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

Part VII. The Tipuloidea of Utah, I

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General Account

In our continuing survey of the crane-flies of western North America, the State of Utah assumes great importance from its strategic geographical position between the Rocky Mountains on the east and the Sierra Nevada to the west.

Utah is nearly rectangular in outline, being 345 miles from north to south and 275 from east to west, the area totalling 84,970 square miles, of which 2,806 is water. The national forest holdings in the State include nearly 8,000,000 acres. All of the drainage is to the west of the Continental Divide.

Alter (in *Climate and Man,* 1941) provides the following comprehensive summary:

"The general elevation of Utah is about 5,500 feet above sea level, though the Wasatch and Uinta Mountains extend diagonally across the State from southwest to northeast, with crest lines mostly above 10,000 feet. Minor mountains are scattered over the rest of the State, though the flatter part of the Great Salt Lake drainage basin is below 4,500 feet in elevation, the lake being about 4,215 feet. The lowest area in the State is the Virgin River Valley in the extreme southwestern part, its elevation being between 2,500 and 3,500 feet.

"Practically the entire area east of the Wasatch Mountains is drained by the Green and Colorado Rivers, the State's largest streams, though neither rises within its borders. Western Utah is almost entirely within the Great Basin, without outlet to the sea. The largest rivers are the Bear, Weber (and Ogden) and Provo, all emptying into Great Salt Lake (the Provo through Utah

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1 The preceding part under this general title was published in The American Midland Naturalist 35:484-531. 1946.

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.

Lake and Jordan River). Sevier River drains the west-central counties and empties into Sevier Lake, a brackish saline basin, when its waters are not wholly withdrawn for irrigation purposes.

"The average annual precipitation for the State is about one-third that of the Middle Western or Eastern States generally, necessitating the practice of irrigation for growing farm crops. But the mountains, whose winter snows form the chief reservoirs, are conveniently adjacent to practically all the farming regions, and there is usually an abundance of water for all lands under irrigation. The bulk of the moisture falls in late winter and spring in the State's leading agricultural areas. The summer and early fall months are almost invariably the driest."

The Uinta Mountains, largest east-west range in the entire United States, some 150 miles long and 30 to 40 miles wide, has some peaks that are more than 13,000 feet high, including the highest point in Utah, King's Peak, 13,498 feet, on the southern border of Summit County.

Bistic and Physical Provinces.—Of the various biotic provinces in North America as recognized by Dice (1943), four are found in Utah, three chiefly in the desert and semi-desert portions of the State. The Artemesian or Great Basin Province includes the western third of Utah, then extending westward to involve almost all of Nevada, with extensive adjoining sections of northeastern California and southern Oregon and Idaho. The Navahonian Province, eminently characteristic of much of northern Arizona and New Mexico, involves the southeastern third of Utah. In the northeastern portion of the State, including the Wasatch and Uinta Mountains, is found the Coloradan Province, extending westward from its major center in Wyoming and Colorado. In the extreme southwest, in the vicinity of St. George and the Virgin River, is found a small northeastern extension of the Mohavian Province from the major area in the adjoining desert areas of Nevada, California and Arizona. The general distribution of the Tipulidae in Utah seems to confirm the distinctness of these four areas.

The Fenneman (1931) classification of Utah into physical divisions is very similar to the last, the western third of the State lying in the Great Basin Section of the Basin and Range Province; more than the eastern half is occupied by the Colorado Plateaus Province, with the High Plateaus Section extending down the central portion of the State, the Uinta Basin Section in the northeast, and the Canyon Lands Section in the southeast. In the extreme northeastern portion of Utah a third major area occurs, the Middle Rocky Mountains Province, including the Wasatch and Uinta Mountains.

Mulford, in Van Dersal (1938), classifies the United States on the basis of plant-growth regions, soil regions and climatic provinces, with detailed maps. For Utah, the Snake River Plain-Utah Valley plant growth region in the northwest is arid, microthermal and is deficient in precipitation at all seasons. The Great Basin-Intermontane plant growth region, chiefly in the southwestern, southern and eastern portions of the State, ranges from semi-arid to arid, is microthermal and shows moisture deficiency at all seasons. In the Central Rocky Mountain plant growth region, in the northern portion of the Central Plateaus, conditions are sub-humid, microthermal and with a

summer deficiency of precipitation; in the southern portion, conditions are semiarid, microthermal and with a deficiency of moisture at all seasons. In the Wasatch and Uinta Mountains, the climatic provinces range from humid to sub-humid, are microthermal and with a summer deficiency of moisture; on the higher crests of the Uintas, taiga conditions prevail.

Life Zones.—In general, the distribution of life zones in Utah appears to be very much as in Colorado, as defined by Cary (1911: 14), as follows:

Northern Colorado (heights in feet; exp.—exposure).
Upper Sonoran to 5600, NE exp.; to 6500, SW exp.
Transition 5600-7500, NE exp.; 6500-8200, SW exp.
Canadian 7500-10,000, NE exp.; 8200-10,400, SW exp.
Hudsonian 10,000-10,900, NE exp.; 10,400-11,600, SW exp.
Arctic-Alpine 10,900 up, NE exp.; 11,600 up, SW exp.

Southern Colorado
Upper Sonoran to 6500, NE exp.; to 7800, SW exp.
Transition 6500-8000, NE exp.; 7800-9000, SW exp.
Canadian 8000-10,500, NE exp; 9000-11,000, SW exp.
Hudsonian 10,500-11,200, NE exp.; 11,000-12,000, SW exp.
Arctic-Alpine 11,200 up, NE exp.; 12,000 up, SW exp.

For Zion National Park and vicinity, the special treatments on life zones by Presnall (1938), Presnall and Patraw (1937) and Woodbury (1933) may be consulted. Presnall (1938: 2-3), by description and diagram, indicates that the Lower Sonoran (Lower Austral) occurs up to 4000 feet; Upper Sonoran (Upper Austral), 4000—7000 feet; Transition, 7000—8500 feet; Canadian, 8500—10,000 feet; Hudsonian, above 10,000 feet (at Cedar Breaks). The occurrence of more northern types in suitable situations in lower zones in the park has been discussed further under *"Collecting Stations,"* later in this introductory account.

General Survey of the Tipuloidean Fauna of Utah

As a result of the intensive efforts of Professor Knowlton and the writer, with the co-operation of many other entomologists, our knowledge of the crane-flies of Utah must be considered as having reached a point where it is better known than any other of our Rocky Mountain and Great Basin States. Virtually all of the species hereinafter recorded had not been reported for the state. Despite this impressive basic list, there will undoubtedly be found many further species and it seems very possible that the complete record for the state may well reach 250 species or even more.

In the present report, 187 species are recorded, well represented in the families, subfamilies and tribes of the Nearctic Region. To date, no member of the subfamily Cylindrotominae has been found in Utah but this is due certainly to insufficient collecting in the northeastern section of the state. The genus *Tipula,* with 51 species, is noteworthy. The small tribe Pediciini, eminently characteristic of northern conditions, is well represented. In the subfamily Limoniinae, by far the most abundant tribe within the state is the Eriopterini, with a host of small and medium-sized forms that include more than one-third the total crane-fly fauna. Of special interest is the great development of the genus *Gonomyia,* represented by no fewer than 18 species, a

number that is equal to the entire northeastern North America and far exceeding the total for any other state of the union, as at present known.

Collecting Stations.—The writer and Mrs. Alexander spent the period between June 21 and 30, 1942 in Utah entering the state from the south at Kanab, following a visit to the Kaibab Plateau in northern Arizona. Our collections, although large, thus were restricted to the last few days of June, in the high mountains representing the spring fauna only, and were quite insufficient for making any comprehensive study of the crane-flies of the state. Most fortunately, such materials have been added to vastly by the great series of specimens made over the past several years and in virtually every section of Utah by Professor George F. Knowlton and his co-workers at Logan. Further acknowledgement of Professor Knowlton's efforts to make known the Tipulid fauna of the state is made later in this general account. Although our own collections were made at intervals along our route in Utah, four places proved to be of such interest and importance as to warrant the establishment of special study stations, where, it is hoped, detailed seasonal studies may be continued in the future. The four stations established by Mrs. Alexander and me in 1942 are as follows:

1. Zion National Park. A vast gorge in the southwestern part of Utah, some 45 miles from the border of Nevada and 15 from Arizona; all collections of Tipuloidea were made in Washington County. The Zion Canyon has been formed primarily by the action of the north fork of the Virgin River (Mukuntuweap River) which flows down the steep southern slopes of the Markagunt Plateau, in a distance of some 40 miles dropping from altitudes of about 10,000 feet on Cedar Mountain to 7000 feet on the plateau through which the canyon is cut and to 3500 feet below the mouth of the gorge. Woodbury (1933) states that "The canyon is about 20 miles in length, running in a general direction slightly west of south. It varies in width from a slit just wide enough for the river in the narrows, gradually widening downstream to a mile or more across the floor near the mouth of the canyon where the town and fields of Springdale are located." A detailed topographic map of the park is available (Gregory and Evans, 1936).

The park is a wonderful spot, surprisingly rich in Tipulidae, particularly when contrasted with the nearby Bryce National Park, where these flies are exceedingly uncommon or do not occur. There are several important references that consider the fauna and flora of Zion and provide more or less detailed accounts of the geology, climate, biota and life zones (as Gregory, 1941; Presnall, 1938; Presnall and Patraw, 1937; Tanner, 1928; Woodbury, 1933). The very important paper by Woodbury should be consulted for many data concerning the climate, geology and biology of the area.

A brief statement from Gregory (1941: 3; Gregory and Evans, 1936) presents a picture of the conditions obtaining in the park. "In Zion National Park the annual rainfall ranges from 10 to 20 inches and the temperature from 10° to 105° Fahr. The winters are short and mild; the summers long and hot. Though varying greatly from year to year, month to month, and even day to day, the precipitation is so distributed as to produce two wet cycles, one in winter and early spring and one in late summer, and two dry

cycles, one in late spring and early summer and one in late fall. In response to these conditions many species of plants complete their life cycle before June, and others begin their cycle in late summer and complete it in the fall. Beginning early in May the spring cycle is the time for violets, orchids, pentstemons, sego lily, and in shady nooks the columbine and monkey flower. During the excessive heat of summer, day-blooming plants are largely replaced by such night-blooming species as evening primrose, four o'clock, spiderwort, and the glorious sacred datura—a veritable 'moonlight garden'. During the late summer cycle the roads pass through fields of asters, sunflowers, bee flowers, Indian paint brush, and sweet clover, and the cool shady nooks are made brilliant by the cardinal flower. There is little evidence of any zonal distribution of plants based on latitude or the equivalent altitude. The range in kinds of soil, exposure to the sun, and amount of ground water is so great that indigenous plants of the Lower Sonoran, Upper Sonoran, Transition, and even Canadian zones, together with most migrating plants, find favorable habitats. On the floor of the canyon are groves of boxelder, willow, cottonwood, and ash." There follows a further consideration of the plants of the slopes and terraces at higher altitudes that have not yet been studied as regards the Tipulidae.

All collections made in Zion by Mrs. Alexander and the writer pertain to the bottom of the canyon, within a few hundred feet of the altitudinal level of the Virgin River and all nominally in the Upper Sonoran (Upper Austral) life zone. However, the occurrence of more northerly "islands" in various places should be emphasized. As stated by Presnall and Patraw (1937: 4): "The most noticeable of these variations is to be seen in the bottom of nearly every canyon, where much moisture and shade favor the growth of Transition or even Canadian Zone species, no matter what may be the actual altitude. In canyons where water seeps continually from the cliffs there are great 'hanging gardens' of ferns and other plants that would normally be found at a much higher altitude. The Narrows is the classic example of this, but dozens of other canyons have the same type of vegetation."

The great majority of the Tipulidae so far taken at Zion have been collected at or near these "hanging gardens", especially at the Weeping Rock and in the Narrows. As discussed by Gregory (1941:17): "The evidence is clear that the canyon alcoves are the work of rain that falls directly into them and of underground water that seeps out through their walls. The process is sapping and undermining rather than excavation. The cliff walls of sandstone are undercut by the removal of soft shales beneath, and in response to gravity fragments fall off. The walls retreat and the rim develops curves and crenulations chiefly in consequence of erosion at their bases. Thus at Wiley Retreat, the Grotto, Weeping Rock, and other prominent alcoves part of the rain water that falls on the upland passes downward through porous rock until it reaches impervious beds and finally reaches the surface as springs and seeps. On emerging, these underground waters carve horizontal grooves in the canyon walls, leaving overhanging cliffs above and a slope below. Into the slope perennial streams from the spring are cutting channels that lead to the Virgin River."

The cliffs that support the rank growth of vegetation called the "hanging

gardens" are of travertine, or calcareous tufa, produced by the springs of water percolating through the sandstone and forming calcium carbonate. The water finally emerges as a constant seeping or dripping, or, in places, as a shower of spray or as small waterfalls. In such continually wet places, a rich vernal flora and associated crane-fly fauna is to be found. In the open alcoves, as at Weeping Rock, the cliff walls are sunlit for much of the day but the actual rock faces are more or less shaded by the luxuriant growth of herbage and provide ideal haunts for several species of Tipulidae. In the Narrows, where the canyon decreases about to the width of the Virgin River, a mere 20 feet, with virtually sheer walls some 2000 feet high, the cliff faces are more cool and shaded and the plant growth even more rank and luxuriant. In June, almost the dominant plant species is the Venushair fern, *Adiantum capillus-veneris* Linn., forming great draperies over the rocks. Associated species of higher plants are many, including *Smilacina liliacea* (Greene); two showy species of columbine, *Aquilegia rubicunda* Tidestrom and *A. thalictrifolia* Rydberg; shootingstar, *Dodecatheon pauciflorum* (Durand); and the monkeyflower, *Mimulus cardinalis* Douglas, and several others. Young plants of cardinal flower, *Lobelia cardinalis graminea* (Lam.) occur. The commonest liana along the streams is poison-ivy, *Rhus rydbergii* (Small).

Certain crane-flies are strictly aquatic in their larval stage and inhabit streams of the general nature and appearance of the Virgin River. The latter seems to be surprisingly poor in such strictly aquatic forms, the reason presumably being as given by Woodbury (1933) in his discussion of the Virgin River, which he describes as being an "Aquatic Desert", due to the scarcity of life forms in the stream proper. The tremendous periodic floods that sweep down the valley seem to keep the stream bed scoured clean, even diatoms and other algae having difficulty in maintaining an existence. It might be observed that a species of net-winged midge, Blepharoceridae, genus *Blepharocera,* occurs along the river at the Narrows and is evidently able to withstand the scouring action.

Crane-fly collecting at both the Weeping Rock and the Narrows proved most exciting and productive. Mrs. Alexander and I camped in Zion between June 21 and 23, 1942. Professor Knowlton and colleagues have supplemented such collections by materials taken on various trips to the Park covering a much wider range of dates. On July 1-3, 1942, Dr. Otto Degener and Mr. Leroy Peiler secured a few further interesting Tipulidae in the Park.

Among the more interesting Tipuloidea taken in Zion are the following: *Protanyderus margarita*, Holorusia grandis, Tipula (Bellardina) schizomera, T. (Yamatotipula) meridiana, Limonia (Dicranomyia) brevivena, L. (Geranomyia) canadensis, L. (G.) diversa, L. (G.)parapentheres*, L. (G.) zionana*, Orimarga (Orimarga) zionensis*, Oxydiscus (Oxydiscus) maddocki*, Phyllolabis zionensis*, Teucholabis (Teucholabis) rubescens, Gonomyia (Progonomyia) zionicola*, G. (Idiocera) multistylata *, G. (I.) coloradica, G. (Lipophleps) cinerea, G. (Gonomyia) paiuta*, G. (G.) spinifer, Rhabdomastix (Sacandaga) californiensis, R. (S.) ioogoon*, R. (S.) leonardi, R. (S.) lipophleps*, Cryptolabis (Cryptolabis) sica*, Erioptera (Psiloconopa) margarita, E. (P.) neomexicana, E. (P.) sinawava*, E. (Mesocyphona) eiseni,*

and others. The species marked with an asterisk* were new to science when first discovered at this station. Labelled "Zion National Park."

2. Sevier River, near Hatch, southwestern Garfield County, altitude estimated at about 6700 feet, June 23, 1942. Collections swept from grasses and *Equisetum* growing among low willows along the river. Vast sagebrush plains occur on both sides of the stream but all collecting was from the more humid strip close to the water. Several Tipulidae occurred, including *Gonomyia (Gonomyia) sevierensis**, *Erioptera (Psiloconopa) margarita* Alexander, *E. (P.) megarhabda* (Alexander), *Molophilus (Molophilus) colonus* Bergroth, and others. Labelled "Sevier River."

3. High-Lowe Creek and Pond, in mountains above Beaver, Fishlake National Forest, Beaver County; altitude 8,000 feet, June 25—26, 1942. A swift-flowing mountain stream, dammed by beavers to form a small pond below the road. Collecting along the stream above the pond for a distance of about 100 yards only but very minutely surveyed. The sparse forest cover consists of ponderosa pine, *Pinus ponderosa* Douglas; blue spruce, *Picea pungens* Engelm.; Douglas-fir, *Pseudotsuga taxifolia glauca* Mayr; white fir, *Abies concolor* (Gordon & Glendinning); aspen, *Populus tremuloides* Michx., together with scattered juniper and willow. The rank streamside herbage included various species of crucifers, together with species of *Smilacina, Urtica, Geranium, Geum, Rosa, Osmorrhiza, Mertensia,* and others. The white form of the Colorado columbine, *Aquilegia coerulea pinetorum* Tidestrom, was very common and several of the Tipulidae were found resting on these plants. The stream was cold (49° Fahr. at noon) and crystal clear, with numerous small falls and riffles. The air temperature at 7 A.M., June 26th, was 38° Fahr. The humid environment so preferred by the Tipulidae was entirely restricted to and created by the stream. Twenty feet away arid conditions began and sagebrush gradually became abundant.

Tipulidae were numerous and interesting, including among others, *Tipula (Schummelia) magnifolia**, *T. (Yamatotipula) meridiana, T. (Y.) spernax, Pedicia (Tricyphona) exoloma, Dicranota (Rhaphidolabis) neomexicana, Limnophila (Elaeophila) aldrichi collata**, *L. (Phylidorea) claggi, L. occidens, Gonomyia (Gonomyia) bihamata, Ormosia (Rhypholophus) bifidaria, O. (Ormosia) albertensis, O. (O.) defrenata**, *O. (O.) fusiformis, O. (O.) spinifex, Erioptera (Psiloconopa) gaspicola, E. (Hesperoconopa) dolichophallus**, *E. (Mesocyphona) distincta,* and others. Labelled "Beaver."

4. Logan Canyon, along the Logan River, in Cache National Forest, Cache County; collecting done in the Lodge Forest Campground, Preston Valley Campground, China Row, and higher up the canyon, between 4800 and 5200 feet, June 29th and 30th, 1942. Logan Canyon is one of the favorite collecting, camping and picnicking spots for the entomologists stationed at Logan. The stream and its environment are magnificent and undoubtedly many further discoveries in the Tipuloidea will be made here. Particular attention is called to the report by Needham and Christenson (1927) on "Economic insects in some streams of northern Utah", where a detailed study of the Logan River is recorded, based upon collecting done in the summer of 1926, with the base station at Birch Glen, in the heart of the Canyon.

Tipulidae secured by us included *Ptychoptera pendula, Tipula (Bellardina) commiscibilis, T. (Schummelia) subtenuicornis, T. (Yamatotipula) albocaudata, T. (Lunatipula) splendens, Antocha (Antocha) monticola, Dicranota (Rhaphidolabis) cayuga, Limnophila (Elaeophila) angustior, L. bigladia, Hexatoma (Eriocera) eriophora, Ormosia (Ormosia) brachyrhabda*, Erioptera (Psiloconopa) microcellula, E. (Hesperoconopa) aperta, Molophilus (Molophilus) perflaveolus,* and others. Particular attention should be called to the strictly aquatic *Antocha* which is certainly the most characteristic single species of this family along this river. Labelled "Logan Canyon."

Collectors and Localities.—As indicated earlier, the primary basis for the present report is the large collection made by Professor Knowlton and associates at Logan. Since a great many collectors are included in the report, it seems advisable to list these alphabetically. In the main body of the report, the very numerous records made by Knowlton have been abbreviated to the letter "K"; where no collector is given it may be understood that the specimens (all 1942) were taken by the writer. The asterisk indicates the more important collectors.

Aldous
Ashdown, D.
Bates, R. C.
Bischoff, L. D.
*Degener, Otto
Duncan, B.
*Edmunds, George F.
Fechser, John C.
Frahm, W. A.
Gaufin, A.
Hagan, H. R.
Hammond, D. M.
Hansen,
Hardy, Agnes T.
*Hardy, D. Elmo
Hardy, Horace
*Harmston, Fred C.
Hayward, C. Lynn
Ivie, W.
Janes, K. & R. L.
*Knowlton, George F. & Mary W.
Linford, J. H.
*Maddock, Darrell R.
McEwen, Harry
Moffet, J. E.
*Mulaik, Stanley B.
Needham, J. G.
Nye, William P.
*Peay, W. E.
Peiler, Leroy
*Rees, B. E.
Rees, Don M.
Rees, H. D.
Roberts, R. S.
Rowe, J. A.
Sargent, K. & D. L.
Smith, C. F.
*Spalding, Thomas U.
Stafford, Harold
*Stains, G. S.
Stoddard, E. R.
*Tanner, Vasco M.
*Telford, P. E.
Thatcher, Thomas
Tibbets, T. & M.
Tipton, Vernon
Van den Akter, J. G.
Wilson, K.
*Wood, Stephen L.
Woodbury, Angus M.

Many of the western United States, including Colorado, Texas, New Mexico and Utah, in the earlier years of the present century had one or more professional insect collectors. For Utah, this was Thomas U. Spalding (Tanner, 1929) who made extensive collections in the state, chiefly between 1900 and 1925. His large and important series of Tipulidae were purchased by Dr. William G. Dietz and several new species were described from such materials, the collection now being preserved in the Academy of Natural Sciences, Philadelphia.

In order to avoid much repetition of data throughout the text it is be-

lieved that an alphabetical listing of the stations with the county and approximate altitude, where known, will prove helpful. Most of the altitudes have been taken from the American Guide Series volume on "Utah", cited in the References.

Allen Canyon, Rich Co.
Alta, Little Cottonwood Canyon, Salt Lake Co., 8583 ft.
Alton, Kane Co., 6875 ft.
Amalga, Cache Co., 4555 ft.
American Fork Canyon, Utah Co.
Appledale, Box Elder Co., 4350 ft.
Arches National Monument, Grand Co.
Aspen Grove, on Mt. Timpanogos, 7000 ft.
Avon Canyon, Cache Co.

Bear Canyon Camp, Mt. Nebo, Juab Co.
Bear Lake, Rich Co., 5925 ft.
Bear River City, Box Elder Co., 4255 ft.
Beaver, Beaver Co., 5970 ft.
Beaver, High-Lowe Camp (Alexander Stat. 3)
Beaverdam, Box Elder Co., 4340 ft.
Benjamin, Utah Co.
Benson, Cache Co., 4417 ft.
Big Cottonwood Canyon, Salt Lake Co.
Blacksmith Fork Canyon, Cache Co.
Blanding, San Juan Co.
Bloomington, Washington Co.
Blue Creek, Box Elder Co., 4660 ft.
Bluff, San Juan Co., 4320 ft.
Bothwell, Box Elder Co., 4325 ft.
Box Canyon, Sanpete Co.
Brigham, Box Elder Co., 4440 ft.
Brigham Canyon, Box Elder Co.
Brighton, Salt Lake Co.
Butterfield Canyon, Salt Lake Co.

Cache Junction, Cache Co.
Callao, Juab Co.
Castilla, Utah Co.
Castle Valley, Grand Co.
Cedar Breaks, Iron Co.
Cedar City, Iron Co., 5805 ft.
Central, Washington Co., 5345 ft.
Charleston, Wasatch Co., 5435 ft.
China Row Camp. in Logan Canyon.
Circleville, Piute Co., 6060 ft.
City Creek Canyon, Salt Lake Co.
Clarkston, Cache Co., 4930 ft.
Clinton, Davis Co.
Coal Creek Canyon, Iron Co.
Coalville, Summit Co., 5570 ft.
Collinston, Box Elder Co., 4460 ft.
Corinne, Box Elder Co., 4230 ft.
Cornish, Cache Co.
Cove (Cove Fort, Millard Co., 6000 ft.)
Currant Creek, Wasatch Co., 7200 ft.

Daniels Pass, Wasatch Co.
Deer Creek (in Provo Canyon)
Delta, Millard Co., 4650 ft.
Devils Slide, Weber River, Morgan Co.
Draper, Salt Lake Co., 4525 ft.
Dry Canyon, Salt Lake Co.

East Promontory, Box Elder Co.
Echo City, Summit Co., 5460 ft.
Eden, Weber Co., 4950 ft.
Elberta, Utah Co., 4660 ft.
Ephraim Canyon, Sanpete Co.,
Eureka, Juab Co., 6395 ft.

Fairmont Park, Salt Lake City.
Fairview, Sanpete Co., 6035 ft.
Farmington, Davis Co., 4260 ft.
Farr West, Weber Co.
Ferron Reservoir, Sanpete Co.
Fillmore, Millard Co., 4995 ft.
Fish Lake, Sevier Co., 8600 ft.
Fish Springs, Juab Co.
Fort Duchesne, Uintah Co., 4990 ft.
Fountain Green, Sanpete Co., 5995 ft.

Gandy, Millard Co.
Garden City, Bear Lake, Rich Co., 5950 ft.
Garfield, Salt Lake Co., 4240 ft.
Garland, Box Elder Co., 4345 ft.
Glacier Lake, on Mt. Timpanogos
Glendale, Kane Co., 5825 ft.
Granite Creek, Juab Co.
Green River, Emery Co., 4080 ft.
Grover, Wayne Co., 6750 ft.

Hanna, Duchesne Co., 6250 ft.
Hatch, Garfield Co.
Hayden, Uintah Co.
Heber, Wasatch Co., 5595 ft.
Henefer, Summit Co., 5340 ft.
Holden, Millard Co., 5115 ft.
Honeyville, Box Elder Co., 4270 ft.
Hooper, Weber Co., 4240 ft.
Howell, Box Elder Co.
Hoytsville, Summit Co., 5665 ft.
Huntington Canyon, Emery Co., 6000-8000 ft.
Huntsville, Weber Co., 4920 ft.

Hurricane, Washington Co., 3250 ft.
Hyde Park, Cache Co., 4450 ft.
Hyrum, Cache Co., 4705 ft.

Ideal Beach, Bear Lake, Rich Co.
Indian Canyon, Duchesne Co.

Johnson, Kane Co., 5000 ft.
Junction, Piute Co., 6250 ft.

Kamas, Summit Co., 6475 ft.
Kanab Canyon, Kane Co.
Kanesville, Weber Co., 4275 ft.
Kanosh, Millard Co., 5125 ft.
Kaysville, Davis Co., 4295 ft.
Kents Lake, Beaver Mt., Beaver Co.
Kimballs Fort, Silver Creek, Summit Co.
Koosharem, Sevier Co., 6850 ft.

Lake Point, Tooele Co., 4240 ft.
Laketown, Rich Co., 5990 ft.
Lakota, Bear Lake, Rich Co.
Layton, Davis Co., 4355 ft.
Leeds, Washington Co., 2750 ft.
Leeton, Uintah Co.
Lehi, Utah Co., 4550 ft.
Lewiston, Cache Co., 4505 ft.
Liberty, Morgan Co., 5110 ft.
Linwood, Daggett Co., 6025 ft.
Little Salt Lake, Iron Co.
Little Valley, Tooele Co.
Loa, Wayne Co., 7000 ft.
Logan, Cache Co., 4535 ft.
Logan Canyon, Cache Co.
(Alexander Stat. 4).
Logan Dry Canyon, Cache Co.

Magna, Salt Lake Co., 4280 ft.
Manila, Daggett Co., 6375 ft.
Mantua, Box Elder Co., 5175 ft.
Maple Canyon, Sanpete Co.
Marriott, Weber Co.
Mendon, Cache Co., 4435 ft.
Midway, Wasatch Co., 5565 ft.
Mill Creek Canyon, Salt Lake Co., 4475 ft.
Mirror Lake, Uintas, Summit Co.
Moab, Grand Co., 4000 ft.
Mona, Juab Co., 4915 ft.
Monroe Canyon, Sevier Co.
Monte Cristo, Weber Co.
Morgan, Morgan Co., 5065 ft.
Mountain Meadows, Washington Co.
Myton, Duchesne Co., 5085 ft.

Naples, Uintah Co.
Narrows, see Zion National Park.
Nebo, Mt., Juab Co.
Neola, Duchesne Co.
Nephi, Juab Co., 5095 ft.
Nibley, Cache Co., 4525 ft.
North Farmington, Davis Co.

Oak Creek Canyon, Millard Co., 5200 ft.
Oakley, Summit Co., 6515 ft.
Ogden, Weber Co., 4300 ft.
Orangeville, Emery Co., 5770 ft.
Orem, Utah Co., 4755 ft.

Paradise, Cache Co., 4860 ft.
Parowan, Iron Co., 5990 ft.
Parrish Canyon (see Upper Parrish Canyon).
Payson, Utah Co., 4700 ft.
Peoa, Summit Co., 6190 ft.
Peterson, Morgan Co., 4890 ft.
Pine Valley, Washington Co.
Pinto, Washington Co.
Plain City, Weber Co.
Pleasant Grove, on Mt. Timpanogos
Portage, Box Elder Co., 4370 ft.
Providence Canyon, Cache Co.
Provo, Utah Co., 4550 ft.
Provo Canyon, Utah Co.

Raft River Mts., Box Elder Co.
Redmond, Sevier Co., 5135 ft.
Richfield, Sevier Co., 5310 ft.
Richmond, Cache Co., 4610 ft.
Riverdale, Weber Co.
River Heights, Cache Co., 4540 ft
Riverton, Salt Lake Co., 4435 ft.
Rockville, Washington Co., 3745 ft.
Rocky Mouth Canyon, Salt Lake Co.
Roy, Weber Co.

St. George, Washington Co., 2760 ft.
Salamander Lake, on Mt. Timpanogos
Salem, Utah Co., 4600 ft.
Salina, Sevier Co., 5160 ft.
Saltair, Great Salt Lake.
Salt Lake City, Salt Lake Co., 4365 ft.
Sandy, Salt Lake Co., 4450 ft.
Sardine Canyon, on Mt. Pisgah, Cache Co.
Settlement Canyon, Tooele Co., 5100 ft.
Sevier River, at Hatch
(Alexander Stat. 2).
Slaterville, Weber Co.
Smithfield, Cache Co., 4595 ft.
Soldier Summit, Wasatch Co., 7440 ft.
South Willow Canyon, Tooele Co.
Spanish Fork, Utah Co., 4550 ft.
Springdale, Washington Co., 3915 ft.
Spring Hollow, in Logan Canyon.
Starr, Juab Co.
Stockmore Ranger Station, Duchesne Co., 6960 ft.

Stockton, Tooele Co., 5070 ft.
Strawberry Creek, Wasatch Co.
Strawberry Reservoir, Wasatch Co., 7600 ft.
Syracuse, Weber Co., 4240 ft.

Taylorville, Salt Lake Co., 4355 ft.
Ten Mile, Escalante Desert, Garfield Co.
Three Lakes, Kane Co.
Timpanogos, Mt., Utah Co.
Timpooneke Guard Station, American Fork Canyon, Timpanogos.
Tony Grove Camp, in Logan Canyon.
Tooele, Tooele Co., 4925 ft.
Trenton, Cache Co., 4460 ft.
Trout Creek, Juab Co.
Tryol Lake, Uinta Mountains.
Tucker, Utah Co.

Uintah, Weber Co. 4495 ft.
Upper Parrish Canyon, Farmington Mt., Davis Co., 7000 ft.

Valencia, Davis Co.
Vernal, Uintah Co., 5520 ft.
Vernon, Tooele Co., 5510 ft.
Vineyard, Utah Co.
Virgin, Washington Co., 3400 ft.

Wanship, Summit Co., 5860 ft.
Washington, Washington Co., 2800 ft.
Weeping Rock, see Zion National Park.
Wellsville, Cache Co., 4495 ft.
Whiterocks, Uintah Co., 6050 ft.
White Valley, Millard Co.
Willard, Box Elder Co., 4265 ft.
Willow Lake, Ferron Canyon, Sanpete Co.
Wolf Creek Pass, Wasatch Co., 9400 ft.
Woodland, Summit Co.
Woodruf, Rich Co., 6345 ft.
Woodside, Emery Co., 4645 ft.

Zion National Park, Washington Co., 4500 ft. (Alexander Stat. 1).

ACKNOWLEDGEMENTS

As previously mentioned, the main source of materials for this study was the large and important series of specimens taken by Professor George F. Knowlton, of the Utah State Agricultural College, Logan. I wish to acknowledge with deepest thanks this friendly aid and cooperation of Professor Knowlton, and several of his staff associates and various former students, in devoting so much attention to the collecting of these often neglected flies. Professor Knowlton's collections cover nearly ten years and include records from virtually all counties in Utah and at all seasons of the year. In addition to the great basic series thus provided, smaller lots of specimens were obtained from other sources, particularly Brigham Young University, Provo, through Professor Vasco M. Tanner, and from the University of Utah, Salt Lake City, through the appreciated interest of Mr. George F. Edmunds, Jr., Mr. Stanley B. Mulaik, and Dr. Don M. Rees. I am most grateful to all such friends and co-workers for the opportunity to study these various lots of Tipuloidea, the records of which have added vastly to the completeness of the present basic treatment for the State.

My deepest appreciation is extended to Mrs. Alexander, not only for invaluable aid in the collecting of specimens but very especially for much assistance in the compiling and checking of data.

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Systematic Account

TANYDERIDAE

Protanyderus margarita sp. nov.—Size small (wing, male, less than 8 mm.); general coloration of thorax light gray, the praescutum with four very poorly indicated light gray stripes; femora yellow, the tips rather narrowly infuscated; tibiae yellow, the bases and tips even more narrowly infuscated; wings whitish subhyaline, with a banded and spotted brown pattern; abdominal segments brown, the posterior borders pale yellow; male hypopygium with the dististyle deeply divided.

♂. Length, about 6.5-7.2 mm.; wing, 6-7.7 mm.

♀. Length, about 8-8.5 mm.; wing, 9-10 mm.

Rostrum and palpi black. Antennae with scape dark, gray pruinose; pedicel black, flagellum brownish black, the outer segments somewhat paler. Head gray; anterior vertex less than three times the diameter of the scape.

Pronotum brownish gray. Mesonotal praescutum light gray, with four very poorly indicated light grayish brown stripes, the intermediate pair better defined, the laterals scarcely evident in the type, a little more pronounced in a paratype; posterior sclerites of notum light gray or testaceous gray. Pleura light gray, vaguely to scarcely patterned with brighter areas. Halteres with stem whitened, knob infuscated. Legs with the coxae and trochanters pale yellow; femora yellow, the tips rather narrowly infuscated, the amount subequal on all legs; tibiae yellow, the bases and tips even more narrowly darkened; tarsi yellow, the tips of the more proximal segments narrowly infuscated, the outer two segments dark brown; penultimate segment with a conspicuous basal tooth or lobe. Wings (Fig. 1) with the ground whitish subhyaline, with a pale brown pattern, the areas very vaguely margined with darker; markings

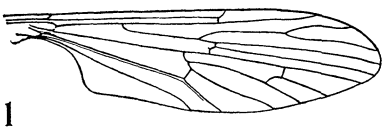

Fig. 1. *Protanyderus margarita* sp. n., venation.

arranged about as in *vipio,* including a postarcular spot in cells *R* and *M*, confluent with a similar area near base of Anal cell; a somewhat equal area at origin of *Rs;* a broken band at cord, narrowly interrupted at *M* and again in the Anal field; a second broken band at level of fork of R_{2+3} and outer end of cell *1st* M_2; elsewhere on wing surface with scattered spots, including marginal ones on all veins and a few other scattered areas; veins yellow, light brown in the patterned portions. Venation: R_{2+3} about one-fourth longer than R_2, the latter sinuous on distal half; cell *1st* M_2 about one-half longer than vein M_1.

Abdominal segments brown, the posterior borders pale yellow; subterminal segments somewhat more uniformly darker brown; hypopygium brownish yellow. Male hypopygium with the dististyle single but deeply divided, the base only about as long as the shorter arm; longer arm, at and near tip, with several long dark-colored setae.

Holotype, ♂, Zion National Park, altitude 4,500 ft., June 22, 1942 *(M. M. Alexander). Allotype,* ♀, Juliaetta, Idaho, May 3, 1901 *(J. M. Aldrich);* United States National Museum. *Paratopotype,* ♀, pinned with type; 1 additional wing, found in a spider's web at the Narrows, June 21, 1942 *(C. P. Alexander). Paratypes,* 1 ♂, with the allotype; 1 ♀, Gothic, Gunnison Co., Colorado, July 6, 1935 *(Inez W. Williams),* earlier recorded as *vipio;* 1 fragmentary ♂ (wings on slide), Sunset, Colorado, July 22, 1915 *(T. D. A. Cockerell).*

I named this attractive fly for Mrs. Alexander, using the second given name, Marguerite. The only other described Nearctic species of the genus are *Protanyderus vanduzeei* (Alexander, 1918) and *P. vipio* (Osten Sacken, 1877), the former of which differs conspicuously in the semi-degenerate wings, with a quite distinct pattern; the latter species still is known only from the unique type, taken along San Mateo Creek, near San Francisco, California, April 9, 1876, by Osten Sacken. It is a much larger fly (Length, male, about 10 mm.), with evident differences in the coloration of the body and legs. It should be emphasized that in the Tanyderidae the female sex is larger than the male.

PTYCHOPTERIDAE

Ptychoptera lenis Osten Sacken, 1877.—Logan Canyon, China Row Camp, June 30, 1942; Raft River, June, 1932 *(Rowe).* Needham and Christenson (1927) give a brief description of the larva and pupa, the material from Birch Glen, Logan River.

Ptychoptera lenis coloradensis Alexander, 1937.—Alton, May 9, 1939 *(K & Harmston);* Clarkston, April 27, 1938 *(K & Hardy);* Hyrum, April 29, 1939*(K & Harmston);* Laketown, June 6, 1938 *(K & Harmston).*

Ptychoptera pendula Alexander, 1937.—Kimball's Fort, June 29, 1943 *(K);* Logan Canyon, Lodge Forest Camp, June 30, 1942; Provo, June 8, 1939 *(K & Nye);* Provo Canyon, June 29, 1939 *(K & Harmston).*

Ptychoptera uta Alexander, 1947.—Logan, May 1, 1941 *(Roberts);* Portage, May 1, 1939 *(K & Harmston);* Willard, April 29, 1939 *(K & Harmston).*

Bittacomorpha clavipes (Fabricius, 1781).—Eden, August 25, 1938 *(K & Hardy);* Garden City, August 25, 1938 *(K & Hardy);* Laketown, August 29, 1939 *(K & Harmston);* Neola, May 23, 1939 *(K & Harmston).*

TRICHOCERIDAE

Diazosma subsinuata (Alexander, 1915).—Provo Canyon, North Fork *(Hardy).*

Trichocera garretti Alexander, 1927.—Cottonwood Canyon, April 6, 1938 *(Nye);* Logan, March 21, 1942 *(Ashdown);* March 30, 1933 *(Thatcher);* May 1, 1939 *(K & Stains);* October 8, 1934 *(Gunnell);* Logan, Campus, March 15, 1938 *(Hardy);* April 3—20, 1938 *(K);* May 5, 1943 *(K);* Logan Canyon, June 12, 1945 *(K);* November 1, 1945 *(K);* Nibley, May 12, 1938

(Hardy); River Heights, April 7, 1943 *(K);* Smithfield, May 11, 1938 *(K & Hardy);* Spanish Fork *(Hardy).*

Trichocera saltator (Moses Harris, 1782).—Provo environs, 6,500 ft., February 21, 1936 *(Hardy).* This is not the species recorded as *saltator* from Wyoming (Alexander, 1945: 398). The interpretation of this fly by Edwards calls for a species with unpatterned wings and with the dististyle entirely unmodified, as in the present fly; the Teton species had a small basal lobe on the dististyle of the male, about as in *hiemalis* (DeGeer, 1776) but its strict identity must remain in question. Whether the various names currently placed in the synonymy of *saltator* actually pertain to the species seems questionable to me since the types of some of these are non-existent and strict comparisons are impossible. However, it would seem that less confusion will result if Edward's later interpretation of the synonymy is followed.

TIPULIDAE

TIPULINAE

Holorusia (Holorusia) grandis (Bergroth, 1888) *(rubiginosa* Loew, 1863, *nec Holorusia (Ctenacroscelis) rubiginosa* Bigot, 1863).—Maple Canyon, August 10, 1923 *(Aldous);* Parowan Canyon, July 20, 1919 (collector unknown); St. George *(Woodbury);* Spanish Fork *(Horace Hardy);* Trout Creek, July 29, 1939 *(Stafford);* Zion Canyon, June 19, 1919 (collector unknown), Weeping Rock, 4,500 ft., June 21—23, 1942.

Prionocera uinticola sp. nov.—Allied to *oregonica;* mesonotal praescutum gray, with three darker stripes, the median one with a narrow velvety black line on cephalic portion; tibiae and tarsi brownish black; wings brownish gray, the prearcular and costal fields more yellowed; stigma barely evident, its proximal half yellow; *Rs* short, only about three times *m-cu;* vein R_3 upcurved, cells R_2 and R_3 at margin subequal in extent; abdominal tergites dark gray, with a brown central stripe, the lateral borders broadly yellow; male hypopygium with the ninth tergite terminating in six slender lobes; basistyle more or less produced into a lobe.

♂. Length, about 10.5 mm.; wing, 12.5 mm.; antenna, about 4 mm.

Frontal prolongation of head black, pruinose, the apex of sides and beneath narrowly yellow; nasus elongate; palpi black. Antennae black, the base of the first flagellar segment narrowly reddened; succeeding flagellar segments conspicuously produced on lower margin at outer end to produce a serrate appearance. Head above dark brown, including the vertical tubercle, the latter subtended by more velvety black areas; front and anterior vertex lighter gray, becoming obscured on the posterior orbits.

Pronotum dark gray, scutellum yellow. Mesonotal praescutum gray, with three darker stripes, the median one with a narrow velvety black line on cephalic portion, the stripe scarcely divided behind; posterior sclerites of notum gray, scutal lobes variegated with darker brown; parascutella yellow. Pleura chiefly gray, the dorsopleural region extensively buffy yellow; posterior pleurites and the katapleurotergite yellow. Halteres brown, knob darker brown,

vaguely paler at apex. Legs with coxae grayish pruinose; trochanters yellow; a single (fore) leg remains; femora obscure yellow, the outer fourth very gradually more infuscated; tibiae and tarsi brownish black. Wings brownish gray, the prearcular and costal fields more yellowed; stigma scarcely evident, its proximal half yellow, the outer portion very pale brown; a scarcely evident darkening in bases of outer radial cells at the anterior cord; obliterative streak extending from before stigma across base of cell *1st* M_2; veins brown, more yellowed in the costal region. Venation: Much as in *oregonica* but *Rs* shorter, about three times *m-cu,* cell R_1 correspondingly widened; in *oregonica, Rs* is more nearly four times *m-cu,* cell R_1 on basal portion very narrow; vein R_3 shorter and more upcurved than in *oregonica,* cells R_2 and R_3 at margin subequal in extent.

Abdominal tergites dark gray, with a brown central stripe; caudal borders of segments very narrowly whitened, lateral tergal borders broadly and conspicuously yellow; sternites more uniformly brownish gray, the posterior borders very narrowly pale. Male hypopygium with the ninth tergite (Fig. 2, *9t)* terminating in six slender lobes, the lateral pair elongate, clothed on outer portion with delicate setulae; sublateral lobes subequal in length, stouter at base, with coarse black setae; intermediate lobes shortest, forming the outer angle of a rectangular median plate, glabrous or virtually so. Basistyle at apex more or less produced into a lobe. Outer dististyle broadest at base, narrowed to the obtuse tip. Inner dististyle narrow, including the beak; lower beak separated from the subbasal lobe by an angular notch.

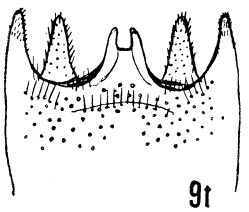

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Fig. 2. *Prionocera uinticola* sp. n., male hypopygium.
(Symbol: *9t,* tergite).

Holotype, ♂, Tryol Lake, Uinta Mountains *(John C. Fechser & Vasco M. Tanner);* Alexander Collection through Hardy.

The most similar species are *Prionocera oregonica* Alexander, 1943, and *P. primoveris* Alexander, 1943, which differ especially in the details of structure of the male hypopygium. The former species is most like the present fly, differing further in the venation, as discussed.

Nephrotoma ferruginea (Fabricius, 1805).—Cedar City, Iron Springs, June 26, 1917, July 3, 1919 (collector unknown); Charleston, August 14, 1943 *(K & Maddock);* Fillmore, August 2, 1935 *(Bischoff),* August 7, 1939 *(Bischoff);* Gandy, August 8, 1945 *(K);* Huntsville, July 18, 1939 *(K);* Logan, June 11, 1943 *(Maddock & Stoddard),* July 19, 1939 *(K & Stains);* Maple Canyon, 1923 (collector unknown); Ogden, August 31, 1943 *(K & Telford);* Pinto, July 12, 1939 *(K & Harmston);* St. George, May 22, 1919

(collector unknown); Salt Lake City, June 10, 1945 *(Edmunds & Mulaik),* June 23, 1943 *(K);* Sandy, on alfalfa, September 11, 1917 (collector unknown); Spanish Fork, September 21, 1943 *(K);* Valencia, July 20, 1938 *(K).*

Nephrotoma lugens erythrophrys (Williston, 1893).—Alta, Little Cottonwood Canyon, July 12, 1938 *(Rees),* Univ. Utah 22,801; Payson Canyon *(Tanner);* Provo Canyon, North Fork *(Hardy),* BYU No. 16; Raft River Mts., 10,000 ft., June 1928 *(Tanner),* No. 3238; Mt. Timpanogos, Aspen Grove *(Hardy),* BYU No. 21.

Nephrotoma occidentalis (Doane, 1908).—Amalga, May 30, 1944 *(K);* Green River, June 14, 1945 *(K);* Hooper, June 13, August 3, 1937 *(Hardy);* Kanab, April 19, 1939 *(K & Harmston);* Kanesville, July 11, 1937 *(K);* Oak Creek Canyon, July 10, 1942 *(K);* Ogden, June 20, 1937 *(K);* Parowan, August 8, 1942 *(K);* Plain City, June 21, 1927 (collector unknown); Providence, June 17, 1931 *(Hammond);* Provo, June 5, 1944 *(K);* Riverdale, July 7, 1937 *(K);* Salem, September 25, 1943 *(K);* Salt Lake City, May 6, 1939 *(Janes),* June 15, 1933 *(Stafford),* September 30, 1930 *(K);* Smithfield, June 5, 1939 *(K & Harmston);* Vernon, August 5, 1930, on potatoes *(K).*

Nephrotoma snowii (Doane, 1908), var.—Leeton, July 25, 1945 *(K).* A single female that agrees well with the description except that praescutal stripes are black only on about their cephalic half and there are further slight differences of coloration.

Tipula (Bellardina) commiscibilis Doane, 1912 *(contaminata* Doane, 1901).—Box Canyon, near Maple Canyon, August 28, 1923 *(Aldous);* Brigham Canyon, June 17, 1938 *(Hardy & Stains);* Head of Fairview Canyon, September 1, 1945 *(Edmunds & Mulaik);* Hooper, July 6—7, 1937 *(Hardy);* Huntington Canyon, 6,000 ft., September 1, 1945 *(Edmunds & Mulaik);* Huntsville, August 25, 1938 *(K & Hardy);* Logan, September 21, 1935 *(Rigby),* at light, September 25, 1939 *(K & Stains),* October 10, 1936 *(Harmston);* Logan Canyon, August 7, 1938 *(Hardy),* at light, August 8, 1945 *(K);* Maple Canyon, August 20, 1923 *(Aldous);* Providence, at light, September 19, 1934 *(Smith);* Provo Canyon, North Fork *(Hardy);* Provo *(Hardy),* August 26—September 7, 1919 *(Spalding);* Salem, September 18, 1943 *(K);* Salt Lake City, Emigration Canyon, August 25, 1935 *(Stafford);* South Willow Canyon, July 4, 1942 *(S. & D. Mulaik);* Spanish Fork *(Agnes Hardy);* Wanship, August 18, 1945 *(Edmunds & Mulaik).*

Tipula (Bellardina) gothicana Alexander, 1943.—Beaver Canyon (Brooklyn Museum, collected by *Charles Schaeffer,* no date); the same, 7,200 ft., July 12, 1945 *(K & Telford).*

Tipula (Bellardina) schizomera Alexander, 1940—St. George, May 26, 1919 (collector unknown), June 28, 1945 *(K);* Virgin, May 18, 1944 *(K);* Washington, June 28, 1945 *(K);* Zion National Park, May 13, 1936 *(Rees & Duncan),* Univ. Utah, 18,376. Mrs. Alexander and I found this handsome fly in various places at Zion, specifically along a small stream at the Grotto Campground, June 21, 1942, resting beneath overhanging rocks in the stream bed, and again at Weeping Rock, resting on the wet cliff faces among masses of Venushair fern.

Tipula (Bellardina) subcinerea Doane, 1901.—Mt. Timpanogos, Aspen Grove *(Hardy, Tanner)*.

Tipula (Trichotipula) macrophallus (Dietz, 1918).—Logan Canyon, August 7, 1938 *(Hardy)*; Provo Canyon, Deer Creek, August 19, 20, 1913 *(Spalding)*; types.

Tipula (Schummelia) magnifolia sp. nov.—Allied to *subtenuicornis*; mesonotal praescutum light gray, with four brown stripes, more intense in female; antennae with scape and pedicel yellow, flagellum black; femora yellow, the tips narrowly but conspicuously blackened; wings whitish subhyaline, extensively clouded with pale brown, stigma darker brown; abdomen yellow, the tergites variegated sublaterally with dark brown; segments six to eight in male blackened to form a ring; male hypopygium with median appendage of ninth sternite entire; inner dististyle with outer basal lobe more or less bilobed; eighth sternite with the lateral lobes very large and conspicuous.

♂. Length, about 13-15 mm.; wing, 12-14 mm.; antenna, about 6-6.2 mm.

♀. Length, about 14-15 mm.; wing, 13-16 mm.

Frontal prolongation of head above obscure yellow, somewhat darker on sides; nasus short; palpi with basal two segments dark brown, the outer ones paler brown. Antennae (male) elongate; scape and pedicel yellow, flagellum black; segments with small basal enlargements; longest verticils unilaterally distributed, slightly more than one-half the length of the segments; in female, antennae shorter. Head above gray, more yellowed on front; vertical tubercle low or scarcely developed.

Pronotum grayish testaceous, vaguely patterned with darker. Mesonotal praescutum light gray, with four brown stripes that are darker colored and more intense in female; in male, intermediate stripes usually paler than the laterals; scutum gray, each lobe with two contiguous or slightly confluent dark areas; scutellum yellow, more brownish gray at base; mediotergite gray, pleurotergite more yellowed. Pleura gray, vaguely patterned with obscure yellow; dorsopleural membrane yellow. Halteres with stem and apex of knob yellow, the base of latter dark brown. Legs with the coxae yellow, sparsely pruinose; trochanters yellow; femora yellow, the tips narrowly but conspicuously black, the amount subequal on all legs; tibiae obscure yellow, the tips narrowly brownish black; tarsi black; claws (male) simple. Wings whitish subhyaline, extensively clouded with pale brown, the pattern involving most of

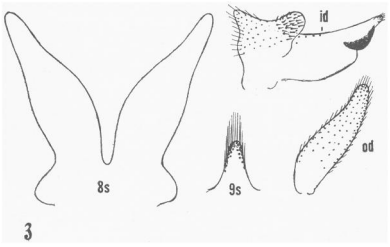


Fig. 3. *Tipula (Schummelia) magnifolia* sp. n., male hypopygium.
(Symbols: *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite).

the cells of the wing and having the general arrangement found in the *hermannia* group; the chief white areas include the wing base, prestigmal and poststigmal markings, and an obliterative area from cell *1st* M_2 almost to the posterior border in cells M_3 and M_4; stigma darker brown; cells *C* and *Sc* somewhat clearer yellow. Venation: *Rs* nearly straight, subequal to the long *m-cu;* petiole of cell M_1 a little exceeding *m*.

Abdomen yellow, the first tergite darkened medially, the succeeding ones with dark brown lateral or nearly lateral markings, on the base of tergite two elongate and continuous, beyond this broken into basal and apical spots; sternites more nearly clear yellow; in male with a broad black subterminal ring involving segments six to eight, inclusive; lobes of the eighth sternite and remainder of hypopygium yellow. Male hypopygium with the median region of ninth tergite produced caudad into a small subrectangular lobe. Median appendage of ninth sternite a small simple lobe, at apex tufted with long setae, these continued down the sides of the lobe to beyond midlength. Outer dististyle pale, broadest on proximal two-thirds, the outer portion more narrowed; setae of moderate length only, lacking on basal fifth. Inner dististyle with the main body long and narrow, the beak slender, on its face with a large flat blackened lobe or flange; outer basal lobe large, more or less bilobed, the cephalic lobe with numerous spinoid setae, the vestiture of the remainder of lobe long and delicate. Eighth sternite with the blackened base restricted in area, concealed or virtually so beneath the seventh sternite, the unusually large whitened lobes projecting caudad and dorsad, very conspicuous.

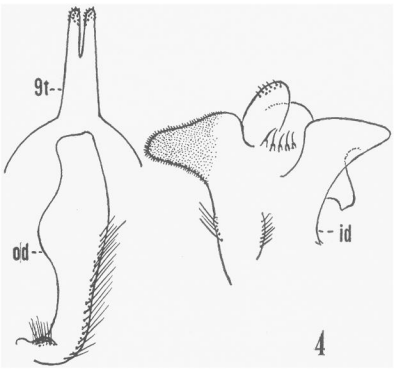


Fig. 4. *Tipula (Yamatotipula) cognata* Doane, male hypopygium.
(Symbols: *id*, inner dististyle; *od*, outer dististyle; *t*, tergite).

Holotype, ♂, Beaver, altitude 8,000 ft., June 26, 1942 *(C. P. Alexander). Allotopotype*, ♀, pinned with type. *Paratopotypes*, ♂♂; *paratypes*, ♂♀, Miami, Mariposa Co., California, June 7, 1940 *(Mont A. Cazier).*

The nearest described species is *Tipula (Schummelia) subtenuicornis* Doane, 1901, which differs conspicuously in the structure of the male hypopygium, particularly of the inner dististyle and the appendages of the eighth sternite and ninth sternite.

Tipula (Schummelia) subtenuicornis Doane, 1901.—Logan Canyon, June 30, 1942 *(Alexander),* July 4, 1945 *(K).*

Tipula (Yamatotipula) albocaudata Doane, 1901.—Logan, May 26—29, 1943 *(Maddock),* June 26, 1943 *(Maddock);* Logan Canyon, May 28, 1938 *(Bischoff),* at 4800 ft., June 30, 1942 *(Alexander).*

Tipula (Yamatotipula) cognata Doane, 1901.—Zion National Park, May 13, 1936 *(Rees)*. The present specimen agrees with a homotype that was determined by Melander, differing from *albocaudata* Doane, 1901, in certain details of structure of the male hypopygium, including the large and conspicuous outer basal lobe of the inner dististyle. Since the hypopygium has not been described and figured I am supplying these data.

Male hypopygium (Fig. 4) having the ninth tergite, *9t*, produced into an elongate median lobe that is split for less than half its length, forming two slender lobules, each tipped with several blackened spiculose points. Outer dististyle, *od*, elongate, pale, truncate at tip, the lower margin beyond midlength strongly dilated; base and posterior margin for more than the proximal half with long conspicuous black setae, on the outer half these small and inconspicuous. Inner dististyle, *id*, complex, the beak and outer basal lobe of somewhat similar shape and size, the latter densely covered with setulae; dorsal crest forming an irregularly obtuse lobe, not appearing as a spinous point as in *edmundsi* and *tephrocephala*, the outer portion with a few short but strong setae; nearer base with about five longer bristles from strong basal tubercles.

Tipula (Yamatotipula) continentalis Alexander, 1941.—Logan Canyon, 5,200 ft., June 30, 1942; July 26, 1939 *(Nye & Stains)*; August 7, 1938 *(Hardy)*; Salt Lake City, June 9, 1945 *(Harmston)*; Mt. Timpanogos, Aspen Grove *(Hardy)*.

Tipula (Yamatotipula) diluta Doane, 1901.—Amalga, May 30, 1944 *(K & Stoddard)*; Benson, May 26, 1944 *(K, Bates & Stoddard)*; Brigham, June 19, 1944 *(K, Wood & Stoddard)*; Cache Junction, May 27, 1944 *(K)*; Logan, May 7, 1941 *(Roberts)*, May 26, 1944 *(K & Wood)*; Logan Dry Canyon, June 23, 1944 *(Wood & Stoddard)*; Mendon, August 26, 1942 *(K)*; Tooele, August 4, 1938 *(K & Stains)*.

Tipula (Yamatotipula) edmundsi sp. nov.—Allied to *albocaudata*; mesonotal praescutum gray, with three somewhat darker gray stripes that are conspicuously bordered by dark brown, the ground color of the lateral stripes almost obliterated; flagellar segments of male black, strongly incised; claws (male) small, simple; wings brownish gray, the prearcular and costal fields more brownish yellow; remainder of wing weakly patterned; *Rs* relatively short, about one-half to two-thirds longer than *m-cu*; male hypopygium with the tergal lobes elongate; outer dististyle nearly parallel-sided, obtuse at apex, the margins virtually straight; inner dististyle with the beak stout, blackened; on outer margin with a slender curved spinoid lobe, the outer basal lobe poorly developed; gonapophyses with tips subatrophied, tapering into pale membrane.

♂. Length, about 12-14 mm.; wing, 15-16 mm.; antenna, about 5-5.5 mm.

♀. Length, about 19-20 mm.; wing, 16-17 mm.

Frontal prolongation of head brownish yellow apically, including nasus, darker on sides, restrictedly pruinose at base; palpi black. Antennae with scape and pedicel light yellow; first flagellar segment obscure yellow at base, the remainder of organ black; flagellar segments of male long, strongly incised,

much more so than in *albocaudata*. Head gray, with a conspicuous brown median stripe on vertex, the sides behind eyes more brightened.

Pronotal scutum gray, variegated with brown; scutellum yellow. Mesonotal praescutum gray, with three somewhat darker gray stripes that are conspicuously bordered by dark brown, the small lateral stripes almost solidly of this color; scutum light gray, the lobes patterned with brownish gray; scutellum dark gray, the posterior portion light brown; postnotum light gray, with a more or less distinct blackish spot on either side just before midlength, the sides of the sclerite restrictedly yellow; pleurotergite brownish yellow, the katapleurotergite more pruinose on lower half. Pleura light gray, the dorsopleural membrane light buffy. Halteres with the stem yellow, knob dark brown. Legs with the coxae light gray; trochanters yellow; femora yellow, the tips dark brown; tibiae extensively dark brown, paler basally; tarsi black; claws small, simple. Wings with a brownish gray tinge, the prearcular and costal fields more brownish yellow; stigma oval, brown; conspicuous brown seams along *Cu* and *m-cu;* weak brown clouds at origin of *Rs* and over anterior cord; obliterative areas scarcely indicated; veins brown, more brownish yellow in the brightened fields. Venation: *Rs* relatively short, about one-half to two-thirds longer than *m-cu;* petiole of cell M_1 subequal to or shorter than *m*.

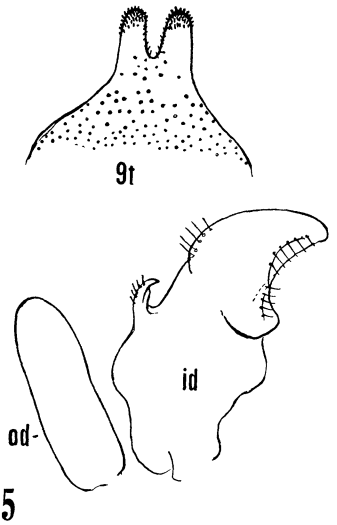


Fig. 5. *Tipula (Yamatotipula) edmundsi* sp. n., male hypopygium.
(Symbols: *id*, inner dististyle; *od*, outer dististyle; *t*, tergite).

Abdominal tergites yellow, with two broad and conspicuous dark brown longitudinal stripes, the median area extensively of the ground; outer three segments brownish black, the outer dististyles pale. Ovipositor with cerci slender and virtually straight. Male hypopygium (Fig. 5) with the ninth tergite, *9t*, having the lobes elongate, separated by a narrow U-shaped notch, in cases this deeper than in others, as shown; each lobe with abundant blackened points at apex. Outer dististyle, *od*, nearly parallel-sided, obtuse at tip, smaller than in *albocaudata*, in cases even wider than shown. Inner dististyle, *id*, with the apical portion, including beak and lower beak heavily blackened; beak stout, the lower beak more or less pendant, separated from the former by a broad rounded emargination; outer margin of crest bearing a slender curved spinous lobe; posterior portion of crest or the outer basal lobe not or scarcely developed, as in *albocaudata* and *cognata*. Gonapophyses not ter-

minating in spatulate blades, the apices subatrophied, tapering into pale membrane.

Holotype, ♂, Logan Canyon, May 22, 1938 *(Hardy);* Alexander Collection. *Allotopotype,* ♀. *Paratopotypes,* 8 ♂♂; *paratype,* ♀, Sardine Canyon, May 27, 1938 *(Hardy);* Fountain Green, May 10, 1939 *(Knowlton & Harmston);* Honeyville, April 29, 1939 *(Knowlton & Bischoff);* Tremonton, April 29, 1939 *(Knowlton & Bischoff).*

I am very pleased to name this species for Mr. George F. Edmunds, Jr., to whom I am indebted for various interesting Tipulidae. The most similar described species are *Tipula (Yamatotipula) albocaudata* Doane, 1901, and *T. (Y.) colteri* Alexander, 1943, differing especially in the structure of the male hypopygium, particularly of the dististyles. The details of coloration and the structure of the antennae are similarly distinct.

Tipula (Yamatotipula) meridiana Doane, 1912.—Beaver, altitude 8,000 ft., June 26, 1942; Zion National Park, 4,500 ft., June 21—22, 1942.

Tipula (Yamatotipula) sayi Alexander, 1911 *(costalis* Say, 1823).— Provo *(Hardy);* Spanish Fork, August 1, 1938 *(Hardy).*

Tipula (Yamatotipula) spernax Osten Sacken, 1877.—Coal Creek Canyon, altitude 9,000 ft., June 25, 1942; Johnson, May 9, 1939 *(K & Harmston);* Kanab, May 9, 1939 *(K & Stains);* Kanosh, September 14, 1939 *(K & Harmston);* Riverdale, July 7, 1937 *(Hardy).*

Tipula (Yamatotipula) sulphurea jacksonensis Alexander, 1945.—Benson, June 23, 1945 *(K & Nye);* Brigham, June 17, 1938 *(Hardy & Stains);* Cache Junction, May 27, 1944 *(K);* Lake Point, June 8, 1945 *(K);* Lewiston, May 29, 1939 *(K & Bischoff);* Logan, May 7, 1941 *(Roberts),* May 26, 1944 *(K);* Logan Meadows, airport, June 13, 1944 *(K);* Mona, June 8, 1938 *(K & Harmston);* Richmond, June 10, 1944 *(K & Bischoff);* Provo, June 5, 1944 *(K & Wood);* Richmond, June 10, 1944 *(K, Stoddard & Wood);* Spanish Fork *(Hardy),* August 20, 1943 *(K);* Starr, June 29, 1945 *(K);* Trenton, June 10, 1944 *(K, Stoddard & Wood).*

Tipula (Yamatotipula) vicina Dietz, 1917.—American Fork Canyon, stream margin, June 23, 1943 *(K);* American Fork, July 6, 1939 *(K);* Benson, June 23, 1945 *(K & Nye);* Brigham, May 27, 1938 *(Hardy);* Central, June 28, 1945 *(K);* Farmington, June 19, 1937 *(Hardy);* Hyrum, June 6, 1939 *(Hardy);* Kaysville, June 2, 1945 *(K);* Kimball's Fort, Silver Creek, June 29, 1943 *(K & Telford);* Laketown, August 21, 1942 *(K, Roberts & Wood);* Logan, June 13, 1944 *(K & Wood),* June, 1943 *(K);* Mona, June 8, 1938 *(K & Harmston);* Naples, June 28, 1943 *(K);* Paradise, June 14, 1938 *(Hardy & Stains);* Provo *(Hardy, Tanner);* Richfield, June 28, 1945 *(K);* Salt Lake City, July 2, 1939 *(K);* Spanish Fork, May 29—30, 1936 *(Hardy).*

Tipula (Tipula) spenceriana hardyi Alexander, 1943.—Very close to the typical form (Pacific Coast States and Provinces), differing in slight details of structure of the male hypopygium.

♂. Length, about 13—14 mm.; wing, 15—16 mm.; antenna, about 3.5—3.6 mm.

Male hypopygium with the tergite large, the caudal margin with a deep and narrow V-shaped notch; margin of lobes narrowly blackened and very

insensibly roughened but not toothed; a single denticle of moderate size on either side at end of the blackened part; furcula between them variable, from about the length of a single spine to twice this distance. Inner dististyle with beak only slightly produced, provided with simple setigerous punctures only.

Holotype, ♂, Eden, August 25, 1938 *(G. F. Knowlton & D. Elmo Hardy). Paratypes,* ♂♀, Allen Canyon, August 12, 1943 *(Knowlton & Maddock);* Clear Creek Canyon, September 4, 1933 *(Rowe);* Huntsville, Ogden Valley, August 21, 1942 *(Knowlton, Roberts & Wood);* Logan Canyon, August 25—30, September 4, 1938 *(Knowlton & Nye);* Mt. Nebo, August 14, 1943 *(Knowlton & Maddock);* Myton, September 18, 1939, at light *(Zirker);* Naples, September 4, 1938 *(Knowlton & Harmston);* Vernal, September 24, 1940 *(Haws).*

The subspecies is named in honor of Dr. D. Elmo Hardy, who has added most materially to our knowledge of the Tipulidae of Utah. A brief diagnosis, in conjunction with the description of *Tipula (Tipula) spenceriana* Alexander, 1943, had been given earlier (Can. Ent., 75: 142; 1943).

Tipula (Tipula) pendulifera Alexander, 1919.—Laketown, August 21, 1942 *(K).*

Tipula (Arctotipula) illustris Doane, 1901 *(Prionocera fuscipennis* Loew, 1865).—Brigham, June 10, 1939 *(Hardy & Stains),* June 24, 1944 *(Wood),* August 5, 1943 *(K);* Charleston, August 14, 1943 *(K & Maddock);* Collinston, April 26, 1939 *(K & Bischoff);* Corinne, June 19, 1944 *(K, Stoddard & Wood);* Garden City, August 21, 1942 *(K, Roberts & Wood);* Lakota, July 18, 1945 *(K);* Logan Canyon, Tony Grove Camp, July 18, 1945 *(K);* Ogden, June 12, 1945 *(Harmston),* July 10, 1937 *(Hardy);* Paradise, June 14, 1938 *(Hardy & Stains);* Peterson, June 14, 1939 *(K);* Uintah, June 26, 1945 *(K).*

In an earlier paper I had called attention to the fact that the common crane-fly that had been called *Prionocera fuscipennis* (Loew, 1865) is, in reality, not a member of the genus *Prionocera* but a *Tipula* that may be referred to the subgenus *Arctotipula.* The name is preoccupied by *Tipula fuscipennis* Curtis, 1834, and the later name *illustris* Doane, 1901, must be used for the present fly.

Tipula (Vestiplex) leucophaea Doane, 1901.— Uinta Mts., Tryol Lake *(Fechser & Tanner).*

Tipula (Oreomyza) clathrata Dietz, 1914.— Beaver, August 12, 1943 *(K);* Provo, July 30-August 1, 1912, August 14, 1913 *(Spalding),* types; Zion National Park, June 21-22, 1942, July 1, 1942 *(Degener & Peiler).*

Tipula (Oreomyza) coloradensis Doane, 1911.—Brighton, July 19, 1942 *(S. & D. Mulaik);* Garden City, June 1, 1939 *(Harmston);* Provo Canyon, North Fork *(Hardy);* Whiterocks, July 22, 1939 *(K & Harmston);* Wolf Creek Canyon, July 24, 1945 *(K).*

Tipula (Oreomyza) gaspensis Alexander, 1929.—Beaver, 8,000 ft., June 27, 1942; Brigham, June 17, 1938 *(Hardy & Stains);* Logan Canyon, 4,800 ft., June 30, 1942.

Tipula (Oreomyza) ingrata Dietz, 1914.—Logan Canyon, 5,200 ft., June 30, 1942; August 12, 1939 *(K & Stains).*

Tipula (Oreomyza) paiuta sp. nov.—Belongs to the *borealis (unca)* group; mesonotal praescutum brownish gray, with three very slightly darker

gray stripes, the median one with four brownish black lines on the cephalic portion; lateral stripes with a ∩-shaped border; pleura yellow, whitish pruinose, with a short dark longitudinal stripe from the propleura backward; apex of haltere whitened; femora and tibiae brownish yellow, their tips narrowly blackened; wings grayish brown, restrictedly patterned with whitish subhyaline and darker brown, the former color more restricted to the outer half of wing; abdominal tergites brownish yellow, trivittate with darker brown; male hypopygium with the tergite on either side produced laterad into a slender blackened rod or spine; outer dististyle short and stout, only about twice as long as wide, the apex broadly rounded; inner dististyle with the beak long and slender; dorsal crest produced only on outer portion, provided with some 20-25 conspicuous setae; lateral appendage entirely pale, without blackened processes; upper process an elongate-oval flattened blade; remainder of appendage consisting of a flattened subquadrate blade, the outer angle more produced than the inner one.

♂. Length, about 15 mm.; wing, 15 mm.; antenna, about 5 mm.

Frontal prolongation of head obscure yellow, slightly darker above, especially the long conspicuous nasus; sides of prolongation a little darkened; palpi with basal segments brown, the outer two segments paler. Antennae relatively long; scape and pedicel yellow; basal two or three flagellar segments with bases narrowly obscure yellow, the remainder black, including all outer segments; flagellar segments gently incised, with small basal swellings; longest verticils subequal in length to the segments. Head with the front yellow; vertex grayish yellow, with a vague darker central stripe.

Pronotum infuscated medially, paling to yellow on sides. Mesonotal praescutum with the ground brownish gray, with three very slightly darker stripes that are patterned with brownish black, the median stripe with four such lines, the intermediate dashes being shorter and broader, the others being narrow black borders to the stripes; lateral stripes with conspicuous ∩-shaped blackened borders; scutum with the central area yellow, each lobe with two light gray marks that are interruptedly bordered by brown; scutellum grayish buffy, with a capillary darkened median vitta; mediotergite yellowish gray, the posterior border darker and with vague pale brown spots on either side of midline. Pleura and pleurotergite yellow, sparsely whitish pruinose, the ventral sternopleurite a little darker; an abbreviated dark brown stripe extending from the propleura onto the anepisternum, not reaching the pteropleurite. Halteres with stem infuscated, darker basally, the knob deepening to black, its apex whitened. Legs with the coxae yellow, whitish pruinose, the fore pair narrowly darker at base; trochanters yellow; femora and tibiae obscure yellow or brownish yellow, the tips narrowly blackened; tarsi passing into black; claws elongate, hairy, conspicuously toothed. Wings with the ground grayish brown, restrictedly patterned with whitish subhyaline and darker brown; prearcular and costal fields more brownish yellow, cell *Sc* more yellowed; stigma darker brown; a small brown spot at origin of *Rs;* the white pattern more restricted to the outer half of wing, including extensive areas before and beyond the stigma and cord; cell R_5 chiefly pale; veins brown, more yellowed in the brightened fields. Venation: *Rs* about one-half longer than *m-cu.*

Abdominal tergites brownish yellow, with a more or less distinct darker brown median stripe and less evident sublateral ones, the posterior borders of the segments narrowly pale yellow; sternites more uniformly yellow, the posterior borders narrowly pale; subterminal segments more uniformly pale but the hypopygium chiefly dark brown. Male hypopygium (Fig. 6) with the ninth tergite, *9t*, narrowed posteriorly, on either side from the ventral surface with a slender blackened rod. Outer dististyle, *od*, short and broad, only about twice as long as wide, the tip broadly rounded. Inner dististyle, *id*, with the beak long and slender, lower beak obtuse, its lower portion with several setae; dorsal crest produced only on outer portion, with about 20—25 conspicuous setae, the more posterior ones longest; outer basal lobe conspicuous, without blackened armature. Lateral appendage entirely pale yellow, without blackened processes; upper process a flattened blade, elongate-oval in outline, the apex obtusely rounded; remainder of appendage consisting of a flattened subquadrate blade, its outer angle produced into an acute point, the inner angle more obtuse. Basistyle opposite the lateral appendage with several very long setae. Gonapophysis appearing as a flattened blade, strongly bent at base, widest about opposite midlength. Eighth sternite biemarginate; lateral lobes much shorter and more obtuse than the broad central portion; setae of mesal part of lateral lobes very dense and erect, straight, their tips acute; remaining setae of lobes dense and chiefly longer and more delicate.

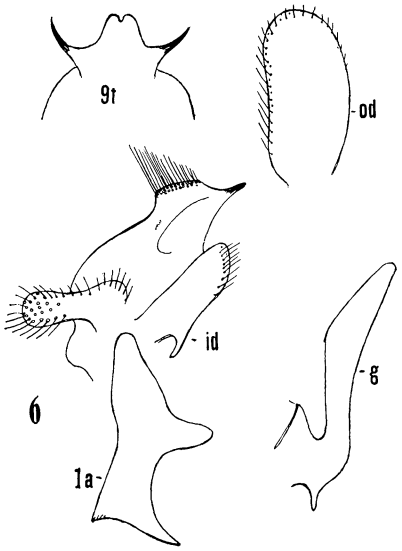


Fig. 6. *Tipula (Oreomyza) paiuta* sp. n., male hypopygium.
(Symbols: *g*, gonapophysis; *id*, inner dististyle; *la*, lateral appendage; *od*, outer dististyle; *t*, tergite).

Holotype, ♂, Kanosh, Millard Co., June 27, 1945 *(G. F. Knowlton)*.

The only approximately similar species is *Tipula (Oreomyza) doanei* Dietz, 1914, which has certain of the details of the male hypopygium about the same. This latter differs in the coloration and in the structure of both dististyles, including the lateral appendage, and in the gonapophyses. The entirely pale yellow lateral appendage readily separates the present fly from the other regional members of the group, all others having at least some of the processes heavily blackened.

Tipula (Oreomyza) rohweri Doane, 1911.—Fort Duchesne, July 25,

1945 *(K);* Logan, August 1, 1939 *(K);* Logan Canyon, 5,200 ft., June 30, 1942; Oakley, August 15, 1943 *(K & Maddock);* Strawberry Reservoir, July 25, 1945 *(K);* Wolf Creek Canyon, July 24, 1945 *(K).*

Tipula (Oreomyza) yellowstonensis Alexander, 1946.— Spanish Fork *(Hardy);* part of type material.

Tipula (Oreomyza) perexigua Alexander, 1924.—Logan Canyon, July 16, 1945 *(K).*

Tipula (Lunatipula) accurata Alexander, 1927 *(johannus* Alexander, 1945).—Mt. Nebo, August 14, 1943 *(K & Maddock).*

Tipula (Lunatipula) acuta Doane, 1901.—Rockville, May 5, 1943 (K); Zion National Park, May 5, 1943 *(K);* "present by the thousands one-fourth mile below Zion Lodge"—G. F. Knowlton.

Tipula (Lunatipula) barbata Doane, 1901.—Huntington Canyon, 6,000 ft., September 1, 1945 *(Edmunds & Mulaik);* Logan, September 10, 1943 *(K),* September 23, 1943 *(K & Maddock);* Orangeville, near summit of mountains to the west, 10,000 ft., September 6, 1945 *(K);* Provo Canyon, North Fork *(Hardy);* Spanish Fork, August 20, 1943 *(Hardy & K);* Mt. Timpanogos, Glacier Lake *(Hardy).*

Tipula (Lunatipula) bisetosa Doane, 1901.—Appledale, July 21, 1939 *(K);* Charleston, August 14, 1943 *(K);* Butterfield Canyon, July 11, 1942 *(S. & D. Mulaik);* Logan Canyon, July 28, 1938 *(Hardy & Stains),* August 7, 1938 *(Hardy);* Magna, August 1, 1942 *(K);* Mantua, August 1, 1942 *(K);* Mt. Nebo, August 14, 1943 *(K & Maddock);* Oak Creek Canyon, July 10, 1942 *(K);* Mt. Timpanogos, Aspen Grove *(Hardy).*

The details of the male hypopygium are shown in Fig. 7. Particular attention is called to the structure of the phallosome, *p,* especially the curved median rod that is quite evident even in dried specimens and is diagnostic for the species.

Tipula (Lunatipula) flavocauda Doane, 1912 *(buenoi,* Alexander, 1946).— St. George, April 23, 1942 *(K),* May 6, 1943 *(K).* Very similar to the types of *buenoi* from Arizona and New Mexico but with the tergal spines of the male hypopygium smaller.

Tipula (Lunatipula) diversa Dietz, 1921.—Beaver Canyon, 7,000 ft., July 12, 1945 *(K & Telford);* Logan, campus, June 6, 1944 *(Stoddard);* Logan Canyon, August 8, 1945 *(K);* Salt Lake City, May 16, 1940 *(Tom Smart);* Spanish Fork, May 19—June 10, 1946 *(Hardy);* Vineyard, June 1912 *(Spalding),* types; Zion National Park, 4,500 ft., June 21—22, 1942.

Tipula (Lunatipula) dorsimacula Walker, 1848 *(angustipennis* Loew, 1863).—Amalga, May 6, 1944 *(Maddock),* May 30 1944 *(K & Stoddard);* Castle Valley, April 13, 1934 *(Gaufin & Telford);* Clarkston, April 27, 1938 *(K & Hardy);* Hooper, July 7, 1937 *(Hardy);* Logan, March 21, 1942 *(D. Ashdown),* April 18, 1931, April 20, 1934, April 26, 1936 *(Harmston),* April 28, 1930, May 1, 1932 *(J. H. Linford),* May 1, 1937 *(W. A. Frahm),* May 3—17, 1938 *(W. A. Frahm)* May 7, 1932, May 9, 1939 *(Bischoff),* June 1, 1931, June 14, 1943 *(Maddock);* Ogden, April 24, 1943 *(K & Maddock);* Providence, April 26, 1934 *(C. F. Smith),* May 1, 1931 *(R. J. Janes);*

Provo, *(Hardy, Fechser, Tanner),* April 1926 *(C. Lynn Hayward);* Provo Canyon, North Fork *(Hardy),* B.Y.U. 30; Salt Lake City, May 19, 1929, on lawn *(W. Ivie),* May 31, 1920 *(A. M. Woodbury);* Spanish Fork *(Hardy),* B.Y.U. 31; Taylorsville, April 2, 1918, April 20, 1940 *(van den Akter).*

As will be noted from the above, this conspicuous fly is one of the earliest of the larger species of *Tipula* to appear and is often collected by college students. The heavy-bodied female is rarely capable of sustained flight and is more frequently found crawling and fluttering over the ground.

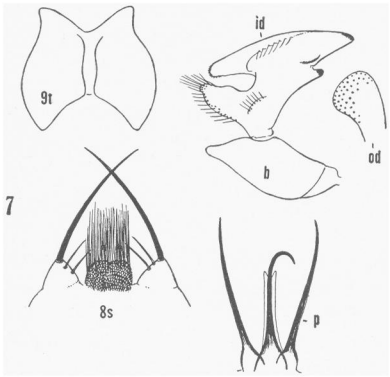


Fig. 7. *Tipula (Lunatipula) bisetosa* Doane, male hypopygium.
(Symbols: *b*, basistyle; *id*, inner dististyle; *od*, outer dististyle; *p*, phallosome; *s*, sternite; *t*, tergite).

Tipula (Lunatipula) lamellata Doane, 1901 *(rangiferina* Alexander, 1915).—Logan, August 6, 1942 *(K & Roberts),* July 16, 1945 *(K);* Logan Canyon, July 14, 1938 *(Hardy & Stains).*

Tipula (Lunatipula) lyrifera Dietz, 1921.—Beaver Canyon, 7,200 ft., July 12, 1945 *(K & Telford);* Fillmore, among June grass, May 31, 1945 *(K);* Maple Canyon, June 12, 1943 *(K & Telford);* Mill Creek Canyon, June 24, 1938 *(K & Hardy);* Provo Canyon, North Fork *(Hardy),* B.Y.U. 32, 35; South Willow Canyon, July 4, 1942 *(Mulaik);* Vineyard, June 6, 1912 *(Spalding),* type.

Tipula (Lunatipula) macrolabis macrolaboides Alexander, 1918.—Mt. Timpanogos, July 26, 1942 *(K).*

Tipula (Lunatipula) madina Dietz, 1921.—Provo, June 24, 1912 *(Spalding),* type.

Tipula (Lunatipula) mormon sp. nov.—Belongs to the *unicincta* group, allied to *bigeminata;* general coloration of thorax opaque yellow, the praescutum with three scarcely differentiated yellow stripes; femora yellow, the tips narrowly infuscated; wings with a weak brownish tinge, the cells of the basal half paler; a very conspicuous white mark across base of cell *1st* M_2; male hypopygium relatively large; ninth tergite transverse, the caudal margin with a small median notch, the broad lateral lobes produced caudad into a narrow blackened point; ventral surface of tergite on either side with a blackened spine that is directed mesad; inner dististyle with beak slender, lower beak stout, transversely corrugated; dorsal crest low, glabrous; outer basal lobe densely clothed with long delicate setae, the pale apical portion with fewer coarse setae; phallosome symmetrical, consisting of two powerful reddened spines and two short straight blades; lateral lobes of eighth sternite terminating in a single very powerful fasciculate bristle.

♂. Length, about 16 mm.; wing, 16.5 mm.; antenna, about 4 mm.

Frontal prolongation of head yellow, slightly more reddish yellow on the ventral half; nasus small; palpi with basal two segments obscure yellow, outer segments dark brown. Antennae with scape and pedicel clear light yellow; first flagellar segment a trifle more darkened; remaining flagellar segments dark brown; flagellar segments with basal enlargements relatively large, longest verticils subequal in length to the segments. Head light grayish yellow; vertical tubercle low and inconspicuous.

Pronotum yellow, with a more obscure yellow pollen. Mesonotum opaque, yellow, the praescutum with three scarcely differentiated yellow stripes that are not pollinose; posterior sclerites of the notum, especially the postnotum, with a more whitish yellow bloom. Pleura brownish yellow, with a more whitish bloom; dorsopleural region light yellow. Halteres yellow, the base of knob infuscated. Legs with the coxae yellow, whitish pollinose; trochanters yellow; femora and tibiae yellow, the tips narrowly infuscated; tarsi passing into dark brown; claws toothed. Wings with a weak brownish tinge, the cells of the basal half paler; prearcular and costal regions, with vein *Cu* and its vicinity, more brownish yellow; stigma pale brown; scarcely evident whitish areas before and beyond the stigma; a very conspicuous white mark from the outer end of cell *R*, across cell *1st* M_2 into the base of M_3; veins light brown. Venation: *Rs* about one-third longer than *m-cu;* petiole of cell M_1 and *m* subequal.

Abdomen with basal segments chiefly yellow, the outer segments, including hypopygium, more infuscated. Male hypopygium (Fig. 8) relatively large and conspicuous. Ninth tergite, *9t,* transverse, the caudal margin with a small and narrow median notch; lateral lobes broad, each produced caudad into a slender blackened spine or point; on dorsal surface with a deep median furrow; on ventral face on either side with a blackened spine that is directed toward the midline. Ninth sternite, *9s,* with the appendage narrowed and obtuse at tip, the apex and outer margin with very abundant retrorse reddened bristles. Basistyle complete, the outer margin strongly sinuous but not produced. Outer dististyle, *od,* pale, about four times as long as wide; setae of basal half restricted to outer margin, pale in color; on apical third the setae longer, dark-colored, conspicuous. Inner dististyle, *id,* with the beak slender, lower beak much stouter, its lower surface coarsely corrugated; dorsal crest low, glabrous, the surface of style along base of crest with long yellow setae that are directed backward, these becoming more abundant behind; posterior crest small and pale, glabrous; outer basal lobe relatively small but very conspicuous by the abundant long pale setae that are distributed in more or less distinct transverse rows, producing a weakly banded appearance; apex of lobe further extended into a pale lobule with sparse coarser setae; sensory area placed at base of the outer basal lobe. Phallosome symmetrical, consisting of two powerful reddened spines that jut from the genital chamber, and two shorter straight slender blades. Eighth sternite with the upper median plate at posterior border of the following sternite having its outer edge broadly emarginate, the lateral lobes thus conspicuous; lateral lobes of sternite ter-

minating in a powerful reddened fasciculate pencil or mat of bristles; median region of sternite with a semidetached pad covered with long reddish setae.

Holotype, ♂, Spanish Fork, June 10, 1936 *(D. Elmo Hardy);* Alexander Collection.

When compared with *Tipula (Lunatipula) inadusta* Alexander, 1946, and other somewhat similar yellow species of the *unicincta* group, the present fly is readily distinguished by the structure of the male hypopygium, particularly the very different ninth tergite.

Tipula (Lunatipula) pellucida Doane, 1912 (*clara* Doane, 1901).—Benson, June 3, 1936 (collector unknown); Eden, June 2, 1938 *(K & Stains);* Farr West, May 9, 1938 *(K & Hardy);* Honeyville, May 27, 1938 *(Hardy);* Hooper, August 8, 1937 (collector unknown); Kanab Canyon, May 5, 1943 *(K);* Logan, May 26, 1944 *(K);* Logan Canyon, May 8, 1938 *(Hardy),* June 30, 1942; Logan Dry Canyon, May 9, 1938 *(Stains);* Providence Canyon, June 7, 1933 (collector unknown); Raft River Mts., 10,000 ft., June 1936 *(Tanner);* Riverton, May 9 1938 *(K & Hardy);* Salt Lake, May 21, 1928 *(A. M. Woodbury, G. C. Hyde);* Salt Lake City, August 21, 1928 *(Woodbury);* Salt Lake City, Dry Canyon, May 4, 1940 *(K. Wilson);* Sardine Canyon, May 31, 1938 *(Hardy);* Slate Canyon, May 14, 1919 *(Spalding);* Smithfield, May 11, 1938 *(K & Hardy);* Spanish Fork, May 19, 1936 *(Hardy).*

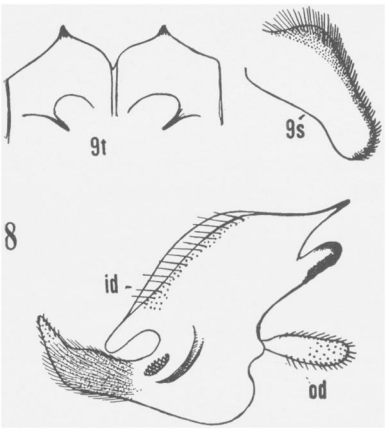


Fig. 8. *Tipula (Lunatipula) mormon* sp. n., male hypopygium.
(Symbols: *id,* inner dististyle; *od,* outer dististyle; *s,* sternite; *t,* tergite).

Tipula (Lunatipula) pyramis Doane, 1912.—The following records are based on determinations made by the late Dr. William G. Dietz. I am not certain of the identity of the species, based on my own knowledge. Eureka, June; Provo, June; Provo Canyon, Deer Creek, August; Stockton, June; Vineyard, July, August (all collected by Spalding).

Tipula (Lunatipula) rabiosa Alexander, 1943.—Monte Cristo, July 24, 1943 *(K);* Parrish Canyon, near head, July 23, 1942 *(K).*

Tipula (Lunatipula) sanctae-ritae Alexander, 1946, var.—Washington, May 18, 1944 *(K);* Zion National Park, 4,500 ft., June 21, 1942. Very similar to the type (Arizona) but differing in slight details of the male hypopygium, particularly of the ninth tergite. Most of the specimens are much larger than the unique type specimen.

Tipula (Lunatipula) sinistra Dietz, 1921.—Beaver, in the mountains, July 10, 1942 *(K)*.

Tipula (Lunatipula) spaldingi Dietz, 1921.—Bluff, April 28, 1935 *(B. E. & H. D. Rees);* Eureka, June 30, August 1, 1911 (collector unknown); Provo, June 24, 1912 (collector unknown); Stockton, June 13, 1913 *(Spalding),* types; Zion National Park *(Rees)*.

The most closely allied species is *Tipula (Lunatipula) albocincta* Doane, 1901, which was inadvertently omitted from Dietz's key to the species of the *impudica* group (Ann. Ent. Soc. America, 14: 3-4; 1921). The male hypopygium of *spaldingi* has not been adequately figured (Fig. 9). Ninth tergite, *9t*, narrowly transverse; median lobe (subtergal process) elongate, compressed-flattened, ending in pale membrane; canthi unusually long and narrow, acute, the median notch very narrow; lateral processes appearing as slightly wider flattened blades that are directed chiefly caudad. Basistyle with its lower margin produced into a flattened cultrate blade, the point acute. Outer dististyle, *od*, unusually narrow, a trifle broader across the base. Inner dististyle, *id*, with the beak broadly obtuse, blackened; posterior crest small, pale; outer basal lobe more or less oval in outline, the apex obtuse. Gonapophyses, *g*, conspicuously developed, somewhat as in *albocincta*, but of different shape, each very unequally bifid, the axial spine long and powerful, the lateral spine very small, both acute. Eighth sternite, *8s*, with the caudal margin truncate, with a median brush of long delicate setae, with a smaller group of 7 or 8 stronger bristles on either side, with further strong setae along the margin between the major groups.

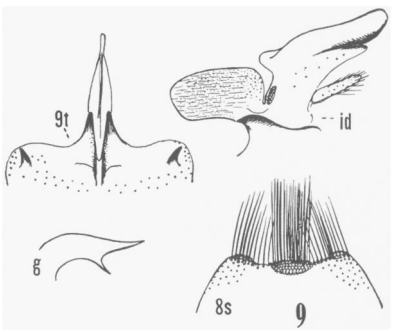


Fig. 9. *Tipula (Lunatipula) spaldingi* Dietz, male hypopygium.

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

Tipula (Lunatipula) splendens Doane, 1901.—Blacksmith Fork Canyon, June 12, 1938 *(Hardy);* Brigham, June 17, 1938 *(Hardy & Stains);* Castilla, July 8, 1945 *(Edmunds & Mulaik);* Devils Slide, June 26, 1945 *(K);* Fish Lake, June, 1930 *(Rowe);* Holden, July 21, 1943 *(K);* Logan, July 13, 1943 *(K);* Logan Canyon, August 8, 1945 *(K);* Marriott, June 30, 1945 *(K);* Mill Creek Canyon, June 24, 1938 *(K & Hardy);* Monte Cristo, July 18, 1939 *(K);* Salt Lake City, City Creek Canyon, June 30, 1945 *(K);* Mt. Timpanogos, July 26, 1942 *(K)*.

Tipula (Lunatipula) tanneri sp. nov.—Belongs to the *unicincta* group, allied to *inadusta;* general coloration of thorax gray, the praescutum with four more reddish brown stripes; head with a capillary dark brown median vitta; femora yellow, the tips narrowly brownish black; wings with a brownish tinge, restrictedly patterned with brown and with a conspicuous obliterative area at

cord; male hypopygium with the tergal lobes elongate, nearly parallel, their tips oblique; appendage of ninth sternite cylindrical, with a single pair of strong reddish setae at apex; phallosome symmetrical, with a single pair of strong reddish spines; lateral lobe of eighth sternite terminating in a single unusually fasciculate bristle.

♂. Length, about 16-18 mm.; wing, 17-19 mm.; antenna, about 4.9-5 mm.

♀. Length, about 18 mm.; wing, 19 mm.

Frontal prolongation of head yellow, slightly pruinose above, especially basally, sides of prolongation infuscated; nasus short; basal three segments of palpi brownish yellow, the terminal one passing into dark brown. Antennae with scape and pedicel yellow, basal flagellar segments bicolored, brown on the small basal swelling, the remainder yellow; on about the sixth segment the bicolored nature is lost and the color is uniformly dark brown; longest verticils exceeding the segments. Head above light gray, with a capillary dark brown median vitta, with less distinct dark areas on either side.

Pronotum gray. Mesonotal praescutum gray with four more reddish brown stripes, the intermediate pair narrower and more or less interrupted at near midlength; posterior sclerites of notum light gray, the scutal lobes patterned with reddish brown. Pleura light gray, vaguely patterned with slightly darker gray; dorsopleural membrane light yellow. Halteres brownish yellow, the stem restrictedly yellow at base, the knob dark brown. Legs with the coxae light gray; trochanters yellow; femora yellow, the tips narrowly but conspicuously brownish black; tibiae yellow, the tips more narrowly blackened; tarsi obscure brownish yellow, passing into black; claws (male) toothed. Wings with a brownish tinge, the prearcular and costal fields more yellowed; stigma small, darker brown; poorly indicated dark spots at arculus, end of *Sc,* along cord and on adjoining portion of vein *Cu;* obliterative area at cord conspicuous, extending from costa almost across the wing along vein M_4, more expanded and whitened over cell *1st* M_2; two small whitish areas in outer end of cell *1st A,* including one at end of vein *1st A;* no poststigmal brightening; veins pale brown, more yellowed in the brightened portions. Venation: *Rs* a little less than twice *m-cu;* petiole of cell M_1 subequal to or shorter than *m.*

Basal abdominal tergites yellow; on posterior ring of tergite two and succeeding segments with an oblique sublateral area, these becoming more extensive and conspicuous on outer segments; lateral borders broadly yellow, the caudal margins more narrowly so; sternites chiefly yellow, the outer segments, including hypopygium, dark reddish brown. Male hypopygium (Fig. 10) with the lobes of the tergite, *9t,* elongate and nearly parallel, about as in *bigeminata,* the tips obliquely truncated and more or less thickened; a broad dorsal furrow that is not fringed with setae. Appendage of ninth sternite, *9s,* narrowed into a cylindrical lobe that is provided with abundant strong reddish setae that are concentrated on about the outer third, at the tip grouped into a pencil; fewer and longer normal setae along the margin of the appendage. Outer dististyle, *od,* dilated at apex. Inner dististyle, *id,* with the beak slender, the lower beak stouter and heavily blackened; dorsal and posterior crests large and conspicuous, their margins microscopically ser-

rulate; outer basal lobe relatively large, bearing a small glabrous lobule on posterior margin near base. Phallosome, *p*, symmetrical, consisting of two powerful reddish spines, nearly straight, gradually narrowed to the acute tips; an inner shorter pair of blades. Eighth sternite, *8s*, with the lateral lobe short and stout, with a very powerful bristle that is unusually flattened and fasciculate; three or four other smaller bristles down the face, mesal border of lobe with dense brushes of setae that are strongly bent and recurved at near midlength; a low median lobe that bears about a dozen very modified frond-like setae, flattened and fimbriate at their outer ends (one shown enlarged); lying more basad, a transverse and feebly bilobed cushion that is densely provided with long reddish setae that split at their tips into fine filaments.

Holotype, ♂, Zion National Park, 4,500 ft., June 21, 1942 *(C. P. Alexander)*. *Allotype*, ♀, Gothic, Colorado, 9,500 ft., July 4, 1934 *(C. P. Alexander)*. *Paratopotypes*, 2 ♂♂, with he types; *paratypes*, 4 ♂♂, with the allotype, 9,500-10,000 ft., July 4-9, 1934 *(C. P. Alexander)*; 1 ♂, Kebler Pass, Gunnison Co., Colorado, 10,150 ft., July 15, 1934 *(C. P. Alexander)*.

The Colorado material had earlier (Amer. Midl. Nat., 29: 153-154; 1943) been recorded as *Tipula (Lunatipula) bigeminata* Alexander, 1915, but a dissection of the male hypopygium of the holotype of the latter, kindly made by Dr. Alan Stone, shows that it is, in reality, a very different species, having the phallosome asymmetrical, with a median element of characteristic shape. I take pleasure in naming this fly for Professor Vasco M. Tanner, of Brigham Young University. The species is closest to *Tipula (Lunatipula) inadusta* Alexander, 1946, and *T. (L.) ruidoso* Alexander, 1946, among those species that have the phallosome symmetrical or without an unpaired median element. From these and others it is distinguished by the details of structures of the male hypopygium.

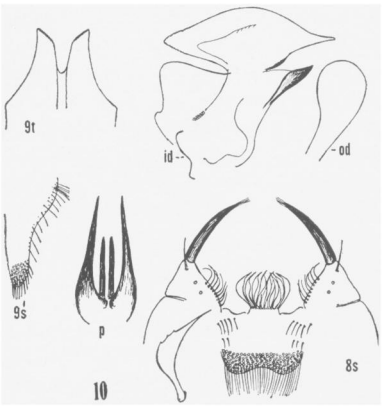


Fig. 10. *Tipula (Lunatipula) tanneri* sp. n., male hypopygium.

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

Tipula (Lunatipula) utahicola sp. nov. — Belongs to the *impudica* group; size small (wing, male, 13 mm.); general coloration gray, the praescutum with four conspicuous dark brown stripes; antennae with scape and pedicel yellow, flagellum black; femora obscure yellow, the tips brownish black; wings whitish subhyaline, patterned with brownish gray and brown, most intense and conspicuous in cells R_2 and R_3, appearing as paler streaks in other cells, as *1st A*; abdominal tergites obscure yellow, with three narrow broken brown stripes; male hypopygium with the median lobe of tergite depressed, canthi obtuse; inner dististyle with the outer basal lobe of moderate

size only; eighth sternite broad at apex, with numerous setae, including a strong modified one on either side, decussate across the midline.

♂. Length, about 12 mm.; wing, 13 mm.; antenna, about 1.4 mm.

Frontal prolongation of head brown, pruinose; nasus elongate; basal segments obscure yellow, the outer ones black. Antennae with scape and pedicel yellow, the latter paler; flagellum black, the segments moderately incised; longest verticils a little shorter than the segments. Head brownish gray, with a delicate blackish median line, the sides of the posterior vertex more brightened.

Pronotum gray, patterned with brown; scutellum light yellow, strongly emarginate medially. Mesonotal praescutum gray, with four narrow but conspicuous dark brown stripes, the relatively broad space between the intermediate pair darker gray; setae of interspaces relatively abundant, from small black punctures; scutum brownish gray, each lobe with two brown areas; posterior sclerites of notum pale brown, sparsely pruinose, more or less darkened medially. Pleura pale brown, pruinose; dorsopleural membrane yellow. Legs with the coxae light gray, paling to yellow apically; trochanters yellow; femora obscure yellow, the tips rather narrowly but conspicuously brownish black, the amount subequal on all legs; tibiae brownish yellow, the tips very narrowly infuscated; tarsi blackened, the basitarsi obscure yellow on proximal portions; claws simple. Wings (Fig. 11) whitish subhyaline, patterned with pale brownish gray and brown, most intense in cells R_2 and R_3; the paler washes occur over the anterior cord, in outer medial cells, outer end of cell *M*, outer end of cell *Cu* adjoining the vein, and as a conspicuous central streak in cell *1st A;* stigma relatively small, darker brown; the white ground includes virtually the basal third of wing, the conspicuous obliterative area at and before cord, a more restricted poststigmal brightening, most of cell R_5 to the wing-tip, and less evident areas elsewhere; prearcular field and wing base restrictedly more yellowed; veins dark brown, much paler in the brightened costal and prearcular fields. Venation: Cell *1st* M_2 variable in shape and size in the two wings of the unique type, *m* being subequal to or shorter than the petiole of cell M_1.

Abdominal tergites obscure yellow, the first more pruinose basally; segments narrowly trivittate with brown, more evidently so on the proximal segments, the stripes narrow and broken on the intermediate and outer segments, particularly the median vitta; lateral tergal borders more grayish pruinose; basal sternites more infuscated, the outer ones passing into yellow; subterminal segments, including the eighth sternite, chiefly darkened; remainder of hypopygium largely yellow. Male hypopygium (Fig. 11) with the ninth tergite, *9t,* having the median lobe (subtergal process) broadly depressed, its tip obtusely rounded; canthi obtuse to subangulate; on ventral surface of each lobe the lateral process juts caudad as a narrow flattened rod, its tip obtuse. Basistyle, *b,* broad, its upper outer angle produced into a short but evident spinous point. Outer dististyle, *od,* small, subtriangular, narrowed outwardly, clothed with long conspicuous setae. Inner dististyle, *id,* with the beak obtuse, blackened; subapical beak shorter and stouter, more nearly truncated at apex; crest low but becoming more conspicuous on its

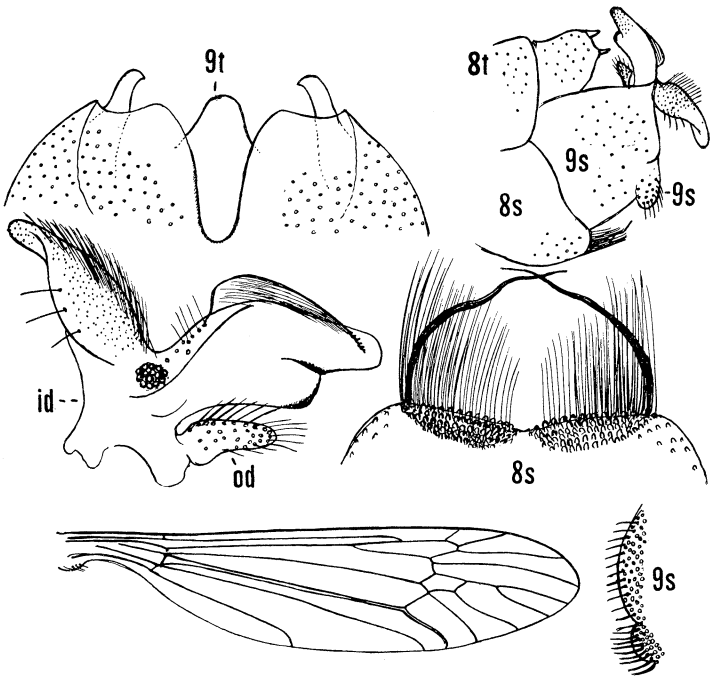


Fig. 11. *Tipula (Lunatipula) utahicola* sp. n., male hypopygium and venation. (Symbols: *id*, inner dististyle; *od*, outer dististyle; *s*, sternite; *t*, tergite).

posterior portion; sensory area consisting of about a dozen pores; outer basal lobe shorter than the main body of style; flattened, twisted, on basal portion near the sensory area with unusually abundant and conspicuous setae, these becoming more sparse outwardly. Ninth sternite with the appendage low, conspicuously setiferous; its most ventral portion slightly more produced and with a compact grouping of short stout setae. Eighth sternite relatively short, its apex very broad, with a conspicuous cushion or fringe of setae, this microscopically broken or interrupted at the midline; a single, unusually long flattened bristle at extreme outer lateral angle; sublateral setae longer and more dense than the inner ones, all evidently crinkly.

Holotype, ♂, White Valley, Millard Co., May 1, 1940; received from Miss Jane C. Dirks; Collector's No. 53.

The nearest relative of the present fly appears to be *Tipula (Lunatipula) mitrata* Dietz, 1921, of New Mexico, which is similarly a small fly with the details of structure of the male hypopygium different, involving the tergite, inner dististyle and eighth sternite.

Tipula (Lunatipula) woodi sp. nov.—Belongs to the *impudica* group; size medium (wing, male, about 17 mm.); mesonotum gray, the praescutum

with three more reddish brown stripes, the broad central one narrowly bordered with darker brown on its anterior portion; femora and tibiae yellow, undarkened; wings brownish yellow, the prearcular and costal fields conspicuously light yellow; obliterative areas very restricted and inconspicuous; male hypopygium with the median lobe of tergite compressed flattened, canthi obtuse, lateral processes very broad, the apex truncated and heavily sclerotized; inner dististyle with the outer basal lobe long and narrow, about two-thirds as long as the style itself, the tip obtuse.

♂. Length, about 18 mm.; wing 17.5 mm.; antenna, about 4.5 mm.

Frontal prolongation of head uniformly yellow; nasus virtually lacking, reduced to a low tubercle; basal two segments of palpi obscure yellow, the remainder dark brown. Antennae with basal three segments yellow, remaining segments dark brown, the small but distinct basal swellings slightly darker; longest verticils shorter than the segments. Head light brown, more pruinose anteriorly, the orbits light gray; a capillary brown median vitta; vertical tubercle low, entire.

Pronotum obscure yellow, vaguely patterned with pale brown. Mesonotal praescutum gray with three more reddish brown stripes, the median one more distinct, on about its cephalic half narrowly bordered by darker brown, on the posterior border similarly margined with yellow; lateral stripes very indistinct; posterior sclerites of notum light gray, the scutal lobes variegated with reddish brown; a vague central line of the same color on the scutellum and mediotergite. Pleura pale yellow, very sparsely pruinose, the ventral sternopleurite slightly darker; dorsopleural membrane pale yellow. Halteres yellow, the knobs weakly darkened. Legs with the coxae yellow, sparsely pruinose, the anterior faces with conspicuous setae; femora and tibiae yellow; tarsi passing into black; claws (male) toothed. Wings with a strong brownish yellow tinge, the preacular and costal fields more saturated yellow; stigma very pale brown; obliterative area before cord very restricted and inconspicuous, scarcely entering the cell M_3; no dark seam on *Cu;* veins pale brown, more brownish yellow in the brightened fields. Venation: *Rs* about one-third longer than *m-cu;* R_{1+2} preserved; *m* sinuous, longer than petiole of cell M_1.

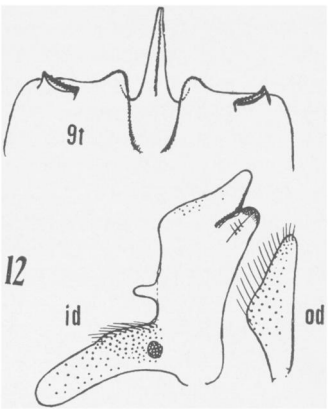


Fig. 12. *Tipula (Lunatipula) woodi* sp. n., male hypopygium.

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

Abdomen yellow, the tergites with three broken brownish black stripes; hypopygium chiefly yellow. Male hypopygium (Fig. 12) having the ninth tergite, *9t*, with the median lobe (subtergal process) compressed-flattened; canthi

obtuse, their margins microscopically crenulate; lateral process very broad, the apex truncated and heavily sclerotized, microscopically toothed. Outer dististyle, *od,* broadest at near midlength, thence narrowed to the obtuse tip. Inner dististyle, *id,* with both beak and lower beak obtuse; posterior crest unusually small, pale; outer basal lobe long and narrow, about two-thirds as long as the main body of style, apex obtuse; sensory area compact, comprised of more than 15 pores. Phallosome without conspicuous spinous armature, as in *albocincta, spaldingi* and others. Eighth sternite with a relatively sparse median fringe of long setae; at base with a very small fleshy median lobe, this less than twice as long as wide across base, entirely pale, the apex obtuse.

Holotype, ♂, Spanish Fork, altitude 4,550 ft., June 10, 1936 *(D. Elmo Hardy);* Alexander Collection, through Knowlton.

The present fly is named for Mr. Stephen L. Wood, who has aided Professor Knowlton in the capture of many interesting Tipulidae from Utah. The species is most nearly allied to *Tipula (Lunatipula) impudica* Doane, 1901, and *T. (L.) spernata* Dietz, 1921, yet is entirely distinct. The unusually broad and sclerotized lateral processes of the ninth tergite of the hypopygium are noteworthy.

LIMONIINAE

LIMONIINI

Limonia (Metalimnobia) cinctipes (Say, 1823).—Monte Cristo, toward Allen Camp, 7,000 ft., August 21, 1942 *(K & Maddock).*

Limonia (Limonia) indigena jacksoni (Alexander, 1917).—Spanish Fork, June 8-14, 1936 *(Hardy).*

Limonia (Limonia) sciophila (Osten Sacken, 1877).— Allen Canyon, below Monte Cristo, July 24, 1943 *(K & Maddock);* Logan Canyon, June 17, 1938 *(Hardy).*

Limonia (Limonia) simulans concinna (Williston, 1893).— Hooper, July 27-August 8, 1937 *(K);* Little Salt Lake, July 19, 1919 (collector unknown); Logan, July 17, 1938 *(D. E. & A. T Hardy);* Logan Camp, July 21, 1937, October 3, 1937 *(Hardy);* Logan Canyon, October 14, 1945 *(K),* October 26, 1945 *(Ted & Mary Tibbetts);* Provo, August 1, 1937 *(Hansen);* River Heights, May 2, 1944 *(Wood);* South Willow Canyon, July 4, 1942 *(Mulaik);* Mt. Timpanogos, Glacier Lake *(Hardy).*

Limonia (Limonia) venusta (Bergroth, 1888) *(negligens* Alexander 1927).—Garden City, July 24, 1943, seepage along shore of Bear Lake *(K & Maddock);* Indian Canyon, April 23, 1943 *(K & Wood);* Logan, April 13, 1938 *(Hardy),* April 20, 1938 *(K & Hardy),* April 26, 1943 *(K),* June 9, 1943 *(Maddock),* August 20, 1942 *(K),* August 21, 1939 *(K),* August 25, 1943 *(K),* September 6, 1938, at light *(K. & Nye),* September 13-23, 1943 *(K),* October 5, 1943 *(K);* North Logan, September 20, 1943 *(K);* Logan Canyon, July 4, October 14, 1945 *(K);* Salt Lake City, September 21, 1939 *(Rees);* Spanish Fork, September 12, 1943 *(K);* Trout Creek, July 27, 1933 *(Stafford);* Wanship, June 29, 1943 *(K).*

Needham and Christenson (1927: 25) give a brief account of the early stages as found in Logan River (emerged July 18, 1926). The larvae occurred

in the shelter of mixed mosses and algae at the water line, spinning silken pupal shelters in the same spots.

Limonia (Dicranomyia) brevivena (Osten Sacken, 1869).—A common and very distinct species, being one of the most characteristic forms that occur in the more arid regions. American Fork, on grass, June 15, 1937 *(Hansen);* Beaver Canyon, Puffers Lake, June 6, 1936 *(Hardy);* Cache Junction, July 2, 1913 *(H. R. Hagan);* Callao, August 8, 1945 *(K);* Circleville, July 9, 1943 *(K);* Cove, July 20, 1939 *(K);* Currant Creek, June 28, 1943 *(K & Telford);* Daniels Pass, July 25, 1945 *(K);* Eden, July 16, 1937 *(K);* Eden, July 16, 1937 *(Hardy);* Fish Springs, August 8, 1945 *(K);* Gandy, August 8, 1945 *(K);* Green River, June 14, 1945 *(K);* Hooper, May 25, 1939 *(K),* September 3-21, 1937 *(Hardy);* Huntsville, June 4, 1938 *(K & Stains);* Junction, June 28, 1945 *(K);* Koosharem, July 10, 1943 *(K & Telford);* Lehi, September 29, 1943 *(K & Maddock);* Liberty, October 9, 1937 *(Hardy);* Linwood, September 6, 1939 *(K & Harmston);* Logan, May 8, 1938 *(Hardy),* July 21, 1938, at light *(K & Hardy);* September 30, 1938 *(K & Nye);* Logan Canyon, October 26, 1945 *(Ted & Mary Tibbetts);* Manila, August 14, 1942 *(K); Midway,* August 14, 1943 *(K & Maddock);* Moab, June 13, 1945 *(K);* Monte Cristo, August 12, 1943 *(K & Maddock);* Morgan, July 24, 1945 *(K);* North Ogden Canyon, October 9, 1937 *(Hardy);* Parowan, August 8, 1942 *(K);* Payson, August 26, 1941 *(K),* August 26, 1943 *(K);* Pleasant Grove, July 26, 1937 *(Hansen);* Provo, June 8, 1939 *(K & Nye);* Riverton, on milkweed, June 18, 1937 *(Hansen);* Roy, June 16, 1945 *(K);* Salt Lake City, August 1, 1939 *(Rees);* Spanish Fork, June 8, 1936 *(Hardy);* Starr, June 29, 1945 *(K);* Strawberry Reservoir, July 25, 1945 *(K);* Mt. Timpanogos, July 26, 1945 *(K);* Zion National Park, 4,500 ft., June 21, 1942; Weeping Rock, July 9, 1943 *(K & Telford),* July 19, 1943 *(K).*

Limonia (Dicranomyia) distans (Osten Sacken, 1859).—Kanab, May 5, 1943 *(K);* Leeds, June 27, 1945 *(K);* Washington, June 27, 1945 *(K).*

Limonia (Dicranomyia) gracilis (Doane, 1900) *(halterella* Edwards, 1921).—Allen Canyon, August 12, 1943 *(K & Maddock);* Ferron Canyon, Willow Lake, September 1, 1945 *(Edmunds & Mulaik);* Huntington Canyon, 8,000 ft., September 1, 1945 *(Edmunds & Mulaik);* Mt. Timpanogos, Salamander Lake, August 26, 1943 *(K & Maddock).*

The name *gracilis* is a secondary homonym of *gracilis* Zetterstedt, 1838, and it may be advisable to use the later name *halterella.*

Limonia (Dicranomyia) haeretica (Osten Sacken, 1869).—Benjamin, June 21, 1945 *(K).*

Limonia (Dicranomyia) halterata (Osten Sacken, 1869).—Henefer, June 29, 1943 *(K & Telford);* Kimball's Fort, Silver Creek, June 29, 1943 *(K & Telford);* Sevier River, near Hatch, June 27, 1942.

Limonia (Dicranomyia) humidicola (Osten Sacken, 1859).—Hooper, July 7, 1937 *(Hardy);* Logan Canyon, October 14, 1945 *(K);* Mill Creek Canyon, June 24, 1938 *(K & Hardy);* Rockville, under rocks near bridge, June 28, 1945 *(K);* Salt Lake City, September 21, 1939 *(Rees);* Spanish Fork, June 14, 1936 *(Hardy);* Zion National Park, Weeping Rock, 4,500 ft., June 22, 1942; July 9, 1943 *(K & Telford).*

Limonia (Dicranomyia) longipennis (Schummel, 1829) *(immemor* Osten Sacken, 1861).—Cache Junction, May 25, 1944 *(K);* Charleston, August 14, 1943 *(K & Maddock);* Eden, June 21, 1937 *(Hardy);* Fish Haven, July 25, 1938 *(D. E. & A. T. Hardy);* Fish Lake, July 10, 1943 *(K & Telford);* Garden City, August 25, 1938 *(K & Hardy);* Heber, August 14, 1943 *(K & Maddock);* Hooper, September 17, 1937 *(Hardy);* Logan Meadows, June 13, 1944, October 15-17, 1943 *(K);* Wellsville, October 10, 1943 *(K).*

Limonia (Dicranomyia) modesta (Wiedemann, 1818) *(spinicauda* Alexander, 1924).—Hoytsville, October 10, 1943 *(K).* The first authentic record of this species from the United States.

Limonia (Dicranomyia) penicillata (Alexander, 1927).—Benjamin, June 21, 1945 *(K & Telford);* Cache Junction, May 27, 1944 *(K);* Corinne, June 19, 1944 *(K, Wood & Stoddard);* Redmond, May 4, 1943 *(K);* Salina, May 4, 1943 *(K).*

Limonia (Dicranomyia) sera erostrata (Alexander, 1930).—Blue Creek, May 31, 1939 *(K);* Saltair, Great Salt Lake, May 21 1926 *(M. C. Van Duzee);* types. This fly appears to be at most a race of the Palaearctic *L. (D.) sera* (Walker, 1848) (Syn. *disjuncta* Walker, 1848; *discors* Kuntze, 1919; *forcipula* de Meijere, 1919; *globata* Walker, 1848). Edwards indicates that in Europe the species frequents coastal marshes, indicating a saline or perhaps brackish habitat.

Limonia (Dicranomyia) uinta sp. nov.—Allied to *athabascae* and *sphagnicola;* size large (wing, male, 7 mm. or more); rostrum yellow; praescutum with three conspicuous stripes, the broad median vitta narrowly divided behind, lateral stripes distinct; halteres elongate; male hypopygium with the caudal margin of tergite convexly rounded, with a narrow median notch, the apical lobes with a concentration of long setae; ventromesal lobe of basistyle with very conspicuous outgrowths and setal brushes, including a blackened lobe that is produced outwardly into a slender finger; rostral prolongation of ventral dististyle long and slender, arcuated, the two subappressed spines beyond midlength; gonapophysis with mesal-apical lobe unusually small and weak, the margins entirely smooth.

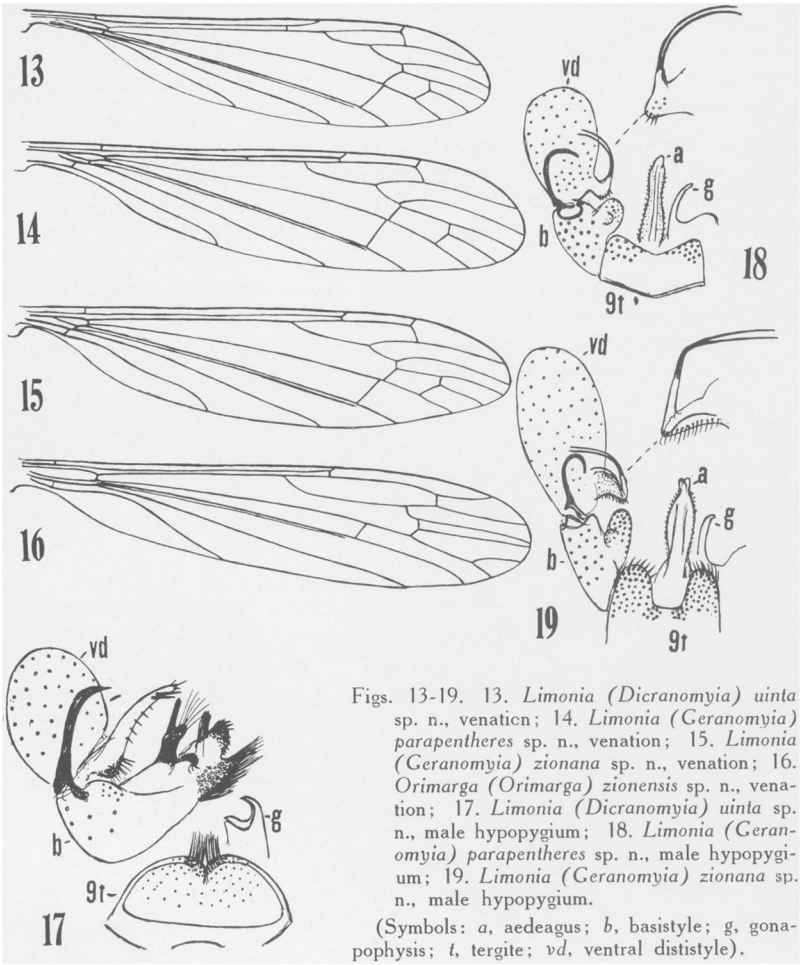
♂. Length, about 6.8-7 mm.; wing, 7-7.5 mm.

Rostrum yellow; palpi black, the basal segment yellow. Antennae black throughout; flagellar segments oval, the outer ones more elongate-oval to subcylindrical; terminal segment about one-fourth longer than the penultimate. Head above brownish gray, more ochreous behind and beneath; anterior vertex relatively wide.

Pronotum dark brown medially, obscure yellow on sides. Mesonotal praescutum in front golden-yellow, with a conspicuous brown median stripe that is divided into two points at the posterior end; lateral stripes narrower and somewhat paler, crossing the suture onto the scutal lobes; median region of scutum and the posterior sclerites of the notum more testaceous yellow. Pleura reddish yellow, the ventral sternopleurite somewhat more darkened. Halteres elongate, brownish black, the extreme base of stem yellow. Legs with the fore coxae weakly darkened, remaining coxae and trochanters obscure yellow; re-

mainder of legs yellowish brown to brown, the outer tarsal segments darker. Wings (Fig. 13) grayish subhyaline; stigma faintly darkened, relatively inconspicuous; veins brown, those of prearcular field paler. Venation: Sc_1 ending opposite origin of *Rs*, Sc_2 some distance from its tip, Sc_1 alone more than one-half *Rs*, in cases fully as long as distal section of vein M_3; *m-cu* variable in position, from close to fork of *M* to some distance beyond, subequal in length to or longer than the distal section of Cu_1; vein *2nd A* gently sinuous.

Abdominal tergites dark brown, sternites obscure yellow; hypopygium dark-colored. Male hypopygium (Fig. 17) with the tergite, *9t*, large, the caudal margin convex, narrowly and weakly notched, lobes nearly contiguous, provided with numerous long setae that are concentrated near the midline to



Figs. 13-19. 13. *Limonia (Dicranomyia) uinta* sp. n., venation; 14. *Limonia (Geranomyia) parapentheres* sp. n., venation; 15. *Limonia (Geranomyia) zionana* sp. n., venation; 16. *Orimarga (Orimarga) zionensis* sp. n., venation; 17. *Limonia (Dicranomyia) uinta* sp. n., male hypopygium; 18. *Limonia (Geranomyia) parapentheres* sp. n., male hypopygium; 19. *Limonia (Geranomyia) zionana* sp. n., male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *g*, gonapophysis; *t*, tergite; *vd*, ventral dististyle).

form strong brushes. Basistyle, *b,* with the ventromesal lobe large and complex, the area subequal to that of the style itself, the armature about as figured; most conspicuous is a blackened lobe that is produced into a long slender lobule or finger. Dorsal dististyle only gently curved, the tip acute. Ventral dististyle, *vd,* with the main body small, dark-colored; rostral prolongation long and slender, gently arcuated; spines two, subappressed, placed beyond midlength of the prolongation. Gonapophysis, *g,* with mesal-apical lobe unusually small and weak, the margins entirely smooth.

Holotype, ♂, Logan, June 13, 1944 *(G. F. Knowlton). Paratypes* 2 ♂ ♂, Weber River, June 29, 1943 *(G. F. Knowlton).*

Although it is allied to both *Limonia (Dicranomyia) athabascae* (Alexander, 1927) and *L. (D.) sphagnicola* (Alexander, 1925), the present fly is amply distinct in the coloration and, especially, in details of structure of the male hypopygium. From the regional *athabascae* it differs in the structure of the tergite, basistyles and gonapophyses, in the last respect being more like *sphagnicola,* of northeastern North America.

Limonia (Geranomyia) canadensis (Westwood, 1835).—Blanding, June 10, 1939 *(K);* Blue Creek, August 26, 1944 *(K);* Delta, August 25, 1943 *(K);* Garden City, August 12, 1943 *(K);* Hooper, September 21, 1937 *(Hardy);* Provo *(Hardy);* Rockville, beneath rocks near bridge, June 28, 1945 *(K);* Salt Lake City, August 8, 1936 *(Rees);* Zion National Park, Observation Point trail, 6,000 ft., July 3, 1942 *(Degener & Peiler);* see also *L. (G.) parapentheres* and *L. (G.) zionana,* below.

Limonia (Geranomyia) diversa (Osten Sacken, 1859).—Beaver, 7,000 ft., June 27, 1942; Zion National Park, Weeping Rock, May 5, 1945 *(K).*

Limonia (Geranomyia) parapentheres sp. nov.—Allied to *pentheres;* size small (wing, male, 6.3 mm.); rostrum short, about one-half the length of wing; femora obscure yellow, the tips narrowly infuscated; wings subhyaline, the oval stigma brown, conspicuous; Sc_1 ending about opposite midlength of *Rs;* male hypopygium with the caudal margin of tergite only slightly notched, the lobes correspondingly low, each provided with about 15 setae; ventral dististyle having about twice the area of the basistyle; rostral spines two, long and curved, arising from the summit of a slender tubercle; mesal-apical lobe of gonapophysis long and slender, pale.

♂. Length, excluding rostrum, about 5.5 mm.; wing, 6.3 mm.; rostrum, about 3-3.1 mm.

Rostrum relatively long, dark brown. Antennae dark brown throughout; flagellar segments subcylindrical, small, very gradually decreasing in length outwardly, the terminal segment a trifle shorter than the penultimate; verticils shorter than the segments. Head above dark brownish gray, the occipital region slightly brighter; anterior vertex narrow.

Cervical region dark brown. Pronotum light yellowish brown. Mesonotal praescutum light yellowish brown, more darkened medially, especially in front, but without lateral stripes; scutal lobes similarly darkened; median region of scutum light yellowish brown; scutellum brownish gray, with two small dark spots on basal portion; postnotum reddish brown, more or less darkened

medially. Pleura and pleurotergite uniformly reddish yellow, with a sparse whitish bloom, especially on posterior sclerites. Halteres with stem obscure yellow, knob dark brown. Legs with coxae and trochanters yellow; femora obscure yellow, the tips narrowly infuscated, the amount subequal on all legs; tibiae and tarsi brown, the outer tarsal segments black. Wings (Fig. 14) subhyaline, the oval stigma brown, conspicuous; veins brown. Venation: Sc_1 ending about opposite midlength of *Rs*, Sc_2 near its tip; supernumerary crossvein about the length of *Rs* before the origin of the latter; cell *1st* M_2 subequal in length to outer section of vein M_{1+2}, *m-cu* close to fork of M; cell *2nd A* relatively narrow, vein *2nd A* diverging only slightly from *1st A*.

Abdomen brown, the bases or incisures of the segments somewhat paler; hypopygium with the ventral dististyle dark-colored. Male hypopygium (Fig. 18) with the tergite, *9t*, transverse, the caudal margin with a broad V-shaped notch, the lobes low and relatively inconspicuous, each provided with about 15 setae. Basistyle, *b*, small, the ventromesal lobe with long pale setae and with a very small lateral lobule. Dorsal dististyle a slender, strongly curved rod, only a little longer than the rostral spines, the apex narrowly obtuse. Ventral dististyle, *vd*, having about twice the area of the basistyle, with sparse scattered setae; rostral prolongation short, the two long curved spines arising from a common tubercle that is placed a short distance back from the apex of the prolongation. Gonapophysis, *g*, with mesal-apical lobe pale, long and very slender. Aedeagus, *a*, microscopically setulose.

Holotype, ♂, Springdale, June 28, 1945 *(G. F. Knowlton)*. *Paratypes*, ♂, Weeping Rock, September 7, 1945 *(G. F. Knowlton)*; ♂ ♂, Zion National Park, Observation Point trail, 6,000 ft., July 3, 1942, "sucking nectar from Composite flowers", *(Otto Degener)*, associated with *canadensis* and *zionana*.

This species and the following are readily separated from one another by the size, relative length of the rostra, and especially the structure of the male hypopygium, particularly the ninth tergite and the relative size of the ventral dististyle.

Limonia (Geranomyia) zionana sp. nov.—Allied to *pentheres;* size large (wings, 8 mm. or over); rostrum elongate, approximately two-thirds the length of wing; wings whitish subhyaline or glassy, the oval stigma pale brown; Sc_1 ending about opposite two-thirds the length of *Rs;* male hypopygium with the caudal margin of tergite deeply notched, the lateral lobes conspicuous, provided with abundant long black setae; ventral dististyle large and fleshy, its total area approximately two and one-half to three times that of the basistyle; rostral spines long and slender, curved, both arising from the summit of a single slender tubercle.

♂. Length, excluding rostrum, about 6.5-7 mm.; wing, 8-8.5 mm.; rostrum, about 5-6 mm.

♀. Length, excluding rostrum, about 8-8.5 mm.; wing, 8-8.5 mm.; rostrum, about 5.5-6 mm.

Rostrum very long, exceeding half the length of wing, light brown basally, becoming darker on outer two-thirds. Antennae with scape light brown,

pedicel reddish, flagellum brownish black; flagellar segments suboval to nearly cylindrical; verticils short and inconspicuous. Head ochreous on front and behind, the intermediate portion of vertex gray pruinose.

Pronotum testaceous brown. Mesonotal praescutum and scutum almost uniformly brownish yellow, with a gray pruinosity that is especially evident on the sides of the praescutum; scutal lobes similarly pruinose, the median region of scutum and the scutellum more testaceous; postnotum reddish brown, sparsely pruinose. Pleura and postnotum reddish brown. Halteres short, stem yellow, knob weakly infuscated. Legs with coxae and trochanters reddish brown; femora obscure yellow, the tips narrowly infuscated; tibiae and basitarsi brownish yellow, the tips narrowly darkened; outer tarsal segments brownish black. Wings (Fig. 15) whitish subhyaline or glassy, the oval stigma pale brown; veins obscure yellow or brownish yellow. Venation: *Sc* long, Sc_1 ending nearly opposite three-fifths to two-thirds the length of *Rs*, Sc_2 near its tip; cell *1st* M_2 subequal to or longer than the distal section of M_{1+2}; *m-cu* a short distance before the fork of *M*; vein *2nd A* gently sinuous, the cell wider than in *parapentheres*.

Abdomen obscure yellow to light brown, the sternites clearer yellow; hypopygium weakly brownish yellow. Male hypopygium (Fig. 19) with the tergal lobes, *9t*, very long and conspicuous, separated by a deep quadrate emargination, the lobes and sides of the notch with abundant black setae. Dorsal dististyle a strongly curved rod, its tip subacute. Ventral dististyle, *vd*, much larger than in *parapentheres*, being approximately two and one-half to three times the size of the basistyle; region of base of rostrum dilated and more heavily sclerotized than the remainder of lobe; rostral spines elongate, strongly curved beyond bases, arising from the summit of a single long slender basal tubercle. Gonapophysis, *g*, with mesal-apical lobe very slender, elongate. Aedeagus microscopically setulose.

Holotype, ♂, Zion National Park, Weeping Rock, 4,500 ft., June 21, 1942 *(M. M. Alexander)*. *Allotype*, ♀. *Paratopotypes*, 2 ♀♀; *paratypes*, 6 ♂♀, Observation Point trail, 6,000 ft., July 3, 1942, "sucking nectar from Composite flowers", *(Otto Degener)*, associated with *canadensis* and *parapentheres*.

The present fly, together with *Limonia (Geranomyia) parapentheres* sp. nov., have the male hypopygium quite distinct from the other members of the subgenus in the Nearctic fauna, though much as in various other species that center about *L. (G.) pentheres* Alexander, 1928, ranging from central Mexico to Peru. These two flies are quite distinct from these various Neotropical forms and from one another, as discussed unnder the preceding species.

Limonia (Alexandriaria) suffusca (Garrett, 1922).—A female, Circleville, June 28, 1945 *(K)*. I am referring the specimen to this species with some question. Garrett (1922) described three supposed new species that evidently represent a single form, *suffusca* being the oldest name and, at the same time, type of the subgenus *Alexandriaria* Garrett. Through the appreciated interest of Mr. Garrett, I have been able to purchase the type material of his species

in the Tipulidae. From present evidence it would seem that *L. (A.) whartoni* (Needham, 1908) is distinct and the possibility is not excluded that the present female may belong to this species.

Antocha (Antocha) monticola Alexander, 1917.—Avon Canyon, August 24, 1942 *(K);* Blacksmith Fork Canyon, June 12, 1938 *(K & Hardy);* Brigham Canyon (no collector); Eden, June 8, 1938, in meadow *(K & Hardy),* July 10, 1937 *(Hardy);* Hooper, September 21, 1937 *(Hardy);* Huntington Canyon, 6,000 ft., September 1, 1945 *(Edmunds & Mulaik);* Kaysville, June 2, 1945 *(K);* Logan, June 9, 1943 *(Maddock),* July 8, 1938 *(Hardy),* July 26, 1938, at light *(K & Hardy),* August 4, 1942 *(K & Roberts),* July 28-August 3, 1943, abundant *(K),* August 19, 1942 *(K & Roberts),* September 13, 1943 *(K);* Logan Canyon, June 30, 1942, July 4, 1945 *(K),* July 23, 30, August 8, 1945 *(K);* Mantua, September 4, October 10, 1943 *(K);* Ogden July 3, 1937 *(Hardy);* Salt Lake City, Fairmont Park, August 4, 31, 1939 *(Rees).* Very common and eminently characteristic in Logan Canyon, as discussed by Needham and Christenson (1927: 24-25), who give a brief account of the habitat and habits of the immature stages, with figures of the larva and pupa.

Elliptera astigmatica Alexander, 1912.—Provo Canyon, North Fork *(Hardy);* Mt. Timpanogos, Aspen Grove *(Hardy),* Glacier Lake *(Hardy).*

Dicranoptycha quadrivittata Alexander, 1919.—Beaver Canyon, 7,200 ft., July 12, 1945 *(K & Telford);* Monte Cristo, July 24, 1943 *(K & Maddock).*

Orimarga (Orimarga) zionensis sp. nov.—General coloration gray, the praescutum with four inconspicuous more plumbeous gray stripes; femora obscure yellow, the tips conspicuously brownish black; wings with a strong blackish suffusion, the preacular field more whitened; macrotrichia on outer radial and medial veins; R_{1+2} about one-half longer than R_{2+3}; cell M_3 small; *m-cu* from two to three times its own length before the fork of M.

♂. Length, about 5.5-6 mm.; wing, 5-6 mm.

♀. Length, about 5.5-6 mm.; wing, 5-5.5 mm.

Rostrum and palpi black. Antennae black throughout; flagellar segments oval. Head dark gray.

Pronotum gray. Mesonotal praescutum gray, with four darker plumbeous gray stripes, the pale median vitta only about one-third as wide as either intermediate stripe; posterior sclerites of notum gray, the scutal lobes with more plumbeous gray areas. Pleura light gray, vaguely striped with more brownish areas, including a more dorsal line from the fore coxae to the root of the halteres; ventral sternopleurite more broadly infuscated. Halteres with stem yellow, knob brownish black. Legs with the coxae yellowish brown, the fore pair somewhat darker; femora obscure yellow, the tips conspicuously brownish black, the amount subequal on all legs; tibiae and basitarsi light brown, the tips very narrowly darker; outer two tarsal segments more blackened. Wings (Fig. 16) with a strong blackish suffusion; preacular field more whitened; veins brown. Macrotrichia on veins R_{1+2}, R_3, distal section of R_{4+5}, outer half of distal section M_{1+2}, M_3 and M_4. Venation: Sc_1 ending about opposite two-fifths the length of Rs, Sc_2 near its tip; free tip of Sc_2 weakly preserved:

R_{1+2} elongate, about one-half longer than R_{2+3}; inner end of cell R_3 slightly arcuated; cell R_5 narrowed toward its outer end; cell M_3 about one-half its petiole; *m-cu* variable in position, from about two to three times its own length before the fork of *M;* vein *2nd A* unusually arcuated, the cell very wide. Several of the type series show abnormalities in venation, more notably the presence of adventitious crossveins in cells R_2, R_3 and R_{5}, especially the last where as many as three such veinlets may occur in a single wing; other abnormalities include angulation and spurring of the basal section of R_{4+5} and an occasional angulation and spurring of the base of *Rs*. Abdomen black, the subterminal sternites somewhat brightened.

Holotype, ♂, Weeping Rock, Zion National Park, 4,500 ft., June 21, 1942 *(M. M. Alexander). Allotopotype,* ♀, pinned with type. *Paratopotypes,* several ♂♀, June 21-23, 1942 *(C. P. & M. M. Alexander).*

The nearest relative is *Orimarga (Orimarga) sanctae-ritae* Alexander, 1946, of southeastern Arizona, which differs conspicuously in all details of venation, including the unusually distal position of *m-cu*. The species was abundant at the Weeping Rock, usually found resting on grass blades. An unusual number were found caught in spider webs, one still with its cast pupal case attached. A few mating pairs were observed. When at rest, the species holds its wings incumbent over the back and thus presents an unusually slender appearance.

PEDICIINI

Pedicia (Tricyphona) exoloma (Doane, 1900).—Beaver, 8,000 ft., June 21-22, 1942.

Pedicia (Tricyphona) septentrionalis (Bergroth, 1888), var.—Allen Canyon, July 24, 1943 *(K & Maddock);* Beaver Canyon, 7,200 ft., July 12, 1945 *(K & Telford);* Devils Slide, August 14, 1943 *(K & Maddock);* Eden, June 23, 1938 *(Hardy & Stains);* Heber, August 14, 1943 *(K & Maddock);* Henefer, August 30, 1943 *(K);* Logan Canyon, June 30, 1942 *(M. A. Alexander)* July 8, 1938 *(Hardy);* Orem, July 26, 1945 *(Harmston);* Strawberry Reservoir, July 25, 1945 *(K);* Weber River, June 29, 1943 *(K);* Wellsville, October 17, 1945 *(George & Mary Knowlton).* The exact identity of this species remains in doubt, due primarily to the fact that the types of Bergroth's species are in Finland and unavailable. It now appears that Bergroth's name pertains to a single variable species or group of allied forms, to which may be added *Pedicia (Tricyphona) vitripennis* (Doane, 1901), *P. (T.) cervina* (Alexander, 1917) and *P. (T.) sparsipuncta* (Alexander, 1920).

Dicranota (Plectromyia) petiolata (Alexander, 1919) *(nemoptera* Alexander, 1927; *stenoptera* Alexander, 1927).—Ephraim Canyon, near summit, September 6, 1945 *(K);* Huntsville, August 21, 1942 *(K, Roberts & Wood),* Kents Lake, July 12-13, 1945 *(K);* Monte Cristo Canyon, August 25, 1938 *(K & Hardy);* Strawberry Reservoir, July 25, 1945 *(K);* Mt. Timpanogos, July 26, 1942 and 1945 *(K),* Glacier Lake *(Hardy),* Timponeeke Ranger Station, August 26, 1943 *(K & Maddock);* Wolf Creek Pass, near summit, July 24, 1945 *(K).*

A most puzzling series of these flies was taken by Knowlton, showing all stages in wing reduction, with corresponding venation. The structure of the male hypopygium is very constant, however, and it now seems evident that the synonymy as given above is correct. This condition of wing atrophy was found in both sexes, reaching its culmination in a long straplike structure, with the venation correspondingly distorted. The type of *nemoptera* was taken at Peterson's Spring, Logan Canyon, 7,500 ft., July 20, 1926, by Dr. J. G. Needham, and originally was placed in the genus *Limnophila*. The present series serves well to interconnect these various supposed species.

Dicranota (Dicranota) montana (Alexander, 1920).—Logan, April 17, 1938 *(K & Hardy)*.

Dicranota (Dicranota) stainsi sp. nov.—Size large (wing, female, over 9 mm.); general coloration gray, the praescutum with four brown stripes; antennae black throughout, basal flagellar segments very short-oval, the outer ones a little longer; wings hyaline, stigma medium brown; *Rs* very short, angulated and long-spurred beyond midlength; basal section of R_{4+5} longer than basal section of R_5; cell *1st* M_2 closed; cell M_1 about one-third longer than its petiole; *m-cu* at fork of *M;* Anal cells very broad; abdomen gray, the tergites with a broad bright brown central stripe.

♀. Length, about 7 mm.; wing 9.1 mm.

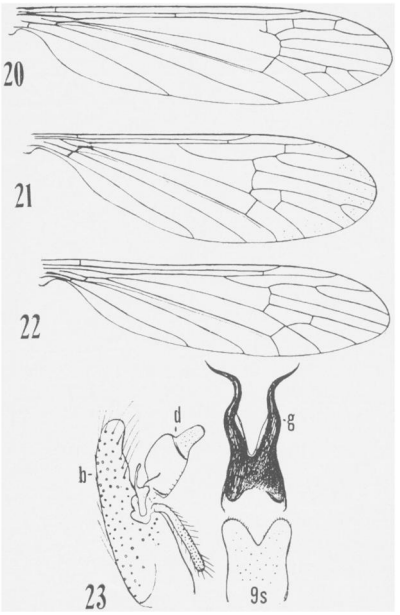
Rostrum dark gray; palpi brownish black. Antennae black throughout; basal flagellar segments very short oval, the outer ones a little longer; terminal segment or segments broken. Head gray, the center of vertex infuscated.

Pronotum gray, more infuscated medially. Mesonotal praescutum gray, with four brown stripes, the broad intermediate pair separated only by a capillary brownish gray median vitta; lateral stripes much narrower; posterior sclerites of notum gray, each scutal lobe with two grayish brown areas. Pleura clear gray. Halteres with stem obscure yellow, clearer basally, knob weakly infuscated. Legs with coxae gray; trochanters brownish gray; remainder of legs light brown, the tips of femora and tibiae narrowly more infuscated; terminal tarsal segments blackened. Wings (Fig. 20) hyaline, the base restrictedly more yellowed; stigma medium brown, in cell R_1 confined by the two transverse veins; veins brown. Venation: Sc_1 ending about opposite one-fifth the length of stigma, Sc_2 just beyond mid-distance between arculus and origin of *Rs; Rs* very short, angulated beyond midlength, with a long conspicuous spur at the point of angulation, jutting back into cell *R;* basal section of R_{4+5} longer than the basal section of R_5; cell M_1 about one-third longer than its petiole; cell *1st* M_2 closed, long and narrow; *m-cu* at fork of *M;* Anal cells very broad.

Abdomen gray, the tergites with a broad and conspicuous bright brown central stripe that is interrupted by the narrow yellow posterior borders of the more proximal segments.

Holotype, ♀, Garden City, June 6, 1938 *(Knowlton & Harmston);* Alexander Collection.

This interesting fly is named in honor of Mr. G. S. Stains, who collected



numerous Tipulidae in conjunction with Professor Knowlton. The fly is so different from all other regional species that little comparison seems necessary. The very distinct venational details, especially the short angulated and spurred *Rs*, closed cell *1st* M_2 and position of *m-cu* at the fork of *M*, all mark the species as being isolated.

Figs. 20-23. 20. *Dicranota (Dicranota) stainsi* sp. n., venation; 21. *Oxydiscus (Oxydiscus) maddocki* sp. n., venation; 22. *Phyllolabis zionensis* sp. n., venation; 23. *Phyllolabis zionensis* sp. n., male hypopygium.

(Symbols: *b*, basistyle; *d*, dististyle; *g*, gonapophysis; *s*, sternite).

Dicranota (Rhaphidolabis) cayuga (Alexander, 1916).—Brigham Canyon, October 10, 1943 *(K)*; Logan Canyon, July 17, 1938 *(Hardy)*.

Dicranota (Rhaphidolabis) cazieriana Alexander, 1944.—Allen Canyon, August 12, 1942 *(K)*; Sardine Canyon, May 21, 1938 *(Hardy)*. Hitherto only from California.

Dicranota (Rhaphidolabis) integriloba Alexander, 1943.—Logan Canyon, Spring Hollow, July 5, 1943 *(K & Maddock)*.

Dicranota (Rhaphidolabis) neomexicana (Alexander, 1912).—Mantua, September 4-13, 1943 *(K)*; Salt Lake City, City Creek Canyon, June 30, 1945 *(K)*.

Dicranota (Rhaphidolabis) querula Alexander, 1944.—Rocky Mouth Canyon, October 1, 1945 *(Edmunds)*.

HEXATOMINI

Oxydiscus (Oxydiscus) maddocki sp. nov.—General coloration dull black; wings with a brownish tinge, the oval stigma still darker; sparse macrotrichia in outer ends of cells R_2 to M_4, inclusive; R_{2+3+4} nearly three times R_{2+3}; cell M_1 present but small; cell *1st* M_2 small, widened outwardly, *m-cu* from one-half to two-thirds its own length beyond the fork of *M*.

♀. Length, about 5 mm.; wing, 4.8 mm.

Rostrum and palpi black. Antennae with scape and pedicel black; flagellum broken. Head dull black.

Thorax dull black throughout, with praescutal stripes. Halteres brownish black, the base of stem pale. Legs with the coxae and trochanters brownish

black; remainder of legs broken. Wings (Fig. 21) with a brownish tinge, the oval stigma still darker. Sparse macrotrichia in outer ends of cells R_2 to M_4, inclusive (their position indicated in figure by stippling). Venation: Sc_1 ending opposite fork of *Rs*, Sc_2 some distance from its tip, Sc_1 alone about equal to the arcuated *r-m*; R_{2+3+4} nearly three times R_{2+3}, the latter subequal to R_2; *cell* M_1 present but small; cell *1st* M_2 small, short-rectangular, widened outwardly; *m-cu* about one-half to two-thirds its length beyond the fork of *M*.

Abdomen black, the genital shield brownish black. Ovipositor with both cerci and hypovalvae long and slender, yellowish horn color.

Holotype, ♀, Zion National Park, Weeping Rock, 4,500 ft., July 19, 1943 *(Knowlton & Maddock)*; Alexander Collection. *Paratype*, 1 ♂, June 29, 1940 *(A. L. Melander)*; Melander Collection; received too late for fuller discussion in the above description.

Oxydiscus (Oxydiscus) maddocki is named in honor of Mr. Darrell R. Maddock, who has collaborated with Professor Knowlton in making the present collection of Tipulidae of Utah. This species is quite distinct from all of the other American species in the uniformly black coloration of the body and the coloration of the wings. All other Nearctic species are brown to yellow in color, with clear wings. Various members of the genus are now known both in eastern and in western North America and in Central and South America, as far south as Ecuador.

Oxydiscus (Oxydiscus) pacificus Alexander, 1944.—Logan, June 9, 1943 *(Maddock)*. A single female but the identity seems to be certain.

Phyllolabis zionensis sp. nov.—General coloration of thorax brownish yellow to yellow, the praescutum with a more or less distinct median brown stripe; rostrum and mouthparts yellow; antennae with the scape yellow, flagellum brown; femora obscure yellow to brownish yellow; wings faintly tinged with yellow, stigma oval, very pale brown; male hypopygium with the sternal plate moderately broad, parallel-sided, the caudal margin with a deep V-shaped notch; basistyle with the outer apical angle produced into a simple lobe; dististyle strongly narrowed and setiferous on outer two-thirds; gonapophyses unusually strong and powerful, appearing as sinuous rods that narrow to the acute tips; ovipositor with cerci slender, the margins smooth.

♂. Length, about 7 mm.; wing, 6.8 mm.

♀. Length, about 7 mm.; wing, 7 mm.

Rostrum and mouthparts light yellow; palpi with basal segment yellow, outer segments passing into brown. Antennae with scape yellow; pedicel yellow basally, more infuscated outwardly; flagellum brown, the segments subcylindrical. Head gray; anterior vertex moderately wide, more than three times the diameter of scape.

Pronotum obscure brownish yellow. Mesonotal praescutum brownish yellow with a more or less distinct median brown stripe, clearly defined in the holotype; scutal lobes weakly darkened; posterior sclerites of notum more uniformly testaceous yellow. Pleura, including the dorsopleural membrane, pale yellow, the ventral sclerites very vaguely more darkened. Halteres yellow,

the knobs weakly infuscated. Legs with the coxae and trochanters yellow; femora obscure yellow to brownish yellow, the tibiae gradually deepening to brown. Wings (Fig. 22) with a very faint yellowish tinge, the prearcular and costal fields clearer yellow; stigma oval, very pale brown; veins brown, more yellowed in the brightened portions. Macrotrichia of veins long and conspicuous. Venation: Sc_1 ending a short distance beyond the fork of *Rs*, Sc_2 before this fork; R_{2+3+4} subequal to or longer than *Rs*, about as long as vein R_3; *m-cu* at or just before the fork of M_{3+4}.

Abdomen brown in male, brownish yellow in female; in male, base of ninth segment more darkened. Ovipositor with cerci long and slender, the margins smooth. Male hypopygium (Fig. 23) of unusually generalized structure for a member of this genus. Appendage of ninth sternite, *9s*, a flattened-depressed pale plate, its caudal margin with a deep V-shaped notch, the slightly divergent apical lobes obtusely rounded, densely clothed with very delicate pale setae; surface of plate with a few scattered longer setae. Basistyle, *b*, with outer apical angle produced into a lobe that is slightly longer than the dististyle, at the obtuse apex flattened and glabrous; ventral lobe of basistyle long and pendulous, pale, with long setae. What appears to represent a distinct upper dististyle is a small flattened blade that narrows into a slender arm, the tip obtuse and weakly dilated; the larger dististyle, *d*, very simple, the enlarged basal two-thirds expanded into a pale entire dorsal crest, the beak stout, with numerous setigerous punctures, its tip obtuse; beak delimited from main body of style by a wrinkled or corrugated transverse line. Gonapophyses, *g*, unusually strong and powerful, dark reddish brown, each appearing as a sinuous rod that narrows very gradually to the acute tip.

Holotype, ♂, Zion National Park, 4,500 ft., May 18, 1944 *(G. F. Knowlton)*. *Allotype*, ♀, The Narrows, June 21, 1942 *(C. P. Alexander)*.

Phyllolabis zionensis is readily told from the other rather numerous Nearctic species by the unusually primitive structure of the male hypopygium. In its pale coloration, the fly superficially resembles *P. flavida* Alexander, of extreme southern California. Among those Nearctic species at present known, the following are the most distinct and isolated—*P. encausta* Osten Sacken, 1877; *P. flavida* Alexander, 1918; *P. lagganensis* Alexander, 1931; *P. myriosticta* Alexander, 1945, and the present fly.

Dactylolabis knowltoni Alexander, 1943.— Logan Dry Canyon, June 24, 1938 *(K & Nye)*, type material; Mirror Lake, Uinta Mountains *(Hardy)*; Monte Cristo, July 21, 1942 *(K)*.

Limnophila (Elaeophila) aldrichi collata subsp. nov.—Generally similar to typical *aldrichi* Alexander, 1927, of the northern Rocky Mountains, differing in relatively slight details of coloration and structure of the male hypopygium.

♂. Length, about 7.5-8 mm.; wing, 8-8.5 mm.

♀. Length, about 8.5-9 mm.; wing, 9-9.5 mm.

Wings with the ground pale yellow, with a conspicuous dark brown pattern that is restricted to the vicinity of the veins, these areas usually more restricted and concentrated than in *aldrichi*. Male hypopygium with the outer

dististyle much the same in both races, including the dorsal crest. Inner dististyle conspicuously narrowed, especially at apex, the actual tip bearing a single seta, the other being removed from this tip; in typical *aldrichi*, the apex is broadly obtuse, there being four or five setae on this bluntly rounded portion. Some of the paratypes are smaller (♂. Wing, 7 mm.; ♀. Wing, 6.5 mm.) but evidently pertain to this same subspecies. The race *alticrista* Alexander, 1943, is less closely related to either of the above.

Holotype, ♂, Beaver, 8,000 ft., June 26, 1942 *(C. P. Alexander). Allotopotype*, ♀. *Paratopotypes*, 3 ♂♀, June 25-26, 1942; *paratypes*, 1 ♂, Mt. Timpanogos, Glacier Lake *(Hardy)*; 1 ♀, Mt. Timpanogos, environs of Aspen Grove *(Hardy)*.

Limnophila (Elaeophila) aleator Alexander, 1945.—Glendale, May 5, 1943 *(K)*; part of type material.

Limnophila (Elaeophila) angustior Alexander, 1919.—Brigham, June 17, 1938 *(Hardy & Stains)*; Currant Creek, 7,200 ft., among willow and nettle, June 28, 1945 *(K)*; Fairview, July 7, 1945 *(Edmunds & Mulaik)*; Glendale, June 28, 1945 *(K)*; Logan Canyon, June 30, 1942, July 29, 1945 *(K)*, July 30, 1945 *(K)*.

One of the Glendale females is of unusual interest in that the supernumerary crossvein in cell *M* is lacking in both wings. In all other respects the fly is quite like typical material and I regard the identification as certain.

Limnophila (Prionolabis) rufibasis Osten Sacken, 1859.—Spanish Fork, without date *(D. Elmo Hardy)*. There is no doubt of the identity of this material. If there is no mistake in the distributional data, the present record greatly extends the known range of the species.

Limnophila (Phylidorea) auripennis Alexander, 1926.—Fort Duchesne, July 25, 1945 *(K)*.

Limnophila (Phylidorea) bigladia Alexander, 1945.—Logan Canyon, 5,200 ft., June 30, 1942.

Limnophila (Phylidorea) claggi Alexander, 1930.—Brigham City, May 25, 1945 *(Harmston)*; Logan Canyon, Spring Hollow, July 5, 1943 *(K)*; Maple Pass, June 5, 1939 *(K & Harmston)*; Salt Lake City, May 29, 1945 *(Harmston)*.

Limnophila (Phylidorea) nycteris Alexander, 1943.—Logan Canyon, China Row Camp, June 30, 1942.

Limnophila (Phylidorea) tepida Alexander, 1926.—Amalga, May 30, 1940 *(K)*; Daniels Pass, July 25, 1945 *(K)*; Garden City, August 11, 1942 *(K)*, August 24, 1941 *(Mulaik)*, August 25, 1938 *(K & Hardy)*; Lewiston, April 27, 1938 *(Hardy)*; Logan Canyon, June 18, 1938 *(Hardy)*; Ogden, July 7, 1937 *(Hardy)*; Spanish Fork, June 14, 1936 *(Hardy)*; Strawberry Reservoir, along stream, July 25, 1945 *(K)*; Wellsville, in meadow swamps, August 10, 1938 *(K & Harmston)*, September 4, 1943 *(K)*.

Limnophila occidens Alexander, 1924.—Logan, June 29, 1943 *(Maddock)*; Logan Canyon, Spring Hollow, July 5, 1943 *(K)*, July 17, 1938 *(Hardy)*;

River Heights, August 14, 1942 *(K & Wood);* Zion National Park, Weeping Rock, May 5, 1943 *(K).* The specimen from River Heights is smaller than the types and other specimens from high altitudes in Colorado.

Shannonomyia oslari (Alexander, 1916).—Wolf Creek Canyon, June 24, 1945 *(K).*

Pilaria imbecilla (Osten Sacken, 1859).—Bear Lake, June 30, 1942; Wolf Creek Canyon, July 24, 1945 *(K).*

Pilaria recondita (Osten Sacken, 1869).—American Fork, June 21, 1938 *(K & Hardy);* Beaver, June 27, 1945 *(K),* July 11, 1945 *(K & Telford);* Brigham, June 17, 1938 *(Hardy & Stains);* Callao, August 7, 1945 *(K);* Charleston, August 14, 1943 *(K & Maddock);* Eden, June 23, 1938 *(Hardy & Stains),* July 16, 1937 *(Hardy);* Fish Springs, August 8, 1945 *(K);* Garden City, August 12, 1943 *(K);* Granite Creek, August 7, 1945 *(K);* Heber, August 14, 1943 *(K & Maddock);* Huntsville, June 23, 1938 *(Hardy & Stains);* Kamar, July 24, 1945 *(K);* Leeds, August 8, 1942 *(K & Peay);* Monte Cristo, August 12, 1943 *(K & Maddock);* Mt. Nebo, July 25, 1942 *(K);* Nephi, June 29, 1945 *(K);* Ogden, June 12, 1945 *(Harmston);* Peoa July 24, 1945 *(K);* Providence, July 2, 1943 *(Telford);* Starr, June 29, 1945 *(K);* Mt. Timpanogos, Pleasant Grove, July 1, 1937 *(K & Hansen);* Wellsville, in meadow swamps, July 21, 1942 *(K),* August 10, 1938 *(K & Harmston);* Woodland, July 24, 1945 *(K).*

Hexatoma (Eriocera) austera (Doane, 1900).—Henefer, June 29, 1943 *(K).* A single male that has the wings very reduced in size but approached by other specimens from the Yellowstone. Free flight would not be possible in such individuals.

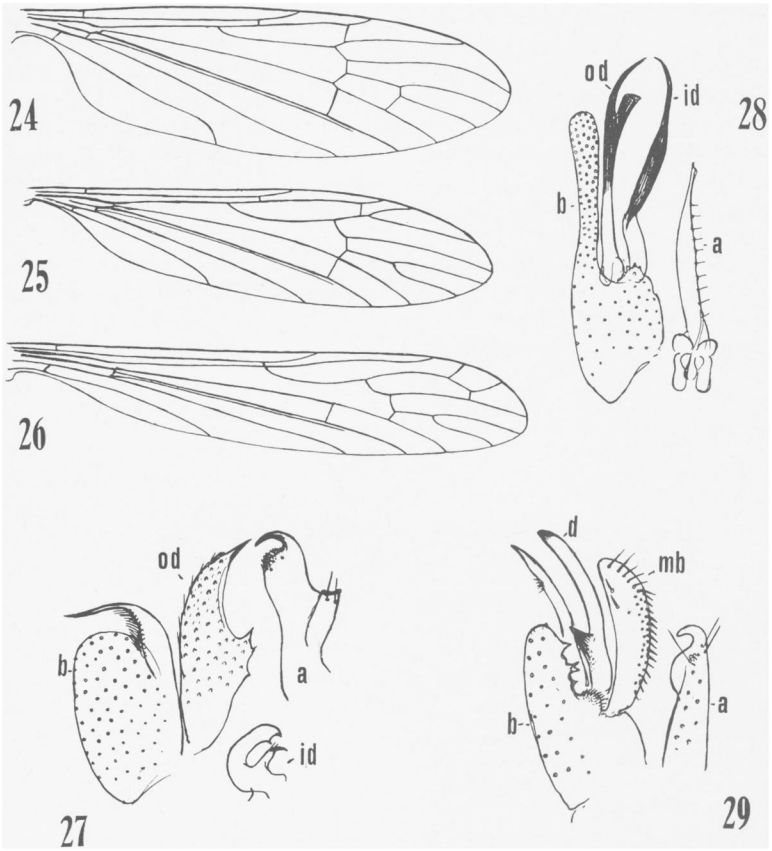
Hexatoma (Eriocera) eriophora (Williston, 1893).—Eden, in meadow, June 8, 1938 *(K & Hardy);* Logan Canyon, at light, July 3, 1939 *(K),* July 23, 1945, July 29, 1939, August 8, 1945 *(K);* Monroe Canyon, June 1930 *(Rowe);* Provo, 4,750 ft., July 29-August 1, 1920; American Museum of Natural History, F 4757.

Hexatoma (Eriocera) velveta (Doane, 1900).—Blacksmith Fork Canyon, June 12, 1938 *(Hardy);* Brigham, June 17, 1938 *(Hardy & Stains);* Eden, June 8, 1938 *(K & Hardy);* Fish Lake, June, 1930 *(Rowe);* Kanosh Canyon, May 27, 1939 *(K & Harmston);* Mirror Lake, Uinta Mts. *(Hardy);* Provo Canyon, North Fork *(Hardy);* Salt Lake City, July 2, 1939 *(K);* Zion National Park, May 13, 1936 *(Rees & Duncan).*

ERIOPTERINI

Teucholabis (Teucholabis) rubescens Alexander, 1914.—Zion National Park, 4,500 ft., June 21, 1942 *(C. P. & M. M. Alexander).* At the Grotto Campground, between 7 and 9 P. M., several specimens were found, usually in groups of from three to five individuals, swarming close to the ground, usually within a foot or two. Almost invariably they swarm about the trunk of a tree, including the cottonwood, *Populus fremontii pubescens* Sargent, the desert or velvet ash, *Fraxinus velutina* Torrey, and the box elder, *Acer negundo*

interius (Britton) Sargent. In some cases a single male would go through all the swarming motions. Almost always the flies were only two or three inches distant from the boles of the tree. A few mated pairs were found, flying through the air while still united. It might be observed that the type of the species was found some half a century ago in the White Mountains, New Mexico, by the late C. H. T. Townsend, who found it swarming about the trunk of a mountain cottonwood, evidently a habit very much as above described.



Figs. 24-29. 24. *Teucholabis (Teucholabis) rubescens* Alexander, venation; 25. *Gonomyia (Progonomyia) zionicola* sp. n., venation; 26. *Gonomyia (Euptilostena) knowltoniana* sp. n., venation; 27. *Teucholabis (Teucholabis) rubescens* Alexander, male hypopygium; 28. *Gonomyia (Euptilostena) knowltoniana* sp. n., male hypopygium; 29. *Gonomyia (Progonomyia) zionicola* sp. n., male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *d*, dististyle; *id*, inner dististyle; *mb*, mesal lobe of basistyle; *od*, outer dististyle).

The wing venation is illustrated (Fig. 24). The sternal pockets on the male abdomen are conspicuous, especially on the fifth segment, where it consists of a shield-shaped darkened area with numerous small blackened tubercles and fewer long scattered setae, the largest and most conspicuous of these marginal in position and directed inwardly, decussate at the midline. On sternite six on either side of the broad central area with a row of from seven to eight very long setae directed mesad, these interspersed with fewer smaller bristles. Male hypopygium (Fig. 27) with the spine of the basistyle, *b*, broad to very broad at base, narrowed very gradually into a long slender blackened point, the lower margin before this with a fringe of yellow setae; mesal flange narrowly blackened, its cephalic portion somewhat more produced. Outer dististyle, *od*, broad, tapering gradually to a small apical spine, the lower edge at near midlength more or less produced into an irregular lobe or flange. Inner dististyle, *id*, small, the long outer lobe unequally bidentate; more basally with a smaller slender lobule that terminates in a long blackened spine. Aedeagus, *a*, conspicuous, appearing as a compressed-flattened blade that terminates abruptly in a curved blackened spine; posterior margin of organ at near midlength slightly produced and bearing two long setae.

Gonomyia (Progonomyia) zionicola sp. nov.—General coloration brownish gray and yellow; antennae brownish black throughout; wings pale yellowish subhyaline, stigma very pale brown; Sc_1 ending about opposite midlength of *Rs*, Sc_2 some distance from its tip; male hypopygium with the outer lobe of basistyle stout, its mesal edge produced into a glabrous plate that is very coarsely toothed; outer dististyle pointed at apex, with a few setae at near two-thirds the length; inner style with a blackened triangular tooth at about the basal third.

♂. Length, about 5 mm.; wing, 6 mm.

♀. Length, about 6 mm.; wing, 6.5 mm.

Rostrum and front yellow; palpi dark brown. Antennae brownish black throughout; flagellar segments long-oval. Head light gray.

Pronotum and pretergites light yellow, the former darker laterally. Mesonotum brownish gray, the humeral and lateral portions of praescutum light yellow; posterior portions of scutal lobes and the caudal border of scutellum yellowed; mediotergite dark gray, the anterolateral borders and the dorsal pleurotergite broadly yellow. Pleura dark reddish brown, sparsely pruinose, with a conspicuous yellow longitudinal stripe in male, not evident in female. Halteres infuscated, the basal half of stem yellow. Legs with the coxae reddish yellow; trochanters yellow; femora and tibiae brownish yellow, the tips of the latter narrowly darkened; tarsi brownish black. Wings (Fig. 25) very pale yellowish subhyaline, the prearcular and costal portions somewhat clearer yellow; stigma oval, very pale brown; veins light brown. Venation: *Sc* long, Sc_1 ending about opposite midlength of *Rs*, Sc_2 some distance from its tip, about opposite one-fourth the length of *Rs;* vein R_2 very weakly preserved, a little longer than vein R_{3+4}; cell R_3 deep; cell *2nd* M_2 about one-half longer than its petiole; *m-cu* at fork of *M;* vein *2nd A* not sinuous.

Abdomen brown in male, dark brown in female; genital segment of female yellow. Ovipositor with valves elongate, yellowish horn color. Male hypopygium (Fig. 29) yellow; outer lobe of basistyle, *b*, relatively short and stout, its mesal edge produced into a coarsely toothed glabrous plate or flange; mesal lobe, *mb*, much longer, extending caudad about to the outermost level of the dististyles. Dististyles, *d*, two in number, subequal in length, the outer one more pointed at apex, with a few scattered setae at near two-thirds the length; inner style with a blackened triangular tooth or flange at near the basal third and here provided with several delicate setulae. Aedeagus, *a*, terminating in a pale curved crook, before which is a conspicuous expanded flange.

Holotype, ♂, Zion National Park, 4,500 ft., June 21, 1942 *(C. P. Alexander)*. *Allotopotype*, ♀, pinned with the type. *Paratopotypes*, 2 ♂♂, a broken specimen, Washington, June 10, 1936 *(Rees)*.

The present fly is most similar to *Gonomyia (Progonomyia) hesperia* Alexander, 1926, and *G. (P.) slossonae* Alexander, 1914, differing especially in the details of structure of the male hypopygium, particularly of both dististyles.

Gonomyia (Euptilostena) knowltoniana sp. nov.—Allied to *dampfiana;* mesonotum gray, the praescutum with four brown stripes; thoracic pleura gray, striped with light yellow, the latter areas narrowly bordered by dark brown; wings whitish subhyaline, restrictedly patterned with brown; male hypopygium with the outer lobe of basistyle, elongate, with numerous setae; both dististyles longer than the lobe of basistyle, the inner one appearing as a narrow blade, its apical third narrowed into a spine.

♂. Length, about 5 mm.; wing, 5.5 mm.

♀. Length, about 6-6.5 mm.; wing, 6-6.5 mm.

Rostrum and palpi black. Antennae brownish black to black, in some females the flagellar segments weakly bicolored, brownish black, the tips obscure yellow; flagellar segments long-oval. Head above light yellow in front, gray behind, with a narrow brown median vitta on vertex.

Pronotum brownish gray medially above, narrowly light yellow on sides; pretergites yellow. Mesonotal praescutum gray, with four brown stripes, the intermediate pair separated by a ground vitta of about one-half their own width; pseudosutural foveae dark brown; scutum gray, each lobe with two brown areas, the smaller outer mark being a continuation of the lateral praescutal stripe; a capillary median brown vitta on scutum; scutellum brown, with a pale yellow central spot; postnotum dark gray. Pleura gray, striped longitudinally with light yellow, the latter including the dorsopleural area and a broader and more conspicuous line from the fore coxae backward, expanded behind, the pale areas narrowly bordered by dark brown; expanded portion of the lower pale stripe more or less lined with brownish black. Halteres with the stem yellow, knob brownish black. Legs with the fore coxae chiefly whitened on outer face; middle and posterior coxae brownish gray, the tips broadly yellow; trochanters obscure brownish yellow; femora obscure yellow, the tips gradually more infuscated, relatively narrow, subequal in amount on all

legs; tibiae brownish yellow, the tips narrowly dark brown; tarsi brown, passing into brownish black. Wings (Fig. 26) whitish subhyaline, clearer white in the prearcular and costal fields, the latter including marginal spots in the outer radial field; a conspicuous but restricted brown pattern, including the arculus; origin of *Rs* and Sc_2; tip of Sc_1; stigma; anterior cord; *m-cu;* fork of M_{1+2} and over the supernumerary crossvein in cell R_4; other brown clouds in outer radial field, bordering the whitish hyaline marginal spots; veins brown, a little darker in the patterned areas, the veins in the prearcular and basal costal fields paler. Venation: Sc_1 ending about opposite midlength of *Rs*, Sc_2 opposite origin of *Rs;* vein R_3 oblique; supernumerary crossvein at near midlength of vein R_4 in cell R_4; cell *2nd* M_2 about twice its petiole; *m-cu* from about two and one-half to three times its length before the fork of *M;* arcular crossvein and interanal crossvein in transverse alignment near base of wing.

Abdomen dark brown, sparsely pruinose, the lateral and posterior borders of tergites very narrowly and indistinctly paler, the sternites more uniformly darkened. Male hypopygium (Fig. 28) with the outer lobe of basistyle, *b,* elongate, pale, enlarged toward tip, provided with numerous setae. Both dististyles longer than this lobe, the outer, *od,* unequally bilobed; inner style, *id,* bent beyond base, thence expanded into a narrow blade, about the apical third more narrowed into a spine, the tip acute. Aedeagus, *a,* flattened, the upper margin with a row of scattered pale setae, the tip narrow.

Holotype, ♂, Leeds, June 27, 1945 *(G. F. Knowlton). Allotype,* ♀, pinned with type. *Paratopotypes,* 16 ♂♀; *paratypes,* 4 ♀♀, Washington, June 27, 1945 *(G. F. Knowlton);* 1 ♀, Springdale, June 28, 1945 *(G. F. Knowlton).*

I take very great pleasure in naming this unusually interesting fly for my long-time friend and colleague, Professor George F. Knowlton. The species is closest to *Gonomyia (Euptilostena) dampfiana* Alexander, 1938, of extreme southwestern Mexico, differing in slight details of wing pattern and structure of the male hypopygium. The regional *G. (E.) polingi* Alexander, 1946, is more distantly allied, being readily distinguished by the series of supernumerary crossveins in the costal cell of the wing.

Gonomyia (Idiocera) blanda (Osten Sacken, 1859).—Bear Lake, June 30, 1942, several along a small stream; Morgan, July 24, 1945 *(K).*

Gonomyia (Idiocera) coloradica Alexander, 1920.—Logan, July 28, 1939 *(K & Nye);* Zion National Park, 4,500 ft., June 21-23, 1942; one of the commonest species at and near the Weeping Rock.

Gonomyia (Idiocera) multistylata sp. nov.—Belongs to the *blanda* group; general coloration dark gray, conspicuously patterened with yellow, especially on the thoracic pleura; wings narrow, heavily patterned with dark brown; *Sc* relatively long, Sc_1 ending beyond midlength of *Rs; m-cu* about twice its length before the fork of *M;* male hypopygium with four distinct dististyles or branches thereof, the innermost a flattened yellow blade.

♂. Length, about 5.5 mm.; wing, 5.7-5.8 mm.

Rostrum light yellow above, black on sides; palpi black. Antennae with the scape yellow, faintly darkened on lower face; pedicel brown, flagellum black; flagellar segments long-oval to subfusiform, the verticils about equal in length

to the segments. Head yellow, with a conspicuous brownish black area on the posterior vertex.

Pronotum light yellow on sides, more brownish gray medially above; pretergites light yellow. Mesonotal praescutum dark gray, with still darker intermediate stripes; humeral region restrictedly pale yellow; scutal lobes dark gray, each with a dark brown median dash; central portion of scutum w ith a dark central vitta; posterior lateral portion of each scutal lobe yellow; scutellum dark brown, with a small but conspicuous yellow central spot, parascutella chiefly dark; mediotergite black, sparsely pruinose, each anterior lateral angle light yellow, marking the posterior end of a pale pleural stripe. Pleura and pleurotergite dark gray, conspicuously striped longitudinally with pale yellow; dorsal stripe including the dorsopleural region, continued backward beneath the wing root, including the dorsal pteropleurite and pleurotergite, to the mediotergite, as described; ventral yellow stripe beginning on the fore coxae, crossing the dorsal sternopleurite and ventral mesepimeron onto the metapleura. Halteres with stem yellow, knob black. Legs with the fore and middle coxae chiefly yellow; posterior coxae blackened except at apices; trochanters obscure yellow; femora and tibiae yellow, the tips very narrowly and indistinctly infuscated; basitarsi pale brown, the tips and remainder of tarsi black. Wings (Fig. 30) narrow; ground color whitish subhyaline, the prearcular and costal fields a little more yellowed; a conspicuous dark brown pattern, including spots at *h,* arculus, origin of *Rs,* fork of *Sc,* stigma, over tips of veins R_{1+2} and R_3, along cord and over fork of M_{1+2}; outer radial field, especially in cell R_3 and tip of *2nd A* similarly darkened; narrower and less evident markings along veins R_5, *Cu* and *2nd A;* two or three small to scarcely evident dark dots in cell *C;* veins dark brown, paler in the brightened costal and prearcular fields. Venation: *Sc* long, Sc_1 ending beyond midlength of *Rs,* Sc_2 near its tip; *Rs* square and slightly spurred at origin; R_{1+2} and R_3 in punctiform contact at margin, closing cell R_1; cell *2nd* M_2 subequal in length to its petiole; *m-cu* about twice its length before the fork of *M.*

Abdominal tergites dark brown, the lateral and posterior borders narrowly yellow; sternites somewhat paler brown, the pale caudal borders more diffuse, the sublateral portions of the segments darker; male hypopygium chiefly dark, the apical lobe of basistyle abruptly pale. Male hypopygium (Fig. 33) with the basistyle, *b,* stout, the outer lobe conspicuous, stout, obtuse at apex. Four distinct dististyles, *d,* or profound branches of the same, as shown (in main figure, the inner or fourth style, *id,* is not shown, to avoid confusion); longest style a strong curved rod, black on outer half, the apex obliquely truncated; second style a short slender black spine, gradually narrowed to an acute point; third style intermediate in length between the preceding two, blackened and expanded at the bispinous apex, the short outer or axial spine much smaller than the apical one which bends at a right angle to the axis of the style, both spines acute; fourth or inner style, *id,* a flattened yellow blade, narrow at base, widely expanded outwardly, the apex truncated; surface provided with several setae, their position and relative size about as shown in the figure. Aedeagus, *a,* stout, narrowed to the small apical orifice; surface with numerous scattered setae.

Holotype, ♂, Zion National Park, Weeping Rock, 4,500 ft., July 19, 1943 *(G. F. Knowlton & P. E. Telford). Paratypes,* 1 fragmentary ♂, Moab, along stream, 4,000 ft., June 13, 1945 *(G. F. Knowlton);* 1 ♂, August 21, 1942 *(G. F. Knowlton & W. E. Peay).*

Gonomyia (Idiocera) multistylata is quite distinct from all other Nearctic species of the subgenus, especially in the structure of the male hypopygium. The unusual number of dististyles or profound branches of the same readily separates the species from other somewhat similar forms. Within the limits of this subgenus we find the normal number of three dististyles, but some species (as *blanda)* show only two such styles while a very few others, including the present fly have four, the maximum as known being five, found in *G. (I.) pruinosa* Alexander, of Formosa.

Gonomyia (Idiocera) proserpina Alexander, 1943.—Beaver, 7,000 ft., June 27, 1942; found in a wet springy area, the pools with white *Batrachium* and similar more terrestrial yellow *Ranunculus* sp.; *Equisetum arvense* and *E. hiemale;* area slightly shaded by Colorado blue spruce and willows.

Gonomyia (Idiocera) shannoni Alexander, 1926.—Settlement Canyon, June 18, 1943 *(K).*

Gonomyia (Lipophleps) cinerea (Doane, 1900).—Moab, along Colorado River, at car lights, September 15, 1943 *(K);* Zion National Park, Weeping Rock, June 28, 1945 *(K).*

Gonomyia (Gonomyia) bihamata Alexander, 1943.—Beaver, 8,000 ft., June 26-27, 1942.

Gonomyia (Gonomyia) filicauda Alexander, 1916.—Eden, June 29, 1943 *(K);* Mt. Timpanogos, Salamander Lake, August 26, 1943 *(K & Maddock).*

Gonomyia (Gonomyia) flavibasis Alexander, 1916 *(tuberculata* Alexander, 1925).—Hurricane, September 6, 1943 *(K).*

Gonomyia (Gonomyia) harmstoni sp. nov.—Mesonotal praescutum with three brown stripes, the interspaces obscure; rostrum yellow; antennae black throughout; Sc_1 ending about opposite one-fourth to one-fifth the length of *Rs;* male hypopygium with the outer dististyle unusually small; inner style with its outer lobe a simple arcuated black rod; phallosome a pale flattened blade, the apex obtusely rounded.

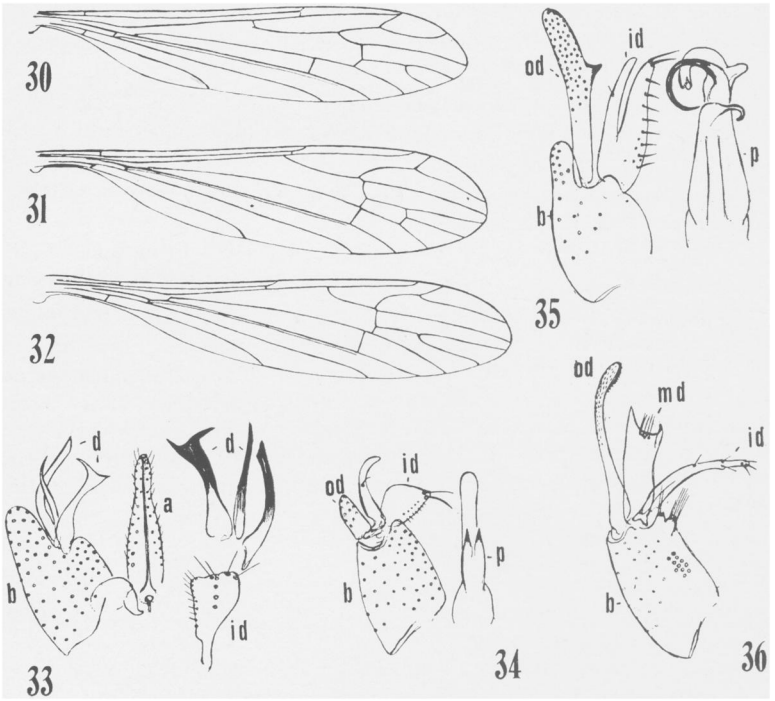
♂. Length, about 4.4-5 mm.; wing, 5.1-6 mm.

Rostrum yellow; palpi black. Antennae black throughout; basal flagellar segments stout, the outer ones more slender. Head light yellow, the center of vertex restrictedly darkened.

Pronotum and pretergites light yellow. Mesonotal praescutum with three brown stripes, the interspaces obscure yellow, the lateral praescutal borders and humeral region broadly light yellow; scutal lobes chiefly dark brown, the surface sparsely pruinose; central region of scutum and base of scutellum restrictedly darkened; mediotergite yellow. Pleura light yellow, patterned with brown, including a longer more dorsal stripe extending from the cervical region across the anepisternum, not involving the pteropleurite; ventral portion of sternopleurite similarly darkened. Halteres elongate, stem pale yellow, knob weakly

infuscated. Legs with coxae and trochanters yellow; femora obscure yellow, clearer basally, the tips passing into brown; tibiae light brown, the tips darker; tarsi passing into brownish black. Wings (Fig. 31) with a weak grayish tinge, the prearcular and costal fields light yellow; stigma barely indicated; veins brown, yellow in the more flavous portions. Venation: Sc_1 ending about opposite one-fourth to one-fifth the length of *Rs*, Sc_2 a short distance from its tip; *m-cu* close to the fork of *M*.

Abdominal tergites dark brown, the lateral and posterior borders of the segments narrowly light yellow; sternites yellow; hypopygium medium brown on basistyles, the remainder, excepting the lobe of the inner dististyle, more yellowed. Male hypopygium (Fig. 34) with the outer dististyle, *od*, unusually small, only about two-thirds as long as the outer lobe of the inner style, provided with about 12 to 14 setae. Inner dististyle, *id*, with its outer lobe a simple



Figs. 30-36. 30. *Gonomyia (Idiocera) multistylata* sp. n., venation; 31. *Gonomyia (Gonomyia) harmstoni* sp. n., venation; 32. *Gonomyia (Gonomyia) paiuta* sp. n., venation; 33. *Gonomyia (Idiocera) multistylata* sp. n., male hypopygium; 34. *Gonomyia (Gonomyia) harmstoni* sp. n., male hypopygium; 35. *Gonomyia (Gonomyia) paiuta* sp. n., male hypopygium; 36. *Gonomyia (Gonomyia) sevierensis* sp. n., male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *d*, dististyle; *id*, inner dististyle; *md*, intermediate dististyle; *od*, outer dististyle; *p*, phallosome).

arcuated blackened rod, with a single powerful seta on face beyond midlength; inner lobe appearing as a flattened blade, narrowed to the apex which bears two slightly unequal fasciculate setae; normal setae in rows along lower edge of style. Phallosome, *p*, a flattened pale blade, the apex obtusely rounded; apophyses small, appearing as appressed stout darkened spinous points.

Holotype, ♂, Bear Lake, 6,000 ft., June 30, 1942 *(C. P. Alexander)*. *Paratopotypes*, 3 ♂ ♂; *paratypes* 2 ♂ ♂, Heber, 5,600 ft., August 30, 1943 *(G. F. Knowlton)*; 1 ♂, Fish Haven, Idaho, July 24, 1943 *(G. F. Knowlton)*.

This interesting fly is named for Mr. Fred C. Harmston, whose cooperation with Professor Knowlton in this study, is greatly appreciated. The fly is readily told from other regional members of the subgenus by the structure of the male hypopygium, especially the dististyles and phallosome. The various allied species in the Rocky Mountain and Great Basin regions fall in the following four groups that are based on the conformation of the apex of the male aedeagus.

1. Apex of aedeagus greatly expanded beyond the apophyses, the outline irregular, before the expanded blade with a more or less developed spine or point.
   extensivena Alexander, 1943; *bihamata* Alexander, 1943; *subcinerea* (Osten Sacken, 1859); *vafra* Alexander, 1945.
2. Apex of aedeagus unequally bilobed by a deep apical split.
   filicauda Alexander.
3. Apex of aedeagus narrowed to a simple point.
   poliocephala Alexander, 1924; *triformis* Alexander, 1946.
4. Apex of aedeagus a simple obtusely rounded blade.
   harmstoni sp. nov.

Gonomya (Gonomyia) paiuta sp. nov.—Allied to *flavibasis* and *spinifer;* wings with a weak brownish tinge, stigma oval, pale brown; *Sc* short, Sc_1 ending a distance before origin of *Rs* nearly equal to the length of the latter; cell M_2 open by the atrophy of the basal section of M_3; male hypopygium with the outer dististyle fleshy and bulbous on outer portion, the margin beyond midlength produced into a blackened tooth; inner dististyle entirely pale, profoundly divided into two blades, the outer one narrow, cultriform, bearing a single seta; phallosome with the apex pale, obtuse; a conspicuous lateral lobe or tubercule opposite the outer spine.

♂. Length about 4.2-4.5 mm.; wing, 4.5-5mm.

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

Rostrum and palpi black. Antennae with scape and pedicel light yellow, flagellum black; flagellar segments long-oval. Head above yellow, the center of vertex restrictedy infuscated.

Pronotum above light yellow. Mesonotal praescutum with three grayish brown stripes, the lateral margins and restricted interspaces more reddish yellow; pseudosutural foveae reddish chestnut; scutal lobes weakly infuscated; posterior sclerites of notum yellow, the posterior border of mediotergite darkened. Pleura and pleurotergite yellow, traversed by a narrow but conspicuous brown longitudinal stripe extending from the cervical sclerites across the dorsal pleurites to the mediotergite, as described; in cases, the ventral sternopleurite more weakly darkened, the two stripes enclosing a more whitish pleural area. from apex; lower lobe stouter, the two fasiculate setae at apex, back from

Halteres with stem yellow, knob weakly infuscated. Legs with the coxae and trochanters reddish yellow; femora yellow, the tips vaguely darker; tibiae and tarsi brownish yellow, the terminal tarsal segments more infuscated. Wings (Fig. 32) with a weak brownish tinge, the prearcular and costal fields more whitened; stigma oval, pale brown; veins brown. Venation: *Sc* short, Sc_1 ending a distance before origin of *Rs* that in cases is nearly equal to the length of the latter, in other specimens about two-thirds as long; Sc_2 a short distance from tip of Sc_1; vein R_3 oblique; basal section of vein R_5 short to lacking; cell M_2 open by atrophy of basal section of M_3; *m-cu* a short distance before fork of *M*.

Abdominal tergites brown, the caudal borders and lateral angles light yellow; sternites and hypopygium chiefly yellow. Male hypopygium (Fig. 35) of the general types of *flavibasis, spinifer* and others, differing in important regards. Apical lobe of basistyle, *b*, small and fleshy, the setae on one face. Outer dististyle, *od*, a long pale blade that juts beyond the other elements of the hypopygium, the surface with abundant long setae, apex obtuse; inner margin beyond midlength with a conspicuous blackened tooth, not as slender and spinelike as in *spinifer* but more pointed than in *flavibasis*. Inner dististyle, *id*, entirely pale, profoundly split into two blades of nearly equal length, the outer narrower and more cultriform, bearing a single seta some distance back from apex; lower lobe stouter, the two fasciculate setae at apex, back from tip on lower margin with a series of more than a dozen strong setae. Phallosome, *p*, with the tip obtuse, pale; outer apophysis a strongly curved blackened hook, opposite its base with a conspicuous knob or tubercle; more basal spine weak and not heavily blackened.

Holotype, ♂, Weeping Rock, Zion National Park, 4,500 ft., June 21, 1942 *(C. P. Alexander)*. *Allotopotype*, ♀, pinned with type. *Paratopotypes*, numerous ♂♀, June 21-23, 1942 *(C. P. & M. M. Alexander)*.

The specific name is that of the dominant Amerind tribe of this general region. The fly is most similar to species such as *Gonomyia (Gonomyia) flavibasis* Alexander and *G. (G.) spinifer* Alexander, differing especially in the structure of the male hypopygium, as above discussed. It should be noted that in *spinifer*, together with the closely allied Mexican species *G. (G.) remota* Alexander, 1926, and *G. (G.) subremota* Alexander, 1938, the apex of the aedeagus is produced into a slender blackened spine. The Mexican *G. (G.) expansa* Alexander, 1938, likewise has the male hypopygium much as in the present fly but has the wings with cell *1st* M_2 closed.

Gonomyia (Gonomyia) sevierensis sp. nov.—Belongs to the *noveboracensis* group; wings narrow, with a weak dusky tinge; stigma and a vague seam over the anterior cord slightly more darkened; *Sc* short, Sc_1 ending a distance before *Rs* about equal to two-thirds to three-fourths the length of the latter; cell M_2 closed; male hypopygium with the outer dististyle long and slender, the slightly dilated apex blackened, the ventral margin with about a dozen erect blackened teeth; intermediate style a broadly flattened pale blade, the outer angle produced into an acute point, the inner angle a small flange, the

apex between these points with from three to five pale setae; inner dististyle unusually slender, not produced into a spine at apex.

♂. Length, about 4-4.5 mm.; wing, 5.4-6 mm.

♀. Length, about 5.5-6 mm.; wing, 6-6.5 mm.

Rostrum obscure yellow above, darker on sides; palpi black. Antennae black throughout; flagellar segments long-oval, the outer ones becoming more slender; verticils exceeding the segments in length. Head above gray, the vertical tubercle and occiput orange.

Pronotum light yellow, narrowly infuscated medially; pretergites and dorsopleural region light yellow. Mesonotal praescutum and scutum dark brownish gray, without distinct pattern; tuberculate pits and pseudosutural foveae black; scutellum obscure orange behind, more pruinose at base; postnotum chiefly gray, the cephalic lateral portion of mediotergite and anapleurotergite yellow. Pleura conspicuously striped with dark brown on a yellow ground, the more dorsal stripe extending from the cervical region to below the wing root; lower stripe best indicated on the ventral sternopleurite, less evident on the meron. Halteres with stem yellow, knob dark brown. Legs with the coxae and trochanters yellow; remainder of legs chiefly dark brown, the femoral bases restrictedly yellow. Wings narrow, with a weak dusky tinge, the prearcular and costal fields somewhat more yellowed; stigma and a vague seam over the anterior cord slightly more darkened; veins brown, more yellowed in the brightened fields. Venation: *Sc* short, Sc_1 ending a distance before *Rs* about equal to two-thirds or three-fourths the length of the latter, Sc_2 at its extreme tip; *Rs* a little shorter than R_{2+3+4}, the latter subequal to vein R_4; vein R_3 oblique, the distance on costa between R_{1+2} and R_3 variable, in cases subequal in length to vein R_3, in other specimens much shorter; basal section of R_5 short; *m-cu* at or immediately before the fork of *M*.

Abdominal tergites dark brown, the posterior borders yellow, slightly more extensive at the lateral angles; sternites somewhat paler brown, with pale posterior borders; hypopygium obscure yellow. Male hypopygium (Fig. 36) with three dististyles; outer style, *od*, long and slender, the slightly dilated apex blackened, its ventral margin with about a dozen erect black teeth, the most proximal one stouter; outer surface of style for almost the distal half with appressed scabrous points; intermediate style, *md*, a broadly flattened pale blade its outer angle produced into an acute point, the inner angle with a much smaller flange, the concave margin between these points with a group of from three to five long pale setae; inner dististyle, *id*, unusually slender, the tuberculate flange on lower margin before apex small; tip of style not produced into a spine, such as occurs in other species; chaetotaxy of style as figured. Basistyle, *b*, with a rather compact group of about a dozen very long setae on mesal face, these setae only a little shorter than the outer dististyle, the group not as compact as in *percomplexa*. The complex phallosome is not figured.

Holotype, ♂, Sevier River, near Hatch, June 23, 1942 *(C. P. Alexander)*. *Allotopotype*, ♀. *Paratopotypes*, several ♂♀.

This fly is readily told from the other western Nearctic members of the group by the details of structure of the male hypopygium, particularly the

dististyles, as indicated in the diagnosis. These relatives include *Gonomyia (Gonomyia) aciculifera* Alexander, 1919, *G. (G.) tetonensis* Alexander, 1945, and *G. (G.) percomplexa* Alexander, 1946, the last having cell M_2 of the wings open.

Gonomyia (Gonomyia) spinifer Alexander, 1918.— Arches National Mon ument, September 16, 1943 *(K);* Moab, August 21, 1942 *(K & Peay);* Zion National Park, Weeping Rock, May 5, 1943 *(K).*

Gonomyia (Gonomyia) subcinerea (Osten Sacken, 1859) *(obscura* Doane, 1900).—Weber River, June 29, 1943 *(K .& Telford).*

Gonomyia (Gonomyia) triformis Alexander, 1946.—Beaver, near Beaver Creek, 6,500-7,000 ft., June 27, 1942; Maple Canyon, August 25, 1923 *(Aldous);* University of Utah.

Gonomyia (Gonomyia) vafra Alexander, 1945.—Wolf Creek Pass, Uinta Mts., July 24, 1945 *(K).*

Rhabdomastix (Sacandaga) californiensis Alexander, 1921.—Zion National Park, 4,500 ft., June 21, 1942.

Rhabdomastix (Sacandaga) ioogoon sp. nov.—Allied to *coloradensis;* general coloration light yellow, patterned with brown; head above with a conspicuous central brown stripe; halteres uniformly pale yellow; femora and tibiae yellow, their tips vaguely darker; wings subhyaline, stigma scarcely darker; *Sc* relatively short, Sc_1 ending about opposite three-fifths to two-thirds *Rs;* male hypopygium with the outer dististyle darkened, provided with conspicuous appressed spinous points and spinulae, the apical point very short and inconspicuous; blade of gonapophysis relatively narrow, pointed at apex.

♂. Length, about 5.5 mm.; wing, 6.5 mm.

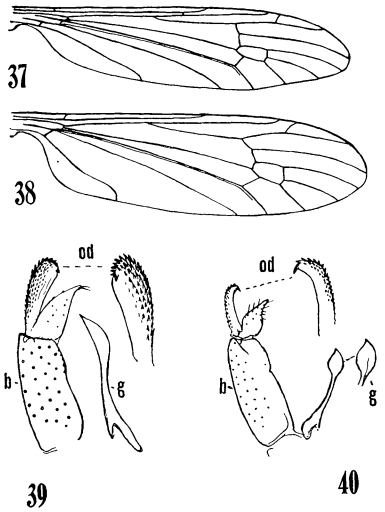
♀. Length, about 6-7 mm.; wing, 7-7.5 mm.

Rostrum yellow, weakly darkened above; palpi brown. Antennae with scape yellow, pedicel and flagellum black; flagellar segments oval, passing into long-oval; longest verticils scarcely equalling the segments, unilaterally distributed. Head above obscure orange, with a conspicuous brownish gray central area that is slightly expanded at near midlength.

Pronotum yellow, slightly darkened laterally. Mesonotal praescutum light yellow, with three broad brownish gray stripes, the wide median one more or less bifid behind, ending far before the suture; lateral stripes crossing the suture onto the scutal lobes; lateral praescutal border paler yellow; pseudo-sutural foveae and tuberculate pits blackened, conspicuous; median region of scutum and base of scutellum brownish gray, the remainder yellow; postnotum yellow, the posterior portion of both mediotergite and pleurotergite more brownish gray. Pleura light yellow, including the dorsopleural membrane, variegated with brownish gray, most conspicuously so on the ventral sclerites, especially the meron. Halteres pale yellow. Legs with the coxae and trochanters yellow; femora and tibiae yellow, vaguely darker at tips; outer tarsal segments dark brown. Wings (Fig. 37) subhyaline, stigma scarcely darker; veins pale brown, more brownish yellow in the prearcular and costal fields. Very sparse

macrotrichia on outer veins from R_4 to M_3, inclusive. Venation: *Sc* moderately long, Sc_1 ending about opposite three-fifths to two-thirds the length of *Rs*, Sc_2 some distance from the tip of Sc_1, the latter being about one-third longer than *m-cu;* vein R_3 nearly erect, along costal border separated from R_{1+2} by a distance subequal to its own length; R_{2+3+4} and R_4 subequal; veins issuing from cell *1st* M_2 only moderately elevated or arched; *m-cu* about its own length beyond the fork of *M*.

Abdominal tergites grayish brown, sternites more yellowed; hypopygium chiefly brownish yellow. Ovipositor with valves very long and slender. Male hypopygium (Fig. 39) with the outer dististyle, *od,* darkened, very conspicuous, provided with appressed spinous points and spinulae, the apical beak very short and inconspicuous, shorter than several of the subtending spines. Inner dististyle strongly narrowed at outer end, entirely pale. Gonapophysis, *g,* pale, the apical blade relatively narrow, only about twice as wide as the stem, pointed at tip.



Figs. 37-40. 37. *Rhabdomastix (Sacandaga) ioogoon* sp. n., venation; 38. *Rhabdomastix (Sacandaga) lipophleps* sp. n., venation; 39. *Rhabdomastix (Sacandaga) ioogoon* sp. n., male hypopygium; 40. *Rhabdomastix (Sacandaga) lipophleps* sp. n., male hypopygium.
(Symbols: *b*, basistyle; *g*, gonapophysis; *od*, outer dististyle).

Holotype, ♂, Zion National Park, 4,500 ft., June 21, 1942 *(C. P. Alexander). Allotopotype,* ♀. *Paratopotype,* 1 ♀.

The term *ioogoon* is the Paiute Indian name for Zion Canyon, from an arrow quiver, "come out the way you come in". Although generally similar to *Rhabdomastix (Sacandaga) coloradensis* Alexander, 1917, the present fly differs evidently in details of coloration, venation and structure of the male hypopygium, especially the short *Sc* and structure of the outer dististyle and gonapophysis.

Rhabdomastix (Sacandaga) leonardi Alexander, 1930.—Devils Slide, Weber River, on grassy banks above the slide, June 29, 1943 *(K & Telford);* Henefer, June 29, 1943 *(K);* Hyrum, July 23, 1942 *(K);* Moab, June 13, 1945 *(K);* Provo Canyon, July 26, 1945 *(K);* Salina, July 11, 1943 *(K);* Zion National Park, June 21, 1942 *(K).*

Rhabdomastix (Sacandaga) lipophleps sp. nov.—General coloration gray, the mesonotum faintly patterned with pale brown; femora obscure yellow, the tips brown; wings grayish subhyaline, restrictedly patterned with pale

brown; macrotrichia on outer veins; Sc_1 ending about opposite three-fifths the length of *Rs*, Sc_2 lacking; *m-cu* oblique; male hypopygium with the gonapophysis terminating in an unusually broad flattened blade.

♂. Length, about 6 mm.; wing, 6.5 mm.

Rostrum light brown; palpi black. Antennae (male) short; scape and pedicel brown, flagellum broken. Head light gray; anterior vertex broad.

Pronotum brownish gray, the lateral margins and pretergites obscure yellow. Mesonotum light gray, the praescutum with four poorly indicated pale brown stripes, the scutal lobes similarly patterned; tuberculate pits dark brown, pseudosutural foveae pale; posterior portions of both mediotergite and pleurotergite darkened. Pleura gray, the ventral portions darker; dorsopleural membrane obscure yellow. Halteres with stem light yellow, knob broken. Legs with the coxae and trochanters yellow, fore coxae a trifle darker; femora obscure yellow, the tips brown, of the tibiae more narrowly and inconspicuously so; outer tarsal segments blackened. Wings (Fig. 38) broad, grayish subhyaline, the base narrowly more whitened; stigma oval, very pale brown; narrow to scarcely evident brown seams along cord and outer end of cell *1st* M_2; veins brown. Macrotrichia on veins R_4, R_5 and distal sections of M_{1+2} and M_3, fewer on R_{2+3+4}, M_4, Cu_1 and *2nd A*. Venation: *Sc* long, Sc_1 ending about opposite three-fifths *Rs*, Sc_2 lacking; vein R_3 short, oblique, gently sinuous; vein R_{2+3+4} a little shorter than R_4; *m* more than twice the basal section of M_3; *m-cu* oblique, about two-thirds its length beyond the fork of *M*.

Abdominal tergites brown, basal sternites somewhat paler; subterminal segments dark brown to form a conspicuous ring; hypopygium more yellowish brown. Male hypopygium (Fig. 40) with the outer dististyle, *od*, relatively narrow, terminating in a strong curved point, the outer face of style with abundant appressed spines and spinulae. Inner dististyle nearly as long, strongly narrowed at apex. Gonapophysis, *g*, with the stem slender, at apex dilated into a very broad flattened blade, the apex subapiculate.

Holotype, ♂, Zion National Park, 4,500 ft., June 22, 1942 *(C. P. Alexander)*. *Allotype*, ♀, Mt. Nebo, July 25, 1942 *(G. F. Knowlton)*.

In its loss of vein Sc_2 of the wings, the present fly agrees more nearly with members of the *lurida* group, including the regional *Rhabdomastix (Sacandaga) sublurida* Alexander, 1943. However, from the venation and structure of the gonapophyses, it is evidently more nearly allied to species such as *R. (S.) fasciger* Alexander, 1920, all of which have vein Sc_2 strongly preserved. The allotype specimen was added to the type series after the description was prepared. In this, vein Sc_2 is vaguely preserved and it is possible that this specimen may not be conspecific with the type.

Cryptolabis (Cryptolabis) molophiloides Alexander, 1943.— Hayden, July 25, 1945 *(K)*; Vernal, June 27, 1943 *(K)*.

Cryptolabis (Cryptolabis) pachyphallus Alexander, 1943.—Logan, at light, August 3, 1938 *(K & Hardy)*.

Cryptolabis (Cryptolabis) sica Alexander, 1946.—Zion National Park,

Weeping Rock, 4,500 ft., June 21-23, 1942, part of type series; same station, June 28, 1945 *(K)*.

Ormosia (Rhypholophus) bifidaria Alexander, 1919.—Beaver, 8,000 ft., June 25-26, 1942; Cedar Breaks, 10,000 ft., June 25, 1942 *(M. M. Alexander)*, June 24, 1942 *(Degener & Peiler)*; Coal Creek Canyon, 9,000 ft., June 25, 1942; Mt. Timpanogos, Aspen Grove *(Hardy)*, July 26, 1945 *(K)*.

Ormosia (Rhypholophus) wasatchensis sp. nov.—General coloration brownish gray, the praescutum with the humeral region and interspaces reddish yellow; antennae with the scape and pedicel obscure yellow, flagellum black; knobs of halteres weakly darkened; male hypopygium with the plates of the gonapophyses suboval in outline, the inner apical angle produced into a blackened tail-like extension, the outer angle evenly rounded, unarmed; arms of aedeagus relatively long, subequal in length to the extensions of the gonapophyses.

♂. Length, about 5-5.5 mm.; wing, 6-6.5 mm.

♀. Length, about 6 mm.; wing, 6.5 mm.

Rostrum obscure yellow; palpi black. Antennae with the scape and pedicel obscure yellow, flagellum black, the base of the first segment restrictedly pale; flagellar segments elongate-oval to elongate; longest verticils unilaterally distributed. Head light gray; anterior vertex broad.

Pronotum yellow middorsally, more brownish gray on sides; pretergites yellow. Mesonotal praescutum with the humeral region and restricted interspaces reddish yellow, the remainder almost covered by three broad brownish gray stripes, obliterating the interspaces at the suture; posterior sclerites of notum brownish gray, the scutellum a trifle brightened; pleurotergite and lateral borders of mediotergite obscure yellow. Pleura chiefly yellow, sparsely gray pruinose. Halteres with stem yellow, knob rather weakly darkened. Legs with coxae and trochanters yellow; femora obscure yellow, brighter at base, narrowly more darkened at tip; tibiae brownish yellow, the tips narrowly infuscated; tarsi black, the basitarsi paler at proximal ends. Wings (Fig. 41) relatively narrow, strongly tinged with brown, the prearcular and costal fields more yellowed; stigma long-oval, brown; very vague darkenings along cord and outer end of cell *1st* M_2, best evidenced by a slight deepening in color of the veins; veins brown, yellowish in the brightened fields and basal portion of *Cu*. Venation: R_2 close to fork of R_{3+4}; cell *1st* M_2 closed, a little longer than vein M_4 beyond it; *m-cu* just beyond the fork of *M;* vein *2nd A* unusually sinuous.

Abdominal tergites dark brown, basal sternites clear yellow, the outer ones and the hypopygium a little darker, more brownish yellow. Male hypopygium (Fig. 44) with the inner dististyle relatively narrow. Gonapophysis, *g*, with the plates suboval in outline, the inner apical angle produced into a blackened tail-like extension, the tip subacute; outer apical angle evenly rounded, unarmed. Arms of the aedeagus, *a*, relatively long, subequal in length to the extension of the gonapophysis.

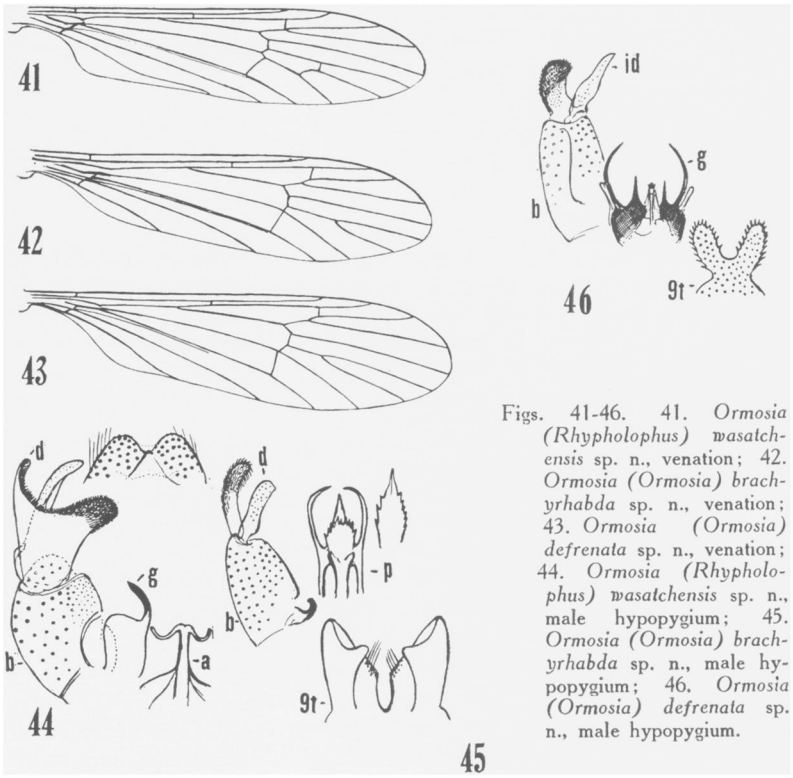
Holotype, ♂, Timpooneke Ranger Station, Mt. Timpanogos, August 26, 1943 *(G. F. Knowlton & Darrell R. Maddock)*. *Allotopotype*, ♀. *Paratopo-*

types, 7 ♂♂, 1 pinned with type; *paratypes,* 1 ♂, 1 ♀, Delta, August 25, 1943 *(G. F. Knowlton).*

The nearest relative of the present fly is *Ormosia (Rhypholophus) suffumata* Alexander, 1943. It is best distinguished by the structure of the gonapophyses of the male hypopygium, particularly the unarmed outer apical angles. In *suffumata,* these latter are produced into a conspicuous acute spine to make the entire structure bispinous.

Ormosia (Ormosia) albertensis Alexander, 1933.—Beaver, 8,000 ft., June 25-26, 1942.

Ormosia (Ormosia) brachyrhabda sp. nov.—Allied to *manicata;* general coloration of thoracic notum medium brown, without distinct pattern; male hypopygium with the phallosome consisting of two depressed-flattened central plates that are coarsely serrate on their margins, the longer one extended into a strong central spine; lateral border of the shorter plate produced caudad into a slender blade that extends to a short distance beyond the central spine, the tips of these blades incurved.



Figs. 41-46. 41. *Ormosia (Rhypholophus) wasatchensis* sp. n., venation; 42. *Ormosia (Ormosia) brachyrhabda* sp. n., venation; 43. *Ormosia (Ormosia) defrenata* sp. n., venation; 44. *Ormosia (Rhypholophus) wasatchensis* sp. n., male hypopygium; 45. *Ormosia (Ormosia) brachyrhabda* sp. n., male hypopygium; 46. *Ormosia (Ormosia) defrenata* sp. n., male hypopygium.

(Symbols: *a,* aedeagus; *b,* basistyle; *d,* dististyles; *g,* gonapophysis; *id,* inner dististyle; *p,* phallosome; *t,* tergite).

♂. Length, about 4.5 mm.; wing, 4.5 mm.; antenna, about 0.5 mm.

Rostrum brown; palpi darker brown. Antennae short, brown throughout; flagellar segments oval to long-oval, with conspicuous verticils. Head brown.

Thorax above medium brown, without distinct pattern, the lateral praescutal borders yellow. Pleura and pleurotergite paler, more yellowish brown. Halteres with stem yellow, knob infuscated. Legs with the coxae and trochanters testaceous yellow; remainder of legs obscure yellow or brownish yellow, femoral tips very weakly more darkened, outer tarsal segments dark brown. Wings (Fig. 42) whitish subhyaline, the prearcular and costal fields a trifle more yellowed; veins pale brown, more yellowed in the brighter portions. Venation: Anal veins divergent; cell *2nd A* relatively narrow.

Abdominal tergites and hypopygium brown, sternites more yellowed. Male hypopygium (Fig. 45) with the tergite, *9t*, greatly enlarged and deeply notched, as in the group. Dististyles, *d*, much as in *manicata*, the outer style narrow, its outer face densely setuliferous; inner style subequal in length, nearly glabrous. Phallosome, *p*, consisting of two depressed-flattened central plates that are coarsely serrate on their margins, the longer one extended into a strong central spine; lateral borders of the shorter plate produced caudad into a narrow blade that extends to a short distance beyond the central spine, the tips of these blades incurved.

Holotype, ♂, Henefer, June 29, 1943 *(G. F. Knowlton). Paratypes*, ♂, Weber River, June 29, 1943 *(G. F. Knowlton)*; ♂, Bear Lake, 6,000 ft., June 30, 1942 *(C. P. Alexander)*; ♂ ♂, Arizona Creek, Teton National Forest, Wyoming, 6,790 ft., July 8, 1941 *(C. P. Alexander)*; previously recorded (Alexander, 1945) as *manicata*.

While very similar in its general appearance to *Ormosia (Ormosia) manicata* (Doane, 1900), the present fly is quite distinct in certain important structures of the male hypopygium, especially the phallosome. In *manicata*, the gonapophyses are three in number, two appearing as very elongate needle-like spines, the slightly broader third element terminating in a furcula.

Ormosia (Ormosia) defrenata sp. nov.—Belongs to the *similis* group; general coloration yellow, the mesonotum more reddish yellow; antennae (male) elongate, shorter than body; flagellar segments strongly narrowed outwardly, giving a nodulose appearance to the organ; legs yellow, the outer tarsal segments infuscated; wings with a weak brownish tinge, stigma a little darker but diffuse; male hypopygium with the tergite very deeply notched, the large lobes with their margins conspicuously fimbriate; inner dististyle a slender pale blade; gonapophysis appearing as a darkened bispinous plate, the outer spine long and slender, its tip pale.

♂. Length, about 4.3-4.5 mm.; wing, 4.6-4.8 mm.; antennae, about 3.5 mm.

Rostrum pale yellow; palpi brownish black. Antennae (male) elongate, as shown by the measurements; basal three segments yellow, succeeding segments chiefly dark brown; flagellar segments with basal portion long-oval, the outer half of each narrowed into a slender glabrous stem; longest verticils shorter than the segments. Head above brownish gray.

Pronotum obscure yellow; pretergites clearer yellow. Mesonotum reddish yellow, sparsely pruinose; sides of praescutum paling to yellow. Pleura and pleurotergite somewhat clearer yellow. Halteres with stem yellow, knob weakly darkened. Legs yellow, the outer tarsal segments infuscated. Wings (Fig. 43) with a weak brownish tinge, the prearcular and costal fields somewhat more yellowish; stigma a little darker, very diffuse; veins brown, paler in the more brightened areas. Macrotrichia of cells abundant and well distributed over virtually the entire wing. Venation: R_{2+3} and R_2 subequal; cell M_2 open by the atrophy of basal section of M_3; *m-cu* close to the fork of *M*; vein *2nd A* very gently sinuous on its outer fourth.

Abdominal tergites pale brown; sternites and hypopygium yellow. Male hypopygium (Fig. 46) with the tergite, *9t*, very deeply notched, the large lobes flattened, their margins produced into long, conspicuous, fimbriate points; surface of tergite, including lobes, with conspicuous setae; base of notch with restricted pale membrane. Outer dististyle a stout suboval blackened lobe, the outer surface with abundant appressed setae that are arranged in more or less distinct rows, as in the group. Inner dististyle, *id*, a slender pale blade, somewhat longer than the outer dististyle. Phallosome with the chief gonapophysis, *g*, appearing as a flattened black plate, the outer angle produced into a slender black rod, the acute tip pale, slightly incurved; inner angle of plate produced caudad into a powerful straight black spine; mesal edge of plate near base with numerous spinulose points or roughenings; a small slender outer gonapophysis. Aedeagus weakly bifid at apex.

Holotype, ♂, Mt. Timpanogos, July 26, 1945 *(G. F. Knowlton)*. *Paratypes*, ♂, Beaver, 8,000 ft., June 25-26, 1942 *(C. P. Alexander)*; one broken ♂, Logan Canyon, Spring Hollow, July 5, 1943 *(Darrell R. Maddock)*; 1 ♂, on slide, Moscow Mt., Idaho, July 25, 1920 *(R. C. Shannon)*.

The most similar species superficially is *Ormosia (Ormosia) cockerelli* (Coquillett, 1901), which closely resembles the present fly in the yellow coloration of the body and elongate antennae of the male, differing in the structure of the male hypopygium. The nearest ally appears to be *O. (O.) pugetensis* Alexander, 1946, which is well distinguished by the structure of the hypopygium.

Ormosia (Ormosia) fusiformis (Doane, 1900).—Beaver, 8,000 ft., June 25-26, 1942; Mt. Nebo, Bear Canyon Camp, August 14, 1943 *(K)*; Settlement Canyon, June 18, 1943 *(K)*; Mt. Timpanogos, July 26, 1945 *(K)*.

Ormosia (Ormosia) opifex Alexander, 1943.—Cedar Breaks, 10,000 ft., along small mountain stream, June 25, 1942 *(M. M. Alexander)*.

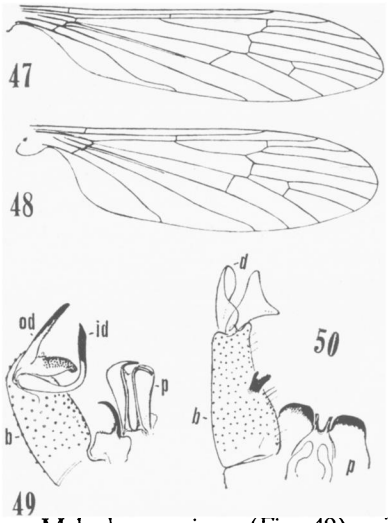
Ormosia (Ormosia) spinifex Alexander, 1943.—Beaver, 8,000 ft., June 25-26, 1942; swept from Colorado blue spruce near mountain stream.

Ormosia (Ormosia) tetonica Alexander, 1945.—Mt. Nebo, July 5, 1945 *(Harmston)*.

Erioptera (Psiloconopa) angularis (Alexander, 1917).—The type was taken near the mouth of Bear River, northern end of Great Salt Lake, September 16, 1914, by Alexander Wetmore. Other records: Circleville, July 9,

1945 *(K);* Howell, August 26, 1942 *(K & Peay);* Junction, June 28, 1945 *(K);* Saltair, May 21, 1926 *(M. C. VanDuzee);* Salt Lake City, May 4, 1945 *(Harmston).*

The species is still poorly known and some further descriptive notes are supplied. Wings (Fig. 47) yellowish gray, slightly paler at base; very small to scarcely evident brown clouds at origin of *Rs,* along cord and over outer end of cell *1st* M_2. The venation varies within surprising limits: Cell *1st* M_2 may be closed or open by the atrophy of the basal section of vein M_3; R_{2+3+4}, while usually shorter than *r-m* is, in some specimens, fully three times this length.



Figs. 47-50. 47. *Erioptera (Psiloconopa) angularis* Alexander, venation; 48. *Erioptera (Psiloconopa) hardyi* sp. n., venation; 49. *Erioptera (Psiloconopa) angularis* Alexander, male hypopygium; 50. *Erioptera (Psiloconopa) hardyi* sp. n., male hypopygium.
(Symbols: *b,* basistyle; *d,* dististyles; *id,* inner dististyle; *od,* outer dististyle; *p,* phallosome).

Male hypopygium (Fig. 49) with the outer dististyle, *od,* profoundly bifid, both arms blackened, the outer one longer and more slender, its inner edge microscopically crenulate or roughened; inner arm short and broad, its outer face similarly but even more delicately crenulate. Inner dististyle, *id,* a long slender arm, at near midlength bent at a right angle or slightly more, the tip darkened and acute; before apex with a few scattered pale acute spinous points. Gonapophyses appearing as flattened pale basal plates, each produced apically into a slender blackened rod or spine, gently curved, the margin microscopically toothed or crenulate. Phallosome, *p,* appearing as a flattened central plate, at apex produced into two genital tubes.

Erioptera (Psiloconopa) bispinigera Alexander, 1930.—Logan Canyon, above Tony Grove, August 12, 1943 *(K & Maddock).*

Erioptera (Psiloconopa) gaspicola (Alexander, 1929).—Beaver, 8,000 ft., June 26, 1942.

Erioptera (Psiloconopa) hardyi sp. nov.—Allied to *angularis;* general coloration yellow, patterned with darker; antennae with scape yellow, pedicel and flagellum brown; mesonotal praescutum with three light brown stripes, the cephalic portion of the broad central stripe more blackened; halteres yellow, the tips narrowly infuscated; wings broad, grayish subhyaline, with a restricted pale brown pattern; vein *2nd A* nearly straight, diverging from *1st A,*

the tip barely sinuous; male hypopygium with a small blackened furcula at near midlength of mesal face of basistyle; inner dististyle blackened, expanded outwardly, the surface smooth; gonapophyses appearing as conspicuous blackened plates or blades, the tips obtuse.

♂. Length, about 5.3-5.5 mm.; wing, 5.4-6 mm.

Rostrum and palpi light yellow. Antennae with scape yellow, pedicel and flagellum brown; basal flagellar segments subglobular to short-oval, the outer four or five becoming smaller. Head above yellow, the center of vertex and occiput more darkened; eyes of male large.

Pronotum and pretergites pale yellow. Mesonotal praescutum with the very restricted interspaces obscure yellow, the disk with three light brown stripes, the surface more or less pruinose; cephalic portion of the broad central stripe more blackened; humeral region and lateral margin light yellow; pseudosutural foveae dark brown; central portion of scutum yellow, crossing the suture onto the praescutum; each scutal lobe with two brownish gray areas, the anterior one larger; scutellum yellow, sparsely pruinose, parascutella a trifle variegated with brown on ventral portion; mediotergite brownish gray, darker on posterior half, the anterolateral portions yellow; pleurotergite yellow, its ventral portion more infuscated. Pleura yellow, conspicuously patterned with brown, especially on anepisternum, ventral sternopleurite and meron. Halteres pale yellow. Legs with the coxae and trochanters yellow; femora yellow; the tips narrowly infuscated, the amount subequal on all legs; tibiae obscure yellow, the tips narrowly brownish black, the bases less evidently darkened; basitarsi yellow, the tips and remainder of tarsi darker. Wings (Fig. 48) broad, grayish subhyaline, with a restricted pale brown pattern, including small spots at origin of *Rs* and Sc_2; R_2; tip of vein R_{1+2}, and over cord and outer end of cell *1st* M_2; broad but less distinct dusky washes in outer ends of both Anal cells. Venation: Sc_2 far from tip of Sc_1, about opposite origin of *Rs*, the latter a little shorter than vein R_3; cell *1st* M_2 closed, a trifle shorter than vein M_4; *m-cu* about one-fourth to one-half its length before the fork of *M*; vein *2nd A* nearly straight, diverging from vein *1st A*, the tip barely sinuous, the cell broad.

Abdominal tergites obscure yellow, with a vague darker central stripe; sternites and hypopygium clearer yellow. Male hypopygium (Fig. 50) with the basistyle, *b*, slender, on mesal face at near midlength with a small blackened furcula, its arms unequal, microscopically scabrous. Outer dististyle a flattened scooplike blade. Inner dististyle larger but not much longer, expanded outwardly, more or less produced into two lobes, their margins blackened, smooth. Phallosome, *p*, with the apophyses appearing as conspicuous blackened plates or blades, the tips obtuse or subtruncate.

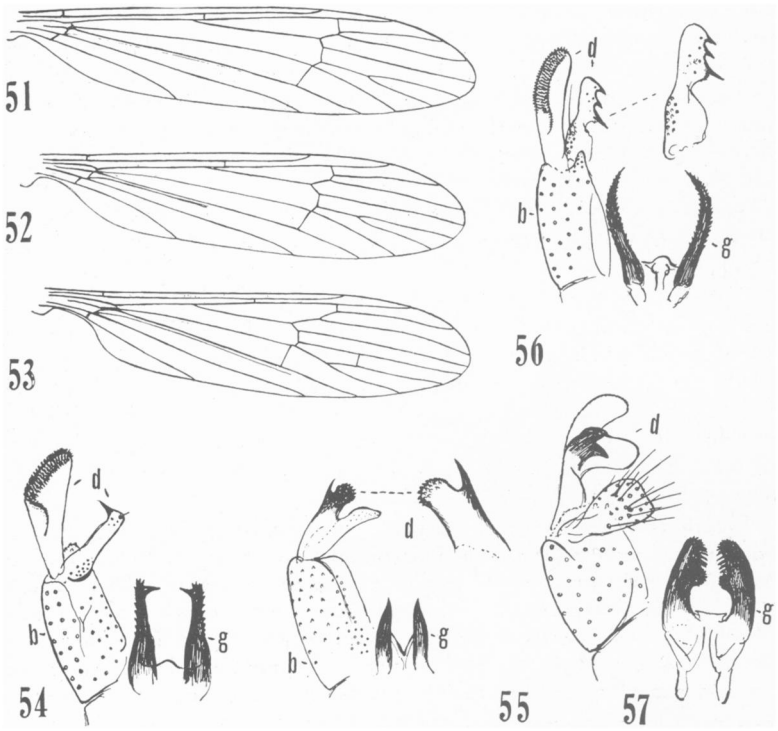
Holotype, ♂, Junction, June 28, 1945 *(G. F. Knowlton). Paratopotype*, ♂.

I am very pleased to name this distinct fly for Dr. D. Elmo Hardy, who has added most materially to our knowledge of the Diptera of the State. The species differs from *Erioptera (Psiloconopa) angularis* (Alexander, 1917), in the details of coloration of the body and wings and in the venation, in-

cluding the course of vein *2nd A* and the width of the cell. The male hypopygia are quite different in the two flies (Figs. 49, 50).

Erioptera (Psiloconopa) lucia Alexander, 1914.—Huntington Canyon, 6,000 ft., September 1, 1945 *(Edmunds & Mulaik)*, 1 ♂, 1♀, cell *1st* M_2 open by the atrophy of *m* in both specimens; Orangeville, summit of mountains to the west, 10,000 ft., September 6, 1945 *(K)*.

The male hypopygium (Fig. 54) has not been adequately illustrated or described. Outer dististyle widely expanded outwardly. Inner dististyle slender, at apex terminating in a single blackened point that is bent at a right angle to the axis. Gonapophyses, *g*, appearing as blackened rods, just before apex on inner face produced laterad into a strong beaklike spine; surface of apophysis, especially the outer face, with microscopic teeth. The venation varies in



Figs. 51-57. 51. *Erioptera (Psiloconopa) neomexicana* Alexander, venation; 52. *Erioptera (Psiloconopa) telfordi* sp. n., venation; 53. *Erioptera (Psiloconopa) sinawava* sp. n., venation; 54. *Erioptera (Psiloconopa) lucia* Alexander, male hypopygium; 55. *Erioptera (Psiloconopa) neomexicana* Alexander, male hypopygium; 56. *Erioptera (Psiloconopa) peayi* sp. n., male hypopygium; 57. *Erioptera (Psiloconopa) sinawava* sp. n., male hypopygium.
(Symbols: *b*, basistyle; *d*, dististyles; *g*, gonapophysis).

the open or closed cell *1st* M_2, as discussed above, both conditions being about equally common.

Erioptera (Psiloconopa) manitobensis Alexander, 1929.—Beaver, along Beaver Creek, 6,500 ft., swept from beds of *Equisetum arvense* in river overflow pools, June 27, 1942; Kanab Canyon, May 5, 1943 *(K);* Provo River, near Utah Lake, July 10, 1945 *(K & Telford);* Rockville, May 5, 1943 *(K).*

Erioptera (Psiloconopa) margarita Alexander, 1919.—Beaver, 8,000 ft., June 27, 1942, August 12, 1943 *(K);* Beaver Canyon, 7,200 ft., July 12, 1945 *(K & Telford);* Beaver Mountain, July 15, 1945 *(K);* Maple Canyon, June 12, 1943 *(K & Telford);* Nephi, August 14, 1943 *(K & Maddock);* Sevier River, at Hatch, June 23, 1942; Zion National Park, Weeping Rock, May 5, 1943 *(K),* June 21, 1942.

Erioptera (Psiloconopa) megarhabda (Alexander, 1943).—Sevier River, near Hatch, June 23, 1942. I formerly considered this as being an *Ormosia* but from the structure of the male hypopygium, the present assignment seems more nearly correct.

Erioptera (Psiloconopa) microcellula Alexander, 1914.—Beaver, 7,000 ft., June 27, 1942; Logan Canyon, Lodge Forest Camp, 4,800 ft., June 30, 1942; Monte Cristo Canyon, August 25, 1938 *(K & Hardy);* Wolf Creek Pass, July 24, 1945 *(K).*

Erioptera (Psiloconopa) neomexicana Alexander, 1929.—Richfield, August 9, 1929 (collector unknown); Salina, July 11, 1943 *(K);* Zion National Park, Weeping Rock, June 21-22, 1942.

The wing venation is shown (Fig. 51). Male hypopygium (Fig. 55) of distinctive conformation. Basistyle, *b,* not produced apically beyond the bases of the dististyles. Outer dististyle a small blackened blade, at apex rounded and provided with numerous obtuse points or spicules; before apex on outer margin with a conspicuous erect spine. Inner dististyle of approximately the same length, pale or with the apex weakly infuscated; outer portion with numerous weak setae; outer margin before the obtuse tip with a low flange. Gonapophysis, *g,* a simple blackened blade, the tip acute.

Erioptera (Psiloconopa) peayi sp. nov.—Allied to *lucia;* general coloration of thorax reddish yellow, the praescutum with a broad grayish brown central stripe that is narrowed behind, not reaching the suture; head gray; halteres pale yellow; femora and tibiae yellow, the tips weakly darkened; wings grayish yellow; cell *1st* M_2 closed, small, the second section of vein M_{1+2} only about one-fourth as long as the outer section; male hypopygium with the inner dististyle terminating in a nearly glabrous blade, the margin produced into three blackened spines, the most basal one largest; gonapophyses long, appearing as strong blackened horns, the surface with abundant blackened spinulae.

♂. Length, about 5 mm.; wing, 5.5 mm.

Rostrum yellow; palpi brownish black. Antennae dark brown throughout; flagellar segments oval, with long verticils. Head gray.

Pronotum and pretergites chiefly very pale yellow. Mesonotum reddish yellow, the praescutum with a broad grayish brown central stripe that is narrowed behind, becoming obsolete before the suture; scutellum more yellowed.

Pleura reddish yellow, unmarked. Halteres pale yellow. Legs with the coxae and trochanters yellow; femora and tibiae yellow, the tips weakly darkened; tarsi passing into brownish black. Wings grayish yellow, the prearcular and costal fields slightly clearer yellow; stigma scarcely indicated; veins brownish yellow to yellow in the brighter fields. Venation: Cell *1st* M_2 closed, small, the second section of M_{1+2} about one-fourth as long as the outer section; *m-cu* about one-third its length beyond the fork of *M;* Anal veins divergent, *2nd A* virtually straight.

Abdominal tergites brown, the sternites and hypopygium yellow. Male hypopygium (Fig. 56) with the outer dististyle moderately expanded, with blackened elongate appressed spicules, arranged in about four rows at and back from margin Inner dististyle elongate, the basal portion with conspicuous pale setae on outer portion, some very long; outer half a more nearly glabrous blade, the margin produced into three blackened spines, the most basal one largest. Gonapophysis, *g,* long, blackened, appearing as a strong horn that gradually narrows to the acute tip, its surface with abundant blackened spinulae; apical point in direct longitudinal alignment with the axis, not bent laterad as in *lucia.*

Holotype, ♂, Mountains west of Orangeville, Emery Co., near summit, 10,000 ft., September 6, 1945 *(G. F. Knowlton). Paratype,* ♂, Beaver Canyon, 7,200 ft., July 12, 1945 *(G. F. Knowlton).*

Named for Professor W. E. Peay, who has aided Professor Knowlton in collecting Utah Tipulidae. The most nearly related species include *Erioptera (Psiloconopa) bispinigera* Alexander, 1930, *E. (P.) lucia,* Alexander, 1914, and *E. (P.) microcellula* Alexander, 1914, all of which differ conspicuously in the structure of the male hypopygium. The single most nearly related species appears to be *lucia,* the hypopygium of which is shown for comparison (Fig. 54).

Erioptera (Psiloconopa) sinawava sp. nov.—Allied to *dorothea;* general coloration brownish gray, the praescutum with four relatively well-defined stripes; antennae (male) moderately long, dark brown throughout; halteres pale yellow; femora obscure yellow, the tips narrowly and weakly darkened; wings yellowish gray, conspicuously patterned with brown and brownish gray, the heaviest pattern being the costal series of markings; cell *1st* M_2 unspurred, *m* about one-half the basal section of M_3, vein *2nd A* almost straight; male hypopygium with each gonapophysis a massive structure, the outer half heavily blackened, the mesal face conspicuously toothed.

♂. Length, about 4.5-5 mm.; wing, 5-6 mm.

Rostrum grayish pruinose; palpi black. Antennae relatively long, dark brown throughout; flagellar segments long-cylindrical, with a dense erect white pubescence. Head brownish gray.

Pronotum obscure testaceous yellow. Mesonotum chiefly brownish gray, the praescutum with four relatively well-defined brown stripes, the humeral and lateral portions paling to obscure yellow; pseudosutural foveae extensive, pale reddish, little conspicuous against the ground; tuberculate pits black, lying on a transverse level with the foveae; posterior sclerites vaguely patterned

with obscure yellow, including the posterior portions of the scutal lobes and the caudal border of the scutellum; mediotergite and pleurotergite at the suture extensively yellowed. Pleura obscure yellow or buffy yellow, the ventral sclerites light gray, including the ventral sternopleurite, meron and metapleura. Halteres pale yellow. Legs with the coxae and trochanters light yellow; femora obscure yellow, the tips narrowly and weakly darkened; tibiae obscure yellow, the tips with the tarsi, more infuscated. Wings (Fig. 53) yellowish gray, conspicuously patterned with brown and brownish gray; the darker spots are costal in distribution, arranged as follows: Arculus; origin of *Rs; Sc_2;* cord; tip of R_1; marginal clouds at ends of all veins excepting R_5 and M_{1+2}; outer end of cell *1st* M_2; paler and less evident brownish gray washes, especially in the outer radial and anal cells; veins yellow, darkened in the patterned areas. Venation: *Rs* shorter than vein R_3; R_{2+3+4} subequal to or longer than R_{2+3}; cell *1st* M_2 moderately long, unspurred, *m* about one-half or less the basal section of M_3; Anal veins divergent, *2nd A* almost straight.

Abdomen brown or yellowish brown, more darkened laterally, the caudal borders of the segments narrowly yellow. Male hypopygium (Fig. 57) with the outer dististyle divided into broadly flattened blades, each with the outer margin darkened, the broad lower edge yellow; near notch of the blades with a further blackening that includes a strong spine. Inner dististyle large and fleshy, widened outwardly, provided with numerous setae, some very long. Gonapophysis, *g*, appearing as a massive structure, the outer half heavily blackened, the mesal face conspicuously toothed, the outermost denticles very small and appressed, the more basal ones fused into a flangelike mass.

Holotype, ♂, Zion National Park, Weeping Rock, 4,500 ft., June 21, 1942 *(C. P. Alexander). Paratopotypes,* 1 ♂, with type; 1 ♂, September 7, 1943 *(G. F. Knowlton).*

The specific name, *sinawava,* is that of a god of the Paiute Indians in southern Utah; compare "The Temple of Sinawava", in Zion National Park. Although generally similar to species such as *Erioptera (Psiloconopa) dorothea* Alexander, 1914, and *E. (P.) zukeli* Alexander, 1940, the present fly is entirely distinct in the structure of the male hypopygium. I had formerly recognized the subgenus *Ilisia* Rondani, 1856, as being sufficiently distinct from *Psiloconopa* Zetterstedt, 1838, but in the light of constant accessions of new species it does not seem advisable to try to maintain the two names as separate groups. Furthermore, *Hoplolabis* Osten Sacken, 1869 is similarly becoming more and more difficult to maintain and will probably have to be placed in the synonymy. As has been pointed out by Bergroth, Edwards, the present writer and others, it is almost impossible to define and keep separate the many groups that have been recognized in the Eriopteraria.

Erioptera (Psiloconopa) telfordi sp. nov.—General coloration yellow, restrictedly patterned with brown, including two narrow lines on the praescutal interspaces; antennae with scape and pedicel yellow, flagellum black; thoracic pleura not or scarcely patterned; femora brownish yellow, very gradually more darkened at tips; wings whitish subhyaline, unpatterned except for the slightly darker stigma; cell M_2 open by the atrophy of basal section of

M_3; *m-cu* at or just before the fork of *M;* Anal veins divergent, *2nd A* straight or evenly convex, the cell relatively narrow; abdominal segments with the posterior borders narrowly yellow.

♀. Length, about 5 mm.; wings, 5.2 mm.

Rostrum and palpi yellow. Antennae with scape and pedicel light yellow, flagellum black; antenna broken beyond the second flagellar segment. Head light yellow in front, darker yellow behind; vertex with a narrow dark brown median vitta.

Pronotum light brownish gray, narrowly light yellow on sides. Mesonotal praescutum light gray, the stripes differentiated only by conspicuous brown interspaces on the posterior half of sclerite, the anterior end of each terminating at the light brown pseudostural fovea; tuberculate pits black, on a transverse level with the fovea; scutal lobes light gray, the median region more testaceous; along mesal portion of each lobe with a short brown mark that is a direct continuation of the prescutal interspace; posterior portions of scutal lobes clear light yellow; posterior sclerites of notum testaceous yellow, weakly pruinose; mediotergite with cephalic half clearer yellow, the posterior part darkened; pleurotergite yellow. Pleura yellow, sparsely pruinose, unpatterned except for exceedingly vague darkenings on the ventral sternopleurite and meron. Halteres pale yellow. Legs with the coxae and trochanters pale yellow; femora brownish yellow, clearer yellow basally, passing very gradually into brown at the tips; tibiae light brown; tarsi passing into black. Wings (Fig. 52) whitish subhyaline, the stigma a trifle darker, very inconspicuous; no distinct pattern elsewhere on wing; veins pale brown, those in the prearcular and costal fields more yellowed. Venation: Sc_1 ending nearly opposite the fork of *Rs,* Sc_2 far from its tip, about opposite one-sixth the length of *Rs;* R_{2+3+4} about one-half longer than the basal section of R_5; vein R_3 gently sinuous; cell M_2 open by the atrophy of basal section of M_3; *m-cu* at or shortly before the fork of *M;* Anal veins strictly divergent, vein *2nd A* straight or evenly convex, the cell relatively narrow.

Abdominal tergites yellow, with indications of a darker central stripe, more extensive on the more proximal segments and as a subterminal suffusion; tergites five and six less evidently darkened; posterior borders of tergites conspicuously light yellow; sternites yellow, the posterior margins narrowly paler yellow.

Holotype, ♀, Lakota, Bear Lake, July 29, 1945 *(G. F. Knowlton).*

This species is named for Mr. P. E. Telford, associated with Professor Knowlton in the collection and study of the insect fauna of Utah. The nearest relative seems to be *Erioptera (Psiloconopa) neomexicana* Alexander, 1929, which differs in the details of coloration of body and appendages. It is believed that the discovery of the male sex will reveal further differences in the hypopygia.

Erioptera (Hoplolabis) armata Osten Sacken, 1859.—Brigham, June 17, 1938 *(Hardy & Stains);* Eden, June 29, 1943 *(K);* Henefer, along margins of Weber River, June 29, 1943 *(K),* August 30, 1943 *(K & Telford);* Kanesville, June 12, 1937 *(Hardy);* Kaysville, June 9, 1938 *(K & Hardy);* Layton,

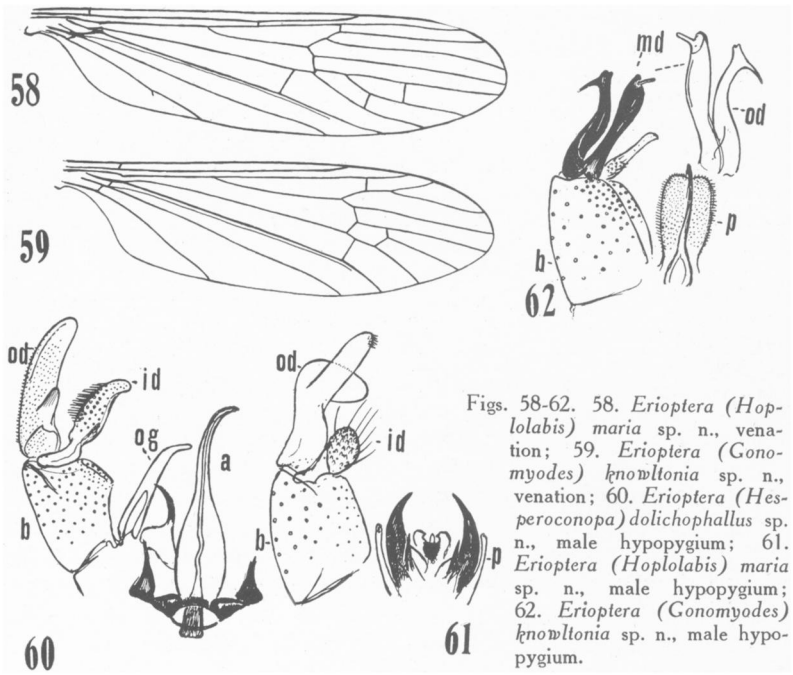
at light, May 25, 1939 *(K);* Nephi, August 14, 1943 *(K & Maddock);* Ogden, June 12, 1945 *(Harmston);* Spanish Fork, May 2, 1936 *(Hardy),* at light, June 9, 1938 *(K).*

Erioptera (Hoplolabis) maria sp. nov.—Allied to *bipartita;* mesonotal praescutum with the stripes confluent, covering the disk; wings restrictedly patterned with brown, the outer costal areas larger; cell *1st* M_2 completely divided by the spur on basal section of M_3; male hypopygium with the gonapophyses appearing as black, gently curved smooth horns, the tips acutely pointed, at base of each major apophysis with a small straight black spine.

♂. Length, about 4.5 mm.; wing, 5.5 mm.

Rostrum and palpi brownish black. Antennae with scape light brown, pedicel and basal three or four flagellar segments obscure yellow, the remainder brown; basal flagellar segments oval to long-oval, the outer ones more elongate. Head brownish gray.

Pronotum brownish gray, the posterior portion and the pretergites obscure yellow. Mesonotal praescutum with the disk brownish gray, the three usual stripes being confluent, the humeral and lateral portions obscure yellow; pseudosutural foveae dark reddish brown; scutum brownish gray, with a capillary blackish median vitta; posterior portions of scutal lobes restrictedly



Figs. 58-62. 58. *Erioptera (Hoplolabis) maria* sp. n., venation; 59. *Erioptera (Gonomyodes) knowltonia* sp. n., venation; 60. *Erioptera (Hesperoconopa) dolichophallus* sp. n., male hypopygium; 61. *Erioptera (Hoplolabis) maria* sp. n., male hypopygium; 62. *Erioptera (Gonomyodes) knowltonia* sp. n., male hypopygium.

(Symbols: *a*, aedeagus; *b*, basistyle; *id*, inner dististyle; *md*, intermediate dististyle; *od*, outer dististyle; *og*, outer gonapophysis; *p*, phallosome).

yellow; scutellum obscure yellow, vaguely more darkened at base; mediotergite brownish gray, the sides broadly yellow. Pleura and pleurotergite almost uniformly medium brown, with faint indications of a paler ventral stripe, most evident on the dorsal sternopleurite and meral region. Halteres with stem yellow, knob brown. Legs with the coxae and trochanters obscure yellow; outer segments passing into brownish black. Wings (Fig. 59) with the ground color grayish yellow, the prearcular region clearer yellow; a conspicuous brown pattern, arranged much as in *bipartita,* including a series of costal darkenings. those at cord, tip of R_{1+2} and R_3 larger and darker; cord and outer end of cell *1st* M_2 darker; smaller brown spots in most parts of wings, including *h,* origin of *Rs,* Sc_2, cell *C* above the origin of *Rs,* ends of longitudinal veins, and a series of small spots in cell Cu_1; elsewhere the veins and membrane more or less streaked longitudinally with paler brown, most evident in the centers of cells *R* and *1st A* and as seams along the outer radial veins; veins yellow, darker in the patterned portions. Venation: Much as in *bipartita;* cell *1st* M_2 completely divided by the spur from the basal section of M_3, forming cells *1st* M_2, *2nd* M_2 and *3rd* M_2; a short spur on vein *2nd A* at near two-thirds the length, jutting into cell *2nd A.*

Abdomen chiefly dark brown, subterminal segments and hypopygium a trifle paler. Male hypopygium (Fig. 61) with the outer dististyle, *od,* blackened, divided into two oval lobes, the inner one somewhat broader, the surface microscopically roughened by papillae in broken rows; outer arm at tip with several erect delicate setae. Inner dististyle, *id,* a short-oval pale lobe, provided with numerous setae, the stem glabrous. Phallosome, *p,* with the major apophysis appearing as a black, gently curved smooth horn, the tip acutely pointed; at its base with a small straight blackened spine.

Holotype, ♂, Rockville, May 5, 1943 *(G. F. Knowlton). Paratypes,* ♂♀. Beaver Canyon, Puffers Lake, July 20, 1936 *(D. Elmo Hardy);* Blacksmith Fork Canyon, June 12, 1938 *(D. Elmo Hardy);* Blanding, June 10, 1939 (collector unknown); Currant Creek, 7,200 ft., June 28, 1943 *(G. F. Knowlton);* Ferron Reservoir, September 1, 1945 *(Edmunds & Mulaik).*

This interesting crane-fly is named in honor of Mrs. Mary W. Knowlton, who has collected several interesting species of Tipulidae in Utah. The most similar species is *Erioptera (Hoplolabis) bipartita* Osten Sacken, 1877, of the Pacific States, which differs in the structure of the male hypopygium, particularly the gonapophyses. It may further be noted that certain species of the subgenus *Psiloconopa,* as *E. (P.) zukeli* Alexander, likewise have the general structure of the hypopygium much the same and serve to break down the supposed distinctions between these two subgenera.

Genus *Erioptera* Meigen; **Hesperoconopa,** subgenus nov.

Antennae short to moderate in length, 16-segmented; flagellar segments oval or with lower face slightly protuberant. Wings with Sc_2 atrophied or very faintly preserved, when present with vein Sc_1 unusually short, subequal to *r-m* or less; *Rs* long; R_{2+3+4} in longitudinal alignment with R_4, R_{2+2} perpendicular or subperpendicular at its origin; R_{1+2} elongate, exceeding R_{2+3+4}; inner ends of cells R_4, R_5, *1st* M_2 and M_4 in transverse alignment; cell M_2 open by the atrophy of *m;* Anal veins divergent. Male hypopygium

(Fig. 60) with both dististyles apical in position, the outer style bearing a conspicuous lobe or branch on face before midlength; surface of style with abundant microscopic setulae; inner style on outer surface with conspicuous erect or retrorse setae. Two pairs of gonapophyses, the outer pair narrowed to the tips, the inner pair acute or spatulate at apex.

Type of subgenus.—Erioptera (Hesperoconopa) aperta (Coquillett, 1905): Western Nearctic Region.

Other included species are **E. (H.) dolichophallus** sp. nov., *E. (H.) melanderi* Alexander, 1944; and *E. (H.) pilipennis* Alexander, 1918.

There can be no question of at least the subgeneric distinctness of the present group, which is well distinguished by the short vein Sc_1 and the basic plan of structure of the male hypopygium. All of the species that I have collected were found close to the margins of mountain streams and the larvae are presumably aquatic or subaquatic.

Erioptera (Hesperoconopa) aperta (Coquillett, 1905) *(mormon* Alexander, 1927).—Bear Lake, near Garden City, June 30, 1942; Logan Canyon, 5,500 ft., June 23, 1926 *(J. G. Needham),* types of *mormon;* Mt. Timpanogos, July 26, 1945 *(K).*

Erioptera (Hesperoconopa) dolichophallus sp. nov.—Size small (wing about 4 mm.); general coloration gray, the praescutum with a single blackish stripe; wings without trichia in cells or with these very restricted; male hypopygium with the inner dististyle narrow; inner gonapophysis a slender blackened rod, the tip acute; aedeagus elongate, extending far beyond the gonapophyses, the base conspicuously expanded.

♂. Length, about 3.7-3.8 mm.; wing, 4-4.2 mm.; antenna, about 1-1.1 mm.

♀. Length, about 5 mm.; wing, 4-4.2 mm.

Rostrum and palpi black. Antennae black throughout, moderately long; basal flagellar segments subcylindrical, the outer ones shorter, passing into oval. Head dark gray.

Pronotum brownish gray. Mesonotum plumbeous gray, the praescutum with a single broad blackish median stripe. Pleura gray. Halteres uniformly pale yellow. Legs with the coxae brownish yellow; trochanters clearer yellow; femora obscure yellow on basal third or slightly more, thence passing into brownish black; tibiae and tarsi black. Wings relatively narrow, with a grayish tinge, the stigma very poorly indicated; veins brown, those at base paler. Cells of wings without trichia or with these restricted to one or two scattered setae in the outer cells, especially R_3, *1st A* and *2nd A*. Venation: Sc_1 ending beyond the fork of *Rs*, Sc_2 a short distance from its tip, Sc_1 alone shorter than *r-m;* cell M_2 open by the atrophy of *m*.

Abdomen black, gray pruinose, with conspicuous erect pale setae; hypopygium light brown. Male hypopygium (Fig. 60) with the lateral lobule of the outer dististyle, *od,* relatively slender, broad-based. Inner dististyle, *id,* narrow, the inner margin not produced. Inner gonapophysis appearing as a slender blackened rod that narrows gradually to the acute point, the margin microscop-

ically roughened. Aedeagus, *a,* long, extending far beyond the gonapophyses, the base conspicuously expanded.

Holotype, ♂, Green Mountain Falls, Ute Pass, Colorado, 8,000 ft., June 26, 1934 *(C. P. Alexander). Allotopotype,* ♀. *Paratopotypes,* ♂♀; *paratypes,* ♂♀, Beaver, Utah, 8,000 ft., June 26, 1942 *(C. P. Alexander);* Kents Lake, Beaver Mt., July 12, 1945 *(G. F. Knowlton);* North Fork of Provo Canyon, Utah *(D. Elmo Hardy).*

Readily told from the related species listed above by the structure of the male hypopygium, particularly the pointed inner gonapophyses and the elongate aedeagus.

Genus *Erioptera* Meigen; **Gonomyodes** subgenus nov.

Characters as in *Gonempeda,* differing especially in the details of venation and structure of the male hypopygium. Wings (Fig. 59) with *Sc* long, Sc_1 ending beyond fork of *Rs,* Sc_2 faint but apparently only a short distance removed from the tip of Sc_1; cell R_3 *Gonomyia*-like, large and sprawly, its inner end acute, R_2 a little more than one-half R_{2+3}; *Rs* elongate, subequal in length to the distal section of R_5; cell *1st* M_2 closed, *m-cu* about one-third its length beyond the fork of *M;* Anal veins divergent. Male hypopygium (Fig. 62) with the basistyle, *b,* not produced at apex; three dististyles, *d,* all terminal in position, the outer two blackened, of peculiar shape, as figured, the outermost at apex produced into a long, slightly retrorse spine; intermediate style at apex produced into a cylindrical blackened peg; inner style only about one-half as long as the others, pale, more or less cultriform at tip, the bases with several long conspicuous setae. No well-defined apophyses unless these are represented by conspicuous hairy phallosomic cushions, *p,* on either side of the slender aedeagus.

Type of subgenus.—**Erioptera (Gonomyodes) knowltonia** sp. nov.: Western Nearctic Region.

Superficially, the present fly most resembles species of the subgenus *Gonempeda* Alexander, 1924, but from the structure of the male hypopygium it cannot be referred to this group, nor to the other allied subgenera, as *Cheilotrichia* Rossi, 1848, or *Empeda* Osten Sacken, 1869 *(Platytoma* Lioy, 1863).

Eriptera (Gonomyodes) knowltonia sp. nov.—General coloration brownish gray, the praescutum without clearly evident stripes; wings pale grayish, the stigma faintly darker; veins relatively pale and indistinct; Sc_2 faint but evident, only a short distance from the tip of Sc_1; cell R_3 *Gonomyia*-like, acutely pointed at inner end; cell *1st* M_2 closed, *m-cu* about one-third its length beyond the fork of *M;* male hypopygium with three dististyles, all terminal in position, the two outer styles blackened and of peculiar and distinctive conformation; phallosomic lobes densely hairy.

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

Rostrum brown; palpi darker brown. Antennae dark brown throughout; scape and pedicel large; verticils of flagellum exceeding the segments in length. Head gray.

Pronotum brownish gray; pretergites very pale yellow, conspicuous. Mesonotal praescutum brownish gray, without clearly evident stripes, pseudosutural foveae reddish, relatively large but scarcely evident against the ground; tuberculate pits black, placed about midway between the level of the cephalic praescutal border and the pseudosutural foveae, separated from one another by a distance about equal to their own diameter; posterior sclerites of notum brownish gray, the posterior portion of scutellum a little more testaceous. Pleura brownish gray, entirely without setae. Halteres with stem whitish, knob weakly darkened. Legs with the coxae pale testaceous brown; trochanters yellow; remainder of legs yellow, broken beyond the basitarsi. Wings (Fig. 59) with a pale grayish tinge, the stigma faintly darker; prearcular and costal fields a trifle more yellowed; veins pale, relatively inconspicuous against the ground. Macrotrichia on veins beyond cord and on distal ends of primary veins basad of cord, most nearly lacking on *1st A*. Venation: As given under the subgeneric diagnosis.

Abdomen pale brown, the hypopygium more yellowish. Male hypopygium (Fig. 62) as described under the subgenus.

Holotype, ♂, Mt. Nebo, August 14, 1943 *(G. F. Knowlton & D. R. Maddock)*.

I take very great pleasure in naming this very distinct fly for my good friend, Professor George F. Knowlton, to whom we owe in greatest part our present satisfactory knowledge of the Tipulidae of Utah. This small obscure fly is of exceptional interest. Superficially it much resembles species of the subgenus *Gonempeda*, such as *Erioptera (Gonempeda) burra* Alexander, 1924, and *E. (G.) yellowstonensis* Alexander, 1943, but is an entirely distinct type that cannot well be confused with any others in our fauna.

Erioptera (Empedomorpha) empedoides (Alexander, 1916).—Bluff, August 30, 1942 *(K & Peay)*; Green River, April 23, 1943 *(K & Wood)*; Hurricane, September 6, 1943 *(K)*; Moab, August 21, 1942 *(K & Peay)*; Rockville, under willow shade along the Virgin River, May 5, 1943 *(K)*; Spanish Fork, at light, June 9, 1938 *(K)*; Ten Mile, Escalante Desert, June 1936 *(Tanner)*; Woodside, in wet area along margin of Price River, June 14, 1945 *(K)*. A more detailed account of this interesting fly is given elsewhere (Amer. Midl. Nat., 35: 527-529; 1946).

Erioptera (Trimicra) pilipes (Fabricius, 1787).—Benjamin, June 21, 1945 *(K & Telford)*; Bloomington, June 28, 1945 *(K)*; Brigham, August 5, 1943 *(K)*; Callao, August 7, 1945 *(K)*; East Promontory, August 26, 1942 *(K)*; Leeds, August 8, 1942 *(K & Peay)*; Ogden, October 13, 1945 *(Harmston)*; St. George, May 18, 1944, June 28, 1945 *(K)*; Washington, May 18, 1944, June 27-28, 1945 *(K)*.

Erioptera (Symplecta) cana (Walker, 1848) *(hybrida* and *punctipennis* records in earlier literature).—American Fork, June 15, 1937 *(Hansen)*; Avon Canyon, July 24, 1942 *(K)*; Bear Lake, Ideal Beach, July 18, 1945 *(K)*; Bear River City, June 12, 1945 *(K)*; Beaver, May 16, 1945, June 27, 1945 *(K)*, July 11, 1945 *(K & Telford)*; Beaverdam, June 10, 1938 *(K)*, June 16,

1945 *(Telford);* Benjamin, June 21, 1945 *(K & Telford);* Benson, June 23, 1945 *(K & Nye),* July 5, 1943 *(K & Telford);* Bothwell, June 22, 1938 *(D. E. & A. T. Hardy);* Brigham, June 24, 1944 *(Wood);* Brigham Canyon, August 1, 1942 *(K);* Cache Junction, April 27, 1938 *(K & Hardy);* Callao, August 7, 1945 *(K);* Cedar City, May 28, 1938 *(K & Sargent);* Clarkston, April 8, 1938 *(K & Hardy);* Corinne, May 24, 1945 *(K);* Cornish, May 31, 1938 *(Hardy);* Cove, April 27, 1938 *(K & Hardy);* Draper, May 10, 1939 *(K);* Eden, June 4-8, 1938 *(K & Hardy);* Elberta, June 2, 1938 *(Hansen);* Fairfield, August 10, 1942 *(K & Peay);* Fish Springs, August 8, 1945 *(K);* Gandy, August 8, 1945 *(K);* Garfield, May 25, 1945 *(K);* Garland, June 10, 1938 *(K & Hardy);* Hatch, June 28, 1945 *(K),* August 9, 1942 *(K & Peay);* Huntington Canyon, September 1, 1945 *(Edmunds);* Huntsville, June 14, 1938 *(K & Stains);* Hurricane, September 7, 1943 *(K);* Hyde Park, June 4-13, 1938 *(Hardy & Stains);* Hyrum, June 6, 1938 *(Hardy);* Junction, June 28, 1945 *(K);* Kanab Canyon, May 5, 1943 *(K);* Kanesville, June 16, 1937 *(Hardy);* Koosharem, July 10, 1943 *(K & Telford);* Lehi, May 10, 1945 *(K);* Lewiston, April 7, 1938 *(K & Hardy);* Liberty, May 21-June 4, 1938 *(K & Harmston);* Loa, July 3, 1938 *(K & Harmston);* Logan, April 20-September 26, 1938 *(K & Hardy);* Logan Canyon, June 30, 1942, July 4, 1945 *(K),* August 7, 1938 *(Hardy);* Magna, June 30, 1945 *(K);* Midway, August 14, 1943 *(K & Maddock);* Mill Creek Canyon, June 24, 1938 *(K & Hardy);* Mt. Nebo, August 14, 1943 *(K & Maddock);* Nibley, July 28, 1938 *(K & Harmston);* Ogden, April 24, 1943 *(K & Maddock),* May 25, 1939 *(K),* June 12, 1945 *(Harmston);* Payson, April 22, May 8, 1938 *(K);* Pleasant Grove, June 22, 1937 *(K & Hansen);* Providence, July 28, 1938 *(K & Nye);* Richfield, June 28, 1945 *(K);* Richmond, June 17, 1938 *(K & Nye);* Roy, June 16, 1945 *(K);* St. George, May 22, 1919 (collector unknown); Salem, September 18-23, 1943 *(K);* Salt Lake City, June 10, 1945 *(Edmunds & Mulaik),* August 21--September 21, 1939 *(Rees);* Sardine Canyon, May 24, 1938 *(Hardy);* Scipio, May 31, 1945 *(K);* Slaterville, June 16, 1945 *(K);* Spanish Fork, June 8, 1938 *(K);* August 10-September 21, 1943 *(K);* Syracuse, June 10, 1938, July 16, 1939 *(K);* Mt. Timpanogos, July 26, 1945 *(K);* Tooele, August 22, 1937, on goldenrod *(Hansen);* Virgin, May 18, 1944 *(K);* Wellsville, June 14, 1938 *(Hardy & Stains),* August 10, 1938 *(K & Harmston);* Wolf Creek Pass, 9,400 ft., July 24, 1945 *(K),* Woodland, July 24, 1945 *(K);* Woodruf, July 24, 1943 *(K & Maddock);* Zion National Park, near Zion Lodge, May 5, 1943 *(K).*

Erioptera (Erioptera) septemtrionis Osten Sacken, 1859.— American Fork Canyon, July 26, 1945 *(K);* Bear Lake, Ideal Beach, August 13, 1939 *(K & Harmston);* Brigham, June 17, 1938 *(Hardy & Stains);* Eden, August 30, 1943 *(K & Telford) ;* Ephraim Canyon, near summit, September 6, 1945 *(K);* Garden City, August 10, 1939 *(K & Harmston),* August 21, 1942 *(K, Roberts & Wood);* Hayden, May 23, 1945 *(K & Harmston);* Heber, August 14, 1935 *(K & Maddock);* Honeyville, June 16, 1945 *(K);* Huntsville, August 21, 1942 *(K, Roberts & Wood);* Little Valley, near Vernon Creek, June 18, 1943 *(K);* Logan, at light, August 3-September 30, 1938 *(K, Hardy & Nye);* Logan Canyon, June 18, 1945 *(K),* June 30, 1942; Medon,

August 1, 1942 *(K);* Midway, August 14, 1943 *(K & Maddock);* Oakley, August 15, 1943 *(K & Maddock);* Ogden, June 12, 1945 *(Harmston);* Provo *(Hardy);* Soldiers Summit, September 16, 1943 *(K);* Mt. Timpanogos, Glacier Lake *(Hardy);* Wolf Creek Pass, near summit, July 24, 1945 *(K);* Woodland, July 24, 1945 *(K).*

Erioptera (Erioptera) villosa Osten Sacken, 1859 *(dilatata* Alexander, 1924).—Bear Lake, near Ideal Beach, July 18, 1945 *(K);* Beaver, July 11, 1945 *(K & Telford);* Kamar, July 24, 1945 *(K);* Laketown, July 12, 1938 *(K & Harmston);* Lakota, at meadow edge, July 24, 1943 *(K & Maddock);* Logan Canyon, June 9, 1943 *(Maddock);* Peoa, July 24, 1945 *(K);* Providence, July 2, 1943 *(Telford);* Provo, July 10, 1945 *(K & Telford).*

Erioptera (Mesocyphona) caloptera Say, 1823.—Glendale, July 9, 1943 *(K & Telford);* Leeds, June 27, 1945 *(K);* Washington, June 27, 1945 *(K).*

Erioptera (Mesocyphona) distincta Alexander, 1912.—Alton, June 28, 1945 *(K);* Amalga, May 30, 1944 *(K & Stoddard);* Bear River City, June 12, 1945 *(K);* Beaver, June 27, 1945 *(K),* July 11, 1945 *(K & Telford);* Brigham, May 27-June 17, 1938 *(Hardy & Stains);* Charleston, August 14, 1943 *(K & Maddock);* Duchesne River, west fork, July 24, 1945 *(K);* Echo, July 24, 1945 *(K);* Eden, June 29-August 30, 1943 *(K & Telford);* Ferron Reservoir, September 1, 1945 *(Edmunds & Mulaik);* Grover, August 20, 1939 *(K & Harmston);* Heber, August 14, 1943 *(K & Maddock);* Henefer, June 29, 1942, July 24, 1945 *(K);* Honeyville, June 16, 1945, July 31, 1942 *(K);* Hooper, September 3, 1937 *(Hardy);* Huntsville, June 9, 1938 *(K & Stains);* Hyde Park, June 11-13, 1938 *(Hardy & Stains);* Hyrum, June 6, 1938 *(Hardy);* Kamar, July 24, 1945 *(K);* Kanab, May 9, 1939 *(K & Stains);* Kanosh, June 27, 1945 *(K);* Kaysville, June 9, 1938 *(K & Hardy);* Lakota, July 24, 1943, July 29, 1945 *(K);* Leeds, August 8, 1942 *(K & Peay);* Leeton, July 25, 1945 *(K);* Logan, August 3, 1938 *(K & Hardy);* Logan Canyon, June 30, 1942; Mantua, August 1, 1942, September 4, 1943 *(K);* Midway, August 14, 1943 *(K & Maddock);* Moab, June 13, 1945, September 16, 1943 *(K);* Monte Cristo, August 12, 1943 *(K & Maddock);* Mt. Nebo, July 25, 1942, August 14, 1943 *(K);* Nephi, June 29, 1945, August 14, 1943 *(K);* Ogden, July 22, 1942 *(K);* Salt Lake City, April 14, 1934 *(Rees),* June 10, 1945 *(Edmunds & Mulaik),* June 13-August 21, 1939 *(Rees);* Smithfield, June 4, 1938 *(Hardy);* Spanish Fork, June 14-19, 1936 *(Hardy),* September 16-23, 1943 *(K);* Starr, June 29, 1945 *(K);* Three-Lakes, along Kanab Creek, August 9, 1942 *(K & Peay);* Mt. Timpanogos, July 26, 1945 *(K);* Wanship, August 15, 1943 *(K & Maddock);* Washington, June 27, 1945 *(K);* Wellsville, July 21, 1942 *(K);* Wolf Creek Canyon, 9,400 ft., July 24, 1945 *(K);* Zion National Park, Weeping Rock, June 21-22, 1942 *(M. M. Alexander),* July 9, 1943 *(K & Telford).*

Erioptera (Mesocyphona) dulcis Osten Sacken, 1877.—Logan Canyon, at light, July 23, 1945 *(K).*

Erioptera (Mesocyphona) eiseni Alexander, 1913.—Brigham Canyon, August 1, 1942 *(K);* Mantua, August 1, 1942 *(K);* Moab, September 15, 1943

(K); Provo, June 8, 1935 *(K & Nye),* August 3, 1945 *(K);* Salt Lake City, August 30, 1945 *(K);* Zion National Park, 4,500 ft., June 21-22, 1942, June 28, 1945 *(K).*

Molophilus (Molophilus) colonus Bergroth, 1888.—Allen Canyon, July 24, 1943 *(K & Maddock);* Alton, June 28, 1945 *(K);* Beaver, June 27, 1945 *(K),* July 11, 1945 *(K & Telford);* Brigham Canyon, September 4-13, 1943 *(K);* Clinton, May 26, 1939 *(K);* Coalville, July 24, 1945 *(K);* Devils Slide, Weber Canyon, July 24, 1945 *(K);* Echo, July 24, 1945 *(K);* Eden, June 23, 1938 *(Hardy & Stains),* June 29, 1943 *(K);* Garden City, August 5, 1939 *(K);* Henefer, June 29, 1943 *(K & Telford),* July 24, 1945 *(K);* Hoytsville, July 24, 1945 *(K);* Layton, May 25, 1939 *(K);* Logan, at light, July 26, 1938 *(K, Hardy & Stains);* Logan Canyon, June 30, 1942; Mantua, September 4, 1943 *(K);* Monte Cristo, August 12, 1943 *(K & Maddock);* Ogden Canyon, August 5, 1939 *(K);* Provo, June 5, 1944 *(K);* Salt Lake City, City Creek Canyon, June 30, 1945 *(K);* Soldiers Summit, June 25, 1943 *(K);* Spanish Fork, June 8, 1936 *(Hardy);* Wolf Creek Canyon, July 24, 1945 *(K);* Woodland, July 24, 1945 *(K);* Zion National Park, June 21-22, 1942.

Molophilus (Molophilus) harrisoni Alexander, 1945.—Devils Slide, Weber River, from grassy banks, June 29, 1943 *(K & Telford);* Echo, June 29, 1943 *(K & Telford),* July 24, 1945 *(K);* Henefer, June 29, 1943 *(K & Telford).*

Molophilus (Molophilus) perflaveolus Alexander, 1918—Logan Canyon, Lodge Forest Camp, 4,800 ft., June 30, 1942 *(M. M. Alexander).*

Molophilus (Molophilus) spiculatus Alexander, 1918.—American Fork Canyon, July 26, 1945 *(K);* Arches National Monument, September 16, 1943 *(K);* Beaver Canyon, Puffers Lake, June 6, 1936 *(Hardy);* Brigham, June 16, 1938 *(Hardy & Stains);* Brigham City, May 25, 1945 *(Harmston);* Eden, July 1, 1937 *(Hardy);* Fish Lake, July 10, 1943 *(K & Telford);* Hooper, August 9, 1937 *(Hardy);* Logan, July 17, 1938 *(Hardy);* Logan Canyon, 5,200 ft., June 30, 1942, Spring Hollow, August 5, 1943 *(Maddock);* Ogden, July 3, 1937 *(Hardy);* Provo *(Hardy);* Mt. Timpanogos, July 26, 1945 *(Harmston);* Wolf Creek Canyon, July 24, 1945 *(K).*