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## Rediscovery of *Cicindela scabrosa floridana* Cartwright (Coleoptera: Cicindelidae) and its elevation to species level

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Rediscovery of *Cicindela scabrosa floridana* Cartwright (Coleoptera:  
Cicindelidae) and its elevation to species level

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Rediscovery of *Cicindela scabrosa floridana* Cartwright (Coleoptera: Cicindelidae) and its elevation to species level

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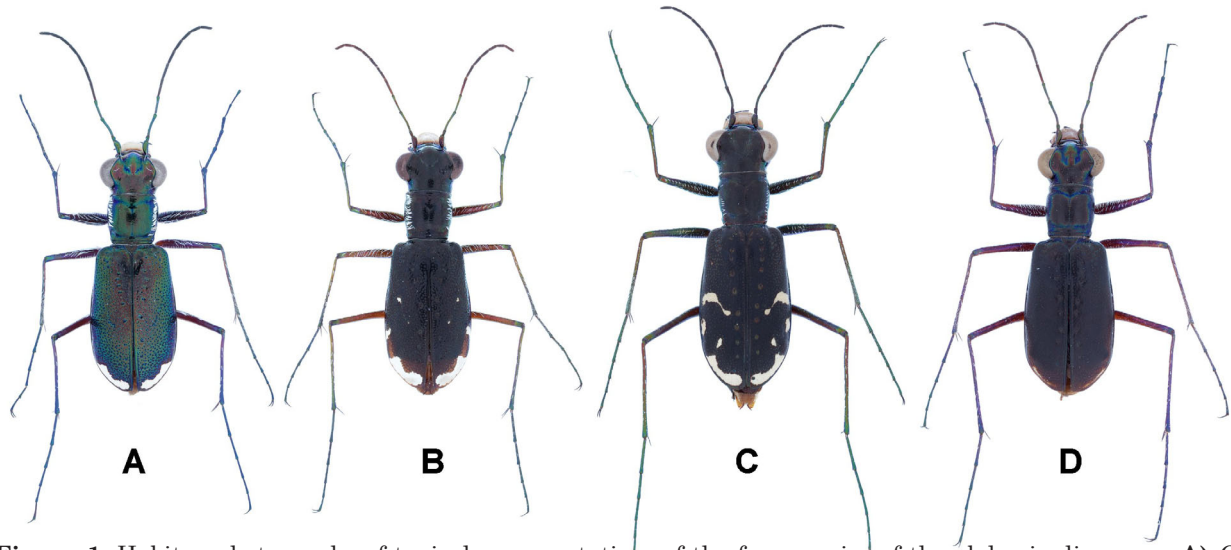
**Abstract.** First discovered in 1934 and described as a variety of *Cicindela abdominalis* Fabricius (Coleoptera: Cicindelidae), the form *floridana*, to our knowledge, has not been recollected until we discovered it in 2007, south of the presumed type locality. From our examination of the type specimen, eight paratypes and 40 specimens from the new locality and additional study, we reinterpreted its status to be a full species. This interpretation is based on distinctive and consistent differences from the closely related *Cicindelidia scabrosa* (Schaupp). These differences include morphology (maculation, color and elytral microsculpture), distribution, habitat, and seasonality. We present here a more detailed description of this species within the genus *Cicindelidia* Rivalier, following Rivalier and Wiesner becoming *Cicindelidia floridana* (Cartwright) **new combination**.

## Introduction

Oscar L. Cartwright (1939) described *Cicindela abdominalis* var. *floridana* from a series of 21 specimens collected by Frank N. Young in Miami, Florida in August of 1934. The description consisted of a four line paragraph which distinguished this form by the “shining green color of the head, thorax and abdomen, the latter with purplish reflections posteriorly at the sides” and “strong deep punctures and fovea of the elytra” (Cartwright 1939). Choate (1984) reviewed the abdominalis group, describing a new species, *Cicindela highlandensis* Choate, and elevating *Cicindela scabrosa* Schaupp to species level. In that paper he created “*C. s. floridana*”, with no mention of types and no other discussion of “*floridana*” except for his section on variation in *C. scabrosa* that “some specimens are quite greenish (i.e. *floridana*)” which he considered to be a possible sign of recent adult emergence. Apparently Choate considered var. *floridana* as a subspecies of *C. scabrosa* because both had similar sculpturing on the elytra and dense flattened setae on the pronotum. However, Choate’s 2003 book on Florida and Eastern U.S. tiger beetles does not mention *C. s. floridana*, possibly because of the paucity of specimens and the assumption of most researchers that it was extinct. Pearson et al. (2006) referred to *C. s. floridana* in their treatment of *C. scabrosa* as “an isolated population in the Miami area has been considered as a subspecies, *C. scabrosa floridana* (Cartwright), which is smaller than the nominate form and distinctly green above.” They indicated this population had not been observed for more than 50 years and was probably extinct because of habitat destruction and urbanization.

## Search and rediscovery

The exact type locality for var. *floridana* is problematic. Cartwright (1939) gives the locality as Miami, Florida based on Young’s label. In the 1980s, R. L. Huber, in an attempt to locate this form



**Figure 1.** Habitus photographs of typical representatives of the four species of the abdominalis group. **A)** *C. floridana*. **B)** *C. scabrosa*. **C)** *C. abdominalis*. **D)** *C. highlandensis*.

contacted Young who told him the specimens were collected in the vicinity of Gratigny Road while he was studying land snails in the sandy hammocks. In May of 1989 Huber and Brzoska visited the area around Gratigny Road and found no appropriate habitat. Knisley also contacted Young in the early 1990s and learned that the specimens were taken in the vicinity of Barry College. These two sites are only a few miles apart in the Hialeah/North Miami area. Finally, in September of 2007, Jeff Slotten, while working with David Fine on a butterfly survey at a pine rockland site in the Richmond Heights area of Miami, rediscovered a population that matched the *C. s. floridana* specimens.

The discovery of this new population provided an additional series of specimens to compare with Young's specimens of *C. s. floridana* and specimens of *C. scabrosa* from various sites in Florida. Our study focused on the characters of maculation, color, size, and setae that have been used to separate species in the abdominalis group. In addition our field work also found differences in distribution, habitat, and seasonality between *C. scabrosa* and *C. s. floridana* that were sufficient for us to elevate *C. floridana* to a full species. We follow the classification of Rivalier (1954) and Wiesner (1992) and place this species in the genus *Cicindelidia* Rivalier.

### ***Cicindelidia floridana* (Cartwright), New Status, New Combination**

(Fig. 1-3, Table 1)

*Cicindela abdominalis* var. *floridana* Cartwright 1939: 364

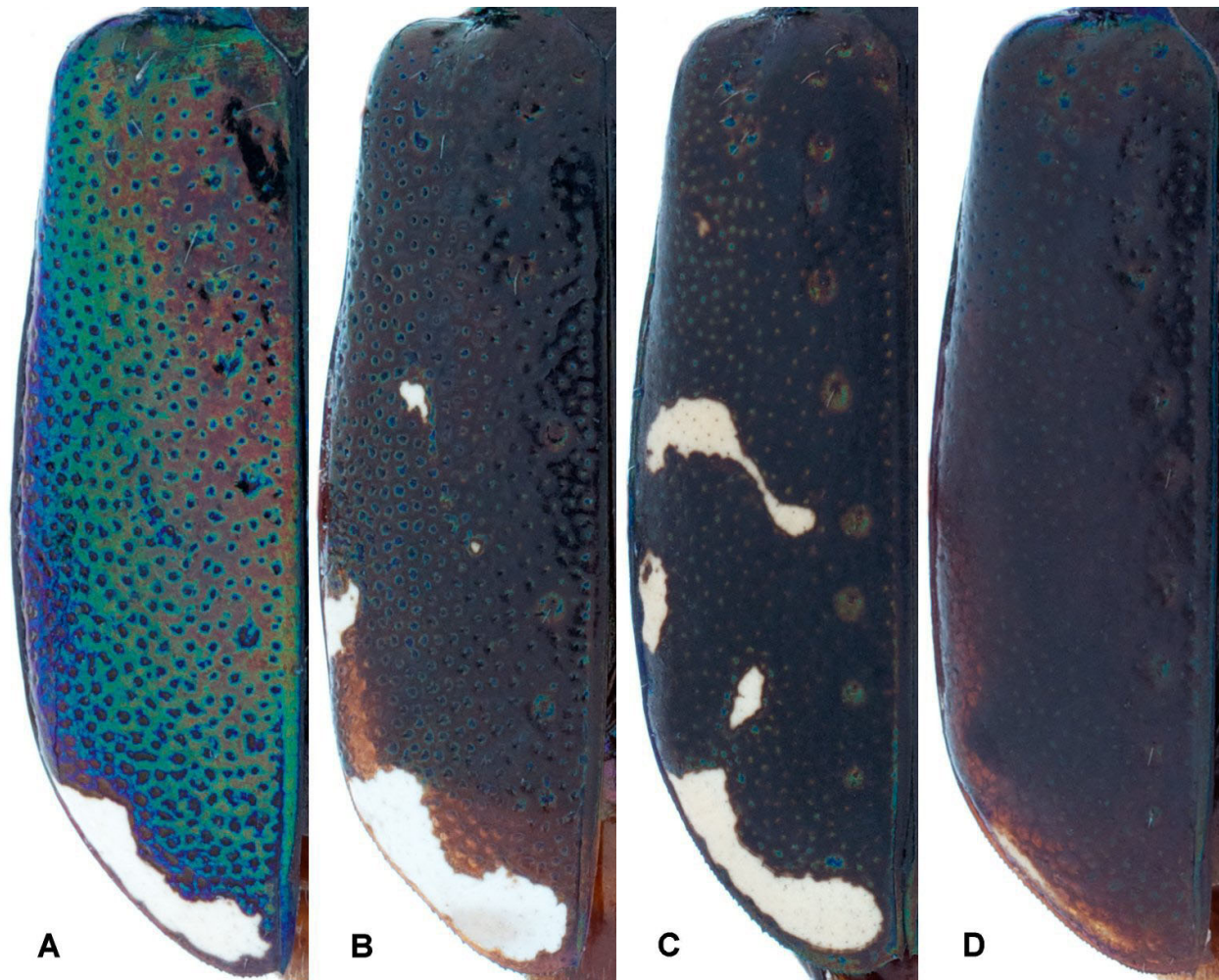
*Cicindela scabrosa floridana* Cartwright: Choate 1984: 76

**Description.** Cartwright's original description of *Cicindela abdominalis* var. *floridana* consisted of two paragraphs, as follows:

"Differs from *abdominalis* in the shining green color of head, thorax and elytra, the later with purplish reflections posteriorly at the sides, and in the strong deep punctures and fovea of the elytra. The green color will also separate this variety from the species *scabrosa* Schaupp."

**Material examined.** Holotype male and six paratypes (USNM), one paratype (FSCA), one paratype (Snow Entomol. Museum, Univ. of Kansas).

Forty additional specimens from the study site will be deposited at Florida State collection of Arthropods, Gainesville, FL; The Carnegie Museum of Natural History, Pittsburg, PA; University of Kansas Entomological Museum, Lawrence, KS; and the private collections of the authors.



**Figure 2.** Comparison of elytra of the four species of the abdominalis group, left to right. **A)** *C. floridana*. **B)** *C. scabrosa*. **C)** *C. abdominalis*. **D)** *C. highlandensis*. Note the separate post median marginal spot in *C. scabrosa* and *C. abdominalis*.

**Redescription. General habitus.** Body small (6.5- 8.2 mm males, 7.4- 9.0 mm females), elytral maculation reduced to apical lunule confined to edge. Dorsal coloration shiny metallic green, with some individuals showing a cuprous wash. Ventral surface metallic blue; abdomen rufous.

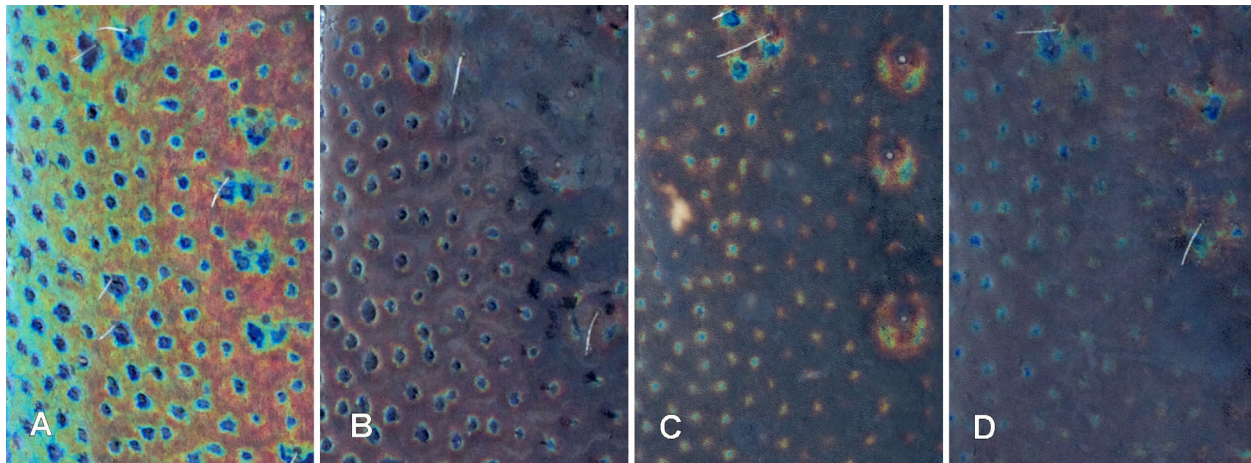
**Head.** Labrum long, white, edentate, slightly flattened anteriorly, with usually 6, rarely 4 submarginal setae. Clypeus and gena glabrous with purple reflection. Frons glabrous (except for two pairs of supraorbital setae), faintly striated, purple reflection laterally. Mandibles with four teeth, anterior third dark brown/black, posterior two-thirds testaceous, white laterally. Antennal segments 1-4 metallic green, 5-11 testaceous. Segment 1, widened anteriorly with 1 subapical sensory seta; segment 2 small, glabrous; segments 3 and 4 thin with apical and lateral setae; segments 5-11 covered with dense tomentose setae.

**Thorax.** Pronotum slightly tapering to posterior, v-shaped impression anteriorly, 40-50 wide flattened setae laterally, disk smooth, ventral surface smooth with dense setae around coxal margins. Mesosternum glabrous, mesepimeron covered with dense decumbent setae. Metasternum with scattered setae on anterior margin; metepisternum with dense decumbent setae.

**Abdomen.** Rufous, sternites 1-3 with dense lateral decumbent setae.

**Legs.** Testaceous to yellow, with metallic green reflection.

**Elytra.** Deeply punctured throughout with subsutural foveae. Apex with microserrations and short medial spine. Maculation includes only a thin apical lunule confined to distal and lateral apex.



**Figure 3.** Close view of elytra showing differences in color and surface sculpturing of the four species of the abdominalis group. **A)** *C. floridana*. **B)** *C. scabrosa*. **C)** *C. abdominalis*. **D)** *C. highlandensis*.

**English name.** Miami tiger beetle

**Discussion. Abdominalis Group.** Choate (1984) gave a detailed description of *C. scabrosa*. The identification key in Pearson et al. (2006) will have *C. floridana* keying to *C. scabrosa*, although couplet 8, dealing with the number of labral setae, may cause some problems as this character is variable in both forms. Of the four small sand dwelling *Cicindelidia* species with red venters, the “abdominalis group” [*C. abdominalis* Fabricius (Fig. 1c), *C. highlandensis* (Fig. 1d), *C. scabrosa* (Fig. 1b) and *C. floridana* (Fig. 1a)], *C. floridana* is most similar to *C. scabrosa* but can be separated by the key and the discussion below.

**Maculation.** *Cicindelidia scabrosa* (Fig. 2b) is more maculated than *C. floridana* (Fig. 2a). All specimens of *C. scabrosa* from seven Florida sites have a post median marginal spot anterior to the apical lunule (Figs. 1, 2) while only 3 of 43 *C. floridana* have this maculation and in two of these, it is connected to the apical lunule (Table 1). The apical lunule is thin in 33 of 43 *C. floridana* and medium or thick in 86 of 101 *C. scabrosa* (Fig. 2). Thirty-seven specimens of *C. scabrosa* have a vestige of a middle band, typically one or two small dots (Fig. 2b), but no *C. floridana* (Fig. 2a) exhibited this character. A microscopic examination of the elytra at 25 x showed that *C. floridana* (Fig. 3a) has distinctively deeper elytral punctures than *C. scabrosa* (Fig. 3b), *C. abdominalis* (Fig. 3c) or *C. highlandensis* (Fig. 3d).

**Color.** Although color is often variable and problematic as a sole diagnostic trait in tiger beetles, it is useful when combined with other factors. All specimens of *C. floridana* we examined were bright metallic

**Table 1.** Comparison of maculation characters for *C. floridana* and seven populations of *C. scabrosa*. \*In two of these specimens, the post median marginal spot is connected to the apical lunule.

Species	Site (County)	No. in sample	No. with post median marginal spot	Size of apical lunule			No. with vestigial middle band
				Thin	Medium	Thick	
<i>C. scabrosa</i>	Dixie	23	23	1	16	6	8
<i>C. scabrosa</i>	Levy	12	12	0	8	4	5
<i>C. scabrosa</i>	Baker	2	2	2	0	0	0
<i>C. scabrosa</i>	Highlands	31	31	5	23	3	14
<i>C. scabrosa</i>	Collier	13	13	1	10	2	7
<i>C. scabrosa</i>	Brevard	3	3	0	3	0	0
<i>C. scabrosa</i>	Lee	17	17	6	9	2	3
	<b>TOTALS</b>	<b>101</b>	<b>101</b>	<b>15</b>	<b>69</b>	<b>17</b>	<b>37</b>
<i>C. floridana</i>	Miami	43	3*	33	8	0	0



**Figure 4.** Miami pine rockland habitat at Miami site with an extant population of *C. floridana* showing small open patches among dense vegetation.

green dorsally, with purplish lateral highlights. Some freshly collected individuals showed a bronze cast and appeared almost black in the field (possibly teneral individuals), but these become typically green when pinned and dried. Most individuals of *C. scabrosa* are metallic black dorsally, but a few have the head and pronotum green. The leg color of *C. floridana* is lighter and more yellow than most specimens of *C. scabrosa*.

**Distribution.** *Cicindelidia scabrosa* is widespread in peninsular Florida and extends south to Collier County on the west side of the state. The intervening wet habitat of the Everglades of South-central Florida from Lake Okeechobee to Florida Bay limits suitable habitat. On the east side of the state it is found as far south as St. Lucie County. There is an older record for Ft. Lauderdale in Broward County, but extensive survey of this area failed to find any specimens. The known range of *C. floridana* includes only the type locality (now apparently urbanized) and the three new sites within the Richmond Heights area of Miami. We do not reveal the exact location of these sites because of the extreme rarity of this beetle.

**Habitat.** *Cicindelidia scabrosa* is found in sand pine scrub, a xeromorphic plant community dominated by evergreen oaks and often with an open canopy of sand pine (*Pinus clausa* [(Chapm. ex Engelm.) Vasey ex Sarg.]) on well-drained, infertile, sandy soils. *Cicindelidia floridana* is found in small sandy pockets of pine rockland habitat (Fig. 4), which in Florida is confined to Miami-Dade County and parts of the Keys. Pine rockland is a savanna-like forest on limestone outcrops with a single canopy species, Florida slash



pine (*Pinus elliotti* var. *densa* Little and Dorman), and a diverse understory of scrubs and herbs. This habitat is maintained by periodic fire.

**Seasonality.** Adults of *C. scabrosa* are active from late spring to mid-summer throughout its range, with a few individuals found into August while *C. floridana* adults have been observed every month from early May through mid-October. This prolonged adult activity period suggests there is either continual emergence or two emergence periods.

**Continuing Studies.** The results of surveys to date at many potential scrub and pine rockland sites in Miami-Dade, Broward, and Palm Beach Counties suggest *C. floridana* is rare and a likely candidate for endangered status by the U. S. Fish and Wildlife Service. Studies of distribution and abundance, biology, and habitat of *C. floridana* are ongoing and will be presented in a separate paper.

### Key to the abdominalis group of tiger beetles

Using the Key to the Species of Common Tiger Beetles (*Cicindela*) in Pearson et al. (2006) all four species of abdominalis group will key to couplet 7 and can be separated by the following key.

- |      |   |  |
|------|---|--|
| 1.   | Elytral surface covered with deep punctures, pronotum with dense decumbent setae*, usually with 6 labral setae .....  | <b>2</b>                                 |
| —    | Elytral surface (excluding presutural foveae) relatively smooth, with shallow punctures, pronotum glabrous or with fine pronotal setae, usually with 4 pronotal setae ..... | <b>3</b>                                 |
| 2(1) | Elytra black, with a post median marginal spot, usually with a vestige of a middle band, restricted to peninsular FL. north of Miami-Dade County .....                      | <b><i>C. scabrosa</i> (Schaupp)</b>      |
| —    | Elytra green or bronze-green, rarely with a post median marginal spot, and without evidence of a middle band, restricted to Miami-Dade County, FL .....                     | <b><i>C. floridana</i> (Cartwright)</b>  |
| 3(1) | Pronotum, and mes- and metepisternum glabrous, restricted to Polk and Highlands Counties, FL .....  | <b><i>C. highlandensis</i> (Choate)</b>  |
| —    | Pronotum with fine decumbent setae, and mes- and metepisternum with decumbent setae .....   | <b><i>C. abdominalis</i> (Fabricius)</b> |

\* Old specimens may have the setae rubbed off and the presence of setal punctures should be checked.

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