

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

Part II. Tipuloidea of Mountainous Western North Carolina

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In the present instalment I wish to discuss the fauna of the mountains of the extreme western portion of North Carolina, — "The Land of the Sky." The major part of the paper is based on collections made by myself in 1939 and 1940, as discussed later.

General Account

During the past several years many important collections of Tipulidae have been taken in western North Carolina, the results of some of which have been published. The chief source of information on these early collections is Brimley's "Insects of North Carolina, 1938,"² where 1 species of Tanyderidae, 3 of Ptychopteridae, 2 of Anisopodidae, 2 of Trichoceridae, and 174 Tipulidae (Limoniinae, 106; Cylindrotominae, 1; Tipulinae, 67) are included.

Besides the collections made by Mr. Brimley and co-workers in the North Carolina Department of Agriculture, the most important lots of material known to me include the following. William Beutenmuller made several trips to these mountains (collections of 1903 and 1906 in the American Museum of Natural History; collection of 1912, purchased by the late William G. Dietz, now preserved in the Dietz Collection, Academy of Natural Sciences, Philadelphia); these collections were made in the Black Mountains (Buncombe county) and include many unusual records. Very extensive series of Tipulidae made in various localities by Professor J. Speed Rogers, University of Florida, Gainesville. When finally determined and published, these rich series will unquestionably add many species to the state list as now known. Professor Rogers has estimated this list in the Tipuloidea to be close to 300 species and from the relatively small series taken by the present writer in 1939 and 1940, it is believed that even this figure will be exceeded and the list when finally completed will include between 350 and 400 species in this superfamily of flies. Collections made on Cedar Mountain and vicinity (Transylvania county) and the vicinity of Highlands (Macon county) by Dr. Henry K. Townes, now in the writer's collection through the generosity of Dr. Townes. Among smaller lots of specimens that deserve special mention should be included the Henry

¹ The preceding part under this general title was published in the American Midland Naturalist 24:602-644; 1940.

² References in the text refer to the bibliography at the conclusion of this general account.

K. Morrison material, now chiefly in the United States National Museum but including some very desirable species in the Cornell University collection (Lot No. 35); Dr. Roland Thaxter who collected several interesting species at Cullowhee (Jackson county) and Cranberry (Avery county) in conjunction with his studies on the Entomophthoraceae (Phycomycetes); Dr. Nathan Banks, along the north fork of the Swannanoa River in the Black Mountains (Buncombe county).

Collecting Stations.—A number of the stations where detailed collections were made in 1939 and 1940 deserve special discussion. The 1939 series were taken by the writer and Mrs. Alexander, aided by Mr. and Mrs. Walter H. Harrison, of Amherst, Massachusetts; in 1940, the materials were taken by Mrs. Alexander and myself.

Low Gap, Surry county. One especially rich locality was about five miles south of the village of Low Gap along the Parkway. This was on the east side of the road where a small stream shaded by a few low trees provided rich collecting. Deeper in the clearing is a cold spring and adjoining boggy area where several interesting species occurred. Labelled "Low Gap;" collections made June 1 and July 9, 1940.

Glen Park, Blowing Rock, Watauga county. Along trail to Glen Burney and Glen Mary Falls, a distance of nearly two miles. Around the falls the forest cover is white pine, northern hemlock, Fraser's magnolia, mountain laurel, mountain rose bay and others. The ground cover included much *Galax* and *Clintonia umbellata* (Michx.) Morong. Labelled "Blowing Rock;" collection June 2, 1940.

Grandfather Mountain, Caldwell county. Along a tram-road following a mountain stream up the mountain side for about one-sixth mile; altitude 4,000 ft. The exact station is a spur of Grandfather Mountain, on the Yonahlossee Highway about 10 miles southwest of Blowing Rock, in the extreme western point of Caldwell county, about equidistant between Watauga county on the north and Avery on the south. Labelled "Grandfather Mountain;" collections June 2, July 9, 1940.

Linville Falls, Burke county. These beautiful falls support an unusually rich Tipulid fauna, especially in a small lateral ravine immediately below the falls. In this gorge, densely shaded with northern hemlock and with undershrubs of *Rhododendron catawbiense* Michx., and *R. carolinianum* Rehd., numerous rare and some new species were secured. Labelled "Linville Falls;" altitude 3200 ft.; collections June 21, 1939, June 3 and July 9, 1940.

Mount Mitchell Game Refuge, Black Mountain Range, Pisgah National Forest, Yancey county. Collections made along Neals Creek, above the junction with Big Lost Cove Creek, and in this general vicinity; altitude 3,200-3,300 ft. From this as a base, collections were made throughout the Mount Mitchell section, including the Bald Knob Ranger Station, near Toe River Gap, altitude 5,200 ft., June 22, 1939, June 6, 1940; along the old Toll Road as far as Camp Alice, altitude 6,000 ft.; along the Mount Mitchell trail

between the Game Refuge to the summit of Mitchell (altitude 3,200 to 6,680 ft.); June 4-9, 1940.

It may be observed that conditions at high altitudes on Mount Mitchell are very different from those found at comparably high altitudes in the Great Smokies, as Mount Leconte. The latter has many low wet cliffs and mossy spring-fed areas along the trails, supporting certain very characteristic crane-flies, as, in June, *Dicranota (Eudicranota) catabiensis* Alexander, 1940, and *Limnophila cherokeensis* Alexander, 1940. On Mount Mitchell, the original forests have been largely removed through lumbering operations and fires, and the remaining restricted but dense forests of red spruce and Fraser's fir occur only along the narrow crests and summits or in other inaccessible places. The mountain trails, such as the one above Camp Alice (6,000 feet to summit) are unusually dry and various crane-flies were taken that have never been found in the Great Smokies, including *Limnophila globulifera* Alexander, 1941, *Ormosia (Ormosia) mitchellensis* sp. nov. and *O. (O.) subdentifera* sp. nov.

Highlands, in the Nantahala National Forest, Macon county. Collections made at and near Van Hook Glade, 3,800 ft.; along the Cullasaje River opposite the camp in Van Hook Glade, altitude 3,750 ft.; Ravenel's woods or the Primaeval Forest, a remarkable virgin forest, chiefly of northern hemlock, with dense and almost impenetrable thickets of *Rhododendron maximum* L., along the streams, altitude about 4,400 ft. (see Oosting and Billings, 1939).

Great Smokies, Swain county. Collections on the North Carolina side of the Smokies were made chiefly in the vicinity of Forney Ridge, including trips to Silers Bald, June 6, 1939, and to Andrews Bald, altitude 5,700-5,860 ft., June 11, 1939, June 18, 19 and 29, 1940. The trail to Andrews Bald from Forney Ridge (altitude about 6,300 ft.), a distance of only a little over a mile, provided splendid Tipulid collecting on June 18 and 19. Very numerous small streams cross the trail, some small but permanent, others temporary and resulting from unusually heavy recent rains. The small bog on Andrews Bald, where among other characteristic bog plants numerous sundews, *Drosera rotundifolia* L., occur, yielded several interesting species of crane-flies.

Smokemont. The public camp ground on the Carolina side of the Smokies. A small stream near the entrance to the public camp ground at Smokemont just as it flows into the Oconolufy River provided such rich crane-fly collecting that it was made the basis of special study on June 20 and 30, 1940. The stream is only about 300 feet in total length from the point of its emergence from the dense thickets in the nearby woods. It then flows through a small grassy field shaded by a few trees, including northern hemlock, white oak, tulip tree, sycamore and sourwood, with a sparse shrubbery of *Rhododendron maximum* and *Kalmia latifolia*. The herbage from which most of the Tipulidae were swept included brook saxifrage, *Rumex*, seedlings of *Impatiens biflora* Walt., grasses and sedges. The shallow stream is in places up to 3 feet in width and is cold and clear, babbling over riffles of stones and gravel; altitude 2,200 ft. Labelled "Smokemont."

At high altitudes in the Great Smokies, an unusually heavy snowfall and

correspondingly rigorous winter conditions are found. The Park Naturalist, Mr. Arthur Stupka, informs me that during the winter of 1939-40 at New-found Gap (altitude 5,000 ft.) the snowfall totalled about 100 inches.

Emendations to the Brimley (1938) List of Tipulidae

The Brimley list is of the very greatest value in bringing together the numerous scattered records that were available to the time of its appearance (1938). It is somewhat unfortunate that the final manuscript for the Tipulidae was not reviewed critically before publication by a special student of the group. As a result of this failure there are a small number of duplicated records where a single species is included under different names, and furthermore, the arrangement of the species in certain genera, especially *Limnophila* Macquart, is far too comprehensive according to our most recent beliefs. I am briefly listing the species of Tipulidae in accordance with this suggested arrangement and at its conclusion have made certain comments concerning synonymy and evidently erroneous records. To this corrected basic list of North Carolina Tipuloidea I am later in the present paper adding 85 species, bringing the nominal reported list for the state to 267 species.

Tipulinae.

- Longurio minimus* Alexander, 1914.
Longurio testaceus Loew, 1869.
Tanyptera frontalis (Osten Sacken, 1864).
Tanyptera fumipennis (Osten Sacken, 1864).
Tanyptera topazina (Osten Sacken, 1864).
Nephrotoma beutenmulleri (Dietz, 1918).
Nephrotoma cornifera (Dietz, 1918).
Nephrotoma costomarginata (Dietz, 1918).
Nephrotoma eucera (Loew, 1863).
Nephrotoma ferruginea (Fabricius, 1805).
Nephrotoma festina (Dietz, 1918).
Nephrotoma incurva (Loew, 1863).
Nephrotoma lugens (Loew, 1864).
Nephrotoma macrocera (Say, 1823).
Nephrotoma montana (Dietz, 1918).
Nephrotoma okesenoke Alexander, 1912.
Nephrotoma polymera (Loew, 1863).
Nephrotoma sodalis (Loew, 1864).
Nephrotoma stigmatica (Dietz, 1918).
Nephrotoma suturalis (Loew, 1863).
Nephrotoma tenuis (Loew, 1863).
Nephrotoma urocera (Dietz, 1918).
Nephrotoma virescens (Loew, 1864).
Nephrotoma xanthostigma (Loew, 1864).
Tipula (Trichotipula) oropezoides Johnson, 1909.
Tipula (Trichotipula) unifasciata (Loew, 1863).
Tipula (Nippotipula) abdominalis (Say, 1823).
Tipula (Nobilitipula) collaris Say, 1823 (as *Nephrotoma*).
- Tipula (Yamatotipula) aprilina* Alexander, 1918.
Tipula (Yamatotipula) caloptera Loew, 1863.
Tipula (Yamatotipula) calopteroides Alexander, 1919 (includes *antiopa* Dietz, 1921).
Tipula (Yamatotipula) conspicua Dietz, 1917.
Tipula (Yamatotipula) dejecta Walker, 1856 (*fumosa* Doane, 1901).
Tipula (Yamatotipula) fraterna Loew, 1864.
Tipula (Yamatotipula) furca Walker, 1848 (*bella* Loew, 1863).
Tipula (Yamatotipula) jacobus Alexander, 1930 (*perlongipes* Johnson, 1909, erroneous).
Tipula (Yamatotipula) sayi Alexander, 1911.
Tipula (Yamatotipula) tephrocephala Loew, 1864.
Tipula (Yamatotipula) tricolor Fabricius, 1794.
Tipula (Tipula) cunctans Say, 1834.
Tipula (Tipula) ultima Alexander, 1915.
Tipula (Schummelia) annulicornis Say, 1829 (*jejuna* Johnson, 1909).
Tipula (Schummelia) hermannia Alexander, 1915 (*fasciata* Loew, 1863).
Tipula (Vestiplex) caroliniana Alexander, 1916.
Tipula (Oreomyza) entomophthorae Alexander, 1918 (includes *similissima* Dietz, 1921).

- Tipula (Oreomyza) borealis* Walker, 1848 (*hebes* Loew, 1863).
Tipula (Oreomyza) senega Alexander, 1915.
Tipula (Oreomyza) trivittata Say, 1823.
Tipula (Lunatipula) apicalis Loew, 1863.
Tipula (Lunatipula) australis Doane, 1901.
Tipula (Lunatipula) catawba Alexander, 1915.
Tipula (Lunatipula) dietziana Alexander, 1915.
Tipula (Lunatipula) duplex Walker, 1848 (*cinctocornis* Doane, 1901, *mingwe* Alexander, 1915).
Tipula (Lunatipula) fuliginosa (Say, 1823) (*speciosa* Loew, 1863).
Tipula (Lunatipula) submaculata Loew, 1863.
Tipula (Lunatipula) triton Alexander, 1915.
Tipula (Lunatipula) triplex Walker, 1848 (*umbrosa* Loew, 1863, records).
Tipula (Lunatipula) translucida Doane, 1901 (*devia* Dietz, 1919).
Tipula (Lunatipula) tuscarora Alexander, 1915.
Tipula (Lunatipula) valida Loew, 1863.
Brachypremna dispellens (Walker, 1860).
Dolichozeza (Oropeza) carolus Alexander, 1940 (*albipes* Johnson, 1909).
Dolichozeza (Oropeza) obscura (Johnson, 1909).
Dolichozeza (Oropeza) sayi (Johnson, 1909); as *annulata* Say, 1823.
Dolichozeza (Oropeza) subalbipes (Johnson, 1909).
- Cylindrotominae
- Liogma nodicornis nodicornis* (Osten Sacken, 1865).
- Limoniinae
- Limoniini
- Limonia (Limonia) cinctipes* (Say, 1823).
Limonia (Limonia) fallax (Johnson, 1909).
Limonia (Limonia) parietina (Osten Sacken, 1869).
Limonia (Limonia) immatura (Osten Sacken, 1859).
Limonia (Limonia) indigena (Osten Sacken, 1859).
Limonia (Limonia) parietina (Osten Sacken, 1861).
Limonia (Limonia) rara (Osten Sacken, 1869).
Limonia (Limonia) triocellata (Osten Sacken, 1859).
Limonia (Limonia) tristigma (Osten Sacken, 1859).
- Limonia (Discobola) annulata* (Linnaeus, 1758) (*argus* Say, 1824).
Limonia (Dicranomyia) haeretica (Osten Sacken, 1859).
Limonia (Dicranomyia) immodesta (Osten Sacken, 1859).
Limonia (Dicranomyia) liberta (Osten Sacken, 1859).
Limonia (Dicranomyia) pudica (Osten Sacken, 1859).
Limonia (Geranomyia) canadensis (Westwood, 1835).
Limonia (Geranomyia) rostrata (Say, 1823).
Limonia (Rhipidia) bryanti (Johnson, 1909).
Limonia (Rhipidia) domestica (Osten Sacken, 1859).
Limonia (Rhipidia) maculata (Meigen, 1818).
Limonia (Rhipidia) shannoni (Alexander, 1914).
Helius (Helius) flavipes (Macquart, 1855).
Antocha (Antocha) opalizans Osten Sacken, 1859.
Dicranoptycha germana Osten Sacken, 1859.
Dicranoptycha nigripes Osten Sacken, 1859.
Dicranoptycha sobrina Osten Sacken, 1859.
Dicranoptycha winnemana Alexander, 1916.
- Pediicini
- Pedicia (Pedicia) albivitta* Walker, 1848.
Pedicia (Pedicia) contermina Walker, 1848.
Pedicia (Tricyphona) calcar (Osten Sacken, 1859).
Pedicia (Tricyphona) inconstans (Osten Sacken, 1859).
Pedicia (Tricyphona) vernalis (Osten Sacken, 1861).
Dicranota (Dicranota) divaricata Alexander, 1925.
- Hexatomini
- Epiphragma (Epiphragma) fascipennis* (Say, 1823).
Epiphragma (Epiphragma) solatrix (Osten Sacken, 1859).
Prolimnophila areolata (Osten Sacken, 1859); as *Limnophila*.
Polymera (Polymera) georgiae Alexander, 1911.
Pseudolimnophila contempta (Osten Sacken, 1869) (*nigripleura* Alexander & Leonard, 1914); as *Limnophila*.

- Pseudolimmiphila inornata* (Osten Sacken, 1869); as *Limmiphila*.
- Pseudolimmiphila luteipennis* (Osten Sacken, 1859); as *Limmiphila*.
- Pseudolimmiphila noveboracensis* (Alexander, 1911); as *Limmiphila*.
- Austrolimmiphila toxoneura* (Osten Sacken, 1859); as *Limmiphila*.
- Dactylolabis cubitalis* (Osten Sacken, 1869); as *Limmiphila*.
- Limmiphila (Lasiomastix) macrocera* (Say, 1823).
- Limmiphila (Elacophila) aprilina* Osten Sacken, 1859.
- Limmiphila (Elacophila) vernata* Alexander, 1927.
- Limmiphila (Trichephelia) seticellula* Alexander, 1938.
- Limmiphila (Dicranophragma) fuscovaria* Osten Sacken, 1859.
- Limmiphila (Eutonia) alleni* Johnson, 1909.
- Limmiphila (Eutonia) marchandi* Alexander, 1916.
- Limmiphila (Prionolabis) munda* Osten Sacken, 1869.
- Limmiphila (Prionolabis) rufibasis* Osten Sacken, 1859.
- Limmiphila (Prionolabis) simplex* Alexander, 1911.
- Limmiphila (Phylidorea) adusta* Osten Sacken, 1859.
- Limmiphila (Phylidorea) consimilis* Dietz, 1921.
- Limmiphila (Phylidorea) lutea* Doane, 1900.
- Limmiphila (Phylidorea) novae-angliae* Alexander, 1914.
- Limmiphila brevifurca* Osten Sacken, 1859.
- Limmiphila irrorata* Johnson, 1909.
- Limmiphila niveitarsis* Osten Sacken, 1869.
- Pilaria quadrata* (Osten Sacken, 1859); as *Limmiphila*.
- Pilaria recondita* (Osten Sacken, 1869); as *Limmiphila*.
- Pilaria stanwoodae* (Alexander, 1914); as *Limmiphila*.
- Pilaria tenuipes* (Say, 1823); as *Limmiphila*.
- Ulomorpha pilosella* (Osten Sacken, 1859).
- Shannonomyia lenta* (Osten Sacken, 1859); as *Limmiphila*.
- Hexatoma (Eriocera) albitarsis* (Osten Sacken, 1869); as *Penthoptera*.
- Hexatoma (Eriocera) aurata* (Doane, 1900).
- Hexatoma (Eriocera) fuliginosa* (Osten Sacken, 1859).
- Hexatoma (Eriocera) tristis* (Alexander, 1914).
- Hexatoma (Eriocera) wilsoni* (Osten Sacken, 1869).
- Elephantomyia (Elephantomyia) westwoodi* Osten Sacken, 1869.
- Atarba picticornis* Osten Sacken, 1869.

Eriopterini

- Neolimmiphila ultima* (Osten Sacken, 1859); as *Limmiphila*.
- Cladura (Cladura) flavoferruginea* Osten Sacken, 1859.
- Lipsothrix sylvia* (Alexander, 1916).
- Gnophomyia (Gnophomyia) lucluosa* Osten Sacken, 1859.
- Gnophomyia (Gnophomyia) tristissima* Osten Sacken, 1859.
- Gonomyia (Lipophleps) alexanderi* (Johnson, 1912).
- Gonomyia (Lipophleps) manca* Osten Sacken, 1869.
- Gonomyia (Lipophleps) sulphurella* Osten Sacken, 1859.
- Gonomyia (Gonomyia) cognatella* Osten Sacken, 1859.
- Gonomyia (Gonomyia) subcinerea* Osten Sacken, 1859.
- Gonomyia (Gonomyia) taeniata* Alexander, 1927.
- Teucholabis (Teucholabis) complexa* Osten Sacken, 1859.
- Rhabdomastix (Sacandaga) brachyneura* Alexander, 1933.
- Ormosia (Ormosia) brevicarata* Alexander, 1929.
- Ormosia (Ormosia) carolinensis* Alexander, 1925.
- Ormosia (Ormosia) holotricha* (Osten Sacken, 1859).
- Ormosia (Ormosia) innocens* (Osten Sacken, 1869).
- Ormosia (Ormosia) monticola* (Osten Sacken, 1869).
- Ormosia (Ormosia) nigripila* (Osten Sacken, 1869).
- Ormosia (Ormosia) pygmaca* (Alexander, 1912) (*pilosa* Dietz, 1916).
- Ormosia (Ormosia) townesi* Alexander, 1933.
- Erioptera (Erioptera) chrysocoma* Osten Sacken, 1859.
- Erioptera (Erioptera) furcifer* Alexander, 1919.
- Erioptera (Erioptera) septemtrionis* Osten Sacken, 1859.

- Erioptera (Erioptera) villosa* Osten Sacken, 1859.
- Erioptera (Symplecta) cana* (Walker, 1848) (*hybrida* Meigen, 1804, of American authors).
- Erioptera (Hoplolabis) armata* Osten Sacken, 1859.
- Erioptera (Ilisia) venusta* Osten Sacken, 1859.
- Erioptera (Mesocyphona) caloptera* Say, 1823.
- Erioptera (Mesocyphona) needhami* Alexander, 1918.
- Erioptera (Mesocyphona) parva* Osten Sacken, 1859.
- Molophilus (Molophilus) hirtipennis* (Osten Sacken, 1859).
- Molophilus (Molophilus) pubipennis* (Osten Sacken, 1859).
- Cryptolabis (Cryptolabis) paradoxa* Osten Sacken, 1859.

COMMENTS ON BRIMLEY LIST

Tanyptera spp. It seems probable that the three names, *frontalis*, *fumipennis* and *topazina*, pertain to a single species, *fumipennis* having the priority. Evidence that this is the case is slowly accumulating and is somewhat borne out by the present records, all three supposed species having been taken at Linville Falls in June.

Nephrotoma spp. Professor J. Speed Rogers has studied the types of the numerous species described by Dietz (1918), now preserved in the Academy of Natural Sciences, Philadelphia. I am privileged to cite his opinions concerning certain of the doubtful species:

Nephrotoma beutenmulleri (Dietz)—apparently a variant of *ferruginea* (Fabricius).

Nephrotoma costumarginata (Dietz)—male of *suturalis*; at most a race of *ferruginea* (Fabricius).

Nephrotoma festina (Dietz)—equals *gracilicornis* (Loew, 1864).

Nephrotoma montana (Dietz)—apparently a paler than average *incurva* (Loew).

Nephrotoma stigmatica (Dietz)—either *brevioricornis* (Doane, 1908) or very close to it.

Tipula spp. *Tipula antiopa* Dietz and *T. calopteroides* Alexander, synonyms; *Tipula similissima* Dietz and *T. entomophthorae* Alexander, synonyms; records duplicated.

Limnophila spp. *Limnophila (Phylidorea) lutea* Doane; record may pertain to *L. (P.) stupkai* Alexander, 1940.

Limnophila niveitarsis Osten Sacken—record may be incorrect; two other closely allied species of this group occur in the state (*cherokeensis* Alexander, 1940; *globulifera* Alexander, 1941) and I have never seen the true *niveitarsis* from this far south.

Erioptera (Erioptera) villosa Osten Sacken — Record very doubtful and improbable; species northern in distribution, in the western mountains ranging as far to the south as Utah.

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Systematic Account

TANYDERIDAE

Protoplasa fitchii Osten Sacken, 1859.³ — Mount Mitchell Game Refuge, 3,200 ft., June 4 and 8, 1940; flying along Neals Creek at evening, in company with *Limnophila (Elaeophila) aprilina* Osten Sacken, 1859. Black Mountains, May 21 (*Beutenmuller*); Canton, Haywood county, June 1910 (*Franklin Sherman, Jr.*).

PTYCHOPTERIDAE

Ptychoptera rufocincta Osten Sacken, 1859. — Black Mountains, June 1, 1906 (*Beutenmuller*).

Bittacomorphella jonesi (Johnson, 1905). — Low Gap, in boggy area, July 9, 1940; Linville Falls, at spring, June 21, 1939, June 3 and July 9, 1940; Van Hook Glade, swale, 3,600 ft., June 11-13, 1940, associated with next species.

Bittacomorpha clavipes (Fabricius, 1781). — Low Gap, June 1, 1940; Van Hook Glade, swale, 3,600 ft., June 11-13, 1940; Fish-hatchery at Kephart Prong, Smokies, 3,200 ft., June 20, 1940.

TIPULIDAE

TIPULINAE

Longurio minimus Alexander, 1914. — Andrews Bald, bog, 5,860 ft., June 11, 1939.

Longurio testaceus Loew, 1869. — Black Mountains, May 28-June 2, 1912; Andrews Bald, 5,800 ft., June 23, 1940 (*Stupka*); Smokemont, 2,200 ft., June 30, 1940.

Tanyptera frontalis (Osten Sacken, 1864). — Conestee Falls, June 12, 1940.

³ 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.

Nephrotoma calinota (Dietz, 1918). — Along Cullasaje River, near Highlands, 3,750 ft., June 14, 1940.

Nephrotoma ferruginea (Fabricius, 1805). — Low Gap, June 1, 1940; Linville Falls, June 3, 1940; Mount Mitchell Game Refuge, 3,200 ft., June 4, 1940; Cliffside Lake, Highlands, 4,000 ft., June 11, 1940.

Nephrotoma macrocera (Say, 1823). — Carolina Hemlocks Campground, near Busick, Yancey county, 2,800 ft., June 21, 1939, among open stands of *Tsuga caroliniana* Engelm.; Ravenels woods, 4,400 ft., June 15, 1940; Van Hook Glade, Highlands, 3,800 ft., June 11, 1940.

Nephrotoma incurva (Loew, 1863). — Linville Falls, 3,100-3,200 ft., July 8-9, 1940.

Nephrotoma tenuis (Loew, 1863). — Black Mountains, 2,000 ft., May 23-June 23, 1912 (*Beutenmuller*).

Nephrotoma virescens (Loew, 1864). — Linville Falls, 3,200 ft., July 7, 1940; Carolina Hemlocks Campground (see under *N. macrocera*), June 22, 1939; Van Hook Glade, Highlands, 3,800 ft., June 13, 1940; ovipositing in relatively dry soil in white pine woods.

Tipula (Trichotipula) oropozoides Johnson, 1909. — Low Gap, June 1, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Mount Mitchell Game Refuge, June 4, 1940; above Toe River Gap to Camp Alice, 4,500-6,000 ft., June 7, 1940; Highlands, Ravenels woods, 4,400 ft., June 15, 1940, Cliffside Lake, 4,000 ft., June 11, 1940; Andrews Bald, 5,700-5,800 ft., June 11, 1939.

Tipula (Nippotipula) abdominalis (Say, 1823). — Blowing Rock, 3,600 ft., (*Wilcox*), in Johnson collection; Black Mountains, August 23, 1906 (*Beutenmuller*); Highlands, September 1906 (*R. S. Woglum*); Deep Creek, September 13, 1934 (*R. J. Fleetwood*), in National Park Collection.

Tipula (Nobilitipula) collaris (Say, 1823). — Sunburst, Haywood county, 3,500 ft., May 1912; Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 21, 1939, June 3, 1940; Mount Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939, June 6, 1940; Camp Alice, 6,000 ft., June 8, 1940; Nantahala Gorge, June 8, 1939; Andrews Bald, bog margin, 5,700 ft., June 11, 1939.

Tipula (Nobilitipula) nobilis (Loew, 1864). — Highlands, Van Hook Glade, 3,800 ft., June 11, 1940. Occurred along crystal-clear streams flowing beneath dense covers of *Rhododendron* and Mountain Laurel; forest cover chiefly northern hemlock and white pine, with some hardwoods.

Tipula (Yamatotipula) brevifurcata Alexander, 1926. — Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Conestee Falls, June 12, 1940; Nantahala Gorge, June 8, 1939; Smokemont, along Hughes Ridge trail, 2,500 ft., along small mountain stream, June 20, 1940.

Tipula (Yamatotipula) caloptera Loew, 1863. — Conestee Falls, June 12, 1940.

Tipula (Yamatotipula) catawbiana Alexander, 1940. — Mitchell, above Toe River Gap, 5,500 ft., June 6, 1940, along small mountain streams over springy banks or low cliffs carpeted with *Houstonia serpyllifolia* Michx.; Camp

Alice, 6,000 ft., along small lateral streamlets, June 7, 1940; Forney Ridge trail to Andrews Bald, Smokies, 6,000-6,100 ft., June 18, 1940, along small lateral streamlets crossing the trail.

Tipula (Yamatotipula) cayuga Alexander, 1915. — Mitchell, Game Refuge, 3,250 ft., June 22, 1939, Bald Knob Ranger Station, 5,200 ft., June 6, 1940, Camp Alice, 6,000 ft., June 7, 1940; Highlands, Van Hook Glade, 3,800 ft., June 14, 1940; Smokemont, 2,200-2,500 ft., June 20-30, 1940.

Tipula (Yamatotipula) fraterna Loew, 1864. — Highlands, along Cullasaje River, 3,750 ft., June 14, 1940. These specimens and associated species of Tipulidae were taken along the sandy banks of the river, swept from beds of scanty herbage consisting of *Zanthorhiza apiifolia* L'Her., Clematis, dwarf willows and azaleas, and other plants, close to water; on the nearby higher banks occur white pine, northern hemlock, oak and dense thickets or hobbles of *Rhododendron maximum* and *Leucothoë Catesbaei*. From such a habitat several rare species were taken that are discussed throughout the present report.

Tipula (Yamatotipula) iroquois Alexander, 1915. — Grandfather Mt., 4,000 ft., June 2, 1940, along a major mountain stream; Mitchell, Camp Alice, 6,000-6,200 ft., along Lower Creek, June 7, 1940; along Setrock Creek, in *Rhododendron* thickets, 5,000 ft., June 7, 1940.

Tipula (Yamatotipula) nephophila Alexander, 1940. — Linville Falls, 3,200 ft., June 3, 1940. One male in a spider's web on wet cliffs below falls. Later a few more specimens taken, fluttering about these cliffs where the only waters are the tiny trickles down the rock faces and the saturated moss cushions. This is about the minimum amount of water required by any of the members of the *iroquois* group (see also *brevifurcata*, *catambiana* and *iroquois*). At Linville, the species was directly associated with *Dicranota (Eudicranota) yonahlossee* Alexander.

Tipula (Yamatotipula) strepens Loew, 1863. — Linville Falls, 3,300 ft., June 3, 1940.

Tipula (Yamatotipula) tephrocephala Loew, 1864. — Linville Falls, 3,300 ft., June 3, 1940; Van Hook Glade, Highlands, 3,800 ft., June 15, 1940; Smokies, Andrews Bald, bog, 5,700-5,900 ft., June 11, 1939; June 18, 1940.

Tipula (Schummelia) stenorhabda sp. nov. — Allied to *hermannia*; general coloration gray, conspicuously patterned with dark brown or brownish black, including four very distinct praescutal stripes; pleura black, striped longitudinally with yellow; femora yellow, the tips rather narrowly brownish black; wings yellow, heavily patterned with brownish gray; abdomen yellow, heavily patterned with black; male hypopygium with the tergal blade narrow, the subtending spines virtually lacking; outer dististyle unusually narrow, pointed at apex, the greatest width about one-third the length; outer dististyle with outer arm unusually long and narrow.

♂. Length, about 10 mm.; wing, 11 mm.; antenna, about 6.5 mm.

Frontal prolongation of head brownish black; nasus distinct; palpi black, the incisures pale; terminal segment obscure yellow. Antennae (male) elongate, approximately two-thirds the length of body; scape yellow, more or less

darkened at either end; pedicel yellow; flagellum bicolored, the basal swelling black, the petiole of the more proximal segments yellow, becoming more obscured on outer segments; distal segments more uniform brownish black. Head gray.

Mesonotum gray, the praescutum with four very conspicuous dark brown stripes, the intermediate pair slightly paler and obliterated on anterior fourth; lateral stripes almost black, very conspicuous; scutum dark gray, each lobe variegated with two conspicuous brown markings; scutellum dark brownish gray, parascutella black; mediotergite brownish gray, pleurotergite dark brown, its katapleurotergite conspicuously pale. Pleura black, striped longitudinally with yellow, including the dorsopleural region; a broad stripe from the propleura across the dorsal sternopleurite, ventral pteropleurite, onto the pleurotergite; ventral sternopleurite and meron darkened, the dorsal meron and metapleura pale. Halteres with stem and apex of knob yellow, base of knob dark brown. Legs with coxae pale, the posterior pair conspicuously dark brown basally; trochanters yellow; femora obscure yellow, the tips rather narrowly brownish black, the degree subequal on all legs; tibiae and tarsi yellowish brown, the terminal tarsal segments black. Wings with the ground color yellow, heavily and conspicuously patterned with brownish gray, the pattern as in *hermannia* but even more accentuated, including major clouds in cells *M* to *2nd A* at the basal third of wing.

Abdomen with tergites yellow, conspicuously patterned with black, including darkened apical rings and more narrow basal darkenings; subterminal segments more uniformly blackened; basal sternites and hypopygium yellow. Male hypopygium (Figs. 2, 3) with the blade of tergite not expanded apically as in *hermannia*, the surface microscopically roughened; subtending spines very reduced to virtually lacking. (In figures of *stenorhabda*, *hermannia* and *friendi*, ninth tergites, *9t*, are all shown as mounted on slides, viewed dorsally but with the apical blade flattened to show something of its extent; note the widely dilated apex of the blade in *hermannia*, Fig. 4). Outer dististyle, *od*, unusually narrow, pointed at apex, the greatest width about one-third the total length; in *hermannia*, about one-half the total length. Inner dististyle, *id*, with the outer arm unusually long and narrow, the small head and outer margin of stem heavily blackened.

Holotype, ♂, Smokemont, Great Smokies, North Carolina, altitude 2,200 ft., along small stream described earlier in this report; June 30, 1940 (*C. P. Alexander*).

The three allied species of the *hermannia* group in eastern North America are most readily distinguished by the details of structure of the male hypopygium. — *stenorhabda* sp. nov., Figs. 2, 3; *hermannia* Alexander, Figs. 4, 5; *friendi* sp. nov., Figs. 6, 7. The distinctions between these species are shown by the following key:

1. Apical portion of blade of ninth tergite conspicuously dilated and compressed. *hermannia* Alexander
- Apical portion of blade of ninth tergite not or scarcely dilated. 2

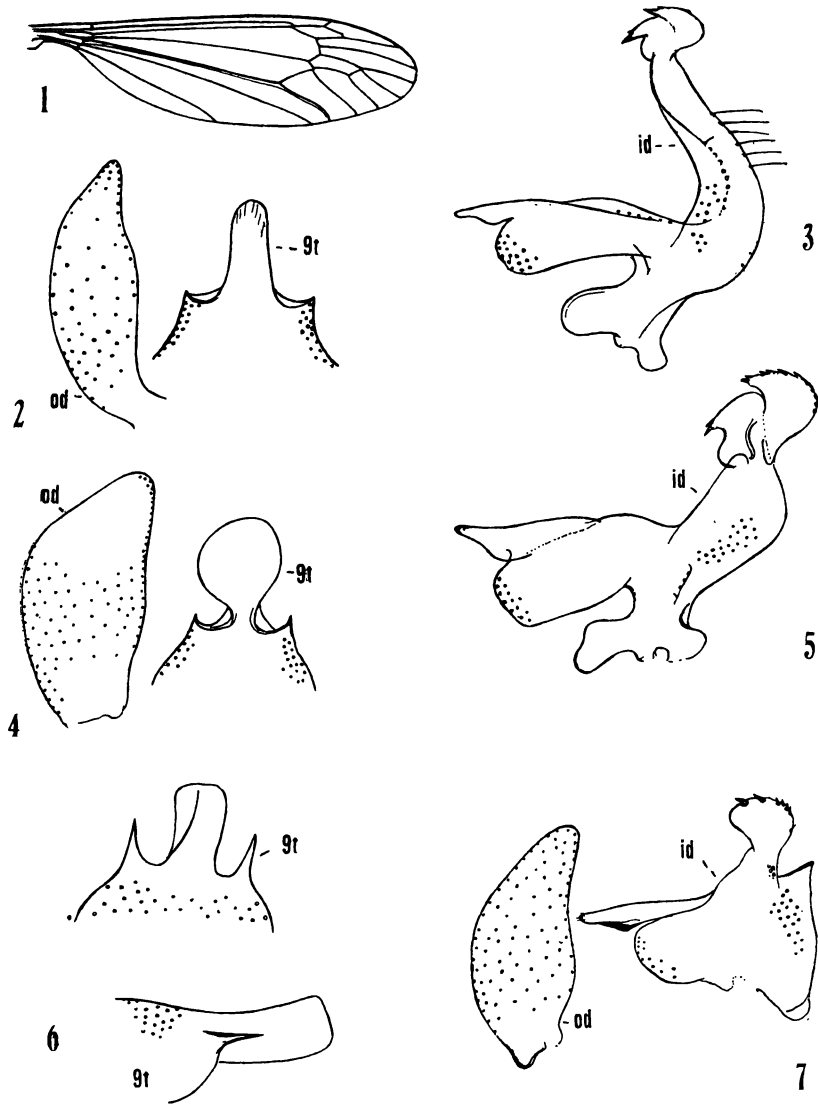


Fig. 1. *Dolichopeza (Oropeza) sessilis* sp.n.; venation. Figs. 2, 3. *Tipula (Schummelia) stenorhabda* sp.n.; male hypopygium. Figs. 4, 5. *Tipula (Schummelia) hermannia* Alexander; male hypopygium. Figs. 6, 7. *Tipula (Schummelia) friendi* sp.n.; male hypopygium. (Symbols: id, inner dististyle; od, outer dististyle; t, 9th tergite.)

2. Outer lobe of inner dististyle unusually long and narrow, the head correspondingly small; ninth tergite with the subtending spines lacking or very reduced.

.....*stenorhabda* sp. nov.
Outer lobe of inner dististyle almost sessile; ninth tergite with long acute spines that subtend the median blade.*friendi* sp. nov.

Tipula (Schummelia) friendi sp. nov.

♂. Length, about 10-11 mm.; wing, 10-12 mm.; antenna, about 5.5 mm.

♀. Length, about 11-12 mm.; wing, 11-12 mm.; antenna, about 3 mm.

Allied to *hermannia*, differing especially in the details of structure of the male hypopygium.

Antennae somewhat shorter; flagellar segments strongly to weakly bicolored, the basal enlargements black, the apical pedicels yellow to brownish yellow, in some individuals the segments of outer half of organ uniformly blackened. Mesonotal praescutum with the four dark stripes variable in intensity, in cases very strongly darkened, in others less contrasted against the ground. Wings with the darkened cloud at or near midlength of vein and cell *Cu* lacking or scarcely indicated. Male hypopygium (Figs. 6, 7) with the compressed median blade of tergite, *9t*, smaller, almost parallel-sided and not dilated into an apical spatula, subtended by long slender spines. Inner dististyle, *id*, with the posterior lobe bearing a blackened tooth-like projection that is separated from the main body of the appendage by a U-shaped notch. Fleshy lobes of basistyle more oval and with more abundant setae that extend to the bases of the lobes, not restricted to the distal portions only.

Holotype, ♂, Amherst, Massachusetts, July 27, 1933 (*C. P. Alexander*). *Allotype*, ♀, Greenbrier Cove, Great Smokies, Tennessee, altitude 2,500 ft., June 15, 1939 (*C. P. Alexander*). *Paratypes*, several of both sexes: Tennessee.—Anakeesta Ridge, Smokies, 4,500 ft., June 8, 1939; Leconte, Alum Cave trail, 4,600-5,500 ft., June 12, 1939; Leconte Lodge, 6,400 ft., July 7, 1939 (*Mrs. J. Huff*); Greenbrier Cove, 2,500-4,500 ft., June 12-15, 1939; Indian Gap, 4,500 ft., June 17, 1939 (*Cole & Hickman*). North Carolina.—Clingmans Dome, Smokies, 6,400 ft., June 25, 1940; Highlands, 3,800-4,000 ft., June 11-15, 1940 (*C. P. Alexander*); Cliffside Lake, Highlands, 4,000 ft., June 11, 1940; Mount Mitchell, above Toe River Gap, 5,500 ft., June 6, 1940; Linville Falls, 3,200 ft., June 3, 1940, a mating pair (*C. P. Alexander*).

In the first part under this title (1940) this species was mentioned as appearing in the "Diptera of Connecticut" which was submitted for publication in 1934 but has never appeared in press. Since there seems to be no immediate prospect of publication it is deemed best to publish the various novelties in the report elsewhere; two of these, the present fly and *Hexatoma (Eriocera) brevioricornis* sp. nov. are defined in this paper. The present species is named in honor of the State Entomologist of Connecticut, Dr. Roger B. Friend. The fly is amply distinct from all other members of the subgenus so far described. Its nearest relative is *Tipula (Schummelia) hermannia* Alexander which has an even more extensive range in eastern North America.

Tipula (Schummelia) hermannia Alexander, 1915. — Linville Falls, 3,200

ft., June 21, 1939; Mitchell, Bald Knob Ranger Station, 5,200 ft., June 20, 1940; Smokies, Andrews Bald, bog margins, 5,600-5,650 ft., June 11, 1939; above Smokemont, 2,500-3,500 ft., June 20, 1940.

Tipula (Vestiplex) longiventris Loew, 1863. — Cliffside Lake, near Highlands, 4,000 ft., June 11, 1940 (*M. M. Alexander*).

Tipula (Oreomyza) angulata cherokeana Alexander, 1940. — Mount Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939, in red spruce forest (*C. P. Alexander*); part of type-series.

Tipula (Oreomyza) entomophthorae Alexander, 1918 (*similissima* Dietz, 1921). — Andrews Bald trail, in spruce-fir forest, 5,700-6,000 ft., June 18, 1940 (*M. M. Alexander*).

Tipula (Oreomyza) ignobilis Loew, 1863. — Black Mountains, May 21, 1903 (*A. Manee*); Carolina Hemlocks Campground, Yancey county, 2,800 ft., June 21, 1939, among stands of Carolina Hemlock, *Tsuga caroliniana* Engelm.

Tipula (Oreomyza) penobscot Alexander, 1915. — Smokies, Trail to Andrews Bald, 5,800 ft., June 11, 1939, in Frasers Fir forest, swept from herbage of *Clintonia borealis* (Ait.) Raf. and *Oxalis montana* Raf. (*W. H. Harrison*).

Tipula (Oreomyza) senega Alexander, 1915. — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Smokies, Andrews Bald trail, in spruce-fir forest, 5,500 ft., June 18, 1940 (*M. M. Alexander*).

Tipula (Oreomyza) trivittata Say, 1823. — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Highlands, Van Hook Glade, 3,800 ft., in white pine woods, June 12, 1940.

Tipula (Lunatipula) apicalis Loew, 1863. — Black Mountains, May 26, 1903, May 21, 1906 (*Beutenmuller*); Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; slopes of Mitchell, 5,000-5,500 ft., June 7, 1940, common on Little Mountain Bald; Smokies, Trans-mountain road above Smokemont, 3,500 ft., June 20, 1940.

Tipula (Lunatipula) australis Doane, 1901. — Southern Pines, March 23-30, 1910 (*A. Manee*); Raleigh, March 25, 1913 (*C. L. Metcalf*), April 12, 1915 (*Leiby*); Holloways Millbrook, April 15, 1915 (*Leiby*); Wrightsville Beach, March 23, 1915 (*Leiby*).

Tipula (Lunatipula) catawba Alexander, 1915. — Southport, April 6, 1914 (*C. L. Metcalf*).

Tipula (Lunatipula) dietziana Alexander, 1915. — Oxford, March 31, 1939 (*H. L. Sweetman*).

Tipula (Lunatipula) duplex Walker, 1848 (*cinctocornis* Doane, 1901; *mingwe* Alexander, 1915). — Black Mountains, June 9-26, 1912 (*Beutenmuller*).

Tipula (Lunatipula) fuliginosa (Say, 1823) (*speciosa* Loew, 1863). —

Black Mountains, June 1906 (*Beutenmuller*), May 12, 1912 (*Beutenmuller*); Mountain Meadows, May 26-30, 1915 (*G. C. Crampton*).

Tipula (Lunatipula) flavoumbrosa Alexander, 1918. — Black Mountains, May 24, 1912 (*Beutenmuller*).

Tipula (Lunatipula) monticola Alexander, 1915. — Smokies, Andrews Bald trail, in spruce-fir forest, 5,600 ft., June 18, 1940 (*M. M. Alexander*).

Tipula (Lunatipula) seminole Alexander, 1915. — North Carolina, without further data (*H. K. Morrison*).

Tipula (Lunatipula) submaculata Loew, 1863. — Black Mountains, May 21, 1906 (*Beutenmuller*), June 18, 1912 (*Beutenmuller*); Carolina Hemlocks Camp Ground, 2,800 ft., June 21, 1939; Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939.

Tipula (Lunatipula) valida atricornis Alexander, 1940. — Mitchell, slopes, 3,500 ft., June 7, 1940; Smokies, Newfound Gap, 5,000 ft., June 5, 1939 (part of type material); Trans-mountain road above Smokemont, 3,500 ft., June 20, 1940.

Dolichopeza (Dolichopeza) americana Needham, 1908. — Linville Falls, 3,200 ft., June 21, 1939, June 3, 1940; Mitchell, Game Refuge, 3,100 ft., June 9, 1940, Conestee Falls, June 12, 1940; Highlands, Ravenels woods, 4,400 ft., June 15, 1940; Smokies, Forney Ridge trail and Andrews Bald, 5,800-6,300 ft., June 11, 1939, June 18, 19, 1940.

Dolichopeza (Oropeza) carolus Alexander, 1940 (*albipes* Johnson, 1909). — Linville Falls, 3,100 ft., July 9, 1940; Mitchell, Game Refuge, 3,250 ft., June 22, 1939; Nantahala Gorge, June 8, 1939. The last mentioned specimens occurred in small accessory ravines opening into the Gorge; at this season *Galax* was in full bloom and it was a striking sight to see the crane-flies of this species dancing about among these flowers.

Dolichopeza (Oropeza) dorsalis (Johnson, 1909). — Conestee Falls, June 12, 1940; Highlands, Van Hook Glade, 3,800 ft., along small mountain streams, June 11-15, 1940; associated with *Limnophila (Lasiomastix) tenuicornis* Osten Sacken and *L. (Prionolabis) mundoides* Alexander.

Dolichopeza (Oropeza) johnsonella (Alexander, 1930). — Mitchell Game Refuge, along Neals Creek, beneath culverts, June 6, 1940; Conestee Falls, June 12, 1940, in small rock caverns below the Falls, associated with *D. (D.) americana* Needham and *D. (O.) dorsalis* (Johnson); Smokies, along Hughes Ridge trail above Smokemont, 2,500 ft., under darkened overhanging banks, swarming in hollows thus formed, June 20, 1940.

Dolichopeza (Oropeza) obscura (Johnson, 1909). — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Carolina Hemlocks Campground, 2,800 ft., June 21, 1939; Highlands, Ravenels woods, 4,400 ft., June 15, 1940; Nantahala Gorge, June 8, 1939; Smokies, Andrews Bald, 5,800 ft., June 11, 1939 (*W. H. Harrison*).

Dolichopeza (Oropeza) polita (Johnson, 1909). — Linville Falls, 3,200 ft., June 21, 1939.

Dolichopeza (Oropeza) sessilis sp. nov. — General coloration of mesonotal praescutum reddish brown, the usual stripes not or scarcely differentiated from the interspaces but with a conspicuous, dark brown, median vitta; pleura and pleurotergite uniformly yellow, unpatterned; wings broad, with a pale brown tinge, the stigma a little darker than the ground; stigmal portion of vein R_1 long; cell M_1 sessile.

♀. Length, about 11 mm.; wing, 10.5 mm.

Frontal prolongation of head brownish yellow, clearer yellow above, with scattered black setae; a narrow dark lateral vitta; palpi dark brown. Antennae with scape and pedicel yellow; basal flagellar segments obscure yellow, the remainder passing into brown; flagellar segments cylindrical, with verticils that are subequal to the segments. Front yellow; vertex brown, with a narrow, darker brown, median line.

Pronotum infuscated, paling to yellow on sides. Mesonotal praescutum reddish brown, the usual stripes not or scarcely differentiated from the interspaces; a conspicuous, dark brown median vitta that almost reaches the suture behind; humeral region of praescutum a little brightened; posterior sclerites of notum light brown, the parascutella and sides of mediotergite paling to yellow. Pleura and pleurotergite uniformly yellow, unpatterned. Halteres weakly darkened throughout. Legs with the coxae and trochanters pale yellow; femora and tibiae obscure brownish yellow, the tips narrowly darkened; tarsi brownish yellow. Wings (Fig. 1) slightly wider than in *dorsalis*, with a pale brown tinge, the oval stigma a little darker than the ground, less conspicuous than in *dorsalis*; restricted whitish obliterative areas before stigma and across base of cell $1st M_2$; prearcular and costal regions a trifle more yellow than the remainder of ground; veins pale brown. Venation: Section of vein R_1 within the stigma (between the free tip of Sc_2 and R_2) elongate, fully one-half as long as vein Sc_2+R_1 in *dorsalis* shorter, approximately one-third this length; cell M_1 narrowly sessile; cell $1st M_2$ elongate, nearly equal in length to M_1 ; cell $2nd A$ slightly wider than in *dorsalis*.

Abdomen of female type badly discolored by included egg-masses; segments obscure yellow or brownish yellow, variegated with darker, the incisures chiefly pale.

Holotype, ♀, Smokemont, Great Smokies, North Carolina, altitude 2,200 ft., June 30, 1940 (C. P. Alexander).

Although only a single female specimen is available, I feel that the present fly represents a valid species. Its nearest ally is *Dolichopeza (Oropeza) dorsalis* (Johnson) which differs in slight but evident differences in coloration, notably the pattern of the praescutum and the darker stigmal area. The venational feature of a sessile cell M_1 is unique in the subgenus and if it proves to be constant will readily distinguish the species. The conditions at Smokemont where the type was taken have been discussed in some detail in the introduction. This specimen was taken by sweeping the sparse vegetation in a small

accessory swampy patch just off the main stream beneath the shade of a tulip tree, where numerous *Rumex* plants were growing. Associated Tipulidae included *Limonia (Geranomyia) diversa* (Osten Sacken), *Pseudolimnophila contempta* (Osten Sacken), *Limnophila (Elaeophila) solstitialis* Alexander, and *Gonomyia (Lipophleps) manca* (Osten Sacken).

Dolichopeza (Oropeza) subalbipes (Johnson, 1909). — Mitchell, trail on the slopes, 3,400 ft., June 7, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Smokies, above Smokemont, 2,500-3,000 ft., June 20, 1940.

Dolichopeza (Oropeza) subvenosa Alexander, 1940. — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939 (part of type material); trail up slopes of Mitchell, 4,000 ft., June 7, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940, Ravenels woods, 4,400 ft., June 15, 1940; Smokies, Newfound Gap, 5,000 ft., June 17, 1940, Andrews Bald, 5,700 ft., June 11, 1939 (*W. H. Harrison*).

Dolichopeza (Oropeza) tridenticulata Alexander, 1931. — Linville Falls, 3,200 ft., June 21, 1939; Highlands, Van Hook Glade, 3,800 ft., June 15, 1940, common under low earthen banks along road.

Dolichopeza (Oropeza) walleyi (Alexander, 1931). — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Game Refuge, 3,100 ft., June 9, 1940; Smokies, above Smokemont, 3,500 ft., June 20, 1940.

CYLINDROTOMINAE

Liogma nodicornis flaveola Alexander, 1919. — Linville Falls, near spring, 3,250 ft., June 3, 1940; Mount Mitchell Game Refuge, 3,100 ft., June 9, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Cashiers, 3,800 ft., in small sphagnum bog, with *Kalmia angustifolia* L., *Sarracenia purpurea* L., *Arethusa bulbosa* L., and numerous other bog plants, June 12, 1940; Conestee Falls, June 12, 1940; Nantahala Gorge, June 8, 1939; Smokies, Forney Ridge trail, 6,000-6,300 ft., June 18, 1940.

LIMONIINAE

LIMONIINI

Antocha (Antocha) biarmata Alexander, 1940. — Smokemont, 2,200 ft., June 20, 1940.

Antocha (Antocha) opalizans Osten Sacken, 1859. — Trans-mountain road above Smokemont, 3,500 ft., in hemlock forests, along mountain stream, June 25, 1940.

Dicranoptycha sobrina Osten Sacken, 1859. — Smokemont, 2,200 ft., June 20-30, 1940.

Limonia (Limonia) apicata subapicata Alexander, 1931. — The types of this fly were from northern Florida, collected by Rogers. One female of what seems unquestionably to be the same, Smokemont, Great Smokies, 2,200 ft., June 30, 1940. This is the most northern subspecies of one of the most widely distributed American Tipulidae; typical *apicata* Alexander, 1914, with a wide range over continental Tropical America; race *dominicensis* Alexander, 1939, Lesser Antilles; race *napoensis* Alexander, 1921, Peru.

Limonia (Limonia) fusca Meigen, 1804 (*pubipennis* Osten Sacken, 1859). — Blowing Rock, June 2, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Linville Falls, 3,200 ft., June 21, 1939; Mitchell, Bald Knob Ranger Station, 5,200 ft., June 6, 1940; Game Refuge, 3,200 ft., June 4, 1940; Van Hook Glade, Highlands, 3,800 ft., June 11, 1940; Cedar Mt., 3,000 ft., June 12, 1940; Smokies, above Smokemont, 3,500 ft., June 20, 1940.

Limonia (Limonia) globithorax (Osten Sacken, 1869). — Blowing Rock, Glen Burney Falls, June 2, 1940; Mitchell, Camp Alice, 6,050-6,600 ft., June 8, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Smokies, Forney Ridge to Andrews Bald, 5,800-6,300 ft., June 18, 1940.

Limonia (Limonia) indigena (Osten Sacken, 1859). — Blowing Rock, June 2, 1940; Linville Falls, 3,300 ft., June 3, 1940, June 21, 1939; Highlands, Van Hook Glade, 3,800 ft., June 13-14, 1940; Smokies, Forney Ridge to Andrews Bald, 5,200-6,300 ft., June 18, 1940.

Limonia (Limonia) rara (Osten Sacken, 1869). — Smokies, Smokemont, 2,000 ft., August 19, 1937, in pentstock at Mingus Mill (*Murray W. George*); Raleigh, emerged in laboratory of North Carolina State College from rotten wood picked up from banks of Neuse River, a few miles east of city; adults appeared February 2, 1939, and thereafter (*B. B. Fulton*).

Limonia (Limonia) simulans (Walker, 1848). — Blowing Rock, at foot of Glen Burney Falls, June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Mitchell, Game Refuge, 3,200 ft., June 5, 1940, Camp Alice, 6,000-6,500 ft., June 7-8, 1940; Conestee Falls, June 12, 1940; Smokies, Forney Ridge trail, in dark and wet rock crevices along streams, 6,000 ft., June 18, 1940.

Limonia (Limonia) triocellata (Osten Sacken, 1859). — Highlands, Van Hook Glade, 3,800 ft., June 11, 1940.

Limonia (Discobola) annulata (Linnaeus, 1758) (*argus* Say, 1824). — Black Mountains (*Beutenmuller*), Dietz Collection; Mitchell, Bald Knob Rangers Station, 5,200 ft., June 22, 1939, in red spruce forest.

Limonia (Dicranomyia) divisa Alexander, 1929 (*diversa* Osten Sacken, 1859). — Low Gap, July 9, 1940; Blowing Rock, June 2, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Smokies, Andrews Bald bog, 5,700 ft., June 11, 1939, associated with *Ulomorpha rogersella* Alexander.

Limonia (Dicranomyia) gladiator (Osten Sacken, 1859). — Cedar Mt., August 24, 1932 (*H. K. Townes*).

Limonia (Dicranomyia) humicicola (Osten Sacken, 1859) (*badia* Walker, 1848, erroneous records). — Mitchell, Game Refuge, 3,250 ft., June 22, 1939; Nantahala Gorge, June 8, 1939 (*W. H. Harrison*).

Limonia (Dicranomyia) liberta (Osten Sacken, 1859). — Cedar Mt., 3,000 ft., June 12, 1940; Smokies, Kephart Prong, above Smokemont, 3,200 ft., June 20, 1940; Andrews Bald trail, 5,600 ft., June 29, 1940.

Limonia (Dicranomyia) morioides (Osten Sacken, 1860). — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Mitchell, Game Refuge, 3,200 ft., June 4, 1940.

Limonia (Dicranomyia) pudicoides Alexander, 1929. — Linville Falls, 3,200 ft., June 21, 1939; Mitchell along trail, 5,000 ft., June 7, 1940, Game Refuge, 3,250 ft., June 22, 1939; Conestee Falls, June 12, 1940.

Limonia (Dicranomyia) stulta (Osten Sacken, 1859) (*monticola* Alexander, 1911). — Linville Falls, 3,200 ft., June 21, 1939, July 9, 1940; Mitchell, Game Refuge, 3,100 ft., June 22, 1939, June 9, 1940; Mitchell, trail, 3,500-4,400 ft., June 7, 1940, some with thoracic notum almost unpatterned but evidently conspecific; Highlands, Bridal Veil Falls, 3,800 ft., June 12, 1940, Cliffside Lake, 4,000 ft., June 11, 1940; Conestee Falls, June 12, 1940; Smokies, above Smokemont, 2,200-3,500 ft., June 20, 1940.

Limonia (Dicranomyia) uliginosa Alexander, 1929. — Smokies, Andrews Bald bog, 5,750-5,800 ft., June 11, 1939, June 18, 1940.

Limonia (Geranomyia) canadensis (Westwood, 1835). — Southern Pines, April 5, 1910 (*A. H. Manee*).

Limonia (Geranomyia) diversa (Osten Sacken, 1859). — Conestee Falls, June 12, 1940; Nantahala Gorge, June 8, 1939; Smokies, Smokemont, 2,200 ft., June 20, 1940.

Limonia (Geranomyia) rostrata (Say, 1823). — Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Smokies, Andrews Bald bog, 5,860 ft., June 11, 1940, common.

Limonia (Rhipidia) maculata (Meigen, 1818). — Blowing Rock, 3,500-4,000 ft., September 9, 1908 (*P. Metcalf*); Black Mountains, June 15, 1912 (*Beutenmuller*).

PEDICIINI

Pedicia (Tricyphona) auripennis (Osten Sacken, 1859) and subspecies. — A study of numerous specimens of this usually rare species from all parts of its known range (Gaspé Peninsula, eastern Quebec, southward to the high mountains of North Carolina and Tennessee) makes it advisable to define three new races, based on the structure of the male hypopygia.

P. (T.) auripennis auripennis (Osten Sacken, 1859). — Male hypopygium with the dististyle (Fig. 10 C, *od*) having its outer end most like *breviclava* subsp. n., the lateral lobe conspicuously longer, exceeding the transverse diameter of style, provided with unusually coarse setae from conspicuous punctures. (Northeastern United States: New England and New York; type-locality, Massachusetts).

P. (T.) auripennis breviclava subsp. nov. — Dististyle (Fig. 10 D, *od*) with outer end shortly but conspicuously narrowed into a cylindrical lobe; lateral lobe pale, unusually short, its length only about two-thirds the transverse diameter of style at point of insertion, its width across head about one-half the length. *Holotype*, ♂, Matapedia, Gaspé, Quebec, June 21, 1929 (*C. P. Alexander*). *Paratopotypes*, 2 ♂ ♂.

P. (T.) auripennis attenuata subsp. nov. — Dististyle (Fig. 10 B, *od*) with outer end very long and attenuated, with conspicuous blackened spines;

at near midlength of style further provided with a small secondary lobule, this provided with four or five blackened spines; lateral lobe dark-colored, clavate, the head conspicuous. *Holotype*, ♂, Blowing Rock, North Carolina, Glen Park, near Glen Mary Falls, altitude about 3,500 ft., June 2, 1940 (*C. P. Alexander*).

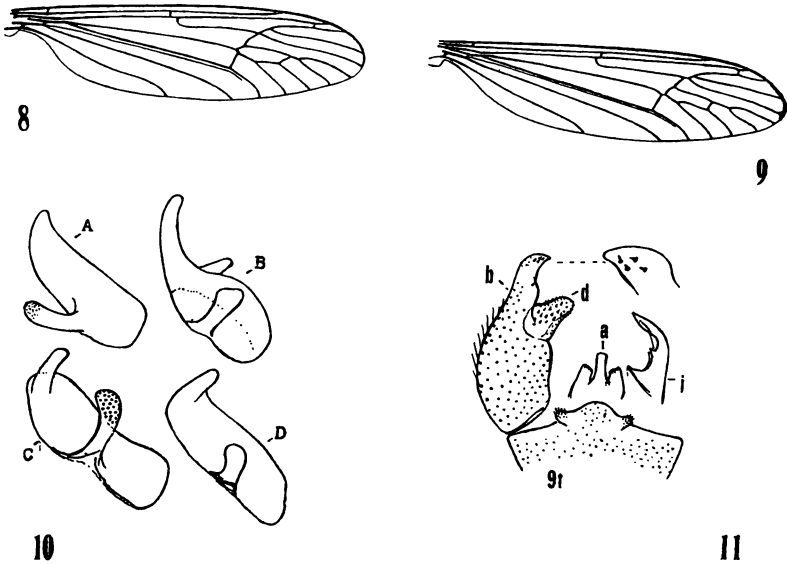
P. (T.) auripennis nephophila subsp. nov. — Dististyle (Fig. 10 A, *od*) with outer end only slightly produced; lateral lobe dark colored, clavate, its length exceeding three times its greatest width. *Holotype*, ♂, Forney Ridge, Smokies, North Carolina, 6,000 ft., June 19, 1940 (*C. P. Alexander*). *Allotopotype*, ♀, June 18, 1940. *Paratopotypes*, several ♂ ♀, June 18-19, 1940; *paratypes*, ♂ ♂, Huff Spring, Mount Leconte, Tennessee, 6,400 ft., June 13, 1939 (*C. P. Alexander*).

Pedicia (Tricyphona) calcar (Osten Sacken, 1859). — Grandfather Mt., 4,000 ft., June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Smokies, Forney Ridge to Andrews Bald, 5,800-6,000 ft., June 11, 1939, June 18, 1940.

Pedicia (Tricyphona) gigantea Alexander 1940.

1940. *Pedicia (Tricyphona) gigantea* Alexander, Ent. News 51:99-100.

This notable crane-fly was described from a single specimen taken in the



Figs. 8, 9. *Pedicia (Tricyphona) gigantea* Alexander; venation. Fig. 10. *Pedicia (Tricyphona) auripennis* subspecies, male hypopygia. A. *P. (T.) auripennis nephophila* subsp.n.; dististyle. B. *P. (T.) auripennis attenuata* subsp.n.; dististyle. C. *P. (T.) auripennis auripennis* Osten Sacken; dististyle. D. *P. (T.) auripennis breviclava* subsp. n.; dististyle. Fig. 11. *Pedicia (Tricyphona) gigantea* Alexander; male hypopygium. (Symbols: a, aedeagus; b, basistyle; d, dististyle; i, interbase; t, 9th tergite.)

black Mountains, Buncombe Co., North Carolina, May 23, 1912, by William Beutenmuller; type in the Dietz Collection, Academy of Natural Sciences, Philadelphia.

In June 1940, I captured four further specimens and the following supplementary descriptive notes are given.

♂. Length, about 20-26 mm.; wing, 19.5-23 mm.

Antennae small, 16-segmented; basal flagellar segments crowded, the outer ones more elongate; longest verticils unilaterally arranged, fully twice as long as the segments. Praescutal stripes more or less pruinose to appear brownish gray, especially the lateral pair. Venation (Figs. 8, 9): R_5 strongly to very strongly angulated at origin, in cases short-spurred at point of angulation; $r-m$ at or shortly before the fork of R_5 ; R_{2+3+4} variable in length, from short to about one-half as long as $r-m$; cell 1st M_2 elongate; cell M_1 very short-petiolate to long-petiolate, in the latter case the petiole exceeding m in length. A single wing of one specimen shows an adventitious crossvein in cell 2nd M_2 just distad of m and parallel with it.

Abdomen with tergites two to six bright yellow on the narrow basal ring, the lateral margins gray, the bright pattern more or less hour-glass shaped by darkened lateral encroachments; posterior ring of these segments blackened medially, light gray on sides, the extreme edge buffy; sternites two to six somewhat similarly patterned but the bright yellow basal rings not constricted, merely with gray lateral margins; outer segments and hypopygium heavily gray pruinose. Male hypopygium (Fig. 11) with the median region of tergite, 9t. convexly rounded, subtended on either side by low shoulders. Interbases, i , appearing as short curved blades. Aedeagus, a , small, the still shorter gonapophyses with their tips obtuse, microscopically crenulated. Basistyle, b , black, produced into a strong flattened cultriform blade, near apex provided with three or four short black spinous points and additional normal setae. Dististyle, d , small and simple, obtuse at apex, the surface provided with several small black spinous points, with additional more slender setae, the basal ones long and conspicuous.

The four specimens were taken at Grandfather Mountain, altitude 4,000 ft., June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; and at Andrews Bald, 5,750 ft., June 18, 1940, all in North Carolina.

The Andrews Bald specimen was found in a dense thicket of *Rhododendron catawbiense* Michx. and *Leucothoë catesbaei* (Walt.) Gray, with sparse forest cover of red spruce and Frasers fir. This is in the Canadian zone but definitely higher than the conditions at Linville Falls and Grandfather Mt., in both of which the principal forest tree was northern hemlock and the chief undershrub was *Rhododendron maximum* L., conditions that indicated very low Canadian or high Transitional zones. The single specimen on Grandfather Mt. was swept from abundant rich herbage of *Diphylleia*, *Hydrophyllum*, *Laportea* and others.

Pedicia (Tricyphona) inconstans inconstans (Osten Sacken, 1859). — Low Gap, June 1, 1940; Blowing Rock, June 2, 1940, Mitchell, Game Refuge,

3,200 ft., June 4, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Nantahala Gorge, June 8, 1939; Smokemont, 2,200 ft., June 20, 1940.

Pedicia (Tricyphona) inconstans calcaroides Alexander, 1940. — Grandfather Mt., 4,000 ft., June 21, 1940; Mitchell, Camp Alice, 6,000 ft., June 7, 1940; Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Smokies, Forney Ridge trail to Andrews Bald, 5,800-6,200 ft., June 11, 1939 (part of type material), June 18, 1940.

Pedicia (Tricyphona) vernalis catawba Alexander, 1940. — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 21, 1939, June 3, 1940; Mitchell, Game Refuge, 3,200 ft., June 4, 1940; Camp Alice, 6,000-6,200 ft., June 6-7, 1940, some of the specimens with wing pattern so reduced as to be virtually unmarked; Smokies, Andrews Bald bog, 5,700 ft., June 11, 1939 (part of type material).

Dicranota (Eudicranota) catawbiensis Alexander, 1940. — Smokies, Forney Ridge trail, 5,800-6,300 ft., June 17, 1940 (part of type material).

Dicranota (Eudicranota) yonahlossee Alexander, 1941. — Linville Falls, 3,200 ft., June 21, 1939, a single male; June 3, 1940, 30 males and females. This very interesting crane-fly is quite distinct from the preceding species. It is known only from a small accessory ravine immediately below the great basin of the lower falls. In 1940 numerous males and much fewer females were found flying and fluttering about over saturated beds of mosses, including both *Sphagnum* and *Polytrichum*. They were so intent in their movements that they could most readily be picked up by hand. Associated with *Tipula (Yamatipula) nephophila* Alexander.

Dicranota (Amalopina) flaveola (Osten Sacken, 1869). — Blowing Rock, June 2, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Linville Falls, June 2, 1940.

Dicranota (Rhaphidolabis) persimilis (Alexander, 1920). — Grandfather Mt., 4,000 ft., June 2, 1940; Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Nantahala Gorge, June 8, 1939.

Dicranota (Rhaphidolabis) rubescens (Alexander, 1916). — Mitchell, Game Refuge, 3,200 ft., June 22, 1939; Bald Knob Ranger Station, 5,200 ft., June 22, 1939.

Dicranota (Plectromyia) confusa (Alexander, 1924). — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 6, 1940; Camp Alice Creek, 6,000-6,200 ft., June 7, 1940; Smokies, Forney Ridge, 6,000-6,200 ft., June 6, 1939, June 18, 1940.

HEXATOMINI

Oxydiscus (Oxydiscus) minutus (Alexander, 1911). — Grandfather Mt., 4,000 ft., June 2, 1940.

Oxydiscus (Oxydiscus) pleuralis (Dietz, 1921). — Linville Falls, 3,100 ft., June 21, 1939, July 9, 1940; Mitchell, Game Refuge, 3,250 ft., June 22, 1939; Smokemont, 2,200 ft., June 30, 1940.

Epiphragma (Epiphragma) fascipennis (Say, 1823). — Blowing Rock,

June 2, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Black Mountains, May 1906, June 10, 1912 (*Beutenmuller*); Mitchell, Game Refuge, 3,200 ft., June 4, 1940, high slopes, 6,100-6,300 ft., June 8, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940, Ravenels woods, 4,400 ft., June 15, 1940; Smokies, Forney Ridge trail, 5,800-6,000 ft., June 11, 1939.

Epiphragma (Epiphragma) solatrix (Osten Sacken, 1859). — Black Mountains, June 16-23, 1912 (*Beutenmuller*); Smokemont, 2,200 ft., June 20-30, 1940.

Prolimnophila areolata (Osten Sacken, 1859). — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 3, July 8, 1940; Black Mountains, May 29, 1912 (*Beutenmuller*); Mitchell, Game Refuge, 3,200 ft., June 22, 1939, June 4, 1940; Mitchell, slopes, 4,000-5,000 ft., June 7, 1940; Highlands, Ravenels woods, 4,400 ft., June 15, 1940; Smokies, Newfound Gap, 5,000 ft., June 17, 1940; Forney Ridge trail, 6,000 ft., June 11, 1939.

Pseudolimnophila contempta (Osten Sacken, 1869). — Mitchell, Game Refuge, 3,200 ft., June 4, 1940; Highlands, along Cullasaje River, 3,750 ft., June 12-14, 1940; Cedar Mt., May 31, 1931 (*Townes*); Smokemont, 2,200 ft., June 20-30, 1940.

Pseudolimnophila luteipennis (Osten Sacken, 1859). — Black Mountains, May 1906, July 5, 1912 (*Beutenmuller*).

Pseudolimnophila noveboracensis (Alexander, 1911). — Black Mountains, May 21, 1912 (*Beutenmuller*).

Austrolimnophila toxoneura (Osten Sacken, 1859). — Mitchell, Game Refuge, 3,200 ft., June 22, 1939, June 4, 1940; Highlands, Ravenels woods, 4,400 ft., June 15, 1940; Cashiers, bog, June 12, 1940; Conestee Falls, June 12, 1940; Smokies, Newfound Gap, 5,000 ft., June 17, 1940; Forney Ridge trail, 5,800-6,000 ft., June 11, 1939.

Dactylolabis cubitalis (Osten Sacken, 1869). — Black Mountains, May 1-29, 1912 (*Beutenmuller*).

Dactylolabis hudsonica Alexander, 1931. — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940, on cliff faces; Mitchell, Bald Knob Ranger Station, 5,200 ft., in forest of red spruce, resting on their trunks; Highlands, Van Hook Glade, 3,800 ft., June 12, 1940; Smokies, Newfound Gap, 5,000 ft., June 17, 1940; Forney Ridge, 6,000 ft., June 11, 1939, June 18, 1940.

Dactylolabis montana (Osten Sacken, 1859). — Linville Falls, 3,300 ft., June 3, 1940; Mitchell, on low cliffs, 5,800-5,900 ft., June 6-7, 1940, associated with next species; Highlands, Cliffside Lake, 4,000 ft., June 11, 1940; Smokies, Newfound Gap, 5,000 ft., on cliff faces, June 17, 1940.

Dactylolabis pemetica Alexander, 1936. — Formerly known only from Maine, New Hampshire and New York. Mount Mitchell, near Camp Alice, 5,800-5,900 ft., June 6-7, 1940. This noteworthy discovery is of particular interest since further notes on the habits of this uncommon fly were made. The adults were noted running over low, nearly horizontal wet rocks and exposures, the males very active, walking slowly and erratically, with both

forward and lateral motions. They are awkward yet are difficult to capture by hand and are most readily taken by careful sweeping with a net. A few teneral individuals were found but no cast pupal skins or immature stages could be noted. The teneral individuals had apparently emerged from small patches of mosses of the genus *Andreaea* (Ehrh.) Hedw., growing on the rock surfaces which here were tilted at about a 40 degree angle. During dry spells these moss patches must bake out very dry to virtually desiccated except on their very lowest portions next to the rock surface and it is difficult to see how the larvae can exist in such a habitat. It should be noted that the flies were here associated with *Dactylolabis montana* as has been the case in all three previous discoveries (Mount Desert Island, Me.; Huntington Ravine, Mount Washington, N. H.; near Mount Marcy, Adirondacks, N. Y.). It may be re-affirmed that the present fly is one of the most remarkable in the entire family, having a wing venation that is so different in the two sexes that it is almost impossible to homologize the wing veins.

Limnophila (Lasiomastix) macrocera (Say, 1823). — Mitchell, Game Refuge, 3,200 ft., June 5, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Smokies, Andrews Bald bog, 5,750-5,800 ft., June 11, 1939, June 18, 1940.

Limnophila (Lasiomastix) tenuicornis Osten Sacken, 1869. — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Mitchell, Game Refuge, 3,200 ft., June 4, 1940.

Limnophila (Elaeophila) aprilina Osten Sacken, 1859. — Black Mountains, March 21, 1906, July 13, 1912 (*Beutenmuller*); Mitchell, Game Refuge, 3,200 ft., June 4, 1940, very common along Neals Creek, flying in the evening.

Limnophila (Elaeophila) johnsoni Alexander, 1914. — Grandfather Mt., 4,000 ft., June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Mitchell, Game Refuge, 3,200 ft., June 4, 1940; Smokies, Trans-mountain road above Smokemont, along small mountain stream, associated with *Limnophila (Trichephelia) seticellula*, June 20, 1940. In all of the above cases the species was found only in the zone of northern hemlock.

Limnophila (Elaeophila) solstitialis Alexander, 1926. — Cullowhee, July 1889 (*Thaxter*); Mitchell, Game Refuge, 3,200 ft., June 22, 1939; Smokies, Smokemont, 2,200 ft., June 30, 1940.

Limnophila (Trichephelia) seticellula Alexander, 1938. — Cedar Mt., 3,000 ft., swept from rank herbage along a small stream, June 12, 1940; Smokies, Smokemont, 2,200 ft., June 30, 1940; trans-mountain road above Smokemont, 3,500 ft., June 20, 1940, along small mountain stream, numerous.

Limnophila (Dicranophragma) fuscovaria Osten Sacken, 1859. — Black Mountains, June 13-August 1, 1912 (*Beutenmuller*); Dugger Creek above Linville Falls, 3,300 ft., swept from beds of *Zanthorhiza apiifolia* L. 'Her. July 8, 1940; Smokemont, 2,200 ft., June 20-30, 1940.

Limnophila (Dicranophragma) angustula Alexander, 1929. — Smokies, Trans-mountain road above Smokemont, 3,500 ft., June 30, 1940.

Limnophila (Eutonix) alleni Johnson, 1909. — Mountains of western

North Carolina, without further data, collected by H. K. Morrison. This is a female specimen in the Cornell Collection (Lot No. 35), showing a strong adventitious crossvein in cell R_5 of both wings, uniting the distal section of vein R_5 with vein M_1 . Cedar Mt., Transylvania Co., June 9, 1931 (*Townes*).

Limnophila (Eutonia) marchandi Alexander, 1916. — Charlotte, April 13, 1922 (*Brimley*).

Limnophila (Prionolabis) munda Osten Sacken, 1869. — Black Mountains, May 4, 1912 (*Beutenmuller*); Smokies, Trans-mountain road above Smoke-mont, 3,500 ft., June 20, 1940; Forney Ridge trail, 6,000 ft., June 29, 1940.

Limnophila (Prionolabis) mundoides Alexander, 1916. — Highlands, Van Hook Glade, near small mountain streams beneath covers of rhododendron and mountain laurel, June 11-14, 1940.

Limnophila (Prionolabis) politissima sp. nov. — General coloration gray, praescutum with three polished black stripes, the scutal lobes similarly polished black; halteres yellow; fore femora black, the basal third yellow; posterior femora yellow with about the distal fifth or sixth blackened; wings fully developed in both sexes, yellowish, stigma oval; a very heavy brown seam along vein Cu involving parts of cells on either side of vein; male hypopygium with the outer dististyle dilated into a flattened blade, toothed; inner style with the apical teeth of the stouter arm appressed to subobsolete.

♂. Length, about 7.5-8.5 mm.; wing, 8.5-10 mm.

♀. Length, about 8 mm.; wing, 7.5-8 mm.

Rostrum black, sparsely pruinose; palpi black. Antennae with the scape and pedicel brownish black; flagellum dark brown to brownish black; flagellar segments oval, the outer ones much smaller. Head dull gray, opaque.

Pronotum dull gray, opaque. Mesonotal praescutum with the interspaces gray, the three stripes polished black, contrasting conspicuously with the ground; posterior interspaces with long yellow setae; scutal lobes polished black, the median area and the scutellum dull black; postnotum opaque black. Pleura black, pruinose. Halteres yellow. Legs with the coxae and trochanters black, the former pruinose; fore femora chiefly black, the basal third yellow; posterior femora with the distal fifth or sixth blackened, the middle femora about intermediate in extent between the fore and hind pairs; tibiae dark brown, the tips blackened; tarsi black. Wings (Fig. 12) yellow, the prearcular and costal fields clearer yellow; stigma oval, brown; rather restricted pale brown seams along cord and outer end of cell $1st M_2$; a broad and very conspicuous brown seam along vein Cu , involving adjoining portions of cells M , M_4 and Cu ; veins brown, yellow in the flavous portions, especially at wing base. Wings relatively narrow. Venation: R_{2+3+4} a little longer than basal section of R_5 ; $m-cu$ close to midlength of cell $1st M_2$.

Abdomen, including hypopygium, black, the surface subnitidous. Male hypopygium (Fig. 15) with the U-shaped notch of caudal border of tergite, $9t$, conspicuous, the sublateral lobes obtusely rounded at tips. Outer dististyle, od , with the outer blade broadly dilated at base, the teeth tending to become

obtuse. Inner style, *id*, bifid, the apical teeth of stouter arm appressed to sub-obsolete, as in *walleyi*.

Holotype, ♂, Highlands, North Carolina, 3,800 ft., June 15, 1940 (*C. P. Alexander*). *Allotype*, ♀, above Smokemont on trans-mountain road across Smokies, 3,500 ft., June 25, 1940. *Paratopotypes*, 5 ♂♂, 3,800-4,400 ft., June 15, 1940; *paratypes*, ♂♂, Brushy Mt. trail, Tennessee, 3,500 ft., June 15, 1939 (*C. P. Alexander*); ♂, Leconte, Alum Cave trail, 5,000 ft., June 12, 1939; 1 ♀, with the allotype.

In the discussion of *Limnophila (Prionolabis) walleyi* Alexander as it occurred in the Great Smoky Mountains (*Amer. Midl. Nat.* 24:632; 1940), it was indicated that confusion still existed in this particular section of the subgenus. The present species and the one next described as *L. (P.) rudimentis* sp. nov., are now separated from this particular complex of forms. The species of the subgenus belonging to *rufibasis* group that have the male hypopygium with the outer dististyle conspicuously pectinate and the inner style bilobed may be separated by the following key:

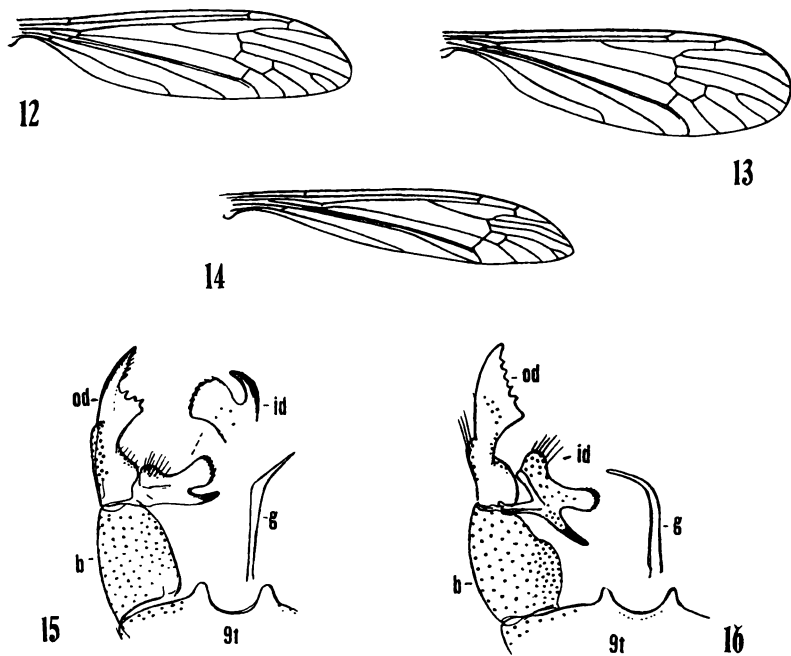


Fig. 12. *Limnophila (Prionolabis) politissima* sp.n.; venation. Fig. 13. *Limnophila (Prionolabis) rudimentis* sp.n.; venation ♂. Fig. 14. *Limnophila (Prionolabis) rudimentis* sp.n.; venation ♀. Fig. 15. *Limnophila (Prionolabis) politissima* sp.n.; male hypopygium. Fig. 16. *Limnophila (Prionolabis) rudimentis* sp.n.; male hypopygium. (Symbols: *b*, basistyle; *g*, gonapophysis; *id*, inner dististyle; *od*, outer dististyle; *t*, 9th tergite.)

1. Wings of male broad, unpatterned except for the small brown stigma; wings of female subatrophied. *rudimentis* sp. nov.
 Wings fully-developed in both sexes, relatively narrow; restricted brown seams along cord and, except in some specimens of *walleyi*, with a broad dark seam along vein *Cu*, chiefly in cell *M*. 2
2. Mesonotal praescutum opaque gray, with three black, highly polished stripes, including a broad median one, the scutal lobes similarly polished black. *politissima* sp. nov.
 Central region of mesonotal praescutum and the scutum opaque, in cases the sub-lateral portions of praescutum polished or subnitidous. 3
3. No conspicuous darkened seam along vein *Cu*; all femora with tips narrowly blackened; male hypopygium with the teeth at apex of stouter lobe of inner dististyle small and appressed. *walleyi* Alexander
 A conspicuous dark seam along vein *Cu*; fore femora more extensively blackened at tips than the middle and hind pair; male hypopygium with teeth at apex of the stouter lobe of inner dististyle coarse and erect (*rufbasis* and subspecies). 4
4. Blackened tips of femora narrow, including the distal third or less; tibiae obscure yellow or brownish yellow, the tips darkened. *rufbasis rufbasis* Osten Sacken
 Blackened tips of femora very broad, especially on fore legs where about the distal two-thirds is included; tibiae black or brownish black. *rufbasis sedula* subsp. nov.

The polished black thoracic stripes of the present fly give it a superficial resemblance to species of the *munda* group, as *L. (P.) munda* Osten Sacken and *L. (P.) mundaoides* Alexander. The nature or cause of the polished black praescutal stripes or the entirely polished mesonotum in certain of the species is still not entirely understood. That it represents a normal and not an abraded condition seems certain, since in *politissima* the condition is found in general individuals and furthermore the bloom or pruinosity of the praescutal interspaces is never disturbed, as would be the case if the notum were accidentally denuded.

***Limnophila (Prionolabis) rudimentis* sp. nov.** — General coloration of thoracic notum black, heavily dusted with yellowish gray to give an opaque appearance; wings of male full-sized, broad, unpatterned except for the small stigma; wings of female rudimentary, with distorted venation; male hypopygium with ninth tergite produced into conspicuous submedian lobes on either side of a shallow median notch; inner dististyle bifid; ovipositor with tips of cerci truncated and narrowly blackened.

♂. Length, about 6.5-8 mm.; wing, 7-10 mm.

♀. Length, about 7 mm.; wing, 4 mm.

Male.—Rostrum black, sparsely pruinose; palpi black. Antennae relatively short, black throughout, 16-segmented; flagellar segments oval, the outer segments becoming more elongate to subcylindrical; verticils conspicuous, the longest ones unilaterally distributed. Head black, sparsely grayish yellow pruinose.

Pronotum and mesonotum black, heavily dusted with yellowish gray, the surface entirely opaque and without distinct praescutal stripes, the interspaces indicated only by sparse yellow setae. Pleura black, sparsely pruinose. Halteres

yellow. Legs with the coxae brown, sparsely pruinose; trochanters obscure yellow; femora obscure yellow to brownish yellow, the tips rather narrowly blackened, the amount subequal on all legs; tibiae brown, the tips blackened; tarsi black; legs slender, with conspicuous appressed setae. Wings (Fig. 13) with a pale brownish yellow tint, the prearcular field and costal border clearer yellow; stigma small, oval, pale brown; no evident or conspicuous darkened seams, on wing, as the origin of R_s , cord or vein Cu ; veins brown, yellow in the flavous portions, especially the wing-base. Wings relatively broad. Venation: R_{2+3+4} very variable in length, in cases cell R_3 sessile but usually short-petiolate; cell 1st M_2 short-rectangular; $m-cu$ usually not far from midlength of cell 1st M_2 .

Abdomen, including hypopygium, black, the surface sparsely pruinose. Male hypopygium (Fig. 16) with the caudal margin of tergite produced into conspicuous submedian lobes on either side of a shallow U-shaped notch. Outer dististyle, *od*, with apical blade broadly expanded. Inner dististyle, *id*, with lateral arm nearly as long as the stout axis but very slender, blackened; teeth of axial arm short and appressed, as in *walleyi*. Gonapophyses, *g*, slender, the narrowed apical portion gently curved laterad.

Female.—Differing from the male chiefly in the subatrophied wings, which are not more than one-half to two-fifths the length of those of male and correspondingly narrow so the total area is only fractional to that of male. Legs correspondingly short and stout, the vestiture even longer and more outspreading. Wings (Fig. 14) distorted, strongly pointed at outer end, all veins found in the male evident but malformed; petiole of cell M_1 very long, the cell correspondingly shortened; $m-cu$ close to fork of M . Genital segment abruptly obscure yellow or castaneous yellow; cerci microscopically truncated and narrowly blackened at tips.

Holotype, ♂, Forney Ridge trail, North Carolina, 6,000 ft., June 18, 1940 (C. P. Alexander). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, several ♂♂, with types; *paratypes*, several ♂♂, 1 ♀, Mount Leconte, Tennessee, 6,000-6,400 ft., June 13, 1939 (Alexander & Harrison); 1 ♂, Newfound Gap, North Carolina, 5,000 ft., June 17, 1940.

The nearest allies among the described species are *Limnophila (Prionolabis) politissima* sp. nov. and *L. (P.) walleyi* Alexander, both of which have the structure of the male hypopygium somewhat similar. The subapterous condition of the female of the present fly is the first case of this kind found in any member of the tribe Hexatomini in eastern North America although several Japanese species of *Prionolabis* have females with reduced wings and such a discovery was not surprising. In degree, the wing reduction is about the same as in females of the Pediciine fly *Pedicia (Nasiternella) hyperborea* (Osten Sacken) of northern North America. A single female of this new fly was found on Mount Leconte in 1939 but since it was not definitely associated with any male it was deemed advisable to postpone discussion of the novelty until more female specimens were discovered as was done in 1940. The species was not uncommon along the trail between Forney Ridge and Andrews Bald,

the abundant males flying low over the herbage and evidently seeking the subapterous females.

Limnophila (Prionolabis) rufibasis sedula subsp. nov.

♂. Length, about 9-12 mm.; wing, 10-13 mm.

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

Characters as in the typical form but the black of the legs very extensive, on the fore femora including more than the distal two-thirds, on the middle and hind femora virtually the distal third; tibiae either dark brown with blackened tips or uniformly black; tarsi black. Lateral and sublateral portions of praescutum more or less nitidous, the broad median area always opaque.

Holotype, ♂, Grandfather Mt., North Carolina, 4,000 ft., June 2, 1940 (C. P. Alexander). *Allotopotype*, ♀, pinned with type. *Paratypes*, ♂ ♀, Mitchell, 5,200-6,200 ft., June 6-8, 1940; Tennessee, Leconte, Huffs Lodge, 6,400 ft., June 13, 1939; Rainbow Trail, 5,500-6,200 ft., June 13, 1939 (W. H. Harrison); Greenbrier Cove, 2,500-3,500 ft., May 7, 1939, June 15, 1940 (Cole & Alexander); North Carolina, Clingmans Dome, 6,640 ft., June 6, 1939; Forney Ridge trail, 6,000 ft., June 11, 1939.

This had been earlier (Amer. Midl. Nat. 24:632; 1940) recorded as *rufibasis* Osten Sacken but since all materials show the characters described above and indicated in the preceding key, it seems best to provide the fly with a distinctive subspecific name.

Limnophila (Prionolabis) walleyi Alexander, 1929. — Mount Mitchell, 6,000-6,500 ft., June 8, 1940.

Limnophila (Phylidorea) adusta Osten Sacken, 1859. — Black Mountains, June 15, 1912 (Beutenmuller).

Limnophila (Phylidorea) consimilis consimilis Dietz, 1921. — Low Gap, altitude about 3,500 ft., July 9, 1940.

Limnophila (Phylidorea) consimilis griseipleura subsp. nov.

♂. Length, about 7-7.5 mm.; wing, 7.5-8 mm.

♀. Length, about 7-9.5 mm.; wing, 7.5-10 mm.

Distinguished from the other forms of *consimilis* chiefly by the color of the thorax which is blackened and heavily pruinose, without any of the polished reddish color of the typical subspecies.

Antennae with flagellum obscure yellow, contrasting markedly with the dark brown scape and pedicel. Head clear light gray, the anterior vertex broad, silvery. Praescutal stripes not differentiated from the ground, the surface of the mesonotum entirely opaque. Pleura heavily gray pruinose, only the meral region more brightened. Halteres uniformly pale or with knobs slightly darkened. Femoral tips broadly blackened, most extensively so on fore pair, least so on posterior femora. Wings with the ground color pale yellow; cells C and Sc, together with the outer radial and medial cells, slightly more infuscated; no darkened seam along cord, outer end of cell 1st M_2 or vein Cu. Venation: K_1 strongly angulated at origin; cells 1st M_2 small, with *m-cu* at near mid-length.

Holotype, ♂, Mount Mitchell Game Refuge, North Carolina, 3,000 ft., June 6, 1940 (*C. P. Alexander*). *Allotopotype*, ♀, 3,200 ft., June 5, 1940. *Paratopotypes*, 1 ♂, 1 ♀, 3,100 ft., June 6, 1940; *paratype*, 1 ♂, Low Gap, June 1, 1940.

In the opaque gray coloration of the thoracic notum and pleura, the present fly differs markedly from typical *consimilis* and its various subspecies. The structure of the male hypopygium is so similar in the various forms that it seems advisable to consider them only as subspecies.

Limnophila (Phylidorea) stupkai Alexander, 1940. — Smokies, Newfound Gap, 5,000 ft.; Clingmans Dome, 6,000 ft., June 11, 1939; Forney Ridge trail to Andrews Bald, 5,000-6,200 ft., June 11, 1939, June 17-18, 1940.

Limnophila (Phylidorea) subcostata (Alexander 1911). — Forney Ridge, 6,000-6,200 ft., June 18, 1940.

Limnophila albipes Leonard, 1913. — Linville Falls, 3,200 ft., June 21, 1939.

Limnophila brevifurca Osten Sacken, 1859. — Grandfather Mt., 4,000 ft., June 2, 1940; Mitchell, above Toe River Gap, 5,500 ft., along springy banks carpeted with *Houstonia serpyllifolia* Michx.; above Camp Alice, 6,000-6,200 ft., June 7, 1940; Mitchell, Forney Ridge to Andrews Bald, 5,800-6,000 ft., June 18, 1940.

Limnophila cherokeensis Alexander, 1940. — Smokies, Newfound Gap, 5,000 ft., June 17, 1940; Clingmans Dome, Silers and Forney Ridge trails, 5,800-6,300 ft., June 6-18, 1939, June 18-19, 1940; one of the commonest crane-flies in the Great Smokies, occurring in small groups near all small lateral streamlets crossing the trail, very conspicuous by the white posterior tarsi.

Limnophila globulifera Alexander, 1941. — Linville Falls, 3,200 ft., June 21, 1939; Mount Mitchell, along trail above Camp Alice, 6,300 ft., in red spruce forests, June 8, 1940 (type material).

Pilaria quadrata (Osten Sacken, 1859). — Linville Falls, near spring, 3,150 ft., July 9, 1940.

Pilaria recondita (Osten Sacken, 1869). — Linville Falls, 3,300 ft., June 3, 1940.

Pilaria stanwoodae (Alexander, 1914). — Highlands, June 21, 1930 (*Rogers*). I can see no differences between this material and the types from northeastern North America.

Ulmomorpha pilosella (Osten Sacken, 1859). — Linville Falls, 3,200 ft., June 21, 1939; Black Mountains, May 29, 1912 (*Beutenmuller*); Bald Knob Ranger Station, Mitchell, 5,200 ft., June 22, 1939; Nantahala Gorge, June 8, 1939; Smokies, Andrews Bald bog, 5,600-5,700 ft., June 11, 1939, associated with next species; Smokemont, 2,200-3,200 ft., June 20-30, 1940.

Ulmomorpha rogersella Alexander, 1929. — Highlands, Ravenels woods, 4,400 ft., June 15, 1940; Smokies, Andrews Bald, in vicinity of bog beneath dense thickets of *Rhododendron catawbiense* Michx. and *Leucothoë Catesbaei* (Walt.) Gray.

Shannonomyia lenta (Osten Sacken, 1859). — Black Mountains, June 6, 1912 (*Beutenmuller*); Mitchell Game Refuge, 3,200 ft., June 22, 1939, June 5-9, 1940; Cullasaje River, near Highlands, 3,750 ft., June 14, 1940; Smoke-mont, June 20-30, 1940.

Hexatoma (Eriocera) albitarsis (Osten Sacken, 1869). — Linville Falls, 3,200 ft., June 21, 1939; Black Mountains, July 3, 1912 (*Beutenmuller*); Bald Knob Ranger Station, Mitchell, 5,200 ft., June 22, 1939; Nantahala Gorge, June 8, 1939. Confused in collections with *H. (E.) brevioricornis*.

Hexatoma (Eriocera) brachycera (Osten Sacken, 1877). — Smokies, Smokemont, 2,200 ft., June 30, 1940, a single male, flying very close to surface over a small stream.

***Hexatoma (Eriocera) brevioricornis* sp. nov.**

♂. Length about 7-9 mm.; wing, 8-9 mm.; antenna, about 3.5 mm.

♀. Length, about 9-10 mm.; wing, 9-10.5 mm.

(*H. (E.) albitarsis*. — ♂. Length 6.5-8 mm.; wing, 7.5-8 mm.; antenna, about 5 mm.)

Very similar to *albitarsis*, differing especially in the short antennae of the male sex which are usually less than one-half the length of the body. When compared with *albitarsis*, the antennae are seen to be much shorter, the total length of the flagellum being about equal to the basal two flagellar segments only in *albitarsis*. Wings somewhat more hyaline.

Holotype, ♂, Orient Springs, Hampshire Co., Massachusetts, July 29, 1929 (*C. P. Alexander*). *Allotype*, ♀, Boobs Backwater, Forest Home, Ithaca, N. Y., July 13, 1912 (*C. P. Alexander*). *Paratypes*, several ♂ ♀, with the allotype; Needham's Glen, Ithaca, N. Y., July 1910 (*C. P. Alexander*); Cincinnati, N. Y., July 20, 1916 (*C. P. Alexander*); Linville Falls, North Carolina, 3,200 ft., June 21, 1939 (*C. P. Alexander*); Smokemont, 2,200 ft., June 20, 1940; Myers Lodge, Cades Cove, Smokies, Tennessee, 2,200 ft., June 17, 1939 (*M. M. Alexander*); 1 ♀, Knowlton, Quebec, July 4, 1929 (*G. S. Walley*).

This species was to have been described in the still unpublished "Diptera of Connecticut" but it seems advisable to remove the new species in that work and publish their diagnoses elsewhere.

Hexatoma (Eriocera) cinerea (Alexander, 1912). — Low Gap, altitude about 3,500 ft., June 1, 1940, along small mountain stream.

Hexatoma (Eriocera) fuliginosa (Osten Sacken, 1859). — Smokies, Smokemont, 2,200 ft., June 20, 1940.

Hexatoma (Eriocera) longicornis (Walker, 1848). — Black Mountains, June 1912 (*Beutenmuller*).

Elephantomyia (Elephantomyia) westwoodi Osten Sacken, 1869. — Blowing Rock, June 2, 1940; Linville Falls, 3,200 ft., June 21, 1939; Black Mountains, June 14-July 1, 1912 (*Beutenmuller*); Nantahala Gorge, June 8, 1939.

Atarba (Atarba) picticornis Osten Sacken, 1869. — Linville Falls, 3,200 ft., June 21, 1939; Black Mountains, June 9, 1912 (*Beutenmuller*); Mitchell Game Refuge, 3,200 ft., June 22, 1939; Smokies, Smokemont, 2,200 ft., June 20-30, 1940.

ERIOPTERINI

Neolimnophila appalachicola sp. nov.

1940. *Neolimnophila ultima* (Osten Sacken, 1859), var.; Amer. Midl. Nat. 24:636.

♂. Length, about 6-6.5 mm.; wing, 7-7.5 mm.

♀. Length, about 6.5-7 mm.; wing, 7.5-8.5 mm.

Compared with *ultima*, differing as follows: Mesonotum yellowish gray, the praescutum without distinct stripes or with a poorly defined median vitta, the lateral stripes not or scarcely differentiated against the ground. In *ultima*, the mesonotum is clear gray, the praescutum with four clearly defined brown stripes. Wings (Fig. 17) with a weak brownish tinge; a more or less distinct dark seam along vein *Cu* in cell *M*. In *ultima*, wings clearer, subhyaline, without a seam along vein *Cu*. Macrotrichia of veins slightly longer than in *ultima*, conspicuous. Venation: *R*₅ but little arcuated at origin, longer than *R*₂₊₃₊₄ or cell *R*₃; *R*₂ beyond the fork of *R*₂₊₃₊₄; subequal to *R*₂₊₃. In *ultima*, *R*₂₊₃₊₄ is usually much longer, subequal to or exceeding *R*₅ and longer than cell *R*₃; *R*₂ commonly before the origin of cell *R*₃; *m-cu* close to midlength of cell 1st *M*₂, in cases a little before or beyond this point. Male hypopygium (Fig. 21) with the basistyle, *b*, provided with two very unequal spines, the small one subglabrous or with reduced setae, the longer spine with delicate appressed setae. Outer dististyle, *od*, long and slender, especially its distal portion, the basal three-fourths glabrous, the apex with scabrous points. Gonapophyses, *g*, extended laterad into spinous points, the surface with relatively sparse, microscopic scutulae. In *ultima* both spines of basistyle with conspicuous setae, those of the major spine more evidently erect. Outer dististyle broad-based, with microscopic corrugations or roughenings over most of the outer surface, the apex more strongly arched. Setae of gonapophyses long and conspicuous.

Holotype, ♂, Forney Ridge, Great Smokies, North Carolina, 6,000 ft., June 18, 1940 (C. P. Alexander). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 2 ♀ ♀, with the types; *paratypes*, 12 ♀ ♀, resting on faces of vertical cliffs near Newfound Gap, associated with *Dactylolabis montana*, June 17, 1940 (C. P. & M. M. Alexander); 3 ♀ ♀, Rainbow Trail, Mt. Leconte, Tennessee, 3,500 ft., June 13, 1939 (C. P. Alexander).

I had tentatively determined females of this fly as representing a variety of *ultima* (Osten Sacken). In 1940, the male sex was discovered and it now seems evident that the fly represents a distinct species. *Neolimnophila appalachicola* differs from the only other described Nearctic species, *ultima*, as indicated in the description. The relative indistinctness of the praescutal stripes in the present fly as compared with the condition in *ultima* is about paralleled in *Dactylolabis hudsonica* Alexander in its relation to *D. montana* (Osten Sacken). Whether *ultima* will prove to be a synonym of the earlier name *placida* (Meigen) of Europe remains in question.

Lipsothrix sylvia (Alexander, 1916). — Blowing Rock, June 2, 1940; Grandfather Mt., 4,000 ft., June 2, 1940; Linville Falls, 3,200 ft., June 3, 1940; Black Mountains, May 21, 1912 (*Beutenmuller*); Mitchell, Game

Refuge, 3,200 ft., June 6, 1940; Settock Creek, 5,000 ft., June 7, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11-15, 1940; Nantahala Gorge, June 8, 1939; Smokemont, 2,400 ft., June 20, 1940.

Gnophomyia (Gnophomyia) luctuosa Osten Sacken, 1859. — Black Mountains, May 1906 (*Beutenmuller*).

Gonomyia (Lipophleps) manca (Osten Sacken, 1869). — Low Gap, July 9, 1940; Linville Falls, 3,300 ft., July 8, 1940; Mitchell Game Refuge, 3,250 ft., June 22, 1930; Smokemont, 2,200 ft., June 30, 1940.

Gonomyia (Lipophleps) sacandaga Alexander, 1914. — Highlands, along Cullasaje River opposite Van Hook Glade, 3,750 ft., June 13-14, 1940. Associated with *Gonomyia (Lipophleps) sulphurella* Osten Sacken and *Rhabdomastix flava* (Alexander). It may be noted that conditions here were very similar to those along the Sacandaga River, Fulton Co., New York, where the types of the present fly and the *Rhabdomastix* were taken. On the nearby higher banks occur white pine, hemlock, oak, and dense thickets or hobbles of *Rhododendron maximum* L. and *Leucothoë Catesbaei* (Walt.) Gray.

Gonomyia (Lipophleps) sulphurella Osten Sacken, 1859. — Highlands, along Cullasaje River, 3,750 ft., June 13-14, 1940, associated with the last. All such species were swept from very sparse herbage and low shrubs on small sand spits close to the water's edge.

Gonomyia (Gonomyia) subcinerea Osten Sacken, 1859. — Low Gap, July 9, 1940; Linville Falls, 3,300 ft., June 3, 1940; Highlands, Cliffside Lake, 4,000 ft., June 11, 1940; Smokemont, 2,200 ft., June 30, 1940.

Rhabdomastix flava (Alexander, 1911). — Low Gap, July 9, 1940, small individuals but apparently conspecific; Mitchell Game Refuge, along Neals Creek, 3,200 ft., associated with the vastly abundant *Molophilus auricomus* Alexander; Highlands, along Cullasaje River, 3,750 ft., June 13-14, 1940, associated with *Gonomyia (Lipophleps) sacandaga* Alexander.

Rhabdomastix hansonii Alexander, 1939. — Linville Falls, along Dugger Creek, 3,200 ft., July 8, 1940; Smokemont, 2,200 ft., June 30, 1940.

Rhabdomastix margarita Alexander, 1940. — Linville Falls, 3,200 ft., June 21, 1939 (*M. M. Alexander*); part of type material.

Ormosia (Ormosia) adirondacensis Alexander, 1919. — Blowing Rock, June 2, 1940; Linville Falls, 3,300 ft., June 21, 1939, June 3, 1940; Mitchell Game Refuge, 3,200 ft., June 4-6, 1940.

Ormosia (Ormosia) apicalis Alexander, 1911. — Smokies, Smokemont, 2,200 ft., June 20-30, 1940.

Ormosia (Ormosia) bilineata (Dietz, 1916). — Smokies, Forney Ridge trail, 6,000 ft., June 18, 1940.

Ormosia (Ormosia) brevicealcarata Alexander, 1929. — Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Cedar Mt., August 24, 1932 (*Townes*).

Ormosia (Ormosia) holotricha (Osten Sacken, 1859). Blowing Rock, June 2, 1940; some specimens with cell 1st M_2 of wings open, others closed;

all swept from beneath low earthen banks along roads, a common habitat of this species; Linville Falls, 3,300 ft., June 3, 1940.

Ormosia (Ormosia) innocens (Osten Sacken, 1869). — Mitchell, trail across Setrock Creek, 5,000 ft., in red spruce-northern hemlock forest, June 7, 1940; Highlands, Cliffside Lake, 4,000 ft., along a *Rhododendron*-banked stream.

Ormosia (Ormosia) lilliana Alexander, 1940. — Smokies, Forney Ridge trail, 5,800-6,300 ft., June 6, 1939 (part of type material), 6,000 ft., June 17-18, 1940.

Ormosia (Ormosia) mitchellensis sp. nov. — General coloration dark gray, including the thorax; praescutum without distinct markings; antennae short; halteres pale yellow; legs dark brown, the femoral bases yellow; wings with a weak brown tinge, the ill-defined stigma darker brown; vein *2nd A* weakly sinuous on distal third; male hypopygium dark-colored, massive; outer dististyle heavily blackened, bearing a long sinuous rod, the main mass of the style with from two to four additional smaller points; inner dististyle simple, parallel-sided, the apex obtuse; gonapophyses each with two slender unequal blackened branches.

♂. Length, about 4.4-5 mm.; wing, 4.3-5 mm.

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

Rostrum dark gray; palpi black. Antennae short, dark brown; flagellar segments oval, the verticils considerably longer than the segments. Head gray.

Pronotum brownish gray; anterior pretergites obscure yellow. Mesonotum almost uniform dark gray, the praescutum without distinct markings. Pleura dark brownish gray, the dorsopleural membrane dark. Halteres pale yellow. Legs with the coxae pale brown to testaceous; trochanters obscure yellow; femora obscure yellow basally, passing into brown; tibiae and tarsi dark brown. Wings (Fig. 19) with a weak brown tinge, the prearcular field and basal portion of costal region pale yellow; stigma darker brown, ill-delimited; veins medium brown, those of the prearcular field yellow. Macrotrichia abundant in all cells but sparser in the more proximal parts of wing. Venation: *Sc*₁ ending opposite or beyond the slightly oblique *R*₂; *m-cu* at or before fork of *M*; vein *2nd A* weakly sinuous on distal third.

Abdomen dark gray, the large hypopygium dark-colored, deep castaneous. Male hypopygium (Fig. 26) with the tergite, *9t*, gently widened outwardly, the apex truncate to feebly crenate. Outer dististyle, *od*, heavily blackened, the main mass bearing from two to four spinous points; near base on side with a further long curved black rod, its tip acute. Inner dististyle, *id*, a simple, parallel-sided, pale blade, the tip truncate or obtuse, near outer end with numerous punctures, including one major seta. Gonapophyses, *g*, blackened, appearing as two slender, gently curved branches, the inner much longer than the outer one.

Holotype, ♂, Mount Mitchell, 6,200 ft., June 8, 1940 (*C. P. Alexander*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 28 ♂ ♀, 6,000-6,200 ft., with the types.

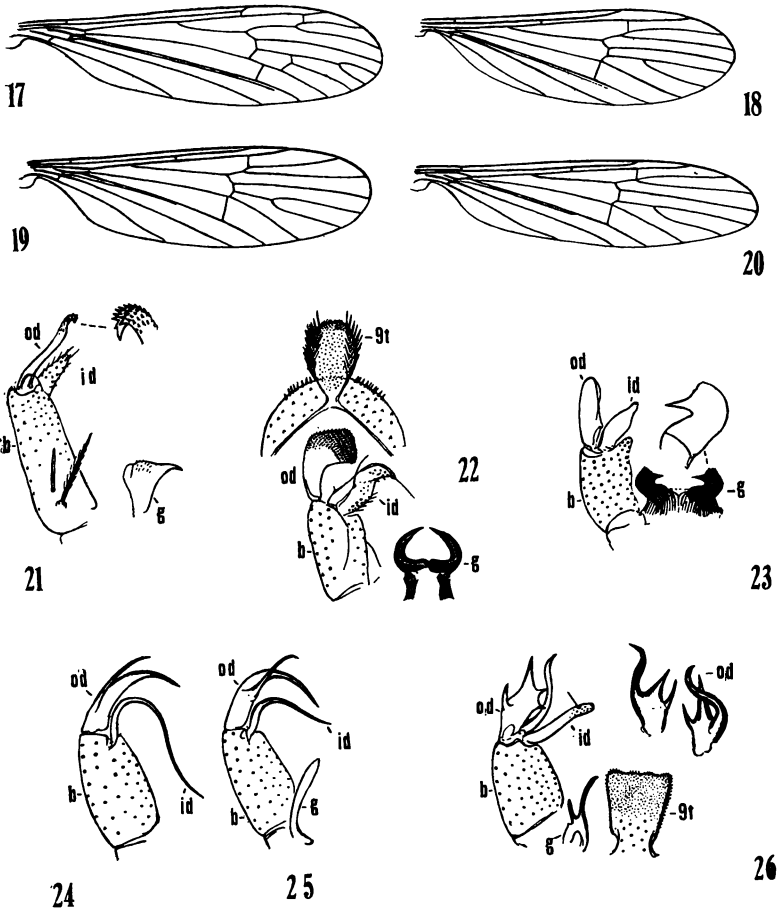


Fig. 17. *Neolimnophila appalachicola* sp.n.; venation. Fig. 18. *Erioptera* (*Mesoclyphona*) *serpentina* sp.n.; venation. Fig. 19. *Ormosia* (*Ormosia*) *mitchellensis* sp.n.; venation. Fig. 20. *Ormosia* (*Ormosia*) *subdentifera* sp.n.; venation. Fig. 21. *Neolimnophila appalachicola* sp.n.; male hypopygium. Fig. 22. *Erioptera* (*Ilisia*) *sweetmani* Alexander; male hypopygium. Fig. 23. *Ormosia* (*Ormosia*) *subdentifera* sp.n.; male hypopygium. Fig. 24. *Erioptera* (*Mesoclyphona*) *serpentina* sp.n.; male hypopygium. Fig. 25. *Erioptera* (*Mesoclyphona*) *needhami* Alexander; male hypopygium. Fig. 26. *Ormosia* (*Ormosia*) *mitchellensis* sp.n., male hypopygium. (Symbols: b, basistyle; g, gonapophysis; id, inner dististyle; od, outer dististyle; t, 9th tergite.)

The nearest allies are *Ormosia (Ormosia) bilineata* (Dietz) and *O. (O.) notmani* Alexander, both of which have the male hypopygium of this same general structure yet with all details distinct. The entirely simple inner dististyle and the long lateral rod of the outer style provide marked specific characters. The types occurred in small dancing swarms near Camp Alice, along the Camp Alice or Lower Creek, flying among dense low growth of Fraser fir-red spruce, with dense thickets of *Rhododendron catawbiense* Michx. They were always close to the stream margin, flying in groups of five to ten specimens.

Ormosia (Ormosia) nubila (Osten Sacken, 1859). — Linville Falls, 3,300 ft., June 3, 1940.

Ormosia (Ormosia) pygmaea (Alexander, 1912) (*pilosa* Dietz, 1916). — Low Gap, June 1, 1940; Linville Falls, 3,300 ft., June 3, 1940, among *Rhododendron* thickets. From the structure of the male hypopygium, the present specimens surely pertain to *pygmaea* rather than to the closely related and similar *nigripila* (Osten Sacken). The hypopygium of the type male of the latter (from Washington, D. C., in the Museum of Comparative Zoology) has never been mounted and studied but topotypical specimens would indicate that the name *nigripila* applies to the species with the gonapophyses of the male hypopygium an elongate simple spine. In the present fly this structure is shorter and stouter, conspicuously bidentate at apex. The hypopygium of *luteola* Dietz (1916) is very similar to that of *pygmaea* and it is somewhat questionable as to whether this represents a valid species.

Ormosia (Ormosia) subdentifera sp. nov. — Allied to *dentifera*; general coloration light gray; male hypopygium with the gonapophyses appearing as very stout and powerful black rods, the inner or mesal margin before apex produced inward as a straight spine, the apex beyond this point with vague microscopic serrulations.

♂. Length, about 4.4-5 mm.; wing, 4.5-5 mm.

♀. Length, about 4.5-5 mm.; wing, 5-5.5 mm.

Rostrum dark brown; palpi black. Antennae short; basal segments dark brown, flagellum black; flagellar segments oval to long-oval. Head gray.

Pronotum gray. Mesonotum light gray, the praescutum without evident dark markings, the interspaces delimited by setigerous punctures; pseudo-sutural foveae and tuberculate pits black; lateral pretergites yellow. Pleura gray, the sternopleurite more yellowish gray; dorso-pleural membrane yellow. Halteres pale yellow. Legs with the coxae yellow, the fore pair slightly more darkened; trochanters yellow; femora dark brown, their bases obscure yellow; tibiae brown; tarsi darker brown. Wings (Fig. 20) with a weak brownish tinge, the stigmal area darker brown but ill-delimited; veins pale brown. Macrotrichia of cells abundant, somewhat less numerous in the extreme basal cells. Venation: R_2 at or very close to fork of R_{2+3+4} ; $m-cu$ close to fork of M ; vein 2nd A sinuous on distal third.

Abdominal tergites brown; sternites and hypopygium yellow. Male hypo-

pygium (Fig. 23) with the outer dististyle, *od*, entirely blackened, the apex obtuse, the surface smooth. Inner dististyle, *id*, strongly narrowed on distal fourth. Gonapophyses, *g*, appearing as very stout and powerful black rods, the inner or mesal margin before apex produced inward as a straight spine, the apex beyond this point in cases with vague microscopic serrulations. The apophyses are quite different in form from those of *dentifera* or *lilliana* and offer the chief character for ready recognition of the species. *O. dentifera* has these apophyses of moderate stoutness, the mesal or inner face at near mid-length with a slender erect or slightly recurved spine that is smaller and more slender than the apical one; in cases with further smaller denticles close to base of this spine. *O. lilliana* has the apophyses unusually slender and strongly curved, gradually narrowed to a long spine, the accessory denticles of mesal face placed at extreme base of the apophysis.

Holotype, ♂, Mount Mitchell, 6,400 ft., June 8, 1940 (*C. P. Alexander*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 10 ♂ ♀, 5,000-6,400 ft., June 7-8, 1940 (*C. P. & M. M. Alexander*).

Ormosia (Ormosia) subdentifera is quite distinct from its near regional allies, *O. (O.) dentifera* Alexander and *O. (O.) lilliana* Alexander, as shown by the comparisons given above. To the present time, this fly has been taken only at high altitudes in the Black Mountain Range in the Blue Ridge Mountains, while *lilliana* has been found at comparable altitudes in the Great Smokies of the Unakas, under similar conditions and at the same general date. Both species occur along small streams or rills in the zone of Frasers fir and red spruce.

Ormosia (Ormosia) townesi Alexander, 1933. — Cedar Mt., altitude about 2,700 ft., August 27-28, 1931 (*Townes*).

Erioptera (Erioptera) chlorophylla Osten Sacken, 1859. — Low Gap, July 9, 1940; Smokemont, 2,200 ft., June 30, 1940.

Erioptera (Erioptera) chrysocoma Osten Sacken, 1859. — Linville, 3,700 ft., July 7, 1940; Linville Falls, June 21, 1939, July 9, 1940.

Erioptera (Erioptera) megophthalma Alexander, 1918. — Linville Falls, 3,250 ft., near spring, June 3, 1940.

Erioptera (Erioptera) septemtrionis Osten Sacken, 1859. — Mitchell, Camp Alice, 6,000 ft., June 7, 1940.

Erioptera (Hoplolabis) armata Osten Sacken, 1859. — Low Gap, June 1, 1940; Blowing Rock, June 2, 1940; Mitchell, Game Refuge, 3,200 ft., June 4, 1940; Highlands, Van Hook Glade, swale, 3,800 ft., June 13, 1940.

Erioptera (Ilisia) laevis restricta subsp. nov. — Close to the typical form, *laevis* Alexander, 1930, of northeastern North America, differing in the coloration of the praescutum which is bright orange yellow, more darkened near the suture. Dark markings of the wing narrower and more restricted, the spot at midlength of vein *Cu* reduced in size to virtually lacking. The conformation of the inner dististyle of the male hypopygium similarly differs slightly in the two forms, the lower edge of the blade being more nearly straight in the present fly.

Holotype, ♂, Linville Falls, North Carolina, 3,300 ft., June 3, 1940 (C. P. Alexander). *Allotopotype*, ♀, 3,200 ft., June 3, 1940.

Erioptera (Ilisia) sweetmani Alexander, 1940. — Described from a unique male taken at Toccoa Falls, Stephen Co., Georgia, April 19, 1939, by Dr. Harvey L. Sweetman, found resting on the cliff faces near the falls. I took a trip to this station in June 1940 endeavoring to locate more of the species but was unsuccessful. Later, a male was taken at Low Gap, North Carolina, July 9, 1940, swept from low vegetation along a small clear stream.

The fore tibia of the male shows a linear flange beginning just beyond the base and extending for nearly one-fifth the length of the entire tibia. This flange and the adjoining portion of the tibia is darker in color than the remainder and is thus correspondingly conspicuous. There are indications of a similar structure in *armillaris* and other species of the subgenus though not as distinct as in the present fly. The peculiar male hypopygium is shown (Fig. 22). The present metatypical specimen agrees very closely with the type, even in the relative size of the various darkened areas on the wing and in the proportions of the broad black femoral rings.

Erioptera (Ilisia) venusta Osten Sacken, 1859. — Linville Falls, 3,300 ft., June 3, 1940.

Erioptera (Symplecta) cana (Walker, 1848) (*hybrida* Meigen, 1804, of American authors, not of Meigen). — Raleigh, October 26, 1906 (R. S. Woglum).

Erioptera (Mesocyphona) caloptera Say, 1823. — Linville Falls, along Dugger Creek, 3,300 ft., July 8, 1940, swept from beds of *Zanthorhiza*.

Erioptera (Mesocyphona) needhami Alexander, 1918. — Low Gap, July 9, 1940; Highlands, Bridal Veil Falls, 3,800 ft., June 12, 1940; Cashiers, bog, 3,800 ft., June 12, 1940.

***Erioptera (Mesocyphona) serpentina* sp. nov.**

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

Generally similar to *E. (M.) needhami*, differing especially in the structure of the male hypopygium.

Mesonotum of type almost uniform brownish yellow, the praescutum without clearly defined stripes. Knobs of halteres weakly darkened. Darkened femoral ring about twice as wide as the whitened apex. Wings (Fig. 18) much as in *needhami* in the distribution of the white areas; in the holotype these areas are more extensive than in the paratype, the costal series being more extensive than the darkened interspaces while the outer radial and medial fields are more variegated by pale spots and dots than in other specimens.

Male hypopygium (Fig. 24) with the dististyles differing conspicuously from *needhami*; outer dististyle, *od*, bifid, the lower arm broad-based, the apical part blackened, about one-half as long as the expanded base. Inner dististyle, *id*, very long and sinuous, nearly twice as long as either arm of the outer dististyle. In *needhami* (Fig. 25) the lower arm of the outer dististyle, *od*, has the apical blackened part much longer, equal to or exceeding in length the

slender second arm. Inner dististyle, *id*, much shorter, subequal in length to the total length of the outer dististyle.

Holotype, ♂, Low Gap, Surry Co., North Carolina, July 9, 1940 (*C. P. Alexander*). *Paratypes*, 2 ♂♂, Amherst, Massachusetts, along the Central Vermont railroad tracks east of town, July 25, 1928 (*C. P. Alexander*); in company with *needhami*. The area is a low swale with considerable sheep laurel, *Kalmia angustifolia* L.

Erioptera (Mesocyphona) parva Osten Sacken, 1859. — Smokies, Smoke-mont, 2,200 ft., June 30, 1940.

Erioptera (Empeda) stigmatica (Osten Sacken, 1869). — Low Gap, June 1, 1940; Linville Falls, 3,250 ft., July 9, 1940.

Erioptera (Gonempeda) nyctops Alexander, 1916. — Smokies, Forney Ridge trail, 6,000-6,300 ft., June 18, 1940; occurred in small swarms and resting on patches of *Clintonia borealis* (Ait.) Raf.

Tasiocera (Dasymolophilus) ursina (Osten Sacken, 1859). — Blowing Rock, June 2, 1940; Mitchell, Bald Knob Ranger Station, 5,200 ft., June 22, 1939; Conestee Falls, June 12, 1940; Smokies, above Smokemont, 3,500 ft., June 20, 1940.

Molophilus (Molophilus) auricomus Alexander, 1926. — Linville Falls, along Dugger Creek, 3,300 ft., July 8, 1940, in thickets of *Rhododendron maximum* L. and *Galax*, beneath shade of northern hemlock; Mitchell, along Neals Creek, 3,200 ft., occurred in myriads among dense thickets of *Rhododendron maximum* beneath the shade of northern hemlock, June 6, 1940; Highlands, Cliffside, 4,000 ft., June 11, 1940; Cashiers, 3,800 ft., June 12, 1940; Smokies, above Smokemont, 3,200 ft., June 20, 1940.

Molophilus (Molophilus) forcipulus (Osten Sacken, 1869). — Low Gap, June 1, July 9, 1940; in boggy area.

Molophilus (Molophilus) fultonensis Alexander, 1916. — Low Gap, June 1, 1940; Linville Falls, 3,200 ft., June 21, 1939; Mitchell Game Refuge, 3,200 ft., June 4, 1940; Cashiers, bog, 3,800 ft., June 12, 1940; Cedar Mt., August 27-28, 1931 (*Townes*); Smokies, Forney Ridge trail, 5,800-6,200 ft., June 12, 1940.

Molophilus (Molophilus) hirtipennis (Osten Sacken, 1859). — Grandfather Mt., 4,000 ft., June 2, 1940; Mitchell, Game Refuge, 3,200 ft., June 6, 1940; Bald Knob Ranger Station, 5,200 ft., June 6, 1940; Highlands, Van Hook Glade, 3,800 ft., June 11, 1940; Smokies, Forney Ridge trail, 5,800-6,200 ft., June 11, 1939, June 18, 1940.

Molophilus (Molophilus) pubipennis (Osten Sacken, 1959). — Low Gap, June 1, 1940; Linville Falls, 3,200 ft., July 9, 1940.

Cryptolabis (Cryptolabis) paradoxa Osten Sacken, 1859. — Black Mountains, July 14, 1912 (*Beutenmuller*).