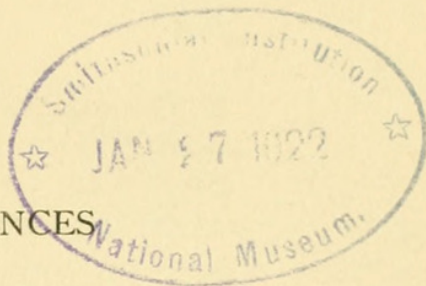


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XVI

REVISION OF THE PIPIZA GROUP OF THE FAMILY
SYRPHIDÆ (FLOWER-FLIES) FROM
NORTH OF MEXICO

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The genus *Pipiza*, as generally accepted in North America, has long been regarded as one of the most difficult genera in the family. The reason for this is found in inadequate descriptions and the absence of outstanding specific characters which could be used for identification. Abundant material has revealed several characters which are of exceptional importance in this group and the old reliance upon the color of the pile is not adhered to in this work where other characters are sufficiently prominent to allow of their employment. The character of the pile often indicates species and is of considerable importance, as variation is not as great as is generally supposed. Many small differences usually accompany its variation in color, and these, together with more important structural differences, lead to the absolute determination of the specimens.

The present paper deals with forty-nine species of North American *Pipizini*. Their retention in a single

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genus makes their study very difficult. It has usually been the practice to break up a genus which has become unwieldy, provided definite and stable characters are available for the separation of the sexes into their respective genera. With the Genus *Pipiza* it is found that there is a natural subdivision into four well-marked groups. In Europe three genera are recognized, *Pipiza*, *Pipizella* and *Cnemodon*. The genus *Heringia*, established by Rondani for *Pipiza heringi* Zett., is also recognized in the present paper, and includes five North American species.

As to the wisdom of accepting four distinct genera I might point out that the material for study has invariably been scanty, that too much emphasis has been placed upon certain prominent characters (for example, hind trochanteral spur in *Cnemodon*) to the detriment of the further study of other characters; that the females, except in some species of *Pipiza*, have never been properly associated with the males, and that, on account of the confusion caused by the difficulty of proper identification, the genus has never received careful study.

With such a condition prevailing in these genera it is no wonder that the generic limitations prevailing in Europe have not been accepted in America. The difficulty of tracing the females to their proper relationships has now been largely overcome, so it is a simple matter to locate them in their proper genus.

I wish to express to Professor A. L. Lovett, of the Oregon Agricultural College, the greatest thanks for specimens loaned for study and for many suggestions. Upon learning of the scope of the present work, Professor Lovett unhesitatingly forwarded his whole collection of *Pipizini* for study, requesting that all new species be named and described, including such as he already had in manuscript. Mr. W. M. Davidson, of the Bureau of Entomology, supplied several specimens of California *Pipizini* which he considered new and offered a number of suggestions for which I am greatly indebted. I also wish to express my gratitude to Dr.

J. R. Malloch for the privilege of examining the para-type of *Cnemodon trochanterata*, and to Dr. Aldrich for several suggestions. To the late Doctor Williston I owe much for the determination of specimens, and for suggestions regarding several of the new species. To Mr. E. P. Van Duzee I am indebted for a critical reading of the manuscript.

The disposition of the type specimens of the new species is given following each description.

KEY TO THE GENERA

1. Face considerably broader at the oral margin than at the antennæ.
(If doubtful, compare *Heringia*) *Pipiza*
Face but little or not at all broader at the oral margin than at the antennæ..... 2
2. Arista microscopically bare; eyes often with a horizontal bare stripe *Pipizella*¹
Arista microscopically pilose to the end; eyes always evenly pilose.... 3
3. Venter of fourth segment in the male only half as long as its dorsum; middle tibiæ in female slender; third antennal joint in female elongate *Heringia*¹
Venter of fourth segment three-fourths as long as its dorsum; middle tibiæ in female rounded in front, in male produced anteriorly; hind trochanters in male usually with long process *Cnemodon*

¹In *Pipizella* and *Heringia* the middle tibiæ are narrow, often somewhat constricted in front; the females of *Pipizella* have the bare stripe on the eyes more marked, and, where present, this will at once distinguish them; more difficulty may be experienced with *Cnemodon* until the student becomes familiar with some species, but usually the shorter and more roundish antennæ will help to distinguish the females belonging to that genus.

Genus *Pipizella* Rondani

Triglyphus Loew (Part), *P. modestus* and *pubescens*.

Pipiza Williston (Part), Synop. N. Am. Syrph., 1886.

Eyes in both sexes often with a median horizontal bare stripe; third antennal joint more than twice as long as wide, usually three or more times longer; arista microscopically bare or pilose at the immediate base only; species usually much shining, sometimes strongly metallic; *last section of fourth longitudinal vein bent or angulated at its middle*, usually forming a moderately acute, or almost a right angle, with the third vein.

(The genus *Triglyphus* is distinguished from other Pipizini by the abdomen being composed of only three

visible segments. *P. pubescens* was therefore wrongly placed when attributed to the genus *Triglyphus* by Loew.)

KEY TO SPECIES OF PIPIZELLA

- | | |
|---|-------------------------|
| 1. Face and frons entirely whitish pilose | 2 |
| Face or frons partly blackish pilose | 4 |
| 2. Third joint of antennæ four or five times as long as wide; wings dark brown | <i>australis</i> |
| Third joint about four times as long as wide; wings hyaline or almost so | 3 |
| 3. Scutellum with apical groove; auxiliary vein ending well beyond apical cross-vein | <i>pulchella</i> |
| Scutellum without apical groove; auxiliary vein ending hardly beyond apical cross-vein | <i>occidentalis</i> |
| 4. Thorax conspicuously reddish pilose; abdomen with some reddish or reddish-yellow pile; antennæ entirely black (western species). | <i>rufithoracica</i> |
| Pile not so colored | 5 |
| 5. Arista microscopically pilose on basal quarter; abdomen of male brassy | <i>pubescens</i> |
| Arista at most pilose at immediate base; abdomen of male not brassy | 6 |
| 6. Arista pilose at immediate base (to end of first section) antennæ reddish below; moderately robust species; (6.5 to 7 mm.) | <i>modesta</i> |
| Arista bare (in all species examined); smaller and more slender, if very similar the antennæ are black throughout in the male | 7 |
| 7. Wings with a large brown spot in the middle | <i>*bellula</i> |
| Wings without median brown cloud | 8 |
| 8. Third joint of antennæ partly reddish, about four times as long as wide | <i>pulchella banksi</i> |
| Third joint of antennæ usually entirely black, about three times as long as wide | <i>fraudulenta</i> |

1. *Pipizella pubescens* (Loew) (Figs. 7, 9, 10, 40)

Triglyphus pubescens Loew, Century, iv, No. 61, 1863.

Pipiza pubescens Williston, Synop. N. Am. Syrph., 23, 1886.

Habitat: Wisconsin (Lw.) Ontario! Shining black to brassy; front basitarsi slightly, the hind ones considerably, incrassate.

Length about 5 mm. Male: Face and frons metallic bluish black, moderately long white pilose; sides of face and frons to well above the antennæ narrowly whitish pollinose; eyes blackish pilose, across the middle with a well-marked horizontal bare stripe. Antennæ elongate, black, second and third joints testaceous below, third joint over twice as long as broad, the end evenly rounded. Thorax and scutellum shining black, the former with a coppery reflection; pile luteous, on the pleuræ white and longer. First segment of abdomen black; remaining segments shining greenish black with a brassy reflection, anterior and posterior margins of segments with ill-defined opaque bands not reaching lateral margins; pile short, white, the posterior margins of second to fourth segments and anterior margins of third and fourth, with rather narrow black pilose bands. Hypopygium with a few white hairs. Legs

*No description available.

black, tips of the four anterior femora, basal quarter of front and third of middle tibiæ and first two joints of their tarsi, together with tip of hind basitarsi and the following joint, yellowish; pile of legs sparse, long, whitish, hind tibiæ below with shorter black pile. Wings hyaline, stigma yellowish; last section of fourth longitudinal vein angulated at its middle, of fifth rectangular.

Female: Face and front shining greenish black, white pilose except across upper part of front and immediately above base of antennæ where the pile is black; sides of face and front to middle narrowly whitish pollinose; about middle of frontal orbits a small triangular spot, well separated from the lateral stripes. Antennæ black, all the joints yellowish below; eyes short black pilose, with bare stripe as in male; occipital cilia cinerous. Thorax, scutellum and abdomen shining greenish black, short white pilose; pile of pleuræ longer; abdomen with black pile as in male; scutellum rather large and usually with a well-marked apical groove; legs as in male, but tip of hind femora and narrow base of its tibiæ yellow.

Five males and six females from various parts of Ontario, May to July (Curran). This is the only species I have examined which is distinctly brassy in some reflections. Only one female showed the same character very markedly. In good specimens the microscopic pile of the arista is very evident, but it may be hard to discern in specimens which have been wet.

2. *Pipizella pulchella* (Williston)

Pipiza (Pipizella) pulchella Williston, Synop. N. Am. Syrph., 29, pl. ii, figs. 1, 1a, 1b.; 1886.

Habitat: Connecticut, Massachusetts, (Will.)

"Female: Length, 5.5 mm. Shining greenish black, clothed with not very abundant nor long, nearly white, pile. Front and face wholly white pilose, the former with a small, triangular spot near each orbit, the latter with a narrow orbital margin, white pollinose; post orbital cilia white, the short pile of the eyes dark; face gently convex near the middle; antennæ elongate, but shorter than the face, the third joint three or four times as long as wide, black, yellowish on the lower basal part. Scutellum with a slender deep groove before its margin. Abdomen very short pilose; on the posterior parts of the second and third segments black, elsewhere nearly white. Legs black, white pilose; tip of all the femora, base and immediate tip of the anterior tibiæ, first two joints of the anterior and middle two of the hind tarsi, yellow; hind basitarsi considerably thickened. Wings grayish hyaline; last section of the fourth vein angulated at its middle; posterior cross-vein rectangular; stigma luteous." (Williston.)

3. *Pipizella pulchella banksi*, new subspecies (Figs. 102, 103)

Habitat: Virginia! Front basitarsi not thickened; bare stripe of eyes broad; third antennal joint about four times as long as wide, basal antennal joints yellow; wings hyaline.

Female: Length 5.5 mm. Face and lower fourth of frons shining metallic blue, frons elsewhere more blackish, steely; pile white, in front of ocelli black;

occipital cilia black face very gently convex in middle, its sides narrowly and two minute spots above middle of frons at orbits, white pollinose. Antennæ luteous, third joint above and apically brownish, about four times as long as wide; arista bare, its basal half luteous; eyes short black pilose, broadly bare across the middle. Thorax and scutellum shining black, slightly greenish; pile short, sparse, white; scutellum without apical groove. Abdomen shining black, the sides with a metallic bluish reflection; pile short, white; the broad posterior margins, not reaching the sides, of the second and third segments with black pile, fourth segment with cinereous pile on basal third. Legs black, tips of front four and narrow base of hind femora, base of front, basal half and extreme tip of middle tibiæ; first two joints of anterior four and middle two of hind tarsi, and tip of hind basitarsi, yellow; hind basitarsi slightly incrassate. Wings tinged with brownish, not clouded; last section of fourth vein sub-angulated immediately before its middle; of fifth, rectangular; halteres yellow.

From *P. pulchella* Williston, it differs in having basal antennal joints yellow, black pile on the front, black occipital cilia, and slightly brownish wings; other differences in color are also noteworthy. The wings are too light for *P. australis*.

The specimen is interesting as occurring practically between the range of *P. pulchella* and *P. australis*. It may be either a southern form of *pulchella* or a northern form of *australis*, or it may prove to be a good species, but without specimens of *pulchella* I refrain from giving it specific rank.

Holotype, female, from Mr. W. M. Davidson, labelled "Falls Church, Va. (N. Banks), Ceanothus (N. J. Tea), June 14," in U. S. National Museum.

4. *Pipizella occidentalis* (Townsend)

Pipiza occidentalis Townsend, Ann. Mag. Nat. Hist., 6th ser., xix, 140, 1897.

Habitat: New Mexico (Townsend.) One female, Rio Ruidosa, four miles west of Dowling's Mill, 6660 ft., on flowers of *Rhus glabra* L., July 10. (Wootton.)

"Length, 5 mm. Differs from Williston's description of *P. pulchella* only in the following particulars: Abdomen less than twice as long as the thorax; no slender deep groove before the margin of the scutellum; legs black, tips of all the femora, bases of anterior tibiæ, basal two joints of the front and middle tarsi and tips of the hind basitarsi with the next joint, yellowish or reddish yellow; hind basitarsi not more swollen than the other joints; apical cross-vein sub-sinuate, abruptly straight at its base but curved on its final portion forming a right angle with the fourth vein; auxiliary vein terminating hardly beyond the anterior cross-vein. Closely like *pulchella* in all other points. This species is very distinct from the two described by Williston in the Biologia Centr. Am., Dipt., iii, pp. 6-7." (Townsend.)

5. *Pipizella australis* (Johnson)

Pipiza pulchella Johnson, Proc. Acad. Nat. Sci. Phila., XLVII, p. 329, 1895 (Not of Williston.)

Pipiza australis Johnson, Psyche, XIV, p. 77, 1907.

Habitat: Florida (Johns.)

"Head thorax and abdomen black, or very dark blue-black, shining, covered with a sparse, whitish pile. Antennæ brown black, length of third joint between four and five times its width, under side towards the base more or less reddish. Legs bluish black; tips of all the femora, basal half of the front and middle tibiæ, the basitarsi and two following joints of the tarsi, yellow; basal half of the posterior basitarsi and the last two joints of all the tarsi, black. Wings brown, somewhat lighter towards the base; last section of fourth longitudinal vein angulated in the middle. Length, 6 mm."

"It is distinguished from *P. pulchella* by its longer third antennal joint, dark brown wings and very dark blue black body." (Johnson.)

6. *Pipizella rufithoracica*, new species

Habitat: California! Antennæ black; eyes with horizontal bare stripe almost obsolete; pile on disc of thorax reddish; on abdomen black and reddish or luteous; hind tarsi black.

Male: Length, 6.5 mm. Pile of the head entirely black, moderately long and stiff on face; face and frons shining black, the sides narrowly gray pollinose; face slightly receding, gently rounded above middle, straight below. Antennæ black, third joint two-and-one-half times longer than wide; arista black, bare. Eyes with moderately short black pile. Thorax obscurely cupreous; pile fairly short, reddish, everywhere intermixed with stout, longer, black hairs, which are rather sparsely placed; front of dorsum, sides, and the pleuræ with black pile, except below the wings where it is reddish; scutellum with its apex compressed, its pile as on dorsum of thorax. Abdomen slender, scarcely wider than thorax, shining greenish black, the usual areas sub-opaque; pile short, black; basal angles and posterior sides of fourth segment with conspicuous reddish pile; shining portions of segments two and three also with reddish pile which does not reach the margins; on these segments the pile only shows red in some lights. Legs black, black and reddish pilose; tips of four anterior femora, bases of their tibiæ, and tips of middle ones, yellowish; narrow base of hind tibiæ luteous; middle basitarsi luteous; front basitarsi with red pubescence below; hind basitarsi not at all swollen. Wings tinged with blackish, especially just before middle; stigma luteous; last section of fourth vein bent at its middle, curving moderately outwards, then joining third vein at almost a right angle.

Female: Length, 5 to 6 mm. Arista yellow basally; face, except upper angles, and front broadly across middle, with yellow pile; a few yellow hairs over ocellar triangle. Sometimes face everywhere bordered with black pile, leaving only middle yellow pilose. Pile of thorax entirely reddish yellow, very short; scutellum with pile similar to that of thorax, its margin as in male. Abdomen broader than the thorax, its pile very similar to that of male, but light pile more yellowish and much more extended, in some specimens covering all but the moderately broad anterior and posterior margins and a median line on second segment. Legs and wings as in the male but the discal cell slightly shorter. Sides of face whitish pollinose, this stripe widely separated from minute spots on frontal orbits.

Holotype, male, No. 843, Mus. Calif. Acad. Sci., July 12, 1918, (E. P. Van Duzee). *Allotype*, female, No. 844, and two *paratypes*, females, same data, in Mus. Calif. Acad. Sci. One *paratype*, same data, in collection of the author.

Type locality, Cayton, Shasta Co., California.

A very distinct and beautiful little species. The black tarsi are distinctive and I know of no other American species with distinctly reddish pile on the thorax.

7. *Pipizella fraudulenta* (Loew) (Figs. 11, 39)

Pipiza fraudulenta Loew, Century, vi, No. 41, 1865; Williston, Synop. N. Am. Syrph., 26, 1886.

Habitat: New York (Lw.); Ontario! Black, considerably opaque, mostly whitish pilose; front basitarsi slightly, hind ones considerably, incrassate; wings cinereous or cinereous hyaline; last section of fifth longitudinal vein oblique in male.

Length, 5.5 to 7 mm. Male: Face and frons shining bluish black, black pilose, middle of face and vertex whitish pilose; sides of face and frons narrowly whitish pollinose; frontal triangle usually opaque above. Antennæ black, third joint slightly over twice as long as wide; eyes short black pilose, across middle with a narrow, almost bare, horizontal stripe; occipital cilia black, except at vertex. Thorax and scutellum shining bluish black, whitish pilose; scutellum sometimes with a shallow apical groove, its apex with a few black hairs. Abdomen opaque black, sides narrowly shining; sides of second segment in middle usually with a pair of large, shining, broadly separated spots, projecting from shining lateral margins; third segment always with large spots, apical one-half to two-thirds of fourth segment shining. Black pile covers the opaque areas except anterior half of second segment; tip of fourth segment and hypopygium also black pilose; elsewhere the pile is white. Legs black; tips of all the femora, base of anterior four tibiae and basal joints of their tarsi, tip of hind basitarsi and the two following joints, yellowish. Sometimes basal half of front four tibiae and base of hind tibiae are yellowish. Front basitarsi slightly, the hind considerably, incrassate. Wings cinereous, except often basal third; stigma luteous; last section of fourth vein bent near its middle, of the fifth, oblique, straight or gently curved.

Female: Face and front shining black, white pilose; immediately above base of antennæ and across front above, black pilose; face slightly receding, rounded above the middle; antennæ black, base of third joint yellowish or entirely black; this joint slightly constricted on basal third and nearly three times as long as wide; arista yellow at base; eyes very short black pilose, with horizontal bare stripe; occipital cilia white but sometimes with a few black hairs; pollinose spots on front small, triangular, separated from side stripes by about half their width. Thorax and scutellum as in male; abdomen shining bluish black, with whitish pile, usual areas with black pile and usual areas opaque. Legs as in male. Wings cinereous hyaline; stigma luteous; last section of fourth vein bent slightly beyond its middle, of fifth rectangular, usually entirely straight.

Many of the males have ground color of face metallic

bluish, and some have a very small tubercle above antennal base. Some females have front of same bluish color, and others a broad, shallow pit below middle of front.

Twenty-five males and seven females, Guelph and Vineland, Ontario, April to June.

8. *Pipizella modesta* (Loew) (Fig. 2, 12, 38)

Triglyphus modestus Loew (Female), Century, iv, No. 62, 1863.

Pipiza nigribarba Loew (Male), Century, vi, No. 40, 1865; Williston, Synop. N. Am. Syrph., p. 25, 1886.

Pipiza modesta (Loew) Williston, Synop. N. Am. Syrph., p. 24, 1886.

Habitat: New York, (Lw.) Ontario! Very much like *P. fraudulenta* but more robust, face entirely black pilose, antennæ more pointed at end, wings always lighter colored.

Length, 6.5 to 7 mm. Male: Face and front shining black; head entirely black pilose except a few hairs at vertex; horizontal bare stripe of eyes almost obsolete; Antennæ entirely black or sometimes reddish below at base, third joint usually reddish below. Pile of thorax luteous, of pleuræ whitish, mixed with black above; of scutellum lutescent with a row of longer black hairs around edge. Abdomen with usual opaque areas, pile of usual colors but the lighter pile inclined to be yellowish; legs as in *fraudulenta*. Wings cinereous hyaline with basal third clear; last section of third vein curved before its middle and much more parallel to edge of wing than in *fraudulenta*; last section of fifth vein nearly straight, subrectangular.

Female: Similar to female of *fraudulenta* but with the horizontal bare stripe of eyes narrower, almost obsolete; antennæ much more pointed below; pile inclined to be slightly yellowish. The shape of the antennæ, together with the pilose base of the arista and larger size, will at once distinguish the female.

I place *P. nigribarba* of Loew here, although not absolutely certain of the synonymy. In any case the above described sexes belong together, and, should this female prove to differ from *modesta*, the species would be *nigribarba*.

With regard to the validity of *fraudulenta*, I disagree with Williston. The two species are certainly distinct but very confusing, especially as *fraudulenta* may have the base of the third antennal joint somewhat reddish but the darker wings seem to be more constant. I have never seen *modesta* with cinereous wings.

Nine males and seven females, Vineland and Guelph, Ontario, April to late June. (Curran).

Genus *Heringia* Rondani (Fig. 28 a-g, 42)

Face black, front slightly swollen; antennæ short in males, long in females; arista microscopically pilose to tip; males with venter of fourth segment only about half as long as its dorsum, and the hypopygium longer than in related genera, inclined to the right; middle tibiæ slender in both sexes; wings as in *Pipiza*. The females may be distinguished from allied genera by the narrow face, evenly pilose eyes, slender middle femora and larger size. Type of genus *Heringia heringi* Zett. (Europe).

KEY TO SPECIES OF HERINGIA

I. Females.

- | | |
|---|--------------------|
| 1. Antennæ entirely black | <i>comutata</i> |
| Antennæ partly yellowish | 2 |
| 2. Thorax entirely finely white pilose (eastern) | <i>salax</i> |
| Thorax with longer, yellowish white pile (western, 9 mm.) | <i>californica</i> |

II. Males

- | | |
|---|--------------------|
| 1. Pile mostly reddish yellow (western) | <i>californica</i> |
| Pile mostly whitish or blackish | 2 |
| 2. Abdomen mostly whitish pilose | 3 |
| Abdomen mostly brownish or blackish pilose | 4 |
| 3. Front entirely black pilose | <i>canadensis</i> |
| Front partly white pilose (larger, western) | <i>comutata</i> |
| 4. Third joint of antennæ twice as long as wide, reddish yellow below;
hypopygial grippers yellow | <i>salax</i> |
| Third joint of antennæ $1\frac{1}{2}$ times as long as wide, bright yellow
below; hypopygial grippers piceous; wings dark brownish | <i>intensica</i> |

9. *Heringia canadensis*, new species (Fig. 17, 32)

Habitat: Ontario! Small, black, whitish pilose; frontal triangle above and abdomen opaque.

Length, 5.5 mm. Male: Face and frons shining black, sides narrowly whitish pollinose; frons black pilose, opaque above; face white pilose, in profile gently rounded from antennæ to mouth; above antennæ a well marked carina, shaped like an inverted V; vertical triangle black pilose with whitish pile behind; eyes short brownish or blackish pilose with white pile below; posterior orbits white pollinose; below and at the vertex white pilose, elsewhere with black pile; occipital cilia black. Thorax and scutellum slightly shining, finely white pilose, with a few black hairs about humeri; scutellum with apical groove. Abdomen opaque black; first segment, a triangular spot on sides of two following, apical corners of fourth and its hind margin and hypopygium shining black; pile black, usual areas with whitish or cinereous pile; fourth segment below only half as long as above; hypopygium two-thirds as long as fourth segment. Legs black, blackish pilose; tips of femora, narrow base of hind and broader base of anterior four tibiæ, and first joints of middle tarsi, yellowish, other tarsal joints piceous. Wings infuscated; stigma yellowish; last section of fifth vein straight.

Holotype, male, No. 845, Mus. Calif. Acad. Sci., June 8, 1913 (Curran).

Type locality, Guelph, Ontario.

10. *Heringia intensica*, new species (Fig. 18)

Habitat: Ontario! Third joint of antennæ scarcely longer than broad, sub-oval; wings densely clouded, basal third and posteriorly lighter; pile mostly tawny.

Male: Length, 7 mm. Face in profile almost straight from antennæ to oral margin; pile black, tawny in middle; front moderately swollen, black pilose, opaque above; vertical triangle black pilose in front, tawny behind; occipital cilia black. Antennæ black; third joint with large basal bright yellow spot below, extended narrowly towards the tip; slightly longer than wide, sub-oval. Eyes brownish pilose. Thorax and scutellum slightly shining greenish black, sides purplish black; pile tawny, on pleuræ with some black hairs. Abdomen sub-opaque purplish black; first segment slightly shining black; usual areas shining brassy; hypopygium black, with a few long black hairs on basal half and white pile on apical half; abdominal pile long, tawny, the usual areas with black pile. Legs brownish black, brownish pilose; knees and first joint of middle tarsi yellow; basal two-thirds of front four tibiæ, second joint of middle and basal joint of the anterior tarsi, brown. Wings fuscous, more clouded across the middle; stigma luteous.

Holotype, male, No. 846, Mus. Calif. Acad. Sci., June 15, 1919 (Curran). *Paratype*, male, Jordan, Ont., August 27, 1920 (Curran), in collection of the author.

Type locality, Jordan, Ontario.

11. *Heringia salax* (Loew) (Fig. 16a)

Pipiza salax Loew, Century, VI, No. 39, 1865 (Berl. Ent. Zeit., IX, p. 152, 1865.)

Habitat: Pennsylvania (Lw.); Ontario! Wisconsin. Very similar to preceding, but antennæ longer, pile lighter in color and legs more largely yellow.

Male: Length, 8 to 8.5 mm. Face and frons shining greenish black, black pilose; face in middle with whitish pile; frons moderately swollen, opaque above; antennæ brownish; first joint black; third joint reddish yellow below, in shape oblong, twice as long as wide, obtusely pointed; arista black, its base yellow; pile of eyes black, brownish below; posterior orbits with white pile, above tawny; occipital cilia black. Thorax and scutellum shining greenish black, dorsum less shining; pile cinerous, in some lights yellowish; on pleuræ, front border of thorax, and apex of scutellum, blackish. Abdomen opaque black, usual areas shining metallic black, somewhat brassy; first segment and hypopygium shining, not metallic; pile whitish or slightly grayish, usual areas with black pile; hypopygium, except tip, black pilose. Legs black; tips of all the femora, immediate base of hind, broad base and tips of front four tibiæ, yellow; front four tarsi luteous, their apical joints piceous. Wings cinereous, basal third more hyaline; stigma luteous.

Female: Length, 7 to 7.5 mm. Face and front shining bluish black, white

pilose; front above and an area immediately above the base of the antennæ with black pile; front with the usual triangular pollinose spots. Antennæ black; third joint yellow below, elongate oval, slightly over twice as long as wide. Eyes evenly short whitish pilose; post orbital pile and cilia white. Thorax, scutellum and abdomen shining black; scutellum with or without a shallow apical groove; hind margins of second and third segments black pilose. Legs black; tips of all the femora, narrow base of hind and basal half of front four tibiæ and their tips, and basal two joints of their tarsi, yellowish; some; times the first three tarsal joints yellow with the apical black. Wings hyaline-stigma yellowish; last section of the fifth vein slightly bent at its middle.

Two males, three females, Guelph and Vineland, Ontario (Curran) and one pair, Wisconsin (Fluke).

I have no doubt that this is Loew's *Pipiza salax*. There are minor variations in my specimens in the color of the pile, which here appears to be darker. His description, "hypopygium much longer than in other species" undoubtedly applies here. The whole description applies very well. I give the synonymy of *P. radicum* Walsh & Riley and *P. pistica* Williston from a careful examination of the two species and an examination of the females of *H. comutata* and *H. californica* confirms my determination.

12. *Heringia comutata*, new species (Fig. 27)

Habitat: Oregon! California! Medium size; white pilose; third antennal joint less than twice as long as wide in the male.

Length 6.5 to 7 mm. Male: Face and frons shining metallic black with a bluish reflection; face receding, very slightly rounded above; white pilose, a few darker hairs on the cheeks; front black pilose, immediately above antennæ in middle and upper angle, with whitish pile; vertical triangle with whitish pile, sometimes a few black hairs in front. Antennæ black; third joint usually obscurely reddish below, one and one half times longer than wide, widest at the apical three-fourths then sharply rounded. Eyes brownish pilose, whitish below; post orbital pile and cilia white. Thorax, scutellum and abdomen shining black; thorax and scutellum white or slightly yellowish pilose, the pile more yellowish anteriorly; scutellum coarsely punctulate. Abdomen with the usual areas opaque; pile white, with the usual black pilose areas less extensive and less conspicuous than usual; left side of hypopygium white pilose, right side black pilose. Legs black; tips of all the femora, base of hind tibiæ, basal quarter of front and basal half of middle tibiæ, first two joints and tips of middle tarsi, yellow; first joint of anterior tarsi piceous yellow. Wings cinereous hyaline; stigma luteous.

Female: Very much like *H. salax*, but differs in having the antennæ entirely black and the third joint a little more pointed; pile slightly longer throughout and inclined to be yellowish on the front and thorax; black pile across the front less intense; scutellum with a well-marked apical groove; legs less extensively yellow, usually luteous or piceous instead of yellow; termination of the discal cell less acute; last section of the fifth vein nearly straight.

Holotype, male, No. 847, and *allotype*, female, No.

848, Mus. Calif. Acad. Sci., collected by F. R. Cole and received from Prof. A. L. Lovett. *Paratypes*, four males, same data, and one male, California, W. M. Davidson, in collections of Prof. Lovett, Mr. Davidson and the author.

Type locality, Hood River, Oregon.

13. *Heringia californica* (Davidson)

Pipiza californica Davidson, Ent. News, XXVIII, p. 417, 1917.

Habitat: California! Length 9 mm. Male: Face and front metallic bluish black; face receding, yellow pilose with a few darker hairs on the sides; front slightly swollen, black pilose with yellowish pile above; antennæ black, yellowish below, nearly twice as long as wide, sides parallel, apex obtusely rounded; vertical triangle with cinereous yellow pile; pile of eyes and posterior orbits yellowish; occipital cilia black. Thorax and scutellum shining metallic black, yellowish pilose, the latter with a shallow apical groove. Abdomen shining black, yellowish pilose; usual areas not so extensively blackish-pilose as usual; hypopygium with a few black hairs toward apex. Legs black; knees, front four tibiæ more broadly, and the basal two joints of their tarsi, yellowish. Wings cinereous hyaline; stigma luteous.

Female: Head and thorax shining purplish black; abdomen slightly brassy black, metallic. Antennæ black; third joint over twice as long as wide, more pointed and reddish below; face and front clothed with long yellowish white pile; immediately above each antenna with black pile, across the front above intermixed with black hairs; side spots of the front about twice as broad as long, separated by about two-thirds width of one spot. Eyes with rather long whitish pile. Thorax and abdomen white pilose, on dorsum of thorax more yellowish, on posterior margins of second and third abdominal segments black. Legs and wings as in the male.

Male and female, Walnut Creek, California, received from Mr. W. M. Davidson.

Genus *Cnemodon* (Egger)

Middle tibiæ of males strongly produced anteriorly (Fig. 4), of the females rounded in front (Fig. 8); Males: Middle coxæ armed with a moderately long slender process (except in *unicolor*); hind trochanters armed with long processes (except in the first four species, see fig. 48), the hind coxæ often with a spur at the outer end. In four species the venter of the fourth segment is armed with a basal spur and a second spur or tubercle on the apical third; arista microscopically pilose to near tip (Fig. 41). The females are much alike, with few characters available for classification and these very difficult to use.

KEY TO SPECIES OF CNEMODON

I. Males

- | | |
|--|----------------------|
| 1. Middle coxæ and hind trochanters without processes | <i>unicolor</i> |
| Middle coxæ with slender process | 2 |
| 2. Hind trochanters without the usual process | 16 |
| Hind trochanters with long or short process | 3 |
| 3. Venter of fourth segment with spur or tubercle on basal and apical thirds | 13 |
| Venter of fourth segment without spurs | 4 |
| 4. Process on hind trochanters moderately short; third antennal joint broader than long; a short rather stout white pilose species | <i>cevelata</i> |
| Process on hind trochanters long and slender; third antennal joint not broader than long; neater appearing species | 5 |
| 5. Hind coxæ without a spur, often with a tubercle on the outer end | 8 |
| Hind coxæ with short sharp spur on outer end | 6 |
| 6. Coxal spur small, slender, directed towards the femora (often difficult to discern because of the pile) | <i>lovetti</i> |
| Coxal spur directed outwards, conspicuous | 7 |
| 7. Face whitish pilose, at least in part, (eastern) | <i>coxalis</i> |
| Face and vertical triangle entirely black pilose | <i>rita</i> |
| 8. Venter of third segment carinate at apex | 10 |
| Venter of third segment not at all carinate | 9 |
| 9. Face entirely black pilose; abdomen inflated, slender | <i>elongata</i> |
| Face white pilose in middle; abdomen not inflated; second segment of middle tarsi almost simple | <i>calcarata</i> |
| 10. Wings pellucid hyaline; face entirely whitish pilose | <i>placida</i> |
| Wings cinereous hyaline | 11 |
| 11. Venter of fourth segment carinate at its immediate base | 12 |
| Venter of fourth segment simple, not even rugose | <i>pisticoides</i> |
| 12. Middle tibiæ produced from about the basal quarter, (western) | <i>auripleura</i> |
| Middle tibiæ produced gradually from the base, (eastern) | <i>carinata</i> |
| 13. Venter of fourth segment with tubercle on apical third | 14 |
| Venter of fourth segment with spur on apical third | 15 |
| 14. Tubercle on apical third considerably pilose; venter of third segment simple along carinate area | <i>ontarioensis</i> |
| Tubercle larger, somewhat spur-like; venter of third segment rugose along carinate area | <i>trochanterata</i> |
| 15. Wings evenly infuscated, (smaller) | <i>venteris</i> |
| Wings with brownish cloud beyond the middle | <i>myerma</i> |
| 16. Squamæ grayish fringed with cinereous pile | <i>squamulæ</i> |
| Squamæ black or brown fringed with brown pile | 17 |
| 17. Length about 8 mm: arista as long as the antennæ | <i>longiseta</i> |
| Length under 7 mm: arista scarcely longer than third antennal joint; anterior legs considerably yellow | <i>intermedia</i> |

II. Females

- | | |
|---|---------------------|
| 1. Middle tibiæ not rounded in front | See <i>Heringia</i> |
| Middle tibiæ rounded in front | 2 |
| 2. Hind coxæ with a sharply pointed tubercle at outer end; pile of the venter depressed | 12 |
| Hind coxæ with rounded tubercle or none | 3 |
| 3. Third antennal joint clearly as broad as long, wings cinereous hyaline | <i>corvallis</i> |
| Third joint at least slightly longer than broad | 4 |
| 4. Wings purely hyaline, (western) | 5 |
| Wings cinereous or brownish hyaline | 6 |
| 5. Last section of fourth vein distinctly sinuous | <i>sinuosa</i> |
| Last section of fourth vein nearly straight | <i>placida</i> |
| 6. Pile of venter appressed or sub-appressed | 7 |

- | | |
|--|---------------------|
| Pile of venter mostly erect | 9 |
| 7. Pile of venter sub-appressed | <i>auripleura</i> |
| Pile of venter appressed | 8 |
| 8. Median depression of frons transverse, broad, entire; wings cinereous hyaline | <i>pisticoides</i> |
| Median depression of frons appearing circular; wings somewhat brownish, (western) | <i>albipleura</i> |
| 9. Middle tibiæ with distinct groove below | <i>intermedia</i> |
| Middle tibiæ not distinctly grooved below | 10 |
| 10. Third joint of antennæ extremely large, obtusely oval; face with some black hairs on sides | <i>cevelata</i> |
| Third joint more elongate, sub-rectangular | 11 |
| 11. Last section of fifth vein nearly straight; third antennal joint brownish above | <i>coxalis</i> |
| Last section of fifth vein bent at its middle; third antennal joint black above | <i>calcarata</i> |
| 12. Thorax shining brassy | <i>myerma</i> |
| Thorax shining black | 13 |
| 13. Wings tinged with luteous | <i>ontarioensis</i> |
| Wings cinereous hyaline, (smaller) | <i>venteris</i> |

The above key to the females is confessedly unsatisfactory, yet it is the best that I can devise at the present time. The females are evidently different, yet present so few characters which are available for a key that exceptional difficulty is encountered. I might add that the antennæ differ in all the species, as well as the coxal spurs and amount of production of the middle tibiæ, but it is apparent that these characters are of use only for comparison. I still have several females in my collection which are not named as I consider that the naming of unlocated females, unless their characters are outstanding, will merely lead to confusion as has been the case in the past.

The true relationship of the females in many cases can be determined only by rearing or capture of specimens in copulation. I secured one pair of *C. venteris* in this latter state. In studying the females the student must rely largely upon his sense of fitness in determining their relationship to the males. The females of the common species will be readily placed by careful collecting and labelling. A careful comparison with the figures in this work will also be of some help.

14. *Cnemodon unicolor*, new species (Figs. 13, 44)

Habitat: Ontario! Male: Length, 6 mm. Face and frons shining black, black pilose; face almost straight from antennæ to oral margin but slightly rounded above, sides whitish pollinose; frons opaque above; antennæ black; third joint bright yellow below, as broad as long; arista black; vertical triangle, post orbital cilia, and eyes black pilose, the latter whitish pilose below. Thorax

and scutellum shining black, dorsum of former less shining; pile black, on disc and pleuræ more brownish; scutellum with a moderately well-marked apical groove. Abdomen opaque black; first segment in middle, margins of second, more broadly in middle, and posterior angles of third and fourth shining; apex of fourth segment opaque; pile black, moderately long, on sides of second segment in front brownish; hypopygium sub-opaque with short black pile. Legs black; tips of all the femora, narrow base of hind and broad base of front tibiæ and their tips, yellow; anterior tibiæ piceous in front; front tarsi yellow, their sub-apical joints and hind tarsi piceous; middle tibiæ produced anteriorly; pile of legs black. Wings evenly cinereous; last section of fourth vein bent at its proximal quarter; apex of discal cell very acute; last section of fifth vein almost straight; stigma luteous.

Holotype, male, No. 849, Mus. Calif. Acad. Sci., June 22, 1913 (Curran).

Type locality, Guelph, Ontario.

At once distinguished by the produced middle tibiæ and the absence of coxal or trochanteral processes.

15. *Cnemodon intermedia*, new species (Figs. 14, 16, 35, 45, 46)

Habitat: Ontario! Middle coxæ with processes, hind trochanters without processes; abdomen largely opaque, pile black, on the shining areas brownish; pile of thorax brownish with a black pilose band in front.

Male: Length, 6.5 mm. Face in profile almost straight from antennæ to oral margin, sides whitish pollinose; frons moderately swollen, opaque above; face and frons with moderately long black pile; antennæ black, second joint apically and third below, basally, yellowish; third joint sub-rectangular; vertical triangle and occipital cilia black pilose; eyes whitish pilose below, the pile becoming longer and brownish above. Thorax and scutellum black, the former slightly metallic; pile brownish, that of thorax in front and a few hairs on apex of scutellum black; scutellum moderately large, with an apical groove. Abdomen opaque; first segment, small lateral median spots on second, larger spots on third, sides of fourth segment posteriorly, and the hind margin, shining; pile black, on the sides of all segments in the middle and on the shining areas, brownish. Legs black; tips of all femora, base of hind tibiæ, front four tibiæ except a broad median black band, sometimes incomplete, and first two joints of front four tarsi, yellow; middle tibiæ produced anteriorly but not concave beneath; middle coxæ with a long slender process beneath. Wings cinereous, more hyaline on basal third and posteriorly; stigma luteous.

Female: Length, 5.5 mm. Face and front shining black; face and vertex white pilose; front black pilose, with lighter, somewhat yellowish pile across the middle; side spots of front separated by more than width of one spot; front with a broad depression below middle. Antennæ black; second joint and third below broadly yellow, third joint larger than in male, its apex more rounded. Pile of eyes rather sparse, short, dark. Thorax and scutellum shining black, slightly cupreous, whitish pilose. Abdomen shining, darker areas not distinct; pile black and white as usual. Legs colored as in the male; wings very slightly darkened.

Holotype, male, No. 850, Mus. Calif. Acad. Sci., June, 12, 1913 (Curran). *Allotype*, female, No. 851, Guelph, Ont., July 13, 1913, (Curran), Mus. Calif. Acad. Sci. *Paratypes*, two males, two females, Guelph,

Ont., June and July (Curran), in collection of the author.

Type locality, Guelph, Ontario.

16. *Cnemodon longiseta*, new species

Habitat: Ontario! Very similar to *C. intermedia* but larger, the arista longer, legs less extensively yellow and the hypopygium different.

Length, 8 to 8.5 mm. Male: Head entirely black pilose except a few golden hairs at vertex and some cinereous pile on extreme lower part of eyes. Third joint of antennæ nearly twice as long as wide, bright yellow on basal third below; apex of second joint more or less yellowish or piceous; arista slender, long, its basal quarter yellowish. Thorax slightly shining black with three obscure opaque stripes on anterior half of dorsum, the middle one broadest and more distinct. Pile long, black; on dorsum more or less mixed with golden or reddish pile. Sometimes the pile may appear mostly reddish yellow on the disc. Scutellum black, with stouter black pile and with an apical groove and pre-apical impression. Squamæ brown, the edge darker, the fringe of hairs brownish. Abdomen opaque black, the usual areas shining; abdominal pile black with basal portion and margins more or less yellowish or tawny pilose, but not very conspicuously so. Legs black with black pile; tips of femora, basal third of front four and immediate base of hind tibiæ, yellow; front four tibiæ and first two joints of their tarsi reddish yellow; middle tibiæ more produced in front than in *C. intermedia*. Wings cinereous across the middle, the venation slightly variable.

Holotype, male, No. 878, Mus. Calif. Acad. Sci., July 11, 1920, H. Curran, collector. *Paratype*, male, Jordan, Ontario, June 20, 1920 (Curran), in Canadian National Museum.

Type locality, Jordan, Ontario.

17. *Cnemodon squamulæ*, new species

Habitat: Ontario! Very similar to *C. longiseta*, but the eyes and thorax wholly, and the abdomen largely, whitish pilose; the squamæ grayish, thus differing from the other two species of the group.

Length, 7.5 mm. Male: Face and front black pilose; vertical triangle and posterior orbits whitish pilose, the occipital cilia and a few hairs on the front of the vertical triangle black. Antennæ black, third joint below and apex of second reddish yellow: this joint one and one-half times longer than wide, its end obtusely rounded; arista slender, a little longer than third joint of antennæ, its basal third luteous. Thorax and scutellum shining, somewhat bronzed black, the former with an obscure opaque median stripe on front half; pile wholly whitish. Squamæ grayish, fringed with cinereous pile. Abdomen opaque black, the usual areas shining; pile black, the base, margins and lateral triangles in the middle of each segment whitish pilose. Legs black; tips of all the femora, narrow base of hind and basal third of front four tibiæ and their apices, and first two joints of front four tarsi, reddish yellow. Wings hyaline, stigma luteous.

December 31, 1921

Holotype, male, No. 879, Mus. Calif. Acad. Sci., May 16, 1920, H. Curran collector.

Type locality, Jordan, Ontario.

18. *Cnemodon cevelata*, new species (Figs. 50, 51)

Habitat: Ontario! Small; hind trochanteral process short, compressed and broadened; third antennal joint broader than long.

Length, 5.5 mm. Male: Face and frons shining bluish black; face whitish pilose, with a few black hairs on sides; frons with black vertical triangle with cinereous pile; antennæ black, third joint orbicular, yellowish basally below; eyes with short black pile, almost bare below. Thorax and scutellum shining black; pile sparse, long, wavy, whitish. Abdomen slightly shining black, opaque markings not conspicuous; pile inconspicuous except on the sides where it is long, whitish; the usual areas with blackish pile; hypopygium shining, inconspicuously short black pilose. Legs black; tips of all the femora, front tibiæ and their tarsi, base and apex of middle tibiæ and their tarsi, and base of the hind tarsi narrowly, piceous; middle tibiæ produced in front; hind basitarsi slightly incrassate; trochanteral process short, compressed and broadened, piceous; middle coxal processes black, the ends rounded. Wings cinerous, more marked anteriorly about the middle; last section of fifth vein almost straight.

Female: Very similar to *intermedia* but third antennal joint shorter, only one and one-half times as long as wide (in *intermedia* it is twice as long); second joint black; face considerably black pilose about the oral margin; lighter pile of the front brownish intermixed with black; thorax and abdomen similar; legs black, tips of all the femora, broad base of all and tips of front four tibiæ and first two joints of their tarsi, yellowish; wings very slightly yellowish.

Holotype, male, No. 852, Mus. Calif. Acad. Sci., June 2, 1913 (Curran). *Allotype*, female, No. 853, Mus. Calif. Acad. Sci., Jordan, Ont., June 22, 1919 (Curran).

Type locality, Guelph, Ontario.

The extremely large roundish third joint of the antennæ is a good character for distinguishing the female while the short trochanteral process will at once distinguish the male from other species. The foregoing species form a very interesting series, representing the primary stages in the development of the long processes on the hind trochanters.

19. *Cnemodon elongata*, new species (Fig. 47)

Habitat: Ontario! Differs from *calcarata* in the abdomen being inflated and conspicuously narrower and not white pilose; the middle tibiæ with more abrupt and

shorter production and third joint of the antennæ shorter and rounder.

Male: Length, 5.5 mm. Face and frons shining greenish black, black pilose; face considerably receding, rounded above, sides whitish pollinose, the pollen produced just below the antennæ to form a small triangular spot; frons swollen, opaque above; vertical triangle black pilose, with cinerous pile across middle; occipital cilia black; antennæ black, third joint with quadrate yellow spot at base below; only slightly longer than wide, end obtusely rounded; arista black; eyes black pilose, becoming brownish or whitish below. Thorax and scutellum shining black, pile luteous, in front broadly black, especially at the humeral angles where it extends back along sides a short distance, on the pleuræ brownish; scutellum with apical groove. Abdomen narrow, thickened, opaque; sides of second segment, more broadly in middle, sides of third, broadly in middle, and sides and apical half of fourth, shining; pile black, on sides in front and the usual areas cinerous or brownish. Legs black; knees, basal third of front four tibiæ and their tips and tarsi yellow, the latter piceous apically; second and third joints of hind tarsi piceous or brown; hind basitarsi slightly thickened; legs wholly black or brownish pilose. Wings cinereous; stigma luteous; last section of fifth vein sub-angulate at its middle; halteres brownish.

Holotype, male, No. 854, Mus. Calif. Acad. Sci., June 22, 1914 (Curran). *Paratype*, male, Jordan, Ont., June 15, in collection of the author.

Type locality, Orillia, Ontario.

20. *Cnemodon calcarata* (Loew) (Figs. 4, 5, 6, 8, 49)

Pipiza calcarata Loew Century, vi. No. 42, 1865; Williston, Synop. N. Am. Syrph., p. 24, 1886.

Habitat: New York (Lw); Ontario! Mostly whitish pilose, coxal spurs absent, scutellum usually with a shallow apical groove.

Length, 5.5 to 7 mm. Male: Face and frons shining black, black pilose, middle of face usually with whitish pile; vertical triangle usually whitish pilose behind; apex of the frons opaque; sides of the face and frons narrowly whitish pollinose; antennæ black, third joint subquadrate, not twice as long as wide, yellowish at base below; eyes brownish pilose; occipital cilia black. Thorax and scutellum shining bronze black, whitish pilose, the scutellum with or without an apical groove. Abdomen opaque black; sides, an interrupted fascia on third segment and apical half of fourth shining bronze black, the second segment often with large shining lateral spots of similar color; pile whitish, with the usual areas black pilose. Legs black; tips of all the femora, front tibiæ and tarsi, except sometimes the apical joints, middle tibiæ except a median piceous ring, with first three joints of their tarsi, base of hind tibiæ, tip of basitarsi and the following joint, yellow; anterior tibiæ with an incomplete brownish or piceous median band; apical joints of the tarsi black or piceous; coxal spur absent, hind trochanteral spur long. Wings cinerous except the basal third which is hyaline; last section of fifth vein slightly curved at its middle.

Female: Face entirely white pilose; front blackish pilose, with white pile across middle and at vertex; antennæ black; second and third joints yellow below, third joint large, twice as long as broad. Scutellum usually with an apical groove. Fifth abdominal segment usually wholly white pilose, the black pile on anterior area of third and fourth segments extending only two-

thirds the width of the segments. Front and middle tibiae with broad blackish median bands; hind tibiae with only the basal quarter yellow; first two joints of front and three of middle tarsi, yellow, the remaining joints becoming brownish. Last section of the fifth vein rectangular, curved outwards at apical third or quarter.

Twenty-five males and 14 females, Guelph, Orillia and Vineland, Ontario, (Curran).

I have no doubt about this being Loew's *Pipiza calcarata*, as my specimens agree entirely with his description. No mention is made of the process on the middle coxæ, but, as the hind coxal spur is not mentioned, it cannot be any of the following species. The female has been largely confused with *pisticoides*.

21. *Cnemodon corvallis*, new species (Figs. 25, 34)

Habitat: Oregon! Anterior four tarsi with only the first joint yellow; pollinose spots on the front separated by not quite the width of one spot; middle femora considerably rounded in front; third joint of antennæ rather large, slightly longer than wide; wings hyaline.

Female: Length, 5.5 mm. Face and front shining black; face receding to below middle, thence perpendicular to oral margin; sides narrowly whitish pollinose; frons white pilose at vertex and very narrowly across the middle, elsewhere blackish; pollinose spots large, their ends rounded, not separated by more than width of one spot and not connected with the side stripes; antennæ black; third joint reddish yellow below, rather large, slightly longer than wide, evenly rounded above, more pointed below; arista black, yellowish at base. Thorax and scutellum shining metallic black, short white pilose, the latter with a shallow apical groove. Abdomen shining black, short white pilose, with the usual areas black pilose. Legs black, knees and first joint of middle tarsi yellow; first joint of front tarsi piceous yellow. Wings hyaline, stigma luteous; last section of fourth vein bent at its proximal third, of the fifth curved beyond its middle.

Holotype, female, No. 855, Mus. Calif. Acad. Sci., A. L. Lovett, collector.

Type locality, Hood River, Oregon.

While I have several female specimens belonging to this genus which I cannot place but which evidently are not those of described species, I consider the characters of this form so distinct that I describe it here as a new species. I have no doubt that the male, when found, will be readily associated with the female.

22. *Cnemodon placida*, new species (Figs. 20, 22)

Habitat: Oregon! Wings pellucid hyaline; stigma luteous; projection of the middle tibiae very broad, its

lower corner rectangular, the tibiae then gradually narrowing to apex. In the female the pile of the venter is appressed, that of the eyes very short, white.

Length, 7 mm. Male: Face and front shining black; face slightly rounded below antennae, thence gradually receding to just above oral margin; entirely white pilose; frontal triangle wholly shining, black pilose; antennae black; third joint yellow below basally, in shape orbicular; vertical triangle black pilose in front; occipital cilia black except at vertex; pile of eyes short, black, becoming shorter and white below. Thorax shining greenish black, thickly short white pilose, with luteous pile about base of wings; scutellum luteous pilose with a broad apical groove. Abdomen shining bronze black, the usual areas opaque; pile short, black; sides of abdomen, more broadly on first two segments, and a small rounded area on each side of third segment, separated from the lateral margin, white pilose; the usual lighter area on the fourth segment brownish pilose; hypopygium with black pile. Legs black; knees, broad base of front four tibiae and their tips, first three joints of front and two of middle tarsi, yellow; middle basitarsi much hollowed beneath. Wings pellucid hyaline; stigma luteous.

Female: Face less receding than in the male, entirely white pilose; whitish pollinose stripes on the sides broadened just below the antennae; front black pilose, across the middle with cinereous pile, with white at the vertex; frontal pollinose spots connected with the side stripes, very large, separated by less than the width of one spot. Antennae black; second joint luteous; third yellow below at base, in shape elongate-rounded; arista yellow on basal third; eyes very short white pilose. Thorax and scutellum with pile shorter than in the male but entirely white. Abdomen silvery white pilose, the usual areas black pilose. Legs colored as in the male. Last section of fifth vein nearly straight and oblique in both sexes.

Holotype, male, No. 856, and *allotype*, female, No. 857, Mus. Calif. Acad. Sci., May 25, 1918, F. R. Cole, collector.

Type locality, Forest Grove, Oregon.

23. *Cnemodon lovetti*, new species (Figs. 26, 53)

Habitat: Oregon! Very closely allied to *coxalis* and *rita* but differing in the hind coxal spur which is directed backwards or towards the femora; the pile is darker, the discal cell is widened considerably towards the margin of the wing, and the last section of the fifth vein is long and straight.

Male: Length, 6.5 mm. Face and frons shining bluish black, black pilose; face somewhat brownish pilose in the middle, slightly rounded above, thence nearly straight to oral margin, sides with a short white pollinose stripe; frons considerably swollen, with a small roundish tubercle above the antennae; vertical triangle and eyes black pilose the pile becoming brownish on lower part of eyes; post orbital cilia and pile black. Antennae black; second and third joints yellowish below; third slightly longer than broad, sub-circular, flattened above toward base; arista black, slender. Thorax and scutellum shining bluish black, slightly metallic, the scutellum without an apical groove; pile whitish, the front of dorsum and the scutellum with brownish or black pile. Abdomen shining black, black pilose; sides of each segment in middle whitish pilose. Legs black, tips of femora, narrow base of hind tibiae, front

tarsi except the apical joints, yellowish; middle joints of hind tarsi piceous; hind coxal spur small, slender, inconspicuous, pointing backwards, not downward as in other species. Wings cinereous hyaline; stigma luteous; last section of fourth vein angulated at its proximal quarter; of the fifth straight.

Holotype, male, No. 858, Mus. Calif. Acad. Sci., July 25, 1909, 6000 feet elevation, J. C. Bridwell, collector.

Type locality, Horse Lake, Oregon.

In this species the spur is very slender and difficult to detect owing to the long pile.

24. *Cnemodon rita*, new species (Fig. 21)

Habitat: Oregon! California! Coxal spur stout, pointing downwards; antennæ entirely black or third joint yellow below basally; pleuræ black pilose.

Male: Length, 5.5 to 6.5 mm. Face and frons shining bluish black, black pilose; face receding, almost straight; frons considerably swollen, with a small elongate depression above the antennæ, not at all opaque. Antennæ black, the apical two joints appearing brownish; third joint as broad as long, subrectangular, the end almost evenly rounded, sometimes yellow basally, below; arista black; pile of eyes brownish, lighter below; post orbital pile white on lower half, black above; occipital cilia black. Thorax and scutellum shining bluish black with light pile, the humeri, pleuræ and scutellum with black pile; scutellum without apical groove. Abdomen shining purplish black with the usual areas opaque; pile black, with the usual areas whitish or cinereous pilose; hypopygium black pilose. Legs black; knees, tips of front four tibiæ and first three joints of their tarsi, yellowish; hind trochanteral processes moderately short, stout, somewhat pointed; middle coxal processes rather stout, long, pointed; middle tibial production gradually widening from base, terminating abruptly. Wings cinereous hyaline; stigma luteous; last section of fifth vein straight.

Holotype, male, No. 859, Mus. Calif. Acad. Sci., July 14, A. L. Lovett, collector. *Paratypes*, three males, Huntington Lake, Fresno Co., Calif., July 17, 1919, E. P. Van Duzee collector, and one male, same place, July 20, in Mus. Calif. Acad. Sci., and in collection of the author.

Type locality, Rock Creek, Oregon.

25. *Cnemodon coxalis*, new species (Figs. 15, 52)

Habitat: Ontario! Wisconsin! Male: Length, 6.5 to 7.5 mm. Face and frons shining bluish black, black pilose, middle of the face whitish pilose; vertical triangle whitish pilose behind; occipital cilia black; sides of face narrowly white pollinose. Antennæ black; third joint yellow below, longer than broad, end almost evenly rounded. Eyes blackish pilose. Thorax and scutellum shining brassy black, with long white pile, appearing yellow in some lights. Abdomen shining black, the usual areas opaque; shining areas inclined to be cupreous; pile short, black, the usual areas with white pile. Legs black; tips of all the femora, front tibiæ except a broad pre-apical piceous band, base

four tibiae except a median broad, incomplete band, and front and middle of middle and narrow base of hind tibiae, first three joints of front and two of middle tarsi, yellowish; pile whitish; middle tibiae produced in front; hind coxal spur sharp, its base large, tip directed outward; trochanteral process moderately long. Wings cinereous hyaline; stigma luteous; last section of fifth vein straight.

Female: White pilose; front black pilose, across the middle with cinereous or white pile; vertex with white pile; pile of the posterior orbits, including occipital cilia, white; face receding to below the middle, thence perpendicular. Antennae black, second joint apically and the third below, yellow; third joint nearly twice as long as wide, the end rounded more gradually above. Side stripes of the face markedly enlarged below the antennae; of the frons elongate triangular, their upper ends rectangular; eyes with short cinereous pile above, white below. Thorax shining greenish black; scutellum black, densely punctured, appearing granulated. Abdomen purplish black, white pilose with the posterior margins of the second to fifth segments black pilose. Legs as in the male. Wings hyaline; last section of fifth vein bent outwards beyond the middle.

Holotype, male, No. 860, Mus. Calif. Acad. Sci., June 8, 1919, H. Curran collector. *Allotype*, female, No. 861, Mus. Calif. Acad. Sci., Orillia, Ont., Sept. 1, 1914, H. Curran collector. *Paratypes*, six males and four females, Orillia and Jordan, Ont., May to September, and one pair, Madison, Wisconsin (Fluke collector), in collection of the author.

Type locality, Jordan, Ontario.

26. *Cnemodon nudifrons*, new species

Habitat: Oregon! Female: Length, 5 mm. Wholly shining black. Face and frons whitish pilose; frons without white pollinose spots; sides of face narrowly whitish pollinose; epistoma prominent; eyes extremely short brown pilose. Antennae luteous; first joint black, third orbicular; occipital cilia cinerous. Thorax light pilose, the pile longer on the pleurae. Abdomen two-thirds as broad as long; pile short, whitish, the posterior margins of the segments inconspicuously black pilose; ovipositor brownish, its tip bifurcate. Legs black; knees, tips of all the tibiae and all the tarsi, yellowish, the apical joints of the tarsi reddish. Wings hyaline; stigma luteous; last sections of fourth and fifth veins almost straight. Halteres whitish yellow.

Holotype, female, No. 877, Mus. Calif. Acad. Sci., collected by Prof. A. L. Lovett, received from Mr. P. W. Fattig, Gainesville, Florida, and presented by him to the California Academy of Sciences.

Type locality, Mount Jefferson, Oregon.

Easily recognized by the absence of the white pollinose spots on the frons possessed by all other known American species. It may prove to be an European species.

27. *Cnemodon sinuosa*, new species (Figs. 19, 31, 33)

Habitat: Oregon! Easily recognized by the sinuous last section of the fifth vein.

Female: Length, 5.5 mm. Face slightly rounded above, a little concave below the middle; oral margin very slightly produced; entirely white pilose; dust area at sides slightly produced below antennæ; front black pilose, across the middle and above with white pile; triangular spots small, separated from the side stripes; eyes extremely short black pilose, becoming white below. Antennæ black; tip of the first and the second and third joints below, yellow; third joint very large, broadest just before the tip which is rounded, more pointed below; arista yellow, tip darker. Thorax and scutellum slightly shining greenish black, white pilose; scutellum with a well-marked apical groove. Abdomen slightly shining purplish black, white pilose, the usual areas with black pile; fifth segment black pilose at apex. Legs black; knees, broad bases and tips of front four tibiæ and first two joints of their tarsi, tip of the hind basitarsi and the following joint, yellow. Wings cinereous hyaline; stigma dilutely luteous.

Holotype, female, No. 862, Mus. Calif. Acad. Sci., May 25, 1918, F. R. Cole, collector.

Type locality, Forest Grove, Oregon.

28. *Cnemodon pisticoides* (Williston) (Figs. 54, 58)

Pipiza pisticoides Williston, Synop. N. Am. Syrph., p. 29, 1886.

Habitat: White Mountains (Will.); Ontario! Mostly white pilose; middle coxal process pointed; hind trochanteral process long; third segment below carinate at apex; fourth segment below not carinate or rugose at base.

Male: Length, 6 mm. Face and frons shining black, slightly greenish; face slightly receding to below the middle, thence perpendicular to the oral margin; sides whitish pollinose; pile whitish, some black hairs about the mouth; frons swollen, black pilose; vertical triangle black pilose in front, occipital cilia black, at immediate vertex white; eyes short whitish pilose. Antennæ black, third joint yellow at base below, sub-quadrate. Thorax and scutellum shining greenish black, white pilose, middle of pleuræ with reddish yellow pile; scutellum with apical groove. Abdomen shining, slightly purplish black, the usual areas opaque; pile white, on the usual areas shorter, black, lateral margins entirely white pilose. Venter of third segment carinate at apex, fourth segment simple. Legs black; tips of all femora, base of hind four tibiæ, first three joints of front and two of middle tarsi, yellow; front tibiæ piceous, ends yellow. Wings hyaline; stigma luteous; last section of fifth vein straight, parallel to margin of wing.

Female: Length, 5.5 mm. Pile of venter appressed. Face receding, rather long; sides narrowly whitish pollinose, produced below the antennæ; spots of front large, nearly round; face, vertex and a narrow stripe across below the middle of the front, white pilose; elsewhere the front is black pilose. Antennæ black, second and third joints yellowish below; third joint short oval; arista black, its base luteous. Thorax and scutellum shining greenish black, white pilose; scutellum with apical groove. Abdomen shining black, pile short, white; apex of all the segments, narrow anterior margins and a narrow median con-

necting stripe on second and third segments, with black pile. Venter entirely white pilose, the pile of the third and fourth segments appressed. Legs colored as in the male; middle tibiæ more rounded in front than usual. Wings hyaline; stigma luteous; last section of fifth vein bent at its middle.

Male and female, Orillia, Ontario (Curran.) I do not give various reported localities as I consider the determinations doubtful.

29. *Cnemodon auripleura*, new species (Figs. 23, 24)

Habitat: Oregon! California! British Columbia. Closely related to *carinata*, but the face more largely black pilose; pile of the pleuræ more reddish; wings cinereous or luteous hyaline; projection of middle tibiæ strongest at the middle.

Male: Length, 6 to 6.5 mm. Face and frons shining bluish black, black pilose; face in middle white pilose; sides narrowly white pollinose, in profile slightly receding; frons slightly swollen, with small, roundish tubercle above the antennæ; vertical triangle white pilose, with a few black hairs in front; post orbital pile whitish; occipital cilia black; eyes brownish pilose, lighter below. Thorax yellowish white pilose; humeri with brown, pleuræ with reddish, pile; scutellum with shallow apical groove, the pile yellowish white. Abdomen shining metallic black, the usual areas opaque; pile black, with the usual areas whitish; venter of third segment at apex and of fourth segment at base, sharply carinate. (In this species there is some variation in the base of the fourth segment, in some specimens the carina is not very distinct, but the base is strongly rugose.) Legs black; knees, anterior tibiæ except an incomplete median piceous band, tips of middle tibiæ and first three or four joints of anterior four tarsi, yellowish; middle tibiæ piceous, its projection when viewed from above abrupt at both ends; processes on middle coxæ and hind trochanters black. Wings cinereous- or luteous-hyaline; stigma luteous; last section of fifth vein nearly straight.

Female: Length, 5.5 mm. Face white pilose; frons brownish pilose, across the middle and at the vertex with white pile. (In the two specimens it is impossible to determine the extent of the pollinose spots.) Antennæ black; second and third joints yellowish below, third one and one-half times longer than wide, end evenly rounded; arista yellow at base. Thorax and scutellum white pilose; scutellum distinctly rugose, with an apical groove; pile towards the end grayish. Abdomen rather broad; white pilose, with the usual areas shorter black pilose; pile of venter sub-appressed. Legs black; tips of all femora, narrow base of hind tibiæ, and four anterior tarsi, yellow, the tarsi becoming darker toward the apical joints which are blackish; front four tibiæ yellow, piceous on outer side. Wings luteous hyaline, basal third more clear; stigma yellowish; last section of fifth vein bent before its middle.

Twenty-five males and two females, Hood River, Oregon (F. R. Cole), received from Professor Lovett. One male, California, Mr. W. M. Davidson, and one female, Cranbrook, B. C. (Garrett).

Holotype, male, No. 863, Mus. Calif. Acad. Sci., June 16, 1917, F. R. Cole, collector. One male *paratype* in Canadian National Collection.

Type locality, Hood River, Oregon.

30. *Cnemodon albipleura*, new species (Figs. 100, 101)

Habitat: California! Differs from *auripleura* in having broader middle tibiae, front less swollen above the antennae, frontal depression circular and deeper and pile of the venter appressed, not sub-appressed.

From *pisticoides* it differs as from *auripleura* but the pile of the venter is appressed in both species.

Female: Length, 5.5 mm. Face and frons shining metallic greenish black, whitish pilose; frons black pilose except across the middle and at the vertex; the depression on the frons well marked, much deeper in the middle than in most species and more shallow at the sides where it is almost obsolete, although a distinct transverse line can be observed when viewed from above. Face considerably receding, epistoma slightly produced. Antennae black, tip of second joint luteous, third below broadly yellow at base, in shape slightly longer than wide; arista luteous at base; eyes inconspicuously pilose; occipital cilia white. Thorax and scutellum shining black, white pilose; scutellum with well marked apical groove. Abdomen shining black, very short white pilose; broad apical area on second and third segments not reaching the sides, with black pile. Legs black; tips of femora, base of front and hind tibiae, broad base of middle tibiae, with tips of the front four, and first two joints of their tarsi, reddish yellow. Wings slightly brownish; stigma luteous; last section of fourth vein bent near its basal quarter; of the fifth oblique, slightly sinuous. Halteres yellow. Middle tibiae strongly rounded in front, more so than usual, the frons less rounded than in allied forms.

One female specimen from Mr. W. M. Davidson, dated, "16 viii, 1911." Of this specimen he writes: "The specimen without locality record was collected in California, I think at San Jose, but am not positive." Type placed in the United States National Museum.

31. *Cnemodon carinata*, new species (Fig. 59)

Habitat: Ontario! Black, shining and opaque; apical third of third abdominal segment and immediate base of fourth, below, carinate; face white pilose.

Male: Length, 6 mm. Face and frons shining black; face rounded above, receding, sides narrowly whitish pollinose, white pilose; a few black hairs at sides of the mouth; front moderately swollen, black pilose; a very conspicuous pit above the base of the antennae. Antennae black, third joint obscurely yellowish at base below, in shape oval; arista black. Vertical triangle whitish pilose, a few black hairs in front; eyes black pilose, below whitish; posterior orbital pile cinerous; occipital cilia black. Thorax and scutellum shining greenish black; white pilose. Abdomen shining slightly purplish black; pile white, the usual areas black pilose, the usual opaque areas indefinite; the light pile cinerous in some lights. Legs black; tips of all the femora, base of all the tibiae, whole of the anterior ones in front, tips of anterior four and first three joints of their tarsi, yellow; pile white except at ends of the femora where it is blackish. Wings hyaline; stigma luteous; last section of fourth vein almost parallel to margin of wing; of the fifth straight.

Holotype, male, No. 864, Mus. Calif. Acad. Sci., June 22, 1919, H. Curran, collector. *Paratypes*, three males;

Jordan, Ont., June (W. A. Ross); Guelph, Ont., June, 1913, and Jordan, Ont., June 13, 1920 (Curran). One *paratype* in Canadian National Collection.

Type locality, Jordan, Ontario.

32. *Cnemodon venteris*, new species (Figs. 60, 63, 64, 65)

Habitat: Ontario! Small, whitish pilose; middle coxal process slender, black; hind trochanteral process short, stout, the end whitish; fourth ventral segment with two spurs.

Male: Length, 6.5 mm. Face very slightly rounded above, almost straight from the antennæ to the oral margin; sides narrowly whitish pollinose, a few black hairs about the oral margin, elsewhere the pile is white; frons black pilose, not noticeably opaque above. Pile of vertical triangle tawny, black in front; occipital cilia black. Antennæ brownish black; second joint and tip of the third below, yellowish; third joint one and one half times longer than wide, sub-pointed below. Eyes black pilose, the pile shorter and whitish below. Thorax and scutellum metallic black, the scutellum less so; pile tawny, in some reflections whitish, on the pleuræ distinctly white. Abdomen shining black, the usual areas opaque; pile whitish or slightly yellowish, shorter on the usual black areas; fourth ventral segment with a basal pointed spur, partly concealed beneath the venter of the third, and a second stouter, less pointed spur on apical quarter. Legs black; tips of all the femora, base of all the tibiæ, tips of the front four and their tarsi, yellowish, the apical tarsal joints darker; white pilose, ends of hind femora black pilose. Wings cinereous hyaline; stigma luteous.

Female: Length, 5.5 mm. Antennæ yellow, all the joints black above; third two and one-half times as long as wide; face straight, white pilose; front black pilose above the antennæ and in front of the ocelli. Eyes short white pilose; occipital cilia white. Thorax shining greenish black, white pilose; scutellum with an apical groove. Abdomen shining black, the last two segments metallic deep bluish; pile short, whitish, but appearing darker on the apical segments, the usual areas inconspicuously black pilose. Legs as in the male but the last three joints of anterior four tarsi piceous. Wings hyaline; last section of fifth vein curved beyond the middle.

Holotype, male, No. 865, and *allotype*, female, No. 866, Mus. Calif. Acad. Sci., June 15, 1919, H. Curran collector.

Type locality, Jordan, Ontario.

33. *Cnemodon myerma*, new species (Figs. 62, 66, 69)

Habitat: Ontario! Differs from *ontarioensis* in having the spur on the apical third of the segment well developed; projection of middle tibiæ slightly greater and the wings more densely clouded.

Male: Length, 8 mm. Face and frons shining greenish black; face rounded above, moderately receding; pile tawny, on the sides and cheeks black; frons swollen, black pilose except a few whitish hairs above. Occipital cilia black except at vertex; vertical triangle tawny pilose with a few black hairs in front. Antennæ black; third joint yellow below, large, subrectangular, more pointed

below; arista brown, the base lighter. Pile of eyes tawny brown. Thorax and scutellum slightly shining black; pile tawny; scutellum with a shallow apical groove. Abdomen opaque, the usual areas shining purplish black; pile tawny, the usual areas with shorter black pile; venter of third segment with apical half carinate; fourth segment with a small basal spur and a larger, slightly pointed one on apical third; hypopygium mostly black pilose. Legs black; tips of all the femora, basal third of the hind and basal half of the front four tibiae, and their tips and tarsi, yellow; apical joints of tarsi and hind basitarsi, piceous; hind coxal spurs short and pointed; hind trochanteral processes short, tipped with whitish. Wings densely clouded with pale brownish, except at the base and posteriorly where the cloud is fainter.

Female: Length, 7.5 mm. Head and thorax shining greenish black; white pilose except immediately above the antennae and across the front above, where the pile is black; spots of the front large, sub-triangular, not touching the eye on their upper half; face rounded above, slightly less receding than in the male; eyes short white pilose. Antennae yellow, third joint blackish on upper third, slightly larger than in the male; arista brown, its base reddish. Scutellum with an apical groove. Abdomen shining black; pile short, white; apical margins of second and third segments shorter black pilose; black pile nowhere reaching the sides. Legs colored as in the male but the tarsi entirely yellow except basal half of hind basitarsi, which is blackish; hind coxae with a small conical spur. Wings hyaline; stigma yellowish; halteres yellow.

Holotype, male, No. 867, Mus. Calif. Acad. Sci., June 13, 1913, H. Curran, collector. *Allotype*, female, No. 868, Mus. Calif. Acad. Sci., Jordan, Ont., June 8, 1919, H. Curran collector.

Type locality, Jordan, Ontario.

34. *Cnemodon ontarioensis*, new species (Figs. 61, 67, 68)

Habitat: Ontario! Male: trochanteral spurs short, slightly pointed; fourth ventral segment with a tubercle on apical third.

Male: Length 7 mm. Face and frons shining bluish black; pile cinerous, above antennae and in front of ocelli, blackish; eyes with short brown pile. Antennae short, luteous; third joint brownish above, one and one-half times longer than wide; arista luteous at base. Thorax scutellum and abdomen shining black, the latter with the usual areas opaque; pile of thorax luteous; abdominal pile whitish or yellowish, the usual areas with black pile; spur at base of fourth segment straight; tubercle on apical third rather sharp, pilose. Femora black, tips yellow; hind tibiae with base and apex yellow; anterior four tibiae yellow, with broad piceous ring below the middle; tarsi except apical joints, yellow; pile cinereous, on the hind tibiae in front shorter and black. Wings slightly brownish, less so on basal third.

Female: Length, 6 mm. Shining black, white pilose; front above and immediately above the antennae with black pile. Antennae large, black; second joint at apex and third below, yellow; third joint large, twice as long as wide. Face receding, straight to just above the oral margin. Scutellum with an apical impression. Abdomen with the usual areas and apex of the fourth and fifth segments black pilose. Legs colored as in the male; coxal spur small. Wings tinged with luteous; last section of fifth vein bent beyond its middle.

Holotype, male, No. 869, Mus. Calif. Acad. Sci., June 13, 1913, H. Curran collector. *Allotype*, female,

No. 870, Mus. Calif. Acad. Sci., Jordan, Ont., June 15, 1919, H. Curran, collector.

Type locality, Guelph, Ontario.

35. *Cnemodon trochanterata* Malloch (Figs. 96, 97, 98, 99)

Malloch, Proc. Ent. Soc., Wash., XX, p. 127, 1918.

Habitat: Illinois! Pile mostly tawny; posterior ventral tubercle large; wings clouded with luteous brown; hind trochanteral spur small.

Male: Length, 7 mm. Antennæ brownish, second and third joint basally, below, yellowish; third joint twice as long as broad, less rounded below; face and front shining bluish black, light yellowish pilose, above the antennæ and the front of the vertical triangle with blackish pile. In profile the face is receding, slightly rounded above; eyes brownish pilose; occipital cilia yellowish, the lateral hairs black. Thorax and scutellum æneous black, the latter slightly bluish at the apex; pile tawny, on the pleuræ lighter. Abdomen opaque black, first segment and the usual areas shining, metallic; pile tawny, the usual areas with shorter black pile; hypopygium black pilose; venter of third segment carinate, the middle of the carina flattened and transversely rugose; basal spur on fourth segment conspicuous, the process on apical third large, tuberculate. Femora black, tips yellowish; tibiæ and tarsi yellowish; middle tibiæ with broad band beyond the middle and hind tibiæ except the broad base and end, blackish; front tibiæ posteriorly blackish beyond the middle; last one or two joints of all the tarsi brownish, the hind basitarsi obscurely brownish; middle tibiæ slightly produced anteriorly; middle coxal process slender, short, not very conspicuous; hind coxal spur small, not conspicuous; hind trochanteral process slender, over twice as long as thick, luteous, its base black; hind coxal articular surface luteous, bell-shaped, but more produced behind and not reaching the base of the coxæ. Wings luteous-brown, more deeply so across the middle; stigma yellow; halteres yellow, the knobs slightly brownish.

The above description was made from a paratype loaned by Dr. J. R. Malloch, labelled, "St. Joseph, Ill., May 10, 1914, Salt Fork."

The outstanding differences distinguishing *ontarioensis* from this species are: *ontarioensis*—middle coxal process smaller; hind coxal spur larger, stouter; hind trochanteral process half black, the end slightly compressed; articular surface on outer side of hind coxæ much smaller, but broader at base; wings darker; hypopygium not all black pilose; face more projecting below; ventral tubercles smaller, and *venter of third segment not rugose*.

These species are of much interest, evidently representing an evolutionary stage. (See note in appendix.)

Genus **Pipiza** Fallén (Fig. 43)

Face much broader at oral margin than at base of

antennæ; antennæ short, third joint never elongate, rarely almost twice as long as wide (Europe); abdomen often with yellow markings; hind femora slightly to much thickened, if much thickened the ventro-apical region bearing two rows of very short spine-like hairs; females more often than the males with yellow markings. In our species the development of the hind femora is equal in the two sexes.

KEY TO SPECIES

1. Abdomen with yellow spots 2
Abdomen wholly black 5
2. Abdomen with four yellow spots *quadrimaculata*
Abdomen with only two yellow spots 3
3. Hind femora considerably incrassate and bearing spinules near the end 4
Hind femora only slightly incrassate; spinules wanting; wings never clouded *nigripilosa*
4. The spinelike hairs not borne on a triangular projection; tarsi wholly yellow *festiva*
Spinelike hairs borne on a triangular projection; apical one or two tarsal joints blackish *femoralis*
5. Hind femora with spinose area near the end, often greatly enlarged 6
Hind femora without rows of spinules, never much enlarged 11
6. Legs and tarsi entirely black; hind femora considerably enlarged; face without shining median stripe *oregona*
Legs or tarsi in part yellow; hind femora variously enlarged 7
7. Hind femora very much enlarged; wings hyaline or tinged with luteous between veins 8
Hind femora moderately enlarged; wings darkened or clouded 9
8. Hind femora with greatest enlargement beyond the middle; antennæ entirely blackish *macrofemoralis*
Hind femora with greatest enlargement at the middle; second antennal joint reddish *grandifemoralis*
9. Ventral apex of fourth segment narrowly emarginate at its middle; face partly black pilose; (about 9 mm., eastern) *severnensis*
Ventral apex not emarginate 10
10. Second segment with faint indications of yellow spots; face chiefly whitish pilose *femoralis*
Second segment entirely black; wings not clouded, evenly diluted with pale brownish; face chiefly black pilose *tricolor*
11. Squamæ dark, fringed with black hairs *distincta*
Squamæ fringed with whitish hairs 12
12. Abdomen wholly with black or brownish black pile *nigripilosa*
Abdomen in large part whitish pilose 13
13. Face wholly white pilose or with shining median stripe, (larger, 7.5 to 9 mm.) 14
Face black pilose near the mouth only (6 to 8 mm.) *puella*
Face entirely black pilose (about 6 mm.) *vanduzeei*
14. Pile short; face short, third antennal joint rather long; front very broad; thorax brassy black *latifrons*
Pile long; thorax steely black; face rather long, with slender median shining stripe *davidsoni*

36. *Pipiza distincta*, new species

Habitat: California! Mostly black pilose; legs entirely slender; squamæ with fringe of black hairs.

Male: Length, 5 mm. Face and frons shining black; eyes luteous pilose, elsewhere the pile of the head black. Antennæ black; third joint more brownish, sub-rectangular, yellowish below; arista luteous, microscopically pilose to tip. Face in profile slightly receding, a little rounded in the middle and slightly concave above and below this. Thorax and scutellum shining black, black pilose; disc of thorax with brownish red pile. Abdomen shining, the usual areas sub-opaque; pile black, the anterior angles and the sides of the third and fourth segments in the middle with reddish pile which is obscure on the distal segments and does not noticeably reach the sides; pile on middle of second segment reddish in some lights; last section of hypopygium broad, rather short. Legs black; anterior four knees, tips of anterior tibiæ and all the tarsi, luteous, the posterior tarsi darker apically. Wings slightly clouded with brownish, more marked on the antero-middle; stigma luteous; discal cell very acute apically; squamæ dark, fringed with black hairs. The pile throughout dense, stout and rather long.

Holotype, male, No. 871, Mus. Calif. Acad. Sci., July 5, 1919, E. P. Van Duzee collector, 7000 feet elevation.

Type locality, Huntington Lake, Fresno Co., Calif.

This species will at once be recognized by its small size and the fringe of black hairs on the squamæ.

37. *Pipiza vanduzeei*, new species

Habitat: California! British Columbia! Squamæ and fringe of hairs whitish; thorax white pilose; pile of abdomen not at all reddish; wings hyaline.

Male: Length about 5 mm. Face and frons shining black, thinly whitish pollinose, black pilose; face receding. Antennæ short, black; third joint reddish below, broader than long (arista missing). Eyes brownish pilose, lighter below; vertical triangle white pilose behind; posterior orbits with whitish pile and black occipital cilia. Thorax and scutellum shining black, with obscure bronze reflection; pile on dorsum and pleuræ whitish, on the margins of the dorsum black; scutellum with light pile and a fringe of isolated long black hairs. Abdomen opaque black, with the usual areas shining coppery or bronzed; pile white, posterior margins of segments two and three, anterior margins of segments three and four and the hypopygium, with black pile. Legs black; tips of femora, anterior tibiæ except a piceous band on apical half, broad base and tip of middle tibiæ, immediate base of hind tibiæ and all the tarsi, yellowish; hind basitarsi basally, and apical three joints of all the tarsi slightly brownish. Wings hyaline; stigma luteous; discal cell less acute than in *distincta*. Halteres luteous, the knobs darker. Squamæ whitish, fringed with white hairs.

Holotype, male, No. 872, Mus. Calif. Acad. Sci., May 25, 1919, E. P. Van Duzee, collector. *Paratypes*, two males, Cranbrook, B. C., 1918 (Garrett), in collections of Mr. Garrett and of the author.

Type locality, Fairfax, Marin Co., Calif.

Close to *puella*, from which it may be distinguished by the entirely black pilose face and frons; broad third antennal joint; black pile on margins of thorax and apex of scutellum and the absence of a brownish cloud on the wings.

38. *Pipiza puella* Williston

Pipiza puella Williston, Synop. N. Am. Syrph., p. 27, 1886.

Habitat: N. H. (Will.) Ontario! Pile chiefly whitish, moderately long for a *Pipiza*; hind femora without a spinulose triangle near the end.

Male: Length 6 to 8 mm. Face metallic bluish black, thinly dusted with white pollen, in profile considerably retreating from the antennal base to just above the oral margin; Antennæ black, third joint thinly whitish pubescent, giving a brownish appearance, and usually with the basal half below obscurely reddish; in shape elongate sub-cordate; arista wholly rather stout and not much longer than third joint. Pile of the eyes tawny, of the head elsewhere moderately long, whitish; except just above the base of the antennæ where it is black; sometimes a few black hairs among the occipital cilia. Thorax and scutellum shining black, wholly whitish pilose. The white squamæ with a yellow margin and a fringe of whitish pile. Abdomen chiefly whitish pilose, the usual areas with shorter black pile; apex of fourth segment wholly whitish pilose. Legs black, tips of all the femora, front four tibiæ except a broad blackish ring beyond the middle, sometimes almost wanting on the front pair, basal third of hind tibiæ and their ends obscurely, and the first two tarsal joints yellowish; hind basitarsi brownish apically. Wings more or less brownish beyond the middle.

Three specimens, Ontario (Curran). One specimen was very kindly compared with the type in the National Museum at Washington by Mr. R. C. Shannon, and differed but slightly. The type, according to Mr. Shannon, is somewhat teneral.

39. *Pipiza nigripilosa* Williston (Figs. 30, 70, 71)

Williston, Synop. N. Am. Syrph., p. 28, 1886.

Habitat: Pennsylvania (Will.); Quebec; Ontario! Blackish pilose; female with an arcuate interrupted yellow band on second abdominal segment; hind femora slightly enlarged, not bearing spinose hairs at the outer end.

Length, 7 to 8 mm. Male: Face and frons shining black, lightly dusted with whitish pollen, black pilose; antennæ black, third joint rather lighter, elongate cordate; arista brownish black, its base yellow; eyes brownish pilose, post orbital pile lighter below. Thorax and scutellum brownish or blackish pilose, the upper portion of the pleuræ always black pilose. Abdomen shining black, the usual areas somewhat opaque; pile black, but sometimes brownish

on the broad median lateral margins of each segment. Legs black; tips of femora, basal quarter of hind and half of front four tibiae, tips of all the tibiae and the tarsi, yellow; tarsi with last two or three joints darker; pile of legs black or brownish black; hind femora gradually broadened to near the end where they are somewhat suddenly constricted to about three-fourths their greatest width. Wings cinereous hyaline; stigma luteous.

Female: Not at all similar to the male. Face and front shining black; face lightly dusted with whitish pollen; front with a rather large triangular dusted spot on each orbit below the middle; pile white, black immediately above the base of the antennae; across front before ocelli brownish black pilose. Antennae black, tip of second and whole of third joint brownish; arista yellow at base. Eyes very short white pilose; post-orbital pile and occipital cilia entirely white. Thorax and scutellum with short white pile. Abdomen shining black, second segment with an arcuate, broadly interrupted, yellowish red cross-band, often resembling two large sub-quadrate yellow spots, the outer ends usually more rounded in front. These spots do not vary much and are about $1\frac{1}{2}$ times as long as wide. Pile of abdomen short, white, except the usual areas where the pile is very short and black. Legs as in male except that the pile is shorter and white. Wings as in male.

Numerous specimens of both sexes from various parts of Ontario. The male cannot well be confused with any other species, but the female is easily confused with *femoralis* but can be readily distinguished by the absence of the spinose area on hind femora. There can be no question about this female belonging here. *Pipiza femoralis* is common in Ontario and the hind femora in both sexes bear spinose hairs.

40. *Pipiza davidsoni*, new species (Figs. 104, 108)

Habitat: California! Rather robust; metallic blackish, the thorax metallic bluish black; hind femora very slender.

Length, 7.5 to 9 mm. Male: Face and frons shining metallic bluish black; thinly covered with whitish pollen which leaves a very narrow median facial stripe extending onto the front, bare and shining; pile rather long, black; on the face appearing lighter colored, sometimes white on cheeks; vertical triangle with lighter pile behind. Antennae black; third joint obscurely reddish, in shape sub-cordate, scarcely longer than broad; second joint sometimes luteous apically. Eyes with brownish or tawny pile above, more whitish below; post orbital pile and cilia blackish. Antennal process less produced and less conical than usual. Thorax and scutellum shining metallic bluish; finely and sparsely long white pilose, on the humeri slightly grayish pilose; on apical portion of scutellum with long black hairs intermixed; scutellum without a groove. Abdomen shining metallic black, the usual areas opaque; pile moderately long, light colored, the usual areas reaching sides, with black pile; hypopygium entirely black pilose; basal portion of sexual organ broader than long. Legs black, white pilose; tips of all femora, narrow base of hind, base of front four tibiae and their tips and tarsi, luteous reddish; hind basitarsi and apical joints of all tarsi darker; hind femora very slender, not spinose. Wings hyaline; stigma luteous; halteres blackish.

Holotype, male, Walnut Creek, California, no date

or collector's label, but probably taken by Mr. Davidson, in the United States National Museum.

Paratype, male, Fairfax, California, April 16, 1913, in the Museum of the California Academy of Sciences.

This species is very readily recognized by the slender femora and the peculiar narrow shining facial stripe.

41. *Pipiza latifrons*, new species

Habitat: California! Front very broad, nearly as wide as face; face scarcely widened below; abdomen sparsely and very short white pilose; hind femora slender.

Female: Length, 7.5 mm. Face and front deep shining black, very thinly covered with whitish dust, with a few black hairs above the antennæ (the pile of the head has been brushed off to a large extent but from a careful examination I believe the front to have been almost entirely white pilose, although it may have been cinereous in front of the ocelli). Sides of face and front to above middle narrowly, not very conspicuously, whitish pollinose. Antennæ black, second and third joints more brownish, second at tip and third below obscurely luteous. Eyes with very short, sparse white pile. Occipital cilia and pile of posterior orbits white. Thorax and scutellum black with a brassy reflection on the dorsum, leaving two broad median stripes shining steely black; pile very short, white; scutellum very densely punctured, finely granulate. Abdomen somewhat shining deep black, densely finely punctulate, with short white pile; pile longer on basal angles, on the usual dark pilose areas cinereous, not conspicuous. Legs black; tips of femora, narrow base of hind and base of anterior four tibiæ, apices of all the tibiæ, the hind ones very narrowly, and all the tarsi, yellowish; apical joints of all the tarsi a little darker; pile all white, on femora and hind tibiæ moderately long. Wings hyaline; auxiliary vein and stigma luteous.

Holotype, female, No. 873, Mus. Calif. Acad. Sci., May 12, 1910, J. A. Kusche collector.

Type locality, Sobre Vista, Sonoma Co., Calif.

Evidently close to *P. davidsoni* but the color is markedly different and the face is much too short and not rounded so it cannot be the female of that species. There are other differences.

42. *Pipiza quadrimaculata* (Panzer)

Syrphus quadrimaculata, Panzer Fauna Germ., LXXXVI, tab. 19, 1802.

Habitat: Europe; Ontario! United States; British Columbia. "Abdomen with two pairs of yellow spots; antennæ short and blunt.

"The two large spots near the base of the abdomen more conspicuous than the next two, which are smaller and redder; wings only a little darkened

on the middle; face and eyes with white hairs; frons chiefly black haired about the vertex and base of the antennæ, whitish between. Legs black, knees, base of the tibiæ broadly, and the tip narrowly, and tarsi, reddish yellow; last three joints of all tarsi browned, hind basitarsi quite yellowish and rather dilated. Pubescence of the thorax, abdomen, pleuræ and femora almost all whitish. Length 9 mm.

"An examination of several European specimens causes me to add: Male: Abdomen with a pair of transverse oblong yellowish or reddish yellow spots on the second and third segments; frons more shining; third joint of the antennæ short and stumpy, dark brown above but reddish brown beneath [this may refer to an individual specimen]; arista short but longer than the antennæ and thickened for about two-thirds its length. Abdomen with a little pale pubescence on and about the pale spots and about the end of the fourth segment.

"Female: More shining. Abdomen with very little black pubescence. Dust spots on sides of the front hardly visible." (Verrall).

This species has been recorded from some of the States and I have a female from Ontario. I give Verrall's description almost word for word although it is not a systematic one. No doubt can exist in the determination of typical specimens but the second pair of spots are often obsolete or nearly so. In such cases, the females may be easily confused with *nigripilosa*; but the males will be recognized by the slender hind femora and the yellow spots on the second segment.

43. *Pipiza tricolor*, new species

Habitat: Ontario! Yellowish white pilose; face entirely black pilose; hind femora with inconspicuous spines behind; wings slightly brownish in front, the basal quarter of the sub-marginal cell purely hyaline.

Male: Length, 7.5 mm. Face and frons shining black, thinly covered with white pollen; face receding, but less so on lower half, black pilose; frons black pilose, above with dilutely yellowish pile. Antennæ black, third joint brown, sub-cordate; arista brown, its base luteous; vertical triangle black pilose in front, yellow behind; eyes with luteous pile, lighter below; occipital cilia black except at the vertex, where there are a few yellowish hairs; pile of posterior orbits whitish below, black in middle, yellowish above. Thorax and scutellum shining bluish black, with luteous pile; an area of black pile crosses the front of the thorax and the pleuræ above and connects with the black of the humeri; tip of scutellum with cinereous pile. Abdomen shining black with the usual areas sub-opaque; yellowish and yellowish white pilose, with the usual areas and the hypopygium black pilose. Legs black; tips of all the femora, broad base and tips of tibiæ, and the first three joints of tarsi, piceous yellow. Wings tinged with brownish in front, basal quarter of sub-marginal cell hyaline; stigma luteous.

Holotype, male, No. 874, Mus. Calif. Acad. Sci., June 15, 1919, H. Curran collector. *Paratype*, male, Orillia, Ont., May 4, 1914 (Curran) in author's collection.

Type locality, Jordan, Ontario.

44. *Pipiza femoralis* Loew (Figs. 1, 3, 36, 72, 73, 74)

Loew, Century, vi, No. 38, 1865; Williston, Synop. N. Am. Syrph., p. 26 (and 28 *albipilosa*).

Habitat: Ontario! Quebec, Ohio, Pennsylvania. A medium sized, moderately pilose species, male usually and female always, with two yellow spots forming an arcuate band on second segment; hind femora with a spinose area behind near end; face whitish pilose.

Length, 8 to 9 mm. Male: Face and front shining, slightly metallic bluish black, ground color slightly obscured by whitish pollen; face receding, white pilose, sometimes with a few black hairs near the mouth and on the sides above; front black pilose with white pile above and often on the sides. Antennæ black, second joint often partly luteous, third usually yellow below basally, in shape sub-cordate; arista brownish, its base sometimes lighter; vertical triangle white pilose, a few dark hairs in front; post orbital pile white; occipital cilia black; eyes with cinerous pile. Thorax and scutellum shining bluish black, white pilose, usually with a few black hairs on the humeri. Abdomen shining bluish black, with sub-opaque areas as follows: one on second segment, narrowed in middle and omitting the sides, an abbreviated fascia on anterior margin of third and fourth segments and a similar fascia on apex of third segment, widened in the middle so as almost to join the anterior fascia; second segment with an interrupted yellow band terminating some distance from the side margins; these spots vary in size and become obsolete (var. *albipilosa* Will.) or sub-obsolete, appearing as yellowish patches in certain lights, but they are never very large; their inner ends are truncate, the outer more or less pointed, the longer side of the triangle formed by each spot being in front. Pile white, moderately long, with shorter black pile on the opaque areas except those on anterior half of second segment. Legs black; hind femora incrassate, near end below bearing one or two rows of spinose hairs; tips of all femora, anterior four tibiae and base of hind ones, and first two joints of front four tarsi, yellow; front and middle tibiae with a piceous band beyond middle, hind tibiae and basal two joints of their tarsi piceous; apical three tarsal joints blackish. Wings faintly or moderately clouded with brownish across middle, fading out apically and posteriorly, almost hyaline in some specimens; stigma luteous.

Female: Front slightly narrowed above, white pilose, with black pile immediately above the base of the antennæ and a few black hairs in front of the ocelli; pollinose side spots broadly connected with side stripes of face, their upper ends rounded. These spots leave a polished area between them about $1\frac{1}{2}$ times width of one spot. Spots on second segment broader and more squarish than usual in male, with outer ends more rounded. Fifth segment black pilose; tarsi lighter colored, mostly yellowish. Wings usually more distinctly clouded. Pile sparser and shorter.

Twenty specimens from various parts of Ontario.

Very great confusion exists at present as regards the identity of *femoralis* and *festiva*, and I am not able entirely to clear up the matter. So far as I know, the only specimens of *festiva* (?) which have been taken in America, are females with much darkened wings; of these I have taken several specimens. In 1914 Dr. Williston determined for me two females as this species,

together with a male, which I am sure does not belong to *festiva*. He also determined as *albipilosa* two males which are distinctly different; one of these bears almost obsolete yellow spots and is certainly *femoralis*, while the other is larger, fully 10 mm., and much more like my *severnensis* which he labelled as a new species near *puella*. This larger specimen, which is not described in this work, apparently is different from *severnensis* and *femoralis* and has the wings very slightly clouded. Until more specimens are available for examination I prefer to retain this as doubtful. I do not believe the true *festiva* occurs in America. I have European specimens of *festiva*, *noctiluca*, *luteitarsis*, and all the closely allied species. In most of these the hind femora are more enlarged than in *femoralis* but in no case is the triangular production near the end present to a marked degree. *P. luteitarsis* has the hind femora (fig. 37) slightly less produced. I reproduce the description of *festiva* as given by Williston, but believe we must discard this species as American.

45. *Pipiza festiva* (Meigen)

Meigen, Syst. Besch., III, 243, 2, 1822.

Habitat: Europe; North America? "Male and female: Length, 6.5 to 10.5 mm. Front and face long white pilose, below the ocelli and above the base of the antennæ in the female blackish pilose. Antennæ brown, third joint trapezoidal. Thorax white pilose; posterior parts of second and third segments black pilose; second segment with a variable yellow band, 'sometimes sulphur yellow, at other times reddish yellow; anterior margin concave (?) or straight; sometimes interrupted by a distinct black space, at other times only by a dark line' (Schiner). Legs yellow, with black femora; tibiæ more or less brown in the middle. Wings hyaline on basal half, externally blackish or smoky brown fading out towards the margin; stigma dark luteous." (Williston).

The species varies considerably and the range in area of the yellow spots is much as in *femoralis*. In my specimens of *luteitarsis* the wings are only slightly darkened apically.

46. *Pipiza severnensis*, new species

Habitat: Ontario! Whitish pilose; venter of fourth segment slightly emarginate in the middle; femora with spinose area.

Male: Length, 9 mm. Face broad, thinly whitish pollinose except a very narrow shining central stripe; black pilose, the frons and middle of face with

lighter pile; pile of vertical triangle long, whitish. Antennæ black, whitish pollinose; third joint nearly as broad as long, sub-quadrate. Eyes whitish pilose, appearing yellowish in some lights; pile of posterior orbits long, whitish; occipital cilia blackish. Thorax and scutellum slightly shining bluish black with long whitish pile. Abdomen bluish black, not much shining, black pilose; on each segment a large pair of triangular spots of long white pile, narrowly separated; sides of abdomen mostly long whitish pilose; hypopygium black pilose; venter of fourth segment a little emarginate in middle at apex. Legs black, whitish pilose except apical quarter of hind femora which bear black pile; tips of all femora and tibiæ at base yellow; anterior tibiæ and the tarsi piceous, the last two joints of hind tarsi black; hind femora moderately enlarged, near end with the usual spinose area. Wings luteous hyaline, the basal third lighter.

Holotype, male, No. 875, Mus. Calif. Acad. Sci., July 31, 1913, H. Curran collector.

Type locality, Severn River, Ontario.

Allied to *femoralis*, but slightly larger, with the black and white pile clearly defined, giving a neater appearance even though the pile is longer. The mostly black pilose face, more yellowish wings and emarginate venter of fourth segment will at once distinguish this species. The Severn River here referred to is a small river running from Lake Simcoe to Georgian Bay, and not the river of that name emptying into Hudson Bay.

47. *Pipiza oregona* (Lovett) (Fig. 29)

Lovett, Proc. Cal. Acad. Sci., 4th ser., vol. ix, p. 246, August, 1919, (New Oregon Diptera)

Habitat: Oregon! California! An entirely black, light pilose species; readily distinguished from any other by the entirely black legs and narrowly contiguous eyes.

Length, 7.5 to 9 mm. Male: Face and frons shining black, lightly dusted with whitish pollen; face entirely whitish pilose or with a few black hairs in middle; front black pilose, lighter above; vertical triangle cinerous pilose, with black hairs in front. Antennæ black; third joint sub-cordate, reddish brown or brownish, with the rather thick arista of the same color but darker towards tip. Eyes only actually touching for about seven facets, whitish pilose; post orbital pile whitish; occipital cilia black. Thorax and scutellum slightly shining black, with luteous or yellowish white pile; thorax across the front narrowly blackish pilose, continued back on the sides behind the humeri, or with only a few black hairs in front; pleuræ whitish pilose. Pile of scutellum more whitish than on the thorax. Abdomen slightly metallic bluish black, the usual areas darker and with black pile; elsewhere the pile is lighter and longer; hypopygium mostly whitish pilose above, black pilose below. Legs entirely black, white pilose; anterior tibiæ yellow pubescent below apically; knees black pilose; tarsi below velvety reddish pubescent; femoral spinose area well marked. Wings clouded with luteous or brownish, more so in the middle; stigma luteous.

Redescribed from two paratypes and an additional

specimen from Walnut Creek, Calif. This latter specimen was destroyed in transit at a later date.

In this species the face is short and evenly thinly pollinose with no median bare stripe.

48. *Pipiza macrofemoralis*, new species (Figs. 55, 56, 57)

Habitat: Oregon! Dark species; hind femora exceptionally thickened for a *Pipiza*; eyes contiguous for a slightly shorter distance than usual; antennæ entirely blackish; hind femora thickest beyond the middle.

Male: Length, 7.5 to 8 mm. Face and frons shining black, slightly obscured by whitish pollen; pile black, rather long. Antennæ black; third joint rather finely whitish pollinose, in shape square with the lower corner produced forward. Eyes brownish black pilose; vertical triangle with lighter pile behind and a few yellowish hairs at vertex. Thorax and scutellum shining black with a slightly bluish reflection; pile whitish, across front of thorax and anterior sides of dorsum blackish pilose; pile of pleuræ white. Abdomen shining black, the usual areas sub-opaque; pile black, with the usual areas white or whitish; first segment short black pilose; hypopygium black pilose. Legs black; knees except hind ones, and tips of front four tibiæ and their tarsi, reddish yellow; hind basitarsi and following joint dilutely reddish; anterior four tarsi more distinctly reddish at base, the tips becoming almost black; hind femora very much thickened, with a well marked spinose area. Wings cinereous hyaline; stigma brown; last section of fourth vein moderately curved.

Holotype, male, No. 876, Mus. Calif. Acad. Sci., June 8, 1917, F. R. Cole, collector. *Paratype*, male, Hood River, Oreg., May 25, 1917, F. R. Cole, collector.

Type locality, Hood River, Oregon.

A very well marked species. The shape of the third antennal joint is peculiar and cannot be accurately described as sub-cordate. Since this description was prepared a female of a second species, described below as *grandifemoralis*, has been received from Mr. W. M. Davidson, which I at first thought might belong here. However, upon examination several marked differences were noted. In *grandifemoralis* the hind femora are more swollen and broadest at the middle, the third antennal joint is larger and marked with yellow, the pile of the head is almost entirely white, the color of the thorax is more metallic bluish and the fly is slightly more robust.

49. *Pipiza grandifemoralis*, new species (Figs. 105, 106, 107)

Habitat: California! Mostly whitish pilose; hind femora greatly enlarged, largest at the middle.

Length, 9.5 mm. Female: Antennæ black; second joint luteous, third sometimes reddish brown, sub-cordate, $1\frac{1}{2}$ times longer than wide; arista brownish. Face and front shining black, the former covered with whitish dust extending narrowly up sides of front and enlarging below middle to form sub-triangular spots which do not occupy half the width. Immediately below these spots is a rather broad transverse carina occupying over $\frac{1}{4}$ the width on each side. Except for a few black hairs above the antennæ the pile is whitish; a bare area below the antennæ extending as a narrow V to oral margin. Front noticeably wider than usual with the pile over the pollinose spots directed inwards. Thorax and scutellum slightly shining with an obscure metallic bluish or greenish blue tinge, entirely whitish pilose; scutellum without a groove. Abdomen shining metallic bluish black, only the broad black pilose hind margins of second and third segments appearing darker, these pilose areas not reaching sides; elsewhere the pile is rather short grayish white, longer basally; apex of terminal segments with a few scattered black hairs. Legs black; tips of all the femora, base of hind tibiæ, broad base of anterior four tibiæ and their tips, and first two joints of anterior four tarsi, yellowish; middle of anterior four tibiæ and apical joints of their tarsi, piceous. Wings hyaline or with cells on the apical half luteous in their middle; stigma luteous; halteres yellow.

Holotype, female, reared by Mr. W. M. Davidson, labelled: "Bred from larva aphidophagous on *Heteromeles arbutifolia*, San Jose, Cal., July 24, 1912."; in the United States National Museum.

Paratype, female, Mus. Calif. Acad. Sci., Sobre Vista, Sonoma Co., Calif., May 12, 1910, (J. A. Kusche) collector.

Unfortunately no pupal case accompanied the holotype. The note on the larval habit is of interest as showing the habits of the immature stages of this genus. I have frequently observed that Syrphid larvæ of some species are more common than the adults, due, no doubt, to the fact that these larvæ are very often heavily parasitized. For further notes see *macrofemoralis*.

Unrecognizable Species.

Pipiza(?) *crassipes* (Bigot)

Bigot, Ann. Soc. Ent. France, Ser. 6, III, p. 557, 1884.

Habitat: North America. Length, 7 mm. "Female: Black, a little shining, almost bare; antennæ with third joint and arista yellow; face evenly finely grayish pollinose. Slightly white pubescent on the pleuræ and femora. Halteres testaceous. Wings a little brownish, hyaline at base; stigma brownish. Knees yellow, hind legs and basitarsi considerably swollen." (Bigot: translation.)

Pipizella(?) *apisaon* (Walker)

Chrysogaster Apisaon Walker, List, III, p. 572, 1849.

Habitat: New York. Williston, Synop. N. Am. Syrph., p. 291, makes the following remark on this species: "It is not impossible that *Chrysogaster apisaon* Walker, is the same as this (*C. pulchellus*). At least the hairy eyes and elongate antennæ indicate that it is a *Pipiza* (*Pipizella*) or *Psilota*."

There is little doubt in my mind but that the above species is one of those described in this paper, but which species it is impossible to tell without an examination of the type.

APPENDIX

EVOLUTION IN THE GENUS CNEMODON

While it is not intended in this paper to go into the evolution of the genera, it has been found that the genus *Cnemodon* as limited in the body of this paper, presents many characters of interest to the student of evolution. It seems that this genus is at the present time undergoing many modifications in structure. The specimens before me exhibit an exceptionally wide range of characters and it is an easy matter to trace the species through from the most simple form, *unicolor*, to the more specialized *myerma*, which is evidently the highest form known.

C. unicolor possesses neither the usual slender processes on the middle coxæ nor the hind trochanteral processes. It does, however, possess the typically produced middle tibiæ, and for this reason is included in the genus *Cnemodon*. It has also the typical *Cnemodon* shape, but is closely approached in that by *Pipizella fraudulenta*. From this species the natural step is to *C. intermedia*, which possesses only the processes on the middle coxæ and because of this fact is a species of especial interest. *C. cevelata* has developed the hind trochanteral processes but, although of the typical shape, they are not as long as in the following species, and are not shortened with the ends rounded, as occurs in the more specialized forms. *C. calcarata* and *elongata* are closely related but the latter has the longest processes to be found in the genus. The next step is

apparently the development of hind coxal spurs, found to be small and inconspicuous in *lovetti* but stronger in *coxalis* and *rita*.

A new development occurs in all the species following these. In *pisticoides* the venter of the third segment is carinate at the end; in *auripleura* the venter of the fourth segment also is carinate at the immediate base, but here the carina of the fourth segment is sometimes very slight and rugose while in *carinata* it is well-marked.

In the species which follow the hind trochanteral process is much shorter with the end rounded. With the development of the ventral spurs there is, also, a marked tendency for the middle coxal processes to disappear.

No one seems ever to have understood the reason for the development of these remarkable processes on the legs. It is possible that they serve some purpose during copulation. Possibly the knobs on the end of the trochanteral processes fit into the abdomen of the female at its base, or into the sides of the scutellum, but they are rather close together for the latter purpose.

However, with the development of the ventral abdominal spurs, it appears that the use for the trochanteral processes is disappearing. It would therefore seem that the two must serve the same purpose. If such is the case, a most interesting question arises: Why should it be necessary to develop the coxal and trochanteral processes in order to later develop the ventral spurs? It would seem that the development of the ventral spurs should have occurred naturally without the intervening development of the processes, but the evidence indicates that this was not the case. It is also remarkable that so far all the species bearing the ventral spurs occur in the vicinity of the Great Lakes. That such species may be developed on the Pacific Coast is to be expected because of the presence there of two species, *albipleura* and *auripleura*, which fall immediately below the spur bearing forms. It will be interesting to watch the development in this region and

to note the first appearance of the more specialized forms.

My first record of the ventral spur bearing species is *ontarioensis*, at Guelph, Ontario, June 13, 1913. The next record is *trochanterata*, Illinois, May 10, 1914. The former species is undoubtedly the lowest member of the group, with the second following. Both of these are larger than the average *Cnemodon*. *C. myerma* and *venteris* were both taken in 1919. In appearance *venteris* approaches more closely the typical *Cnemodon*.

It must not be thought that the other genera are devoid of evolutionary interest. *Pipizella* and *Pipiza* both present forms which are very important. In the latter genus species occur with slender hind femora and others with remarkably thickened femora with many forms intermediate between these extremes. *Heringia* shows a great deal of variation in the hypopygium and in the specialization of the fourth segment, as well as in other structures. In these genera many gaps occur and it is not possible to trace the species definitely from one to the other, although I have examined most European and all North American species but one. *Pipizella* is even more difficult to trace through although it is quite evident that *P. fraudulenta* is either the highest or the lowest form.

A suggested tree of relationship is given on the next page. It will be noticed that all the genera are traced from a common ancestor, but all developed along different lines and for the genus *Pipiza* no direct connection can be found. Its broad face, with practically nothing in common with the other genera except the dark color and the pilose face, eyes and abdomen, clearly indicates considerable separation.

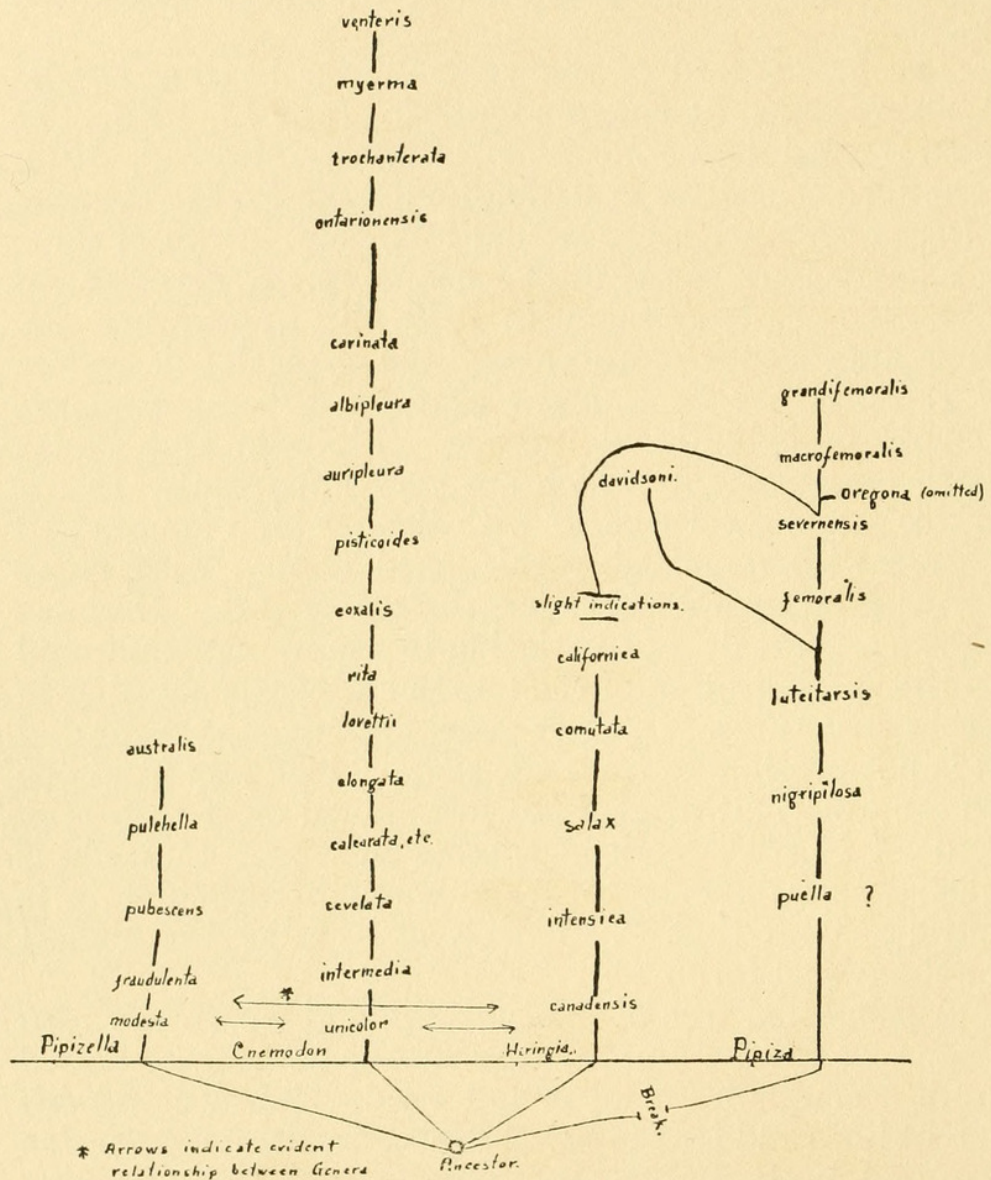
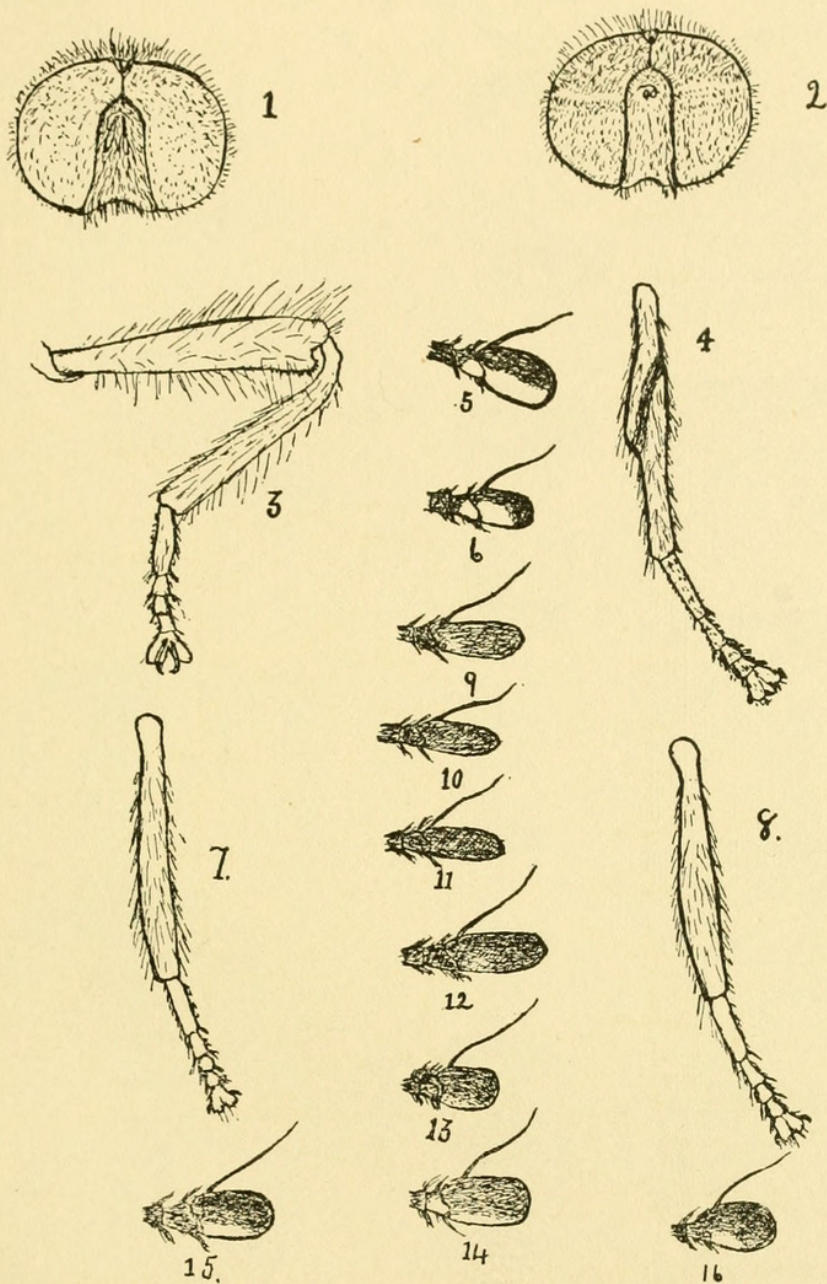
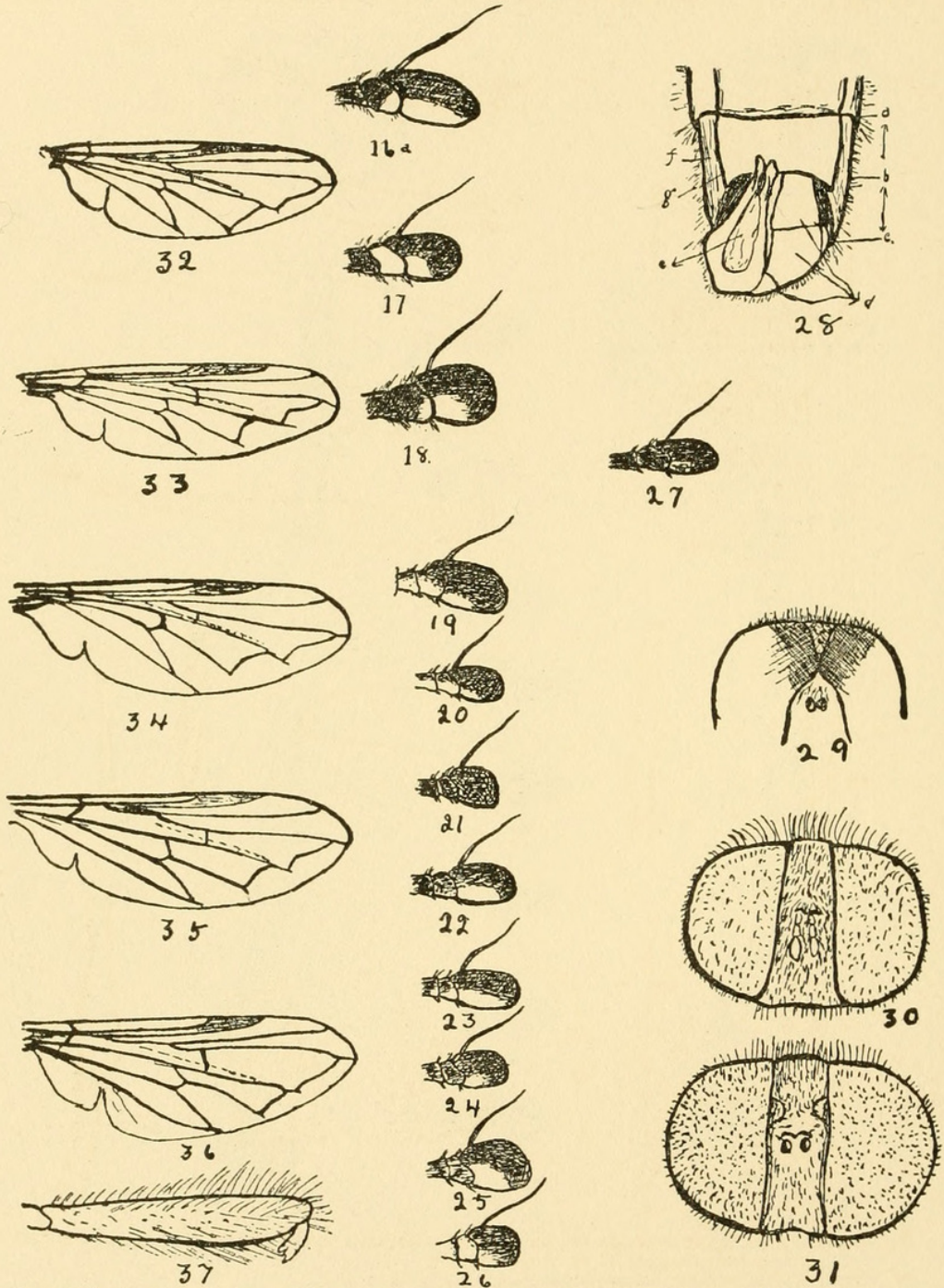


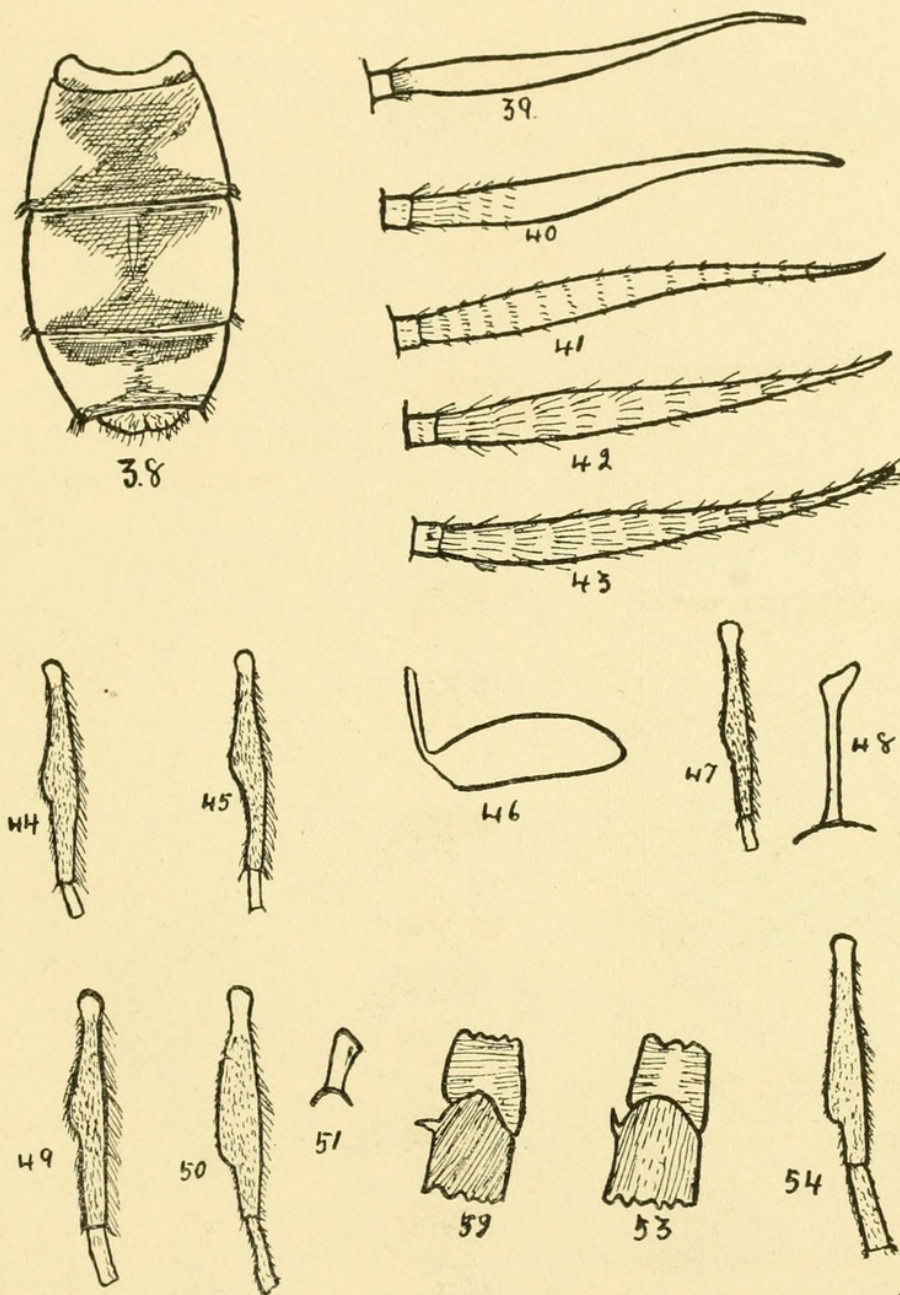
Diagram showing a suggested phylogeny for the Pipiza group of the Syrphidæ



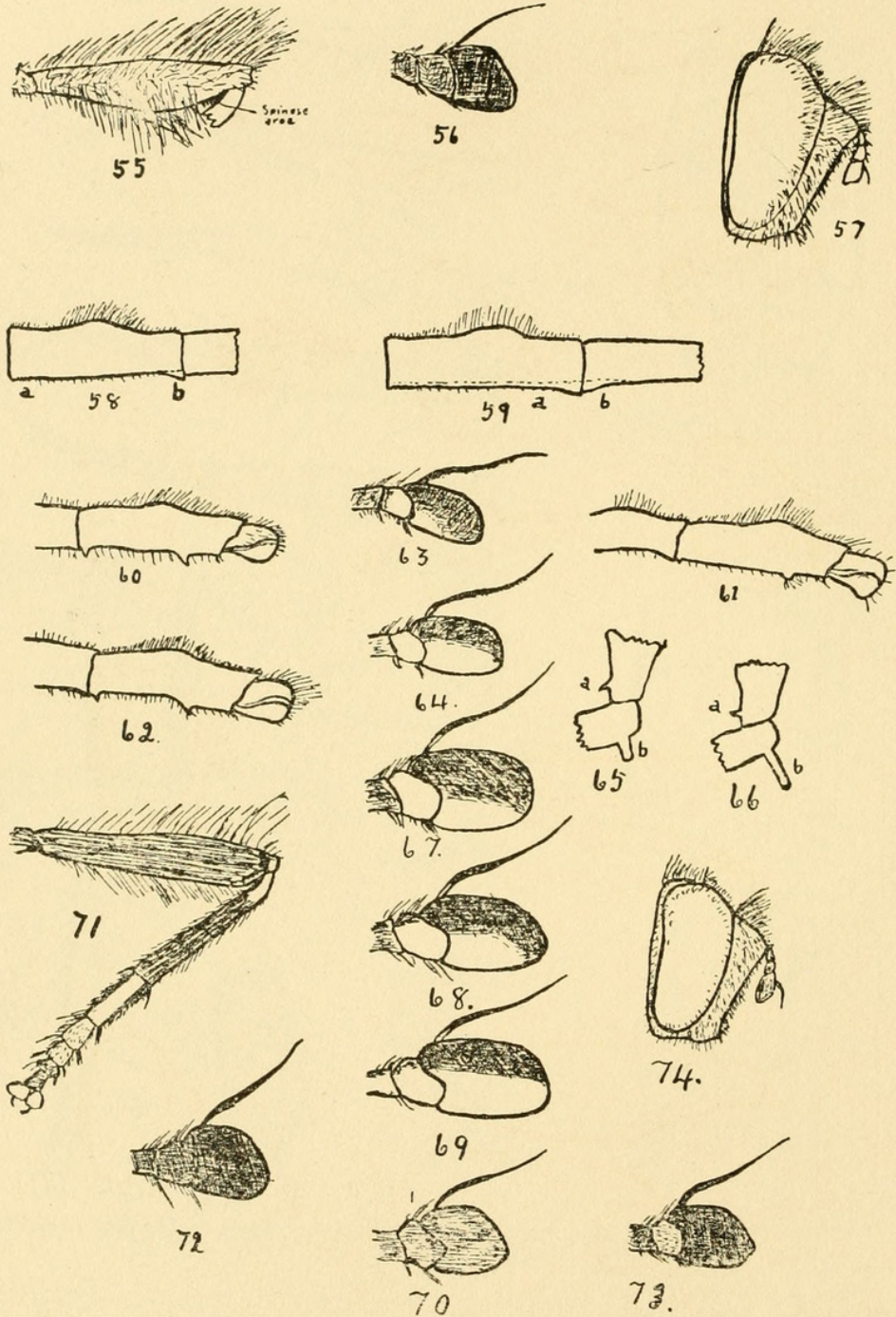
1. *Pipiza femoralis*, head, showing wide face.
2. *Pipizella modesta*, male, showing narrow face and horizontal bare stripe on eyes.
3. *Pipiza femoralis*, hind leg.
4. *Cnemodon calcarata*, middle tibia showing groove beneath.
5. *Cnemodon calcarata*, female, antenna.
6. *Cnemodon calcarata*, male, antenna.
7. *Pipizella pubescens*, middle tibia, female.
8. *Cnemodon calcarata*, middle tibia, female.
9. *Pipizella pubescens*, female, antenna.
10. *Pipizella pubescens*, male, antenna.
11. *Pipizella fraudulenta*, antenna.
12. *Pipizella modesta*, antenna.
13. *Cnemodon unicolor*, male, antenna.
14. *Cnemodon intermedia*, male, antenna.
15. *Cnemodon coxalis*, male, antenna.
16. *Cnemodon intermedia*, female, antenna.



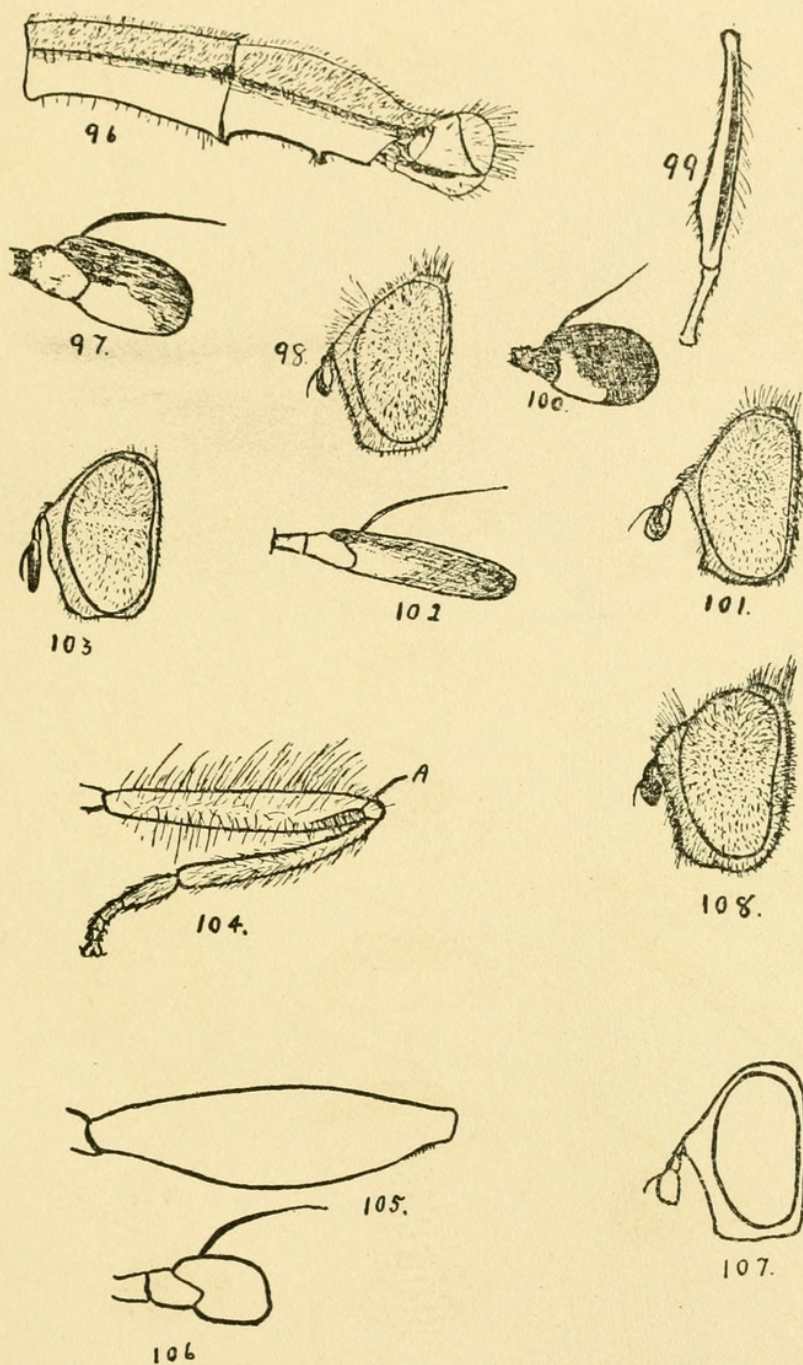
- 16a. *Heringia salax*, male, antenna.
 17. *Heringia canadensis*, male, antenna.
 18. *Heringia intensica*, male, antenna.
 19. *Cnemodon sinuosa*, female, antenna.
 20. *Cnemodon placida*, male, antenna.
 21. *Cnemodon rita*, male, antenna.
 22. *Cnemodon placida*, female, antenna.
 23. *Cnemodon auripleura*, female, antenna.
 24. *Cnemodon auripleura*, male, antenna.
 25. *Cnemodon corvallis*, female, antenna.
 26. *Cnemodon lovetti*, male, antenna.
 27. *Heringia comutata*, male, antenna.
 28. Venter of *Heringia*: a-c, length of fourth segment;
 b-c, length of venter of fourth segment;
 d, hypopygial segments; e, hypopygium;
 f, membrane; g, chitinous ventral plate.
 29. *Pipiza oregona*, upper portion of head, showing narrowly contiguous eyes.
 30. *Pipiza nigripilosa*, head of female.
 31. *Cnemodon sinuosa*, head of female.
 32. *Heringia canadensis* wing.
 33. *Cnemodon sinuosa*, wing.
 34. *Cnemodon corvallis*, wing.
 35. *Cnemodon intermedia*, female, wing.
 36. *Pipiza femoralis*, wing.
 37. *Pipiza luteitarsis*, hind femora.



38. Abdomen of *Pipizella modesta*, male. The cross lines show usual opaque areas; vertical-oblique lines, the usual black pilose areas.
 39. *Pipizella fraudulenta*, arista.
 40. *Pipizella pubescens*, arista.
 41. *Cnemodon*, arista, showing pilosity.
 42. *Heringia*, arista.
 43. *Pipiza*, arista.
 44. *Cnemodon unicolor*, male, middle tibia.
 45. *Cnemodon intermedia*, male, middle tibia.
 46. *Cnemodon intermedia*, male, middle coxa, showing process.
 47. *Cnemodon elongata*, male, middle tibia.
 48. *Cnemodon*, typical hind trochanteral process.
 49. *Cnemodon calcarata*, male, middle tibia.
 50. *Cnemodon cevelata*, male, middle tibia.
 51. *Cnemodon cevelata*, male, hind trochanteral process.
 52. *Cnemodon coxalis*, male, hind coxal spur.
 53. *Cnemodon loveti*, male, hind coxal spur.
 54. *Cnemodon pistioides*, male, middle tibia.



- 55, 56, 57. *Pipiza macrofemorialis*, male, hind femora, antenna and head.
 58. *Cnemodon pistioides*, male, cross section of third segment; a, rugose base; b, carinate end of segment.
 59. *Cnemodon carinata*, male; a, carinate venter of third segment; b, carinate base of fourth segment.
 60. *Cnemodon venteris*, male, cross section of fourth segment.
 61. *Cnemodon ontarioensis*, male, cross section of fourth segment.
 62. *Cnemodon myerma*, male, cross section of fourth segment.
 63. *Cnemodon venteris*, male, antenna. 64. *Cnemodon venteris*, female, antenna.
 65. *Cnemodon venteris*, male; a, hind trochanteral process.
 66. *Cnemodon myerma*, male; a and b as in 65.
 67. *Cnemodon ontarioensis*, female, antenna.
 68. *Cnemodon ontarioensis*, male, antenna.
 69. *Cnemodon myerma*, antenna, male and female.
 70. *Pipiza nigripilosa*, antenna. 71. *Pipiza nigripilosa*, hind femora.
 72, 73, 74. *Pipiza femoralis*, antennae of two extremes and head of male.



- 96, 97, 98, 99. *Cnemodon trochanterata*, abdomen, antenna, head, and middle tibia.
 100, 101. *Cnemodon albipleura*, antenna and head.
 102, 103. *Pipizella pulchella banksi*, head and antenna.
 104. *Pipiza davidsoni*, hind leg; *a*, longitudinal carina with subappressed pile below.
 105, 106, 107. *Pipiza grandifemoralis*, hind femora, antenna and head (outline only).
 108. *Pipiza davidsoni*, head.



Curran, Charles Howard. 1921. "Revision of the Pipiza group of the family Syrphidae (flower-flies) from north of Mexico." *Proceedings of the California Academy of Sciences*, 4th series 11, 345–393.

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