

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

Part I. Tipuloidea of the Great Smoky Mountains  
National Park, Tennessee

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### Introduction

I began the study of the North American Tipulidae in 1906 and since that date many thousand records of distribution of these flies have been gathered. Most of these data are still unpublished and it is believed that a series of papers making available the more interesting of these records will add materially to our still insufficient knowledge of seasonal and geographical distribution in this family. With this idea in mind, the present paper has been prepared and it is hoped will be followed by others of similar nature.

### General Account

My interest in Tipulidae of the Great Smoky Mountains was aroused when collections made by Dr. Inez W. Williams and Dr. Arthur C. Cole in 1938 and 1939 indicated the extreme richness of the fauna (Cole 1938:276).\* In June 1939, Mrs. Alexander and I, accompanied by Mr. and Mrs. Walter H. Harrison, camped for more than two weeks at the Chimneys Camp in the Tennessee Smokies and the extensive collections made at that time furnish the bulk of the records listed here. Besides the assistance given by Dr. Cole and Dr. Williams, further appreciated cooperation is acknowledged to Miss Mary E. Hickman (now Mrs. Cole) and to Mrs. John Huff. The collections made by Mrs. Huff, wife of the proprietor of Leconte Lodge near the summit of Mount Leconte, were made from June into September 1939 and furnished several records of species not taken by others. All members of our camping party assisted in the collecting of specimens on all of our many trips and this aid is gratefully acknowledged. Special mention is made of the friendliness of the Park Naturalist, Mr. Arthur Stupka, whose interest in the present report has proved a source of much satisfaction and encouragement. It is expected that further collecting in the Tennessee Smokies will be done in 1940 and in subsequent years. The present basic list includes 2 species of Ptychopteridae, together with 160 species of Tipulidae, of which no fewer than 16 species proved to be undescribed. The types of these novelties are preserved in my extensive collection of these flies.

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

The only previous basic paper that considers the Tipulidae of Tennessee is the remarkably fine report of Dr. J. Speed Rogers, on the Summer Crane-fly fauna of the Cumberland Plateau, in Fentress, Morgan and Scott counties (Occas. Pap. Mus. Zool., Univ. Michigan, 215:1-50, 5 pls.; 1930). It is my opinion that this is one of the most valuable papers on the Tipulidae that has ever been published. The Cumberland Plateau report includes no fewer than 68 species of Tipulidae not represented in the present list for the Smokies. In addition, I have available some five further records for Tennessee, so the present State List is approximately 235 species, to which a number of additions will be made. This figure compares well with that of all states in the union excepting those where very detailed and long-term collecting has been done, as New York and Michigan, both of which have more than 300 known species of Tipulidae.

*Collecting Stations.*—The 1939 collections in Tennessee were made in Blount and Sevier counties. The conditions obtaining in the area have been well described by King (1939). The special stations where we collected may be defined briefly:

Chimneys Camp. We camped here between June 4 and 19, using this site as our base. Collections were made along the West Prong of the Little Pigeon River at the Camp (2,700 ft.) and down the main road from the entrance (2,600 ft.).

Over-the-Mountain or Newfound Gap Highway. This trans-montane road permits easy traversal of the Park. Special collecting was done along the Walker Camp Prong, between Grassy Patch (4,000 ft.) and Newfound Gap (5,000 ft.), along the southern spurs of Anakeesta Ridge in the vicinity of the upper tunnel. Such specimens are labelled "*Anakeesta Ridge.*"

The "Skyway" or Forney Ridge Road. This spur road from Newfound Gap to Forney Ridge provides ready access to Andrews Bald (5,860 ft.) in North Carolina; Clingmans Dome (6,640 ft.), highest point in the Park; and along the Appalachian trail (5,000-6,000 ft.) towards Silers Bald. This trail follows the state line between North Carolina and Tennessee and collecting in either state may be done at will. Some further collections were made at Indian Gap (5,000 ft.), one mile from Newfound Gap along the Skyway, by Dr. Cole, Miss Hickman and myself.

Mount Leconte. A trip on June 12 and 13, via the Alum Cave Trail to Grassy Patch on the Newfound Gap Highway, via Alum Cave (5,000 ft.) to Leconte Summit (6,593 ft.). Detailed collecting was done at frequent intervals along the trail and in the boggy area near the spring of the Leconte Lodge (6,400 ft.). The return on the second day was by the Leconte Creek trail, Rainbow Falls and Cherokee Orchard.

Greenbrier Cove. Especially rich collecting along the Fire Road to the Outing Club cabin and along Porters Creek and Cannon Creek, via the Brushy Mountain trail to the summit of Brushy Mountain and return, by way of Half-way Spring and Trillium Gap. One of the most profitable trips taken was on June 15, in company with Dr. Cole, Miss Hickman, and all members of our party. A small accessory stream near the junction of Porters and the

Middle Prong of the Little Pigeon River (1,700 ft.) produced some interesting species, as did the main stream itself.

Cades Cove. Two trips were taken by our party, both via the road over Rich Mountain (2,050 ft.), June 10 and 17. We collected at Rich Mountain and in the vicinity of Myers Lodge, on Forge Creek (1,930 ft.), near the head of the Cove. On June 17, with Mr. and Mrs. Stupka, we took the trip to Gregory Bald via the Gregory Ridge Trail and Rich Gap (2,000-4,595 ft.). Unfortunately, heavy rains on this trip and some others greatly hampered collecting and materially reduced the number of species taken.

Little River Gorge. Some collecting was done along the cliffs of the gorge (1,400 ft.) while enroute to Cades Cove and elsewhere. The country is very definitely Upper Austral and will undoubtedly yield further interesting Tipulidae when thoroughly investigated.

*Plant Associations and Biotic Areas.*—The interrelations existing between Tipulidae and various plant associations are becoming better understood. The different associations and societies of plants harbor very definite species and groups of crane-flies (consult Rogers, J. S., reference previously cited; Alexander, C. P., Cornell Univ. Agr. Expt. Sta. Mem. 25:826-837; 1919). For the area under consideration, unusually complete and important data concerning the forest types of the Smokies are available. The staff and graduate students of the University of Tennessee, under Dr. Stanley A. Cain, Dean L. R. Hesler, Dr. Harry M. Jennison, Dr. Aaron J. Sharp, and others, have performed an invaluable service in rendering this information available to workers on other groups of organisms. The more important of these papers are cited in the brief bibliography furnished at the end of the present introductory account. Particularly helpful toward an appreciation of the interrelationships of the flora and the insect fauna has been the unpublished manuscript, prepared by Cain and co-workers, on the Greenbrier-Brushy Mountain trail (1937).

Cain and Sharp (1938:278) classify the primaevial forest types of the Great Smokies as follows:

1. The subalpine spruce—fir forest.
2. Cove hardwoods forests.
3. The chestnut—oak—hickory—pine complex.

A further subdivision of the first two, of particular interest in the present survey, is given (l.c., p. 250):

- I. Prealpine belt. The Canadian spruce—fir forest.
  1. The southern balsam fir association. *Abies Fraseri* (Pursh) Lindl.
  2. The red spruce association. *Picea rubra* (DuRoi) Dietr. (*Picea rubens* Sargent).
  3. The beech gap associations. *Fagus grandifolia* Ehrh.
- II. Montane belt. The Cove hardwoods forests.
  1. The buckeye—basswood association. *Aesculus octandra* Marsh.—*Tilia neglecta* Spach.
  2. The silverbell—sugar maple association. *Halesia monticola* (Rehder) Sargent—*Acer saccharum* Marsh.

3. The yellow poplar—hemlock association. *Liriodendron Tulipifera* L.—*Tsuga canadensis* (L.) Carr.

In this preliminary survey of the Tipulidae of the Tennessee Smokies, particular attention has been devoted to the six associations above listed, more especially the prealpine belt in the spruce-fir forest.

The definite stations established at various altitudes along the Brushy Mountain trail (Cain *et al.*, 1937) permit a detailed study and comparison with the insect fauna. The stations of greatest interest as they concern the Tipulidae are:

1. The hemlock ridge forest-type (3,000 ft.).
2. Buckeye—basswood forest-type (4,000 ft.).
3. Lead-type laurel slick (4,650 ft.).
4. Subalpine beech gap forest-type (4,717 ft.).
5. Brushy Mountain heath bald (4,900 ft.).
7. Pine-Heath (3,800 ft.).
8. Cove hardwoods, mixed type (2,950 ft.).
10. The red spruce forest-type (4,950 ft.).
11. The southern balsam fir forest-type (6,500 ft.).

The life zones or biotic areas of the Tennessee Smokies are three in number. The lowest, the *Upper Austral* or *Carolinian* includes the coves and the bases of the mountains, involving the Gorge of the Little River. The high summits down to the lower level of spruce and fir (to about 4,500 ft.) are definitely *Canadian* of various degrees. The intermediate zone is *Transition* or *Alleghanian*, invaded in the gullies and on the ridges by encroachments from the other two zones.

#### REFERENCES

- ANON., (T. V. A.) 1938—The scenic resources of the Tennessee Valley. Tennessee Valley Authority, Knoxville, Tenn., pp. 222. 7 maps, abundant half-tones.
- BILLINGS, W. D. AND W. B. DREW. 1938—Bark factors affecting the distribution of corticolous bryophytic communities. *Amer. Midl. Nat.* 20:302-330, 12 figs.
- CAIN, STANLEY A. 1930—Certain floristic affinities of the trees and shrubs of the Great Smoky Mountains and vicinity. *Butler Univ. Bot. Stud.* 1(9):129-156.
- 1935—Ecological studies of the vegetation of the Great Smoky Mountains. II. The quadrat method applied to sampling spruce and fir forest types. *Amer. Midl. Nat.* 16:566-583, 5 figs.
- 1938—The cove hardwood forest complex of the Great Smoky Mountains. (Unpublished mss.; University of Tennessee).
- CAIN, STANLEY A. AND AARON J. SHARP. 1938—Bryophytic unions of certain forest types of the Great Smoky Mountains. *Amer. Midl. Nat.* 20:249-301, 4 figs.
- CAIN, STANLEY A. AND CO-WORKERS. 1937—A preliminary guide to the Greenbrier-Brushy Mountain Nature Trail, the Great Smoky Mountains National Park. (Unpublished mss.; University of Tennessee).
- COLE, A. C., JR. 1938—Insect collecting in the Great Smoky Mountains National Park. *Tennessee. Journ. Tennessee Acad. Sci.* 13:274-276.
- 1940—A guide to the ants of the Great Smoky Mountains National Park. *Tennessee. Amer. Midl. Nat.* 24:1-88, 7 pls., 17 figs.
- KING, WILLIS. 1939—A survey of the herpetology of the Great Smoky Mountains National Park. *Amer. Midl. Nat.* 21:531-582, 9 figs., map.

- MASON, R. L. AND M. H. AVERY. 1931—A bibliography for the Great Smokies. *Appalachia* 18:271-277.
- SHOUP, C. S. 1939—An annotated bibliography of the zoology of Tennessee and the Tennessee Valley region. *Amer. Midl. Nat.* 21:583-635.
- THORNBOROUGH, LAURA. 1937—The Great Smoky Mountains, pp. 147, ill. (Crowell Co.).

### Systematic Account

#### PTYCHOPTERIDAE

*Bittacomorphella jonesi* (Johnson, 1905).\*—Leconte, Huffs Spring, 6,400 ft., June 12-13; Anakeesta Ridge, 4,700 ft., June 5; Greenbrier Cove, May 15, 1938 (*Williams*); Porters Creek, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, Myers Lodge, 2,200 ft., June 17 (*M. M. Alexander*).

*Bittacomorpha clavipes* (Fabricius, 1781).—Greenbrier, near Forks, 1,700 ft., June 7 (*M. M. Alexander*).

#### TIPULIDAE

##### TIPULINAE

*Longurio testaceus* Loew, 1869.—Chimneys Camp, 2,700 ft., at light, June 17 (*Cole & Hickman*).

*Longurio minimus* Alexander, 1914.—Leconte, Huffs Spring, 6,400 ft., September 9 (*Mrs. J. Huff*).

*Ctenophora nubecula* Osten Sacken, 1864.—Greenbrier, along Brushy Mt. trail, 2,500 ft., flying over prostrate log, June 15.

*Tanyptera frontalis* (Osten Sacken, 1864).—Indian Gap, 5,200 ft., June 10 (*Cole & Hickman*).

*Nephrotoma ferruginea* (Fabricius, 1805).—Indian Gap, 5,300 ft., June 9.

*Nephrotoma calinota* (Dietz, 1918).—Greenbrier, 1,700 ft., one ♀ ovipositing at margin of small stream.

*Nephrotoma incurva* (Loew, 1863).—Chimneys Camp, 2,700 ft., June 17 (*Cole & Hickman*); Park Headquarters, June 9 (*J. Manley*); Greenbrier, 1,800 ft., June 7; Cades Cove, Myers Lodge, 2,200 ft., June 17 (*M. M. Alexander*).

*Nephrotoma macrocera* (Say, 1823).—Silers Trail, 6,400 ft., June 6; Chimneys Camp, 2,700 ft., June 8; Greenbrier, 2,000 ft., May 15-22, 1938 (*Williams*), 2,500 ft., May 20 (*Williams*), 1,900 ft., June 7; Porters Creek, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, 2,200 ft., June 17 (*M. M. Alexander*).

*Nephrotoma tenuis* (Loew, 1863).—Greenbrier, May 15, 1938 (*Williams*).

#### *Nephrotoma tenuis fuscostigmosa* subsp. nov.

♂. Length about 14 mm.; wing, 13.5 mm.; antenna, about 3.4 mm.

Antennae as in the typical form; flagellum black, the proximal ends of the first three or four segments pale, the outer ends and remaining segments uniformly blackened. Occipital brand with the anterior end blackened and

\* In all cases in this report, dates without year were collected in 1939; where no collector is given, the specimens were secured by the author. M. M. Alexander = Mrs. Charles P. Alexander.

slightly produced forward onto the vertex; posterior portion of brand pale and scarcely differentiated; a dusky cloud on either side of anterior vertex.

Praescutal stripes dark brown, polished, well-defined, the median stripe with a broad reddish center throughout its length; scutal lobes extensively dark brown, including the lateral ends of the suture which are even more intensely blackened; scutellum darkened; mediotergite reddish yellow. Pleura and pleurotergite yellow, vaguely patterned with more reddish on the ventral sternopleurite. Wings with the costal border clearer yellow than remainder of wing; stigma brown, oval, well-delimited; veins dark brown, clearly defined, more yellowish in the costal and prearcular fields. Venation: Cell  $M_1$  short-petiolate.

Abdomen with tergites infuscated medially, obscure yellow sublaterally, the sides with a narrow blackened area to form a broken lateral stripe; subterminal segments uniformly darkened. Male hypopygium with the inner dististyle (Fig. 1, *id*) having the dorsal crest very high and conspicuous, elongate, extending distad beyond the base of the beak; lobe at base of style a simple spine. Lobes of the eighth sternite with abundant elongate setae, those near the mesal

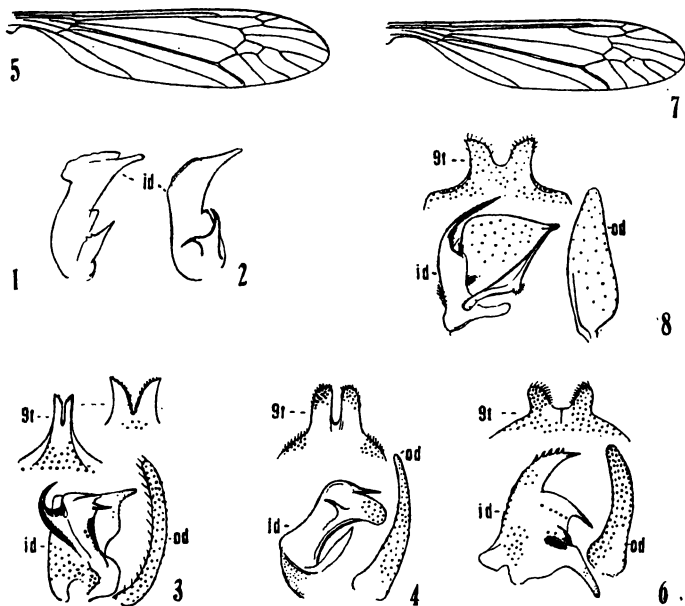


Fig. 1. *Nephrotoma tenuis fuscostigmata* subsp.n.; male hypopygium, inner dististyle.

2. *Nephrotoma tenuis tenuis* (Loew); male hypopygium, inner dististyle.

3. *Tipula* (*Yamatotipula*) *brevifurcata* Alexander; male hypopygium.

4. *Tipula* (*Yamatotipula*) *iroquois* Alexander; male hypopygium.

5. *Tipula* (*Yamatotipula*) *catawbiana* sp.n.; venation.

6. *Tipula* (*Yamatotipula*) *catawbiana* sp.n.; male hypopygium.

7. *Tipula* (*Yamatotipula*) *nephophila* sp.n.; venation.

8. *Tipula* (*Yamatotipula*) *nephophila* sp.n.; male hypopygium.

(Symbols: *id*, inner dististyle; *od*, outer dististyle; *t*, 9th tergite.)

portions much more delicate but still elongate. Typical *tenuis* has the crest of the inner dististyle (Fig. 2, *id*) very low to scarcely evident; lobe at base of style bispinous. Setae of eighth sternite less numerous.

*Holotype*, ♂, Chimneys Camp, 2,700 ft., July 6, 1939 (*A. C. Cole*).

I prefer to consider this as being a subspecies of *tenuis* until further specimens are discovered and the status confirmed. In the conspicuous praescutal stripes and distinct brown stigma, the fly more resembles a group of Austral species, *Nephrotoma cornifera* (Dietz), *N. okefenoke* (Alexander) and *N. urocera* (Dietz), all species with a large and conspicuous male hypopygium.

*Nephrotoma virescens* (Loew, 1864).—Silers trail, 6,200 ft., June 6; Leconte, Rainbow trail, 3,500-4,000 ft., June 13, several females ovipositing in wet soil along trail; Greenbrier, June 15 (*A. Stupka*); Brushy Mt. trail, 2,500-3,000 ft., June 15, 3,500-4,500 ft., July 11 (*A. C. Cole*).

*Tipula* (*Trichotipula*) *algonquin* Alexander, 1915.—Chimneys Camp, 2,700 ft., July 26 (*A. C. Cole*).

*Tipula* (*Trichotipula*) *oropezoides* Johnson, 1909.—Anakeesta Ridge, 4,500-4,700 ft., June 5; Leconte, Alum Cave trail, 5,600-6,000 ft., June 12 (*W. H. Harrison*); Huffs Spring, 6,400 ft., June 12-13; Greenbrier, Brushy Mountain trail, 2,500 ft., May 20 (*Williams*); May 7 (*A. C. Cole*); Cades Cove, May 8, 1938 (*Williams*).

*Tipula* (*Nobilitipula*) *collaris* Say, 1823.—Silers trail, 5,800 ft., June 6; Anakeesta Ridge, 3,300 ft., June 5, a mating pair (*M. M. Alexander*); Leconte, 5,600 ft., June 13; Greenbrier, 2,500 ft., Brushy Mt. trail, May 7 (*A. C. Cole*).

These specimens differ from typical *collaris* of the northeastern states in having the basal lobe of the inner dististyle of the male hypopygium stouter and subequal in diameter for most of its length, at tip abruptly narrowed into a spine. In typical *collaris* this lobe narrows very gradually to the apical spine.

*Tipula* (*Yamatotipula*) *brevifurcata* Alexander, 1926.—Silers trail, 6,000 ft., June 6; Greenbrier, 2,000 ft., May 15, 1938 (*Williams*). Cades Cove, 1,900 ft., June 10 (*M. M. Alexander*).

Male hypopygium (Fig. 3) with the median lobe of tergite, *9t*, heavily blackened, very narrow, at apex split into two parallel to very feebly divergent lobes, the mesal edges of which are provided with blackened spines; base of incision with delicate setulae. Outer dististyle, *od*, unusually long and slender, parallel-sided, the apex obtuse, the length exceeding seven times the greatest width. Inner dististyle, *id*, subquadrate, the beak very slender, subequal in general size and appearance to a powerful curved spine at opposite outer angle of style; a small to very small spine on face of disk.

*Tipula* (*Yamatotipula*) *iroquois* Alexander, 1915 (*cincta* Loew, 1863).—Anakeesta Ridge, 4,700 ft., June 5; Leconte, Alum Cave trail, 4,100-6,000 ft., June 12, common; Greenbrier, 2,500 ft., May 7 (*Williams*); Brushy Mt. trail, 2,500 ft., June 15.

Male hypopygium (Fig. 4) with the lobes of the tergite, *9t*, elongate, with



blackened setae on distal half, the lobes separated from one another by a deep and very narrow notch that is narrower than the width of either lobe. Outer dististyle, *od*, long-attenuate to the very narrow apex. Inner dististyle, *id*, with the beak flattened, obtuse, with a long, subappressed spine along its outer edge and a more erect spine of approximately the same size on the face of the blade and directed more basad; a third, longer spine on inner portion of style near base. Ninth sternite with a conspicuous oval lobe on either side of midline, this clothed with abundant long coarse setae.

*Tipula* (*Yamatotipula*) *catawbiana* sp. nov.

Allied to *iroquois*; general coloration light gray, the praescutum with four darker gray stripes that are narrowly bordered by blackish; antennal scape yellow; pleura uniformly gray; legs black, the femoral bases broadly yellow; wings with a brownish yellow tinge, sparsely patterned with darker; abdominal tergites brownish black, the caudal borders of the segments very narrowly paler; male hypopygium with the tergite produced into two divergent lobes that are narrower than the notch between them, the lobes set with abundant black setae; inner dististyle with beak very slender, much narrower than a strong outer arm that bears five or six strong spines along its posterior border.

♂. Length about 10 mm.; wing, 12 mm.; antenna, about 3.7 mm.

Frontal prolongation of head light gray; nasus distinct; palpi brownish black. Antennae with scape yellow; pedicel brownish yellow; flagellum black; flagellar segments only weakly incised; terminal segment reduced to a tiny cone. Head brownish gray, the front light gray; center of vertex glabrous and darker brown.

Pronotum buffy gray; pretergites yellow. Mesonotal praescutum light gray with four darker gray stripes that are very narrowly bordered by blackish, more heavily and distinctly so along the mesal edges of the intermediate pair; scutal lobes dark brownish gray, continued across the posterior portion of median area, the cephalic portion of the latter, adjoining the suture, light gray; scutellum and mediotergite gray, the parascutella darker. Pleura light gray, variegated on ventral anepisternum, ventral sternopleurite, meron, pteropleurite and pleurotergite with darker gray, without yellow areas; dorsopleural membrane buffy. Halteres brownish yellow, the knobs obscure yellow. Legs with the coxae gray pruinose; trochanters yellow; femora black, with less than the proximal half yellow; tibiae and tarsi black; claws (male) with a minute erect spine before midlength. Wings (Fig. 5) with a brownish yellow ground, the prearcular and costal fields clearer yellow; weak brown seams at wing-tip, along anterior cord, and as seams and washes on some of the veins, especially those beyond cord and the distal portion of *Cu*; veins brown, paler in the flavous areas. Venation: *Rs* approximately twice *m-cu*; cells 1st *M*<sub>2</sub> short; *m-cu* on *M*<sub>3-4</sub> before fork.

Abdominal tergites brownish black, the caudal borders of the segments very narrowly and insensibly paler, more conspicuously so on outer segments; sternites yellow, the caudal borders a trifle darker, especially medially; hypo-

pygium dark, the appendages somewhat brighter. Male hypopygium (Fig. 6) with the tergite, *9t*, produced medially into two divergent lobes that are narrower than the U-shaped notch separating them, each lobe with abundant black setae. Outer dististyle, *od*, moderately long and narrow, pale, the apex obtuse. Inner dististyle, *id*, complex, the beak very slender, much narrower than a powerful outer arm bearing five or six strong spines along its posterior margin before the apical spine; between the beak and this outer arm a more slender glabrous spine and a smaller spinule just above the sensory group. Blades of gonapophyses elongate.

*Holotype*, ♂, Indian Gap, 5,500 ft., along small stream in coniferous forest, June 9, 1939 (C. P. Alexander). *Paratypes*, 1 ♂, Mt. Mitchell, North Carolina, 5,500 ft., June 6, 1940, 1 ♂, 6,000 ft., June 7, 1940, ♂, Forney Ridge, Smokies, North Carolina, 6,000-6,100 ft., June 18, 1940 (C. P. Alexander).

*Tipula (Yamatotipula) catawbiana* is readily told from *T. (Y.) iroquois* Alexander by the structure of the male hypopygium. Besides the characters listed and figured for the two species, the present fly lacks the conspicuous setiferous lobes on the ventral aspect of the ninth sternite found in *iroquois*. The latter species has the antennae uniformly darkened, including the scape and pedicel.

#### ***Tipula (Yamatotipula) nephophila* sp. nov.**

Allied to *iroquois*; general coloration gray, the praescutum with four slightly darker gray stripes that are insensibly bordered by darker; antennae with basal two segments yellow; knobs of halteres dark brown; femora obscure yellow basally, passing into brownish black; wings brownish yellow, the apex darkened; male hypopygium with the tergal lobes yellow, separated by a U-shaped notch, only weakly setiferous; inner dististyle a broad compressed plate, the beak unusually short and blackened; base of style on outer margin with a powerful curved smooth spine, on its concave face with microscopic setulae.

♂. Length about 11-12 mm.; wing, 13-13.5 mm.; antenna, about 4.7 mm.

Frontal prolongation of head brownish gray; nasus elongate; palpi brownish black. Antennae with scape and pedicel yellow, flagellum black; flagellar segments moderately incised. Head gray; anterior vertex broad.

Pronotum and pretergites obscure yellow. Mesonotal praescutum gray with four only slightly differentiated dark gray stripes that are insensibly bordered by darker, the humeral region lighter gray; scutal lobes gray, bordered by darker, the median area abruptly obscure yellow; scutellum pale brown, parascutella darker brown; postnotum gray. Pleura obscure yellow, variegated with gray, the latter areas on the anepisternum, ventral sternopleurite and meral region. Halteres yellow, the knobs dark brown. Legs with the coxae and trochanters pale yellow, not or scarcely pruinose; femora obscure yellow basally, with less than the distal half brownish black; tibiae brown to brownish black; tarsi black; claws long, with a minute tooth at near midlength. Wings (Fig. 7) brownish yellow, the prearcular field clearer yellow, the costal region less

evidently so; stigma dark brown; wing-tip narrowly infuscated; cord and distal portion of vein *Cu* narrowly seamed with brown; veins dark brown, brighter in the more yellowish fields. Venation: *Rs* about one-half to two-thirds longer than *m-cu*.

Abdominal tergites brownish black, narrowly bordered laterally and caudally with pale; sternites pale yellow, the outer segments brownish black, narrowly bordered caudally with pale; hypopygium, excepting the appendages, blackened. Male hypopygium (Fig. 8) with the tergite, *9t*, produced apically into a yellow plate that bears a U-shaped median notch, the lateral lobes thus formed subequal in width to the diameter of the notch; armature of lobes very sparse, reduced to slender setae so that a general subglabrous appearance is produced. Outer dististyle, *od*, relatively broad, the apex little-produced, obtuse. Inner dististyle, *id*, with the beak unusually short, heavily blackened and obtuse, the body of the style a broadly compressed plate with sparse scattered setae; at base of style on outer margin a powerful curved smooth spine, on its concave face with microscopic setulae.

*Holotype*, ♂, Silers trail, 6,000 ft., June 6, 1939, along small stream in coniferous forest. *Paratypes*, 1 ♂, Alum Cave trail, Mount Leconte, 5,800 ft., June 12, 1939, along small mountain stream in coniferous forest (*C. P. Alexander*); 4 ♀♀, Leconte, 6,000 ft., June 26-28, 1940; 5 ♂♀, Linville Falls, North Carolina, 3,200 ft., June 3, 1940 (*C. P. Alexander*).

*Tipula* (*Yamatotipula*) *nephophila* is amply distinct from all members of the *iroquois* group. It is most similar to *T. (Y.) catawbiana* sp. n. and *T. (Y.) succincta* Alexander, differing most evidently in the quite distinct male hypopygium. The specific name is an allusion to the Great Smoky Mountains.

*Tipula* (*Yamatotipula*) *calopterooides* Alexander, 1919 (*antiopa* Dietz, 1921).—Chimneys Camp, near entrance, along wet swale, 2,600 ft., June 16.

*Tipula* (*Yamatotipula*) *noveboracensis* Alexander, 1919. — Greenbrier, 2,000 ft., April 22 (*Williams*); Middle Prong of the Little Pigeon River, 1,800 ft., June 7.

*Tipula* (*Yamatotipula*) *furca* Walker, 1848 (*bella* Loew, 1863).—Park near Gatlinburg, May 1, 1938 (*Williams*).

*Tipula* (*Yamatotipula*) *cayuga* Alexander, 1915.—Anakeesta Ridge, 3,500-3,700 ft., June 5; Chimneys Camp, 2,700 ft., June 9; Cades Cove, 2,200 ft., June 17 (*M. M. Alexander*).

*Tipula* (*Yamatotipula*) *tephrocephala* Loew, 1864.—Indian Gap, 5,200 ft., June 10 (*Cole & Hickman*); Leconte, Huffs Spring, 6,400 ft., June 11 (*Mrs. J. Huff*); Anakeesta Ridge, 4,700 ft., June 5-8 (*W. H. Harrison*).

*Tipula* (*Tipula*) *cunctans* Say, 1834.—Park boundary, near Sevierville, October 23, 1938 (*Williams*).

#### *Tipula* (*Arctotipula*) *williamsiana* sp. nov.

Size large (wing, 20 mm. or more); general coloration gray, the praescutum with four conspicuous dark brownish gray stripes; antennae with flagellar segments strongly binodose; wings brownish gray, restrictedly patterned with more

whitish areas; macrotrichia lacking on veins of outer medial field;  $R_5$  from one-half to two-thirds its length longer than  $m-cu$ ; abdomen reddish brown, with a conspicuous median dark stripe on both tergites and sternites; male hypopygium of very simple construction; ninth tergite large, the dorsal surface covered with abundant short black setulae; inner dististyle of simple form, blackened; ovipositor with cerci long and slender, their margins smooth.

♂. Length about 15-16 mm.; wing, 20-23 mm.; antenna, about 6 mm.

♀. Length about 21-23 mm.; wing, 23-26 mm.; antenna, about 5 mm.

Frontal prolongation of head relatively short, gray; nasus stout; palpi black. Antennae with scape and pedicel obscure yellow; flagellum bicolored, the basal enlargement dark brown, the remainder yellow; flagellar segments very strongly binodose, especially in male, the basal enlargement unusually conspicuous, larger than the outer swelling; verticils long and conspicuous, exceeding the segments in length. Head brownish gray, the front and orbits more buffy gray; a capillary brown median vitta; setigerous punctures darkened, conspicuous.

Pronotum gray, with a narrow dark brown median line. Mesonotal praescutum brownish gray, with four conspicuous, dark brownish gray stripes that are insensibly bordered by darker brown; extreme cephalic portion of praescutum with a further capillary median darkening; vestiture of praescutum pale and delicate; scutum brownish gray, each lobe with two brown areas; posterior sclerites of notum dark brownish gray. Pleura gray, more yellowish gray on dorsal sternopleurite and ventral pleurotergite; dorsopleural membrane buffy; groups of conspicuous setae on anepisternum and dorsal sternopleurite. Halteres with stem yellow, knob dark brown. Legs with coxae gray, with conspicuous setae; trochanters obscure yellow, darkened apically beneath; femora obscure yellow, the tips blackened, the amount subequal on all legs; tibiae brown, the tips blackened; tarsi black; claws small, simple. Wings (Fig. 9) brownish gray, restrictedly patterned with more whitish areas, including brightenings before and beyond the darker brown stigma; vague but evident whitened areas at near one-third the length of cell  $Cu$  and again before outer ends of cells  $M$  and  $Cu$ ; certain of the veins, especially  $Cu$ ,  $m-cu$ ,  $R_5$  and outer radial veins narrowly seamed with brown; cell  $Sc$  yellowish brown; veins brown. Macrotrichia of veins beyond cord very sparse, entirely lacking in medial field; a relatively complete series of small trichia on outer section of  $R_{4+5}$ . Venation:  $R_{1+2}$  strongly preserved;  $R_5$  from about one-half to two-thirds its length longer than  $m-cu$ ; cell  $1st M_2$  long, vein  $M_3$  beyond it strongly arcuated on basal half;  $m-cu$  long so cell  $M_4$  at base is slightly wider than at margin;  $m-cu$  at fork of  $M_{3+4}$ .

Abdominal tergites reddish brown, with a conspicuous median brownish black vitta, continuous on basal segments, narrowly interrupted on posterior borders of outer segments; sublateral stripes less evidently darkened, lateral margins grayish; sternites with a similar, very conspicuous median vitta, more or less interrupted at the paler posterior portions of the segments. Male hypopygium (Fig. 13) small, reddish brown, of unusually simple structure. Ninth tergite,  $9t$ , very small, the caudal border with a small U-shaped median notch, the lateral lobes with their apical margin sinuous; dorsal surface of tergite with

abundant short black setulae; ventral surface with a short black point on either side of median notch. Basistyle with outer apical angle produced into a short spinous point. Outer dististyle, *od*, a flattened ear-shaped structure, when flattened on a slide becoming slightly pointed at apex. Inner dististyle, *id*, of simple structure, the outer margin with scanty setae. Ovipositor with the cerci long and slender, blackened, the margins smooth.

*Holotype*, ♂, Rich Mountain, near Cades Cove, Tennessee, along stream, 1,950 ft., March 15, 1939 (*I. W. Williams*). *Allotopotype*, ♀, with the type. *Paratopotype*, 1 ♀, with the type. *Paratypes*, 1 ♂, 2 ♀♀, Greenville, South Carolina, March 14, 1931; 3 ♀♀, altitude 950 ft., February 26, 1933 (*H. K. Townes*); 1 ♂, Greenville Co., April 9, 1932 (*J. S. Rogers*) No. 1303.

I take unusual pleasure in naming this species in honor of Dr. Inez W. Williams, who has added most materially to our knowledge of the Tipulidae of the Great Smokies. I am referring this conspicuous fly to the subgenus *Arctotipula* Alexander, although the structure of the ovipositor is not typical of this group. Superficially the species resembles *Tipula* (*Vestiplex*) *carolinensis* Alexander, which is actually an entirely different fly. The present insect is evidently on the wing only in early spring. In June 10, 1939, I found a single wing of this species caught in a spider's web on the bridge spanning the small

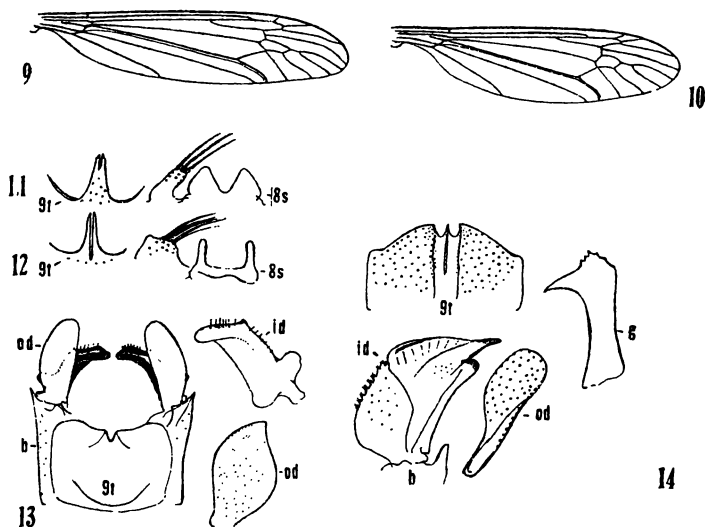


Fig. 9. *Tipula* (*Arctotipula*) *williamsiana* sp.n.; venation.

10. *Tipula* (*Oreomyza*) *coleana* sp.n.; venation.

11. *Tipula* (*Lunatipula*) *triplex linearis* subsp.n.; male hypopygium.

12. *Tipula* (*Lunatipula*) *triplex triplex* Loew; male hypopygium.

13. *Tipula* (*Arctotipula*) *williamsiana* sp.n.; male hypopygium.

14. *Tipula* (*Oreomyza*) *coleana* sp.n.; male hypopygium.

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

creek on Rich Mountain where the types had been taken earlier by Miss Williams.

*Tipula (Schummelia) hermannia* Alexander, 1915 (*fasciata* Loew, 1863).—Indian Gap, 5,300-5,500 ft., June 9; Anakeesta Ridge, 4,000-4,500 ft., June 6-8; Chimneys Camp, 2,700 ft., June 4; Greenbrier, May 15, 1938 (*Williams*); May 20 (*Williams*); Brushy Mt. trail, 2,500 ft., May 7 (*Cole*); Cades Cove, April 24, 1938 (*Williams*).

*Tipula (Schummelia) friendi* Alexander, 1940.—Anakeesta Ridge, 4,500 ft., June 8; Leconte, Alum Cave trail, 4,600-5,500 ft., June 12, common; Leconte Lodge, 6,400 ft., July 7 (*Mrs. J. Huff*); Greenbrier, Brushy Mt. trail, 2,500-4,500 ft., June 15; 3,500 ft., September 16 (*Cole & Hickman*).

The description of this novelty is to appear in the forthcoming "Diptera of Connecticut" which has been delayed in publication for several years. The fly is amply distinct from *hermannia*, especially in the structure of the male hypopygium. This latter has the median blade of the tergite smaller, subtended by long, slender spines. Posterior appendage of inner dististyle with a blackened tooth-like projection separated from the main body of the appendage by a U-shaped notch. In the Canadian zone of Mount Leconte it proved to be one of the commonest and most characteristic flies.

*Tipula (Oreomyza) fragilis* Loew, 1863.—Leconte Lodge, 6,400 ft., September 1-9 (*Mrs. J. Huff*); Park, near Gatlinburg, October 23, 1938 (*Williams*).

*Tipula (Oreomyza) ignobilis* Loew, 1863.—Chimneys Camp, 2,700 ft., June 17, at light (*Cole & Hickman*); Greenbrier, 2,500 ft., May 22, 1938 (*Williams*).

*Tipula (Oreomyza) trivittata* Say, 1823.—Chimneys Camp, 2,700 ft., June 10; June 17, at light (*Cole & Hickman*); Greenbrier, 2,500 ft., May 15-22, 1938 (*Williams*).

*Tipula (Oreomyza) entomophthorae* Alexander, 1918 (*similissima* Dietz, 1921).—Indian Gap, 5,200 ft., June 10 (*Cole & Hickman*); Leconte Summit, 6,590 ft., June 13 (*W. H. Harrison*).

*Tipula (Oreomyza) margarita* Alexander, 1918.—Greenbrier, 2,500 ft., May 7, 1939 (*Cole*). This rare fly had hitherto been known only from New York and Ohio.

***Tipula (Oreomyza) angulata cherokeana* subsp. nov.**

♂. Length, about 13-14 mm.; wing, 15-16.5 mm.; antenna, about 4 mm.

Characters as in typical *angulata* Loew (Northeastern North America), differing as follows: Antennae shorter, approximately two-thirds as long as in typical form, bicolored. Wings with petiole longer and narrower; white band beyond stigma and cord much wider, its outer edge lying beyond the outer end of cell 1st  $M_2$ . Venation: Cell 1st  $M_2$  shorter, the cephalic face (second section of vein  $M_{1+2}$ ) gently arcuated. Male hypopygium with details of structure distinct. Ninth tergite with the median notch narrow, with a small

median point at its base. Blade of outer dististyle more widely expanded, the greatest width opposite the base of blade. Inner dististyle with apical beak more obtusely rounded; lobe at base of outer face of style blackened and bearing a separate cylindrical lobule. Gonapophyses appearing as slender rods, the tips decurved acute spines. In *angulata*, the apophyses appear as flattened pale blades that narrow gradually to a small apical point.

*Holotype*, ♂, Brushy Mountain trail, 4,300 ft., June 15, 1939 (*A. C. Cole*), caught while flying over trail near Trillium Gap. *Paratype*, a badly damaged ♂, Mount Mitchell, North Carolina, Bald Knob Ranger Station, 5,200 ft., June 22, 1939 (*C. P. Alexander*).

I am placing this as a southern race of *angulata* but believe that more material will validate it as a species.

*Tipula (Oreomyza) coleana* sp. nov.

Allied to *angulata*; general coloration gray, the praescutum with four more brownish stripes; wings whitish subhyaline, heavily patterned with brown; cells *C* and *Sc* more yellowish brown; an incomplete white fascia beyond stigma and cord;  $R_{1+2}$  entire; abdominal tergites obscure yellow, trilineate with brown; male hypopygium with the caudal margin of tergite convexly rounded, with a median notch that bears an acute spine; dorsal surface of tergite with a yellow median furrow; inner dististyle with the basal lobe irregularly fimbriate along outer margin; gonapophyses heavily blackened, at apex produced laterad into a powerful acute spine.

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

Frontal prolongation of head yellow above, including nasus, a little darker on ventral half; palpi dark brown. Antennae with scape and pedicel light yellow; flagellum broken. Head light gray, more buffy in front; a capillary darkened median brown vitta.

Pronotum pale brownish gray, with a brown median vitta. Mesonotal praescutum gray with four more brownish gray stripes, the intermediate pair more distinct; scutal lobes weakly darkened, the median area grayish; scutellum brownish gray, with a capillary dark brown median line; mediotergite gray. Pleura brownish yellow, sparsely pruinose, sparsely variegated with darker areas, dorsopleural membrane clearer yellow. Halteres with stem white, knob brownish black. Legs with coxae pale yellow, sparsely pruinose; trochanters yellow; femora obscure brownish yellow, the tips darker; tibiae brown, darker at tips; tarsi black. Wings (Fig. 10) with the ground color whitish subhyaline, heavily patterned with brown; prearcular field and cells *C* and *Sc* more yellowish brown; an incomplete but conspicuous white fascia beyond stigma and cord, extending from costa to near midlength of cell  $M_4$ , including virtually all of cell  $1st M_2$ ; ground areas before cord extensive and clearly delimited; cell  $Cu_1$  uniformly darkened; veins dark brown, paler in the ground areas and costal field. Venation: Tip of  $R_{1+2}$  preserved but pale and without trichia; basal section of  $R_{4+5}$  reduced; petiole of cell  $M_1$  a little exceeding the cell itself.

Abdominal tergites obscure yellow, the first segment clearer yellow; three

narrow but conspicuous brown stripes, the median one entire or virtually so, the sublateral pair interrupted by the gray lateral and posterior borders of the segments; sternites pale brown, darker medially; hypopygium of moderate size, black. Male hypopygium (Fig. 14) with the caudal margin of tergite, 9t, convexly rounded, with a conspicuous median furrow and apical notch, the latter bearing an acute point that extends caudad to the level of the remainder of tergite; median furrow yellow, contrasting with the dark brown remainder of tergite, with a median carina extending cephalad from the apex of the median spine; lateral tergal shoulders low. Outer dististyle dusky, appearing as a flattened club, the stem narrow. Inner dististyle, *id*, with a conspicuous blackened basal lobe or flange, the outer margin with blackened tubercles that bear conspicuous setae to produce a fimbriate appearance; apical beak slender, blackened. Gonapophyses, *g*, heavily blackened, expanded into a head at apex, the latter produced at a right angle into a powerful acute spine.

*Holotype*, ♂, Mount Leconte, near Leconte Lodge, 6,400 ft., September 3, 1939 (*Mrs. J. Huff*). *Paratype*, ♂, Ramsey Fork, Greenbrier Cove, 1,900 ft., July 14, 1939 (*A. C. Cole*).

I am very pleased to dedicate this species to Dr. Arthur C. Cole, of the University of Tennessee, who has aided most materially in the present survey of the Tipulidae of the Smokies. The fly is most nearly related to *Tipula* (*Oreomyza*) *angulata* Loew, differing most conspicuously in the structure of the male hypopygium, notably the tergite, inner dististyle and gonapophyses.

*Tipula* (*Oreomyza*) *penobscot* Alexander, 1915.—Indian Gap, 5,600 ft., June 9; Leconte, Huffs Lodge, 6,400 ft., July 21 (*Mrs. J. Huff*); Rainbow trail, 5,500 ft., June 13 (*W. H. Harrison*). This small species occurred only in the spruce-fir forests where it was rare. Previously it had not been recorded from south of Pennsylvania.

*Tipula* (*Oreomyza*) *senega* Alexander, 1915 (*pallida* Loew, 1863).—Indian Gap, 5,300-5,500 ft., June 9; in spruce-fir forests and beech gap association; Silers trail, 6,200 ft., June 6. This is another species that had not been recorded from the southern Appalachians.

*Tipula* (*Lunatipula*) *apicalis* Loew, 1863.—Leconte, Alum Cave trail, 5,100 ft., June 12; Greenbrier, 2,500 ft., May 20 (*Williams*); 2,500 ft., (*W. H. Harrison*).

*Tipula* (*Lunatipula*) *monticola* Alexander, 1915.—Indian Gap, 5,300 ft., June 9. In the coniferous forests of the Canadian zone; hitherto not recorded from south of Pennsylvania.

#### *Tipula* (*Lunatipula*) *valida atricornis* subsp. nov.

Very close to the typical form but much darker, especially the antennae and wings. Antennal flagellum beyond the first segment uniformly blackened or with the basal enlargement only a trifle darker than the apical pedicel of the segment. Wings heavily patterned, especially at and beyond cord, leaving major areas of the ground along the cord, beyond the stigma, and in cells  $R_5$  and the basal medial cells.



*Holotype*, ♂, Leconte Lodge, 6,400 ft., June 21 (*Mrs. J. Huff*).

*Allotype and paratypes*, several of both sexes, with the type, June 21-August 12, 1939 (*Mrs. J. Huff*); Newfound Gap, North Carolina, resting on cliffs, 5,000 ft., June 5; 1 ♀, Myers Lodge, Cades Cove, 1,900 ft., June 10 (*M. M. Alexander*).

Although this fly differs from the typical form of northeastern North America only in details of coloration, I feel that it should be distinguished by a subspecific name. It is one of the largest and most conspicuous crane-flies within the Park area.

*Tipula (Lunatipula) duplex* Walker, 1848 (*mingwe Alexander*, 1915).—Chimneys Camp, July 2-18 (*A. C. Cole*); Greenbrier, Brushy Mt. trail, 3,500-4,500 ft., July 11 (*A. C. Cole*).

*Tipula (Lunatipula) umbrosa* Loew, 1863.—Chimneys Camp, 2,700 ft., June 4; Gatlinburg, May 1, 1938 (*Williams*); Greenbrier, 1,800-2,500 ft., June 15; Cades Cove, April 24, 1938 (*Williams*).

***Tipula (Lunatipula) triplex linearis* subsp. nov.**

♂. Length, about 20 mm.; wing, 20 mm.; antenna, about 6.2 mm.

Differs from the typical form chiefly in hypopygial features. Male hypopygium (Fig. 11) with the median lobe of tergite, *9t*, narrow, strongly produced, the incision linear and unusually short, extending back from the tip of lobe for only about one-third the length of latter. Eighth sternite, *8s*, with the lateral lobes unusually long and conspicuous; submedian lobes very broad, subtriangular in outline, the surface microscopically corrugated.

In typical *triplex* Walker (*inermis* Doane) of northeastern North America, the male hypopygium (Fig. 12) has the median lobe of tergite, *9t*, very deeply split, the incision extending cephalad to beyond the bases of the lobes, the tergal spines thus formed very slender. Eighth sternite, *8s*, with the lateral lobes very stout, the setae numerous, arising from the mesal portion of the lobe; submedian lobes very slender, almost parallel-sided, their surface smooth.

*Holotype*, ♂, Greenbrier Cove, 2,000 ft., May 15, 1938 (*I. W. Williams*).

There is still much difficulty in defining the various species and forms of members of the *triplex* group. The shape of the submedian lobes of the eighth sternite of the present fly is much as in the otherwise distinct *T. (L.) flavo-umbrosa* Alexander and it will probably have to be removed from its present assigned position when more material becomes available.

*Tipula (Lunatipula) submaculata* Loew, 1863.—Silers trail, 6,000 ft., June 6; Leconte, Huffs Lodge, 6,400 ft., July 21 (*Mrs. J. Huff*); Cades Cove, May 8, 1939 (*Williams*).

*Tipula (Lunatipula) mallochi* Alexander, 1920.—Greenbrier, 2,500 ft., May 22, 1938 (*Williams*).

*Tipula (Lunatipula) translucida* Doane, 1901.—Brushy Mt. trail, Greenbrier, 2,000 ft., June 15.

*Tipula (Lunatipula) tuscarora* Alexander, 1915.—Greenbrier, May 20 (*Williams*); Brushy Mt. trail, 2,200 ft., June 15.

*Dolichocheza (Dolichocheza) americana* Needham, 1908.—Leconte, Huffs Lodge, 6,400 ft., June 12-13; Alum Cave trail, 4,500-6,000 ft., June 12; Greenbrier, 2,400 ft., May 7 (*Williams*), 1,800-1,900 ft., June 7; Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*).

*Dolichocheza (Oropeza) carolus* Alexander, 1940 (*albipes* Johnson, 1909).—Greenbrier, 1,800 ft., June 7; Cades Cove, Myers Lodge, 2,000 ft., June 17 (*M. M. Alexander*).

*Dolichocheza (Oropeza) walleyi* Alexander, 1931.—Indian Gap, 5,300-5,500 ft., June 9; 4,800 ft., June 17 (*Cole & Hickman*); Leconte, Alum Cave trail, 5,800 ft., June 12; Chimneys Camp, 2,700 ft., in rock houses behind camp, June 5-10; Greenbrier, 1,800 ft., June 7; Brushy Mt. trail, 3,500 ft., June 15.

***Dolichocheza (Oropeza) subvenosa* sp. nov.**

Allied to *venosa*; mesonotal praescutum grayish yellow with three conspicuous blackish stripes; pleura grayish yellow, variegated with brown; tips of tibiae and the tarsi paling to yellow, femoral tips narrowly brightened; wings with a strong brownish tinge; stigma darker brown, with conspicuous cream-colored post-stigmal areas; male hypopygium with the inner dististyle broad, especially opposite its outer end; aedeagus with a strong spine on ventral face near apex.

♂. Length, about 9-11 mm.; wing, 11-12.5 mm.; antenna, about 3-3.3 mm.

♀. Length, about 11 mm.; wing, 11 mm.

Frontal prolongation of head pale testaceous; palpi brown. Antennae with scape and pedicel pale yellow; base of first flagellar segment pale, the remainder black; segments relatively long, subcylindrical, much exceeding the erect verticils; pubescence of segments short. Head brownish gray, darker in central portion.

Pronotum brown, blackened medially. Mesonotal praescutum grayish yellow, with three conspicuous blackish stripes, the posterior interspaces obscured; scutal lobes brownish black, the median area very restrictedly paler; posterior sclerites not black or brownish black. Pleura grayish yellow, variegated with brown on the anepisternum, ventral sternopleurite, meron and extreme ventral edge of pleurotergite. Halteres elongate, stem yellow, knob darkened. Legs with coxae pale, the fore pair darker; trochanters yellow; femora blackened, the tips narrowly pale; tibiae dark brown, paling to obscure yellow on distal portion; tarsi obscure yellow. Wings (Fig. 15) with a strong brownish tinge; stigma oval, dark brown; a conspicuous, paler brown seam along vein *Cu*; membrane adjoining the stigma, especially in cells beyond the stigma, cream-yellow; a restricted brightening across the fork of *M*; veins brown. Venation:  $Sc_2$  ending opposite or just beyond origin of *R*<sub>5</sub>.

Abdominal segments blackened medially and on basal rings of segments, leaving extensive yellow areas on sides of posterior rings; outer sternites and tergites, including hypopygium, more uniformly blackened. Male hypopygium

(Fig. 18) with the lateral arms of tergite, *9t*, blackened, the apices dilated into oval spatulate blades, the margins smooth or without conspicuous angulations; median area of tergite trilobed, the central lobe longer and more spinous. Outer dististyle, *od*, uniformly blackened, cylindrical, a little exceeding the inner style. Inner dististyle, *id*, much deeper than in *venosa*, elevated just above the short apical beak. Gonapophyses, *g*, much as in *venosa*, appearing as blackened spines, their bases with conspicuous setae. Aedeagus, *a*, close to apex on ventral face with a strong erect spine, this variable in length but always strongly developed. In *venosa*, the lateral arms of tergite are more angular, the median area of the caudal margin with the central lobe low or lacking; inner dististyle narrower, especially above and before the apical beak; aedeagus without spine.

*Holotype*, ♂, Anakeesta Ridge, 4,500 ft., June 12, 1939 (*C. P. Alexander*). *Allotopotype*, ♀, 4,000 ft., June 5, 1939. *Paratypes*, ♂, Indian Gap, 4,500 ft., June 17 (*Cole & Hickman*); Anakeesta Ridge, 4,000-4,500 ft., June 7-12, 1939; Forney Ridge, 5,800-6,300 ft., June 18-19, 1940; Leconte trail,

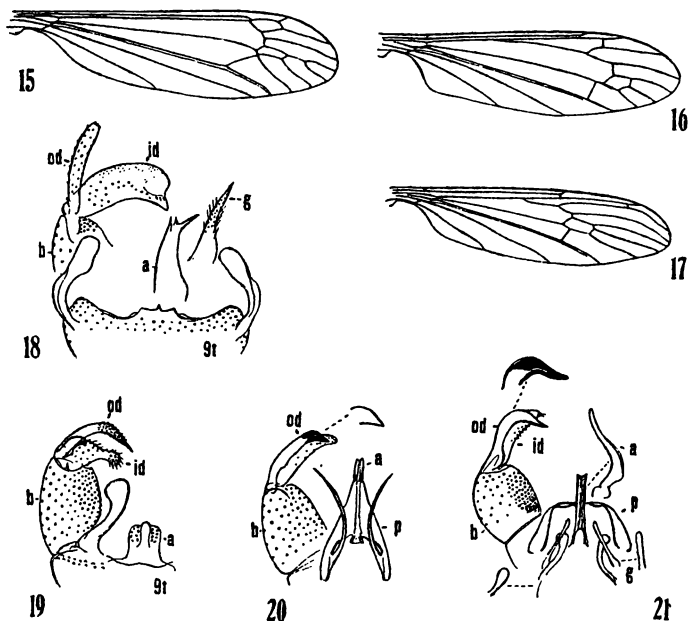


Fig. 15. *Dolichozepea (Oropeza) subvenosa* sp.n.; venation.

16. *Antocha (Antocha) biarmata* sp.n.; venation.

17. *Dicranoptycha acanthophallus* sp.n.; venation.

18. *Dolichozepea (Oropeza) subvenosa* sp.n.; male hypopygium.

19. *Dicranoptycha acanthophallus* sp.n.; male hypopygium.

20. *Antocha (Antocha) biarmata* sp.n.; male hypopygium.

21. *Antocha (Antocha) decurvata* Alexander; male hypopygium.

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

5,000 ft., June 13, 1939 (*W. H. Harrison*); Greenbrier, Brushy Mt. trail, 2,500-3,500 ft., June 15; Gregory Ridge trail, 2,500 ft., June 17, 1939 (*C. P. Alexander*); North Carolina, Bald Knob Ranger Station, Mt. Mitchell, 5,200 ft., June 22, 1939 (*C. P. Alexander*); Mt. Mitchell, 4,000-5,000 ft., June 7, 1940.

Common and wide-spread, especially in the zone of spruce and fir, but also in the hemlock forests of the Transition zone. The fly is readily told from its nearest ally, *Dolichopeza (Oropeza) venosa* (Johnson, 1909) by the details of coloration of the body and wings, and by the structure of the male hypopygium, especially of the ninth tergite, inner dististyle and aedeagus, as discussed above. This is the most common and characteristic member of the subgenus at high altitudes in the Great Smokies.

*Dolichopeza (Oropeza) obscura* (Johnson, 1909).—Leconte, Alum Cave trail, 5,000 ft., June 12; Greenbrier, 2,500 ft., May 20 (*Williams*), 1,800 ft., June 7; Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*), an unusually late record; Cades Cove, Myers Lodge, 1,900 ft., June 10.

*Dolichopeza (Oropeza) tridenticulata* Alexander, 1931.—Greenbrier, 1,850 ft., June 7; 2,500 ft., June 15; Cades Cove, 1,900 ft., June 10 (*M. M. Alexander*).

*Dolichopeza (Oropeza) subalbipes* (Johnson, 1909).—Greenbrier, Brushy Mt. trail, 2,000-4,800 ft., the latter at Piney Heath on Brushy Mt., June 15.

#### CYLINDROTOMINAE

*Liogma nodicornis flaveola* Alexander, 1919.—Silers trail, 6,000-6,500 ft., June 6; Indian Gap, 5,300-5,500 ft., June 9 (*Cole & Hickman*); Anakeesta Ridge, 4,500 ft., swept from beds of *Diphylleia cymosa*, June 5-8; Leconte Lodge, 6,400 ft., June 12-13; Greenbrier, May 15, 1938, May 7-20 (*Williams*). Brushy Mt. trail, 3,500 ft., June 15.

#### LIMONIINAE

##### LIMONIINI

#### *Antocha (Antocha) biarmata* sp. nov.

General coloration buffy to light brown, the cephalic portion of praescutum narrowly dark brown; antennae black; halteres yellow, knobs brown; legs brownish black; wings whitish subhyaline, the prearcular field milky white; abdomen brown, the subterminal segments black; male hypopygium with the blackened apex of outer dististyle very small; phallosome with a single pair of developed spines, the outer pair very reduced to atrophied.

♂. Length, about 5.6 mm.; wing, 5.5-7 mm.

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

Rostrum light brown; palpi black. Antennae black, short; flagellar segments subglobose to short-oval, the outer segments a little longer. Head uniformly gray.

Thorax buffy to light brown, with the cephalic portion of the median

praescutal area narrowly darker brown, the posterior portion and the lateral stripes paler, more reddish brown; posterior sclerites of notum brownish yellow to obscure yellow, especially the uniformly yellow scutellum. Pleura brownish yellow, the dorsopleural membrane paler. Halteres yellow, knobs brown. Legs with the coxae yellow to brownish yellow; trochanters yellow; remainder of legs dark brown to brownish black. Wings (Fig. 16) whitish subhyaline, the prearcular field more milky-white; stigma lacking; veins brown, *Cu* and *2nd A* somewhat darker; in prearcular field, veins white. Venation: Cell *1st M*<sub>2</sub> small.

Abdomen with tergites brown; sternites more yellowish brown; a subterminal black ring involving segments seven and eight; hypopygium obscure yellow. Male hypopygium (Fig. 20) with the blackened apex of the outer dististyle, *od*, unusually small, the shortest of any of the species in eastern North America. Phallosome, *p*, consisting of only two elongate slender spines, their tips acute; before apex of aedeagus a constriction or break with the subtending apophyses here produced into very small pale spines that are sometimes lost by atrophy.

*Holotype*, ♂, Greenbrier Cove, Tennessee, 1,680 ft., June 7, 1939 (*M. M. Alexander*). *Allotopotype*, ♀, pinned with type, June 7. *Paratopotypes*, several ♂ ♀, 1,700-1,900 ft., June 7, 1939, June 22-23, 1940; *paratype*, 1 ♂, on microscope slide, McLean, Tompkins Co., New York, May 16, 1911 (*C. P. Alexander*).

*Antocha (Antocha) biarmata* is most nearly related to *A. (A.) opalizans* Osten Sacken, among the described species. The male hypopygium of *A. (A.) decurvata* Alexander is shown for comparison. The present fly differs from all other regional species in the structure of the male hypopygium, especially the small blackened head of the outer dististyle and the presence of a single pair of developed spines on the phallosome. The species was very common on stones at the edge of the water of the Middle Prong of the Little Pigeon River, near the Fork of Porters Creek. It was associated with a species of *Blepharocera* and with another crane-fly, *Limonia (Limonia) simulans* (Walker).

*Dicranoptycha sobrina* Osten Sacken, 1859.—Leconte Summit, 6,590 ft., June 12; Chimneys Camp, 2,700 ft., June 4-10; Greenbrier, May 15-22, 1938 (*Williams*); Brushy Mt., 3,000 ft., May 20 (*Williams*).

#### *Dicranoptycha acanthophallus* sp. nov.

General coloration dark gray, the praescutal stripes only feebly differentiated; femora yellow, the tips narrowly infuscated, the amount subequal on all legs; wings with the ground color brownish yellow, the prearcular and costal fields clearer yellow; a distinct brown seam along vein *Cu* for the entire length of wing; abdomen black, hypopygium obscure yellow; male hypopygium with lateral tergal arms broadly expanded at tips; outer dististyle with subappressed spinules on distal third, the apex along straight spine; inner dististyle strongly constricted before apex; aedeagus massive, near apex with more than a score of erect spines.

♂. Length, about 8-8.5 mm.; wing, 9 mm.

♀. Length, about 11-12 mm.; wing, 9-11 mm.

Rostrum gray pruinose; palpi black. Antennae with scape black, sparsely pruinose; pedicel and basal flagellar segments brown, the outer flagellar segments black; flagellar segments long-oval. Head gray.

Mesonotum dark gray, the praescutum with scarcely differentiated blackish gray stripes; pseudosutural foveae black. Pleura dark gray, the dorsopleural membrane a little more obscure. Halteres pale yellow. Legs with coxae obscure yellow, the bases of fore pair a trifle darkened; trochanters yellow; femora yellow, the tips narrowly infuscated, the amount subequal on all legs; tibiae and basitarsi yellow, the tips narrowly darkened; terminal tarsal segments black. Wings (Fig. 17) with the ground color weakly brownish yellow, the prearcular and costal fields clear luteous; a distinct brownish seam along vein *Cu*, involving the adjoining portions of cells *M* and *M*<sub>4</sub> to margin, as well as the extreme base of cell *Cu*; veins brown, yellow in the flavous portions. Costal fringe (male) moderately long and dense. Venation: *R*<sub>5</sub> subequal in length to cell 1st *M*<sub>2</sub>; *m-cu* variable in position, from close to fork of *M* to more than one-half its length beyond this fork.

Abdomen brownish black, more or less pruinose; hypopygium obscure yellow. Male hypopygium (Fig. 19) with the tergal arms broadly expanded at tips into flattened spatulate blades. Outer dististyle, *od*, terminating in a long straight spine, before apex on distal third with abundant subappressed spinules on all faces. Inner dististyle, *id*, strongly expanded basally, constricted before the slightly dilated apex. Aedeagus, *a*, stout and massive, near apex provided with more than a score of conspicuous erect spines.

*Holotype*, ♂, Gregory Ridge Trail, 4,600 ft., June 17, 1939 (*C. P. Alexander*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, 7 ♀♀, with the types; *paratypes*, 1 ♀, Greenbrier Cove, 2,000 ft., June 15, 1939; ♂♀, 2,100 ft., June 23, 1940 (*C. P. Alexander*). The types were picked from vegetation along the trail during heavy rains.

By my most recent key to the American species of *Dicranoptycha* (Dipt. Connecticut, Tipulidae; mss.), the present fly runs to couplet 4, disagreeing with all species beyond that point in the combination of spinulose outer dististyle and darkened femoral tips. It differs from all regional species in the structure of the male hypopygium, notably the spinulose aedeagus.

*Helius (Helius) flavipes* (Macquart, 1855).—Greenbrier, 2,000 ft., May 15, 1938 (*Williams*).

*Limonia (Limonia) tristigma* (Osten Sacken, 1859).—Leconte, Huffs Lodge, 6,400 ft., July 30, August 5, September 7 (*Mrs. J. Huff*).

*Limonia (Limonia) indigena* (Osten Sacken, 1859).—Silers trail, 5,800-6,200 ft., numerous, often resting on moss-covered trunks of trees, associated with *Epiphragma fascipennis* and *Dactylolabis hudsonica*; Indian Gap, 4,800 ft., June 17 (*Cole & Hickman*); Leconte, Alum Cave trail, 4,000-6,000 ft., June 12; Huffs Lodge, 6,400 ft., August 15 (*Mrs. J. Huff*); Chimneys Camp, 2,700 ft., June 4, in rock-houses behind camp; Greenbrier, May 7, 1939, May 15, 1938 (*Williams*); Brushy Mt. trail; 3,000-4,500 ft., June 15.

*Limonia (Limonia) macateei* (Alexander, 1916) (*varipes* Dietz, 1921).—Foot of trail to the Chimneys, 3,200 ft., June 18 (*W. H. Harrison*), several flying above rotten log; Greenbrier, Brushy Mt. trail, 3,500 ft., June 15 (*Hickman*).

*Limonia (Limonia) globithorax* (Osten Sacken, 1869).—Clingmans Dome, 6,000 ft., June 11; Leconte, Alum Cave trail, 6,000 ft., June 12; Huffs Lodge, 6,400 ft., September 7 (*Mrs. J. Huff*); Chimneys Camp, 2,600 ft., June 16; Smoky Mt. Park, near Gatlinburg, October 23, 1938 (*Williams*); Greenbrier, Brushy Mt. trail, 4,000 ft., June 15; 3,500 ft., September 16 (*Cole & Hickman*).

*Limonia (Limonia) fusca* Meigen, 1804 (*pubipennis* Osten Sacken, 1859).—Silers trail, 5,800-6,000 ft., June 6; Indian Gap, 4,800 ft., June 17 (*Cole & Hickman*); Anakeesta Ridge, 4,000-4,700 ft., June 5; Leconte, Alum Cave trail, 4,500-5,500 ft., June 12; Huffs Lodge, 6,400 ft., June 13; Greenbrier, May 15, 1938, May 7, 1939 (*Williams*), Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, April 24, 1938 (*Williams*).

*Limonia (Limonia) simulans* (Walker, 1848).—Anakeesta Ridge, 4,000-4,200 ft., June 5, along wet cliffs; Chimneys Camp, 2,700 ft., July 26 (*Cole*); Park, near Gatlinburg, October 23, 1938 (*Williams*); Greenbrier, May 7, 1939 (*Williams*).

*Limonia (Dicranomyia) divisa* Alexander, 1929 (*diversa* Osten Sacken, 1859).—Silers trail, 6,200 ft., June 6; Newfound Gap Highway, 3,500 ft., June 5; Indian Gap, 4,800 ft., June 17 (*Cole & Hickman*); Leconte Summit, 6,590 ft., June 13; Greenbrier, May 7 (*Williams*), June 7; Little River Gorge, 1,400 ft., on cliffs, June 10; Cades Cove, 1,900 ft., June 10 (*M. M. Alexander*).

*Limonia (Dicranomyia) humidicola* (Osten Sacken, 1859).—Anakeesta Ridge, 4,000-4,500 ft., June 5-8; Little River Gorge, 1,400 ft., on wet cliffs, June 10.

*Limonia (Dicranomyia) liberta* (Osten Sacken, 1859).—Chimneys Camp, July 13 (*Cole*); Greenbrier, May 7 (*Williams*); Cades Cove, April 24, 1938 (*Williams*).

*Limonia (Dicranomyia) morioides* (Osten Sacken, 1860).—Chimneys Camp, 2,700 ft., June 8; Greenbrier, 1,800 ft., June 7; Cades Cove, Myers Lodge, 1,900 ft., June 10.

*Limonia (Dicranomyia) spinifera* (Alexander, 1929).—Leconte, Huffs Lodge, 6,400 ft., September 7 (*Mrs. J. Huff*); Greenbrier, Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*).

*Limonia (Dicranomyia) gladiator* (Osten Sacken, 1859).—Greenbrier, Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*).

*Limonia (Dicranomyia) pudicoides* Alexander, 1929.—Leconte, Rainbow trail, 3,500 ft., June 13, 1 ♀ ovipositing in wet moss along trail; Chimneys Camp, 2,600 ft., June 14, numerous around small waterfall along road; Little River Gorge, 1,400 ft., June 10, several on wet dripping cliffs, associated with *Limonia (Dicranomyia) humidicola* (Osten Sacken), *L. (Geranomyia)*

*diversa* (Osten Sacken), *Dolichopeza (Dolichopeza) americana* Needham and others. Most of these specimens had assumed the yellow color of aged specimens while those at the Chimneys were all of the pale green general coloration.

*Limonia (Dicranomyia) stulta* (Osten Sacken, 1859).—Chimneys Camp, 2,700 ft., June 4, not uncommon in rock houses behind the camp, in damp shaded woods; Greenbrier, 2,500 ft., May 15, 1938 (*Williams*), 1,800 ft., June 7; Cades Cove, Myers Lodge, 1,900 ft., June 10-17 (*M. M. Alexander*).

*Limonia (Dicranomyia) uliginosa* Alexander, 1929.—Leconte, Alum Cave trail, 6,000 ft., June 12, in patches of wet sphagnum moss on sloping cliffs with a sparse growth of *Leiophyllum Lyoni*, with a Carolina Junco nesting at this exact spot; boggy areas near Huffs Lodge, 6,400 ft., June 13. A characteristic bog-inhabitant, not before reported from south of New York and Michigan.

*Limonia (Geranomyia) diversa* (Osten Sacken, 1859).—Newfound Gap Highway, on wet cliffs, 3,300 ft., June 5; Gatlinburg, May 1, 1938 (*Williams*); Little River Gorge, 1,300-1,400 ft., abundant on wet cliffs, June 10; Cades Cove, Gregory Ridge trail, 2,600 ft., June 17.

*Limonia (Geranomyia) rostrata* (Say, 1823).—Gatlinburg, May 1, 1938 (*Williams*); Cades Cove, May 8, 1938 (*Williams*).

*Limonia (Rhipidia) domestica* (Osten Sacken, 1859).—Leconte, Huffs Lodge, 6,400 ft., July 23 (*Mrs. J. Huff*); Chimneys Camp, July 13 (*Cole*); Gatlinburg, May 1, 1938 (*Williams*); Greenbrier, 2,000 ft., May 15-22, 1938 (*Williams*), Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, May 8, 1938 (*Williams*).

*Limonia (Rhipidia) fidelis* (Osten Sacken, 1859).—Greenbrier, May 15 (*Williams*).

*Limonia (Rhipidia) maculata* (Meigen, 1818).—Chimneys Camp, 2,700 ft., July 26 (*Cole*); Gatlinburg, May 1, 1938, October 23, 1938 (*Williams*); Greenbrier, May 15, 1938 (*Williams*), Brushy Mt. trail, September 16 (*Cole & Hickman*); Cades Cove, April 24-May 8, 1938 (*Williams*).

***Limonia (Rhipidia) maculata lecontei* subsp. nov.**

As in the typical form but with the dark wing pattern very extensive, greatly reducing the pale ground color; the three major costal areas reach vein *M* behind and leave only small pale spots between them in the costal cell. In some specimens the dark pattern of the wing disk is so extensive that the ground dots become very small and scattered.

Antennae of male with segments four to ten, inclusive, with two short branches, the longest about one-half longer than the segments; terminal three segments simple. Femora darkened, on outer half brown, the darkened apical ring not or scarcely differentiated against this ground. Male hypopygium with six or seven rostral spines that are placed at near two thirds the length of the prolongation. In typical *maculata*, these spines are at or immediately beyond midlength of the prolongation.



*Holotype*, ♂, Mount Leconte, Huffs Lodge, 6,400 ft., August 10, 1939 (Mrs. J. Huff). *Allotopotype*, ♀, with type. *Paratopotypes* 5 ♂ ♀, July 16-August 8, 1939.

## PEDICIINI

*Ula elegans* Osten Sacken, 1869.—Greenbrier, May 22, 1938; May 7, 1939 (Williams); Cades Cove, May 24, 1938 (Williams).

*Ula paupera* Osten Sacken, 1869.—Greenbrier, May 3, 1938 (Williams).

*Pedicia (Pedicia) margarita* Alexander, 1929.—Leconte, Huffs Lodge, 6,400 ft., July 10, 16; August 2 (Mrs. J. Huff).

This is the smallest and one of the rarest of our local species of the subgenus. It had not been recorded from south of New York and Massachusetts.

*Pedicia (Tricyphona) calcar* (Osten Sacken, 1859).—Silers trail, 6,000 ft., June 6; Leconte, Huffs Lodge, around spring in boggy areas, 6,400 ft., June 12-13.

***Pedicia (Tricyphona) huffae* sp. nov.**

Allied to *autumnalis*: antennae (male) relatively elongate, 16-segmented; mesonotum and pleura conspicuously patterned with dark brown and yellow; knobs of halteres darkened; wings yellowish gray, the stigma oval, brown; wings of female virtually as large as those of male; cell  $M_2$  open by atrophy of  $m$ ; male hypopygium with the basistyle provided with long coarse setae; dististyle with five unequal spinous points.

♂. Length, about 13-15 mm.; wing, 12-14 mm.; antenna, 3.6-3.8 mm.

♀. Length, about 15-17 mm.; wing, 11-13 mm.; antenna, 2.3-2.5 mm.

Rostrum and palpi black. Antennae (Fig. 28, male) 16-segmented; scape and pedicel reddish brown, flagellum black; antennae of male unusually long for a member of this subgenus, as shown by the measurements; segments cylindrical, clearly delimited, clothed with a dense white pubescence; pedicel elongate, exceeding one half the length of scape; antennae of female shorter than in male but still longer than in either sex of *autumnalis*. The antenna of *autumnalis* (male) is shown for comparison (Fig. 29). Head gray.

Pronotum obscure yellow, brownish gray medially. Mesonotal praescutum chiefly dark brown, sparsely pruinose; praescutal stripes in cases lacking or ill-defined, in other specimens the stripes separated and much more evident; scutal lobes darkened; scutellum obscure yellow; mediotergite brown or reddish, in cases lined medially and on sides by darker; pleurotergite chiefly darkened. Pleura yellow, variegated with brownish black on the anepisternum and sternopleurite; propleura and pteropleurite pale. Halteres with stem pale, knob darkened. Legs with coxae darkened on outer face; trochanters obscure yellow; femora brownish yellow, the tips narrowly dark brown; tibiae and basitarsi obscure yellow, the tips narrowly infuscated; remainder of tarsi brownish black. Wings (Fig. 23) yellowish gray, the prearcular and costal portions clearer yellow; stigma oval, brown; veins dark brown. Wings of female not or but slightly smaller than those of male. Venation:  $r-m$  at or near midlength of  $R_{4-5}$ ; cell  $M_2$  open by atrophy of  $m$ .

Abdomen elongate; tergites and hypopygium dark brown; sternites obscure yellow, the outer segments darkened. Male hypopygium of the general type of *ampla* and *autumnalis*; basistyle with long coarse setae that exceed the dististyle in length. Dististyle (Fig. 32, *d*) with five unequal horns or spinous points, about as shown; a small fingerlike lobe with elongate setae.

*Holotype*, ♂, Leconte, Huffs Lodge, 6,400 ft., August 8, 1939 (*Mrs. J. Huff*). *Allotopotype*, ♀, pinned with type. *Paratopotypes* 10 ♀ ♂, July 30-September 7, 1939.

I am very pleased to name this distinct species in honor of Mrs. John Huff, whose collecting of crane-flies at and near the summit of Mount Leconte has added materially to our knowledge. The species is most nearly allied to *P. (T.) ampla* (Doane) of northwestern North America and *P. (T.) autumnalis* (Alexander) of northeastern North America. It differs conspicuously from both in the coloration, elongate antennae in the male, and open cell  $M_2$  of the wings. The wings of the female are virtually equal in size to those of the male, not showing the marked reduction found in this sex in *autumnalis*.

*Pedicia (Tricyphona) auripennis* (Osten Sacken, 1859).—Silers trail, 6,300 ft., June 6; Leconte, Huffs Spring, 6,400 ft., June 13. This Canadian zone species had not been recorded from south of New York and Massachusetts.

*Pedicia (Tricyphona) inconstans* (Osten Sacken, 1859).—Leconte, Huffs Lodge, 6,400 ft., September 4 (*Mrs. J. Huff*); Gatlinburg, May 1, 1938 (*Williams*); Greenbrier, May 15-22, 1938, May 7, 1939 (*Williams*); Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, May 8, 1938 (*Williams*) June 10.

***Pedicia (Tricyphona) inconstans calcaroides* subsp. nov.**

Very similar to typical *inconstans* but with the wings virtually unpatterned and with the venational details distinct so that the fly superficially resembles the otherwise entirely distinct *calcar*.

Thorax almost uniformly orange yellow, without distinct stripes but often with a whitish bloom. Wings (Fig. 22) subhyaline or with a faint yellow tinge, the costal region and stigma more or less suffused with yellow or pale brownish yellow; no dark clouds at origin of *Rs* or along cord. Venation: *r-m* usually connecting with *Rs* a variable distance before the fork of latter, in cases this distance exceeding one-half the length of *r-m*; cell  $R_3$  at origin erect to virtually perpendicular; cell  $M_1$  short-petiolate to sessile. Male hypopygium as in the typical form.

*Holotype*, ♂, Anakeesta Ridge, 4 200 ft., June 5, 1939 (*C. P. Alexander*); *Allotopotype*, ♀, pinned with type. *Paratopotypes*, several ♀ ♂. *Paratypes*, Leconte, 5,800-6,400 ft., June 12-13, 1939; Silers trail, 6,000 ft., June 6; Andrews Bald bog, North Carolina, 5,800 ft., June 11, 1939 (*W. H. Harrison*).

The crane-fly above discussed is common and widely distributed at high altitudes throughout the Smokies. Superficially it resembles *calcar* but on the

basis of structure of the male hypopygium is unquestionably *inconstans*, from the typical form of which it is most readily told by the virtually unpatterned wings and slight venational details. One paratype, Alum Cove trail, Leconte. June 12, 1939, from the same spot discussed under *Limonia (Dicranomyia) uliginosa*, has the same unpatterned wings but with cell  $R_3$  unusually long-

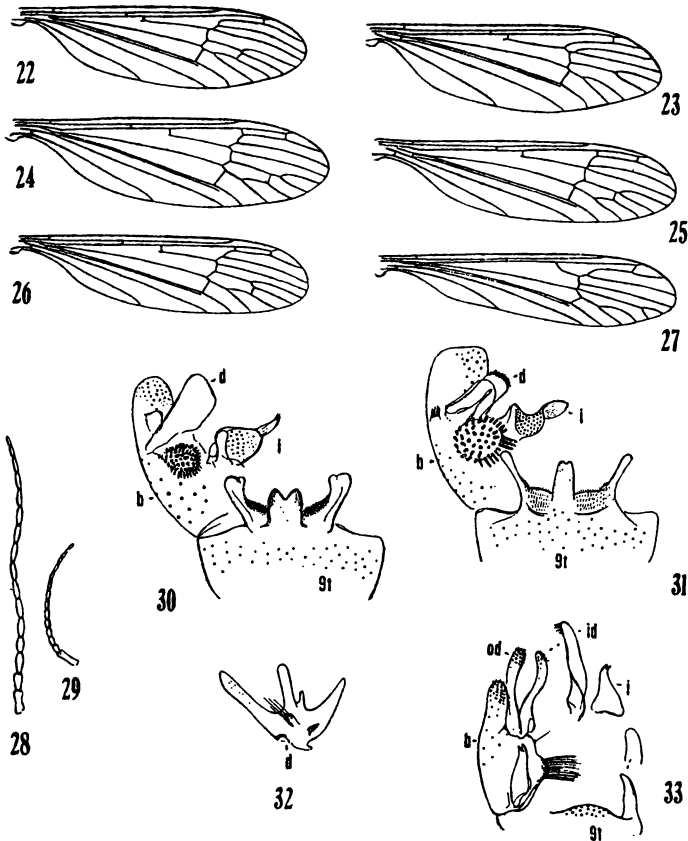


Fig. 22. *Pedicia (Tricyphona) inconstans calcaroides* subsp.n.; venation.  
 23. *Pedicia (Tricyphona) huffae* sp.n.; venation.  
 24-26. *Dicranota (Eudicranota) catawbiensis* sp.n.; venation, showing three extremes.  
 27. *Dicranota (Raphidolabis) hickmanae* sp.n.; venation.  
 28. *Pedicia (Tricyphona) huffae* sp.n.; antenna ( $\delta$ ).  
 29. *Pedicia (Tricyphona) autumnalis* (Alexander); antenna ( $\delta$ ).  
 30. *Dicranota (Eudicranota) catawbiensis* sp.n.; male hypopygium.  
 31. *Dicranota (Eudicranota) yonahlossee* Alexander; male hypopygium.  
 32. *Pedicia (Tricyphona) huffae* sp.n.; male hypopygium.  
 33. *Dicranota (Raphidolabis) hickmanae* sp.n.; male hypopygium.  
 (Symbols: b, basistyle; d, dististyle; i, interbase; id, inner dististyle; od, outer dististyle; t, tergite.)

petiolate, with the origin of  $R_{2-3}$  only slightly perpendicular. I am referring this specimen to this same clear-winged form which rather obviously requires a differentiating name.

***Pedicia (Tricyphona) vernalis catawba* subsp. nov.**

♂. Length, about 7.5-9 mm.; wing, 8-10 mm.

♀. Length, about 11-13 mm.; wing, 11-12 mm.

Very similar to the typical *vernalis* (Osten Sacken, 1861) of northeastern North America, differing especially in the much more restricted wing pattern and in the details of structure of the male hypopygium. Wing markings much reduced, almost as in the otherwise distinct *paludicola* (Alexander). Male hypopygium with the setae before apex of dististyle abundant but delicate, evenly distributed over the extent of the style. Interbase with the feebly dilated head produced laterad into a short point.

*Holotype*, ♂, Indian Gap, Tennessee, 4,500 ft., June 17, 1939 (*C. P. Alexander*). *Allotopotype*, ♀ with type. *Paratypes*, ♂ ♀, Leconte, Alum Cave trail, 5,000 ft., June 12, 1939; Leconte Lodge, 6,400 ft., July 31-August 25, 1939 (*Mrs. J. Huff*); Chimneys Camp, 2,600 ft., June 11, 1939; Silers trail, 6,000 ft., June 6, 1939; Greenbrier, 2,000 ft., April 22 to May 7, 1939 (*Williams*), Brushy Mt. trail, 2,500 ft., May 7, 1939 (*Cole*), June 15, 1939 (*W. H. Harrison*); Cades Cove, April 24, 1938 (*Williams*). North Carolina: Black Mts., May 21 (*Nathan Banks*); Cedar Mt., August 28, 1931 (*H. K. Townes*); Andrews Bald bog, 5,860 ft., June 11, 1939 (*C. P. Alexander*).

***Dicranota (Eudicranota) catawbiensis* sp. nov.**

General coloration reddish yellow; antennal flagellum brownish black; halteres pale, the knobs weakly darkened; legs yellow, the tips of femora and tibiae blackened; wings subhyaline, the stigma not or scarcely differentiated;  $R_{2-3+4}$  present; cell  $M_1$  petiolate to broadly sessile; abdomen yellow, the ninth segment black; male hypopygium with the median tergal lobe broad, the apex with a wide U-shaped notch; interbasal lobe terminating in a flattened fascicle of bristles; dististyle appearing as a flattened horn-colored blade, the apex obtusely rounded and unarmed with spines or chitinized points.

♂. Length, about 5.5-6.5 mm.; wing, 6-7.5 mm.

♀. Length, about 7-7.5 mm.; wing, 7-7.8 mm.

Rostrum brown; palpi with basal segments brown, the outer segments paler. Antennae 14-segmented, short; scape and pedicel pale brown, flagellum brownish black, the more basal segments paler; flagellar segments oval, with very long verticils. Head brownish gray.

Thorax uniform reddish yellow, unmarked. Halteres pale, the knobs weakly darkened. Legs yellow, the tips of femora and tibiae and the outer tarsal segments blackened. Wings (Figs. 24-26) subhyaline, the stigma not or scarcely differentiated; prearcular field more yellowish; veins brown, conspicuous. Venation:  $Sc_1$  ending about opposite the supernumerary crossvein in cell  $R_1$ ;

$R_1$  angulated to square at origin, usually conspicuously spurred;  $R_{2+3+4}$  distinct, usually subequal in length to the supernumerary crossvein; cell  $M_1$  usually petiolate, in cases sessile;  $m-cu$  beyond fork of  $M$ , the distance variable. As is usual in the Pediciine crane-flies, the venation in this species is variable, especially as regards the length of  $R_{2+3+4}$  and the petiole of cell  $M_1$ . The figures given show three extremes of venation, the shortest  $R_{2+3+4}$  being as in Fig. 25; in Fig. 24, cell  $M_1$  is relatively long-petiolate, in Fig. 25 short-petiolate, while in Fig. 26 it is broadly sessile with  $m$  on  $M_3$  about its own length beyond the fork. All such variations in venation occur rather commonly in the species.

Abdomen obscure yellow, the swollen ninth segment of the male black, the styli again yellow. Male hypopygium (Fig. 30) with the median tergal lobe,  $9t$ , relatively broad, with abundant setulae, at apex with a wide U-shaped notch; subtending arms of tergite relatively stout, with dense dark setae on inner margin at base. Interbasal lobe,  $i$ , terminating in a flattened fascicle of bristles. Basistyle,  $b$ , with outer lobe only moderately large and with a sparse armature of spiculae, the lower lobe with numerous coarse black spines. Dististyle,  $d$ , appearing as a flattened horn-colored blade, the apex obtusely rounded and without spines or chitinized points. The male hypopygium of the related *yonahlossee* is shown for comparison (Fig. 31); note especially the tergite,  $9t$ , and the armed dististyle,  $d$ .

*Holotype*, ♂, Alum Cave trail, Mount Leconte, 5,000 ft., June 12, 1939 (C. P. Alexander). *Allotopotype*, ♀. *Paratopotypes*, several ♂ ♀, 4,500-6,000 ft., June 12-13, 1939, June 26-28, 1940; 1 ♂ at actual summit of Leconte, 6,590 ft., June 13, 1939; ♂ ♂, Silers trail, 6,200 ft., June 6, 1939; Forney Ridge, 5,800-6,300 ft., June 17, 1940, both in North Carolina and Tennessee.

*Dicranota (Eudicranota) catawbiensis* is readily told from its nearest ally, *D. (E.) yonahlossee* Alexander, of North Carolina, by the structure of the male hypopygium. Both species are entirely distinct from *D. (E.) pallida* Alexander, of the northeastern United States, and from *D. (E.) notabilis* Alexander, of the Cumberland Plateau, Tennessee. The present species and *Limnophila cherokeensis* sp. n., were the two most common crane-flies in mid-June at high altitudes on Mount Leconte. This fly was frequently noted while resting on low mossy cliffs along the trail.

*Dicranota (Amalopina) flaveola* (Osten Sacken, 1869).—Anakeesta Ridge, 3,300 ft., June 5; Leconte, Huffs Lodge, 6,400 ft., August 5-September 3, 1939 (*Mrs. J. Huff*); Chimneys Camp, 2,700 ft., June 11; Greenbrier, May 15, 1938 (*Williams*).

*Dicranota (Rhaphidolabis) persimilis* (Alexander, 1920). — Anakeesta Ridge, 4,000 ft., June 5; Leconte, Alum Cave trail, 4,000-5,000 ft., June 12; Greenbrier, Porters Creek, 2,500 ft., May 15, 1938, May 7 (*Williams*).

***Dicranota (Rhaphidolabis) hickmanae* sp. nov.**

General coloration gray, the praescutum with three brown stripes; antennae 13-segmented, black throughout; wings nearly hyaline, the stigma only faintly indicated; vein  $R_{2+3+4}$  short; male hypopygium with the median area of tergite

darkened, moderately produced; lateral tergal arms appearing as flattened blades with obtuse apices; basistyle with a low lobe on mesal face, tipped with a dense brush of very long setae; interbase a flattened blade bearing two small teeth at apex; both dististyles narrow.

♂. Length, about 6 mm.; wing, 6-6.3 mm.

♀. Length, about 6.5 mm.; wing, 7 mm.

Rostrum gray; palpi black. Antenna black throughout, 13-segmented; flagellar segments oval, gradually decreasing in size outwardly. Head dark gray.

Mesonotal praescutum light gray, with three conspicuous brown stripes, the median one broader; scutal lobes extensively dark brown, median area of scutum and the posterior sclerites of notum gray. Pleura brownish gray. Halteres with stem pale, especially at base, knob darkened. Legs with coxae testaceous brown; trochanters pale; remainder of legs dark brown, the femoral bases somewhat paler. Wings (Fig. 27) nearly hyaline, the stigma only faintly indicated; veins dark brown. Venation:  $R_{2+3+4}$  short, about two-thirds the basal section of  $R_5$ .

Abdomen, including hypopygium, dark brown. Male hypopygium (Fig. 33) with the median area of tergite,  $9t$ , moderately produced, darkened, with abundant setae; lateral tergal arms appearing as flattened blades with obtuse apices. Basistyle,  $b$ , with outer lobe conspicuous, about one-half the length of the more slender outer dististyle but with similar spinous armature; mesal face of basistyle with a low lobe that bears at apex a dense brush of very long setae. Interbase,  $i$ , a flattened blade terminating in two small teeth. Outer dististyle,  $od$ , clavate, with spinous setae on distal half. Inner dististyle unusually long and slender, subequal to or a little longer than the outer style, at apex with a few erect spinous setae.

*Holotype*, ♂, Mt. Leconte, near Huffs Lodge, 6,400 ft., September 2, 1939 (*Mrs. J. Huff*). *Allotopotype*, ♀, pinned with type. *Paratopotypes*, ♂ ♀, August 25-September 7, 1939 (*Mrs. J. Huff*). What seems to be this same species but represented only by females was taken by Dr. Cole and Miss Hickman along Brushy Mountain trail, 3,500 ft., September 16, 1939.

*Dicranota (Rhaphidolabis) hickmanae* is named in honor of Mrs. Arthur C. Cole (Miss Mary E. Hickman) who collected many of the new and rare species of crane-flies discussed in this report. The fly is quite distinct from all of the now somewhat numerous species of the subgenus in eastern North America. In the lobe on the mesal face of the basistyle of the male hypopygium it agrees with *D. (R.) forceps* Alexander and *D. (R.) persimilis* (Alexander) but the nature of this lobe and its vestiture is quite different from that of any of our species. The low median lobe of the tergite, structure of the interbase, and elongate dististyles, similarly separate the species from all allied forms.

*Dicranota (Rhaphidolabis) rubescens* (Alexander, 1916). — Anakeesta Ridge, 3,500-4,000 ft., June 5; Leconte, Alum Cave trail, 4,600 ft., June 12.

*Dicranota (Plectromyia) confusa* (Alexander, 1924). — Silers trail, 5,800-6,000 ft., June 6; Clingmans Dome, 6,400 ft., June 6, and 18, along small stream in a dense growth of fir; Indian Gap, 4,700 ft., June 9; Leconte, Alum

Cave trail, 5,800-6,000 ft., June 12; Huffs Lodge, 6,400 ft., June 13. Restricted to the spruce-fir zone.

#### HEXATOMINI

*Oxydiscus (Oxydiscus) americanus* (Alexander, 1912).—Leconte, Huffs Lodge, 6,400 ft., August 22-September 7, 1939 (*Mrs. J. Huff*).

*Oxydiscus (Oxydiscus) minutus* (Alexander, 1911).—Silers trail, in wet swale, 5,800 ft., June 6; Anakeesta Ridge, 4,000-4,700 ft., June 5; Leconte, Alum Cave trail, 4,000-4,500 ft., June 12; Huffs Lodge, 6,400 ft., June 12-13.

*Oxydiscus (Oxydiscus) pleuralis* (Dietz, 1921).—Indian Gap, 4,800 ft., June 17 (*Cole & Hickman*); Greenbrier, Brushy Mt. trail, 2,000-2,500 ft., June 15.

*Epiphragma (Epiphragma) fascipennis* (Say, 1823).—Indian Gap, 5,300-5,500 ft., June 5; Anakeesta Ridge, 3,500-4,500 ft., June 5-7; Leconte, Huffs Lodge, 6,400 ft., June 12-13; Greenbrier, Brushy Mt. trail, 2,500 ft., May 20 (*Williams*).

*Epiphragma (Epiphragma) solatrix* (Osten Sacken, 1859).—Greenbrier, May 15-22, 1938 (*Williams*); 2,500 ft., May 7 (*Williams*); 2,300 ft., June 15 (*W. H. Harrison*).

*Prolimnophila areolata* (Osten Sacken, 1859).—Silers trail, 5,800-6,000 ft., June 6; Indian Gap, 5,300-5,500 ft., June 9; Anakeesta Ridge, 4,000-4,700 ft., June 5; Leconte, Alum Cave trail, 4,000-6,000 ft., June 12, summit, 6,590 ft., June 13; Greenbrier, 2,500 ft., May 7 (*Williams*); Brushy Mt. trail, 3,000-4,500 ft., June 15.

*Pseudolimnophila contempta* (Osten Sacken, 1869).—Greenbrier, 1,800 ft., June 7; 2,200-2,500 ft., June 15; May 15, 1938 (*Williams*); Brushy Mt. trail, 3,500 ft., September 16, 1939 (*Cole & Hickman*).

*Austrolimnophila toxoneura* (Osten Sacken, 1859).—Silers trail, 6,000-6,300 ft., June 6; Indian Gap, 5,000-5,300 ft., June 9, 4,800 ft., June 17 (*Cole & Hickman*); Leconte, Alum Cave trail, 4,000-5,500 ft., June 12; Greenbrier, May 15, 1938 (*Williams*), Brushy Mt. trail, 3,500-4,500 ft., June 15; Cades Cove, Myers Lodge, June 10 (*M. M. Alexander*). One of the commonest crane-flies in the Canadian zone, somewhat less numerous in the Transition.

*Dactylolabis cubitalis* (Osten Sacken, 1869).—Chimneys Camp, 2,700 ft., April 30, 1939 (*Williams*).

*Dactylolabis montana* (Osten Sacken, 1859).—Newfound Gap and Anakeesta Ridge, 4,000-5,000 ft., June 5 and 7; Leconte, Alum Cave trail, 5,000-6,000 ft., June 12; Greenbrier, May 15, 1938, May 7, 1939 (*Williams*). Common and conspicuous on dripping faces of cliffs, sometimes associated with the next.

*Dactylolabis hudsonica* Alexander, 1931.—Silers trail, 6,000 ft., June 6; Newfound Gap, 5,000 ft., June 5; Leconte, Alum Cave trail, 4,500-6,000 ft., June 12; Huffs Lodge, 6,400 ft., June 12-13; Greenbrier, May 7, 1939 (*Williams*); Cades Cove, April 24, 1938 (*Williams*). Although often found on wet cliffs, the present species occasionally occur on tree trunks. This was

noted especially along the Silers trail, where the trunks of Frasers Fir are densely moss covered; here occurred many *Limonia indigena* and *Epiphragma fascipennis*, with occasional specimens of the present fly. I had never before seen the spotted-winged species of the genus in such a habitat although the unpatterned species, as *D. cubitalis*, are less lithophilous in their habits.

*Limnophila (Lasiomastix) macrocera* (Say, 1823).—Indian Gap, 4,800 ft., June 17 (Cole & Hickman); Greenbrier, Brushy Mt. trail, 3,500 ft., September 16 (Cole & Hickman); Gregory Ridge trail, spring at the Gantlot, in swale, 4,800 ft., June 17.

*Limnophila (Lasiomastix) tenuicornis* Osten Sacken, 1869.—Leconte, Alum Cave trail, 4,400 ft., among the dense "hobbles" of *Rhododendron maximum* L. and *Leucothoë Catesbaei* (Walt.) Gray, associated with *Limnophila (Prionolabis) munda*, June 12 (M. M. Alexander); Greenbrier, 2,500 ft., May 15, 1938, May 20, 1939 (Williams).

*Limnophila (Elaeophila) aprilina* Osten Sacken, 1859.—Greenbrier, 2,500 ft., May 7, 1939 (Williams).

*Limnophila (Elaeophila) solstitialis* Alexander, 1926.—Greenbrier, 1,700 ft., June 7, along small accessory stream underneath hemlock.

*Limnophila (Trichephelia) seticellula* Alexander, 1938.—Greenbrier, Brushy Mt. trail, 2,300 ft., June 15.

*Limnophila (Dicranophragma) angustula* Alexander, 1929. — Anakeesta Ridge, 3,300 ft., June 5; Chimneys Camp, 2,700 ft., June 7; Little River Gorge, 1,300-1,400 ft., on wet cliffs, June 10; Gregory Ridge trail, Gantlot, 4,800 ft., June 17.

*Limnophila (Dicranophragma) fuscovaria* Osten Sacken, 1859.—Greenbrier, May 15, 1938 (Williams), 1,800-1,900 ft., June 7; Cades Cove, May 8, 1938 (Williams).

*Limnophila (Prionolabis) rufibasis* Osten Sacken, 1859.—Anakeesta Ridge, 5,000 ft., June 5; Silers trail, 6,000 ft., June 6; Leconte, summit, 6,590 ft., June 12. Common at high altitudes; praescutal stripes opaque.

*Limnophila (Prionolabis) walleyi* Alexander, 1929.—Newfound Gap and Anakeesta Ridge, 4,500-5,000 ft., June 5-7; Newfound Gap to Indian Gap, 4,800 ft., June 9; Leconte, Alum Cave trail, 4,600-5,800 ft., June 12; Greenbrier, May 7 (Cole), May 20 (Williams). There is still confusion in this section of the subgenus. What appears to represent this single species has the praescutal stripes opaque or, in cases, highly polished.

*Limnophila (Prionolabis) munda* Osten Sacken, 1869.—Leconte, Alum Cave trail, 4,400 ft., June 12 (M. M. Alexander), from dense "hobbles" or thickets of *Rhododendron maximum* and *Leucothoë Catesbaei*; near summit of Leconte, 6,000 ft., June 12; Leconte Creek trail, 5,500 ft., June 13; Cades Cove, Gregory Ridge trail, 2,500 ft., June 17.

***Limnophila (Phylidorea) stupkai* sp. nov.**

Allied to *lutea*; general coloration brown, sparsely dusted with yellow; femora obscure yellow, the tips infuscated; wings yellow, unmarked except for



the small pale brown stigma; abdominal tergites dark brown with a black sub-terminal ring; male hypopygium with the phallosome appearing as three blackened spines, the central one from a bulbous base set with acute spinous points arising from tessellated plates or areas; flange of aedeagus relatively narrow, without spinulae.

♂. Length, about 7-7.5 mm; wing, 8-9 mm.

Rostrum dark brown; palpi brownish yellow. Antennae with scape and pedicel dark brown, flagellum obscure brownish yellow, the outer segments darker; flagellar segments oval, with long conspicuous verticils; terminal segment about one-half longer than the penultimate. Head yellowish gray, more yellow pollinose on the front and orbits.

Mesonotum brown, sparsely dusted with yellow. Pleura yellowish brown, sparsely pruinose. Halteres with stem yellow, knob dark brown. Legs with the coxae reddish yellow; trochanters yellow; femora obscure yellow, the tips infuscated; tibiae obscure yellow, the tips more narrowly dark brown; tarsi yellowish brown, the outer segments black. Wings (Fig. 34) yellow, the prearcular and costal fields clearer yellow; stigma small, oval, pale brown, inconspicuous against the ground; veins brown, more yellowish in the clearer ground areas. Venation: *Rs* moderately long, strongly arcuated to angulated and short-spurred at origin; *m-cu* at or beyond midlength of cell 1st *M*<sub>3</sub>.

Abdominal tergites dark brown, the sternites more yellowish brown; sub-terminal segments blackened; hypopygium pale yellow. Male hypopygium (Fig. 36) with the dististyles pale, the outer style, *od*, narrowly blackened and weakly bidentate at apex. Phallosome, *p*, appearing as three spinous apophyses, the central one from an oval blackened base that is provided with several acute spinous points arising from reticulated or tessellated areas or plates. Aedeagus, *a*, sinuous at base, of moderate width only, without spinulae as in *lutea*.

*Holotype*, ♂, Mount Leconte, Aium Cave trail, 6,000 ft., June 13, 1939 (C. P. Alexander). *Paratypes*, 1 ♂, Clingmans Dome, 6,000 ft., June 11, 1939; 1 ♂, Leconte trail, 5,000 ft., June 13, 1939; 1 ♂, Andrews Bald bog, North Carolina, 5,860 ft., June 11 1939; Forney Ridge, 5,000-6,200 ft., June 17-18, 1940 (C. P. Alexander).

I take great pleasure in naming this interesting new species in honor of the capable Park Naturalist, Mr. Arthur Stupka, to whom we are greatly indebted for many favors. *Limnophila* (*Phylidorea*) *stupkai* is most similar to *L. (P.) lutea* Doane, of northeastern North America, differing especially in the coloration of the body and in the structure of the male hypopygium, notably of the aedeagus and gonapophyses.

*Limnophila* (*Phylidorea*) *subcostata* Alexander, 1911.—Silers trail, swale near Double Spring Gap, 5,800 ft., June 6; Anakeesta Ridge, from beds of *Diphylleia*, 4,500 ft., June 8; Leconte, Huffs Lodge, bog, 6,400 ft., June 12-13.

*Limnophila brevifurca* Osten Sacken, 1859.—Anakeesta Ridge, 4,500-5,000 ft., June 5; Greenbrier, Brushy Mt. trail, 2,500 ft., May 20, 1939 (Williams).

*Limnophila albipes* Leonard, 1913. — Greenbrier, along small accessory

stream at Forks of Porters Creek and the Middle Prong of Little Pigeon River, 1,700-1,750 ft., June 7.

*Limnophila cherokeensis* sp. nov.

Allied to *niveitarsis*; general coloration black, pruinose with gray; antennae of male elongate; posterior tarsi white; wings with a strong brownish tinge;  $R_{2+3+4}$  unusually long, from two-thirds to fully as long as  $R_s$  and approximately twice  $m-cu$ ; male hypopygium with the outer dististyle uniformly darkened, unequally bidentate at apex; basistyle and inner dististyle without modified groups of spinous setae; one pair of gonapophyses on either side of the trifold aedeagus.

♂. Length, about 5.5-6.5 mm.; wing, 6.5-7.5 mm.; antenna, about 2.8-3 mm.

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

Rostrum and palpi black. Antennae black, the base of first flagellar segment brightened; antennae of male elongate, approximately one half the length of body; flagellar segments elongate-oval to fusiform. Head gray.

Thorax black, heavily to very sparsely dusted with gray, the color thus appearing opaque dark gray to subnitidous black, dorsopleural membrane dark. Halteres with stem pale, knob weakly darkened. Legs with coxae yellow, the fore pair a little darker; trochanters yellow; femora obscure yellow, the tips blackened, only a little more extensive on fore pair where about the distal fourth is darkened; tibiae dark brown, the tips narrowly black; fore and middle tarsi light brown; posterior tarsi snowy white, the outer segment darkened;

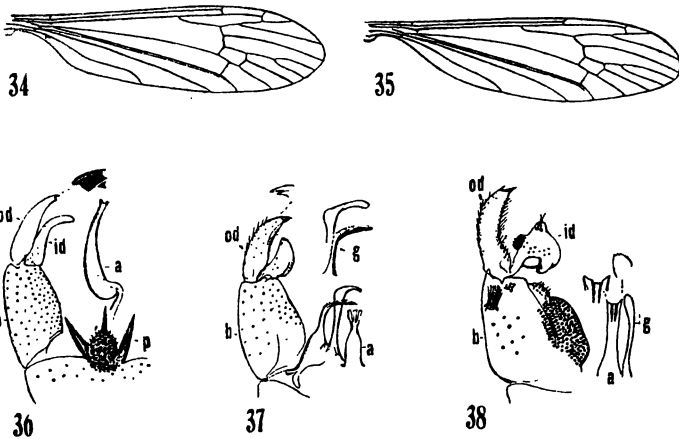


Fig. 34. *Limnophila (Phylidorea) stupkai* sp.n.; venation.

35. *Limnophila cherokeensis* sp.n.; venation.

36. *Limnophila (Phylidorea) stupkai* sp.n.; male hypopygium.

37. *Limnophila cherokeensis* sp.n.; male hypopygium.

38. *Limnophila globulifera* Alexander; male hypopygium.

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

posterior basitarsi not dilated on proximal portion nor with modified setae. Wings (Fig. 35) with a strong brown tinge, the perarcular field more yellow; stigma oval, very faintly darker than the ground; veins dark brown. Venation:  $Sc_1$  ending opposite or shortly before fork of  $R_s$ ,  $Sc_2$  near its tip;  $R_{2+3+4}$  unusually long, from about two-thirds to fully equal in length to  $R_s$  and at least twice the length of  $m-cu$ ; cell 1st  $M_2$  varying from rectangular to short-rectangular, with  $m-cu$  at or beyond midlength.

Abdomen with tergites black, the sternites pale brown to obscure brownish yellow medially, blackened on sides; hypopygium black. Male hypopygium (Fig. 37) with the basistyle,  $b$ , simple, without modified groups of spines or blackened setae; mesal face of basistyle with small groups or stellate areas of microscopic setulae. Outer dististyle,  $od$ , entirely blackened, unequally bidentate at apex. Inner dististyle small and simple, without modified spinous setae. Gonapophyses,  $g$ , appearing as two distinct pairs, the outer ones expanded beyond midlength into boomerang-shaped blades; inner apophyses appearing as slender curved chitinized rods; under higher magnification, the distal third with hyaline outer membrane set with microscopic spinules. Aedeagus,  $a$ , trifid at apex, as in the *niveitarsis* group. I have shown the male hypopygium of the related *globulifera* for comparison (Fig. 38).

*Holotype*, ♂, Silers trail, 6,000 ft., June 6, 1939 (*C. P. Alexander*). *Allotopotype*, ♀. *Paratopotypes*, numerous ♂ ♀; *paratypes*, numerous ♂ ♀ from various stations in the Great Smokies, 4,400-6,400 ft., June 6-18, 1939 and June 17-28, 1940, including Silers trail, on both the North Carolina and Tennessee sides; Clingmans Dome and Forney Ridge, on North Carolina side; Indian Gap; Mt. Leconte, on both Alum Cave and Leconte Creek trails.

*Limnophila cherokeensis* is amply distinct from the other members of the *niveitarsis* group, including *L. globulifera* Alexander and *L. niveitarsis* Osten Sacken. It is most readily told by the unusually long  $R_{2+3+4}$  which is fully twice as long as  $m-cu$ , and especially by the very distinct male hypopygium, as described above. This fly was one of the most common and characteristic flies of the spruce-fir forests at high altitudes in the Great Smokies, being unusually numerous near Clingman's Dome and Forney Ridge, and on Mount Leconte. *L. niveitarsis* has been recorded both from Tennessee (Cumberland Plateau) and North Carolina (Wake Co.) but I have not seen it from so far south and it is possible that these records pertain to one or another species of the same group subsequently described.

*Shannonomyia lenta* (Osten Sacken, 1859).—Indian Gap, 5,300 ft., June 9; 4,800 ft., June 17 (*Cole & Hickman*); Chimneys Camp, 2,700 ft., July 26 (*Cole*); Greenbrier, Brushy Mt. trail, 3,500-4,000 ft., June 15 (*Cole, Harrison & Hickman*).

*Ulomorpha pilosella* (Osten Sacken, 1859). — Anakeesta Ridge, 4,000-4,700 ft., June 5; Chimneys Camp, 2,700 ft., June 7; Leconte, Huffs Lodge, 6,400 ft., August 1-5 (*Mrs. J. Huff*); Greenbrier, May 15-22, 1938 (*Williams*); Brushy Mt. trail, 2,000-4,000 ft., June 15; 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, Myers Lodge, 1,900 ft., June 10.

*Atarba (Atarba) picticornis* Osten Sacken, 1869.—Foot of trail to the

Chimneys, 3,200 ft., June 18 (*W. H. Harrison*); Greenbrier, Brushy Mt. trail, 2,000-3,500 ft., June 15, abundant, many mating (*Cole, Harrison and Hickman*); Cades Cove, Gregory Ridge trail, 2,800 ft., June 17.

*Elephantomyia (Elephantomyia) westwoodi* Osten Sacken, 1869.—Indian Gap, 5,200 ft., June 10 (*Cole & Hickman*); foot of Chimneys trail, 3,200 ft., June 18 (*Harrison*); Chimneys Camp, 2,700 ft., July 2 (*Cole*); Leconte, Alum Cave trail, 4,200-4,800 ft., June 12; Greenbrier, Brushy Mt. trail, 4,000-4,500 ft., June 15.

*Hexatoma (Eriocera) cinerea* (Alexander, 1912).—Greenbrier, May 15, 1938 (*Williams*); Cades Cove, along Forge Creek, 1,900 ft., June 10.

*Hexatoma (Eriocera) fuliginosa* (Osten Sacken, 1859).—Greenbrier, near Forks, 1,800 ft., June 7; Cades Cove, Myers Lodge, 2,000 ft., June 17 (*M. M. Alexander*). These specimens vary considerably in size and in intensity of coloration, the male from Cades being considerably larger and darker in color. The intermediate praescutal stripes are confluent or virtually so, except at their posterior ends.

*Hexatoma (Eriocera) albitarsis* (Osten Sacken, 1869).—Chimneys Camp, 2,700 ft., July 13 (*Cole*); Greenbrier, 2,000 ft., June 15, Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, Rich Mt., 1,950 ft., June 10 (*M. M. Alexander*), Myers Lodge, 2,000 ft., June 17 (*M. M. Alexander*).

#### ERIOPTERINI

*Neolimnophila ultima* (Osten Sacken, 1859), var. *Clingmans Dome*, 6,000 ft., June 11 (*W. H. Harrison*); Leconte, Rainbow trail, 2,000-3,500 ft., June 13. The identity seems assured but only females have been discovered and the male sex may show unsuspected differences.

*Cladura (Cladura) flavoferruginea* Osten Sacken, 1859.—Chimneys Camp, 2,700 ft., October 21 (*Cole & Hickman*).

*Gonomyia (Lipophleps) manca* (Osten Sacken, 1869). — Greenbrier, Porters Creek, 2,000 ft., June 15 (*M. E. Hickman*).

*Gonomyia (Lipophleps) sulphurella* Osten Sacken, 1859. — Chimneys Camp, along small stream, 2,600 ft., June 11.

*Gonomyia (Gonomyia) subcinerea* Osten Sacken, 1859.—Greenbrier, May 15, 1938 (*Williams*), Brushy Mt. trail, 2,500 ft., May 20 (*Williams*); Cades Cove, Myers Lodge, 1,900 ft., June 10.

*Gnophomyia tristissima* Osten Sacken, 1859.—Greenbrier, May 22, 1938 (*Williams*), 2,500 ft., May 7 (*Williams*); Brushy Mt. trail, 2,400-3,000 ft., June 15; 3,500 ft., September 16 (*Cole & Hickman*).

*Teucholabis (Teucholabis) immaculata* Alexander, 1922.—Cades Cove, Rich Mt., 1,950 ft., June 10 (*M. M. Alexander*).

This species was originally characterized as a subspecies of *T. (T.) complexa* Osten Sacken, 1859, and was based upon the immaculate nature of the mesonotum of the types. It is now evident that there are two very distinct

species confused under the name *complexa*, these being very similar in general appearance but differing notably in the structure of the male hypopygium.

The original description of *complexa* indicates that both species were confused by Osten Sacken but his figure of the male hypopygium (Mon. Dipt. N. Amer., 4, pl. 3, figs. 9, 9a; 1869), while very diagrammatic, can pertain only to one of these species. Accordingly I am herewith designating as lectotype of the species, the specimen in the original series (Museum of Compara-

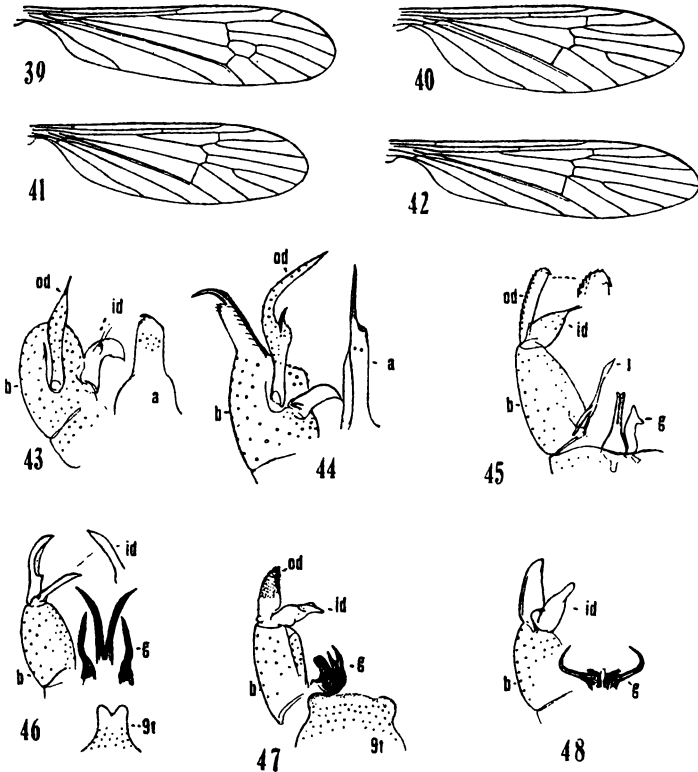


Fig. 39. *Rhabdomastix margarita* sp.n.; venation.  
 40. *Ormosia (Ormosia) tennesseensis* sp.n.; venation.  
 41. *Ormosia (Ormosia) harrisoniana* sp.n.; venation.  
 42. *Ormosia (Ormosia) lilliana* sp.n.; venation.  
 43. *Teucholabis (Teucholabis) complexa* Osten Sacken; male hypopygium.  
 44. *Teucholabis (Teucholabis) immaculata* Alexander; male hypopygium.  
 45. *Rhabdomastix margarita* sp.n.; male hypopygium.  
 46. *Ormosia (Ormosia) tennesseensis* sp.n.; male hypopygium.  
 47. *Ormosia (Ormosia) harrisoniana* sp.n.; male hypopygium.  
 48. *Ormosia (Ormosia) lilliana* sp.n.; male hypopygium.  
 (Symbols: a, aedeagus; b, basistyle; g, gonapophysis; i, interbase; id, inner dististyle; od, outer dististyle; t, tergite.)

tive Zoölogy, Cambridge, Mass.) upon which this figure is based, with the hypopygium conforming to the description given herewith. The two species may be differentiated as follows:

*Teucholabis (Teucholabis) complexa* Osten Sacken. Male hypopygium (Fig. 43) with the tip of basistyle, *b.* obtusely rounded, the spine lateral in position and very small. Outer dististyle, *od*, a simple straight rod that terminates in an acute apical spine. Inner dististyle with the outer blade nearly simple, the basal lobe with two long setae, as shown by Osten Sacken. Aedeagus, *a*, obtuse at apex, the terminal spine very short, curved and reduced, scarcely visible except under high magnification.

*Teucholabis (Teucholabis) immaculata* Alexander. Male hypopygium (Fig. 44) with the spine of basistyle, *b.* apical, from a conspicuous expanded basal blade. Outer dististyle, *od*, a long sinuous rod, the tip an acute spine, at near midlength bearing a strong lateral thorn. Inner dististyle small. Aedeagus, *a*, terminating in a long straight apical spine that is more than a third as long as the entire aedeagus.

Unfortunately, the immaculate mesonotum of the types of *immaculata* is not constant for the species since many, if not most, of the known specimens have three unusually heavy black praescutal stripes and the thoracic pleura heavily patterned with black.

*Lipsothrix sylvia* (Alexander, 1916).—Silers trail, 5,800 ft., June 6; Anakeesta Ridge, 4,500-4,700 ft., June 5-8; Leconte, Alum Cave trail, 4,500-5,500 ft., June 12; Greenbrier, 2,500 ft., April 22, May 20, 1939 (*Williams*); Cades Cove, April 24, 1938 (*Williams*); Myers Lodge, 1,900 ft., June 10.

The beds of bears-foot or umbrella leaf, *Diphylleia cymosa* Michx., at Anakeesta Ridge harbor a number of species of Tipulidae. On June 8, the following species were collected from such a bed: *Tipula (Yamatotipula) cayuga* Alexander, *Tipula (Schummelia) hermannia* Alexander, *Dolichopeza (Oropeza) subvenosa* sp. n., *Liogma nodicornis flaveola* Alexander, *Limonia (Dicranomyia) humidicola* (Osten Sacken), *Prolimnophila areolata* (Osten Sacken), *Austrolimnophila toxoneura* (Osten Sacken), *Limnophila (Phylidorea) subcostata* (Alexander), *Limnophila cherokeensis* sp. n., and the present species.

*Erioptera (Erioptera) megophthalma* Alexander, 1918.—Greenbrier, May 15, 1938 (*Williams*).

*Erioptera (Erioptera) septemtrionalis* Osten Sacken, 1859.—Silers trail, 6,000-6,200 ft., June 6, common along trail; Leconte, Huffs Lodge, 6,400 ft., June 13; July 26 (*Mrs. J. Huff*); Chimneys Camp, 2,700 ft., June 8; Greenbrier, 2,000 ft., November 12, 1938 (*Williams*).

*Erioptera (Erioptera) vespertina* Osten Sacken, 1869.—Park, near Gatlinburg, May 1, 1938 (*Williams*).

*Erioptera (Hoplolabis) armata* Osten Sacken, 1859.—Greenbrier, 2,000 ft., May 7, 1939 (*Williams*).

*Erioptera (Symplecta) cana* (Walker, 1848) (*hybrida* Meigen, 1804).—Park, near Gatlinburg, May 1, 1938 (*Williams*).

*Erioptera (Mesocyphona) needhami* Alexander, 1918.—Greenbrier, near Forks, 1,800 ft., June 7.

*Erioptera (Empeda) stigmatica* (Osten Sacken, 1869).—Silers trail, 6,200 ft., June 6; Indian Gap, 4,800 ft., June 17 (Cole & Hickman); Leconte, Rainbow Falls, 2,500 ft., June 13; Greenbrier, 2,000 ft., May 7, 1939 (Williams).

*Erioptera (Gonempeda) nyctops* Alexander, 1916.—Indian Gap, 5,300 ft., June 9; Leconte, Alum Cave trail, 5,500-6,000 ft., June 12; Huffs Lodge, bog, 6,400 ft., June 13; Leconte Creek trail, 6,000-6,200 ft., June 13.

*Rhabdomastix hansonii* Alexander.—Greenbrier, Forks, 1,800 ft., June 7; Cades Cove, Gregory Ridge trail, 2,600 ft., among dense growth of *Rhododendron maximum*, June 17.

#### *Rhabdomastix margarita* sp. nov.

General coloration reddish brown; antennae (male) elongate, only a little shorter than the entire body; wings with a weak brown tinge, the oval stigma vaguely darker; veins conspicuous, brown, the macrotrichia long;  $Sc_1$  ending about opposite midlength of  $R_s$ ,  $Sc_2$  present or lost by atrophy;  $m-cu$  shortly before midlength of cell 1st  $M_2$ ; abdomen yellowish brown, the terminal two segments brownish black; male hypopygium with the interbases slender, the apex expanded into a weak triangular head.

♂. Length, about 5.5-6 mm.; wing, 6.3-7 mm.; antenna, about 4.7-5 mm.

♀. Length, about 5.5 mm.; wing, 5 mm.

Rostrum and palpi dark brown. Antennae with scape and pedicel obscure yellow, flagellum black; antennae (male) elongate, only a little shorter than the body; flagellar segments cylindrical with a long erect white pubescence and short, subequal verticils that are much shorter than the segments. Antennae of female much shorter but still long for this sex in the genus. Head brownish gray; anterior vertex wide.

Pronotum obscure yellow. Mesonotum reddish brown, the surface subnitidous, in cases with the anterior portion of praescutum darker medially. Pleura reddish yellow, unmarked. Halteres dusky, the base of stem pale. Legs with coxae and trochanters yellow; femora obscure brownish yellow, the tips darkened; tibiae obscure yellow, the tips narrowly darkened; tarsi chiefly yellow, the outer segments darkened. Wings (Fig. 39) with a weak brown tinge, the oval stigma vaguely darker; prearcular field more yellow; veins brown, conspicuous. Macrotrichia of veins beyond cord long and conspicuous, well distributed on all veins excepting  $R_s$ . Venation:  $Sc_1$  ending about opposite midlength of  $R_s$ ,  $Sc_2$  in cases present, in still other specimens atrophied;  $R_3$  oblique, separated from  $R_{1+2}$  on costa by a distance a little greater than its length;  $m-cu$  shortly before midlength of cell 1st  $M_2$ , the latter variable in size, in the holotype unusually small; veins issuing from cell 1st  $M_2$  moderately arcuated; cell 2nd  $A$  relatively narrow.

Abdomen yellowish brown, the basal tergites somewhat darker; eighth and ninth segments brownish black; hypopygium yellowish brown. Male hypo-

pygium yellowish brown. Male hypopygium (Fig. 45) with the basistyle, *b*, elongate; interbase, *i*, with the stem slender, the apex expanded into a weak triangular head. Outer dististyle, *od*, with appressed spinules along outer face; apex a simple decurved spine. Inner dististyle, *id*, stout, narrowed to a small point.

*Holotype*, ♂, Mount Leconte, Leconte Creek trail, near Rainbow Falls, 2,500 ft., June 13, 1939 (*C. P. Alexander*). *Allotype*, ♀, Leconte Lodge, near summit of Mount Leconte, 6,400 ft., July 31, 1939 (*Mrs. J. Huff*). *Paratypes*, 1 ♂, with allotype, July 30, 1939 (*Mrs. J. Huff*); 3 ♂♂, Linville Falls, Burke Co., North Carolina, 3,200 ft., June 21, 1939 (*M. M. Alexander*).

*Rhabdomastix margarita* is affectionately dedicated to Mrs. Alexander who collected part of the type material, as well as many of the other specimens recorded in this paper. The elongate antennae of the male sex readily separates the fly from all other species in the Nearctic fauna. The length and nature of the antennae is about intermediate between the elongate condition in typical *Rhabdomastix* Skuse and the short type found in *Sacandaga* Alexander. If a name were deemed advisable for such species, the subgeneric term *Palaeogonomyia* Meunier, 1899, 1906, based on certain fossil species (Oligocene: Baltic Amber) is available. However, since the character of length of antennae is a sexual one, it seems preferable to drop these various subgeneric groups except to designate groups of species within the now complex genus *Rhabdomastix*. Professor Rogers informed me that he had taken this same species in the southern Appalachians but unfortunately his material was not available to me for inclusion in the type series of the species.

*Ormosia (Ormosia) apicalis* Alexander, 1911.—Greenbrier, May 20, 1939 (*Williams*); Cades Cove, Rich Mt., 1,950 ft., June 10.

*Ormosia (Ormosia) innocens* (Osten Sacken, 1869).—Silers trail, in swale near Double Spring Gap, 5,800 ft., June 6.

*Ormosia (Ormosia) nubila* (Osten Sacken, 1859).—Park, near Gatlinburg, October 23, 1938 (*Williams*); Greenbrier, 2,000 ft., April 22, 1939 (*Williams*); Brushy Mt. trail, 3,500 ft., September 16 (*Cole & Hickman*); Cades Cove, April 24, 1938 (*Williams*), Rich Mt., 1,950 ft., April 15 (*Cole*).

*Ormosia (Ormosia) arcuata* (Doane, 1908).—Greenbrier, Brushy Mt. trail, May 20, 1939 (*Williams*). Although only females are available, there seems to be no possible doubt of the identity.

*Ormosia (Ormosia) nigripila* (Osten Sacken, 1869).—Anakeesta Ridge, 4,700 ft., June 9, near upper tunnel; Greenbrier, Brushy Mt. trail, 2,000 ft., May 7-20, 1939 (*Williams*); 3,500 ft., September 16 (*Cole & Hickman*).

*Ormosia (Ormosia) holotricha* (Osten Sacken, 1959).—Silers trail, 6,000-6,200 ft., June 6.

***Ormosia (Ormosia) tennesseensis* sp. nov.**

Allied to *meigenii*; male hypopygium with the inner dististyle a simple narrow cultriform blade; gonapophyses simple, without lateral teeth or spines.



♂. Length, about 4.6-5 mm.; wing, 5.2-6 mm.

Rostrum brown; palpi black. Antennae short, black; flagellar segments long-oval, with very long verticils. Head brownish gray.

Pronotum brown; pretergites yellow. Mesonotum brownish gray, without distinct stripes. Pleura brownish gray. Halteres yellow, the knobs clearer yellow. Legs with coxae brownish yellow; trochanters obscure yellow; femora obscure brownish yellow, the tips weakly darkened; tibiae and tarsi dark brown. Wings (Fig. 40) subhyaline, patterned with brown, including a conspicuous stigmal area; cells C and Sc darkened; restricted dark seams along cord and certain of the longitudinal veins; more whitish areas before and beyond stigma; base and outer end of cell R, cell  $M_3$  and bases of Anal cells whitened; veins brown. Venation:  $R_2$  at or just beyond fork of  $R_{2+3+4}$ ;  $m-cu$  before fork of M, in cases up to one-third its own length; Anal veins convergent.

Abdomen dark brown, male hypopygium a trifle brightened. Male hypopygium (Fig. 46) with the median tergal lobe, *9t.* relatively narrow. Outer dististyle, *od.* a simple curved rod, the concave inner face with pale membrane. Inner dististyle, *id.* a simple narrow cultriform blade. Gonapophyses, *g.* simple, all without lateral teeth or spines, the central pair about one-third longer than the more slender lateral apophyses.

*Holotype*, ♂, Greenbrier Cove, 2,000 ft., March 12, 1939 (*Williams*). *Paratopotypes*, 3 ♂♂, pinned with type; *paratypes*, 2 ♂♂ on one pin, Knoxville, March 4, 1938; 4 ♂♂ on one pin, Love Brook, Knoxville, March 12, 1938 (*Williams*).

*Ormosia (Ormosia) tennesseensis* is very similar in its general appearance to *O. (O.) meigenii* (Osten Sacken) but is quite distinct in the structure of the male hypopygium, especially of the inner dististyle and gonapophyses.

*Ormosia (Ormosia) serridens* Alexander, 1919.—Greenbrier, 2,000 ft., March 12, 1939; May 3, 1938 (*Williams*).

*Ormosia (Ormosia) adirondacensis* Alexander, 1919.—Anakeesta Ridge, 4,000 ft., June 12; 3,300 ft., common among dense beds of dog-hobble, *Leucothoë Catesbaei*, and among tangled vines of *Aristolochia*, June 5; Leconte, Alum Cave trail, 4,000-4,500 ft., June 12, in *Leucothoë* hobbles. Compared with northern specimens, these flies are much lighter in color, pale brownish yellow, yet the male hypopygium confirms the identity.

*Ormosia (Ormosia) brevicealcarata* Alexander, 1927.—Greenbrier, Forks, 1,700 ft., June 7; Brushy Mt. trail, 2,000 ft., June 15; 3,500 ft., September 16 (*Cole & Hickman*).

#### *Ormosia (Ormosia) lilliana* sp. nov.

Allied to *dentifera*; general coloration of thorax gray; antennae black throughout; legs brownish black, the femoral bases restrictedly obscure yellow; wings brownish yellow, stigma pale brown; cell 1st  $M_2$  open by atrophy of

basal section of  $M_3$ ; vein  $2nd\ A$  gently sinuous; male hypopygium with the inner dististyle strongly narrowed on outer third; gonapophyses appearing as slender curved black horns, at base of each with two or three small teeth.

♂. Length, about 4.2-4.3 mm.; wing, 5-5.2 mm.

♀. Length, about 5 mm.; wing, 5.5 mm.

Rostrum dark brown; palpi black. Antennae short, black throughout, scape more pruinose; flagellar segments oval; longest verticils exceeding the segments. Head gray.

Pronotum and mesonotum uniform light gray, the lateral pretergites restrictedly light yellow; pseudosutural foveae and tuberculate pits black. Pleura pale brownish gray. Halteres yellow. Legs with the coxae and trochanters obscure yellow; remainder of legs brownish black, the femoral bases restrictedly obscure yellow. Wings (Fig. 42) tinged with brownish yellow, the prearcular and costal fields lighter yellow; stigma long-oval, pale brown; veins brown, more flavous in the yellow areas. Macrotrichia abundant in all cells (not indicated in figure). Venation:  $Sc_1$  ending about opposite  $R_2$ ;  $R_{2-3-4}$  longer than  $R_{2+3}$ ; cell  $2nd\ M_2$  deep,  $1st\ M_2$  open by atrophy of basal section of  $M_3$ ;  $m-cu$  erect, close to fork of  $M$ ; vein  $2nd\ A$  gently sinuous.

Abdominal tergites dark brown, sternites obscure brownish yellow; hypopygium yellow. Male hypopygium (Fig. 48) with the apex of basistyle,  $b$ , produced into a small setiferous lobe (not shown in figure). Outer dististyle,  $od$ , a flattened ear-shaped structure, darkened on outer half; inner dististyle strongly narrowed on outer third. Gonapophyses,  $g$ , appearing as long slender curved black horns, at base of each with two or three small teeth.

*Holotype*, ♂, Silers trail, 6,000 ft., June 6, 1939 (C. P. Alexander). *Allo-topotype*, pinned with a paratype ♂. *Paratopotypes*, 6 ♂ ♀, with the types, 5,800-6,300 ft., June 6, 1939 and June 17, 1940, in both North Carolina and Tennessee; 1 ♀, Indian Gap, 5,500 ft., June 9, 1939 (C. P. Alexander).

This distinct species of *Ormosia* is named in honor of Mrs. Lillie Schreiber Harrison (Mrs. Walter H. Harrison), who has been our colleague on many camping trips throughout the extent of the Appalachian system. In my field notes, I had tentatively determined this fly as being *Ormosia (Ormosia) dentifera* Alexander, of northeastern North America, which it closely resembles and which is its nearest ally. The structure of the male hypopygium is quite distinct in the two flies, especially the inner dististyle and the gonapophyses. In *dentifera*, the gonapophyses are much stouter, with one or more denticles at near midlength, so there is a narrow lower notch between this spine and the base of the apophysis; in the present fly, the denticles are small and placed at the very base of the apophysis.

***Ormosia (Ormosia) harrisoniana* sp. nov.**

Allied to *monticola*; antennae of male greatly elongated; general coloration of thorax yellow, the praescutum with three conspicuous brown stripes; wings with a dusky tinge; vein  $2nd\ A$  slightly sinuous on distal third; male hypo-

pygium with the tergite conspicuous, its caudal border shallowly and unequally trilobed, the lateral lobes appearing as pale cushions; gonapophyses conspicuously blackened and trilobed, the outermost point obtuse at apex, the others appearing as acute spines.

♂. Length, about 4.5 mm.; wing, 5.5 mm.; antenna, about 3.5 mm.

♀. Length, about 4.5 mm.; wing, 5 mm.

Rostrum and palpi brownish black. Antennae (male) elongate, as shown by the measurements; scape and pedicel pale, flagellum black throughout; flagellum nodulose, the basal swelling of the segments with abundant long outspread setae, the long apical pedicels smooth. Head brownish gray.

Pronotum pale, darker medially. Mesonotal praescutum obscure yellow laterally, with three conspicuous brown stripes, in cases these latter confluent to virtually cover the disk; remainder of notum dark brown. Pleura obscure brownish yellow, the pleurotergite darker. Halteres dusky, the base of stem yellow. Legs with the coxae and trochanters yellow; remainder of legs brown, the tarsi with more golden-yellow vestiture. Wings (Fig. 41) with a dusky tinge, the stigma darker; veins brown. Macrotrichia of cells abundant (not shown in the figure). Venation: Cell 1st  $M_2$  open by the atrophy of the basal section of  $M_3$ ; vein 2nd  $A$  slightly sinuous on distal third.

Abdomen, including hypopygium, dark brown or brownish black. Male hypopygium (Fig. 47) with the tergite conspicuous, the caudal border shallowly and unequally trilobed, pale, the lateral lobes obtuse. Dististyles, *id*, *od*, much as in *monticola*; outer style narrowed at apex, the distal half with abundant delicate setulae; inner style narrowed at apex. Gonapophyses, *g*, heavily blackened, with three points instead of two as in *monticola*; inner pair acute spines, the outer lobe longer and stouter, its apex obtuse.

*Holotype*, ♂, Mount Leconte, near Huffs Lodge, 6,400 ft., August 8, 1939 (*Mrs. J. Huff*). *Allotopotype*, ♀, pinned with type. *Paratype*, ♂, Brushy Mt. trail, Greenbrier Cove, 3,500 ft., September 16, 1939 (*Cole & Hickman*).

I take unusual pleasure in naming this species after my long-time friend and fellow camper, Mr. Walter Henry Harrison, of Amherst, with whom we have collected Tipulidae in most sections of the Appalachian Mountains (Gaspé: Shickshocks; White Mountains, N. H.; Green Mountains, Vt.; Adirondacks, N. Y.; the Great Smokies and Mount Mitchell). The fly is most nearly related to *Ormosia* (*Ormosia*) *monticola* (Osten Sacken) of north-eastern North America, differing most conspicuously in the characters of the male hypopygium, notably of the gonapophyses.

Members of the present genus, *Ormosia* Rondani, are among the most interesting and instructive in the entire family Tipulidae. It should be noted that while Rogers found but a single species, *adirondacensis*, in the Cumberland Plateau region, no fewer than twelve species from the Smokies are here recorded and several others will undoubtedly be discovered as a result of future collecting.

*Tasiocera (Dasympophilus) ursina* (Osten Sacken, 1859).—Chimneys Camp, 2,700 ft., June 4-8. Near rock-houses, occurring in small dancing swarms along tiny rills flowing from springs along the low cliffs; many hundreds. in small groups of from 15 to 30. Rogers (l.c., p. 5-6, pl. 5, fig. 9) has well described and figured these so-called "rock-houses" as they occur in the Cumberland Plateau.

*Molophilus (Molophilus) auricomus* Alexander, 1926.—Greenbrier, May 22, 1938 (Williams); near Forks, 1,800 ft., June 7; Cades Cove, May 8, 1938 (Williams); Myers Lodge, 2,000 ft., June 17 (M. M. Alexander).

*Molophilus (Molophilus) fultonensis* Alexander, 1916.—Clingmans Dome, 6,400 ft., June 18, common in boggy areas; Chimneys Camp, 2,600 ft., June 11; Cades Cove, Myers Lodge, swept from beds of *Zanthorhiza apiifolia* L'Her. (Ranunculaceae) along Forge Creek, 1,900 ft., June 10. I am unable to satisfactorily separate the present fly from *huron* Alexander or from the manuscript species *cumberlandensis* Alexander (Rogers list, l.c., p. 49) and more material will be needed from all parts of the range to determine the variation in characters.

*Molophilus (Molophilus) pubipennis* (Osten Sacken, 1859).—Greenbrier, May 22, 1938 (Williams).

*Molophilus (Molophilus) cramptoni* Alexander, 1924.—Chimneys Camp, near small waterfall, 2,600 ft., June 11.

*Molophilus (Molophilus) hirtipennis* (Osten Sacken, 1859).—Silers trail, 5,800-6,000 ft., June 6; Clingmans Dome, in boggy areas, associated with *Dicranota (Plectromyia) confusa* and *Limnophila cherokeensis*, 6,400 ft., June 18; Anakeesta Ridge, 5,000 ft., June 5; Leconte, Alum Cave trail, 5,500-6,000 ft., June 12; Greenbrier, Brushy Mt. trail, 2,500 ft., May 20 1939 (Williams).

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