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

Part V. Tipuloidea of the Grand Teton National Park and Teton National Forest, Wyoming

Charles P. Alexander

In continuation of the series of papers considering the rich crane-fly fauna of the western North American states and provinces, the present report concerns one of the most beautiful and striking sections of the entire United States, the Grand Teton National Park and vicinity. As was done in previous instalments, illustrations of new and little-known species are provided since it is certain that such aid materially in the correct determination of the various forms. The recent publication of the "Crane-flies of Connecticut" [2] has made available keys and figures for the species now known from northeastern North America. With this as a basis it is intended in the present paper and succeeding reports under this title to figure such species that have not been so illustrated.

General Account

The Grand Teton National Park, embracing the more striking peaks of the Teton Range, northwestern Wyoming, has an area of approximately 150 square miles or 96,000 acres. The park has a length of 27 miles, with a width varying from 3 to 9 miles. Its northern extremity lies approximately 11 miles south of the southern boundary of the Yellowstone National Park (see Part IV of this series of papers; Alexander 1943). Despite the close proximity of the two parks, a marked difference in the crane-flies was found that cannot be attributed to seasonal collecting, since the major series of flies available for study from both areas was taken at approximately the same time of year, representing the late spring and early summer fauna. The apparent reason for the differences lies in certain very distinct ecological conditions existing in the two areas (compare Stations 1 and 2 of present paper). As indicated by the present title, I am including not only the species of crane-flies known from the National Park but also from certain selected stations

1 The preceding part under this general title was published in the American Midland Naturalist **30**:718-764; 1943.

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.

2 Alexander, Charles P. The Diptera or true flies of Connecticut. Tanyderidae, Ptychopteridae, Trichoceridae, Anisopodidae, Tipulidae. Conn. State Geol. and Nat. Hist. Surv. Bull. **64**:183-486, index 501-509; figs. 18-55 (with 389 individual illustrations); 1942 (published in 1943).

in the adjoining Teton National Forest, a vast area bordering the Park on the east and extending northward to the limits of the Yellowstone National Park and the Shoshone National Forest. Very recently a further noteworthy addition to the national holdings in the Grand Teton section was made by the setting aside of the Jackson Hole National Monument, established by order of President Franklin D. Roosevelt in the spring of 1943, including nearly 220,000 acres of land to the south and southeast of the Park in the Jackson Hole country.

As was indicated in the preceding part, the first white man to see the Tetons was John Colter, who, in the winter of 1807-1808, passed through the Jackson Hole at the foot of the Teton Range. In the autumn of 1811, the Astorians, under the leadership of Mr. Wilson Price Hunt, crossed the range through the Teton Pass. Washington Irving, in "Astoria", has described this in detail. Two short paragraphs may be quoted from this classic. September 15, 1811. "In the course of the day they came to a height that commanded an almost boundless prospect. Here one of the guides paused, and, after considering the vast landscape attentively, pointed to three mountain peaks glistening with snow, which rose, he said, above a fork of the Columbia River. * * * These remarkable peaks are known to some travelers as the Tetons." And still later in September. "An important point in their arduous journey had been attained, a few miles from their camp rose the three vast snowy peaks called the Tetons."

Atwood (1940) speaks of the Grand Teton National Park as being "one of the scenic wonderlands of the world." To anyone visiting the area in mid-June, when the mountains are still chiefly snowclad, the above characterization does not seem exaggerated. In its essentials, the National Park consists of the Teton Range, with its series of giant peaks separated by deep canyons, at the foot of each of the latter with a beautiful lake. From north to south, these lakes draining into Cottonwood Creek and thence into the Snake River, include Leigh (altitude 6,870 feet); String or Beaver Dick (6,867 feet); Jenny (6,779 feet) and Bradley (7,061 feet). Still farther to the south at the foot of Death Canyon and draining directly into the Snake is one of the most beautiful of all the lakes, Phelps (6,615 feet). The mountains that concern us chiefly are, from north to south, Mount Moran (12,100 feet), separated from the St. John Range by Indian Paintbrush Canyon and Leigh Canyon; the various peaks of the St. John Range between Leigh Creek on the north and Cascade Creek on the south; the great mass of the Teton Range proper, with the various giants, Owen, Grand Teton (13,766 feet), Teewinot, Middle Teton, South Teton and Nez-Perce, with others. Still farther to the south the peaks become lower but are still impressive and very beautiful. The southern end of the range is marked by the Teton Pass (8,429 feet), permitting travel into Idaho.

From the eastern or Jackson Hole side, the Teton Range presents an unusually precipitous front, rising abruptly from the floor of the valley (about 6,500 feet) to the maximum height of more than 13,760 feet. Glaciers of the Ice Age have played the chief role in sculpturing the valleys and altering the floor of the Hole. Each of the various main canyons contained its own local

glacier, all emptying onto the floor of Jackson Hole. The signs of the last stages of the glacier are to be seen everywhere in the moraines, outwash plains, lakes and canyons.

The various canyons permit easiest access into the heart of the range. Those most used by our party in 1941 and 1942 were Indian Paintbrush Canyon, Cascade Canyon and Death Canyon, the latter the most southerly. Cascade Canyon, between the St. John peaks and the three Teton giants was especially favorable and accessible. Cascade Creek, often a roaring mountain torrent from melting snow, flows down the canyon and may be followed for several miles along a well-maintained park trail. Near the head of the north fork of Cascade Creek, one reaches a beautiful mountain tarn, Lake Solitude (9,024 feet), close to the extreme western boundary of the park. Shortly before it flows into Jenny Lake, Cascade Creek forms one of the most beautiful falls in the region, Hidden Falls, where numerous crane-flies were taken, as discussed later. The Indian Paintbrush and Death Canyon trails were similarly followed for several miles and excellent collecting found, particularly at middle altitudes.

Life Zones.—Of the seven life zones or faunal areas recognized by Merriam and his successors, four are to be found within the geographical limits considered in this report.

Transition (Foothills). The valley of the upper Snake River in the Jackson Hole country, between the towns of Moran and Jackson. This includes the floor of the "Hole" to an altitude of about 6,700 feet. This is noteworthy as being one of the chief winter reserves of the American elk in this region. Station No. 1 (Arizona Creek) is definitely in this zone; Station No. 2 (Moran bog), while lying within the limits of the Transition shows definite features of the next zone.

Canadian (Montane). Much of the country surrounding the foot of the Teton Range, including the various lakes as discussed before; thence up the lower mountain slopes and canyons to the upper limits of large tree growth, or approximately 8,000—9,000 feet, dependent on exposure. Lake Solitude (9,024 feet) and Twogwotee Pass (9,650 feet) show some features of the highest Canadian, yet appear to fall in the succeeding zone. Virtually all collections of crane-flies made by the author and colleagues in 1941 and 1942 are from the Canadian zone.

Hudsonian (Subalpine). The relatively narrow belt of scrubby tree growth above the Canadian zone and below the limits of extreme timberline. As mentioned, Lake Solitude and Twogwotee Pass seem to pertain to this zone.

Arctic-Alpine (Alpine). The high mountain country above extreme timber line on the highest peaks and ridges. Because of the unusual number of major mountain peaks in the Teton Range, a considerable proportion of the park lies within this zone.

(References to life zones of the Tetons: Bailey, 1930: 9-15, colored map showing the life zones; Cary, 1917, colored map; best sources for this region.)

The more recent classification of North America into biotic provinces (Dice, 1943) places all of northwestern Wyoming in the Montanian Province, which here attains its southern limits, thence extending far to the northwest to include the western third of Montana, northern half of Idaho, much of the southern half of British Columbia, together with the adjoining portions of Alberta, and a comparatively narrow arm extending westward in northern Washington. The distribution of Tipulidae confirms that this arrangement of states and provinces is a natural one.

The Fenneman (1931) classification of the United States into physical divisions places the Grand Teton region in the Middle Rocky Mountain Province of the Rocky Mountain System. Mulford's division of the country on the basis of plant-growth regions (Van Dersal, 1938: 16-27, map) places all of northwestern Wyoming in the Northern Rocky Mountain Region.

All streams within the Park limits eventually drain into the Snake River, a chief tributary of the Columbia. All collections were made to the west of the Continental Divide.

Collecting Stations.—Although collections of crane-flies were made in many scattered places within the area under consideration, a few localities proved to be of such importance that they were made the basis of special investigation.

The chief collections available for this study were those made in 1941 by the author and Mrs. Alexander, with the appreciated co-operation of Mr. and Mrs. Walter H. Harrison, of Amherst, Massachusetts, our companions on many trips to various sections of the United States and Canada. These collections were made between the dates of July 1st and 15th, representing the late spring and early summer fauna. In 1942, Mrs. Alexander and I again camped in the Park and collected between the dates of July 1st and 10th. As indicated in an earlier paper, this second trip was a great disappointment in that I suffered a serious foot injury on July 1st, this necessitating hospital treatment in Jackson and restricting possible collecting trips to a very few where transportation by car was possible and but little walking or hobbling was required in order to secure at least a few specimens (Station 1, Arizona Creek; Station 3, Hidden Falls; Station 6, Twogwotee Pass: this last proved to be of exceptional interest and added several species of these flies to those previously known from the area). Besides the above lots of material, totalling some thousands of specimens, only one further major series from the Teton Area has been available to me. This included several specimens taken by Mr. and Mrs. John L. Sperry, of Riverside, California, taken chiefly along Pilgrim Creek, near Moran, and in the Indian Paintbrush Canyon, in the Park proper. Many of these latter specimens were captured at a date later than any indicated above and represent the late summer or early autumn fauna. Among these late season species, especially, were found various additions to the present list.

The base stations established by us in 1941 and 1942 are as follows:

1. Arizona Creek; altitude 6,790 feet, July 1, 2, 8, and 15, 1941; July 4, 1942. Arizona Creek rises on Wildcat Peak in the Teton National Forest, and

flows southwest into Jackson Lake. At the point where Route 89 (287) crosses the creek unusually rich collecting was found. The country is definitely in the Transition lifezone, which probably accounts for the fact that many of the species of Tipulidae found here were different from those of the Canadian or Hudsonian zones in either the Yellowstone or Grand Teton National Parks. The sparse woody cover along the creek and nearby consists especially of Engelmann spruce, *Picea engelmannii* (Parry) Engelm., and alpine fir, *Abies lasiocarpa* (Hook.) Nutt., with mountain alder, *Alnus tenuifolia* Nutt., species of willow, *Salix* sp., and bog birch, *Betula glandulosa* Michx.; further growths of *Shepherdia, Cornus stolonifera* Michx., and *Lonicera involucrata* (Richards) Banks. Most of the Tipulidae were swept from the rank herbage consisting primarily of *Equisetum arvense* L., *E. hiemale* L., *Smilacina stellata* (L.) Desf., *Actaea arguta* Nutt., *Heracleum lanatum* Michx., *Pedicularis groenlandica* Retz., *Castilleja* sp. (red flowered), and *Rudbeckia occidentalis* Nutt. Some of the more characteristic Tipulidae of this station include *Dicranoptycha quadrivittata* Alexander, *Dicranota (Dicranota) montana* Alexander, *Limnophila (Elaeophila) aleator* sp. nov., *Hexatoma (Eriocera) velveta* (Doane), *Gonomyia (Gonomyia) aciculifera* Alexander, *Rhabdomastix (Sacandaga) neolurida* Alexander, *Erioptera (Psiloconopa) gaspicola* (Alexander), *E. (P.) shoshone* sp. nov., *E. (Ilisia) bispinigera* Alexander, *E. (I.) manitobensis* Alexander, *E. (I.) zukeli* Alexander, *Ormosia megarhabda* Alexander, *O. tetonica* sp. nov., *Molophilus (Molophilus) harrisoni* sp. nov.; *M. (M.) perflaveolus* Alexander. The above list provides an idea of the extreme richness of this particular station. Labelled "Arizona Creek."

2. Moran. Teton National Forest; a large bog, 2.4 miles north of the village of Moran; altitude 6,800 feet, July 2 and 5, 1941. Around the bog margin numerous lodgepole pine, *Pinus murrayana* Balf., with fewer alpine fir and much aspen, *Populus tremuloides* Michx. On the hummocks of the bog proper, extensive thickets of willow, the dominant shrub. The herbage included extensive beds of *Equisetum arvense* between the willow thickets; *Limnorchis borealis* (Cham.) Rydb., *L. viridiflora* (Cham.) Rydb., *Camassia esculenta* Lindl., *Geranium Richardsonii* F. & M., *Mimulus Langsdorfii* Sims., and *Pedicularis groenlandica,* the latter in the very wet places. Some of the more interesting crane-flies included *Tipula sulphurea jacksonensis* subsp. nov.; *Dicranota (Polyangaeus) megalops* sp. nov.; *Limnophila (Phylidorea) platyphallus* Alexander. Labelled "Moran."

3. Hidden Falls, Cascade Creek, Grand Teton National Park; altitude 6,900-7,000 feet, July 3, 4, 1941; July 8, 1942. Collections under this heading include especially those made on shaded earthen banks along the trail below the falls. These banks were shaded by alpine fir, Greene Mountain Ash, *Sorbus scopulina* Greene; *Rubus parviflorus* Nutt.; *Acer glabrum* Torrey; species of *Ribes,* as *R. lacustre* (Pers.) Poir., and *R. parvulum* (Gray) Rydb., and other low shrubs. On the moist banks beneath this shade occurred a rank growth of liverworts, including *Marchantia,* and various mosses. In this habitat occurred *Ornithodes harrimani* Coq., *Dicranota (Polyangaeus) subapterogyne* Alex., *Archilimnophila subunica* (Alexander) and others. Also

near the falls occurred various low cliffs and rock outcroppings, on the dripping faces and slopes of which occurred a sparse but characteristic lithophytic association. Some of the characteristic Tipulidae of this habitat included *Limonia (Dicranomyia) citrina* (Doane), *Elliptera astigmatica* Alexander, and *Phyllolabis lagganensis* Alexander. Labelled "Hidden Falls."

4. Cascade Canyon trail to Lake Solitude; boggy area at 8,200 feet, July 9, 1941. An extensive oxylophytic area on the mountain side, with several streams and cold springs. The tree growth included scattered low trees of alpine fir and whitebark pine, *Pinus albicaulis* Engelm. Shrubs scattered about included *Salix* sp., dominant; *Betula glandulosa; Spiraea densiflora* Nutt., and three very characteristic heaths, *Kalmia polifolia* Wang, *Phyllodoce empetriformis* (Smith) Don., and *Menziezia ferruginea* Smith. In the streamlets of the boggy areas, various herbs as *Limnorchis borealis, L. viridiflora, Camassia esculenta, Mitella pentandra* Hook., and *Saxifraga arguta* Don. Characteristic crane-flies included *Prionocera primoveris* Alexander, *Tipula (Oreomyza) absaroka* Alexander, *Erioptera (Ilisia) rainieria* Alexander, and others. It should be observed that there is a marked resemblance between this station and the Emerald Pool Station, Yellowstone (Alexander, 1943: 721-722); there the dominant heath was a *Ledum* while here the latter was replaced by the three genera listed above. Labelled "Cascade Trail."

5. Jenny and Leigh Lakes; altitude 6,780-6,870 feet; July 3, 4, 6, 10, 12, 1941; Jenny Lake partly repeated in 1942. Collections made along small mountain streams flowing into these lakes. Approximately a half dozen such streams flow down the eastern slopes of the St. John Range into the west side of Jenny Lake; several other similar streams flow from the foothills of Rockchuck Peak at the northern end of the St. John Range northward into the western arm of Leigh Lake. Some of the streams are presumably temporary, fed by the melting snows from the slopes above, but others are unquestionably permanent. The largest of these is Cascade Creek, described under Station 3. In such places as the above, the evergreen forest cover is more boreal in aspect, kinds and number than on the opposite shore of Jenny Lake, the lodgepole pine being replaced chiefly by alpine fir, Engelmann spruce and whitebark pine. Characteristic shrubs include *Alnus tenuifolia, Ribes lacustre, Sorbus scopulina, Rubus parviflorus,* and *Acer glabrum.* Characteristic herbs of the area are *Equisetum arvense, Streptopus amplexifolius* (L) DC, *Mitella pentandra, Saxifraga arguta* and *Heracleum lanatum.* Some of the more noteworthy Tipulidae of this habitat were *Tipula (Bellardina) jepsoni* sp. nov., *Pedicia (Tricyphona) degenerata* (Alexander), *Dicranota (Dicranota) tetonica* sp. nov., *Ula paupera* Osten Sacken, *Austrolimnophila badia* (Doane), *Limnophila tetonica* sp. nov., *Gonomyia (Idiocera) shannoni* Alexander, *Erioptera (Empeda) tristimonia* Alexander, *Erioptera (Psiloconopa) aperta* (Coquillett), and various species of *Ormosia,* as *O. albertensis* Alexander, *O. dedita* Alexander and *O. hallahani* Alexander. Labelled "Jenny Lake, Leigh Lake."

6. Twogwotee Pass, Teton National Forest; altitude 9,650 feet; July 9, 1942. This single day's collecting provided the best high-altitude material

found in the area. Close to the summit of the pass on this date, numerous masses of snow and ice persisted and conditions were very definitely those of early spring. A great similarity was noted between this station and the one at a slightly lower altitude and earlier date reported at Sylvan Lake, Yellowstone, altitude 8,000 feet, June 21, 1941, as previously described (Alexander, 1943: 720). At the present station, *Caltha rotundifolia* (Huth.) Greene, was in full bloom and many were in full flower while actually protruding through masses of snow; also in full flower were *Trollius albiflorus* (Gray) Rydb., and *Ranunculus eximius* Greene. The forest cover consisted principally of alpine fir and Engelmann spruce, with some limber pine, *Pinus flexilis* James. Great thickets of willow and adjoining wet areas produced many crane-flies. Other excellent collecting was found by sweeping along the margins of small mountain streams close to the pass. Some of the more noteworthy Tipulidae of this place and date included *Tipula (Yamatotipula) spernax* Osten Sacken, *T. (Arctotipula) twogwoteeana* sp. nov., *T. (Oreomyza) absaroka* Alexander, *T. (O.) pseudotruncorum* Alexander, *Ornithodes harrimani* Coquillett, *Molophilus rostriferus* Alexander, and various species of *Ormosia,* as *O. absaroka* Alexander and *O. paradisea* Alexander. It seems certain that this particular station will well repay further collecting at a later seasonal date. A very few additional specimens from here were taken by Mr. and Mrs. Sperry, and by Professor G. F. Knowlton and Mr. H. F. Thornley, the last on September 13, 1941. Labelled "Twogwotee Pass."

I wish to express my deepest thanks to Mrs. Alexander, and to Mr. and Mrs. Harrison and Mr. and Mrs. Sperry, for continued aid in collecting these rich materials in the family. Further acknowledgements of kindly aid and advice are extended to the Park Naturalist, Mr. Carl E. Jepson, and the Ranger Naturalist, Mr. Willis T. Smith, of Ogden, Utah. No one could be more kindly and efficient than these gentlemen and their friendly co-operation is gratefully acknowledged.

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Systematic Account

PTYCHOPTERIDAE

Ptychoptera lenis coloradensis Alexander, 1937.—Twogwotee Pass, Station 6; 9,650 ft., July 9, 1942.

Ptychoptera pendula Alexander, 1937.—Arizona Creek, Station 1; 6,790 ft., July 1-5, 1941; July 4, 1942; Moran bog, Station 2, 6,800 ft., July 5, 1941.

Bittacomorpha clavipes (Fabricius, 1781).—Pilgrim Creek, near Moran, 6,800 ft., in wet swales, July 5, 1942.

TRICHOCERIDAE

Trichocera saltator (Harris, 1782) *(gracilis* Walker, 1848).—Twogwotee Pass, Station 6; 9,650 ft., July 9, 1942.

Trichocera tetonensis sp. nov.—General coloration blackish gray, the praescutum without stripes; knobs of halteres brownish black; legs brownish black to black; wings with a weak brownish tinge, sparsely patterned with darker, including a more distinct cloud over the anterior cord; male hypopygium with the bridge of the basistyles complete; dististyle on mesal face with a flattened compressed blade; dense curved setulae on mesal face of dististyle beyond the marginal blade.

♂. Length, about 6 mm.; wing, 7 mm.; antenna, about 3 mm.

Rostrum and palpi black. Antennae (male) approximately one-half the length of body, brownish black, the outer segments paling to whitish. Head dark brownish gray.

Pronotum brownish gray. Mesonotum darker blackish gray, especially the praescutum and scutum; praescutum without differentiated pattern; scutellum and postnotum clearer gray. Pleura black, sparsely pruinose. Halteres relatively long, stem obscure yellow, knob brownish black. Legs with the coxae dark brown; trochanters obscure yellow; remainder of legs brownish black to black. Wings (Fig. 1) with a weak brownish tinge, the prearcular and basal costal fields more whitened; stigma faintly darkened, lying distad of vein R_2; a distinct pale brown cloud over anterior cord; cell Cu_1 and posterior cord somewhat less evidently clouded; veins dark brown, paler in the brightened portions. Venation: Sc_1 ending shortly before level of R_2, Sc_2

at near one-fifth the length of *Rs;* R_{2+3+4} about one-fourth longer than R_{2+3}; cell M_1 a little longer than its petiole; *m-cu* shortly before fork of M_{3+4}; vein *2nd A* angularly bent, its distal portion slightly sinuous.

Abdomen, including hypopygium, black. Male hypopygium (Fig. 2) with the bridge of the basistyles, *b,* (so-called coxal bridge) complete, at point of union of the lobes produced caudad into a low compressed point. Dististyle, *d,* elongate, on mesal margin at near one-third the length with a flattened-compressed lobe or blade that is provided with setae on both faces, about fifteen longer setae on upper face, somewhat fewer on lower surface; style beyond the blade a little expanded, with scattered elongate setae at apex and on outer surface; mesal margin as far basad as the blade with short, abundant, curved setulae. Gonapophyses, *g,* appearing as relatively broad, elongate, flattened blades.

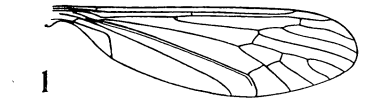


Fig. 1. *Trichocera tetonensis* sp. nov.; venation.

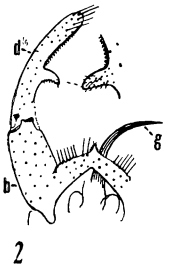


Fig. 2. *Trichocera tetonensis* sp. nov.; male hypopygium.

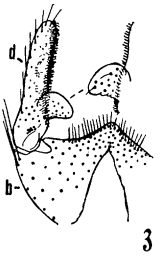


Fig. 3. *Trichocera garretti* Alexander; male hypopygium. (Symbols: *b,* basistyle; *d,* dististyle; g, gonapophysis.)

Holotype, ♂, Hidden Falls, Station 3, 6,900 ft., July 8, 1942 (Alexander).

The most similar species is *Trichocera garretti* Alexander, 1927, with a wide distribution in southern Canada and the northern United States (Idaho, Utah). This latter differs especially in the structure of the male hypopygium (Fig. 3). Here the bridge of the basistyles, *b,* is much larger and more extensive, involving the entire mesal face of the basistyle, completely fused at the midline and here provided with very abundant long pale setae. Dististyle, *d,* with the blade of mesal face much broader, semicircular in outline, the convexly rounded outer margin without setae; setulae of mesal face of style longer and much more numerous, forming an elongate band from near the apex extending basad to beyond the blade of the style, as illustrated.

TIPULIDAE

TIPULINAE

Prionocera primoveris Alexander, 1943.—Moran bog, 6,800 ft., July 5, 1941; Cascade Trail, Station 4, 8,200 ft., July 9, 1941; Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942, the latter part of the type series.

Nephrotoma ferruginea (Fabricius, 1805).—Jenny Lake, near camp, 6,780 ft., July 1, 1941.

Nephrotoma lugens erythrophrys (Williston, 1893).—Twogwotee Pass, 9,650 ft., July 9, 1942 *(M. M. A.).*

Tipula (Bellardina) commiscibilis Doane, 1912 *(contaminata* Doane, 1901).—Jackson, Wyoming, August 17, 1941 *(J. L. & G. H. Sperry).*

Tipula (Bellardina) jepsoni sp. nov.—Allied to *faustina;* antennal flagellum brownish black to black; mesonotal praescutum light gray, with four dark gray stripes that are narrowly bordered by brownish black; interspaces with conspicuous setigerous punctures; wings creamy yellow, marbled with pale grayish brown and darker brown; *Rs* long, from one-half to two-thirds longer than *m-cu;* petiole of cell M_1 short, less than one-half *m;* male hypopygium with the ninth tergite produced into a glabrous blackened tooth on either side of midline; setae of tergal lobes relatively short, black, from simple punctures; outer dististyle unusually large and complex, with about four lobes or blades, two of which are provided with dense and abundant black setae.

♂. Length, about 22 mm.; wing, 21.5 mm.; antenna, about 3.8 mm.

♀. Length, about 29 mm.; wing, 24 mm.; antenna, about 4 mm.

Frontal prolongation of head relatively short, gray above, more infuscated on sides; palpi black. Antennae subequal in length in the two sexes; scape brownish yellow, more darkened distally; pedicel yellow; flagellum brownish black to black; flagellar segments with basal enlargements poorly developed; longest verticils much exceeding the segments. Head gray, with a conspicuous median, dark brown stripe; posterior vertex behind eyes less distinctly infuscated.

Pronotum broadly dark brown medially, with a capillary pale central vitta, the sides of sclerite paling to yellow, sparsely pruinose. Mesonotal praescutum with the restricted ground color light gray, with conspicuous brown setigerous punctures; four dark gray stripes that are narrowly bordered by brownish black, the median dark line broader on cephalic half, becoming very narrow to subobsolete behind; humeral and lateral portions of praescutum more or less distinctly infuscated; scutum with median portion brownish gray, each lobe with two dark gray areas that are narrowly bordered by dark brown; scutellum gray, with a capillary dark brown median line, this obsolete on caudal portion; mediotergite light gray on cephalic two-thirds, darker gray behind, with a capillary brown median vitta and poorly indicated brown clouds on either side of basal half of disk; pleurotergite gray, the katapleurotergite abruptly yellow pollinose. Pleura with the broad dorsopleural region light yellow; remainder of pleura dark gray, variegated with lighter gray on the dorsal sternopleurite and the more posterior ventral sclerites. Halteres dark brown, the base of stem and apex of knob slightly more brightened. Legs with the coxae gray, the bases of fore pair more infuscated, of the middle pair less extensively so; trochanters brownish gray; femora yellow to reddish yellow, the tips rather broadly and conspicuously blackened, the amount subequal on all legs; tibiae reddish brown, the tips more narrowly blackened; tarsi black,

the basitarsi somewhat paler on proximal portions; tooth of claws (male) broad but acute. Wings (Fig. 4) with the ground color creamy yellow, conspicuously marbled with pale grayish brown and darker brown; darkest areas relatively extensive, much more so than in *faustina,* especially the postarcular darkening; area at anterior cord virtually confluent with stigma; yellow band beyond cord wide; outer two-fifths of cell R_5 pale; darkened area in cell *Cu* distinct, subtended by yellow ground areas. Venation: *Rs* long, from about one-half to two-thirds longer than *m-cu;* petiole of cell M_1 short, less than one-half *m; m-cu* slightly less oblique than in *faustina.*

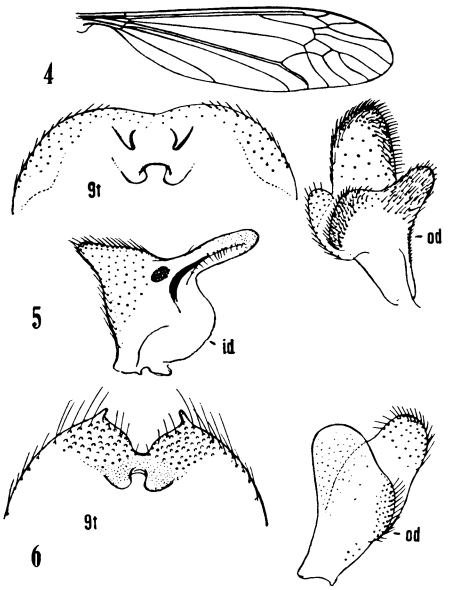


Fig. 4. *Tipula (Bellardina) jepsoni* sp. nov.; venation.

Fig. 5. *Tipula (Bellardina) jepsoni* sp. nov.; male hypopygium.

Fig. 6. *Tipula (Bellardina) faustina* Alexander; male hypopygium. (Symbols: *id,* inner dististyle; *od,* outer dististyle; *t,* tergite.)

Abdomen with basal tergite brownish yellow, darker and more pruinose on posterior portion; succeeding tergites reddish or reddish yellow, the lateral borders gray, narrowly bordered internally by dark brown, on the outer segments this latter becoming more extensive and conspicuous; basal sternites similarly reddish brown; outer segments, including hypopygium, more uniform brownish black. In female, subterminal segments more opaque black, pruinose; ovipositor with cerci long and straight, more than twice the length of the hypovalvae, their ventral margin fringed with long pale setae. Male hypopygium (Fig. 5) with the tergite, *9t,* somewhat as in *faustina;* tergite transverse, with a gentle caudal emargination; on either side with a slender glabrous black tooth, which in slide mounts are bent cephalad; on the ventral side of tergite with a broad depressed plate that is notched at apex to produce two obtuse lobes; setae of tergite relatively short, black, from small simple punctures. Outer dististyle, *od,* unusually complex, on a slide mount appearing about as figured; about four lobes and blades, of which two are provided with unusually abundant and dense black setae. Inner dististyle, *id,* with the sensory area consisting of only eight or nine pegs. Notch of ninth sternite

very shallow, its margin blackened and microscopically corrugated or roughened; no modified flange at base of dististyles.

In *faustina* (Fig. 6), the ninth tergite, *9t,* narrows outwardly, its caudal margin with an irregular V-shaped notch, the lobes thus formed terminating in slender, sparsely hairy lobules; surface of tergal lobes provided with abundant long pale setae from conspicuous punctures to produce a roughened appearance; ventral surface of tergite with two very broad, obtuse, darkened lobes that are separated from one another only by a narrow circular notch; ventral surface of tergal lobes with scattered transverse groups of from four to six small setulae, appearing as microscopic rows or bunches. Outer dististyle, *od,* relatively large but comparatively simple, with only two or three lobes, the vestiture relatively pale. Inner dististyle with the posterior portion of main body relatively stout. Sternal tube unusually short and broad.

Holotype ♂, Jenny Lake, Station 5, 6,780 ft., July 4, 1941 *(Alexander). Allotopotype,* ♀ caught with the male but not mating, pinned on same pin. *Paratopotype,* 1 ♂, July 6, 1941 *(Alexander).*

I am very pleased to name this handsome crane-fly in honor of the Park Naturalist of the Grand Teton National Park, Mr. Carl E. Jepson. All of the type specimens were swept from rich herbage close to the margin of a large stream just north of Cascade Creek. The species is closest to *Tipula (Bellardina) faustina* Alexander, 1941, which differs especially in the venation and pattern of the wings, and in the structure of the male hypopygium, as compared above. In the subgenus *Bellardina* Edwards, 1931, there are more than a dozen species in the Rocky Mountain and Pacific Coast areas, all being large and unusually handsome flies.

Tipula (Yamatotipula) albocaudata Doane, 1901.—Arizona Creek, 6,790 ft., July 1, 1941.

Tipula (Yamatotipula) colteri Alexander, 1943.—Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942.

Tipula (Yamatotipula) continentalis Alexander, 1941.—Cascade Trail, Station 4, 8,200 ft., July 9, 1941.

Tipula (Yamatotipula) spernax Osten Sacken, 1877.—Twogwotee Pass, 9,650 ft., July 9, 1942; several swept from willow thickets.

Tipula (Yamatotipula) sulphurea jacksonensis subsp. nov.

♂. Length, about 13 mm.; wing, 11.5 mm.; antenna, about 4.5 mm.

♀. Length, about 14-15 mm.; wing, 12 mm.

Differs from typical *sulphurea* in coloration and in slight structural details. Frontal prolongation of head above gray, with a narrow, obscure yellow, median vitta; sides of prolongation more reddish yellow; nasus conspicuous, especially in female, tufted with long yellow setae. Antennae black, with only the base of scape slightly reddened; first flagellar segment shorter than in *sulphurea.* Head gray to blue gray, with a narrow brown median vitta.

Praescutal stripes more clearly defined and contrasting with the ground; scutellum conspicuously infuscated, especially at base; postnotum clear light

gray, more darkened posteriorly, the lateral border of mediotergite and katapleurotergite light yellow, anapleurotergite darkened. Legs with the apices of femora broadly and conspicuously blackened, on the fore legs including the distal half or approximately so, on the remaining legs somewhat narrower; tibiae brown, with blackened tips; tarsi black. Wings with the stigma darker brown and more conspicuous; a more or less distinctly darkened seam along vein *Cu*, in both cells *M* and Cu_1. Abdomen with the sublateral black tergal stripes broader and more conspicuous, leaving broad lateral borders; mid-dorsal tergal stripe narrower but very striking.

Holotype, ♂, Moran bog, Station 2, 6,800 ft., July 5, 1941 *(C. P. Alexander). Allotopotype,* ♀ pinned with type. *Paratopotypes,* 1 ♂, 3 ♀♀.

In its general appearance, the present fly is rather different from the typical form but upon a careful analysis proves to be nothing more than a race of the more eastern and northern *sulphurea* Doane, 1901. The almost uniformly blackened antennae and the increase in amount of gray color on the thorax provide the most evident characters for the separation of this race.

Tipula (Tipula) spenceriana hardyi Alexander, 1943.—Moran, August 7-23, 1941 *(J. L. & G. H. Sperry).*

Tipula (Tipula) pendulifera Alexander, 1919.—Moran, in wet areas, August 26-27, 1942 *(J. L. & G. H. Sperry).* Known hitherto only from Colorado and Alberta. Very recently discovered in Quebec (La Ferme, in late August, *A. Robert*); not hitherto recorded from northeastern North America.

Tipula (Arctotipula) twogwoteeana sp. nov.—General coloration of thoracic notum gray, the praescutum with four stripes that are bordered with dark brown; antennae very short; head and mesothorax with unusually long and abundant black setae; halteres brownish black; legs with femora brown, the tips blackened; wings pale brown or brownish gray, variegated with darker brown and cream-colored areas, the latter including incomplete bands at origin of *Rs* and beyond the stigma; *Rs* gently curved, only a little longer than *m-cu;* cell *1st* M_5 small; petiole of cell M_1 long; abdomen dark gray, the caudal and lateral borders of the segments yellow; ovipositor with short compressed cerci, their tips obtusely rounded.

♀. Length, about 16 mm.; wing, 16 mm.; antenna, about 2.2 mm.

Frontal prolongation of head relatively short, dark gray, conspicuously clothed with long black setae; nasus conspicuous; palpi black, very sparsely pruinose. Antennae (female) very short, black, the basal segments sparsely pruinose; flagellar segments with basal enlargements poorly indicated, verticils long and conspicuous. Head dark brownish gray, with conspicuous erect setae, especially conspicuous surrounding the antennal fossae and on the conspicuous genae; vertical tubercle undeveloped; anterior vertex broad, nearly four times the diameter of scape.

Pronotum dark gray, variegated with lighter gray, the sides with conspicuous erect setae. Mesonotal praescutum with the ground color gray, with four stripes, the intermediate pair more brownish, narrowly bordered by dark brown, the double median margin broad and conspicuous; lateral praescutal

stripes with their restricted centers dark gray, the borders brown; interspaces and lateral borders with conspicuous long black setae; scutum dark gray medially, the lobes somewhat lighter gray, with poorly defined darker central areas; elongate setae of scutum relatively restricted, more numerous along mesal edges of lobes behind the suture and on lateral portions of sclerite; scutellum dark plumbeous gray, the parascutella more infuscated; mediotergite short, light gray, with a darker median stripe, the surface of sclerite on anterior two-thirds with very conspicuous erect setae. Pleura and pleurotergite gray, the mesepisternum, including both anepisternum and sternopleurite, with conspicuous black setae, as in the subgenus; dorsopleural region weakly infuscated. Halteres brownish black, the extreme base of stem brightened. Legs with coxae light gray, clothed with abundant elongate, chiefly pale setae; trochanters dark gray; femora brown, the tips blackened, somewhat more extensively so on the fore femora; tibiae dark brown, the tips more blackened; tarsi black; legs relatively short and stout (female). Wings (Fig. 7) with

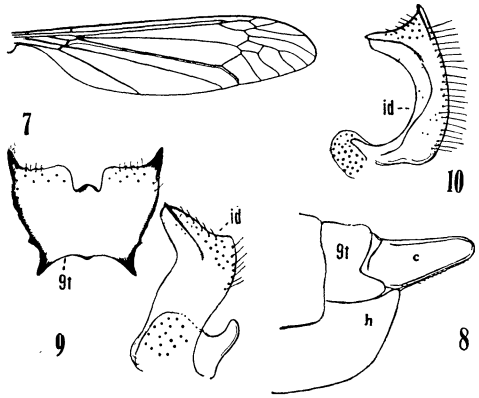


Fig. 7. *Tipula (Arctotipula) twogwoteeana* sp. nov.; venation.

Fig. 8. *Tipula (Arctotipula) twogwoteeana* sp. nov.; ovipositor, lateral.

Fig. 9. *Tipula (Vestiplex) baliopteroides* sp. nov.; male hypopygium.

Fig. 10. *Tipula (Vestiplex) balioptera* Loew; male hypopygium.

(Symbols: *c*, cercus; *h*, hypovalva; *id*, inner dististyle; *t*, tergite.)

the ground color pale brown or brownish gray, very restrictedly patterned with darker brown and with somewhat more extensive cream-colored areas; the darkest areas include the stigma and confluent areas over anterior cord and at origin of *Rs;* the paler ground is somewhat more intense and conspicuous in outer radial field and as areas in cells *M* and *Cu* on either side of vein *Cu;* the cream-colored markings are most conspicuous as a narrow post-stigmal band extending from costa into cell R_5 and as a more conspicuous oblique band before origin of *Rs,* extending from costa to vein *Cu* near outer ends of cells *R* and *M;* further small pale areas in extreme outer end of cell R_5, in vicinity of vein M_{3+4}, in basal half of cell *Cu* and in margins of anal cells on either side of vein *2nd A;* prearcular field deeper yellow. Macrotrichia of veins extremely reduced in number, as in the subgenus, beyond the cord with only about three or four very scattered trichia over the length of distal section of R_{4+5}; squama with one or two setae. Venation: *Rs* gently arcuated, only a little longer than *m-cu;* R_{1+2} entire; cell *1st* M_2 small, pentagonal; petiole of cell M_1 long, about three-fifths the length of the cell or approximately three times *m; m-cu* on M_4 some distance beyond base; cell *2nd A* wide.

Abdomen dark gray, the lateral and caudal borders of the segments narrow-

ly pale yellow; tergites with vestiture much reduced, with scattered small black setae only; sternites with vestiture similarly inconspicuous, appearing as longer pale scattered setae; genital segment brownish yellow. Ovipositor (Fig 8) with cerci, *c,* short, compressed, the tips obtuse, margins smooth; hypovalvae, *h,* very short and blunt; lateral border of ninth tergite produced slightly caudad as a small lobe over the base of cercus.

Holotype, ♀, Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942 *(C. P. Alexander);* ovipositing in wet earth at margin of small mountain torrent.

The present fly is readily distinguished from other regional members of the subgenus by the handsomely patterned wings. The fly bears a general resemblance to *Tipula (Oreomyza) pseudotruncorum* Alexander, with which it was associated in nature, but the subgeneric characters readily separate the two flies. It should be emphasized that such characters include the abundant body setae of *Arctotipula* as contrasted with the more nearly glabrous condition in *Oreomyza,* this condition being well shown in the two species of *Tipula* here discussed.

Tipula (Vestiplex) baliopteroides sp. nov.—Allied to *balioptera;* basal flagellar segments more or less bicolored; wing pattern whitish subhyaline and restricted dark brown on a pale brownish gray ground; abdomen chiefly yellow, the tergites trivittate with dark brown; male hypopygium with a very conspicuous blackened tergal saucer, armed at anterior and posterior angles with strong spines, with a further more or less developed discal spine near base of median notch; inner dististyle stout-stemmed.

♂. Length, about 13-15 mm.; wing, 14-16 mm.; antenna, about 5 mm.

Frontal prolongation of head dark brown above, sparsely pruinose, paler beneath; nasus elongate; palpi brown, the terminal segment passing into black. Antennae with proximal three segments yellow, the succeeding segments usually bicolored, the basal swelling black, the remainder yellow, at about the fifth to seventh flagellar segments the color becoming uniformly dark; in one paratype, the bicolorous nature is lost almost on the second or third segment; flagellar segments rather strongly incised. Head gray, clearer in front, with a conspicuous brown longitudinal line extending from the low vertical tubercle to the occiput, narrowed behind.

Pronotum dark gray. Mesonotal praescutum gray, with four slightly differentiated clearer gray stripes that are conspicuously margined with brown; scutal lobes each with two similar brown ringed areas; posterior sclerites of notum gray, with a median brown vitta. Pleura chiefly gray, the dorsopleural membrane yellow; vague patterns of paler gray on the dorsal sternopleurite in some specimens. Halteres with stem obscure yellow, knob infuscated. Legs with the coxae pale, gray pruinose; trochanters yellow; femora obscure yellow, the tips brownish black, the amount subequal on all legs; tibiae and tarsi obscure yellow, the terminal tarsal segments darkened. Wings with the ground pale brownish gray, variegated by slightly darker brown and more extensive whitish subhyaline areas; the darker pattern includes the stigma, adjoining portion of anterior cord and a small spot over origin of *Rs;* the pale marks include a broad band beyond stigma, extending from costa to cell *1st* M_2, including

the bases of cells of the outer radial field; the white obliterative band at cord is especially conspicuous from outer end of cell *R*, across *1st* M_2 into base of M_3; other pale areas at near two-thirds cell *M* and near basal third of cells *Cu* and *1st A;* no darkened area at arculus nor any whitening in cells immediately beyond; prearcular and costal fields clearer yellow; veins brown, more brownish yellow in the brightened fields. Venation: *Rs* long, nearly three times *m-cu;* R_{1+2} long; inner end of cell *1st* M_2 pointed; petiole of cell M_1 nearly twice *m*.

Basal abdominal tergite brownish yellow, sparsely pruinose, restrictedly patterned with darker brown; succeeding tergites bright yellow with three dark brown stripes that are more or less interrupted at the posterior borders of the segments; sublateral stripes widened posteriorly; lateral tergal margins pale; sternites yellow, the outer segments more infuscated and pruinose; tergites eight and nine, and, in cases, tergite seven, more darkened; outer portions of hypopygium (Fig. 9) with the tergal saucer, *9t,* heavily blackened and very conspicuous, its greatest length nearly equal to the maximum width, narrowed anteriorly; posterior angles produced caudad into strong horns, the anterior angles similarly produced, these horns directed chiefly cephalad; margin of saucer with further spinous points and denticles; caudal margin with a quadrate notch, at or near base of which arises a single median horn or spine, as in *balioptera;* in the type, as figured, the horn appears to lie very close to the base of the notch, in other specimens somewhat more removed from the margin. Outer dististyle narrower than in *balioptera.* Inner dististyle, *id.* with the stem much stouter and broader, the fringe of yellow setae sparse and chiefly confined to the distal portion. I have shown the inner dististyle (Fig. 10, *id*) of *balioptera* for comparison; here the stem is narrower, the entire outer surface with abundant long delicate pale setae from very pale and inconspicuous punctures.

Holotype, ♂, Pilgrim Creek, near Moran, 6,800 ft., July 5, 1942 *(M. M. Alexander). Paratypes,* 1 ♂, Arizona Creek, Station 1, 6,790 ft., July 8, 1941 *(C. P. Alexander);* 1 ♂, Gothic, Colorado, 9,500 ft., July 1, 1934 *(C. P. Alexander).*

The present fly is readily distinguished from the more northern, subarctic *Tipula (Vestiplex) balioptera* Loew, 1863, by the hypopygial characters, especially the details of the tergal saucer and the inner dististyle. The latter species is known from Saskatchewan and Alberta, the types being from English River (now Churchill River), Saskatchewan, at near 56° N.Lat., and from the then Russian America, all collected by Robert Kennicott.

Tipula (Schummelia) subtenuicornis Doane, 1901.—Jenny Lake, 6,780 ft., July 4-5, 1941; Leigh Lake, 6,870 ft., July 10-12, 1941; Hidden Falls, 7,000 ft., July 8, 1942; Death Canyon, 7,800 ft., July 14, 1941.

Tipula (Oreomyza) absaroka Alexander, 1943.—Cascade Trail, Station 4, 8,200 ft., July 9, 1941; Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942; part of the type material (Alexander, 1943: 729).

Tipula (Oreomyza) alia Doane, 1911.—A single female, Death Canyon.

7,000 ft., July 14, 1941. In this, *Rs* is longer than in any other specimen that I have seen but the identification seems correct.

Tipula (Oreomyza) fundata sp. nov.—Belongs to the *borealis* or *unca* group; most similar to *coloradensis* and *criddlei;* antennal flagellum uniformly blackened; mesonotum gray, the praescutum and scutum conspicuously patterned; tips of femora narrowly blackened; wing pattern only weakly developed; abdomen with a conspicuous median, dark brown stripe that becomes obsolete beyond segment six; male hypopygium with the lateral appendage bearing a pair of blackened spinous points; gonapophyses strong, terminating in a spatulate head.

♂. Length, about 10-13 mm.; wing, 11-15 mm; antenna, about 4-5.2 mm.

♀. Length, about 15 mm.; wing, 14 mm.

Frontal prolongation of head pale, sparsely pruinose; nasus elongate, black; palpi black. Antennae of moderate length; scape and pedicel yellow, flagellum black. Head gray, paler gray on front and anterior vertex.

Pronotal scutum brownish gray, with a narrow median infuscation; scutellum yellow. Mesonotal praescutum with the ground color gray, the stripes barely indicated, best marked by brown borders that form an irregular pattern, the intermediates widened on anterior portion, very narrow behind, the posterior ends recurved; lateral brown stripes forming strongly curved hook-shaped lines; scutum gray, the lobes with scarcely indicated darker gray areas that are narrowly bordered by pale brown; scutellum and mediotergite gray, with a vague capillary median darkening. Pleura extensively gray, the posterior sclerites, including the katapleurotergite, more yellow; dorsopleural membrane buffy yellow. Halteres with stem obscure yellow, knob brownish black. Legs with the coxae brownish gray; trochanters yellow; femora yellow, the tips rather narrowly but very conspicuously blackened, the amount subequal on all legs; tibiae and basitarsi obscure yellow, the tips very narrowly infuscated; outer tarsal segments blackened. Wings with the ground color pale brown, restrictedly patterned with darker brown and whitish subhyaline; prearcular field and cell *Sc* much clearer yellow; stigma dark brown; small darker brown areas at origin of *Rs* and over anterior cord; somewhat paler clouds in outer radial field, outer end of cell *1st* M_2 and in cells *M* and *Cu,* the two latter alternating with whitish subhyaline spots; whitish post-stigmal band passing through cell *1st* M_2 into bases of adjoining cells; outer end of cell R_5 slightly brightened; veins brownish black, yellow in the flavous areas. Venation: *Rs* variable in length, from approximately twice to about three times *m-cu.*

Abdominal tergites yellow, the first more infuscated; a conspicuous, dark brown median stripe, ending at about segment six, narrowly interrupted by pale caudal borders of the segments; sternites and subterminal tergites more yellowish; ninth segment and eighth sternite chiefly black; genital shield black; cerci long and slender. Male hypopygium (Fig. 11) relatively large. Ninth tergite, *9t,* with the caudal margin truncate, with a small median notch; each lobe with a conspicuous outer horn on ventral surface, this directed chiefly caudad. Outer dististyle, *od,* truncated at apex. Inner dististyle, *id,* with

the setae of dorsal crest relatively inconspicuous, excepting a group or pencil immediately back of the beak. Lateral appendage, *la*, with two blackened teeth or denticles, as in *coloradensis* and *criddlei;* pendulous lobe moderately elongate, broad at base. Gonapophyses, *g*, strongly developed, broad at base, much narrowed before a conspicuous dilated apical spatula. Eighth sternite with caudal margin weakly biemarginate to form three blunt lobes that are fringed with abundant long pale setae, those of the central lobe longer and more conspicuous.

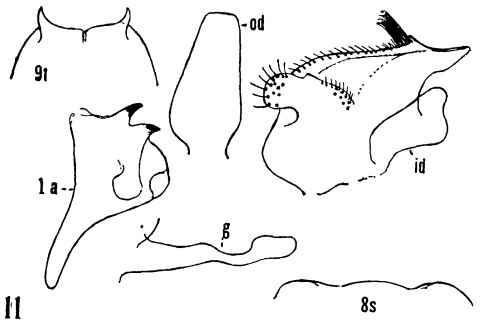


Fig. 11. *Tipula (Oreomyza) fundata* sp. nov.; male hypopygium.

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

Holotype, ♂, Buffalo Creek, below Twogwotee Pass, 8,000 ft., July 9, 1942 *(C. P. Alexander). Allotype,* ♀, Richel Lodge, Montana, August 20, 1942, *(J. L. & G. H. Sperry). Paratypes,* 1 ♂, with the allotype; 1 ♂, Plateau of Beartooth Mts., Wyoming, 10,000 ft., July 29, 1942 *(J. L. & G. H. Sperry);* ♂ ♂, Arizona Creek, Station 1, 6,790 ft., July 4, 1941 *(C. P. Alexander);* ♂ ♂, Moran bog, Station 2, 6,800 ft., July 2-5, 1941 *(M. M. Alexander);* ♂ ♂, Death Canyon, 7,800 ft., July 14, 1941 *(C. P. Alexander);* 1 ♂, Twogwotee Pass, 9,650 ft., July 24, 1942 *(J. L. & G. H. Sperry).*

The two species with which the present fly requires comparison are *Tipula (Oreomyza) coloradensis* Doane, 1911, and *T. (O.) criddlei* Dietz, 1914. Both of these have the lateral appendage of the male hypopygium having two upper teeth or points, much as in the present fly. The former fly is described as having the entire abdomen yellowish brown, darker posteriorly, without the conspicuous central darkened tergal stripe; ovipositor with the cerci long and slender, as in the present fly. The latter species, described from Manitoba, has the abdominal pattern much as in the new form; ovipositor with unusually short valves, the cerci and hypovalvae being of equal length. Both of these species are described and figured as having the gonapophyses slender, with the apical portion curved into a sickle, not at all as in the insect here defined.

Tipula (Oreomyza) gaspensis Alexander, 1929.—This small fly had been known only from eastern Canada. It was found commonly at various stations throughout the Tetons. Arizona Creek, 6,790 ft., July 8, 1941; Moran bog, 6,800 ft., July 2, 1941; Hidden Falls, 7.000 ft., July 4, 1941; Jenny Lake, Station 5, 6,790 ft., July 6, 1941; Leigh Lake, Station 5, 6,870 ft., July 12, 1941; Indian Paintbrush Canyon, 8,000 ft., July 13, 1941; Death Canyon, 7,800 ft., July 14, 1941. As was the case with Quebec specimens, in this material *Rs* similarly varies in length within rather surprisingly wide limits.

Tipula (Oreomyza) ingrata Dietz, 1914.—Arizona Creek, Station 1, 6,790 ft., July 2, 1941 *(M. M. Alexander).*

Tipula (Oreomyza) serta Loew, 1863 *(albonotata* Doane, 1901).—Pilgrim Creek, near Moran, July 25, 1942 *(J. L. & G. H. Sperry).*

Tipula (Oreomyza) pseudotruncorum Alexander 1920.—General coloration gray, the praescutum yellowish gray with four brownish black stripes, the intermediate pair with an interpolated median dark vitta; antenna short, flagellum uniformly black; head, scutellum and mediotergite with a central brown vitta; knobs of halteres dark brown; femora brownish yellow, the tips narrowly blackened; claws (male) toothed; wings yellowish white, heavily clouded with pale brown and darker brown; *Rs* long, exceeding twice *m-cu;* R_{1+2} entire; cell *1st* M_2 large; petiole of cell M_1 short, subequal to or shorter than *m;* abdominal tergites gray, heavily patterned with brown, the posterior borders of the segments yellow; male hypopygium with the beak and outer basal lobe of the inner dististyle heavily blackened; eighth sternite with lateral lobes that bear conspicuous hair tufts.

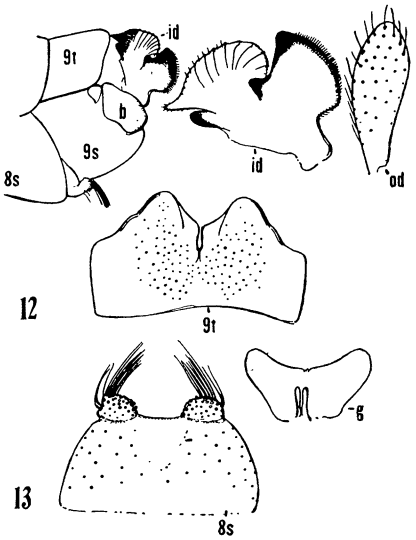
♂. Length, about 14.5-15 mm.; wing, 16-17 mm.; antenna, about 3 mm.

Frontal prolongation of head relatively long, dark gray; nasus very short; palpi black. Antennae (male) short; scape elongate, transversely corrugated; pedicel brown; flagellum uniformly black; flagellar segments short, with basal enlargements feebly developed; verticils longer than the segments; terminal segment reduced to a small thimble-shaped structure. Head gray; vertex infuscated medially; vertical tubercle very low and simple.

Pronotum brownish gray, more infuscated above. Mesonotal praescutum yellowish gray with four brownish black stripes, with a further narrow central vitta, the intermediate three stripes all narrowed behind and connected at the suture; lateral stripes narrow, with slightly paler, more brownish gray centers; humeral region in vicinity of pseudosutural foveae more or less darkened; scutum yellowish gray, each lobe with two brownish gray areas, the more cephalic one much smaller; scutellum and postnotum clearer gray, with a narrow, interrupted median brown vitta. Pleura and pleurotergite clear gray; dorsopleural membrane yellow, conspicuously variegated with brown areas along both the dorsal and ventral edges. Halteres brownish yellow, knobs dark brown. Legs with coxae light gray; trochanters obscure yellow or brownish yellow, the tips narrowly blackened, the amount subequal on all legs; tibiae dark brown, the tips more blackened; tarsi black; claws (male) toothed. Wings with the ground pale yellowish white, heavily clouded with pale brown and with fewer dark brown areas; the darkest clouds include the stigma and a confluent cloud over the anterior cord, origin of *Rs,* and a spot in bases of cells *R* and *M* at arculus; paler brown clouds in distal half of outer radial field, as seams along outer medial veins, most of cell *R,* and two conspicuous clouds in cells *M* and *Cu,* separated from one another by a ground area about opposite origin of *Rs;* cell *1st A* conspicuously clouded, cell *2nd A* virtually clear except for a narrow axillary margin; the creamy areas include a broad, nearly complete band beyond cord, extending from C to the posterior margin

in outer medial field; cells *C* and *Sc;* prearcular cells and conspicuous areas in cells *M* to *1st A;* veins dark brown, *Sc* paler at base. Macrotrichia on outer veins, from R_{4+5} to *2nd A* inclusive. Venation: *Rs* long, exceeding twice *m-cu;* R_{1+2} entire; cell *1st* M_2 large, exceeding in length vein M_3 beyond it; petiole of cell M_1 short, subequal to or less than *m*.

Abdominal tergites gray, clearest laterally, heavily patterned with brown, on the first segment this including a narrow mid-dorsal area; tergite two with a continuous dorsal and interrupted sublateral stripes; succeeding segments with dorsal and sublateral stripes more extensive and becoming confluent; all segments with a more yellowish posterior border, this more distinct and broader on segments four to eight, inclusive; sternites more uniform brownish gray, with conspicuous yellow posterior borders; ninth segment more brownish gray, the posterior margins of both the tergite and sternite more reddish yellow; dististyles chiefly pale. Male hypopygium (Figs. 12, 13) relatively small and of simple structure; ninth tergite entirely separated from ninth sternite; basistyle complete; accessory sclerite small but developed. Ninth tergite, *9t,* generally rectangular in outline, transverse; caudal margin produced into two flattened yellow lobes that are separated from one another at the midline only by a very narrow notch; posterior borders of lobes obliquely truncated, their surface with the setae sparse and very small. Ninth sternite, *9s,* extensive,



Figs. 12, 13. *Tipula (oreomyza) pseudotruncorum* Alexander; male hypopygium.

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

with a median line of pale membrane, on caudal portion widened to form a V-shaped incision; caudomesal margins of notch with a small lobe on either side, this bearing abundant long yellow setae that virtually fill the whole incision. Basistyle, *b,* not produced caudally, its outer portion provided with several long setae. Outer dististyle, *od,* relatively broad and flattened. Inner dististyle, *id,* with both the beak and the outer basal lobe heavily blackened and unusually short and compact; posterior crest of style thin, pale yellow,

longitudinally striate, its posterior border microscopically erose. Gonapophyses, *g*, appearing as a pair of very thin, flattened plates. Eighth sternite, *8s*, moderately sheathing, the median area filled with pale membrane; each posterior angle bearing an oval lobe that is completely detached from body of sternite by pale membrane; each lobe bearing numerous strong setae, some of which are grouped into a more conspicuous apical tuft or pencil directed caudad and slightly mesad, more or less decussate across midline with its mate of opposite side.

This rare fly was taken at Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942 *(M. M. Alexander)*. It is most closely related to *Tipula (Oreomyza) shoshone* Alexander, 1945, and *T. (O.) ternaria* Loew, 1864, both of which it somewhat resembles in general appearance. It is readily told by the nature of the wing pattern and by the structure of the male hypopygium, particularly of the ninth tergite, inner dististyle and eighth sternite. Mrs. Alexander captured these specimens while they were flying high among the spruces on a forested slope not far from a cold mountain torrent. A few others were observed but always so high that they could not be netted. The species had not been figured or adequately described hitherto.

Tipula (Oreomyza) trivittata laetifica subsp. nov.

♀. Length, about 26 mm.; wing, 20.5 mm.

Close to typical *trivittata* Say, 1823, differing especially in the distribution of the wing pattern which gives the fly a distinctive appearance.

Arcular darkening restricted; dark crossband at near one-third the length of wing widely separated from the brown spot at origin of *Rs;* wing apex only restrictedly darkened, the areas in outer ends of cells R_2 and R_3 solid, in the remaining cells represented only by narrow but conspicuous dark seams to the veins, leaving the central portions of cells R_5 to M_4, inclusive, white. In typical *trivittata,* these cells are dark with the exception of M_3 which is traversed by the complete white band before the stigma and cord; the other cells, in cases, have restricted pale areas but are not whitened as in the present fly; the dark spot at origin of *Rs* is confluent with the dark band at near one-third the wing length.

Holotype, ♀, Jenny Lake, Grand Tetons, 6,780 ft., August 9, 1942 *(J. L. & G. H. Sperry)*.

The discovery of the male sex of the present fly will show whether there are any hypopygial characters to support the distinctions indicated above. I have seen typical *trivittata* from the Black Hills, South Dakota (Harney Peak and vicinity, 6,500 ft., June 15, 1941, *Alexander)*.

Tipula (Lunatipula) bisetosa percita subsp. nov.

Differs from typical *bisetosa* Doane, 1901, chiefly in minor hypopygial details, especially of the eighth sternite. In the present fly, this shows the cushion between the major lateral setae as transverse, its caudal border truncate or even weakly bilobed, the entire cushion with more abundant setae.

In typical *bisetosa,* the cushion is roughly semicircular in outline, its posterior border evenly rounded to strongly convex, the surface with fewer setae.

Holotype, ♂, Jenny Lake, Grand Tetons, 6,780 ft., August 10, 1942 *(J. L. & G. H. Sperry). Allotopotype,* ♀, August 6, 1942. *Paratopotype,* ♂, August 9, 1942 *(Sperry).*

Tipula (Lunatipula) diversa Dietz, 1921.—Jenny Lake, around camp, July 1-9, 1941; a few, flying beneath the evergreens, associated with the much more numerous *pellucida* and *sinistra.*

Tipula (Lunatipula) johannus sp. nov.—Allied to *barbata;* general coloration gray, the praescutum with four narrow brown stripes; capillary dark gray lines on head, scutellum and mediotergite; tips of femora narrowly blackened; wings with a strong brown ground, the obliterative areas at cord and beyond stigma unusually large and conspicuous; abdominal tergites yellow, trivittate with brownish black; sternites with an unusually broad black central stripe; male hypopygium with the lobes of the tergite obliquely truncate; ninth sternite with the lobes large, with conspicuous pencils of long reddish setae; inner dististyle with beak long and slender, outer basal lobe long and narrow, unarmed; eighth sternite with the outer major bristle strongly tuberculate; median sternal plate transverse, its central portion produced into a rounded lobe.

♂. Length, about 12.5 mm.; wing, 12 mm.; antenna, about 3.5 mm.

Frontal prolongation of head dark brown, sparsely pruinose at base above; nasus short but distinct; palpi black. Antennae with scape and pedicel yellow, flagellum black; flagellar segments moderately incised, a little longer than the verticils. Head gray, with a conspicuous black vitta on vertex.

Pronotum gray, with a narrow, dark brown, median dash. Mesonotal praescutum gray with four narrow but conspicuous entire brown stripes; intermediate pair narrow to obsolete at their cephalic ends, widest at near midlength, separated by a ground vitta of about the same width; a dusky triangular area in humeral region; scutum gray, each lobe with two disconnected dark brownish gray areas; scutellum and mediotergite gray with a capillary black median vitta. Pleura and pleurotergite gray; dorsopleural membrane buffy. Halteres with stem dusky, narrowly yellow at base, knob blackened, its apex a trifle paler. Legs with coxae pale, gray pruinose; trochanters yellow; femora yellow, the tips narrowly blackened, a very little more extensive on fore legs; tibiae yellow, the tips more narrowly infuscated; basitarsi dark brown; remainder of tarsi black; claws (male) toothed. Wings with a strong brownish ground, deeper than in allied species, especially in the cells beyond cord; stigma oval, still darker brown; basad of cord the dark ground is more restricted to the centers of the cells, the vicinity of the veins broadly pale, this including almost all of cell *Cu* and the broad bases of the Anal cells; cells *C* and *Sc* uniformly darkened except at their whitened outer ends, cell *Sc* a little more yellowish; whitish obliterative areas along cord and beyond stigma unusually extensive and conspicuous against the ground, including almost all of cell R_1; dark central area of cell *1st A* with a whitish elongate marginal streak; veins dark brown, brownish yellow in the costal and prearcular fields.

Venation: *Rs* moderately long, more than one-half longer than *m-cu;* R_{1+2} entire; petiole of cell M_1 shorter than *m;* cell *1st* M_2 relatively long, its outer end pointed.

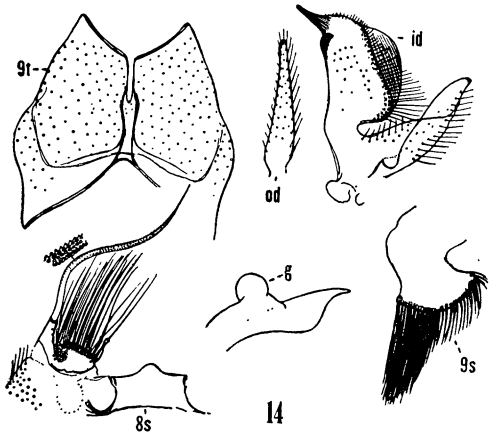


Fig. 14. *Tipula (Lunatipula) johannus* sp. nov.; male hypopygium.

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

Abdominal tergites with first segment gray pruinose; succeeding segments yellow, conspicuously trivittate with brownish black, the mid-dorsal stripe narrowly interrupted by pale caudal borders to the segments; sublateral stripes similarly broken, conspicuously wavy on the more proximal tergites; lateral borders pale; sternites yellow, with an unusually broad and conspicuous black mid-ventral stripe that is only narrowly broken at the incisures; hypopygium brownish yellow. Male hypopygium (Fig. 14) complex, as in the *barbata* subgroup. Ninth tergite, *9t,* with the median incision unusually deep and narrow; lateral lobes obliquely truncate, their outer angles subacute. Ninth sternite, *9s,* with the lobe very conspicuous, transversely elongate-oval, the lower margin with unusually long and conspicuous reddish setae, the inner group longer, more compact and forming a strong brush or pencil. Outer dististyle, *od,* long and narrow, as in the subgroup. Inner dististyle, *id,* with the beak long and slender; dorsal crest high, with all portions evenly rounded; outer basal lobe long and slender, twisted, unarmed with teeth or spines. Gonapophyses, *g,* with the outer sclerotized knobs rounded; inner compressed blades produced into a slender apical point. Eighth sternite, *8s,* with the armature of the outer semi-detached lobes conspicuous; at outer lateral portion a small cylindrical peduncle bearing a single unusually strong and powerful spinous seta, its surface with microscopic tubercles; remaining setae long and conspicuous, their margins fimbriate, those lying closest to the mesal portion of lobe arising from expanded bases; median plate of sclerite sclerotized, transverse, the central portion of the posterior border produced into a rounded lobe.

Holotype, ♂, Jenny Lake, Grand Tetons, 6,790 ft., August 10, 1942 *(J. L. & G. H. Sperry).*

I am very pleased to name this fly in honor of Mr. John L. Sperry, to whom I am greatly indebted for numerous interesting Western Tipulidae. The fly is allied to *Tipula (Lunatipula) barbata* Doane, 1901, and to *T. (L.)*

subbarbata Alexander, 1927, more particularly to the latter. The structure of the male hypopygium, especially as regards the inner dististyle, is more as in *subbarbata,* but it differs from this latter fly in almost every detail of the hypopygium; as regards the inner style, the present species differs in the more elongate beak, the evenly rounded dorsal crest, and the unarmed outer basal lobe. The shape and armature of the paired lobes of the ninth sternite of the present fly is entirely distinct from those of either of the allied species mentioned.

Tipula (Lunatipula) macrolabis macrolaboides Alexander, 1918.—Pilgrim Creek, Moran, 6,800 ft., July 25, 1942 *(J. L. & G. H. Sperry).* Jenny Lake, Station 5, 6,780 ft., July 4, 1941; August 8-9, 1942 *(Sperry);* Hidden Falls, 7,000 ft., July 4, 1941 *(W. H. Harrison).*

I had considered this fly as being identical with *macrolabis* Loew, 1864, but now believe it represents a distinct race, best differentiated by the unusually narrow arm of the basistyle, at its apex this being only a little wider than the basal portion. In typical *macrolabis,* this blade is distinctly widened into a paddle. From Snodgrass' description and figures of the hypopygium of *spectabilis* Doane, 1901, based on type material from Idaho (Trans. Amer. Ent. Soc., 30:220-221, figs. 156, 158-161; 1904), it is evident that the latter is a synonym of typical *macrolabis.*

Tipula (Lunatipula) pellucida Doane, 1912 *(clara* Doane, 1901).—Shores of Jenny Lake, July 1-5, 1941; String Lake, 6,870 ft., July 7, 1941; Hidden Falls, 6,900 ft., July 4, 1941. This is the commonest crane-fly among the lodgepole pines of the eastern shore of Jenny Lake, often associated with *T. (L.) sinistra* Dietz.

Tipula (Lunatipula) saxemontana Alexander, 1945.—Arizona Creek, Station 1, 6,790 ft., July 2-8, 1941; Pilgrim Creek, Moran, 6,800 ft., July 5, 1942.

Tipula (Lunatipula) sinistra Dietz, 1921.—Jenny Lake, among the lodgepole pines, 6,780 ft., July 1-12, 1941; July 5, 1942, associated with *pellucida;* Hidden Falls, 6,900 ft., July 4, 1941; String Lake, 6,750 ft., July 7, 1941; Leigh Lake, 6,870 ft., July 12, 1941.

Tipula (Lunatipula) splendens Doane, 1901.—Pilgrim Creek, Moran, 6,800 ft., July 5, 1942; Jenny Lake, 6,780 ft., August 8, 1942 *(J. L. & G. H. Sperry);* Leigh Lake, 6,875 ft., July 12, 1941; Indian Paintbrush Canyon trail, 7,500 ft., July 13, 1941, the last relatively abundant in unusually dry places along the trail; String Lake, 6,870 ft., July 7, 1941, associated with *Limnophila (Phylidorea) adusta* Osten Sacken.

Tipula (Lunatipula) unicincta Doane, 1901.—Pilgrim Creek, near Moran, 6,900 ft., August 9, 1942 *(J. L. & G. H. Sperry).*

Tipula (Lunatipula) willis-smithi sp. nov.—Size relatively large (wing, male, over 15 mm.); general coloration yellowish gray, the praescutum with three brownish yellow stripes that are narrowly bordered by reddish brown; antennal flagellum black; wings brownish gray, conspicuously patterned with

darker brown, especially evident as a seam over the posterior cord; male hypopygium with the ninth sternite produced caudad into a long conspicuous arm; ninth tergite with caudal border terminating in six blackened teeth.

♂. Length, about 16-17 mm.; wing, 17-18 mm.; antenna, about 4.8-5 mm.

Frontal prolongation of head brownish yellow above, in cases a little darker laterally; nasus short and stout; palpi with proximal segments obscure yellow, the intermediates brownish yellow, the terminal segment black. Antennae with scape and pedicel yellow; first flagellar segment brown, remainder of flagellum black; flagellar segments moderately incised; longest verticils exceeding the segments in length. Head buffy, narrowly gray pruinose on orbits.

Pronotum brownish yellow. Mesonotal praescutum with the interspaces yellowish gray, with three poorly differentiated stripes, these brownish yellow with more reddish brown margins; scutal lobes brownish gray; scutellum

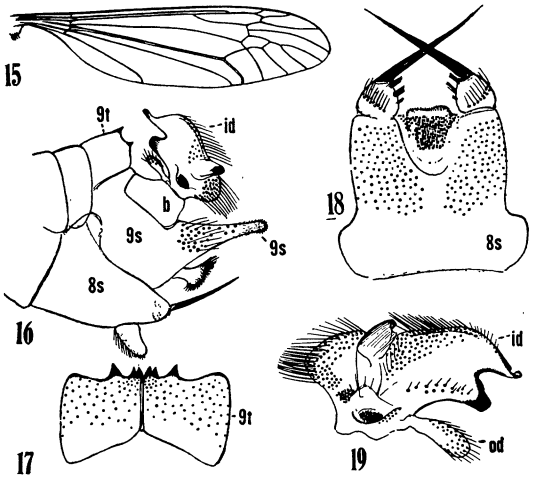


Fig. 15. *Tipula (Lunatipula) willis-smithi* sp. nov.; venation.

Figs. 16-19. *Tipula (Lunatipula) willis-smithi* sp. nov.; male hypopygium.

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

darker brown; postnotum brownish gray, sparsely pruinose. Pleura light brown or yellowish brown, sparsely pruinose, especially on the mesepisternum. Halteres brownish black, base of stem paler, apex of knob more or less brightened. Legs with coxae brownish yellow; trochanters slightly darker; remainder of legs brown, tarsi passing into black; claws (male) with a conspicuous tooth. Wings (Fig. 15) brownish gray, conspicuously patterned, including a dark brown seam along cord, particularly the posterior cord; less conspicuous brown suffusions in costal field, along *Rs*, broad bases of outer radial field, including the anterior cord, and as seams along veins *Cu* and *2nd A;* outer ends of Anal cells suffused; a very conspicuous whitened obliterative area before the cord and stigma, extending from cell R_1, before stigma across cell *1st* M_2 into base of M_3, narrowly interrupted at *Rs;* stigma brown, its proximal end more yellowish; a scarcely evident post-stigmal brightening, chiefly in base of cell R_2; prearcular field more yellow or brownish yellow; veins brown. Venation:

Rs relatively long, approximately three-fourths longer than *m-cu;* cell *1st* M_2 relatively small, pentagonal; petiole of cell M_1 subequal to or a little shorter than *m; m-cu* at fork of M_{3+4}.

Basal abdominal tergites yellow, the outer segments more reddish brown, passing into dark brown on outer segments; basal tergite slightly pruinose; tergites with three little-developed brown stripes, broader and more evident on outer segments; basal sternites clear yellow, the outer segments passing into dark brown. Male hypopygium (Figs. 16-19) with both the tergite and basistyle entirely cut off from sternite by sutures. Ninth tergite, *9t,* a transverse plate that is completely divided medially by a furrow; caudal margin of either half heavily blackened and produced into three strong black spinous points, two of which lie more dorsad, the third immediately beneath the more mesial of these, close to midline. Ninth sternite, *9s,* immediately ventrad of basistyle, produced caudad into a long powerful arm that gradually narrows to an obtusely rounded point, the enlarged base with numerous long coarse setae, the distal portion clothed with abundant microscopic setulae; ventrad and mesad of this arm projects caudad a second lobe that is shorter but still very conspicuous, short-stemmed, expanded at apex into a head that is provided with abundant reddish setae, the more dorsal ones longer and more delicate. Outer dististyle, *od,* a small pale, relatively narrow spatula. Inner dististyle, *id,* about as figured, the actual beak very slender, blackened, slightly twisted, separated from the shorter and stouter obtuse subapical beak by a rounded notch; outer basal lobe closely applied to main body of style, with a flattened, sclerotized plate lying in the notch; sensory area large, comprised of more than 25 pegs, placed close to base of style. Gonapophyses appearing as long powerful blackened spines. Eighth sternite, *8s,* sheathing, its dorsal-cephalic region strongly produced into a lobe; caudal margin with a deep U-shaped emargination that is filled with membrane in which is suspended a conspicuous subquadrate lobe that is densely covered with microscopic setulae; its lower or ventral surface with a central brush of long reddish setae, the outer or more caudal ones becoming shorter and less conspicuous; lateral lobes of sternite bearing a disconnected plate that is separated from the main body by a complete suture, at apex produced into a powerful black horn, probably composed of fused or fasciculate bristles; at base of this latter with several strong setae, and on mesal face close to base of horn with two smaller hair tufts.

Holotype, ♂, near Pilgrim Creek, Teton National Forest, in woods, 6,800 ft., July 5, 1942 *(C. P. Alexander). Paratype,* ♂, Jenny Lake, Grand Tetons, 6,780 ft., August 10, 1942 *(J. L. & G. H. Sperry).*

This fine species is dedicated to the Ranger Naturalist, Professor Willis T. Smith, of Ogden, Utah. The general appearance of the male hypopygium suggests species such as *Tipula (Lunatipula) saxemontana* Alexander, but the actual structure is entirely distinct. In the latter fly it is the basistyle that is produced into an arm whereas in the present fly this structure is a direct prolongation of the ninth sternite, ventrad of the basistyle. The conspicuously patterned wings likewise are distinctive of the present fly.

CYLINDROTOMINAE

Cylindrotoma pallescens Alexander, 1930.—Common in situations described under Station 5; Jenny Lake, 6,780 ft., July 3, 1941; Leigh Lake, 6,870 ft., July 10-12, 1941.

LIMONIINAE

LIMONIINI

Limonia (Limonia) cinctipes (Say, 1823).—Moran, August 7, 1941 *(J. L. & G. H. Sperry).*

Limonia (Limonia) indigena jacksoni (Alexander, 1917).—Jenny Lake, 6,780 ft., July 4, 1941; Leigh Lake, 6,870 ft., July 10-12, 1941; Indian Paintbrush Canyon, 7,500 ft., July 13, 1941.

Limonia (Limonia) sciophila (Osten Sacken, 1877).—Arizona Creek, 6,790 ft., July 3, 1941; Jenny Lake, 6,780 ft., July 3, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941.

Limonia (Limonia) solitaria (Osten Sacken, 1859).—Moran bog, 6,800 ft., July 5, 1941; Jenny Lake, 6,780 ft., July 1-3, 1941; Leigh Lake, 6,870 ft., July 10-12, 1941.

Limonia (Discobola) annulata (Linnaeus, 1758) *(argus* Say, 1824).—Moran, 6,800 ft., August 23, 1941 *(J. L. & G. H. Sperry).*

Limonia (Dicranomyia) athabascae (Alexander, 1927).—Moran bog, Station 2, 6,800 ft., July 2-5, 1941; bog near Jackson Lake, 6,770 ft., July 15, 1941.

Limonia (Dicranomyia) brevivena (Osten Sacken, 1869).—Moran bog, 6,800 ft., July 3, 1941; Jackson Lake, 6,780 ft., July 2, 1941.

Limonia (Dicranomyia) citrina (Doane, 1900).—Along Cascade Trail, Grand Tetons, between 6,900 and 8,800 ft., July 4-9, 1941; again on July 8, 1942; especially numerous on wet rocks (Station 3) below Hidden Falls; at these lower altitudes on July 4th, only females were found but males were still flying at the higher levels.

Limonia (Dicranomyia) halterata (Osten Sacken, 1869).—Arizona Creek, 6,790 ft., July 1, 1941.

Limonia (Dicranomyia) humidicola dampfi (Alexander, 1925).—Jenny Lake, July 3, 1941; Leigh Lake, July 10-12, 1941; both discussed under Station 5. This is the same form as reported from the Yellowstone as being *humidicola* (Osten Sacken, 1859); it now appears that the Rocky Mountain materials actually pertain to the subspecies listed above.

Limonia (Dicranomyia) longipennis (Schummel, 1829) *(immemor* Osten Sacken, 1861).—Moran, bog, 6,800 ft., July 2, 1941; along Buffalo Creek, near Moran, July 9, 1942.

Limonia (Dicranomyia) morioides (Osten Sacken, 1860).—Arizona

Creek, 6,790 ft., July 1-8, 1941; Moran bog, 6,800 ft., July 5, 1941; Buffalo Creek, near Moran, July 9, 1942; Death Canyon, 7,800 ft., July 14, 1941.

Limonia (Dicranomyia) penicillata (Alexander, 1927).—Moran bog, 6,800 ft., July 5, 1941; Buffalo Creek, near Moran, July 9, 1942; Twogwotee Pass, 9,650 ft., September 13, 1941 *(Knowlton & Thornley).*

Limonia (Dicranomyia) venusta (Bergroth, 1888) *(negligens* Alexander, 1927).—Moran, August 24, 1941 *(J. L. & G. H. Sperry);* Jenny Lake, 6,790 ft., August 5, 1942 *(Sperry);* Leigh Lake, 6,870 ft., July 10-12, 1941; Hidden Falls, Station 3, 6,900 ft., July 8, 1942; a few of the individuals were still teneral.

Antocha (Antocha) monticola Alexander, 1917.—Along the banks of the Snake R., Moose, Wyoming, July 6, 1942.

Elliptera astigmatica Alexander, 1912.—On wet rocky outcrops below Hidden Falls, Station 3, July 4, 1941; July 8, 1942; resting and crawling about among patches of *Saxifraga* and *Lewisia.*

Dicranoptycha quadrivittata Alexander, 1919.—Arizona Creek, 6,790 ft., July 8, 1941 *(W. H. Harrison);* along Pilgrim Creek, 6,800 ft., July 5, 1942; July 25, 1942 *(J. L. & G. H. Sperry);* along the Snake R., Moose, Wyoming, 6,800 ft., July 6, 1942; among rich riverside vegetation.

PEDICIINI

Pedicia (Tricyphona) degenerata (Alexander, 1917).—Jenny Lake, Station 5, 6,780 ft., July 4, 1941; Leigh Lake, 6,870 ft., July 12, 1941, very common; Death Canyon, 7,000 ft., July 14, 1941; one male from the last-named station has the wings even more reduced in size than usual but still with the venation clearly defined though distorted (♂. Length, about 6 mm.; wing, 4 x .38 mm.).

Pedicia (Tricyphona) sparsipuncta (Alexander, 1920).—Jenny Lake, 6,780 ft., July 3, 1941.

Ornithodes harrimani Coquillett, 1900.—Hidden Falls, Station 3, 6,900 ft., July 8, 1942, resting on the face of perpendicular wet rocks *(M. M. Alexander);* Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942; swept from dense willow patches.

Dicranota (Dicranota) montana Alexander, 1920.—Arizona Creek, 6,790 ft., July 4, 1942 *(M. M. Alexander);* flying close to stream margin.

Dicranota (Dicranota) tetonicola sp. nov.—General coloration dark gray, the praescutum with three blackish stripes; antennae short, 13-segmented; knobs of halteres dark brown; legs black, the femoral bases restrictedly brightened; wings with a strong blackish tinge, stigma oval, still darker; cell R_3 sessile or virtually so, R_{2+3+4} usually lacking or reduced to a punctiform element; cell M_1 present; male hypopygium with the lateral tergal arms very

small, slender-stemmed, terminating in a small head; apex of basistyle produced into a stout dorsal lobe; interbase a strong powerful rod, at apex expanded into an oval blade that terminates in a small apiculate point.

♂. Length, about 6.5 mm.; wing, 8 mm.; antenna, about 1-1.1 mm.

Rostrum black, sparsely pruinose; palpi black. Antennae short black throughout, 13-segmented; first flagellar segment cylindrical, nearly twice as long as second; succeeding segments oval, with the lower face a little produced; terminal segment reduced, about one-third as long as the penultimate; longest verticils a little shorter than the segments; besides the verticils, an abundant vestiture of short erect dark setulae. Head dark brownish gray; anterior vertex broad; vertical tubercle low.

Pronotum dark gray. Mesonotum dark gray, the praescutum with three blackish stripes, the median one vaguely divided by a paler vitta; scutal lobes variegated by blackened areas. Pleura and pleurotergite gray, the ventral sternopleurite darker; dorsopleural membrane infuscated. Halteres relatively long, stem pale, knob dark brown. Legs with the coxae gray; trochanters testaceous; remainder of legs black, the femoral bases restrictedly brightened. Wings (Fig. 20) with a strong blackish tinge; costal border and a seam along vein *Cu* still darker; stigma oval, even darker brown; veins dark brown. Venation: Sc_1 ending opposite the supernumerary crossvein in cell R_1, Sc_2 a

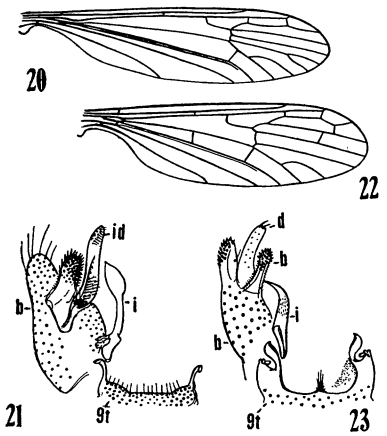


Fig. 20. *Dicranota (Dicranota) tetonicola* sp. nov.; venation.

Fig. 21. *Dicranota (Dicranota) tetonicola* sp. nov.; male hypopygium.

Fig. 22. *Dicranota (Polyangaeus) megalops* sp. nov.; venation.

Fig. 23. *Dicranota (Polyangaeus) megalops* sp. nov.; male hypopygium.

(Symbols: *b*, basistyle; *d*, dististyle; *i*, interbase; *id*, inner dististyle; *t*, tergite.)

distance before the origin of *Rs* greater than the length of the latter; vein R_2 erect; cell R_3 sessile or with R_{2+3+4} indicated by a punctiform element; cell M_1 present; *m-cu* about its own length beyond the fork of *M*.

Abdomen black, sparsely pruinose, the pleural membrane conspicuously pale; hypopygium large, black. Male hypopygium (Fig. 21) with the tergite, *9t*, broad, concave across the margin, the lateral angles produced, terminating in a very small, slender-stemmed arm with an expanded or capitate head. Basistyle, *b*, with the apical lobe large and stout, with long coarse pale setae; interbase, *i*, a strong powerful rod, at apex expanded into an oval blade that terminates in a small apiculate point. Outer dististyle, *od*, broad, the distal

half with abundant blackened spinous setae. Inner dististyle, *id,* a flattened elongate blade, its tip narrowly obtuse.

Holotype, ♂, Jenny Lake, Station 5, 6,790 ft., July 6, 1941 *(C. P. Alexander). Paratopotype,* 1 ♂. The types were captured by sweeping vegetation along banks of Cascade Creek close to the lake margin.

Dicranota (Dicranota) tetonicola is entirely distinct from all other Nearctic species described to this date. It is well distinguished by the blackened wings, with distinctive venation, and by the structure of the male hypopygium, especially the produced basistyle and the shapes of the interbase and lateral arms of tergite.

Dicranota (Plectromyia) reducta (Alexander, 1921).—Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941, abundant; Indian Paintbrush Canyon, 7,500 ft., July 13, 1941.

Dicranota (Polyangaeus) megalops sp. nov.—Fully-winged in both sexes; general coloration dark brown or brownish black the praescutal stripes poorly differentiated; antennae with flagellar segments tending to fuse into groups of two or three, more especially the proximal ones; eyes (male) large and protuberant; halteres pale; tibiae white with both ends narrowly darkened; male hypopygium with the median tergal lobe very narrow, tipped with about four large setae.

♂. Length, about 4-5 mm.; wing, 4.2-5.2 mm.; antenna, about 0.7-0.9 mm.

♀. Length, about 4-4.5 mm.; wing, about 4.5-5 mm.

Rostrum and palpi black. Antennae with scape and pedicel brownish black, flagellum yellowish brown to dark brown; antennal segments varying in number from 12 to 14 segments; basal flagellar segments tending to become united into one or more paired segments, or into a more extensive fusion, in some cases involving the proximal three flagellar segments; in some cases, the outermost pair of segments likewise more or less fused; unfused segments short-oval to oval. Head dark brownish gray; eyes of male very large and protuberant, broadly contiguous beneath but widely separated by the vertex; anterior vertex about three times the diameter of scape.

Pronotum restricted in size, testaceous brown. Mesonotum almost uniform dark brown or brownish black, the three praescutal stripes poorly differentiated. Pleura brownish black; dorsopleural membrane pale. Halteres pale. Legs with the coxae testaceous, the fore pair a little paler than the others; trochanters yellow; femora brownish yellow, the tips narrowly blackened; tibiae white, with both base and apex narrowly blackened; proximal tarsal segments pale brown, the outer segments darker. Wings (Fig. 22) broad, subhyaline, with restricted dark clouds, as follows: Over supernumerary crossvein in cell *Sc;* origin of *Rs;* cord; R_2 over all outer supernumerary crossveins; veins pale brown, darker in the clouded portions. Wings equally developed in both sexes. Venation: Supernumerary crossveins in cells R_3, R_4 and M, additional to the usual one in cell R_1; venation unusually variable, especially as regards cell

M_1 which, while normally present, may be lacking (as figured) or in process of loss by atrophy of vein M_2.

Abdomen, including hypopygium, brownish black. Male hypopygium (Fig. 23) with the median region of tergite, *9t*, produced into a slender lobe that bears about four elongate setae at and near summit; lateral tergal arms appearing as conspicuous flattened blades, narrowest at base, expanded at apex into a semicircular head; still laterad of the insertion of the blade with two smaller lobes on the incurved margin of the tergite. Basistyle, *b*, with two slightly unequal apical lobes, the outer one stouter than the inner, both with abundant short blackened spines; interbase, *i*, a strong powerful blade, very broad at base, at about three-fourths the length bent almost at a right angle and thence narrowed to a long straight point; surface of interbase before the bend with abundant microscopic setulae. Dististyle, *d*, in the notch formed by the lobes of the basistyle, appearing as a slender yellow blade, broadest at base, narrowed very gradually to the obtuse tip which bears two strong spinous setae; elsewhere on surface the setae sparse and reduced in size.

Holotype, ♂, Moran bog, Station 2, 6,800 ft., July 2, 1941 *(C. P. Alexander)*. *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 1 ♂, pinned with type; numerous additional ♂ ♂ and a few ♀ ♀, July 2-5, 1941 *(C. P. & M. M. Alexander)*.

Dicranota (Polyangaeus) megalops is readily told from the only other discovered Rocky Mountain species, *D. (P.) subapterogyne* (Alexander, 1943) by the large eyes of the males and the fully-winged females. From the still more western, *D. (P.) maculata* (Doane, 1900), it is told by the unusually large size of the head, especially across the eyes, and in the details of coloration, as the almost uniform dark tone of the body. From a recent survey of the greatly developed *Dicranota* fauna of Asia, particularly the Himalayan region, it seems best to place various groups, including *Polyangaeus* Doane, 1900, as subgenera rather than to attempt to maintain them as full genera.

The present fly was found in a very restricted area in the Moran bog. Here they were found resting on herbs beneath the willow thickets and a series of more than fifty specimens was taken. Toward evening the males appeared in small swarms of from six to eight individuals, dancing close to the ground alongside the willow thickets.

Dicranota (Polyangaeus) subapterogyne (Alexander, 1943).—Jenny Lake, 6,780 ft., July 4, 1941; Hidden Falls, 6,900 ft., 6,900-7,000 ft., July 3-8, 1941; Leigh Lake, 6,875 ft., July 10, 1941; Moran, bog, 6,800 ft., July 2, 1941; all part of type series. For an account of the habits and occurrence of this fly, with its nearly wingless females, the preceding part of this series should be consulted (Alexander, 1943: 743).

Dicranota (Rhaphidolabis) cayuga (Alexander, 1916).—Jenny Lake, 6,780 ft., July 6, 1941; Cascade Trail, above Station 4, 8,800 ft., July 9, 1941.

Dicranota (Rhaphidolabis) subsessilis (Alexander, 1921).—Jenny Lake,

Station 5, 6,780 ft., July 3-6, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941.

Ula (Ula) paupera Osten Sacken, 1869.—Arizona Creek, 6,790 ft., July 5, 1942, beneath evergreens; Leigh Lake, 6,870 ft., July 10, 1941.

HEXATOMINI

Austrolimnophila badia (Doane, 1900).—Jenny Lake, 6,780 ft., July 3-5, 1941; Hidden Falls, 6,900 ft., July 8, 1942.

Archilimnophila subunica (Alexander, 1920).—Hidden Falls, 6,900 ft., July 3, 1941; male, with both wings badly deformed.

Phyllolabis lagganensis Alexander, 1931.—Below Hidden Falls, Station 3, on wet rocky exposures, July 4, 1941.

Limnophila (Elaeophila) aleator sp. nov.—General coloration gray, the praescutum with four entire dark brown stripes; antennae brownish black, relatively short; knobs of halteres dark brown; femora obscure yellow, the tips narrowly darkened; remainder of legs medium brown; wings relatively narrow, spotted and dotted with brown, including six larger costal areas; cells of posterior three-fourths of wing with relatively numerous brown dots; male hypopygium with the outer dististyle relatively broad, its outer flange broadly attached.

♂. Length, about 6.5-7 mm.; wing, 8 x 1.8-8.5 x 1.9 mm.; antenna, about 1.3-1.4 mm.

♀. Length, about 7-8 mm.; wing, 8-9 mm.

Rostrum brown, sparsely pruinose; palpi black. Antennae relatively short, brownish black, the scape sparsely pruinose; basal flagellar segments short-oval, the outer ones more elongate, with conspicuous verticils. Head dark gray, the broad anterior vertex with a narrow blackish spot or short stripe.

Pronotum brownish gray, with a darker brown median line. Mesonotal praescutum with the ground yellowish gray, with four entire, dark brown stripes; pseudosutural foveae large and black; scutum brownish gray, each lobe and the central region patterned with brown; posterior sclerites of notum dark brown, sparsely pruinose. Pleura dark brown, heavily gray pruinose; dorsopleural membrane darkened. Halteres yellow, the knobs dark brown. Legs with the coxae obscure testaceous yellow, the fore and middle pairs narrowly more darkened basally; trochanters obscure brownish yellow; femora obscure yellow, the tips narrowly darkened; remaining segments of legs medium brown. Wings (Fig. 24) relatively narrow, as shown by the measurements; ground color yellow, more saturated in the prearcular and costal regions; a series of six major brown costal spots, all reaching the anterior margin, the first more broken, at *h* and above the arculus; third area at origin of *Rs,* fourth at fork of *Sc,* fifth area stigmal, the sixth at the end of vein R_3; more restricted brown clouds at cord, outer end of cell *1st* M_2, over the supernumerary crossvein, and at end of vein *2nd A;* relatively numerous, small, paler brown dots in the cells of posterior three-fourths of wing, lacking or virtually so along the

brightened costal border; veins brown, yellow in the costal interspaces. Venation: *Rs* long, angulated and sometimes spurred at origin; R_{2+3+4} relatively long, subequal to or slightly longer than cell *1st* M_2, virtually in longitudinal alignment with *Rs;* R_2 subequal to or longer than R_{2+3}; cell *1st* M_2 relatively small, *m-cu* at or before midlength.

Abdominal segments obscure brownish yellow or light brown, the lateral and posterior borders of the segments darker brown; sternites with the ground somewhat clearer yellow; a narrow darker subterminal ring; hypopygium medium brown. Male hypopygium (Fig. 27) with the basistyle, *b,* relatively stout, without elongate setae as in *angustior.* Outer dististyle, *od,* broader than in *superlineata,* the outer flange broadly attached, relatively small and

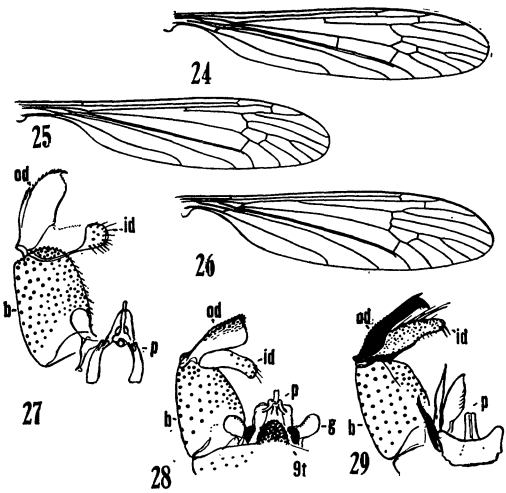


Fig. 24. *Limnophila (Elaeophila) aleator* sp. nov.; venation.

Fig. 25. *Limnophila bigladia* sp. nov.; venation.

Fig. 26. *Limnophila tetonicola* sp. nov.; venation.

Fig. 27. *Limnophila (Elaeophila) aleator* sp. nov.; male hypopygium.

Fig. 28. *Limnophila (Elaeophila) shannoni* Alexander; male hypopygium.

Fig. 29. *Limnophila tetonicola* sp. nov.; male hypopygium.

(Symbols: *b,* basistyle; *g,* gonapophysis; *id,* inner dististyle; *od,* outer dististyle; *p,* phallosome; *t,* tergite.)

inconspicuous. Inner dististyle, *id,* with only the distal third sclerotized and provided with setae, the basal portion, excepting a narrow band along the lower or cephalic border, consisting of white membrane. Phallosome, *p,* with the gonapophyses appearing as relatively large and conspicuous oval blades, much larger than in *superlineata;* phallosomic plate narrowed outwardly, not forming, square shoulders, as in *superlineata.*

Holotype, ♂, Arizona Creek, Station 1, 6,790 ft., July 2, 1941 *(C. P. Alexander). Allotopotype,* ♀, July 8, 1941. *Paratopotypes,* 6 ♂ ♀, 6,790-6,800 ft., July 1-8, 1941 *(C. P. & M. M. Alexander); paratypes,* a few ♂ ♀, 5 miles south of Glendale, Utah, along stream seepage, May 5, 1943 *(G. F. Knowlton).*

The only generally similar regional species is *Limnophila (Elaeophila) superlineata* Doane, 1900, which is well-distinguished by the broad wings, with a different arrangement of pattern, and in the details of structure of the male hypopygium, as discussed above.

Limnophila (Elaeophila) angustior Alexander, 1919.—Arizona Creek, 6,790 ft., July 4-8, 1941.

Limnophila (Elaeophila) shannoni Alexander, 1921.—The types were from Moscow Mt., Idaho, collected July 25, 1920, by R. C. Shannon. I have not seen any additional specimens until the present material.

Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941. I am transferring both this species and *L. (E.) bifida* Alexander, 1921, from the subgenus *Idioptera* Macquart, 1834, where they were originally assigned, to *Elaeophila* Rondani, 1856. Such a treatment conforms to that of the late Dr. Fred W. Edwards (Trans. Soc. British Ent., 5, pt. 1:76-84; 1938) where, by a readjustment of characters, the various British species previously referred to *Idioptera* on the basis of length of the antennae in the male sex were placed in *Elaeophila* on other characters of venation and hypopygial structure. Both of the Nearctic species above mentioned have the male antennae elongate and in this respect differ widely from the remaining rather numerous species of *Elaeophila,* being evidently more nearly allied to the northern European *L. (E.) trimaculata* (Zetterstedt, 1838).

Male hypopygium (Fig. 28) with the median region of tergite, *9t,* produced caudad into a rounded or oval lobe that is densely clothed with setae. Outer distyle, *od,* simple, appearing as a blackened blade, expanded outwardly, its apex truncated; outer apical portion with microscopic blackened spinulae, the extreme angle more or less produced. Inner dististyle, *id,* subequal in length to the outer style, gradually narrowed to the obtuse tip. Gonapophyses, *g,* appearing as oval plates, the apex smooth and evenly rounded, the inner or caudal margin more roughened. Phallosome and aedeagus short.

Limnophila (Phylidorea) adusta Osten Sacken, 1859.—String Lake, bog, 6,870 ft., July 7, 1941. The first record of this eastern North American species from the west; hitherto not known from west of Wisconsin and Illinois.

Limnophila (Phylidorea) claggi Alexander, 1930.—Moose Ponds, near Jenny Lake, 6,700 ft., July 6, 1941; Jenny Lake, 6,790 ft., July 3, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941; Cascade Trail, in Engelmann Spruce forest, 8,000 ft., July 9, 1941.

Limnophila (Phylidorea) platyphallus Alexander, 1926.—Moran bog, 6,800 ft., July 2-5, 1941.

Limnophila (Phylidorea) tepida Alexander, 1926.—Moran bog, 6,800 ft., July 2-5, 1941; Cascade Trail, in boggy areas in the Engelmann Spruce forest, 8,000-8,200 ft., July 3-9, 1941. Closely allied to *L. (P.) flavipila* Doane, 1900.

Limnophila bigladia sp. nov.—Allied to *mcdunnoughi;* general coloration dark gray, the praescutum with four brown stripes; fore femora extensively blackened; wings cream-colored, with a restricted but conspicuous brown pattern; outer radial field darkened; area near base of cell *R* very reduced; cell *1st* M_2 rectangular; abdominal sternites yellow; subterminal seg-

ments blackened; male hypopygium with the outer dististyle broadly flattened; gonapophyses appearing as relatively small, slender, divergent blades that exceed the aedeagus in length.

♂. Length, about 11-12 mm.; wing, 10-11.5 mm.; antenna, about 1.6-1.7 mm.

♀. Length, about 13 mm.; wing, 12 mm.

Rostrum black, pruinose; palpi brown, passing into black. Antennae with scape and pedicel black; flagellum dark brown, the outer segments even darker; basal flagellar segments subglobular, relatively large and crowded, with verticils on their dorsal surface only; on about the sixth and succeeding segments with verticils on both faces, very long and conspicuous, the segments elongate. Head gray, the setigerous punctures brown; head only moderately narrowed behind; anterior vertex about three times as wide as the diameter of scape.

Pronotum relatively small, gray. Mesonotum dark gray, the praescutum with four brown stripes, the humeral region lighter gray, enclosing the large, conspicuous, black pseudosutural foveae; scutal lobes with weakly darkened centers; posterior sclerites of notum light gray. Pleura gray, the dorsopleural region only slightly brightened. Halteres uniformly pale yellow. Legs with fore and middle coxae dark gray, brightened at apices, posterior coxae more extensively pale; trochanters reddish; fore femora in types extensively blackened, as in *nigrofemorata,* with about the proximal third yellow; middle and hind femora usually with the tips more narrowly blackened, especially the middle pair; in other specimens, all femora equally and broadly blackened; tibiae brown, the tips narrowly blackened; tarsi black. Wings (Fig. 25) with the ground color creamy, the prearcular and costal fields clearer yellow; a restricted but conspicuous brown pattern, including the stigma and a complete band at cord; outer end of cell *1st* M_2; wing-tip, especially in outer radial field; a large circular spot at origin of *Rs;* a small cloud near outer end of cell *1st A* adjoining the vein; a small to scarcely indicated darkening in cell *R* adjoining the vein, about mid-distance between arculus and origin of *Rs,* this much smaller than in *nigrofemorata.* Venation: *Rs* square and spurred at origin; R_{2+3+4} relatively short, up to about one-half longer than the basal section of R_5; cell *1st* M_2 rectangular, longer than in related species.

Abdomen yellow; basal tergite and proximal ring of second darkened; succeeding tergites brown with the basal lateral portions yellow; on the fifth and succeeding tergites more uniformly brown; sternites clear yellow, the intermediate segments with a weak dark area on posterior border; eighth and ninth segments black; styli paler. Male hypopygium with the dorsal lobe of basistyle much produced. Outer dististyle of about the same shape as in *mcdunnoughi,* broadest across the proximal half, the greatest width at about two-thirds the length; apex unequally bidentate. Gonapophyses appearing as relatively small, slender, divergent blades that exceed the aedeagus in length.

Holotype, ♂, Death Canyon, Grand Tetons, 7,800 ft., July 14, 1941 *(C. P. Alexander). Allotopotype,* ♀, with the type. *Paratopotypes,* 25 ♂ ♀; *paratypes,* 1 ♀, Arizona Creek, Station 1, 6,790 ft., July 1, 1941 *(C. P. Alexander);* 1 ♂, Mount Rainier, Washington, 2,900 ft., July 28, 1940 *(H. &*

M. Townes); 1 ♂, 1 ♀, Banff, Alberta, July 18-25, 1922 *(C. B. D. Garrett);* other material in this series in the Canadian National Collection (as *mcdunnoughi).*

Although closely allied to *Limnophila mcdunnoughi* Alexander, 1926, and *L. nigrofemorata* Alexander, 1927, the present fly is distinguished by various characters, particularly in the structure of the male hypopygium. From *mcdunnoughi* it differs in the venation and pattern of the wings and legs, and, especially, in the conformation of the gonapophyses, which in *mcdunnoughi* are unusually large and flattened, much more complex in structure. From *nigrofemorata,* it differs in the structure of the hypopygium, particularly the outer dististyle and the gonopophyses (see figure, Proc. U. S. Nat. Mus., 72, art. 2, pl. 1, fig. 7; 1927; outer dististyle). In their general appearance all three species much resemble large, showy species of the subgenus *Phylidorea* but form a distinct and isolated group of forms that it seems better not to attempt to assign to any particular subgeneric group at the present time.

The main series of types was swept from low grasses and rushes near the banks of Death Creek, near the Forks. The males were flying very close to the ground and were much in evidence.

Limnophila occidens Alexander, 1924.—Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941; Indian Paintbrush Canyon, 8,000 ft., July 13, 1941; Cascade Trail, 8,000 ft., in Engelmann spruce association, July 3, 1941.

Limnophila tetonicola sp. nov.—Size large (wing, male, 10 mm. or more); general coloration of notum brownish gray, the posterior sclerites and the pleura clearer gray; antennae relatively short, the proximal three flagellar segments enlarged, the outer ones very slender, with conspicuous verticils; wings brownish yellow, the oval stigma dark brown; *Rs* very long, subequal to the distal section of R_5; cell M_1 longer than its petiole; *m-cu* at or beyond midlength of cell *1st* M_2; abdomen brownish black, the basal sternites with their central portion obscure yellow; male hypopygium with the outer dististyle a nearly straight rod, with a suberect spine before the decurved apex.

♂. Length, about 9.5-11.5 mm.; wing, 10.5-13.5 mm.; antenna, about 1.9-2.1 mm.

Rostrum black, brownish gray pruinose; palpi black. Antennae relatively short; scape brownish black above, lighter brown beneath; pedicel and flagellum black; pedicel large, pyriform; basal three flagellar segments large, especially the first, outwardly becoming progressively smaller, subcylindrical or with the lower face slightly produced; succeeding segments passing into long-cylindrical, with long conspicuous verticils, the longest exceeding the segments in length; terminal segment a little longer than the penultimate. Head brownish gray; anterior vertex relatively wide, about three times the diameter of scape; head only moderately narrowed behind.

Pronotum moderately massive; scutum brownish gray; scutellum brightened, obscure yellow medially, infuscated on sides. Mesonotum almost uniform dark brown, the praescutum without clearly differentiated stripes, the interspaces about concolorous with the stripes, the central region before suture more

reddened; pseudosutural foveae lying close to lateral border, pale in color and very inconspicuous; surface of notum sparsely pruinose, the lateral and humeral regions of praescutum more yellowish gray; scutellum and postnotum clearer gray pruinose. Pleura gray pruinose; dorsopleural membrane yellow. Halteres with stem yellow, clearer at base, knob infuscated. Legs with coxae infuscated, pruinose, paler at tips, the posterior pair somewhat more uniformly pale; trochanters obscure yellow; femora obscure yellow, more brownish yellow outwardly, the tips narrowly and inconspicuously darker brown; tibiae and basitarsi light brown, the tips narrowly blackened; remainder of tarsi black; claws long and simple. Wings (Fig. 26) large, with a strong and almost uniform brownish yellow suffusion; prearcular and costal fields slightly more yellowish; stigma oval, dark brown, relatively conspicuous; certain of the veins, especially in the radial field, very insensibly bordered by darker; veins brown, more brownish yellow in the brightened fields. Venation: *Sc* relatively long, Sc_1 ending opposite fork of R_{2+3+4}, Sc_2 at its tip; *Rs* very long, subequal to or a little longer than the distal section of R_5; R_{2+3+4} relatively short, varying from subequal to less than twice the basal section of R_5 or nearly subequal to R_{1+2}; cell M_1 longer than its petiole; *m-cu* at or beyond midlength of cell *1st* M_2; anterior arculus present.

Abdomen brownish black; basal sternites obscure yellow on median portion, the sides blackened, this pale color narrowed on outer segments; subterminal segments uniformly dark; hypopygium brightened, obscure brownish yellow to dark brown. Male hypopygium (Fig. 29) with the basistyle, *b*, stout, simple, not produced at apex nor with an interbasal process. Outer dististyle, *od*, a nearly straight blackened rod, the apex slightly decurved into a strong spine, with a nearly equal suberect spine on outer margin a short distance back from tip. Inner dististyle, *id*, stout, narrowed to the obtuse tip, terminating in two strong setae, with four or five longer and more slender bristles on outer margin; remaining surface of style with abundant smaller setae and setulae. Phallosome, *p*, with the apophyses longer than the aedeagus.

Holotype, ♂, Indian Paintbrush Canyon, Grand Tetons, 8,000 ft., July 13, 1941 *(C. P. Alexander)*. *Paratopotypes*, 11 ♂♂, 7,800-8,000 ft., July 13, 1941; 1 ♂, Leigh Lake, Station 5, 6,870 ft., July 10, 1941 *(C. P. Alexander)*; 1 ♂, Indian Paintbrush Canyon, 9,000 ft., August 7, 1942 *(J. L. Sperry)*.

As with the preceding species, I am quite uncertain as to the strict subgeneric position of the present fly. It may possibly be referred to *Phylidorea* but the great length of *Rs* would seem to preclude such an assignment. The fly needs no comparison with any of the species so far made known. The main series of types was swept from a marshy area along the stream in Indian Paintbrush Canyon. They would swarm in groups of two or three individuals very close to the ground beneath the alpine firs.

Pilaria imbecilla (Osten Sacken, 1859).—In a nearly dessicated wet area where *Pedicularis groenlandica* Retz., was the dominant plant, near Jackson Lake, 6,770 ft., July 15, 1941.

Pilaria osborni (Alexander, 1914).—Associated with the last named. The

fly is very close to the Palaearctic *meridiana* Staeger, 1840, and may prove to be identical, in which case it would have a vast subpolar range throughout the North Temperate zone.

Hexatoma (Eriocera) eriophora (Williston, 1893).—Pilgrim Creek, near Moran, 6,800 ft., July 5, 1942.

Hexatoma (Eriocera) velveta (Doane, 1900).—Arizona Creek, Station 1, along stream border, 6,790 ft., July 8, 1941.

ERIOPTERINI

Gonomyia (Idiocera) shannoni Alexander, 1926.—Jenny Lake, 6,790 ft., July 4, 1941; swarming in small groups beneath the Engelmann spruce in relatively dry places along the trail. The habitat is quite different from that frequented by *G. (I.) proserpina* Alexander, 1943, in the Yellowstone (Alexander, 1943: 749).

Gonomyia (Gonomyia) aciculifera Alexander, 1919.—Arizona Creek, Station 1, 6,790 ft., July 1-8, 1941, very abundant on herbage near stream.

Gonomyia (Gonomyia) bihamata Alexander, 1943.—Hidden Falls, 6,900 ft., July 4, 1941; Jenny Lake, 6,790 ft., July 6, 1941; Leigh Lake, 6,870 ft., July 10, 1941.

Gonomyia (Gonomyia) extensivena Alexander, 1943.—Cascade Canyon, Station 4, 8,200 ft., July 9, 1941.

Gonomyia (Gonomyia) vafra sp. nov.—Allied to *extensivena;* general coloration of mesonotum brownish gray, the posterior border of scutellum yellow; antennae black throughout; fore coxae blackened; wings with a grayish tinge, the prearcular and costal fields more yellowed; *Sc* relatively short, Sc_1 ending about opposite origin of *Rs*, Sc_2 a short distance from its tip; R_{2+3+4} only slightly arcuated; cell *1st* M_2 only gently widened outwardly; abdominal tergites dark brown, sternites and hypopygium yellow; male hypopygium with the outer dististyle of moderate length, with a long dark-colored lateral flange; inner dististyle with a single simple blackened spine.

♂. Length, about 4.5 mm.; wing, 5-5.2 mm.

Rostrum yellow; palpi black. Antennae black throughout, relatively elongate; flagellar segments long-oval, passing into elongate. Head dark gray, indistinctly patterned with reddish on vertex.

Mesonotal praescutum light yellow with three brownish gray stripes that are only vaguely separated; scutal lobes similarly darkened, the median region pale; scutellum darkened medially at base, the posterior border obscure yellow; mediotergite brownish gray, the lateral borders yellow; pleurotergite entirely yellow. Pleura yellow, the propleura and mesepisternum patterned with dark brown or brownish black, including the extensive propleural area and less evident darkenings on the ventral anepisternum and ventral sternopleurite. Halteres brownish black, the base of stem pale. Legs with fore coxae brown-

ish black, the remaining coxae testaceous yellow; trochanters yellow; femora, tibiae and basitarsi brownish yellow, somewhat darker at their tips; remainder of tarsi black. Wings (Fig. 30) with a grayish tinge, the prearcular and costal fields more yellowed; stigma pale brown, ill-delimited and poorly indicated against the ground; veins brown. Venation: *Sc* relatively short, Sc_1 ending opposite the origin of *Rs*, Sc_2 a distance before this origin that is subequal to *m*; R_{2+3+4} only slightly arcuated; cell *1st* M_2 rectangular, only slightly arcuated; cell *1st* M_2 rectangular, only slightly widened outwardly, subequal in length to vein M_4 beyond it; *m-cu* about one-fifth to one-sixth its length beyond the fork of *M*.

Abdominal tergites dark brown, the incisures of the outer segments paler; sternites and hypopygium yellow. Male hypopygium (Fig. 36) with the outer dististyle, *od*, shorter than in *extensivena*, its darkened flange longer. Inner dististyle, *id*, with a single simple blackened spine. Gonapophyses unequal. Apex of aedeagus shaped as in the group, the subterminal lobes obtuse, the tips nearly hyaline.

Holotype, ♂, Arizona Creek, Station 1, 6,790 ft., July 4, 1942 *(C. P. Alexander)*. *Paratopotype*, ♂.

Although in its general appearance, *Gonomyia (Gonomyia) vafra* is rather different from *G. (G.) extensivena* Alexander, there can be no question of the close relationships between the two flies. The hypopygial differences have been discussed above. In *extensivena*, the wings are broader, with the individual cells correspondingly wider, and with vein *Sc* extending to a varying distance beyond the origin of *Rs*.

Rhabdomastix (Sacandaga) leonardi Alexander, 1930.—Arizona Creek, 6,790 ft., July 1-8, 1941, July 5, 1942; abundant on low willows along the stream.

Rhabdomastix (Sacandaga) neolurida Alexander, 1943.—The type material was from Arizona Creek, 6,700-6,790 ft., July 8, 1941. Additional specimens from the same station July 5, 1942.

Rhabdomastix (Sacandaga) subcaudata Alexander, 1927.—Cascade Trail, Grand Tetons, below Lake Solitude, 8,800 ft., July 9, 1941.

Erioptera (Empeda) tristimonia Alexander, 1943.—Jenny Lake, Station 5, 6,780 ft., July 6, 1941.

Erioptera (Erioptera) septemtrionis Osten Sacken, 1859.—Leigh Lake, 6,870 ft., July 10-12, 1941; Death Canyon, 7,000 ft., July 14, 1941 *(M. M. Alexander)*.

Erioptera (Mesocyphona) distincta Alexander, 1912.—Arizona Creek, Station 1, 6,790 ft., July 1, 1941.

Erioptera (Symplecta) cana (Walker, 1848).—Arizona Creek, 6,790 ft., July 2, 1941; Moran bog, 6,800 ft., July 5, 1941; Leigh Lake, 6,870 ft., July 10-12, 1941; Pilgrim Creek, near Moran, 6,800 ft., July 5, 1942.

Erioptera (Psiloconopa) aperta (Coquillett, 1905) *(mormon* Alexander, 1927).—Cascade Creek, below Hidden Falls, 6,850 ft., July 4-6, 1941, close to the stream margin; Death Canyon, 7,800 ft., July 14, 1941.

Erioptera (Psiloconopa) gaspicola (Alexander, 1929).—Arizona Creek, Station 1, 6,790 ft., July 1-8, 1941.

Erioptera (Psiloconopa) shoshone sp. nov.—Belongs to the *meigenii* group; size small (wing, under 4 mm.); general coloration black, the surface more or less opaque; pronotum, mesonotal scutellum and pleura variegated with yellow; palpi, antennae and legs uniform black; halteres clear yellow; wings subhyaline; cell M_2 open by the atrophy of *m; m-cu* a short distance before fork of *M;* vein *2nd A* evenly convex; abdomen black, the outer segments ringed caudally with yellow; male hypopygium with both dististyles small and simple, the glabrous outer style blackened on distal portion; both sets of gonapophyses appearing as simple slender rods with acute tips.

♂. Length, about 2.8-3 mm.; wing, 3.2-3.5 mm.; antenna, about 0.5 mm.

♀. Length, about 3-3.2 mm.; wing, 3-3.5 mm.

Rostrum and palpi black. Antennae black throughout; flagellar segments oval, with verticils of moderate length. Head brownish gray; anterior vertex relatively narrow; eyes of male large.

Pronotum light yellow, variegated on central portion with brown. Mesonotum black, the surface slightly opaque; humeral region of praescutum restrictedly bright yellow; scutellum obscure orange-yellow, parascutella dark. Pleura black, more heavily gray pruinose, conspicuously variegated with yellow, arranged as follows: Dorsopleural region; dorsal anepisternum; posterior ventral sternopleurite; dorsal and ventral pteropleurite, and on the metapleura. Halteres conspicuously light sulphur yellow, the base of stem restrictedly darkened. Legs with the coxae black, sparsely pruinose; remainder of legs black. Wings (Fig. 31) subhyaline, the prearcular field slightly more yellowish; veins pale brown. Venation: *Sc* moderately long, Sc_1 ending a short distance before fork of *Rs,* Sc_2 far from its tip; R_{2+3+4} usually much longer than R_{2+3}, in cases the veins subequal; cell M_2 open by the atrophy of *m; m-cu* a short distance before the fork of *M,* this distance slightly variable; Anal veins divergent, vein *2nd A* strongly convex.

Abdomen black, the segments patterned with yellow, on the more basal segments restricted to the posterior lateral angles; larger and more conspicuous on the subterminal segments, forming complete crossbands at the posterior borders; hypopygium relatively large, chestnut brown to darker brown. Male hypopygium (Fig. 37) with the basistyle, *b,* produced slightly beyond the point of insertion of the dististyles as a low obtuse glabrous lobe or flange. Both dististyles relatively small and simple, the outer style, *od,* glabrous, almost parallel-sided, its apex blackened and obliquely truncated, the outer upper angle subacute; inner dististyle, *id,* slightly longer, appearing as a flattened blade, its apex obtuse, the setae small, distributed at apex and along the lower or cephalic edge. Gonapophyses, *g,* appearing as simple blackened rods with acute tips, the outer pair strongly sinuous; inner apophyses more nearly straight with their bases dilated.

Holotype, ♂, Arizona Creek, Station 1, 6,790 ft., July 2, 1941 *(C. P. Alexander). Allotopotype,* ♀, pinned with the type. *Paratopotypes* 6 ♂ ♀, pinned with the types; numerous additional paratypes, 6,790-6,800 ft., July 1-8, 1941 *(C. P. & M. M. Alexander; W. H. Harrison);* July 5, 1942 *(C. P. Alexander).*

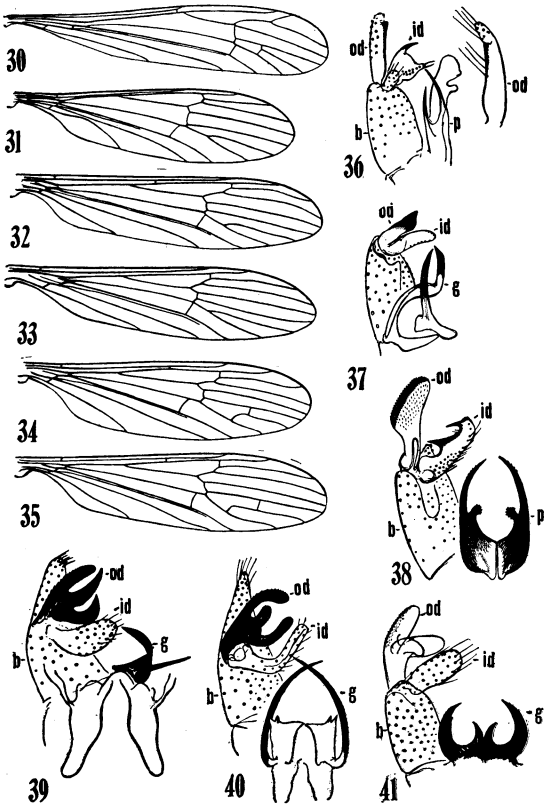


Fig. 30. *Gonomyia (Gonomyia) vafra* sp. nov.; venation.

Fig. 31. *Erioptera (Psiloconopa) shoshone* sp. nov.; venation.

Fig. 32. *Erioptera (Ilisia) bispinigera* Alexander; venation.

Fig. 33. *Erioptera (Ilisia) manitobensis* Alexander; venation.

Fig. 34. *Erioptera (Ilisia) rainieria* Alexander; venation.

Fig. 35. *Erioptera (Ilisia) zukeli* Alexander; venation.

Fig. 36. *Gonomyia (Gonomyia) vafra* sp. nov.; male hypopygium.

Fig. 37. *Erioptera (Psiloconopa) shoshone* sp. nov.; male hypopygium.

Fig. 38. *Erioptera (Ilisia) bispinigera* Alexander; male hypopygium.

Fig. 39. *Erioptera (Ilisia) rainieria* Alexander; male hypopygium.

Fig. 40. *Erioptera (Ilisia) dorothea* Alexander; male hypopygium.

Fig. 41. *Erioptera (Ilisia) zukeli* Alexander; male hypopygium.

(Symbols: *b,* basistyle; *g,* gonapophysis; *id,* inner dististyle; *od,* outer dististyle; *p,* phallosome.)

The present very distinct crane-fly belongs to the typical group of the subgenus, now known to be represented by several species distributed throughout the Holarctic Region. In our fauna, the only related species is *Erioptera (Psiloconopa) cramptonella* (Alexander, 1931), of eastern Canada, which differs in the larger size, venation, and in the very different male hypopygium. In its open cell M_2, the present fly agrees more closely with *E. (P.) pusilla* (Schiner, 1865) of Europe, and *E. (P.) verna* (Alexander, 1920), of Japan.

In recent years it has become increasingly evident that it will be difficult or impossible to maintain as distinct certain subgenera of *Erioptera,* such as *Ilisia* Rondani, *Hoplolabis* Osten Sacken, and *Psiloconopa* Zetterstedt. I have

discussed this problem in other papers and it seems virtually certain that eventually all three groups will be reduced to a single name, the oldest being *Psiloconopa*. In this particular subgenus several very distinct groups of species are found, some of which are well represented in the Rocky Mountain region.

Erioptera (Ilisia) bispinigera Alexander, 1930.—Arizona Creek, Station 1, 6,790 ft., July 2-15, 1941. Hitherto known only from the unique type specimen from Montana. The wing venation is shown (Fig. 32). Male hypopygium (Fig. 38) with the basistyle, *b*, at apex produced into a small conical point that bears several very long setae; mesal face of style near base with a pale fleshy lobe provided with several short setae; remainder of style with scattered elongate setae. Outer dististyle, *od*, a blackened blade, the stem relatively short, the distal two-thirds expanded into an oblique spatula, its outer margin with parallel rows of subappressed comb-like teeth. Inner dististyle, *id*, shorter and smaller, outer or lateral margin produced into two powerful black spines, the more basal one slightly larger, both spines slightly recurved; surface of style with numerous conspicuous setae. Phallosome, *p*, consisting of a powerful blackened plate on either side, broad at base, at near midlength with the outer portion produced into a long slender spinous rod, the tip acute, the outer margin before apex with a few appressed teeth; on mesal edge at point of narrowing of style with a smaller knoblike projection that is tipped with numerous short blackened spines to produce a macelike appearance.

Erioptera (Ilisia) margarita Alexander, 1919.—A few specimens taken along Pilgrim Creek, near Moran, 6,800 ft., July 5, 1942 *(M. M. Alexander)*. One male shows an interesting abnormality of venation. The right wing (mounted on slide) has cell M_2 open by the atrophy of the basal section of vein M_3, producing a *Mesocyphona* type of venation; the left wing has the cell open by the atrophy of *m*, producing the normal *Erioptera* type.

Erioptera (Ilisia) manitobensis Alexander, 1929.—Arizona Creek, Station 1, July 1-8, 1941; numerous. The wing venation is shown (Fig. 33).

Erioptera (Ilisia) rainieria Alexander, 1943.—One male, Cascade Trail, Station 4, 8,200 ft., July 9, 1941. This was in the alpine fir-whitebark pine-heath association discussed before.

I had hitherto referred this species and the more southern *dorothea* to the subgenus *Hoplolabis* Osten Sacken but it now appears preferrable to place both in the older subgenus *Ilisia* Rondani. If *Hoplolabis* is to be recognized as a subgenus distinct from *Ilisia* or *Psiloconopa*, it must be strictly on the basis of the spurred or divided cell *1st* M_2, which would restrict the group to the subgenotype, *armata* Osten Sacken, 1859, and two further species, *bipartita* Osten Sacken, 1877, and *asiatica* Alexander, 1919. At best it would appear that *Hoplolabis* may be maintained as a weak subgenus for convenience only.

The differences between *dorothea* and *rainieria* are best shown in the structure of the male hypopygium, as follows:

E. (I.) dorothea Alexander, 1914. Male hypopygium (Fig. 40); apical lobe of basistyle, *b*, very slender, extending caudad beyond the level of the

outermost arm of the outer style. Outer dististyle, *od,* entirely blackened, the three arms unequal, the central one short, about one-half the length of the outer; outer arm with microscopic spinulae; lower arm longer and more slender, the tip obtuse. Inner dististyle, *id,* a long slender rod, entirely pale, strongly bent at midlength to appear more or less boomerang-shaped, the tip very obtuse. Gonapophyses, *g,* blackened, on either side with a subquadrate plate, from the cephalic lateral angle of which arises a long slender spine that is bent on its base, directed caudad and slightly mesad, very gradually narrowed to the acute blackened tip; basal plate at outer lateral angle produced into two blackened teeth. (Colorado—New Mexico).

E. (I.) rainieria Alexander, 1943. Male hypopygium (Fig. 39); apical lobe of basistyle, *b,* slender, extending caudad about to the level of the outermost arm of outer dististyle. Outer dististyle, *od,* entirely blackened, with a very short base that is produced into three short arms of approximately the same shape; outer arm obtuse at tip, its outer surface with appressed acute spinulae, its lower surface merely crenulate; central arm of about the same length, more narrowed outwardly, the lower surface crenulate; lower arm shorter and more strongly curved, thickest at near midlength, thence narrowed to a stout acute point. Inner dististyle, *id,* a pale stout clavate lobe, strongly widened on distal half. Gonapophyses, *g,* blackened, with two principal arms, a more basal slender spine directed laterad, and a flattened outer blade that is twisted at near midlength. Ninth tergite large, its caudal margin with a deep U-shaped notch, the lateral lobes more broadly obtuse. (Wyoming—Washington). The wing venation is shown (Fig. 34).

E. (I.) zukeli Alexander, 1940.—Arizona Creek, 6,790 ft., June 1-8, 1941; July 5, 1942. Hitherto known only from the unique female type from Idaho. The present material agrees closely with the type except that in most specimens the dark pattern of the wing along vein *Cu* is much more restricted and does not involve cell *M*. The wing-venation is shown (Fig. 35). Male hypopygium (Fig. 41) about as shown. Outer dististyle, *od,* unequally trilobed, with two primary flattened blades, with a third smaller lobe on the upper margin of the lower of these blades; outer blade microscopically roughened on outer face, the inner blade more nearly smooth. Inner dististyle, *id,* entirely pale and fleshy. Gonapophyses, *g,* appearing as powerful curved lateral horns that narrow to acute spinous points, the inner portion close to the midline produced caudad into smaller acute horns; outer margins of lateral horns with microscopic appressed denticles, the inner margin in cases with a more or less distinct denticle.

Cryptolabis (Cryptolabis) molophiloides Alexander, 1943.—Jenny Lake, 6,800 ft., July 13, 1941 *(C. P. Alexander);* part of the type series. As previously indicated, this series was taken in the dry evergreen forests near the camp at the lake, the tree species being chiefly lodgepole pine, Douglas fir and alpine fir; no streams or other wet areas were present other than the lake which was some distance away. The significance of these remarks lies in the fact that although we have no definite knowledge of the immature stages, we have several reasons to believe that the larvae of members of the genus are

strictly aquatic. Where the immature stages of the present fly occur remains very much in question.

Ormosia (Ormosia) absaroka Alexander, 1943.—Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942; abundant along small mountain torrents that were fed wholly or in part by melting snow; associated with *O. (O.) paradisea* Alexander.

Ormosia (Ormosia) albertensis Alexander, 1933.—Arizona Creek, 6,790 ft., July 4, 1942; Jenny Lake, Station 5, 6,780 ft., July 3, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941; Indian Paintbrush Canyon, 7,500-8,000 ft., July 13, 1941.

Ormosia (Ormosia) dedita Alexander, 1943.—Hidden Falls, 6,900 ft., July 8, 1942; Jenny Lake, Station 5, July 6, 1941; Leigh Lake, Station 5, July 10-12, 1941.

Ormosia (Ormosia) fusiformis (Doane, 1900).—Jenny Lake, 6,790 ft., July 6, 1941.

Ormosia (Ormosia) hallahani Alexander, 1943.—Arizona Creek, 6,790 ft., July 4, 1942; Leigh Lake, Station 5, 6,870 ft., July 12, 1941; Indian Paintbrush Canyon, 8,000 ft., July 13, 1941. This very distinct fly is evidently widely distributed in the northern Rockies; I have seen it from the Big Horn Mountains, Wyoming, and the Black Hills, South Dakota.

Ormosia (Ormosia) manicata (Doane, 1900) *(deviata* Dietz, 1916; *fuscopyga* Alexander, 1924).—Moran bog, 6,800 ft., July 2-5, 1941; Jenny Lake, near camp, 6,790 ft., July 1, 1941.

Ormosia (Ormosia) megarhabda Alexander, 1943.—Arizona Creek, Station 1, 6,790 ft., July 8, 1941.

Ormosia (Ormosia) onerosa Alexander, 1943.—Arizona Creek, Station 1, 6,790 ft., July 4, 1942.

Ormosia (Ormosia) paradisea Alexander, 1920 *(garretti* Alexander, 1926). —Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942; taken by sweeping fir and spruce along a small, clear mountain stream, very common.

Ormosia (Ormosia) sentis Alexander, 1943.—Arizona Creek, Station 1, 6,790 ft., July 4, 1942.

Ormosia (Ormosia) tetonica sp. nov.—Allied to *innocens;* general coloration blackened, heavily pruinose; antennae short, black throughout, basal flagellar segments subglobular; halteres black, the knobs obscure yellow; legs black, the femoral bases more reddish brown; wings yellow, restrictedly patterned with brown; macrotrichia of cells unusually sparse, restricted to outer cells of wing; cell *1st* M_2 closed; vein *2nd A* gently sinuous; male hypopygium with the ninth tergite complex, produced into two slender lobes that are separated by a rounded notch; dististyle a heavily blackened mace-like structure, provided with several blackened denticles.

♂. Length, about 4.2-4.5 mm.; wing, 5-5.6 mm.; antenna, about 1 mm.
♀. Length, about 5 mm.; wing, 6.8 mm.

Rostrum and palpi black. Antennae relatively short, black throughout; basal flagellar segments short-oval to nearly globular, the outer six or seven segments oval and much more slender; terminal segment elongate, more than one-half longer than the penultimate. Head blackened, heavily gray pruinose; anterior vertex wide.

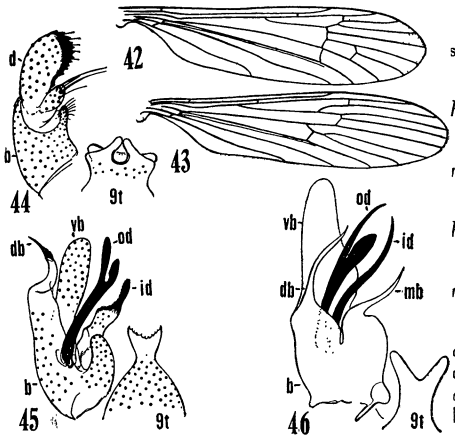


Fig. 42. *Ormosia (Ormosia) tetonica* sp. nov.; venation.

Fig. 43. *Molophilus (Molophilus) harrisoni* sp. nov.; venation.

Fig. 44. *Ormosia (Ormosia) tetonica* sp. nov.; male hypopygium.

Fig. 45. *Molophilus (Molophilus) harrisoni* sp. nov.; male hypopygium.

Fig. 46. *Molophilus (Molophilus) nitidus* Coquillett; male hypopygium.

(Symbols: *b*, basistyle; *d*, dististyle; *db*, dorsal lobe of basistyle; *id*, inner dististyle; *mb*, mesal lobe of basistyle; *od*, outer dististyle; *vb*, ventral lobe of basistyle; *t*, tergite.)

Pronotum black, sparsely gray pruinose; anterior pretergites obscure brownish yellow, poorly differentiated. Mesonotum blackened, heavily pruinose, the praescutum with three brownish black stripes; median stripe broad and conspicuous, not reaching the suture behind; lateral stripes narrow and poorly indicated; pseudosutural foveae and tuberculate pits black, the latter lying in front of the level of the latter. Pleura, including dorsopleural membrane, dark gray. Halteres with stem blackened, knobs abruptly obscure yellow. Legs with the coxae and trochanters black, sparsely pruinose; remainder of legs brownish black to black, the femoral bases more reddish brown. Wings (Fig. 42) with the ground color yellowish, restrictedly but conspicuously patterned with pale brown, as follows: Cord; outer end of cell *1st* M_2; origin of *Rs;* paler washes along veins beyond cord and in outer portions of Anal cells, especially cell *1st A;* veins brown. Macrotrichia of cells unusually sparse (shown in figure by stippling), restricted to cells beyond cord and chiefly to outer ends of these cells, especially in the outer radial and medial fields. Venation: Sc_1 ending about opposite one-third to one-half R_{2+3+4}; R_2 usually less than its own length beyond fork of R_{2+3+4}, in cases at or even shortly before the fork; vein R_3 a little upcurved at apex; cell *1st* M_2 closed, subequal in length to vein M_4 beyond it; *m-cu* gently sinuous, close to the fork of *M;* vein *2nd A* gently sinuous, cell *2nd A* widest before midlength.

Abdomen, including hypopygium, black. Male hypopygium (Fig. 44) with the tergite, *9t,* unusually complex, consisting of a lower and an upper plate, the latter produced into two slender lobes that are separated by a con-

spicuous U-shaped notch, the tips of the lobes almost touching and thus closing the notch or virtually so. Basistyle, *b,* with mesal face near apex bearing an oval lobe provided with several long setae. Dististyle, *d,* a massive blackened structure, the apex and mesal face heavily blackened and produced into several teeth to produce a mace-like appearance; on mesal face at near one-third the length bearing a small dusky lobe that is provided with several setae, two of which are of unusual length, much longer than the lobe itself. Gonapophyses appearing as flattened plates with obtuse margins.

Holotype, ♂, Arizona Creek, Station 1, 6,790 ft., July 4, 1942 *(M. M. Alexander). Allotopotype,* ♀, with the type. *Paratopotypes,* 33 ♂ ♂, with the type *(C. P. & M. M. Alexander);* 5 ♂ ♀, July 1-8, 1941 *(C. P. Alexander);* the main series was taken while flying close to the low overhanging banks of the stream, just above the water; one week later they had completely disappeared.

The present fly is very distinct from the two eastern Nearctic species that are most nearly allied, *Ormosia (Ormosia) apicalis* Alexander, 1911, and *O. (O) innocens* (Osten Sacken, 1869). The great reduction in number of macrotrichia in the wing cells is particularly noteworthy. In both allied species these trichia are much more abundant and are distributed over virtually the entire wing surface, as is common in the genus. From their reduction in number in the present fly it would seem reasonable to expect that an *Ormosia* wholly lacking macrotrichia in the wing cells may be discovered or that such species have already been described but are now placed in the closely related genus *Erioptera,* based on the lack of such trichia in the wing cells. It is thus obvious that the generic distinctions between *Ormosia* and *Erioptera* are not as well-marked as had formerly been believed.

Whether the present fly and its two Nearctic relatives fall in the subgenus *Scleroprocta* Edwards, 1938, remains somewhat in question but probably will be found to be the case. The chief characters of this subgenus, other than the ones confined to the male sex, are the glabrous postnotum and the cephalic position of the tuberculate pits of the praescutum which lie before the transverse level of the pseudosutural foveae. However, it should be noted that various other groups of *Ormosia* similarly have the above mentioned characters, these including the *nigripila* group and the species that center about *O. (O.) prava* Alexander, 1940, including the western Nearctic *O. (O.) hallahani* Alexander. Whether it is advisable to erect subgenera for these various isolated groups of *Ormosia* seems somewhat questionable to me at the present time. It appears certain that there will be some notable discoveries in this genus in the Indo-Chinese region that may still further complicate this matter.

Molophilus (Molophilus) colonus Bergroth, 1888.—Moran bog, Station 2, 6,800 ft., July 2-5, 1941.

Molophilus (Molophilus) falcatus Bergroth, 1888.—Jenny Lake, Station 5, 6,780 ft., July 3, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941; Indian Paintbrush Canyon, 7,500 ft., July 13, 1941.

Molophilus (Molophilus) harrisoni sp. nov.—Belongs to the *gracilis* group and subgroup; allied to *nitidus;* general coloration dark brown or brownish black, sparsely pruinose; head dark brown; pronotal scutellum and the pretergites variegated with yellow; halteres pale yellow; legs brownish black; wings with a strong blackish tinge; R_{2+3} and basal section of R_{4+5} long, petiole of cell M_3 short; male hypopygium with the ninth tergite terminating in a flattened-depressed plate, its caudal margin with microscopic teeth; mesal lobe of basistyle obtuse; inner dististyle a blackened rod, narrowed on outer portion and provided with abundant blackened spines; aedeagus long and slender.

♂. Length, about 3.8-4.2 mm.; wing, 4-4.5 mm.; antenna, about 1-1.1 mm.

♀. Length, about 4.5 mm.; wing, 4.8 mm.

Rostrum and palpi black. Antennae relatively short, black throughout; flagellar segments oval; longest verticils slightly exceeding the segments in length, chiefly unilaterally distributed. Head dark brown.

Pronotum dark brown, the lateral borders of scutellum and the pretergites obscure yellow. Mesonotum dark brown to brownish black, the surface sparsely pollinose; scutellum dark. Pleura dark brown, sparsely pruinose; dorsopleural membrane obscure yellow to brownish yellow. Halteres pale yellow. Legs brownish black. Wings (Fig. 43) with a strong blackish tinge, the prearcular field a trifle more brightened; veins and macrotrichia brownish black. Venation: Sc_1 ending about opposite R_2; R_{2+3} long, a trifle exceeding basal section of R_{4+5}; cell M_3 deep, its petiole variable in length, from subequal to *m-cu* to one-half longer than this element; vein *2nd A* relatively short, gently sinuous, ending before level of *m-cu*.

Abdomen, including hypopygium, black. Male hypopygium (Fig. 45) with the ninth tergite, *9t,* conspicuous, narrowed outwardly, terminating in a flattened-depressed plate, the caudal margin of which is concave and irregularly toothed. Basistyle, *b,* with the dorsal lobe, *db,* at apex narrowed into a cylindrical yellow rod that terminates in a powerful black spine, at base of latter with several conspicuous setae; ventral lobe, *vb,* long, clavate; mesal lobe short and obtuse. Outer dististyle, *od,* an elongate blackened rod, unequally bifid at tip, both lobes obtuse at their tips. Inner dististyle, *id,* a shorter black rod, stout on basal half, the outer portion conspicuously narrowed, the surface of outer portion with abundant blackened spinous points; surface of enlarged basal portion with scattered setae. Aedeagus unusually long and slender..

Holotype, ♂, Arizona Creek, Station 1, 6,790 ft., July 8, 1941 *(W. H. Harrison). Allotopotype,* ♀, pinned with type. *Paratopotypes,* 6 ♂ ♀, July 1-8, 1941 *(C. P. Alexander & W. H. Harrison);* 1 ♀, July 4, 1942 *(M. M. Alexander).*

This very interesting and distinct fly is named in honor of Mr. Walter H. Harrison, who has participated in virtually all of our collecting trips during the past ten years. The nearest ally is the more western *Molophilus (Molophilus) nitidus* Coquillett, 1905, which differs in the still larger size *(Holotype,* male, length, 4.5 mm.; wing, 6.2 mm.), more intensely black coloration

of the body and appendages, and, especially, the structure of the male hypopygium. The type of *nitidus* was taken at Fieldbrook, California, May 18, 1903, by H. S. Barber and is preserved in the United States National Museum (Type No. 8347). I am greatly indebted to Dr. Henry Townes for making a slide mount of the hypopygium of this type and sending me a drawing that shows the essential structures. From this (Fig. 46) it may be noted that the ninth tergite, *9t,* terminates in a simple furcula, without denticles; both the dorsal, *db,* and mesal, *mb,* lobes of the basistyle, *b,* are produced into long slender spines of approximately the same shape. The upper branch of the outer dististyle, *od,* likewise is a long slender sinuous rod that narrows gradually to the acute tip. The drawing further indicates that the aedeagus is quite different in shape from that of *harrisoni,* near its apex bearing a lateral spur or branch immediately before the decurved tip. From this figure of the type I have determined that *nitidus* is represented in my own collection from northern California and Oregon and that there is a still different undescribed species in extreme southern California.

Molophilus (Molophilus) perflaveolus Alexander, 1918.—Arizona Creek, Station 1, July 5, 1941; Snowshoe Cabin, Wister Draw, at foot of Death Canyon, 6,800 ft., July 14, 1941. The species is exceedingly close to *M. (M.) auricomus* Alexander, 1926, of the southeastern United States.

Molophilus (Molophilus) rostriferus Alexander, 1943.—Twogwotee Pass, 9,650 ft., July 9, 1942; in swampy meadows near Jackson Lake, 6,800 ft., July 5, 1942; part of type material.

Molophilus (Molophilus) spiculatus sigmoideus subsp. nov.—

Very similar to typical *spiculatus* Alexander, 1918, differing only in slight hypopygial details. The outer dististyle has the conspicuous sigmoid shape in both races but in the present fly the inner style is shorter and broader, particularly across its base. In typical *spiculatus* the blackened outer portion is approximately one-half the total length of the outer style and the spiculae of the surface are more sparse, particularly on basal portion and sides, being best developed on outer surface and on outer half of lower edge. In the present race, the blackened outer portion of the inner style is only about one-third the length of the outer style while the spiculae are more abundant and more evenly distributed, occurring virtually to the base.

Holotype, ♂, Cascade Trail, Grand Tetons, 8,500 ft., July 9, 1941 *(C. P. Alexander). Paratopotypes,* ♂ ♀. *Paratypes,* ♂ ♀, Moose Ponds, near Jenny Lake, 6,700 ft., July 6, 1941; Leigh Lake, Station 5, 6,870 ft., July 10-12, 1941; Indian Paintbrush Canyon, 7,000-8000 ft., July 13, 1941; Twogwotee Pass, Station 6, 9,650 ft., July 9, 1942 *(C. P. Alexander).*

The classification of the western Nearctic members of the *gracilis* group, *pubipennis* subgroup, is fully as complicated and involved as is the condition in the species of eastern North America. Bergroth, in 1888, described from southern Alaska three species, *colonus, falcatus* and *paulus,* that, despite my inability to study the types now preserved in Finland, I feel have been correct-

ly identified. The species most in question is *colonus* and it seems certain that what Coquillett (Harriman Expedition Report, 1900) determined as this from Alaska and later from British Columbia, is not the true *colonus* but actually pertains to the new subspecies of *spiculatus* described above. This latter species has the wings unpatterned while Bergroth's description of *colonus* calls very definitely for a fly with marked wings. I have identified as *colonus* a species previously recorded (Alexander, 1943: 762) from the Yellowstone and represented in the Teton series. It appears further that *comatus* (Doane, 1900) is a synonym of *colonus*. *Molophilus squamosus* Alexander, 1919, from the extreme southern parts of California appears to represent a subspecies of *colonus*. The present fly, *spiculatus,* has the outer dististyle of the male hypopygium more strongly sigmoid than any of these allied species. *Molophilus paulus* Bergroth, of which I have seen a broken male from the type locality (Sitka, Alaska) has the antennal structure and vestiture distinct from all of the above mentioned members of the *pubipennis* subgroup. Unfortunately, the abdomen of this specimen is broken and the hypopygium cannot be described.