

# INSECTA MUNDI

A Journal of World Insect Systematics

---

0051

The genus *Cotinis* Burmeister in the eastern United States,  
with description of a new species from the Florida Keys,  
including a checklist of the genus  
(Coleoptera: Scarabaeidae: Cetoniinae)

Robert E. Woodruff  
Florida State Collection of Arthropods  
P.O. Box 147100  
Gainesville, FL 32614-7100

Date of Issue: December 5, 2008

Robert E. Woodruff

The genus *Cotinis* Burmeister in the eastern United States, with description of a new species from the Florida Keys, including a checklist of the genus  
(Coleoptera: Scarabaeidae: Cetoniinae)  
Insecta Mundi 0051: 1-13

**Published in 2008 by**

Center for Systematic Entomology, Inc.  
P. O. Box 141874  
Gainesville, FL 32614-1874 U. S. A.  
<http://www.centerforsystematicentomology.org/>

**Insecta Mundi** is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod taxon. Manuscripts considered for publication include, but are not limited to, systematic or taxonomic studies, revisions, nomenclatural changes, faunal studies, book reviews, phylogenetic analyses, biological or behavioral studies, etc. **Insecta Mundi** is widely distributed, and referenced or abstracted by several sources including the Zoological Record, CAB Abstracts, etc.

As of 2007, **Insecta Mundi** is published irregularly throughout the year, not as quarterly issues. As manuscripts are completed they are published and given an individual number. Manuscripts must be peer reviewed prior to submission, after which they are again reviewed by the editorial board to insure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

**Managing editor:** Paul E. Skelley, e-mail: [insectamundi@gmail.com](mailto:insectamundi@gmail.com)

**Production editor:** Michael C. Thomas, e-mail: [insectamundi@gmail.com](mailto:insectamundi@gmail.com)

**Editorial board:** J. H. Frank, M. J. Paulsen

**Printed copies deposited in libraries of:**

CSIRO, Canberra, ACT, Australia  
Museu de Zoologia, São Paulo, Brazil  
Agriculture and Agrifood Canada, Ottawa, Ontario, Canada  
The Natural History Museum, London, England  
Muzeum I Instytut Zoologii Pan, Warsaw, Poland  
National Taiwan University, Taipei, Taiwan  
California Academy of Sciences, San Francisco, CA, USA  
Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA  
Field Museum of Natural History, Chicago, IL, USA  
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA

**Electronic copies in PDF format:**

Printed CD mailed to all members at end of year.  
Florida Center for Library Automation: [purl.fcla.edu/fcla/insectamundi](http://purl.fcla.edu/fcla/insectamundi)  
University of Nebraska-Lincoln, Digital Commons: <http://digitalcommons.unl.edu/insectamundi/>

**Author instructions** available on the Insecta Mundi page at:

<http://www.centerforsystematicentomology.org/insectamundi/>

|              |                |
|--------------|----------------|
| Printed Copy | ISSN 0749-6737 |
| On-Line      | ISSN 1942-1354 |
| CD-ROM       | ISSN 1942-1362 |

The genus *Cotinis* Burmeister in the eastern United States,  
with description of a new species from the Florida Keys,  
including a checklist of the genus  
(Coleoptera: Scarabaeidae: Cetoniinae)

Robert E. Woodruff  
Florida State Collection of Arthropods  
P.O. Box 147100  
Gainesville, FL 32614-7100  
bobsgems@aol.com

**Abstract.** In the eastern United States, the genus *Cotinis* Burmeister previously contained only *C. nitida* (L.), the common economic pest known as the “Green June Beetle”. A new species from the Florida Keys, *Cotinis aliena*, is here described and illustrated. A checklist is provided for the genus, which includes 27 valid New World species, and 44 synonyms.

**Introduction**

The most recent revision of the entire genus is 42 years old (Goodrich 1966), in which 19 species in 2 subgenera were recognized. Subsequently, Deloya and Ratcliffe (1988) treated the 15 Mexican species, including 3 new species. Other isolated new species were described from Mexico by Deloya (1995), Delgado (1998), Deloya, Ibañez-Bernal, and Nogueira (2000), and from Panama by Antoine (2007). With the new species described herein, the genus *Cotinis* now includes 27 species.

**Genus *Cotinis* Burmeister, 1842**

**Type species.** *Gymnetis mutabilis* Gory and Percheron (1833: 334), by subsequent designation of Casey (1915: 277). The name *Cotinis* was synonymized under *Gymnetis* MacLeay by Martinez (1949), but Goodrich (1964) successfully petitioned the International Commission on Zoological Nomenclature to conserve (under plenary powers) the names *Cotinis* and *Gymnetis*, as defined by Burmeister (1842) and in common usage for over a century.

**Subgenera.** The genus *Cotinis* contains 3 subgenera: The typical subgenus *Cotinis* Burmeister contains the bulk of species, with the subgenus *Criniflava* Goodrich (1966: 566) containing 2 species, and the subgenus *Liberocera* Deloya and Ratcliffe (1988: 39) a single species.

**Generic Diagnosis.** *Cotinis* (Fig. 1, 4, 32) is a member of the tribe Gymnetini. Within the tribe, *Cotinis* is unique in possessing a median, upturned, lobiform process on the anterior margin of the clypeus (Fig. 9-12) in both sexes. The head possesses a central, horn-like, frontal process, extending from the vertex toward the clypeus (Fig. 9, 11). Species may be shiny or matte, and green to black, but they all lack dorsal scales (found in the related genus *Balsameda* Thompson). Species in the similar genus *Gymnetis* lack the clypeal process, and often have bright color patterns.

Species-level characters include size and shape of the clypeal process; the extent, size, and amount of fusion of the frontal process; body color, sculpture, and vestiture; anterior tibial dentition (usually bidentate or tridentate); size and shape of the male genitalia (in a few species the internal sac is useful); and pygidial color and sculpture. There is little external sexual dimorphism. However, in some species, the last abdominal sternite is punctate over its entire surface in females, smooth medially in males; in a few species (including *C. aliena*) anterior tibiae are bidentate in males and tridentate in females (wear may affect the teeth).

**Variation.** Many species within the genus *Cotinis* are extremely uniform in appearance, but others show considerable variation in size, color, vestiture, punctures, and clypeal processes. Variation is espe-

cially noticeable for *C. nitida* (L.) and *C. mutabilis* (Gory and Percheron), and it caused Goodrich to synonymize all of the 9 species and 10 subspecies described by Casey (1915), as well as many others.

***Cotinis aliena* Woodruff, new species**

(Fig. 1, 2, 5, 6, 9, 10, 13, 14, 17-28)

**Holotype male.** FLORIDA: Monroe County, Islamorada, Junction US Rt. 1 and Jerome St., Ekblom Nursery, VII-VIII-1976, Ekblom Family. Deposited in Florida State Collection of Arthropods.

**Diagnosis** (habitus Fig. 1). Medium sized (L. 20.0 mm, W. 11.5 mm), typical member of the genus *Cotinis*. Entire dorsum and venter bright shiny, metallic green, except pygidium, which is bicolored orange and green. Elytron with 2 noticeable discal costae coalescing near posterior declivity, apically truncate, sutural apex not prolonged into a sharp tooth. Punctuation not coarse nor deep, but readily visible to naked eye. Clypeal process triangular, upturned vertically; frontal process free for part of length and not extending to clypeal process.

**Head** (Fig. 9-10, 18, 21-25). Clypeus quadrate, corners rounded, slightly indented below clypeal process, margin not raised. Process or tooth median, triangular in shape, tip rounded, width about one-third of clypeal width, produced upward nearly vertical (Fig. 18), not expanded apically. Head surface finely, shallowly punctate, with central depression margined by raised carinae above eye until clypeus. Central depression containing a narrow frontal process, projecting slightly more than half head length, free beneath for one-fourth its length, narrowing near rounded tip, surface impunctate basally, with few scattered, shallow punctures medially. Process margined by long, fine, anteriorly curved, golden setae in depression. Antennae 10-segmented, club oval, 3-segmented, slightly longer than eye width, lamellae subequal to previous 6 segments, scape with 7 long, fine setae apically. Eye emarginate dorsally for one-third its width, with a fringe of fine, long setae posteriorly.

**Pronotum** (Fig. 1). With few light punctures centrally, punctures coalescing at sides. Marginal line (or bead) well defined laterally, but absent posteriorly and anteriorly. Anteromedial area slightly prolonged and raised into low conical projection. Medial line (or bead) shallowly depressed in posterior half, cover for scutellum depressed slightly at apex. Metepimeron large, convex, dorsally visible, filling space between posterior pronotal angles and elytra. Pronotum projecting anteriorly into a triangular area (behind eye), visible from above, margined with carinae, creating appearance that pronotum has sharp anterolateral angles Fig. 22-25).

**Elytra** (Fig. 1). Glabrous, flattened, with alternate intervals carinate, surface noticeably punctate. Sutural carina less prominent than 2 central ones, terminating in slight projection (not tooth-like as in *C. nitida*), central 2 carinae obvious, terminating posteriorly by fusing at the apical declivity and tumosity, middle carina curved to join lateral one. Elytral termination nearly quadrate.

**Pygidium** (Fig. 14). Triangular, apex rounded, surface noticeably strigose horizontally throughout, heaviest at base, margined completely. Color basically green, blending to irregular triangular orange area near apex, surface glabrous, without setae on margin.

**Legs** (Fig. 13). All legs, tarsal segments, and tarsal claws similar in color (as dorsum). Anterior tibia bidentate, with rounded area where 3rd tooth would be (as on female), dorsally with 2 parallel carinae for entire length, anterior tooth sharp, projecting forward. Single terminal spine sharp (as in other tibiae), projecting forward, length subequal to anterior tooth.

Meso- and metatibiae similar, with notch (transverse carina) at posterior third, sharper and slightly better developed in metatibiae. Posterior marginal fringe of long, contiguous, yellow-red setae for entire tibial length. Both apical spurs long, inner about length of first 2 tarsal segments, outer slightly shorter.

Basal tarsomere short, barely half length of second, 2-4 subequal in form and length, 5th longer, slender, terminating in 2 large, fine, sharp, curved claws without teeth or carinae, about length of tarsomeres 2 and 3.

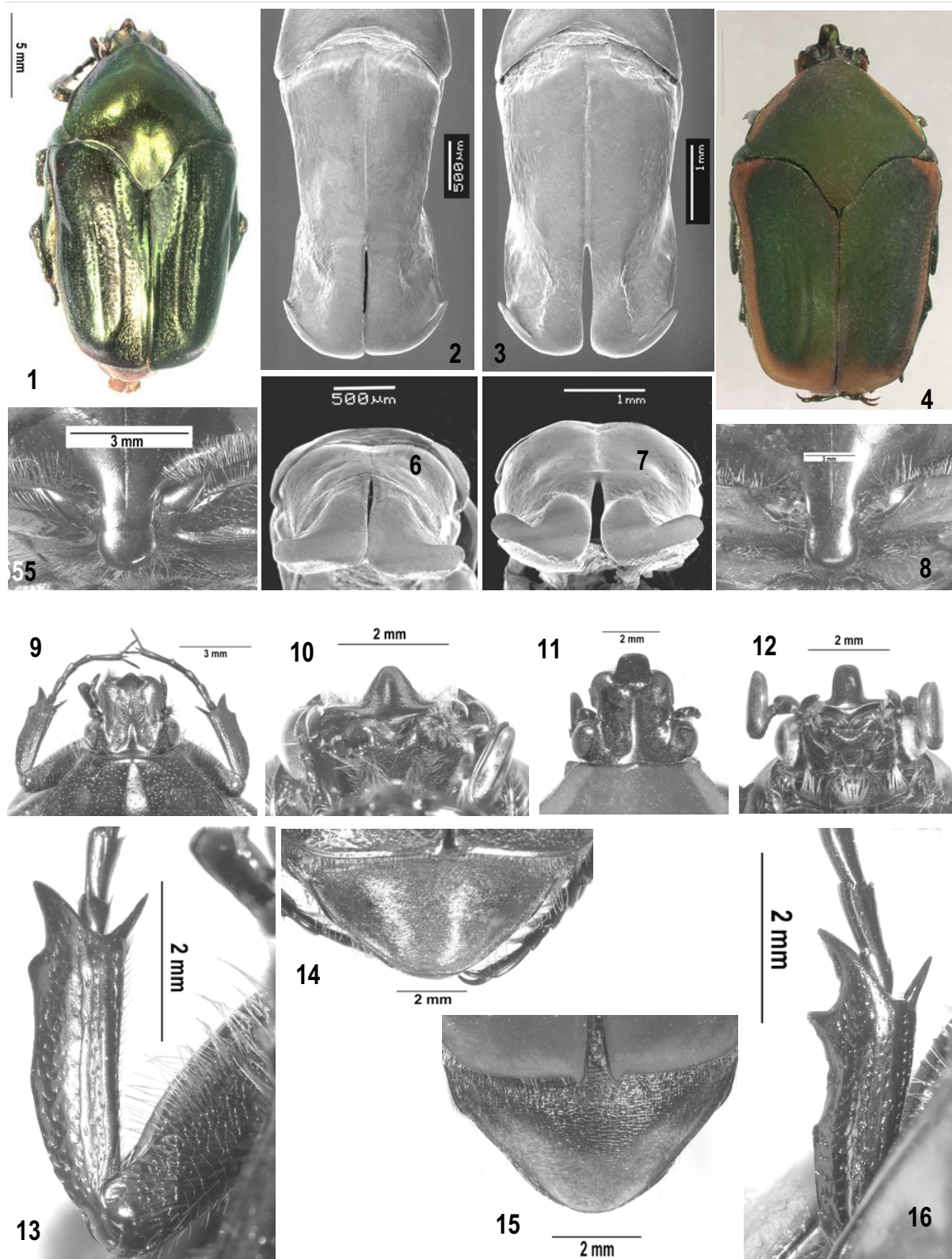


Figure 1-16. *Cotinis* spp. 1, 2, 5, 6, 9, 10, 13, 14) *Cotinis aliena* Woodruff. 3, 4, 7, 8, 11, 12, 15, 16) *Cotinis nitida* L. 1, 4) Habitus, dorsal. 2, 3) Male genitalia, dorsal. 5, 8) Mesosternal projection. 6, 7) Male genitalia, caudal. 9, 11) Head, dorsal. 10, 12) Head, ventral. 13, 16) Anterior tibia, left, dorsal. 14, 15) Elytral tip and pygidium.

**Venter.** Medially convex, surface shiny, green (as dorsum), with shallow punctures and few setae on sides of sternites. Terminal sternite lightly punctate on sides, without terminal setae. Mesosternal process rounded at apex (Fig. 5), projecting anteriorly beyond mesocoxae.

**Genitalia.** Male (Fig. 2, 6, 27, 28). Parameres (in dorsal view, Fig. 2) separated narrowly in apical third, nearly touching terminally. Lateral teeth acute, posteriorly originating from low carinate margin for about half paramere width. Parameres (in caudal view, Fig. 6) terminating nearly horizontally; not abruptly upturned as in *C. nitida* (Fig. 7). Internal sac (Fig. 27-28) containing a field of fine teeth or spines, into which is imbedded a sharp pointed, heavily sclerotized spine (2 spines present in *C. nitida*). A single spine is present in *C. viridicyanea* also.

**Female Allotype.** Same data as holotype. Length 22 mm, width 11 mm. Little dimorphism, except anterior tibiae distinctly tridentate (Fig. 17). Genitalia (Fig. 26) consisting of 2 sclerotized plates, orange with yellow borders, separated their entire length and apex with 4 fine setae. Deposited in Florida State Collection of Arthropods.

**Paratypes (132).** All Florida (numbers of specimens in parentheses): Monroe Co., same data as holotype (84). Additional Islamorada specimens listed chronologically as follows: 23-VI-77, no collr. (1); 27-X-77, W. E. Wyles (1); 9-XII-77, W. E. Wyles (2); 11-XII-77, R. E. Woodruff, W. E. Wyles, bait trap with caproic acid in mineral oil, behind Manny & Isas Restaurant, under Bauhinia tree (1); 9-VI-78, G. Pratt (1); 23-VI-78, W. E. Wyles (6); 12-VII-78, J. Ekblom (2); 18-VII-78, R. Clark (1); 18-VII-78, W. E. Wyles (1); 9-VIII-78, C. F. Dowling (1); 10-VIII-78, E. Tetro (2); 17-VIII-78, P. Chobrdá (2); 12-VII-79, L. A. Stange, on *Bidens pilosa* (1); 19-VIII-80, R. E. Woodruff (1); 3-VIII-83, Mile 88, H. Glenn, on beach (1); 28-VII-94, L. D. Howerton (1); Monroe Co., Plantation Key, Herbert Zim residence, 1-6-VIII-1979, Paul Tuskes (10); same 30-VII-79 (4), 1-VIII-79 (2), 2-VIII-79(1).

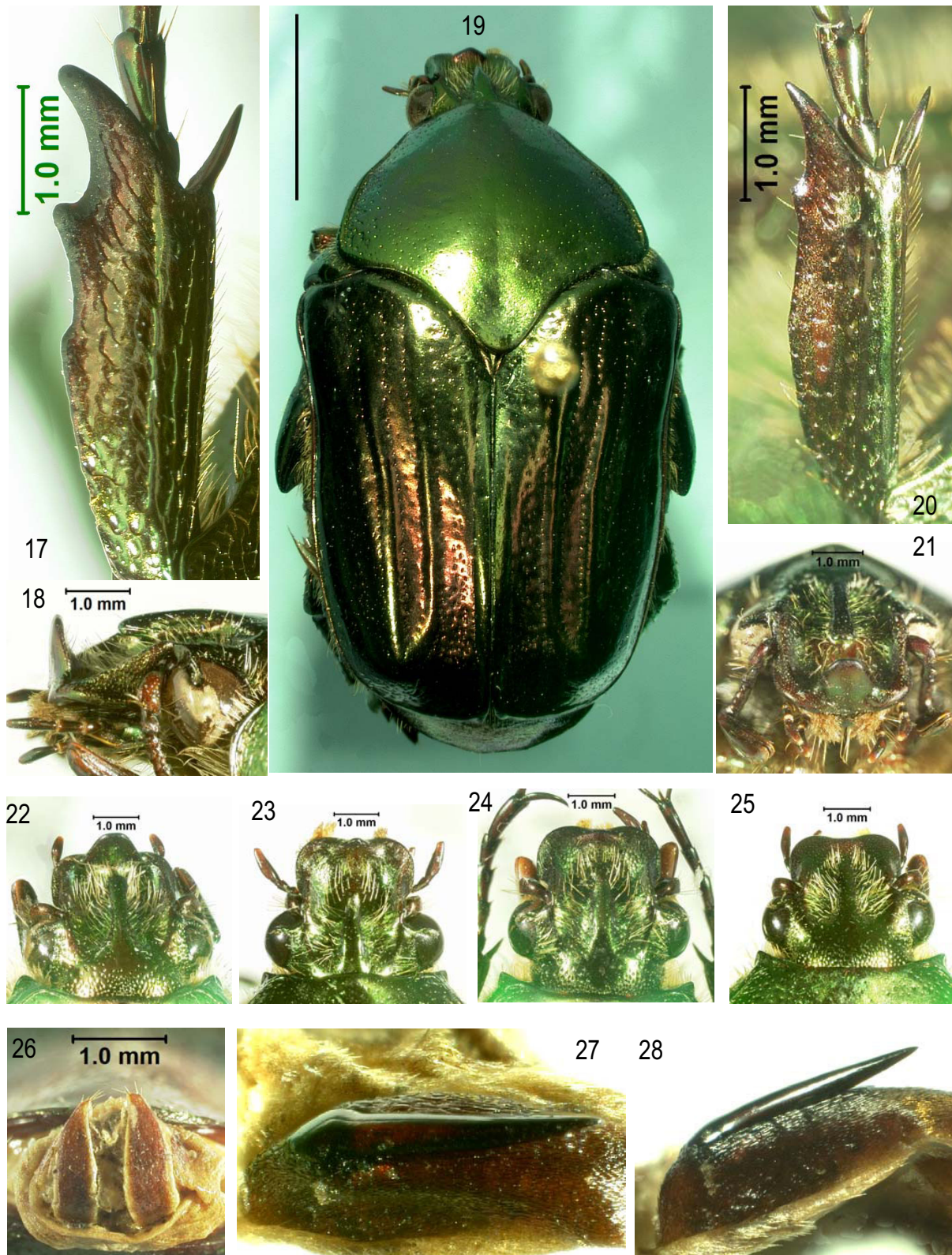
The most recently collected paratype specimens are from Monroe Co., Big Pine Key, Cactus Hammock, 22-VIII-98, R. Beiriger (5) ["around wild coffee", pers. comm. of collector]; and Dade Co., Navy Wells, 22-VII-98, R. Beiriger, in flight (1). The latter represents the first collection on the Florida mainland.

In addition to most of the paratypes deposited in the Florida State Collection of Arthropods, others are deposited in the following collections: Canadian Museum of Nature, National Museum of Natural History, University of Nebraska State Museum, University of Missouri, Illinois Natural History Survey, Ohio State University, California Academy of Sciences, Instituto de Ecología (Xalapa, Mexico), M. A. Goodrich, W. B. Warner, M. A. Morón, C. Deloya, P. E. Skelley, R. Beiriger, and M. L. Jameson.

**Variation.** In general the type series is uniform in appearance. Length of males varies from 16 to 22 mm; females from 16 to 23 mm. Color varies from green (Fig. 1) to coppery with red reflections (Fig. 19). The greatest variation occurs in the shape of the clypeal process (Fig. 22-25), ranging from prominent to nonexistent. This variation occurs in both sexes. A single specimen from Big Pine Key has the frontal process obsolete, the only vestige being a low, central, vertical tubercle. The pronotal "hump" varies in extent, occasionally with a slight depression posteriorly, producing a low, nipple-like projection.

**Comparison.** Although not matching, *C. aliena* specimens will run to couplet 18 in Goodrich's key (1966): "Brilliant blue-green; elytra weakly bicostate, with rows of usually distinct punctures between costae; posterior sutural angles thickly punctate"...*C. viridicyanea* Perbosc. A single character will serve to distinguish them: the obvious extensive setal patches surrounding the clypeal process in *C. aliena* are absent in my only specimen seen of *C. viridicyanea*. I have included a photo of this rare species (Fig. 32) and commented on it below. They appear similar because of the elytral carinae, and share the single spine in the aedeagus, but they are easily distinguished by specific differences listed in the following paragraphs:

*Cotinis aliena*: Color bright grassy green, often with red reflections. Smaller: length 16-23 mm. Clypeal beard prominent. Clypeal process pointed, more cylindrical. Overall punctation visible with naked eye. Punctures more numerous, coarser, some coalescing near lateral pronotal and humeral angles.



**Figure 17-28.** *Cotinis aliena* Woodruff. **17)** Anterior left tibia, female. **18)** Head, lateral, showing upturned clypeal process. **19)** Male, showing rare, reddish, metallic color (line = 5 mm). **20)** Anterior left tibia, male. **21)** Head, frontal view of specimen in Fig. 18. **22-25)** Head, showing variation in clypeal process. **26)** Female genitalia, caudal view. **27)** Single spine of internal sac of male genitalia, dorsal view, L = 1.2 mm). **28)** Same in lateral view.



**Figure 29-31.** *Cotinis aliena* Woodruff, pupal cases. **29)** Lateral view, empty. **30)** Lateral view with beetle killed by fungus. **31)** Caudal view.

Elytral carinae prominent, more elevated. Pygidium bicolored, basally green, with orange apical third. Scutellum barely exposed. Mesofemora ventrally punctate, covered with setae.

*Cotinis viridicyanea* (based on the single specimen examined): Color blue-green, with violet reflections (Fig. 32). Larger: length 20.8-28.8 mm (from Goodrich 1966). Clypeal beard absent. Clypeal process flatter, broader, more truncate. Overall punctation noticeable only under magnification, except a few fine punctures barely visible at apex of elytral carinae, appearing shinier. Punctures finer, shallower, rarely coalescing. Elytral carinae less elevated. Pygidium unicolorous as body. Scutellum more exposed. Mesofemora ventrally punctate with few setae.

**Immature stages.** Pupal cases (Fig. 29-31) consist of rigid cylindrical cocoons composed of relatively coarse sand and calcareous bits of coral and shell. These cases were extremely numerous during a visit in 1988, but none were found to contain pupae. Instead, several mummified adults, presumably killed by a fungus, were found dead inside the cocoon. Within the non-eclosed cocoons the remaining pupal skins were inadequate for description. Dr. Peter Landolt subsequently collected and preserved pupae for study. These and earlier-collected larvae will be formally described and compared with those of *C. nitida* in a future paper.

Larvae of other *Cotinis* species have the unusual behavior of surfacing from the soil at night and foraging by crawling on their backs. The speed is remarkable in *C. nitida*, averaging nearly 50 centimeters per minute (Hintze 1925). That species is well known for exhibiting thanatosis when touched or disturbed and can survive complete submergence in water for over 48 hours. Because of extensive damage to the lawn at the Ekblom residence, a commercial exterminator chemically treated the lawn and picked up hundreds ("buckets full") of larvae the following day.

**Natural enemies.** It appears that the initial populations, reported by nursery personnel and homeowners, subsequently have been greatly reduced. During my last collecting trip to the nursery (Oct., 1979) I encountered thousands of parasitic wasps (*Scolia dubia* Say; det. L.A. Stange) flying about 6 inches above the ground. This wasp has previously been reported as a parasite of *C. nitida* (Felt 1933) and other scarabaeid larvae. Such a large wasp population could have diminished the *C. aliena* population to a low level. The related *Euphoria sepulcralis* (Fab.) is also common in the area, providing an additional host.

Florida Department of Agriculture nursery inspector W. Eugene Wiles, who collected the first specimen, provided the following observations on blackbird predation. On June 23, 1978, he "saw a flock of blackbirds (probably grackles) fly noisily into a Gumbo Limbo tree, which startled several *Cotinis* there. The beetles flew immediately to a Sapodilla tree across the street and to other scattered locations. The birds caught several and beat them on the street". He caught 2 and also observed them copulating in a tree.

**Possible origin.** Although the first specimens of *C. aliena* were collected over 30 years ago, this description was delayed initially because it was believed to be an immigrant or recent introduction. After thor-



ough checking, comparison with most of the known species, as well as opinions from the major scarab workers, I believe it is undescribed.

There is a narrow possibility that the new species is not native to Florida, even though there is no direct evidence that it is known from elsewhere, or that it has been intercepted in commerce. Many early collectors have worked in the Keys and never obtained specimens. It is such a large, showy beetle it is unlikely that even casual collectors would overlook it. The small islands making up the Florida Keys have been completely under water in recent geological periods, and few true endemic (precinctive) species are known from there. I suspect that the new species has been introduced, and therefore I have given it the name *aliena*.

Several ideas have been postulated as methods of introduction. The South Florida climate is subtropical, and thousands of landscape plants have been introduced over the past century. Many of these plants originated in Central and South America. The original find, and the most specimens, were collected in a plant nursery. During early surveys, U.S. Customs officials discovered several bales of marijuana that washed up on Islamorada beaches. Such contraband could have provided a suitable substrate for larval food and pupation. The extremely hard and well-constructed pupal cases (Fig. 29-31) could survive such transport. However, we will probably never know how or from where the original specimens arrived.

A similar scenario occurred when another introduced scarab, *Plectris aliena* Chapin, was discovered in South Carolina (Chapin 1934). It is now present in Florida and Australia (Woodruff 1968). All its relatives are South American, but this species has not been discovered there. Chapin chose the name *aliena* because he believed it was introduced; its origin has yet to be determined after 74 years! Both it and *C. aliena* inhabit extremely sandy soils, and they could have been transported easily in any of their life stages by commerce or in ballast, soil, or plant containers.

*Cotinis aliena* was listed as “threatened” in the Florida endangered species list (Woodruff 1982) and as “rare” in a later classification (Woodruff and Deyrup 1994). The species was previously listed by Peck and Thomas (1998: 63) as *Cotinis* n.sp. from “Monroe Co., Islamorada: rare; this species has been collected on only one key; it may be a very localized endemic or it may be an immigrant.” The records above provide little recent information, except that a single specimen has been taken on the Florida mainland (Dade Co.).

### ***Cotinis nitida* (Linnaeus) 1764**

(Fig. 3, 4, 7, 8, 11, 12, 15, 16)

This is the only other species of *Cotinis* in the eastern U.S., and it is treated here for comparison with the new species. It is often extremely common throughout most of the eastern United States (Goodrich 1966), although there are no records of it from the Florida Keys. I previously listed it (Woodruff 1973) as the only species of *Cotinis* from Florida. Adults have been recorded as a pest of many crops, where they feed on fresh fruits of peaches, pears, apples, figs, etc. It has acquired the common name of “Green June Beetle”, but it is not related to the “May or June Beetles” of the genus *Phyllophaga* Harris. However, most damage caused by the species results from high populations of larvae in sod, tobacco seedbeds, and other root crops. Hundreds of papers treat the economic nature of the species, but only a few are cited here (e.g., Brandhorst-Hubbard et al. 2001; Davis and Luginbill 1921).

**General description** (Fig. 4). Dorsally dull or matte, with almost no shining areas except head. Dark green, often with varying pattern of dull orange borders. Easily recognized by the photos presented here.

**Nomenclature.** Many synonyms (8) were listed by Goodrich (1966), and 11 are listed in the catalogue of Nearctic species (Poole and Gentili 1996), in which the generic name was incorrectly considered masculine, and the specific name erroneously changed to “*nitidus*” to agree in gender. The more recent checklist by Smith (2003) correctly listed the specific names with feminine terminations and listed the 11 synonyms discussed above.

**Behavior.** While organizing the initial survey for the new species, I reviewed most of the literature on *C. nitida*, searching for information on attractants and mating behavior. Muma (1944) indicated that caproic acid was used as an attractant. Beckham and Dupree (1952) considered several attractants and

discussed seasonal occurrence. Subsequently, Landolt (1990) discovered that adults were attracted to isopropanol.

Baker and Monroe (2005) studied the sensillae on adult and larval antennae. Patton (1956) reported mating behavior and swarming. Brandhorst-Hubbard *et al.* (2001) studied oviposition sites and food preferences. Domek and Johnson (1987, 1988) investigated sex pheromones and aggregations

**Florida records.** Records from the Division of Plant Industry (Florida Department of Agriculture) data base and specimens in the Florida State Collection of Arthropods include the following counties (nearly statewide): Alachua, Broward, Charlotte, Collier, Dade, DeSoto, Duval, Highlands, Hillsborough, Lake, Manatee, Okeechobee, Orange, Palm Beach, Pasco, Pinellas, and St. Lucie. Peck and Thomas (1998) listed only “ALA[chua] and MARI[on]” counties in Florida.

***Cotinis viridicyanea* (Perbosc) 1839**  
(Fig. 32)

*Gymnetis viridicyanea* Perbosc 1839: 262.  
*Cotinis viridicyanea* (Perbosc), Schaum 1844: 356.

In Goodrich’s key (1966), *C. aliena* keys to this rare species (for characters separating the 2 species, see comparison section under that species).

This appears to be one of the rarest species in the genus. Goodrich saw 18 specimens in his revision from: “Yucatan peninsula (States of Campeche and Yucatan) and Costa Rica. Four specimens labeled “Texas” are found in old European collections. This locality seems likely to be erroneous”. During my studies I searched for material to borrow, but I succeeded in obtaining only the male in Fig. 32 from Dr. M.A. Goodrich and the single U.S. National Museum specimen. Inquiries to Dr. Miguel Morón and Dr. C. Deloya, at the major collections in Mexico, indicated that they possessed no specimens. Additional specimens thought to be this species were borrowed from Dr. J. Wappes, but they were subsequently determined to be *C. subviolacea* Gory and Percheron. I am unaware of any specimens having been collected since Goodrich’s revision (over 40 years ago). To my knowledge, the species has not been previously illustrated.

**Checklist of the World species of *Cotinis* Burmeister**

Although Smith (2003: 79-81) provided a checklist of the 12 species known from the Nearctic Realm, there is no complete checklist of the genus. The *Nomina Insecta Nearctica* (Poole and Gentili 1996: 337) listed only 4 species. The following alphabetical checklist of the described species (along with their synonyms) is presented to bring the list current.

Synonyms are indented under the valid species, and are based primarily on those established by Goodrich (1966) in the latest revision. The original designations of “var., ab., and subsp.” are retained here only for precision, but are not to be recognized as viable entities; they are now all considered junior synonyms as listed. Two patronymic species names of Gory and Percheron (1833) originally were not given Latin endings (*G. barthelemy* and *G. lebas*), but were subsequently emended. The Latinized spell-



**Figure 32.** *Cotinis viridicyanea* (Perbosc). Specimen loaned and in private collection of M. A. Goodrich: “Yucatan, Mexico”. Photo by P.E. Skelley and L. Buss.

ings listed here are in accordance with ICZN Article 33.3, and based on Goodrich's (1966) selection as the first reviser. That revision also established that *C. atrata* (Gory and Percheron 1833: 330) was a junior synonym of *C. mutabilis* (Gory and Percheron 1833: 334), even though it was described 4 pages earlier in the same publication.

- Cotinis aliena* Woodruff, new species.  
*Cotinis antonii* (Dugés) 1878: 170 (*Gymnetis*).  
*Cotinis senex* Janson 1880: 575.  
*Cotinis barthelemyi* (Gory and Percheron) 1833: 333 (*Gymnetis*).  
*Cotinis barthelemy* (Gory and Percheron) 1833: 333 (*Gymnetis*).  
*Cotinis bartholomaei* Burmeister 1842: 257.  
*Cotinis barthelemeyi*, Bates 1889: 345.  
*Cotinis beraudi* Delgado 1998: 451-452.  
*Cotinis boylei* Goodrich 1966: 567 (subg. *Criniflava*).  
*Cotinis columbica* Burmeister 1842: 258.  
*Cotinis fuscopicea* Goodrich 1966: 563-564.  
*Cotinis ibarra* Deloya and Ratcliffe 1988: 39-42 (subg. *Liberocera*).  
*Cotinis impia* (Fall) 1905: 272. (*Gymnetis*).  
*Cotinis laticornis* Bates 1889: 345.  
*Cotinis latifrons* Schoch 1895: 27.  
*Cotinis lebasi* (Gory and Percheron) 1833: 334 (*Gymnetis*).  
*Cotinis lebas* (Gory and Percheron) 1833: 334 (*Gymnetis*).  
*Cotinis lebasii*, Burmeister 1842: 258.  
*Cotinis lebasi*, Bates 1889: 350.  
*Cotinis lebasi panamensis* Casey 1915: 297.  
*Cotinis lemoulti* Antoine 2007: 47-50.  
*Cotinis mutabilis* (Gory and Percheron) 1833: 334 (*Gymnetis*).  
*Cotinis atrata* (Gory and Percheron) 1833: 330 (*Gymnetis*).  
*Cotinis nigrorubra* (Gory and Percheron) 1833: 332 (*Gymnetis*).  
*Cotinis mexicana* (Gory and Percheron) 1833: 335 (*Gymnetis*).  
*Cotinis palliata* (Gory and Percheron) 1833: 338 (*Gymnetis*).  
*Cotinis sobrina* (Gory and Percheron) 1833: 336 (*Gymnetis*).  
*Cotinis sobrina* var. *cabira* Burmeister 1842: 256.  
*Cotinis sobrina* var. *schafraneki* Nonfried 1894: 126.  
*Cotinis sobrina schafrencki*, Smith 2003: 80 (misspelling).  
*Cotinis malinus* Janson 1880: 575.  
*Cotinis mutabilis* var. *cuprascens* Bates 1889: 347.  
*Cotinis mutabilis* var. *cuprascenti* Bates 1889: 347.  
*Cotinis mutabilis* var. *subcastanea* Bates 1889: 347.  
*Cotinis mutabilis* var. *intergenea* Bates 1889: 347.  
*Cotinis mutabilis* var. *aurantiaca* Bates 1889: 348.  
*Cotinis mutabilis* var. *robusta* Bates 1889: 348.  
*Cotinis mutabilis* var. *atra* Kraatz 1898: 222.  
*Cotinis mutabilis* var. *atropurpurea* Kraatz 1898: 222.  
*Cotinis mutabilis* var. *cuprea* Kraatz 1898: 222.  
*Cotinis mutabilis* var. *nigrovariegata* Kraatz 1898: 222.  
*Cotinis mutabilis* var. *piciventris* Kraatz 1898: 222.  
*Cotinis arizonica* Casey 1915: 286.  
*Cotinis texana* Casey 1915: 286.  
*Cotinis abdominalis* Casey 1915: 287.  
*Cotinis abdominalis discolor* Casey 1915: 287.  
*Cotinis obliqua* Casey 1915: 288.  
*Cotinis obliqua* subsp. *coahuilae* Casey 1915: 288.  
*Cotinis obliqua* subsp. *commiscens* Casey 1915: 288.

- Cotinis obliqua* subsp. *viridicauda* Casey 1915: 289.  
*Cotinis capito* Casey 1915: 296.  
*Cotinis mutabilis* subsp. *ovicornuta* Casey 1915: 296.  
*Cotinis nitida* (Linnaeus) 1764: 26 (*Scarabaeus*).  
*Cotinis flagranticeps* (Voet) 1766: 16 (*Scarabaeus*).  
*Cotinis debiliceps* Casey 1915: 289.  
*Cotinis longula* Casey 1915: 290.  
*Cotinis angustula* Casey 1915: 290.  
*Cotinis parvula* Casey 1915: 290.  
*Cotinis nitida* subsp. *ornata* Casey 1915: 291.  
*Cotinis nitida* subsp. *tibialis* Casey 1915: 291.  
*Cotinis nitida* subsp. *pygidialis* Casey 1915: 291.  
*Cotinis longitarsis* Casey 1915: 292.  
*Cotinis longitarsis* subsp. *seriella* Casey 1915: 292.  
*Cotinis nitida* ab. *brunnea* Hatch 1930: 25.  
*Cotinis olivia* Bates 1889: 352.  
*Cotinis orientalis* Deloya and Ratcliffe 1988: 36-38.  
*Cotinis pauperula* Burmeister 1847: 550.  
*Cotinis polita* Janson 1876: 1 33.  
*Cotinis pokornyi* Deloya, Ibáñez-Bernal, and Nogueira 2000: 149-151.  
*Cotinis producta* Bates 1889: 350 (subgen. *Criniflava*).  
*Cotinis pueblensis* Bates 1889: 350.  
*Cotinis punctatostriata* Bates 1889: 349.  
*Cotinis rufipennis* Bates 1889: 414.  
*Cotinis sinotoc* Deloya, Ibáñez-Bernal, and Nogueira 2000: 171-175.  
*Cotinis sphyracera* Deloya and Ratcliffe 1988: 22-23.  
*Cotinis subviolacea* (Gory and Percheron) 1833: 333 (*Gymnetis*).  
*Cotinis plicatipennis* Blanchard 1850: 33.  
*Cotinis viridicyanea* (Perbosc) 1839: 262 (*Gymnetis*).

**Nomenclatural Note.** The insect genus *Cotinis* has sometimes been confused with the plant genus *Cotinus* Miller (Anacardiaceae). Although *Cotinis* is feminine, perhaps this similarity of names has caused some authors (e.g., Poole and Gentili 1996) to treat it as masculine; the other 3 Nearctic species of *Cotinis* were also incorrectly terminated with masculine endings. Several internet websites have mixed the 2 names. The catalogues by Blackwelder (1944) and Smith (2003), as well as all recent papers, have correctly treated *Cotinis* as feminine.

### Acknowledgments

I thank the following individuals for their aid in this study: Dr. Paul Skelley for assistance with SEM and Auto-Montage use and arranging loans; Eugene Wiles, Division of Plant Industry (DPI), Florida Department of Agriculture and Consumer Services (FDACS), who collected the first specimen and accompanied me in the field; the Ekblom family of Islamorada for field assistance and providing most of the paratypes; Curtis F. Dowling, FDACS supervisor in Dade and Monroe counties for encouraging inspectors to survey for this species; Dr. Alan Hardy for deferring his description and providing additional data; Dr. Michael Goodrich for examination of early specimens and confirmation that it was undescribed, and the loan of specimens of the rare *Cotinis viridicyanea*; Richard Weaver, FDACS, DPI, for information on the tree genus *Cotinus*; Dr. Cal Welbourn for data retrieval of DPI records; Dr. Peter Landolt for donating larval and pupal specimens; R. Beiriger and the Enns Entomological Museum of the University of Missouri for loan of recently collected specimens; Dr. M. C. Thomas for calling them to my attention and arranging the loan; Dr. P. Antoine for providing literature; Dr. Miguel Morón for information on Mexican collections; Dr. Andrew Smith for nomenclatural assistance; Dr. Francois Génier for loan of Canadian Museum of Nature specimens; Dr. B. C. Ratcliffe for loan assistance of National Museum of Natural History specimen of *C. viridicyanea*; Dr. J. Wappes for donation of specimens; L. Buss and P.E. Skelley

provided the illustration of *C. viridicyanea*; Drs. M. L. Jameson, W. B. Warner, and B. C. Ratcliffe provided thorough and helpful peer reviews. This is Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Entomology Contribution No. 1106.

### Literature Cited

- Antoine, P. 2007.** Un nouveau *Cotinis* du Panama (Cetoniidae). Coléoptères (France) 13(5): 47-50; 10 figs (2 in color).
- Baker, G. T., and W. A. Monroe. 2005.** Sensilla on the adult and larval antennae of *Cotinis nitida* (Coleoptera: Scarabaeidae). Microscopy and Microanalysis (Microscopy Society of America) 11(Suppl. 2): 170-171; 6 fig.
- Bates, H. W. 1889.** Pecticornia and Lamellicornia. *In*: Biologia Centrali-Americana, Insecta, Coleoptera, Vol. 2(2): 1-432.
- Beckham, C. M., and M. Dupree. 1952.** Attractants for the green June beetle, with notes on seasonal occurrence. Journal of Economic Entomology 45(4): 736-737.
- Blackwelder, R. E. 1944.** Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. United States National Museum Bulletin 185(Part 2): 180-341 [*Cotinis* p. 261-262].
- Blackwelder, R. E. 1957.** Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. United States National Museum Bulletin 185(Part 6): 927-1492.
- Blanchard, C. E. 1850.** Catalogue de la Collection Entomologique. Classe des Insectes. Ordre des Coléoptères. Muséum d'Histoire Naturelle de Paris 1: 1-240.
- Brandhorst-Hubbard, J. L., K. L. Flanders, and A. G. Appel. 2001.** Oviposition site and food preference of the green June beetle (Coleoptera: Scarabaeidae). Journal of Economic Entomology 94(3): 628-633.
- Burmeister, H. C. 1842.** Handbuch der Entomologie. Band 3. Theodor. Ehr. Fr. Enslin, Berlin. 826 p.
- Casey, T. L. 1915.** A review of the American species of Rutelinae, Dynastinae and Cetoniinae. p. 1-394. *In*: Memoirs on the Coleoptera VI. New Era Printing Company, Lancaster, Pennsylvania. [*Cetoniinae* p. 274-394, *Cotinis* p. 285-297].
- Chapin, E. A. 1934.** An apparently new scarab beetle (Coleoptera) now established at Charleston, South Carolina. Proceedings of the Biological Society of Washington 47:33-35.
- Davis, J. J., and P. Luginbill. 1921.** The green June beetle or fig eater. North Carolina Agriculture Experiment Station Bulletin 242: 1-35; 9 fig.
- Delgado, L. 1998.** A new Mexican species of *Cotinis* (Coleoptera, Melolonthidae). Revista Brasileira de Entomologia 41(2-4): 451-452.
- Deloya, C. 1995.** A new species of *Cotinis* (*Cotinis*) Burmeister from Mexico (Coleoptera: Melolonthidae, Cetoniinae). Coleopterists Bulletin 49(2): 149-152.
- Deloya, C., and B. C. Ratcliffe. 1988.** Las especies de *Cotinis* Burmeister en México (Coleoptera: Melolonthidae:Cetoniinae). Acta Zoologica Mexicana (nueva serie): 28: 1-52; 76 fig.
- Deloya, C., S. Ibañez-Bernal, and G. Nogueira. 2000.** A new species of *Cotinis* (Col. Melolonthidae) and a key for the identification of Mexican species. Entomological News 111(3):171-176.
- Domeck, J. M., and D. T. Johnson. 1987.** Evidence of sex pheromone in the green June beetle, *Cotinis nitida* (Coleoptera: Scarabaeidae). Journal of Entomological Science 22: 264-267.
- Domeck, J. M., and D. T. Johnson. 1988.** Demonstration of semiochemically induced aggregation in the green June beetle, *Cotinis nitida* (L.) (Coleoptera: Scarabaeidae). Environmental Entomology 17: 147-149.
- Fall, H. C. 1905.** New species of Coleoptera from the southwest. Canadian Entomologist 37: 270-276. [description of *Gymnetis* (= *Cotinis*) *impius* p. 272].
- Felt, E. P. 1933.** Observations on shade tree insects. Journal of Economic Entomology 26(1): 45-51 [p. 46 *Allorrhina* (= *Cotinis*) *nitida* parasitized by *Scolia dubia*].
- Goodrich, M. A. 1963.** Secondary sexual dimorphism in *Cotinis nitida* L. Coleoptera: Scarabaeidae. Coleopterists Bulletin 17(3): 70-72.
- Goodrich, M. A. 1964.** *Cotinis* Burmeister, 1842 (Insecta, Coleoptera): proposed conservation under the plenary powers. Z.N. (s)1641. Bulletin of Zoological Nomenclature 21(6): 429-431.

- Goodrich, M. A. 1966.** A revision of the genus *Cotinis* (Coleoptera: Scarabaeidae). *Annals of the Entomological Society of America* 59(3): 550-568; 20 fig.
- Gory, H. L., and A. R. Percheron. 1833.** Monographie des Cétoines et genres voisins, formant, dan les familles naturelles de Latreille, la division des Scarabées Mélitophiles. Baillièrre, Paris. 410 p., 77 pl.
- Dugés, E. 1878.** Descripción de coleópteros indígenas. *La Naturaleza* 4:169-188.
- Hatch, M. H. 1930.** Records and new species of Coleoptera from Oklahoma and western Arkansas, with subsidiary studies. *Publications of the University of Oklahoma Biological Survey* 2:15-26.
- Hintze, A. L. 1925.** The behavior of larvae of *Cotinis nitida* Burmeister (Coleoptera). *Annals of the Entomological Society of America* 18(1): 31-34.
- Howden, H. F. 1965.** Lectotype designations in *Cotinis* Burm. for species described by Bates in the *Biologia Centrali-Americana* (Coleoptera: Scarabaeidae). *Canadian Entomologist* 97(6): 670-871.
- Janson, O. E. 1876.** Notices of new or little known Cetoniidae, No. 1. *Cistula Entomologica* 2: 133-140.
- Janson, O. E. 1880.** Descriptions of new American Cetoniidae. *Cistula Entomologica* 2: 575-580.
- Kraatz, G. 1898.** Bemerkungen zum Nachtrag VI von Schoch's "Genera und Species seiner Cetoniden Sammlung". *Deutsche Entomologische Zeitschrift* 1898. 2: 217-224.
- Landolt, P. J. 1990.** Trapping the green June beetle (Coleoptera: Scarabaeidae) with isopropanol. *Florida Entomologist* 73: 328-330.
- Linnaeus, C. von. 1764.** *Museum S:ae R:ae M:tis. Ludoviciae Ulricae Reginae Svecorum, Gothorum, Vandalorumque; in quo Animalia Rariora, Exotica, Imprimis Insecta & Conchilia describuntur & determinantur Prodromi instar editum. A Carolo v. Linné. Literis & impensis. L. Salvius, Stockholm* 8+719+2 p.
- Muma, M. H. 1944.** The attraction of *Cotinis nitida* by caproic acid. *Journal of Economic Entomology* 37(6): 855-856.
- Martinez, A. 1949.** Cambios necesarios en la nomenclación de algunos géneros de Gymnetini (Coleop., Scarab., Cetoniinae). *Anales de la Sociedad Científica Argentina* 147: 13-14.
- Nonfried, A. F. 1894.** Beschreibungen neuer Lamellicornien, Buprestiden und Cerambyciden aus Central- und Sud-Amerika. *Entomologische Nachrichten* 20(8): 113-128.
- Patton, C. N. 1956.** Observations on the mating behavior of the green June beetle, *Cotinis nitida* (Linn.). *Florida Entomologist* 39(2): 95.
- Peck, S. B., and M. C. Thomas. 1998.** A distributional checklist of the beetles (Coleoptera) of Florida. Florida Department of Agriculture, Division of Plant Industry, Arthropods of Florida and Neighboring Land Areas 16: viii+1-180.
- Perbosc, M. 1839.** Insectes nouveaux découverts au Mexique. *Revue Zoologique*. 1839: 261-264 [description of *C. viridicyanea* p. 262; reference not seen].
- Poole, R. W., and P. Gentili (eds.) 1996.** *Nomina Insecta Nearctica. A checklist of the insects of North America. Vol. 1: Coleoptera, Strepsiptera.* Entomological Information Services, Rockville, Maryland [*Cotinis* p. 337]. 827 p.
- Schoch, G. 1895.** Die Genera und Species meiner Cetonidensammlung. I. Teil: Trib. Goliathidae, Gymnetidae, Madagassae, Schizorrhinidae. Privately published(?); Zurich. 148 p.
- Smith, A. B. T. 2003.** Checklist of the Scarabaeoidea of the Nearctic realm. Version3- released 25 September 2003. [[http://www\\_museum.unl.edu/research/entomology/Nearctic\\_scarabs3.pdf](http://www_museum.unl.edu/research/entomology/Nearctic_scarabs3.pdf)].
- Voet, J. E. 1766.** *Catalogus Systematicus Coleopterorum.* Le Haye. [This rare reference not seen. According to Blackwelder (1957:1320, from Horn) 2 volumes were published in 1778 and 1806, with a note that there are various translations and dates]. The citation here is as given by Goodrich (1966: 568). For additional details see: <http://www.animalbase.de/>.
- Woodruff, R. E. 1968.** The present status of *Plectris aliena* Chapin in the United States (Coleoptera: Scarabaeidae). Florida Department of Agriculture, Division of Plant Industry, Entomology Circular 68: 1-2; 1 fig.
- Woodruff, R. E. 1973.** The scarab beetles of Florida (Coleoptera: Scarabaeidae). Part 1. The Laparosticti (Subfamilies: Scarabaeinae, Aphodiinae, Hybosorinae, Ochodaeinae, Geotrupinae, Acanthocerinae). Florida Department of Agriculture, Division of Plant Industry, Arthropods of Florida and Neighboring Land Areas 8: xi+219; 407 fig.[p. 29 *Cotinis nitida*].
- Woodruff, R. E. 1982.** Coleoptera, Scarabaeidae. p. 84-102. *In*: R. Franz (ed.). Rare and endangered biota of Florida. University Presses of Florida, Gainesville. xx+121 p. [*Cotinis* n. sp., p. 89].

**Woodruff, R. E., and M. Deyrup. 1994.** Keys green June beetle, *Cotinis* n. sp., p. 381-382. *In*: M. Deyrup and R. Franz (ed.). Rare and endangered biota of Florida. Vol. 4, Invertebrates. University Press of Florida, Gainesville. xxx+798 p.

**Received August 25, 2008; accepted October 12, 2008.**

