

Reprinted from *University of Colorado Studies*, Vol. VI, No. 3,  
 Boulder, Colo., April, 1909.

## THE BEMBECID WASPS OF BOULDER COUNTY, COLORADO

By S. A. ROHWER

The Bembecids form a very distinct group of wasps, being easily recognized by the sessile abdomen; three cubital cells, the second receiving both recurrent nervures; the labrum exerted beyond the clypeus; the subtransverse head, and the subtle sculpture. Most of the Bembecids have very a wide range, but they are found more abundantly in the warmer parts of the temperate zone. In color they vary very much, as in the case of *Stizus godmani* Cam. The Colorado species were recently tabulated by S. A. Johnson and S. A. Rohwer in the *Entomological News* (October, 1908, pp. 373-80); but since that paper was written a few observations have been made which necessitate some changes, and the notes on the habits of *Bembex sayi* Cress. and *Stizus godmani* Cam. are of interest.

The Boulder County species may be separated as follows:

- |   |                                  |
|---|----------------------------------|
| Middle tibiae with two spurs at the apex; ocelli normal; (metathorax emarginate posteriorly; small species) . . . . .                                 | <b>Stizus godmani</b> Cam.       |
| Middle tibiae with one spur at the apex; anterior ocellus abnormal . . . . .  | 1                                |
| 1. Metathorax emarginate posteriorly; (abdomen banded with yellow; clypeus black) . . . . .   | <b>Bembidula ventralis</b> Say.  |
| Metathorax not emarginate posteriorly . . . . .   | 2                                |
| 2. Mesothorax above with two yellow lines; metathorax more or less yellow . . . . .   | 3                                |
| Mesothorax above black; metathorax black . . . . .  | 4                                |
| 3. Markings yellow; pleurae and pectus without black . . . . .  | <b>Steniolia duplicata</b> Prov. |
| Markings greenish-yellow; pleurae and pectus with black . . . . .   | <b>Bembex sayi</b> Cress.        |
| 4. First abdominal segment with two broad spots which nearly meet in the middle; scutellums black . . . . .   | <b>Bembex spinolae</b> Farg.     |
| First abdominal segment with four pale spots, the two middle ones smaller and farther posterior than the lateral ones; scutellums maculated . . . . . | <b>Steniolia obliqua</b> Cress.  |

### **Steniolia obliqua** Cresson

This species has been found at Ward, Colo., July, 1905, at flowers of *Gilia* by Professor T. D. A. Cockerell; and at Boulder, Colo., September 8, 1908 (S. A. Rohwer).

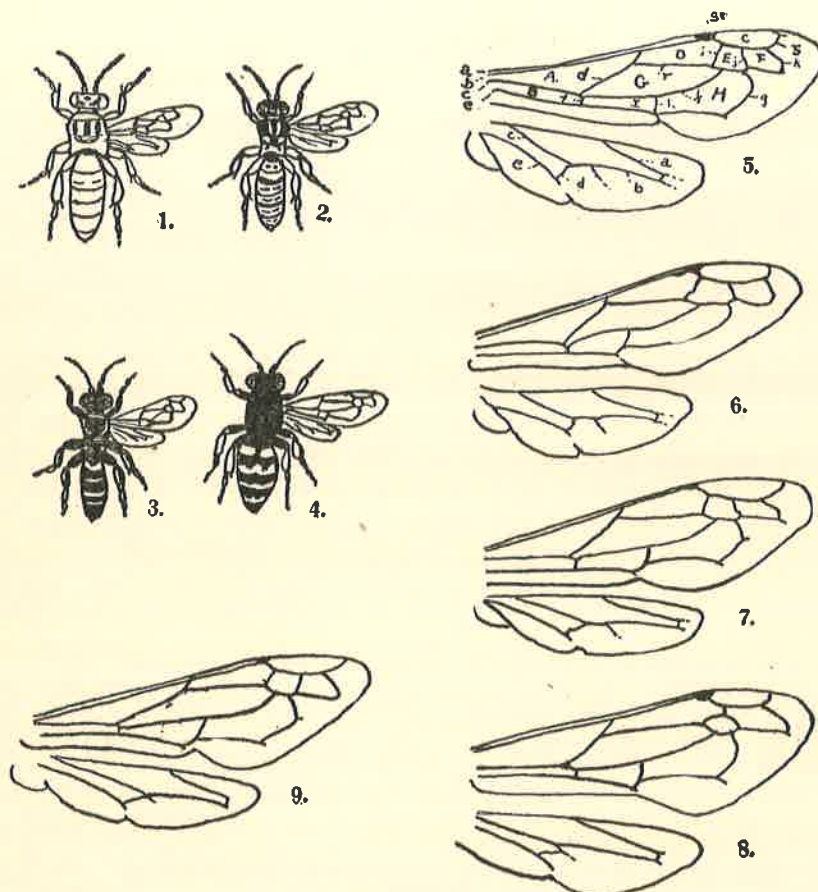


FIG. 1.—Habit drawing of *Stizus godmani flavus*. FIG. 2.—Habit drawing of *Stizus godmani lineatus*. FIG. 3.—Habit drawing of *Stizus godmani godmani*. FIG. 4.—Habit drawing of *Bembex spinolae*.

FIG. 5.—Wings of *Microbembex monodonta deltaensis*: *a*=costa; *b*=subcosta; *c*=externo-medial nervure; *d*=basal nervure; *e*=anal nervure; *f*=first recurrent nervure; *g*=second recurrent nervure; *i*, *j*, *h*= first, second and third transverse cubitus respectively; *l*=discoidal nervure; *r*=radius; *s*=cubitus; *t*=transverse median nervure; *st*=stigma; *A*=median cell; *B*=submedian cell; *C*=radical cell; *D*, *E*, *F*=first, second and third cubital cells respectively; *G*=first discoidal cell; *I*=second discoidal cell; *H*=third discoidal cell; hind wings: *a*=radial nervure; *b*=cubitus; *c*=median nervure; *d*=transverse median nervure; *e*=anal nervure.

FIG. 6.—Wings of *Bembex spinolae*. FIG. 7.—Wings of *Bembidula ventralis*. FIG. 8.—Wings of *Stizus godmani flavus*. FIG. 9.—Wings of *Steniolia obliqua*. Figs. 1-4 are enlarged about 2.75 times; the others are greatly enlarged.

**Steniolia duplicata** Provancher

This species is quite common at Boulder during the later part of the summer, usually flying around flowers of *Chrysothamnus graveolens*.

**Bembidula ventralis** Say

A female without any black on the tibiae was taken at Boulder, Colo., July 25, 1908 by S. A. Rohwer.

**Bembex sayi** Cresson

This species is not common, and when seen is hard to catch, because of its swift flight. Three females were taken in Boulder during the first of August by S. A. Rohwer. The bands on the mesonotum are very narrow in two of the specimens, and there is more black on the abdomen. This species does not nest in colonies as do *Bembex spinolae* Farg. and *Stizus godmani* Cam., but digs its nest off by itself. I found four nests during the season in the sandy soil along a creek west of Boulder. The nest is always closed on leaving. The wasp while near her nest appears very nervous, quite contrary to the actions of *Stizus godmani* Cam. There is no hesitation as to finding the nest, but the wasp will light, dig for a few seconds, then fly off, look around to see if anything is near, then return to the nest. Sometimes when inside she would close the opening even if she stayed a few moments. On August 4, 1908, I excavated a nest which was 70 cm. long and 1 cm. in diameter. It was 10 cm. below the surface, and leaving it at an angle of about 70°. The provisioning was not completed, but it contained a Tabanid larva, one specimen of *Tabanus fratellus* Will. and three Tachinids which have bright red eyes in life. This species has a short season of flight. It lasts only about three weeks, during the later part of July and first of August.

**Bembex spinolae** Farg.

This species was rather common during August of 1907, but only one specimen was taken in 1908. All the Boulder specimens have a small yellow spot below the tegulae.

***Stizus godmani* Cameron**

On July 31, 1908, I found a colony of *Stizi* nesting in a sandy creek bed in the northwest part of Boulder, Colorado. The creek is very near the contact of the Upper Austral and Transition Life Zones, and affords a very interesting locality in which to collect Fossorial Hymenoptera. The colony of *Stizi* was near the edge of the sandy area, quite close to a field of alfalfa. It was about 10 by 15 feet in area, and closely filled with nests; often the nests were but three or four inches apart. The conduct of the colony was very similar to that of *Bembex spinolae* as described by Peckham in his interesting book on the habits of wasps. Each time a wasp left its nest it would close it tightly with the loose gravelly sand, throwing the sand in much the same manner as it would if it were digging, then tamping it down with the four anterior legs, holding the posterior pair over the abdomen. On return there was no hesitation about finding the nest; but they would alight within a few inches of it, walk to the exact spot, and, uncovering the opening, disappear into the ground. I watched this colony a short time each day, and found their working hours on warm sunny days to be from about 9:30 in the forenoon, to 4 in the afternoon. Of course there were always a few who worked over time. On cloudy and rainy days little or no activity could be noticed about the colony. Two days it rained about noon, but shortly afterward it was bright and sunny; and by 3 o'clock the whole colony was very active. About August 5 I began to notice that the number of individuals was fewer than the day I first found the colony, and from then on they became noticeably fewer; and on August 10 not a single *Stizus* was seen around the nest.

The nest is about 8 cm. in diameter and 40 cm. long, ending below the surface about 5 inches (13 cm.). It is straight, and at an angle of about 90° with the surface. It is provisioned with small flies; none of the ones I obtained could be determined because they were without wings. None of the species of *Bembex* are known to remove the wings.

The most interesting thing to me in connection with the finding of this colony was that here in the same nesting site and within an area of about 150 square feet three apparently distinct forms were found nesting. These were *S. godmani* Cam., *S. lineatus* Cam. and *S. flavus* Cam.

(*S. flavus subalpinus* Ckll). The finding of these three different forms nesting together in the most friendly manner has led the writer to conclude that they all belong to the same species. To strengthen this conclusion no structural characters can be found to separate these widely different color forms. I have examined all my specimens carefully and have also sought for characters in the original descriptions, but without success. I would not, however, reduce these distinct color races to synonymy; on the other hand I would object to such an arrangement, because for one thing I do not consider the fact they nest together proves that they are the same, and again it is an undesirable practice to lump varieties which are easily separable. The finding them all assembled together in this one colony at Boulder does not indicate that they are always found together, and that in different localities they would not be found in different ecological areas. I would call these different forms varieties and separate them as follows:

- Insect mostly black; femora entirely black; mesonotum without yellow . . . . . **godmani godmani** Cam.
- Insect largely yellow or greenish-yellow; femora partly, usually entirely, yellow; mesonotum with some yellow. . . . . I
- 1. Pectus black; mesonotum black with two narrow, longitudinal lines; pleurae usually marked with black; markings usually greenish-yellow . . . **godmani lineatus** Cam.
- Pectus yellow; mesonotum with three black lines to rest yellow; pleurae without black; markings and color bright yellow . . . . . **godmani flavus** Cam.

**Stizus godmani godmani** (Cameron).

- Stizus godmani* Cam., *Biol. Centr. Am.* (Hym.), Pl. U, fig. 8, a, b, c.
- Stizus agilis* Cam. (not *S. agilis* Sm.), *ibid.*, p. 102.
- Stizus godmani* Fox, *Proc. Nat. Sci. Phil.* p. 267, June, 1895.
- Stizus (Stizus) godmani* Johnson and Roh., *Ent. N.*, p. 374, October, 1908.

A number of specimens of this variety collected at Las Cruces, N. M., at flowers of *Solidago canadensis* by C. H. T. Townsend and given to me by Professor T. D. A. Cockerell vary among themselves in size (the smallest being 7 mm., the largest 10 mm.) and the abundance of yellow markings. The clypeus is entirely black, as are also the metathoracic spines in one of them. The flagellum is entirely black in another. The Boulder specimens are on the average more robust than the New Mexico ones. The abdominal bands are broader; the clypeus is in some specimens entirely yellow while in others it is yellow at the sides only; the amount



of yellow on the legs also varies. In one female there is a small yellow spot on the pleurae.

**Stizus godmani lineatus** (Cameron).

*Stizus lineatus* Cam., *Biol. Centr. Am.* (Hym.), Vol. II, p. 108, Pl. V, fig. 7, a, b.

The amount of black on the abdomen varies. The amount of yellow on the pleurae varies; in one specimen the pleurae are entirely pale, while in another they are largely black. The pale lines on the mesonotum vary in strength, in one specimen they are very faint. There is one specimen with the lines on the mesonotum very small, and very dark. Although it has a larger number of characters in common with this variety it resembles very closely *godmani godmani*. The lines on the mesonotum are very faint, the pleura is mainly black, and the abdomen is as in *godmani godmani*.

**Stizus godmani flavus** (Cameron).

*Stizus flavus* Cam., *Biol. Centr. Am.* (Hym.), Vol. II, p. 103, Pl. V, fig. 9, a, b, c.

*Stizus flavus* Fox, *Proc. Acad. Nat. Sci. Phil.*, p. 268, June, 1895.

*Stizus flavus* var. *subalpinus* Ckll., *Proc. Dav. Acad. Nat. Sci.*, Vol. VII, p. 142, 1898

*Stizus subalpinus* Johnson and Roh., *Ent. N.*, p. 374, October, 1908.

The black is usually entirely absent in the Boulder specimens. The three basal joints of the flagellum are sometimes yellow.

The following table may show the relative abundance of the three forms at Boulder. It is made from the specimens which were collected July 31, 1908, at the nesting site spoken of above, by sweeping with a net at random during the warmest part of the day.

Name	Number of Specimens	
	♀	♂
<i>godmani godmani</i> . . . . .	8	1
<i>godmani lineatus</i> . . . . .	1	3
<i>godmani flavus</i> . . . . .	0	2

The finding of these three forms together and in the proportions given above suggests that they are Mendelian, and that *godmani flavus* is recessive while *godmani godmani* is dominant. It would be very interesting to obtain a large series from the same nest, and see if the different forms do exactly follow the Mendelian ratios. It is the writer's desire to carry on such experiments next season.