

## Small Carpenter Bees, *Ceratina* spp. (Insecta: Hymenoptera: Apidae: Xylocopinae)<sup>1</sup>

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### Introduction

In America north of Mexico, *Ceratina* (small carpenter bees) is one of two genera of the subfamily Xylocopinae, the other being *Xylocopa*, (large carpenter bees). Of the 21 species of *Ceratina* in America north of Mexico, only two are known to occur in Florida: *C. cockerelli* H.S. Smith and *C. dupla* Say. Mitchell (1962) described the subspecies *C. dupla floridanus* from Florida, but Daly (1973) synonymized it simply as a more densely punctate, brighter blue population of the typical eastern *C. dupla*.

### Distribution

*Ceratina cockerelli* is found throughout Florida and most of the southern coastal states from Texas to Georgia (Daly, 1973). Specimens have not been reported from Alabama or Mississippi, but probably occur there. *Ceratina dupla* is found throughout Florida as well as most of the eastern United States (Daly, 1973).

### Identification

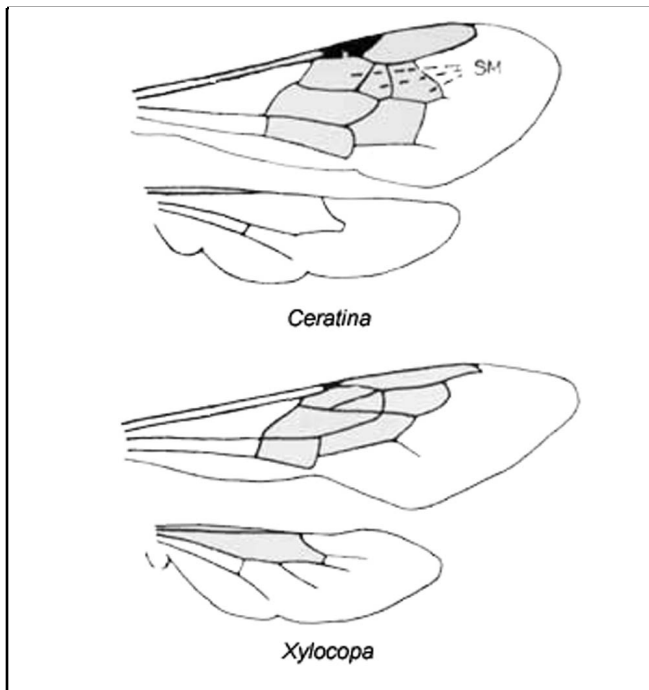
At various times carpenter bees have been placed in the families Anthophoridae, Xylocopidae, or Apidae. Hurd and Moure (1963) traced the history of the placement of these bees in various families; the most recent placement is within the Apidae (Krombein, 1967). This family is characterized, in part, by the jugal lobe of the hindwing being absent or shorter than the submedian cell and by the forewing having three submarginal cells. Within the family, carpenter bees are distinguished most easily by the triangular second submarginal cell, and by the lower margin of the eye almost in contact with the base of the mandible (i.e., the malar space is absent).

The easiest method of separating *Ceratina* from *Xylocopa* is by size: *Ceratina* are less than 8 mm in length whereas *Xylocopa* are 20 mm or larger. In addition, *Ceratina* has the second submarginal cell about as high as wide basally, whereas in *Xylocopa* it is about half as high as wide basally.

Small carpenter bees are black, bluish green, or blue, and often have yellowish or whitish markings

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**Figure 1.** Differences in wing venation between the small carpenter bees, *Ceratina* spp., and the large carpenter bees, *Xylocopa* spp. Credits: Division of Plant Industry

on the clypeus, pronotal lobes, and legs. The two Florida species of *Ceratina* may be separated as follows:

*C. cockerelli* (both sexes): body length 3 to 4.5 mm; head and thorax mostly black, abdomen black with brownish or tawny areas; head and scutum (dorsum of thorax) mostly polished, without punctures for the most part.

*C. dupla* (both sexes): body length 6 to 8 mm; body dark metallic blue; head and scutum with numerous distinct punctures, not polished.

## Biology

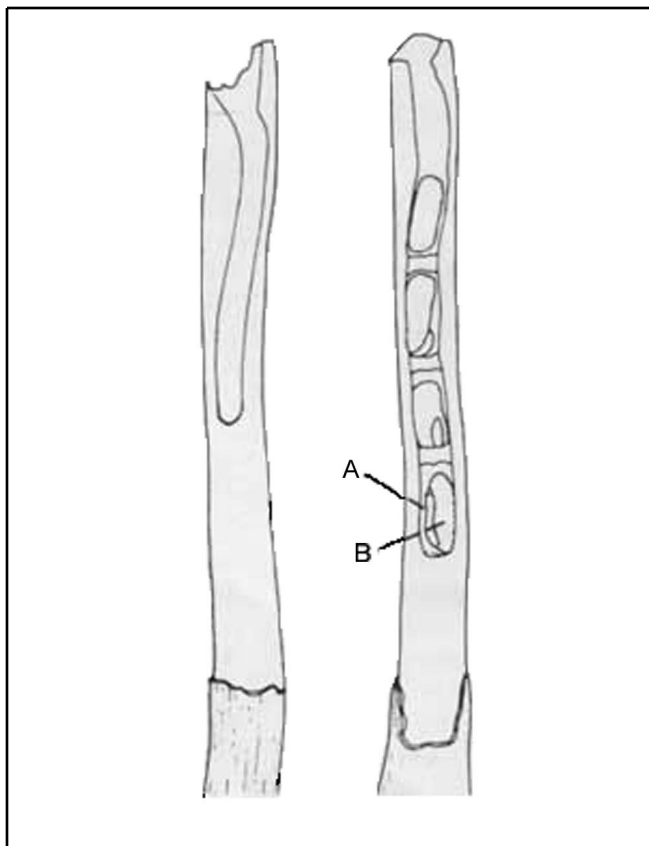
In general, members of this genus excavate nests with their mandibles in the pith of broken or burned plant twigs and stems. Females overwinter as adults in partially or completely excavated stems. In the spring, this resting place (hibernaculum) is modified into a brood nest by further excavation. Rau (1928) reported several nests of *C. calcarata* Robertson that ranged from 20 to 30 cm deep. Daly (1966) measured 126 nests of *C. dallatorreana* Friese which ranged from 3 to 19 cm deep. When a desired depth is reached, the female collects pollen and nectar, places this mixture at the base of the burrow, lays an egg on



**Figure 2.** Small carpenter bee, *Ceratina dupla* Say, dorsal and side views. Credits: Jeffrey Lotz, FDACS-DPI

the provision, and then caps off the cell with masticated plant material. Several cells are constructed end to end in each plant stem, the absolute number depending upon the depth to which the nest was excavated. Daly (1966) found a range of two to 12 cells (19 completed nests examined) for *C. dallatorreana*.

The female works at a single stem until it is filled with cells, each of which contains provisions and an egg or larva, except for the last cell near the nest entrance. Here the bee rests and, according to Malyshev (1936) and Daly (1966), presumably defends her nest from intruders. The female bee remains with the nest until her progeny emerge. Since the nest has been under construction for some time, the oldest progeny (at the base of the nest) mature and begin to gnaw their way out before the others above them are ready. This poses a special problem



**Figure 3.** Nest diagrams of the small carpenter bees, *Ceratina* spp. Left: overwintering nest (hibernaculum); Right: active brood nest with (A) bee larva and (B) provisions. Credits: Division of Plant Industry

because the bees do not emerge laterally through the side of the stem, but vertically through all the other cells. Rau described this process thoroughly for *C. calcarata* (1928). Essentially the oldest bee chewed apart the cell cap above and packed it at the base of its own cell. If the bee above was not mature it was carefully moved down to rest on the new "floor." If the bee above was mature, the eldest passed it by and worked on the cell cap above, passing the pithy material to the younger bee or bees beneath. These bees packed the material at the base of the nest, moving and adjusting any pupae which remained. Thus the mature bees at the base of the nest gained freedom by "... a process of displacement, gradually shifting the material behind them as they make their way to the top" (Rau, 1928: 390). The process observed by Rau took eight days for the eldest bees to make their way to the entrance; several days later all the bees emerged.

Special biological references to the *Ceratina* occurring in Florida are scarce. Extensive flower

visitation records were given by Mitchell (1962) and Daly (1973). The only biological record for *C. cockerelli* was given by Daly (1973) who cited Sage (in litt.) as reporting nests "... in dead, cut stems of sea-oats, *Uniola paniculata* L., on the beach of Mustang Island, Texas." References to *C. dupla* are not in abundance, but Daly (1973) cited what was known at that time. The more important papers, though wholly inadequate, are Ashmead (1894), Comstock and Comstock (1895), and Graenicher (1905).

### Economic Importance

Unlike their larger relatives in the genus *Xylocopa*, the small carpenter bees in the genus *Ceratina* are not known to be of economic importance.

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