray; anterior vertex relatively narrow.

Pronotum gray, infuscated above. Mesonotal praescutum gray, with four brown stripes, the lateral pair crossing the suture onto the scutal lobes; intermediate stripes only narrowly and vaguely separated by a capillary ground line; posterior sclerites of notum chiefly dark plumbeous gray. Pleura dark gray. Halteres brownish black, the base of stem restrictedly brightened. Legs with the coxae black, pruinose; trochanters brownish black; femora yellow, the tips rather narrowly but conspicuously blackened, the amount subequal on all legs and involving about the distal eighth to tenth of the segment; tibiae obscure yellow, the extreme bases and tips darkened; basitarsi dark brown, remainder of tarsi black. Wings (Fig. 13) with a strong blackish tinge, patterned with still darker areas; prearcular field whitened; darker clouds along vein $R_1$ in the general region of the stigma and in the outer marginal field; a dusky central streak in cell *R;* a conspicuous cloud near base of cell *1st A* at point of narrowing of the anal veins; less distinct dark clouds along vein *Cu* and in the axillary angle; whitish streaks bordering certain of the veins, including outer portions of $R_{4+5}$ and $M_{1+2}$, much of veins *M*, $M_{3+4}$ and $M_4$, and near the base of vein *1st A* in cell *1st A;* veins dark brown. Macrotrichia of veins beyond cord relatively numerous on all outer radial veins, becoming sparse in the medial field, lacking on $M_{3+4}$, *Cu* and the Anals. Venation: *Sc* relatively long, $Sc_1$ ending about opposite midlength of *Rs*, $Sc_2$ a short distance from its tip, $Sc_1$ alone nearly twice $R_2$; vein $R_1$ between the free tip of $Sc_2$ and $R_2$ about three times the length of the latter; $R_{1+2}$ elongate, nearly three times $R_{2+3}$; inner end of cell $R_4$ arcuated, lying proximad of cell $R_5$; cell $M_3$ deep, $M_{3+4}$ about three-fourths as long as $M_3$ alone or a little longer than $M_4$; *m-cu* unusually far distad for a member of this genus, lying just before the fork of *M;* vein *2nd A* unusually arched beyond the level of arculus, greatly narrowing cell *1st A*, cell *2nd A* opposite this point very wide.

Abdomen, including the genital shield, black; cerci blackened, small and slender, strongly upcurved.

*Holotype,* ♀, Madera Canyon, Santa Rita Mountains, Arizona, altitude 5,000 ft., June 7, 1942 (*C. P. Alexander*). The type was swept from a damp area overgrown with a species of mint not far from the stream. Close by, only a few feet distant on a wet bank, were nests containing young birds of the Arizona Junco, *Junco phaeonotus palliatus,* and the Painted Redstart, *Setophaga picta picta.*

*Orimarga* (*Orimarga*) *sanctae-ritae* is very different from all described regional species, its nearest relative being a still undescribed form from Zion National Park, southern Utah. The present fly is well-distinguished by the venation, especially the unusual position of *m-cu,* relative proportions of veins $R_{1+2}$ and $R_{2+3}$, and the deep cell $M_3$.

*Dicranoptycha quadrivittata* Alexander, 1919.—Huachuca Mountains, Arizona, along creek in Miller Canyon, altitude 6,400 ft., September 4, 1938 (*E. R. Tinkham*); Oak Creek Canyon, Arizona, 5,500 ft., June 12, 1942 (*Alexander & Sperry*).

*Antocha* (*Antocha*) *monticola* Alexander, 1917.—New Mexico: near Cumbres Pass, at Colorado border, altitude 9,500 ft., July 28, 1934. Arizona:

Oak Creek Canyon, 5,500 ft., May 11, 1945 (*G. F. Knowlton*), June 10-12, 1942 (*Alexander & Sperry*).

PEDICIINI

*Pedicia* (*Tricyphona*) *aspidoptera* (Coquillett, 1905).—Las Vegas Mountains; near Beulah, New Mexico, June (*Cockerell and Viereck*).

*Dicranota* (*Rhaphidolabis*) *neomexicana* (Alexander, 1912).—Beulah, New Mexico, June 29, 1902 (*Viereck*); type. White Mountains, New Mexico, altitude 7,500 ft., May 31, 1942, along small mountain stream beneath Douglas Fir; Mescalero Apache Indian Reservation, Sacramento Mountains, 5,000 ft., June 1, 1942. Oak Creek Canyon, Arizona, 5,500 ft., June 12, 1942.

HEXATOMINI

**Epiphragma (Epiphragma) arizonensis** sp. nov.—Mesonotal praescutum with four dark gray stripes, the posterior interspaces grayish brown, with conspicuous dark punctures; scutellum obscure yellow; pleura yellowish gray, variegated with dark brown; femora yellow, with a vague, narrow brown ring before tip; wings whitish subhyaline, heavily patterned with pale brown areas that are very narrowly but distinctly bordered by dark brown, the costal and subcostal areas without ground centers; cell *1st* $M_2$ large and much widened outwardly; abdominal tergites grayish yellow, with vague indications of three slightly darker stripes; transverse impressions on tergites dark brown; setigerous punctures abundant and conspicuous; interbases of male hypopygium with subtriangular reflexed tips.

♂. Length, about 11-12 mm.; wing, 13 mm.; antenna, about 3.1 mm.

♀. Length, about 16 mm.; wing, 13 mm.

Rostrum dark brown, gray pruinose; palpi black. Antennae with scape black; pedicel brown, paler beneath; basal two or three flagellar segments yellow, the outer ones passing into brownish black; fusion-segment comprised of two elements, the suture very faintly indicated; outer segments long-cylindrical, with elongate verticils, the longest exceeding the segments in length; terminal segment a trifle longer than the penultimate. Head dark gray, the region of the low vertical tubercle more darkened; region of posterior orbits paler; a more or less distinct capillary black median vitta on posterior vertex; setigerous punctures distinct.

Pronotum with scutum brownish gray, with coarse dark punctures; scutellum chiefly yellow. Mesonotal praescutum with the disk almost covered by four dark gray stripes, the intermediate pair separated by a slightly paler gray line; posterior interspaces more grayish brown, with conspicuous dark punctures; humeral and lateral portions of praescutum broadly obscure orange, the extreme border dark brown; in cases, including the holotype, the lateral border is chiefly dark brown; scutum chiefly brownish gray, each lobe with two darker brown areas; posterior borders of scutal lobes and the scutellum obscure yellow; mediotergite broadly yellow medially, more darkened on sides, especially on cephalic half, the entire surface more or less pruinose; pleurotergite chiefly pale, sparsely pruinose. Pleura with the ground yellow, gray pruinose, varie-

gated with dark brown, including part of the dorsopleural membrane and major areas on the anepisternum, ventral sternopleurite and ventral meron. Halteres with stem obscure yellow, knob darkened, its tip vaguely paler. Legs with the coxae brownish yellow; trochanters paler yellow; femora yellow, with a narrow and vague brown ring just before the tip; remainder of legs yellow, the outer segments a little more darkened; claws with long basal spine. Wings (Fig. 14) whitish subhyaline, heavily patterned with pale brown areas that are distinctly but very narrowly bordered by dark brown; costal areas without ground centers in either cells *C* or *Sc;* marginal spots on outer radial veins large and full; base of cell *1st A* entirely clear; outer dark band at end of cell *1st* $M_2$ broader than in *solatrix* and tending to become much broken; in cases, including type, a dark spot at midlength of cell *2nd A;* veins brown, somewhat darker in the patterned fields. Venation: Supernumerary crossvein in cell *Sc* oblique; *Rs* angulated and long-spurred near origin, in the type the spur completely traversing cell *R;* $R_{2+3+4}$ long and nearly straight, exceeding *m-cu;* cell *1st* $M_2$ large and much widened outwardly.

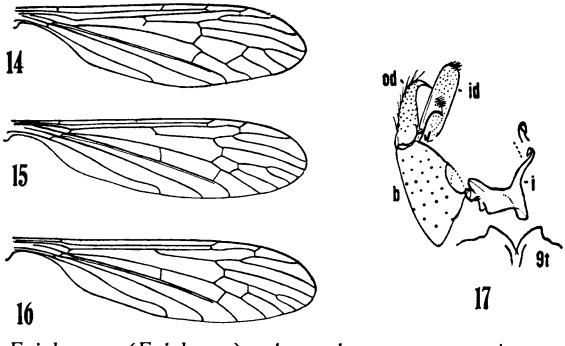


Fig. 14. *Epiphragma* (*Epiphrama*) *arizonensis* sp. nov.; venation.
Fig. 15. *Limnophila* (*Elaeophila*) *edentata* Alexander; venation.
Fig. 16. *Limnophila* (*Elaeophila*) *woodgatei* sp. nov.; venation.
Fig. 17. *Epiphragma* (*Epiphragma*) *arizonensis* sp. nov.; male hypopygium.
(Symbols: *b*, basistyle; *i*, interbase; *id*, inner dististyle; *od*, outer dististyle; *t*, tergite.)

Abdominal tergites chiefly grayish yellow, with vague indications of three slightly darker broken stripes; transverse impressions darker brown and more distinct; brown setigerous punctures abundant and conspicuous; sternites, especially of female, more yellowed. Male hypopygium (Fig. 17) with the submedian tergal lobes, *9t,* low, separated by a deep V-shaped notch. Outer dististyle, *od,* with conspicuously pale setae to the base of the curved apical spine. Inner dististyle, *id,* flattened, its apex obtuse, provided with a few pale setae; near basal third with a group of about a dozen blackened setae on a small flange. Interbases, *i,* with the short, subtriangular apices reflexed.

*Holotype,* ♂, Oak Creek Canyon, Arizona, altitude 5,180 ft., June 12, 1942 (*C. P. Alexander*). *Allotopotype,* ♀. *Paratopotype,* 1 ♂.

The nearest relative of the present fly is *Epiphragma* (*Epiphragma*) *solatrix* (Osten Sacken, 1859), which differs in all details of coloration of the body and wings, and in the structure of the male hypopygium, particularly the tergal lobes and the interbases.

*Limnophila* (*Elaeophila*) *edentata* Alexander, 1919.—Oak Creek Canyon, Arizona, altitude 5,180 ft., June 10-12, 1942.

**Limnophila (Elaeophila) woodgatei** sp. nov.—Size relatively large (wing, female, 8.5 mm.); general coloration gray, the notum conspicuously patterned with dark brown; femora yellow, the tips conspicuously blackened; wings with the ground color grayish white, with an unusually heavy spotted and dotted brown pattern, the dark color subequal in extent to the pale; dark crossband at origin of *Rs* virtually unbroken and of nearly equal width throughout; dashes in costal interspaces conspicuous; margin of wing, including axillary border, very extensively washed with brown; $R_{2+3+4}$ relatively long, approximately one-third *Rs;* cell *1st* $M_2$ large, subequal in length to vein $M_4$ beyond it.

♀. Length, about 9 mm.; wing, 8.5 mm.

Rostrum black, sparsely pruinose; palpi black. Antennae with scape black, pruinose; pedicel reddish brown; basal flagellar segments yellow, the outer ones broken. Head gray, the central portion of vertex extensively infuscated.

Pronotum large, gray, the central and lateral portions extensively infuscated; scutellar lobes more yellowed; pretergites pale yellow. Mesonotal praescutum gray, with a conspicuous brown pattern, including two intermediate stripes that converge or touch in front and less evidently so behind; median ground line subequal in width to either stripe, lateral stripes narrow; additional brown spots on praescutum include the lateral borders behind the pseudosutural foveae and a series of small brown dots in the posterior interspaces, the largest at the suture; pseudosutural foveae black; posterior sclerites of notum gray, patterned with dark brown, including a common central line on scutum and scutellum, on the latter not reaching the posterior border; mediotergite with a capillary brown central vitta. Pleura and pleurotergite gray, conspicuously patterned with dark brown, most extensively so on the ventral sternopleurite and meron but including areas on all other pleurites; dorsopleural membrane chiefly infuscated. Halteres with stem yellow, knob infuscated. Legs with coxae dark brown, gray pruinose; trochanters obscure yellow; femora obscure yellow, the tips conspicuously blackened, preceded by a slightly clearer yellow ring of about equal extent; remainder of legs light yellow, the tips of tibiae and the outer tarsal segments more infuscated. Wings (Fig. 16) with the ground color grayish white, with an unusually heavy spotted and dotted brown pattern, the dark color subequal in extent to the pale; major dark costal area at near mid-distance between *h* and the origin of *Rs;* a complete crossband at origin of *Rs* and over the supernumerary crossvein in cell *M,* reaching the posterior margin near the outer end of cell *2nd A;* third dark area over fork of *Sc,* the fourth at stigma, the latter two converging behind over the anterior cord; outer costal areas at ends of veins $R_3$ and $R_4$; cord and outer end of cell *1st* $M_2$ seamed with brown; very

extensive and more or less confluent paler brown clouds at ends of all longitudinal veins, almost unbroken in the axillary area; all interspaces with abundant brown dashes and spots on the veins, including a very conspicuous series in cells *C* and *Sc;* elsewhere on wing, particularly before cord in cells *Cu, 1st A* and *2nd A,* the membrane is extensively washed with pale brown; vein *1st A* unpatterned, *2nd A* with a series of about five darker brown spots before the major dark subterminal area; veins yellow, darker in the interspaces, very conspicuous in the outer costal spaces. Venation: $R_{2+3+4}$ longer than in *edentata* (Fig. 15), approximately one-third *Rs;* cell *1st* $M_2$ larger than in *edentata,* rectangular, subequal in length to vein $M_4$ beyond it.

Abdominal segments dimidiate, obscure yellow, the posterior borders of the segments dark brown, more conspicuous on the sternites where the bands are broader, reaching the posterior border and more or less darkening the lateral portions of the segments; on the tergites, the subterminal dark bands are narrower, the extreme tips of the segments narrowly pale, with indications of a second subbasal darkened band; genital shield fulvous; cerci light yellow, hypovalvae darker on proximal two-thirds.

*Holotype,* ♀, Jemez Springs, New Mexico, altitude 6,400 ft., June 12, 1916 (*John Woodgate*).

Named in honor of the veteran collector of New Mexican insects, John Woodgate. Although only the female sex is known, I believe that the present fly is distinct from the more western *Limnophila* (*Elaeophila*) *edentata* Alexander, 1919, which is the most similar known species. The differences in the female sex are found chiefly in the wing pattern and venation and these have been detailed in the above description. The venation of *edentata* is shown for comparison (Fig. 15).

*Limnophila costata* Coquillett, 1901.—The type was from the alpine summits between the Pecos and Sapello Rivers, New Mexico, altitude about 11,000 ft., in the Hudsonian zone, August 1-4, 1900 (*T. D. A. Cockerell*); U. S. Nat. Mus. No. 5318. I have not been able to recognize this species in later collections.

*Hexatoma* (*Eriocera*) *austera* (Doane, 1900).—Jemez Springs, New Mexico, altitude 6,400 ft., May 17, 1916 (*John Woodgate*). I possess a rather large series showing a most surprising variation in the wing venation that serves to connect the two supposed subgenera *Hexatoma* Latreille, 1809, and *Eriocera* Macquart, 1838 (a part of the series mounted on microscope slides in the Alexander Collection).

*Hexatoma* (*Eriocera*) *eriophora* (Williston, 1894).—Frijoles Canyon, New Mexico, June 22, 1942 (*J. & G. Sperry*). The reference to *H.* (*E.*) *spinosa* (Osten Sacken, 1859) from near Beulah, New Mexico, in Sapello Canyon, San Miguel Co., New Mexico, 8,000 ft., August 9-26, 1901 (Skinner, 1903: 101-106) evidently refers to the present species.

*Hexatoma* (*Eriocera*) *velveta* (Doane, 1900).—New Mexico: Mescalero Apache Indian Reservation, Sacramento Mountains, 7,000 ft., June 1, 1942; Cloudcroft, Sacramento Mountains, 8,000 ft., June 2, 1942. Arizona: Oak Creek Canyon, 5,500 ft., June 12, 1942.

ERIOPTERINI

**Teucholabis (Teucholabis) duncani** sp. nov.—General coloration black, the thorax variegated with yellow on the scutellum and pleura; head dark gray; wings hyaline, with a conspicuous short-oval dark brown stigma; *Sc* relatively long, both $Sc_1$ and $Sc_2$ lying beyond the origin of *Rs;* tip of $R_{1+2}$ pale to subatrophied.

♀. Length, about 5 mm.; wing, 5.5-5.6 mm.

Rostrum and palpi black. Antennae with the basal segments black; outer segments broken. Head dull dark gray; anterior vertex broad, about four times the diameter of the scape.

Pronotum black, the pretergites light yellow. Mesonotal praescutum black, the surface subnitidous to nitidous; humeral region restrictedly reddened; scutal lobes black, the cephalic end of the central portion, with the adjoining part of the praescutum, restrictedly reddened; posterior median portion of scutum heavily gray pruinose; scutellum broad, yellow, parascutella brownish black; postnotum black, the mediotergite heavily pruinose except at posterior border; suture between mediotergite and pleurotergite restrictedly reddened. Pleura black, with a conspicuous silvery white longitudinal stripe, extending from behind the fore coxae to the base of abdomen, slightly widened behind; dorsopleural membrane yellow. Halteres black throughout. Legs with the fore coxae black, mid-coxae brown, hind coxae black to brown; trochanters obscure brownish yellow; femora yellow, the tips dark brown, the amount subequal on all legs, including the distal sixth (fore legs) to eighth (hind leg); tibiae and basitarsi obscure yellowish brown, the tips dark brown; outer tarsal segments more uniformly blackened. Wings (Fig. 18) hyaline, the prearcular field more yellowed; a conspicuous short-oval dark brown stigma; veins dark brown in the brightened prearcular portion. Venation: *Sc* relatively long, $Sc_1$ ending at near one-half to three-fifths the length of *Rs,* $Sc_2$ distinctly beyond the origin of *Rs;* $R_2$ more or less oblique; $R_{2+3+4}$ very short; tip of $R_{1+2}$ pale to subatrophied; branches of *Rs* strongly divergent at outer ends, especially $R_5$ which terminates just before the wing-tip; cell *1st* $M_2$ a little longer than vein $M_4$ beyond it; *m-cu* about one-third to one-half its length beyond the fork of *M;* vein *2nd A* nearly straight for most of its length.

Abdomen black, the extreme posterior borders of the outer sternites very restrictedly pale. Ovipositor with the genital shield black, the cerci horn-yellow, slender, gently upcurved to the acute tips.

*Holotype,* ♀, Wheatfields, near Globe, Gila County, Arizona; down Pinal Creek, along a running stream, altitude 3,000 ft.; a broad canyon lying between the north point of the Superstition Range and part of the Sierra Ancha Range, which lies between Pinal Creek and Salt River, March 29 (*D. K. Duncan*). *Paratopotype,* ♀.

The species is named for the collector, Mr. Douglas K. Duncan, who added many species of insects to the Arizona list. The fly is closest to *Teucholabis (Teucholabis) lucida* Alexander, 1916, of eastern North America (as far west as the Ozarks, Missouri), differing in the larger size and in details of colora-

tion and venation, as the longer vein *Sc*. The still undiscovered male will undoubtedly provide additional specific characters.

*Teucholabis* (*Teucholabis*) *rubescens* Alexander, 1914.—New Mexico: Rio Ruidoso, White Mountains, 6,500 ft., July 25; hovering around the trunks of Mountain Cottonwood (*C. H. T. Townsend*); type. Arizona: Oak Creek Canyon, 5,180 ft., June 10, 1942.

**Gonomyia (Progonomyia) plumbea** sp. nov.—General coloration of thorax dark plumbeous gray, the praescutum with four brown stripes; pseudosutural foveae shiny black, very conspicuous; thoracic pleura without a yellow stripe, variegated only by a small obscure yellow area below the root of the halteres; knobs of halteres darkened; fore legs chiefly black, the remaining legs paler, the tips of the femora and tibiae narrowly darkened; wings subhyaline, stigma medium brown; *Sc* short, $Sc_1$ ending about opposite two-fifths the length of *Rs;* abdomen brownish black.

♀. Length, about 6.5 mm.; wing, 6 mm.

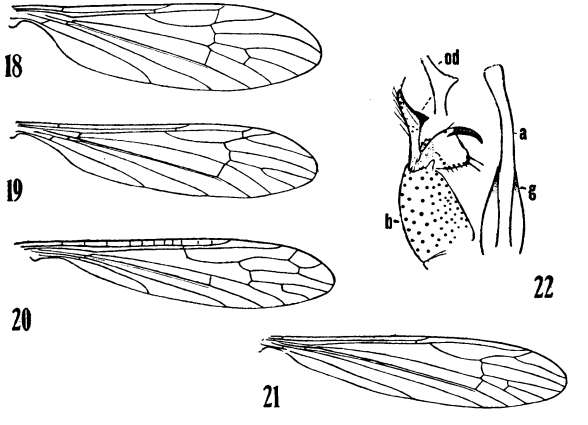


Fig. 18. *Teucholabis* (*Teucholabis*) *duncani* sp. nov.; venation.
Fig. 19. *Gonomyia* (*Progonomyia*) *plumbea* sp. nov.; venation.
Fig. 20. *Gonomyia* (*Euptilostena*) *polingi* sp. nov.; venation.
Fig. 21. *Gonomyia* (*Gonomyia*) *triformis* sp. nov.; venation.
Fig. 22. The same; male hypopygium.
(Symbols: *a*, aedeagus; *b*, basistyle; *g*, gonapophysis; *od*, outer dististyle.)

Rostrum grayish pruinose; palpi black. Antennae black throughout; flagellar segments subcylindrical, the outer ones more elongate-oval. Head gray.

Pronotum dark plumbeous gray; anterior pretergites and the restricted humeral region of praescutum obscure yellow. Mesonotum gray, the praescutum with four brown stripes, the intermediate pair separated by a more brownish gray vitta of nearly equal width; pseudosutural foveae shiny black, very conspicuous; tuberculate pits small and inconspicuous, near the extreme cephalic border of praescutum; posterior sclerites of notum dark plumbeous gray. Pleura

almost uniformly dark plumbeous gray, variegated by a vague obscure area below the halteres, involving the ventral pteropleurite and adjoining sclerites. Halteres with stem obscure yellow, knob darkened. Legs with the coxae plumbeous gray, the apices restrictedly more reddened; trochanters chestnut brown; fore legs chiefly brownish black, the femoral bases restrictedly more brightened; remaining legs paler brown, the tips of the femora and tibiae, and the outer tarsal segments more darkened. Wings (Fig. 19) subhyaline or with a very faint brownish tinge; stigma oval, medium brown; veins brown. Venation: *Sc* short, $Sc_1$ ending about opposite two-fifths the length of *Rs*, $Sc_2$ about opposite the basal sixth of this latter vein; $R_{3+4}$ short; *m-cu* at fork of *M*.

Abdomen brownish black, the pleural membrane more yellowed; genital shield more reddish brown. Ovipositor with valves, especially the cerci, horn-yellow.

*Holotype*, ♀, Santa Rita Mountains, Arizona, June 21, 1935 (*F. H. Parker*); Alexander Collection, through the kindness of Dr. A. L. Melander.

*Gonomyia* (*Progonomyia*) *plumbea* is readily distinguished from the described regional species of the subgenus by the almost uniform dark plumbeous gray coloration, polished black pseudosutural foveae, and in the details of venation, as the short *Sc* that ends before midlength of *Rs*.

**Gonomyia (Euptilostena) polingi** sp. nov.—General coloration dark, gray pruinose, variegated with yellow, including stripes on the thoracic pleura; basal flagellar segments black, with the tips narrowly pale; femora yellow, the tips narrowly brownish black; wings whitish hyaline, patterned with dark brown, including a series of about a dozen spots in cell *C;* a series of about ten supernumerary crossveins in cell *C; m-cu* more than three times its own length before the fork of *M*.

♀. Length, about 7 mm.; wing, 7-7.1 mm.

Rostrum and palpi black. Antennae with the scape black, narrowly reddened above; pedicel obscure brownish; basal flagellar segments black, the tips narrowly pale; outer flagellar segments uniformly black; flagellar segments elongate-oval to subcylindrical; longest verticils of the intermediate segments a trifle shorter than the segments. Head discolored, the front and anterior orbits narrowly reddened; posterior portion of head dark gray.

Pronotum long, black above, probably pruinose in fresh specimens, the sides yellow; pretergites light yellow. Mesonotal praescutum chiefly covered by three confluent black stripes, probably gray pruinose in fresh specimens; humeral region narrowly reddened; pseudosutural foveae black; posterior sclerites of notum black and presumably pruinose; scutellum extensively more reddened. Pleura black, pruinose, striped longitudinally with yellow, narrowly so on the propleura and dorsal sternopleurite, widened behind. Halteres with stem white, knob blackened. Legs with the coxae blackened basally, yellow at tips, the middle pair extensively so; trochanters obscure yellow; femora and tibiae yellow, the tips narrowly brownish black, conspicuous; tarsi passing through brown to brownish black. Wings (Fig. 20) whitish hyaline, with a conspicuous dark brown pattern arranged as follows: A costal series covering the supernumerary totalling about a dozen between *h* and the tip of $Sc_1$; one

or two further in cell *Sc* over the origin of *Rs;* larger dark spots include the stigma; origin of *Rs;* along the cord and fork of $M_{1+2}$; over the supernumerary crossvein in cell $R_4$; distal ends of outer radial cells; before outer end of vein *2nd A* in cell *1st A;* veins light brown, darker in the patterned areas. Venation: *Sc* long, $Sc_1$ ending about opposite five-sixth the length of *Rs;* a supernumerary crossvein in cell $R_4$ at near midlength of vein $R_4$; *m-cu* more than three times its length before the fork of *M;* a series of about ten supernumerary crossveins in cell *C* between *h* and the tip of $Sc_1$.

Abdomen brownish black, sparsely pruinose, the caudal borders of the intermediate segments narrowly yellow. Ovipositor with the valves reduced, the cerci small and fleshy, with setae almost to the obliquely truncated tips.

*Holotype,* ♀, Old Fort Davis, Davis Mountains, Texas, altitude 5,000 ft.; May 28, 1942 (*C. P. Alexander*). *Paratypes,* 1 ♀, Andreas Canyon, near Palm Springs, Riverside County, California, April 22, 1945 (*J. A. Comstock*); taken beneath icebox in house; ♀ ♀, Cuernavaca, Morelos, Mexico, on the shores of a clear mountain brook in dense woods, 1540 meters, April 21, 1930 (A. M. Dampf, No. 1629); ♀ ♀, Chilpancingo, Guerrero, Mexico, at light, in a barranca on shores of a rivulet, some portions of which have muddy bottoms, others with gravel, 1350 meters, December 16, 1929 (A. M. Dampf, No. 1522).

I name this interesting species for Mr. and Mrs. Otto C. Poling, who have contributed so materially to our knowledge of the insect fauna of the Davis Mountains. The only other New World species of *Euptilostena* Alexander is the Mexican *Gonomyia* (*Euptilostena*) *dampfiana* Alexander, which superficially resembles the present fly but is readily told by the lack of the supernumerary crossveins and accompanying dark markings in cell *C* of the wings. The subgenus had not been recorded hitherto from the Nearctic Region. The occurrence of abundant supernumeraries in cell *C* is of unusual interest in this genus. Other species in the subgenera *Idiocera* Dale and in *Euptilostena,* as the Palaearctic *Gonomyia* (*Idiocera*) *sexguttata* (Dale) and *G.* (*E.*) *reticulata* Alexander have dark marks or dashes in this cell but do not have the extra crossveins.

*Gonomyia* (*Idiocera*) *coloradica* Alexander, 1920.—Arizona: Oak Creek Canyon, 5180 ft., June 10-12, 1942, abundant along the stream; Santa Ritas, near Big Rock Camp, Madera Canyon, 5000 ft., June 8-9, 1942.

*Gonomyia* (*Lipophleps*) *cinerea* (Doane, 1900).—Old Fort Davis, Davis Mountains, Texas, 5000 ft., November 15, 1925 (*Poling*).

*Gonomyia* (*Lipophleps*) *helophila* Alexander, 1916.—Old Fort Davis, Davis Mountains, Texas, 5000 ft., November 11-15, 1925 (*Poling*).

*Gonomyia* (*Gonomyia*) *spinifer* Alexander, 1918.—Texas: Old Fort Davis, 5,000 ft., November 15, 1925 (*Poling*). Arizona: Oak Creek Canyon, 5,180 ft., June 10-12, 1942.

*Gonomyia* (*Gonomyia*) *filicauda* Alexander, 1916.—Taos Creek, New Mexico, 7,500 ft., July 27, 1934 (*Alexander*).

**Gonomyia (Gonomyia) triformis** sp. nov.—Allied to *poliocephala;* antennae black; mesonotum dark gray, the posterior border of scutellum vaguely

reddened; legs brownish black; wings relatively narrow, stigmal region faintly darkened; $Sc_1$ ending before origin of *Rs;* male hypopygium with the outer dististyle expanded on distal half into a flattened dusky triangular blade, the margin near the point slightly erose; aedeagus elongate, the subtending closely applied apophyses broad, their tips not produced into free spines.

♂. Length, about 5-6 mm.; wing, 5-6.5 mm.

Rostrum obscure brownish yellow; palpi black. Antennae relatively elongate, black; flagellar segments elongate, subfusiform, the verticils shorter than the segments. Head obscure yellow, vaguely patterned with darker.

Pronotum pale yellow, narrowly darkened medially. Mesonotum dark gray, the praescutum without clearly differentiated stripes; humeral region yellow; pseudosutural foveae conspicuous, blackened; posterior border of scutellum vaguely reddened. Pleura yellow, indistinctly patterned with darker, forming vague dorsal and ventral stripes. Halteres with stem yellow, knob infuscated. Legs with the coxae and trochanters yellow; remainder of legs brownish black, the femoral bases restrictedly brightened. Wings (Fig. 21) relatively narrow, grayish subhyaline; stigmal region very faintly darkened; veins brown. Costal fringe relatively long and conspicuous. Venation: *Sc* short, $Sc_1$ ending just before origin of *Rs,* $Sc_2$ some distance from its tip, $Sc_1$ alone about two-thirds *m-cu;* $R_{2+3+4}$ only moderately arched, about three-fourths as long as *Rs;* vein $R_4$ elongate, cell $R_3$ at margin correspondingly extensive; cell *1st* $M_2$ longer than vein $M_4$ beyond it; *m-cu* about one-third its length beyond the fork of *M.*

Abdomen dark brown, with pale incisures; hypopygium yellow. Male hypopygium (Fig. 22) with the outer dististyle, *od,* of moderate length, approximately equal to the inner dististyle; stem narrow, the apical half of mesal face expanded into a triangular dusky blade, the margin weakly erose; outer face of style with relatively long setae, especially the outermost. Inner dististyle with the outer darkened spine or blade extending beyond the tip of the style, on outer margin near base with a single strong seta; fasciculate setae only slightly modified. Aedeagus, *a,* elongate, the apex only feebly expanded, entire; subtending apophyses, *g,* equal to one another in size and shape, not produced into free spines at tip, being closely appressed to the aedeagus.

*Holotype,* ♂, Chiricahua Mountains, Arizona, 7,500 ft., June 6, 1942 (*C. P. Alexander*); swept from vegetation along small mountain stream. *Paratype,* ♂, Kaibab Plateau, Arizona, 8,000 ft., along small stream at the Kanabownits Spring, June 19, 1942 (*C. P. Alexander*).

The nearest relative of the present fly is *Gonomyia* (*Gonomyia*) *poliocephala* Alexander, 1924 (California to Colorado), which differs in the coloration of the head, broader wings with distinct venational details, and in the structure of the male hypopygium, especially of the dististyles and phallosome.

**Gnophomyia (Gnophomyia) apache** sp. nov.—Generally similar to *luctuosa,* differing especially in the structure of the male hypopygium, particularly the simple outer dististyle; gonapophysis with the apical point relatively short, directed mesad.

♂. Length, about 6.5 mm.; wing, 7 mm.

♀. Length, about 7 mm.; wing, 7-7.5 mm.

In general appearance, very much like *luctuosa* Osten Sacken, 1859, and confused with this latter species in collections.

Rostrum and palpi black. Antennae short in both sexes, black throughout; basal flagellar segments very short-oval, the outer segments smaller and a little more elongate. Head black; anterior vertex a little exceeding three times the diameter of scape.

Thorax almost uniformly dull black, very restrictedly pruinose. Halteres and legs uniformly black. Wings strongly blackened, the veins still darker. Venation: $R_2$ at or close to the fork of $R_{2+3+4}$; *m-cu* about one-third its length beyond the fork of $M$. The paratype male has only one wing preserved, this with abnormal venation, cell $M_2$ being open by the atrophy of the basal section of $M_3$.

Abdomen, including the genitalia of both sexes, black. Male hypopygium of the general type of *luctuosa;* basistyle produced caudad far beyond the origins of the dististyles, approximately to the tip of the outer style; apex of lobe of basistyle pale, flattened, obtuse. Outer dististyle a simple slender yellow blade, the basal half more expanded. Inner dististyle shorter, a flattened dark colored plate, its apex unequally bilobed. Gonapophysis with apical point relatively short, directed mesad. In *luctuosa,* the outer dististyle is bispinous, there being a smaller, more slender lateral spine that is a little less than one-half the apical point, the latter shorter and stouter than in the present fly. Gonapophysis at apex produced into a long needlelike point, these decussate across the median line. Aedeagus stouter, the apex more crook-shaped.

*Holotype,* ♂, Santa Rita Mountains, Arizona, altitude 7,000 ft. *Allotype,* ♀, Huachuca Mountains, Arizona (U.S.N.M., ex Brooklyn Mus. Coll. 1929, No. 107). *Paratopotype,* 1 broken ♂; *paratypes,* 1♂, 1 ♀, with the allotype.

*Cryptolabis* (*Cryptolabis*) *minutula* Alexander, 1927.—Old Fort Davis, Texas, along Limpia Creek, altitude 5,000 ft., at light, November 15, 1925 (*Poling*); types; 4,000 ft., May 29, 1942 (*Alexander*).

**Cryptolabis (Cryptolabis) sica** sp. nov.—Size medium (wing, male, about 4 mm.); general coloration of thorax dark brown or brownish black, variegated with yellow, including a central line on scutellum and major areas on postnotum and pleura; femora yellow, the tips brownish black; wings grayish subhyaline, the prearcular and costal fields more yellowed; male hypopygium with the dististyle a flattened blade, terminating in a simple acute beak, before apex of outer margin bearing a narrow acute blade; aedeagus relatively short and stout.

♂. Length, about 3.5-3.6 mm.; wing, 3.8-4 mm.

♀. Length, about 4 mm.; wing, 4.5 mm.

Rostrum brownish gray; palpi dark brown. Antennae short, dark brown; in the type, basal two flagellar segments more or less fused into a single major element, in other specimens with all segments distinct; segments oval, with long outspreading verticils. Head dark brown; vertex elevated, with a yellow spot on either side adjoining eyes; head conspicuously hairy.

Pronotum, pretergites and lateral praescutal border pale yellow. Mesonotum dark brown or brownish black, sparsely pruinose, the pattern of praescutum

forming a discal shield; central portion of scutum and scutellum obscure yellow, the latter especially distinct; postnotum dark, with a common yellow area on anterolateral angle of mediotergite and adjoining portion of pleurotergite. Pleura chiefly dark brown, sparsely pruinose, variegated with pale yellow, including the dorsopleural membrane, an area at and before wing-root, propleura and dorsal sternopleurite, producing a conspicuous checkered appearance. Halteres with stem dusky, base and knob more yellowed. Legs with fore and middle coxae yellow, the posterior pair darker; trochanters yellow; femora obscure yellow basally, passing into brown, the tips narrowly brownish black; tibiae and basitarsi pale brown, the tips darker, the outer tarsal segments blackened. Wings (Fig. 23) grayish subhyaline, the prearcular and costal fields more yellowed; stigma barely indicated; a small axillary darkening; veins brown, yellow in the prearcular field. Cells beyond and slightly before cord (male) with abundant macrotrichia, involving approximately the distal half of wing; in female, restricted about to outer third of wing. Venation: *Rs* oblique, slightly extended, moderately convex, cell $R_1$ triangular; *m-cu* on $M_4$ about one-third to one-fourth its length beyond origin, in cases at or close to the fork of $M_{3+4}$.

Abdomen, including hypopygium, brownish black to black. Male hypopygium (Fig. 24) with the dististyle, *d*, a flattened blade, terminating in a simple acute beak, the outer margin before apex with an erect flattened spinous blade; surface of style with numerous long pale setae. Aedeagus, *a*, relatively short and stout, straight, the apex suddenly narrowed into a slender point.

*Holotype*, ♂, Oak Creek Canyon, Arizona, altitude 5,180 ft., June 10, 1942 (*C. P. Alexander*). *Allotopotype*, ♀. *Paratopotypes*, numerous ♂ ♀, June 10-12, 1942; *paratypes*, numerous ♂ ♀, Weeping Rock, Zion National Park, 4,420-4,450 ft., June 21-22, 1942 (*M. M. Alexander*).

*Cryptolabis* (*Cryptolabis*) *sica* is readily told by the structure of the male hypopygium, especially the shape and armature of the dististyle. The most similar species is *Cryptolabis* (*C.*) *pachyphallus* Alexander, 1943, with an extensive range in the Rocky Mountain region.

*Rhabdomastix* (*Sacandaga*) *californiensis* Alexander, 1921.—One female, Pinal Mountains, Arizona, June 11, 1935 (Parker Lot 179); in Melander Collection. I can see no difference from the type (Monterey County, California) excepting the uniformly darkened scutellum.

*Rhabdomastix* (*Sacandaga*) *leonardi* Alexander, 1930.—Taos Creek, New Mexico, 7,500 ft., July 27, 1934 (*M. M. Alexander*).

*Ormosia* (*Ormosia*) *cockerelli* (Coquillett, 1901).—New Mexico: Summit of the range between the Pecos and Sapello Rivers, altitude about 11,000 ft., Hudsonian zone, August 1-4, 1900 (*Cockerell*); type, female. Near the Colorado border at Cumbres Pass, 9,500 ft., July 28, 1934.

*Ormosia* (*Ormosia*) *onerosa* Alexander, 1943.—Arizona: North rim of the Grand Canyon, Kaibab Plateau, at the Kanabownits Spring, 8,000 ft., June 19, 1942.

*Erioptera* (*Empedomorpha*) *empedoides* (Alexander, 1916).—A very characteristic species of the arid and semiarid sections of the midwestern and

southwestern United States. The general range of the fly is indicated by the following distribution:

*South Dakota:* Ardmore, Fall River County, August 10, 1915 (*E. G. Holt*); U. S. Biological Survey, part of the type material.

*Kansas:* Cimarron, Gray County, July 13, 1917 (*C. P. Alexander*); Wallace County, altitude 3,440 ft., (*F. X. Williams*); Kansas University.

*Texas:* Brownwood, Brown County, June 17, 1919 (*W. A. Hoffman*); Brownsville, Cameron County, May 3, 1904 (*H. S. Barber*); U. S. N. M.; Big Bend Park, Brewster County, July 29, 1937 (*Rollin H. Baker*).

*New Mexico:* Jemez Springs, Sandoval County, 6,400 ft., August 8, 1915 (*John Woodgate*); type, Alexander Collection; Lordsburg, Grant County, July 13, 1917, at light (*J. Bequaert*).

*Arizona:* San Bernardino Ranch, near Douglas, Cochise County, 3,750 ft., August (*F. H. Snow*); Kansas University.

*Utah:* Rockville, Washington County, along the margins of the Virgin River, May 5, 1943 (*Geo. F. Knowlton*).

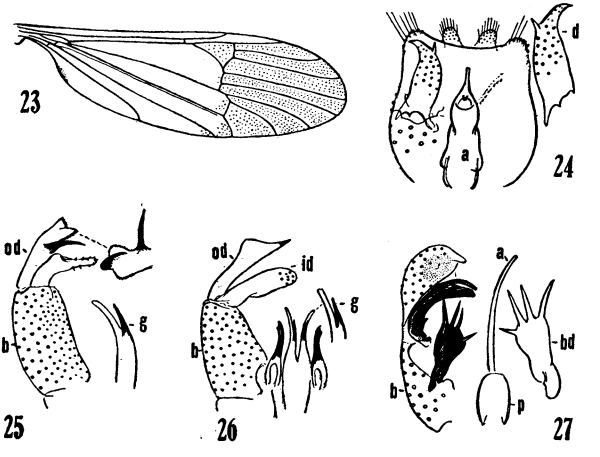


Fig. 23. *Cryptolabis* (*Cryptolabis*) *sica* sp. nov.; venation.

Fig. 24. The same; male hypopygium.

Fig. 25. *Erioptera* (*Empedomorpha*) *empedoides* (Alexander); male hypopygium.

Fig. 26. *Erioptera* (*Empedomorpha*) *apacheana* Alexander; male hypopygium.

Fig. 27. *Molophilus* (*Molophilus*) *arizonicus* sp. nov.; male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *bd*, basal dististyle; *d*, dististyle; *g*, gonapophysis; *id*, inner dististyle; *od*, outer dististyle; *p*, phallosome.)

The only specimens that I ever collected personally were found along the banks of the Arkansas River, near Cimarron, where they occurred in company with tiger-beetles and other sun-loving insects, all running about actively over the hot unshaded sand.

Just south of the Rio Grande there occurs a second and only other known species of the subgenus, *E.* (*E.*) *apacheana* Alexander, 1946, taken at Granja

Rodriguez, Nuevo Leon, Mexico, altitude 195 meters, along the shore of the Rio Salado; collected at light, June 5-6, 1931 (*A. M. Dampf*, M. F. Nos. 2029, 2047). The two species are most readily separated by the structure of the male hypopygia.

*E.* (*E.*) *empedoides* (Fig. 25). Outer dististyle, *od*, at apex blackened and irregularly truncate, the margin microscopically toothed or crenulate, near base of the blackened portion bearing a conspicuous blackened spine or narrow blade. Inner dististyle, *id*, broad on basal half, thence narrowed, the tip acute.

*E.* (*E.*) *apacheana* (Fig. 26). Outer dististyle, *od*, a simple flattened blade, dilated just before the acutely pointed apex, without armature. Inner dististyle, *id*, subequal in length, a little expanded on outer portion, the tip obtuse.

In both species, the inner gonapophyses, *g*, appear as slender yellow rods, each bearing a conspicuous blackened lateral spine.

Some of the records for *empedoides* as given above are based on the female sex and it is possible that the Mexican species may be confused in such material, since it does not seem probable that each species will be found to be restricted to its location north or south of the Rio Grande.

The two species are very striking in the male sex in the greatly dilated and enlarged hairy stigma of the wings. In the female, these latter are normal and have the venation of the radial field undistorted. I am now placing *Empedomorpha* Alexander, 1916, as a subgenus of *Erioptera* Meigen, 1803, rather than recognizing it as a valid genus as heretofore. It seems fairly obvious that the group is allied to *Trimicra* Osten Sacken, 1861, which is now assigned only subgeneric rank. Both subgenera include species that show a surprising range in size of individuals, especially the males, such ranging from very small to unusually large individuals, even though collected at the same place and date.

*Erioptera* (*Trimicra*) *pilipes* (Fabricius, 1787), var.—Eloy, Arizona, March 14, 1945 (*G. F. Knowlton*).

*Erioptera* (*Symplecta*) *cana* (Walker, 1848).—New Mexico: Taos Creek, 7,500 ft., July 27, 1934; Frijoles Canyon, June 19, 1942 (*Sperry*); Sierra Blanca, near the Rio Ruidoso, 7,500 ft., May 31, 1942; Mescalero Apache Indian Reservation, 5,000 ft., June 1, 1942. Arizona: Chiricahua Mountains, 6,000 ft., June 4, 1942; Watson Lake, north of Prescott, May 11, 1945 (*G. F. Knowlton*); Clarkdale, near seepage from abandoned swimming pool, May 6, 1945 (*G. F. Knowlton*).

*Erioptera* (*Ilisia*) *dorothea* Alexander, 1914.—New Mexico: South Fork of Eagle Creek, White Mountains, 8,000 ft., August 16 (*C. H. T. Townsend*). The male hypopygium has been described and figured in the preceding part under this title (Amer. Midl. Nat. 33:432-433, fig. 40; 1945).

*Erioptera* (*Ilisia*) *lucia* Alexander, 1914.—New Mexico: Beulah, 8,000 ft., August (*Cockerell*); Taos Creek, 7,500 ft., July 27, 1934.

*Erioptera* (*Ilisia*) *microcellula* Alexander, 1914.—Taos Creek, New Mexico, 7,500 ft., July 27, 1934.

*Erioptera* (*Ilisia*) *neomexicana* Alexander, 1929.—Jemez Springs, New Mexico, 6,400 ft., June (*John Woodgate*); type.

*Erioptera* (*Erioptera*) *septemtrionis* Osten Sacken, 1859.—Sapello Canyon, New Mexico, 8,000 ft., August 9-26, 1901 (*Skinner*).

*Erioptera* (*Mesocyphona*) *caloptera* (Say, 1823, as *caliptera*).—Texas: Davis Mountain, along Limpia Creek, 4,000 ft., May 29, 1942. Arizona: Cottonwood, May 6, 1945 (*G. F. Knowlton*); Clarkdale, May 6, 1945 (*G. F. Knowlton*).

*Erioptera* (*Mesocyphona*) *eiseni* Alexander, 1913.—New Mexico, La Cueva, Organ Mountains, Donna Ana County, 5,300 ft., September 1 (*C. H. T. Townsend*). Arizona: Chiricahuas, 6,000 ft., June 4, 1942; Santa Ritas, Madera Canyon, 5,000 ft., June 8, 1942.

*Erioptera* (*Mesocyphona*) *distincta* Alexander, 1912.—New Mexico: Highrolls, Sacramento Mountains, May 31, June 2-10, 1902; Mescalero Apache Indian Reservation, Sacramento Mountains, 5,000 ft., June 1, 1942; Sierra Blanca, 7,500-8,000 ft., May 31, 1942; Taos Creek, 7,500 ft., July 27, 1934 (*M. M. Alexander*). Arizona: Grand Canyon, Indian Gardens, along the Bright Angel Trail, 3,800 ft., June 17, 1942 (*M. M. Alexander*).

*Erioptera* (*Mesocyphona*) *rubia* Alexander, 1914.—Chiricahua Mountains, Cochise County, Arizona, June 24 (*H. G. Hubbard*); type.

*Erioptera* (*Empeda*) *cinereipleura* Alexander, 1917.—New Mexico: Near the Cumbres Pass, on the Colorado border, 9,500 ft., July 28, 1934.

**Molophilus (Molophilus) arizonicus** sp. nov.—Belongs to the *plagiatus* group; size large (wing, male, 5.5 mm. or more); general coloration of thorax brownish black, the surface with a sparse bloom; antennae short; halteres yellow; femora and tibiae obscure brownish yellow, a little darker at tips; wings with a faint dusky tinge, slightly more clouded on the anterior and posterior cords; male hypopygium with the basal dististyle a short compact blackened structure, terminating in four powerful spines; phallosomic plate glabrous.

♂. Length, about 4.5-5.5 mm.; wing, 5.5-7 mm.; antenna, about 0.9-1.1 mm.

♀. Length, about 6 mm.; wing, 7 mm.

Rostrum and palpi brownish black. Antennae short, black throughout; flagellar segments oval; verticils about one-half longer than the segments. Head gray.

Pronotum brownish black. Mesonotum brownish black, the surface a little obscured by a sparse bloom; humeral region of praescutum restrictedly obscure yellow; pretergites light yellow. Pleura brownish black, sparsely pruinose. Halteres uniformly light yellow. Legs with the coxae brownish testaceous; trochanters testaceous yellow; femora and tibiae obscure brownish yellow, a little darker at the tips; tarsi passing into black. Wings with a faint dusky tinge, the prearcular field light yellow; a concentration of dark setae along cord to produce a slightly spotted appearance, the membrane at these places slightly infuscated; veins and macrotrichia darker. Venation: $R_2$ lying a short distance beyond the level of *r-m;* petiole of cell $M_3$ nearly twice *m-cu;* vein *2nd A* gently sinuous, ending about opposite one-third to one-fourth the length of petiole of cell $M_3$.

Abdomen, including hypopygium, black. Male hypopygium (Fig. 27) with the beak of the ventral lobe of basistyle, *b*, a flattened dark-colored blade, stouter in the type (as shown) than in some of the paratypes; face of ventral lobe back from the beak with a large densely setuliferous area. Outer dististyle with the two arms unequal, the outer one slender, gently curved, its tip obtuse; inner arm much broader, more or less scoop-shaped. Basal dististyle, *bd*, short and compact, usually terminating in four powerful spines, these differing slightly in their relative length and thickness and are slightly variable in different specimens. Phallosome, *p*, a suboval glabrous plate, the apex truncate or nearly so.

*Holotype*, ♂, Chiricahua Mountains, Arizona, in a small ravine below Rustler's Park, altitude 7,500 ft., June 6, 1942 (*C. P. Alexander*). *Allotopotype*, ♀. *Paratopotypes*, 6 ♂ ♀, 7,000-7,500 ft., June 5-6, 1942; *paratypes*, several ♂ ♀, Oak Creek Canyon, Arizona, 5,180-5,200 ft., June 12, 1942 (*C. P. & M. M. Alexander*).

The only other described regional member of the *plagiatus* group is *Molophilus* (*Molophilus*) *ursus* Alexander, 1918, which has the male hypopygium entirely different, particularly the basal dististyle. The latter structure in the present fly somewhat suggests the shape and armature of a bur, the number of spinous points being slightly variable, especially as to relative length and thickness.

*Molophilus* (*Molophilus*) *colonus* Bergroth, 1888.—New Mexico: Sapello Canyon, New Mexico, 8,000 ft., August 9-26, 1901 (*Skinner*); Mescalero Apache Indian Reservation, Sacramento Mountains, 5,000 ft., June 1, 1942. Arizona: Oak Creek Canyon, 5,180 ft., June 10-12, 1942.

*Molophilus* (*Molophilus*) *ursus* Alexander, 1918.—Jemez Springs, New Mexico, 6,400 ft., August 21, 1916 (*John Woodgate*); types.