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## SYNOPSIS OF THE NORTH AMERICAN SPECIES OF *SPILOMYIA* (SYRPHIDAE, DIPTERA)

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The discovery of a new species of *Spilomyia* from the southwest furnishes an opportunity to review the species belonging to the genus. No complete key to the North American forms has previously been published. The last key to appear was published by Williston in 1886 and included only the species known to him from the United States. Unfortunately I do not have representatives of the Mexican species before me, so they are included on the basis of descriptive differences.

In the genus *Spilomyia* all of the species bear a strong superficial resemblance to vespid wasps found in the same region and, in addition, their actions, while visiting flowers or resting on leaves, simulate those of the wasps under similar circumstances. So completely do these flies mimic the vespids that even experienced collectors are often deceived and pass them by as unwanted wasps.

In all the species of *Spilomyia* the anterior third to half of the wings is brown, yellowish brown, brownish yellow, or conspicuously darkened. In some species the dark costal band is of a lighter shade basally or in front. This coloration rather closely approximates the wing color of the vespids when their wings are folded, and when the flies vibrate their wings, as they often do while crawling about on flowers, the resemblance is even greater. While the yellow markings on the black thorax do not exactly match those on the thorax of wasps, they are so much like them that the differences would not be noted without careful examination.

There is nothing on the head of these flies that even vaguely approaches in appearance the long antennae of the wasps that they mimic. All species of *Spilomyia* have short antennae. However, the flies have developed the habit of resting on the four posterior legs and waving the front legs about in almost the same way that the vespids move their antennae. Indeed, the similarity of the fly is so great that the differences in movement can be discerned only by very close observation. In *Spilomyia* and other related flies that mimic wasps the front legs are black on the apical third or more, but they are rarely all black, at least the broad apex of the femora being usually of a reddish or yellow color.

It is in the coloration of the abdomen that the greatest resemblance to vespids occurs. The yellow and black bands of the flies closely resemble those found on certain vespids of the regions in which the flies occur. However, an examination of the species concerned will show that the banding of the flies is not an exact duplication of the banding of the wasps. A discussion of the species mimicked follows notes on the species recorded in the following pages.

When captured in a net the flies act very wasp-like. They buzz loudly and crawl about, stopping very frequently to press down the tip of the abdomen as though they would sting. If held in the fingers they buzz and go through the same stinging motion, repeating it many times while grasping at the fingers with the front feet, provided they are free. This same buzzing and depressing of the abdomen occurs, among at least some species, while they are crawling about on flowers.

Although members of the genus *Spilomyia* are common in wooded areas in the clearings, and around the edges of the woods, particularly where swampy areas occur, nothing is known about the biology of American species, but it seems certain that they live in decaying wood. In Europe larvae were found in a tree hole, but beyond this nothing is known.

Only the species occurring in the United States and Canada, of which there are 10, including the new form described from Arizona, are recorded in the present paper. The three species described from Mexico are included in the key on the basis of descriptions alone. No specimens of these have been recorded since the appearance of the original descriptions.

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***Spilomyia quadrifasciata* Say**

*Paragus quadrifasciatus* SAY, 1824, in Keating, Narrative of an expedition to  
... St. Peter's River ... under ... Long, vol. 2, app., p. 377; 1859, in LeConte,  
The complete writings of Thomas Say, vol. 1, p. 257.

*Psarus quadrifasciatus* WIEDEMANN, 1830, Aussereuropäische Zweiflügelige  
Insekten, vol. 2, p. 91.

*Myxtemyia quadrifasciata* MACQUART, 1834, Histoire naturelle des insectes,  
diptères, vol. 1, p. 491; 1842, Diptères exotiques, vol. 2, pt. 2, p. 18.

*Spilomyia quadrifasciata* WILLISTON, 1886, Synopsis of North American Syr-  
phidae, p. 248.

An easily recognized black species, the second abdominal segment with an arcuate yellow fascia situated chiefly on the anterior half of the segment and widening laterally, the posterior border black except laterally; third and fourth segments with yellow median fasciae, either of which may be very narrowly interrupted in the middle, the fourth segment with yellow posterior border.

This is the commonest and most widely distributed species. It occurs commonly on goldenrod during August and September.

Five males and one female, Tuxedo, New York, August 20 to 28, 1928 (Curran); female, Nyack, New York, August, 1883 (J. L. Zabrisky); female, Catskill Mountains, August 31, 1903; female, Sullivan County, New York; male, Lake George, New York, August 18, 1894 (Zabrisky); male, Arlington, New Jersey, August 26, 1918 (A. Nicolay); female, Leonia, New Jersey, September 16, 1936; male and two females, Delaware Water Gap, and female, Franconia, New Hampshire (Mrs. Slosson); female, Brookline, Massachusetts, October 3, 1928; four males and two females, Rockford, Illinois, August 27 and September 5, 1898, and two males, Price County, Wisconsin, August 28, 1907 (W. M. Wheeler); male, Dane County, Wisconsin, August 31, 1904 (G. M. Reed); male, Douglas County, Kansas (Curran collection, A.M.N.H.); five males and one female, Orillia, Ontario, Canada, August 10 to September 25, 1919-1921 (Curran); male, Aylmer, Quebec, Canada, August 31, 1924 (Curran).

In life *S. quadrifasciata* resembles several species of wasps belonging to the family Eumenidae.

### ***Spilomyia ephippium* Osten Sacken**

*Mixtemyia ephippium* OSTEN SACKEN, 1876, Bull. Buffalo Soc. Nat. Hist., vol. 3, p. 70; 1878, Catalogue of the . . . Diptera of North America, ed. 2, p. 254. WILLISTON, 1886, Synopsis of North American Syrphidae, p. 249.

I have not seen this species, described from Mexico. It closely resembles *quadrifasciata*, but the brown of the wings extends back to cover the basal cells.

### ***Spilomyia fusca* Loew**

LOEW, 1864, Berliner Ent. Zeitschr., p. 67. WILLISTON, 1886, Synopsis of North American Syrphidae, p. 246.

Very easily recognized by the wholly black first and second

abdominal segments; third segment with a median transverse stripe on each side and the apex pale; fourth segment with medianly interrupted median band and the broad apex pale. The markings vary from light yellow to whitish yellow.

Six males and six females, Tuxedo, New York, July 5 to August 1, 1928 (Curran); four males and two females, Delaware Water Gap (Mrs. Slosson); male and female, Lake George, New York, August 25, 1894 (A. Zabrisky); female, Ramsey, New Jersey, August 11, 1917; male and female, White Mountains, New Hampshire, and three females, Franconia, New Hampshire (Mrs. Slosson); male, Wilawana, Pennsylvania, July 10 (R. H. Crandall); female, Lake Toxaway, North Carolina (Mrs. Slosson); female, Valley of the Black Mountains, North Carolina, July 16, 1906 (W. Beutenmüller); three males and one female, Price County, Wisconsin, August 24 to 28, 1897 (W. M. Wheeler); male, Orillia, Ontario, September 5, 1920 (Curran).

*Spilomyia fusca* bears a close superficial resemblance to the white-faced hornet, *Dolichovespula maculata*, and the two are often seen on the same flowering plants. Both *fusca* and *hamifera* seem to prefer the flowers of certain shrubs and trees, and I have taken both species commonly on basswood and elder.

### ***Spilomyia hamifera* Loew**

LOEW, 1864, Berliner Ent. Zeitschr., p. 66 (Century V, no. 33). WILLISTON, 1886, Synopsis of North American Syrphidae, p. 247.

In *S. hamifera* the abdomen is chiefly orange, with the first segment and the broad base of the second dull black except laterally; the following black bands are narrow to linear, the median bands interrupted or indented, those on the third and fourth segments tapering laterally and not reaching the lateral margins. The front tibiae are practically all black.

Because of the reddish yellow coloration of the abdomen, *S. hamifera* is readily distinguished from other North American species, with the exception of *texana* Johnson. It is common on various kinds of flowering plants near woods, and is particularly attracted to linden, hawthorn, elderberry, and vibernum.

The species is represented in the American Museum collection by the following specimens: nine males and 12 females, Tuxedo, New York, June 26 to July 17, 1928 (Curran); male, Washington Heights, New York City, July 6, 1940 (Curran); female, Inwood

Park, New York City, May 30, 1941 (S. C. Harriot); Newfoundland, New Jersey, June 2, 1918 (A. Nicolay); Milltown, New Jersey, June 10 (J. A. Grossbeck); Ramapo Mountains, New York, August 12, 1935; Hummelstown, Pennsylvania, July 1, 1917 (J. N. Knull), from Curran collection.

In nature *S. hamifera* shows a strong resemblance to the light-colored queens of *Vespula rufa atropilosa* Sladen and *V. pennsylvanica* Saussure. Small specimens have a resemblance to workers of *V. rufa atropilosa*, and to some forms of *V. pennsylvanica*. However, comparison of the abdominal markings shows that there are conspicuous differences, and it is not possible to find an exact duplication of the color patterns of the flies and wasps. The actions of the flies are very similar to those of the wasps.

### ***Spilomyia texana* Johnson**

JOHNSON, 1921, Psyche, vol. 28, p. 57.

I have not seen this species, which closely resembles the preceding, but which can be readily separated by the mostly yellow front tibiae. It has been recorded only from Texas.

The remarks under *hamifera* regarding the resemblance of flies and wasps will probably apply to *texana*.

### ***Spilomyia longicornis* Loew**

LOEW, 1872, Berliner Ent. Zeitschr., p. 82 (Century X, no. 49). WILLISTON, 1886, Synopsis of North American Syrphidae, p. 245. TOWNSEND, 1895, Trans. Amer. Ent. Soc., vol. 22, p. 54.

This species is very similar to the preceding. The chief differentiating characters are discussed following the description of *crandalli*. In addition to the differences mentioned there it might be added that the front tibiae of *longicornis* are almost all black, the base being more or less reddish.

This is an eastern species, and it is frequently found in fair numbers on bloom of goldenrod and wild aster in August and September.

The following material is in the American Museum collection: one male and six females, Tuxedo, New York, July 17 to August 30, 1928 (Curran); male and female, Ramapo Mountains, New York, August 12, 1935; two males, Flushing, New York, August 31, 1933, and August 10, 1918; male, Nyack, New York, Septem-

ber 9, 1884 (J. L. Zabrisky); male, Watkins Glen, New York (Mrs. Slosson); two females, New York (Henry Edwards); female, Ramsey, New Jersey, September 15, 1917; female, Lakehurst, New Jersey, October 7, 1917; male and two females, Delaware Water Gap (Mrs. Slosson); female, Richmond, Virginia (Mrs. Slosson); two females, Valley of the Black Mountains, North Carolina, July 11 and August 24, 1906 (W. Beutenmüller); four males and two females, Rockford, Illinois, September 4 and 5, 1906 (W. M. Wheeler). Also before me is a specimen in R. H. Crandall's collection from St. Louis, Missouri, September 9, 1937.

In nature *S. longicornis* closely resembles the workers of *Vespula squamosa* Drury, and the actions of both the flies and wasps are usually very similar when they are visiting flowers. On both wild aster and goldenrod the flies appear to "hug" the flowers, and they may move about in a rather jerky manner, thus adding to the deception. Often when they have become settled on a flower they will move the abdomen up and down, thus simulating the expansion of the abdomen of the wasps.

#### *Spilomyia crandalli*, new species

Black, the second to fourth abdominal segments each with two entire yellowish fasciae; pleura with five yellow spots. Length, 13 to 16 mm.

MALE: Eyes with dark spots that tend to form a broad line posteriorly, each eye also with a dark border. Head black, the face, cheeks, and sides of the frontal triangle yellow; face with a broad median black stripe, ending just below the antennae; face and cheeks separated by irregular black stripe. Pollen grayish on the occiput and vertical triangle, white on the frontal triangle and face, the latter bare between the black stripe and eyes except above and below, the bare area with fine yellow pile. Occiput yellow pilose, with some coarser black hairs above; vertical triangle coarse black pilose. Antennae black, the third segment brown; second segment not so long as the second and third combined; arista reddish yellow.

Thorax black, the humeri, an adjacent subtriangular spot, a vitta extending from the posterior calli almost to the suture where it curves inward and is continued as a slender, silvery pollinose stripe and a pair of oblique stripes forming an inverted V in front of the scutellum, and a small spot at each end of the suture,

pale yellow; pleura with five large yellow spots, one above the front coxae, one on the mesopleura, sternopleura, and pteropleura, and one below the squamae. The mesonotum is thinly pollinose and has a slaty tinge, but the lateral vittae are bordered with dull black. Pile black, yellow on the pleura and dorsal yellow spots and on the scutellum. Scutellum blackish, with the free border very broadly yellow.

Wings hyaline, brown in front of the third vein, the brown extending narrowly into the apical half of the first basal cell and broadly into the narrow base of the apical cell. Squamae and halteres yellow.

Legs yellow, the coxae black, the posterior pair yellow externally, the front pair rarely mostly yellow; apical third or less of the front tibiae and their tarsi black; posterior femora with a very broad brown or black stripe on the posterior surface, which does not reach the base or apex, and rarely covers the full width of the femur; posterior four tarsi reddish yellow. Pile yellow, tawny on the front tarsi, black beneath the posterior femora. Spur on posterior femora strong; a second angulation is present about one-third of the distance between the spur and apex of the femora.

Abdomen dull black above, with yellow markings as follows: a spot on the side of the first segment, a transverse band extending across the anterior third of each of the following segments and expanding laterally to connect with the broad posterior band. The yellow bands are narrower than the black ones, and the dorsal ones are somewhat narrowed towards the middle. The pile is yellow on the base and sides of the abdomen, and on the yellow bands; there is also some yellowish pile basally on the third and fourth segments. Genitalia reddish, becoming brown basally; hair black. Venter shining black, the apices of the segments yellow; pile yellow.

**FEMALE:** Front dull brownish black, the sides broadly yellow below the ocelli; hair black; antennal tubercle shining black. Front tibiae blackish anteriorly for nearly half their length. Fifth abdominal segment yellow except at base, the hair coarse and black.

**TYPES:** Holotype, male, allotype, female, and paratypes, seven males and three females, Mt. Lemon, Arizona, September 5, 1939 (R. H. Crandall), in Museum collection and Crandall collection.

This species bears an extremely close resemblance to the eastern *S. longicornis* Loew, but the front is wider in the female, and the black frontal vitta is never reduced to a mere line above, as frequently happens in that species; also, there is no secondary "spur" on the posterior femora of *longicornis*. In *longicornis* the yellow spots on the middle of the pleura form a continuous band, and the yellow lateral vittae on the mesonotum continue inward behind the suture, only the inner ends being replaced by silvery pollen.

### ***Spilomyia interrupta* Williston**

WILLISTON, 1883, Proc. Amer. Phil. Soc., vol. 20, p. 327; 1886, Synopsis of North American Syrphidae, p. 246.

This species has the same general appearance as *S. longicornis* Loew but is readily separated by having all the median bands on the abdominal segments conspicuously interrupted in the middle. The broad yellow band crossing the pleura is continuous or at most narrowly interrupted at the sutures.

Three specimens of each sex (all from the American Museum collections) are before me from the following localities in California: male, Paradise Springs, September 30, 1922 (L. S. Slevin), from Curran collection; male, Carrville, Trinity County, June 8, 1934 (T. G. H. Aitken), male, Folsom, June 5, 1936 (B. E. White), and female, Nipinnawasse, September 5, 1938 (M. A. Cazier), from Cazier collection; female, Sierra Nevada, and female, "Calif.," from Henry Edwards collection.

I have not seen this species, nor *liturata* Williston, in nature, so do not know its actions. However, both species bear a strong resemblance to workers of *Vespula squamosa* Drury, and the remarks under *S. longicornis* might well apply to them.

### ***Spilomyia obscura* Coquillett**

COQUILLET, 1902, Canadian Ent., vol. 34, p. 195.

This species was described from the State of Chihuahua, Mexico, and I have not seen it. From the description it must be closely related to *interrupta* Williston, some specimens of which have the abdominal markings as described by Coquillett. However, the face is said to be yellow; *interrupta* has a black facial vitta. *S. obscura* also has the scutellum wholly black.

**Spilomyia liturata** Williston

WILLISTON, 1886, Synopsis of North American Syrphidae, p. 245.

*Spilomyia liturata* is extremely similar to *interrupta* Williston but is readily distinguished by the absence of a yellow spot on the pteropleura so that there is no broad pleural band. The other pale spots are the same as in *interrupta*. Also the yellow bands on the middle of the segments are only very narrowly interrupted.

The collection contains two specimens of each sex: male, Dubois, Wyoming, September 6, 1895 (W. M. Wheeler); male, Rock Creek, Colorado Springs, Colorado, August 19, 1937; female, Denver, Colorado, July 29, and female, Logan, Utah, August 5, 1933 (T. O. Thatcher).

The remarks under *interrupta* concerning action in nature also apply to this species.

**Spilomyia kahlII** Snow

SNOW, 1895, Kansas Univ. Quart., vol. 3, p. 245.

*Spilomyia xanthocauda* CURRAN, 1935, Amer. Mus. Novitates, no. 812, p. 6.

There is little doubt that *xanthocauda*, described from a female from Globe, Arizona, is the same as *kahlII* Snow, described from a male from the summit of Little Baldy Mountain, New Mexico. The type of *xanthocauda* differed in several respects from the description given by Snow, but a series of nine specimens, including two males and five females taken by Mr. R. H. Crandall, Huachuca Mountains, Arizona, September 14, 15, and 23, 1938, contains specimens that agree with Snow's description. A third male is from Santa Rita Railroad, Arizona, September 20, 1935 (F. H. Parker), and one female was collected by E. L. Bell, from Williams, Arizona, 6800 feet, August 8, 1934.

**Spilomyia pallipes** Bigot

BIGOT, 1883, Ann. Soc. Ent. France, ser. 6, vol. 3, p. 352.

I have not seen any species that agree with the description. Apparently the pleura are reddish yellow, as in *pleuralis* Williston. The reddish basal abdominal segment and wholly pale femora will separate *pallipes* from *pleuralis*. Described from "Mexico."

**Spilomyia pleuralis** Williston

WILLISTON, 1886, Synopsis of North American Syrphidae, p. 247.

I have not examined the type of this species, which is in the Museum of Comparative Zoölogy. It seems to belong with *pallipes*. The two can be distinguished as indicated under that species.

