

**FIRST REPORT OF *TYRTAEUS RUFUS* CHAMPION AND *TYRTAEUS DOBSONI*
HINTON (TENEBRIONIDAE: DIAPERINAE: ANOPIDIINA) FROM FLORIDA**

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Abstract

Tyrtaeus rufus Champion and *Tyrtaeus dobsoni* Hinton (Coleoptera: Tenebrionidae: Anopidiina) are reported for the first time from Florida. Diagnoses of both species are presented, with illustrations, distributional and known biological data. *Tyrtaeus guadeloupenensis* Dajoz is synonymized under *Tyrtaeus rufus* Champion **NEW SYNONYMY**. *Tyrtaeus rufus* is redescribed, and reported for the first time from Mexico, Costa Rica, Panama, Columbia, Venezuela, and the West Indian islands of Grand Cayman and Dominica. New records for *Tyrtaeus dobsoni* are reported for Luzon, Leyte and Samar of the Philippine Islands, and Majuro Atoll of the Marshall Islands. *Tyrtaeus* is incorporated into the North American tenebrionid key to genera in *American Beetles*.

The tenebrionid subtribe Anopidiina are an enigmatic and rarely collected group of small to minute beetles widespread in the tropical and subtropical areas of the Neotropical, Australasian, Oriental and Ethiopian regions. Previous records are not known from the Holarctic region, and the group is not recorded in a recent review of the fauna of North America north of Mexico (Aalbu *et al.* 2002).

The anopidiines were redefined and diagnosed by Doyen and Lawrence (1979) and are currently placed as a subtribe in the diaperine tribe Gnathidiini (Bouchard *et al.* 2005). Anopidiina can be differentiated from the other subtribe of the Gnathidiini, the Gnathidiina, by a visible clypeolabral membrane and an acuminate terminal maxillary palpomere (Matthews and Lawrence 2005). The antennal club is often fused into a single mass, so that the number of free antennomeres may be reduced from eleven to six or seven. The anopidiines are in need of a revision, but under the current nomenclature, nine of the thirteen currently recognized genera (one of which is synonymized below) and about two-thirds of the described species have reduced tarsal formulae, with 4-4-4 being the most common. Most species are known only from the original, usually poor, description made from very few specimens taken from a single locality. Lack of series, and the resulting lack of understanding of intraspecific variation in the anopidiines, has hampered use of the literature.

The anopidiine genus *Tyrtaeus* is characterized by a 4-4-4 tarsal formula, 6–7 articulated antennomeres (an annulate, but variably fused, club may indicate the missing segments), and the presence of normal eyes. *Tyrtaeus* was originally described in the Colydiidae, and was subsequently moved to the Cerylonidae (as Ceryloninae, Cerylonini, Hetschko 1930; Blackwelder 1945), until it was eventually placed in the subtribe Anopidiina of the tribe Gnathidiini by Doyen and Lawrence (1979). Recently, it has again been listed, in error, under the Cerylonidae (Peck 2005).

Champion (1913) included two species in *Tyrtaeus* at the time of its description – *Tyrtaeus rufus* Champion and *Tyrtaeus cribripennis* Champion – designating *T.*

rufus as the type species. To date, a total of 11 extant species of *Tyrtaeus* have been described and recorded from Guatemala, Panama, Cuba, Guadeloupe, the Seychelles, Brazil, India, Australia, and Indonesia's Sumatra and Sulawesi (Champion 1913; Grouvelle 1918; Hinton 1947; Costa Lima 1956; Dajoz 1977, 1981; Matthews and Lawrence 2005). Doyen and Poinar (1994) added four fossil species from the Dominican Republic. Undescribed species have been reported from Malaysia and Fiji (Matthews and Lawrence 2005) and material on hand indicates that the genus is even more widespread, including undescribed species from Papua New Guinea (UCDC), Brazil (FSCA, MCZC, NMNH), Ecuador (NMNH), Mexico (MCZC), Costa Rica (MAIC), and Panama (MCZC, OSUC).

For the last 20 years, one of us (MAI) has been accumulating material for an eventual revision of the anopidiines. Recently, KJH has been working on a key to genera of West Indian tenebrionids, and together we have been reviewing our assemblage of specimens. The recent collection of a long series of these tiny beetles on Guadeloupe, and comparison of those specimens with two recently received series from Florida, and other material, has brought to light the unexpectedly broad distribution of two obscure and poorly known species of *Tyrtaeus* Champion. The two species of *Tyrtaeus* found in Florida appear to be recently introduced, providing us with the opportunity to give the first record of the subtribe from the USA. We also note the highly dispersive nature of these two species, discuss the status of their populations in the context of other known populations, redescribe *T. rufus* and place *Tyrtaeus* in a modified key to North American genera of tenebrionids.

Materials and Methods

Material for this study is deposited in the following collections:

BMNH	The Natural History Museum, London, United Kingdom (M. V. L. Barclay).
CASC	California Academy of Sciences, San Francisco, California.
CNCI	Canadian National Collection of Insects, Ottawa, Canada.
FSCA	Florida State Collection of Arthropods, Gainesville, Florida (M. C. Thomas, P. E. Skelley).
INBIO	Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica (A. Solis, W. Porras).
MAIC	Michael A. Ivie, Montana State University, Bozeman, Montana.
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.
MIZA	Museo del Instituto de Zoología Agrícola, Maracay, Venezuela (L. Joly).
NMNH	National Museum of Natural History, Washington, D.C. (W. E. Steiner, Jr.).
OSUC	C. A. Triplehorn Insect Collection, Ohio State University, Columbus, Ohio (C. A. Triplehorn).
UCDC	R.M. Bohart Museum of Entomology, University of California, Davis, California (S. Heydon).
VCPC	Vince Golia, private collection, Lake Worth, FL.
WIBF	West Indian Beetle Fauna Project Collection, Montana State University, Bozeman, Montana.

Verbatim label data of material examined is given within quotation marks (""). Lines are separated by a semicolon (;) and different labels are separated by a slash (/). Numbers preceding museum coden within parentheses () indicate the number of specimens examined.

Modified Key to North American Genera of Tenebrionidae

The discovery of two species of *Tyrtaeus* in Florida requires a modification of the key to genera for North America north of Mexico by Aalbu *et al.* (2002). To accommodate *Tyrtaeus*, the following should be substituted for couplets 1–3 of Key I (page 465):

Key to the Subfamilies and Tribes of the United States

- | | | |
|--------|--|----------------------|
| 1. | Tarsal formula 4-4-4 | 2 |
| 1'. | Tarsal formula 5-5-4 | 4 |
| 2(1). | Abdomen without visible membrane along hind margin of visible sternites 3 and 4; pronotum and elytra costate (<i>Anepsiini</i> , <i>Anchomma</i> , in part) | Key I |
| 2'. | Abdomen with visible membrane along hind margin of visible sternites 3 and 4 (Fig. 4); pronotum and elytra not costate | 3 |
| 3(2). | Antenna with 3-4-segmented club | 3A |
| 3'. | Antenna with 7-segmented, pectinate club (<i>Bolitophaginae</i> , <i>Bolitophagini</i> , in part) | Key M |
| 3A (3) | Antenna 11-segmented with last 4 segments enlarged, forming a fully articulated 4-segmented club; elytral width at humeral angles distinctly broader than base of pronotum (<i>Myrmechixenini</i>) | <i>Myrmechixenus</i> |
| 3A'. | Antenna 9-segmented with last 3–4 segments enlarged, forming a fused 3- or 4-segmented club; elytral width at humeral angles equal to base of pronotum (<i>Gnathidiini</i> , <i>Anopidiina</i>) | <i>Tyrtaeus</i> |

Tyrtaeus rufus Champion

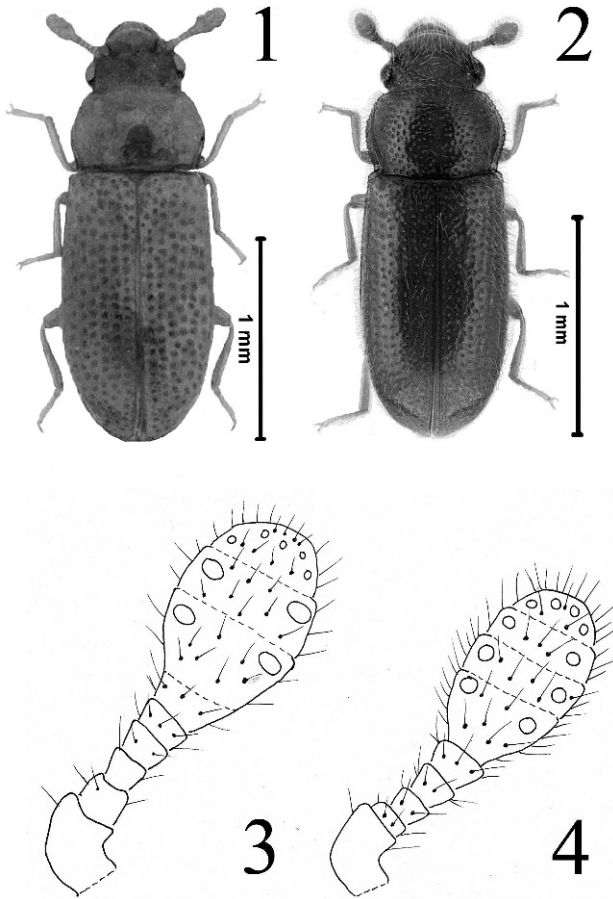
Figs. 1, 3

Tyrtaeus rufus Champion 1913: 77; Hetschko 1930: 100; Blackwelder 1945: 474; Hinton, 1947: 851; Dajoz, 1981: 227; Peck 2005: 135.

Tyrtaeus guadeloupensis Dajoz, 1981: 227. **NEW SYNONYMY.** [Although the types of *T. guadeloupensis* Dajoz were not available, his description, illustrations, and a long topotypic series allow us to be certain of the synonymy.]

Diagnosis. Distinguished from all described congeners by the combination of the antennal club of 3 fused segments (*i.e.*, there are 2 pairs of white pits, plus the apical series (Fig. 3), which at high magnification can be seen to contain stellate sensoria), with 6 (may appear to be 5) free segments before the club; elongate body form (Fig. 1); glossy rufo-testaceous color; dorsal surface with short, sparse and inconspicuous setae; punctures of head and prothorax usually separated by two to four or more puncture diameters; lateral edges of pronotum sinuately narrowed posteriorly and irregularly crenulate; elytra nearly glabrous with moderate punctures forming well-defined and separated striae; triangular labrum; lack of male setal patches on the first 2 ventrites; and unmodified ventrites of the female.

Description. Length 1.10–2.25 mm. Elongate, somewhat flattened, surface finely punctate, glossy, yellowish-brown to dark reddish brown (Fig. 1). Head finely punctate; eye round, not at all emarginate. Antenna (Fig. 3) short, 7-segmented, reaching anterior third of thorax; finely to moderately setose, last antennomere with stellate sensoria (visible at $\geq 50\times$ magnification, appearing as



Figs. 1–2. Habiti photos. **1)** *Tyrtaeus rufus* Champion; **2)** *Tyrtaeus dobsoni* Hinton. **Figs. 3–4.** Antennae. **3)** *Tyrtaeus rufus* Champion; **4)** *Tyrtaeus dobsoni* Hinton.

minute circular white pits at lower magnification); scape and pedicel broader than antennomeres 3–6; scape quadrate; pedicel slightly transverse; antennomeres 3–6 gradually widening; antennomere 3 marginally longer than broad, 4–6 subquadrate, subequal; antennomere 7 triannulate, widened to form distinct club, as long as antennomeres 3–6 combined. Anterior margin of clypeus truncate; clypeo-frontal suture present; clypeolabral membrane visible; labrum triangular, giving the head a triangular shape from above; galea expanded, somewhat securiform at apex; terminal segment of maxillary palpus acuminate; palpi yellowish-brown. Pronotum short, transversely convex, lateral margins rounded, slightly crenulate toward base, sinuate, narrowed before base, posterior angles acute; pronotal surface finely punctate with several coarser impressions on each side near the base. Scutellum small, triangular, flat. Elytra entirely covering metathoracic wings, somewhat flattened on the disk; elytra subequal in width to pronotum, parallel in their anterior half, humeri angular; elytra with rows of

punctures which diminish towards the apices; elytral interstices broad, flat, smooth; epipleuron narrowing abruptly at fifth abdominal ventrite. Legs and tarsi yellowish-brown; tarsal formula 4-4-4, tarsi sparsely pilose beneath. Ventral surface finely punctate; abdomen with visible membrane along hind margin of visible ventrites 3 and 4; ventrite 5 transversely depressed at the apex in males.

Distribution. Florida, Cuba, Grand Cayman, Guadeloupe, Dominica, Mexico, Guatemala, Costa Rica, Panama, Colombia, Venezuela.

Biology. This species is most commonly taken under bark, but shows amazingly catholic tastes in this regard, having been taken under bark of *Terminalia* (Combretaceae), *Bursera* (Burseraceae), *Ceiba* and *Ochroma* (Bombacaceae), and *Rhizophora* (Rhizophoraceae). It has also been taken in association with imported orchids, under rocks, and among dead leaves.

Material Examined. *Tyrtaeus rufus* Champion. **LECTOTYPE** here designated: specimen of undetermined sex in BMNH mounted on card. Round blue-ringed label "SYN-; TYPE / S. Geronimo.; Guatemala.; Champion./ *Tyrtaeus; rufus* Ch. / Sp. figured. / Tr. Ent. Soc. L.; 1913; det. Champion./ **LECTOTYPE**; *Tyrtaeus rufus*; Champion; designated by; Hopp & Ivie '08." **PARALECTOTYPES** here designated, each with a label reading: "PARALECTOTYPE; *Tyrtaeus rufus*; Champion; designated by; Hopp & Ivie '08." 1 – Round blue-ringed syntype label and red-ringed type label; "SYN-; TYPE / TYPE/ S. Geronimo.; Guatemala.; Champion./ *Tyrtaeus; rufus* Ch. / Tr. Ent. Soc. L.; 1913; det. Champion." [BMNH]. 1 – Round blue-ringed syntype label; "SYN-; TYPE/ El Jicaró.; Vera Paz.; Champion./ 1911-403./ *Tyrtaeus; rufus* Ch./ Tr. Ent. Soc. L.; 1913.; det. Champion." [BMNH]. 2 – Round blue-ringed syntype label; "SYN-; TYPE/ El Jicaró.; Vera Paz.; Champion./ 1911-403./ ♀/ *Tyrtaeus; rufus* Ch./ Tr. Ent. Soc. L.; 1913.; det. Champion." [BMNH]. 1 – Round blue-ringed syntype label; "SYN-; TYPE/ El Jicaró.; Vera Paz.; Champion./ *Tyrtaeus; rufus* Ch." [NMNH]. 1 – Round blue-ringed label "SYN-; TYPE /♂/ Tamahu.; Vera Paz.; Champion./ 1911-403./ *Tyrtaeus; rufus* Ch./ Tr. Ent. Soc. L.; 1913.; det. Champion./ Placed presently; in Colydiidae; all tarsi apparently; 4-jointed. Careful; examination required" [BMNH]. In spite of labels to the contrary added at the National Museum of Natural History in Washington, three specimens cited by Champion from Cuba (data below in Material Examined) are not eligible to be designated as paralectotypes, because he specifically excluded them from the type series with the statement "Described from 7 specimens from Guatemala." The Cuban specimens were mentioned as "others."

Material examined in addition to types: FLORIDA: Collier Co., Everglades City, 3 Jan. 1977, W. E. Steiner, under bark of *Rhizophora* (3 NMNH). CUBA: Pinar del Rio, Sierra del Rosario, ca. 15 km S. Cinco Pesos Rangel, 29 JUNE 1990, 420 m, M. A. Ivie (1 MAIC); Cayamas, Baker (1 NMNH); Cayamas, 8.6, E. A. Schwarz, in *Ceiba* bark, ♂, [this specimen bears a red label with the text "Paratype; 21518; U.S.N.M." followed by a label with "Tyrtaeus; rufus Ch." but is not eligible for paralectotype status because the Cuban specimens were excluded from the types series by Champion, see above] (on red paper) PARATYPE, 21518, U.S.N.M. (1 NMNH); and Cayamas, 8.6, Cuba, E. A. Schwarz, in *Ceiba* bark, 872 (1 NMNH). CAYMAN ISLANDS: Grand Cayman, The Mountain, 2 km SW of Old Man Bay, 19°20'N, 81°12'W; 18 February 1993/ Under bark of rotten trunk of *Bursera simarouba*; F. J. Burton, W. E. Steiner & J. M. Swearingen (1 NMNH); Grand Cayman, Salina Reserve, 19°21'N, 81°08'W; 17 February 1993, under bark of rotten trunk of *Bursera simarouba*, F. J. Burton, W. E. Steiner & J. M. Swearingen (1 NMNH); Grand Cayman, Prospect;

19°17'N, 81°20'W; 25 February 1993, W. E. Steiner & J. M. Swearingen, under bark of dead standing *Terminalia catappa* near beach (1 NMNH). GUADELOUPE: Basse Terre rd to Soufriere, 748 m, 16°01.883'N, 61°40.854'W, 23 AUG 2005, M. A. Ivie, under bark of lg dead log (69 WIBF). DOMINICA: 3 mi. E. of Pont Casse; VII-16-1964, T. J. Spilman (7 NMNH). MEXICO: Cordoba; Mex. Ver., Dr. A. Fenyes (1 CASC); Laredo, Tex, ex. Mexico, X-26-1945, with orchids, #45-18921 (1 NMNH). COSTA RICA: Puntarenas, Est. La Leona, Penn. Osa en pie Balsa Muerto, 25 JUN 2001, W. Porras (1 INBIO, 4 MAIC); San Jose, XI-18-55, B. Malkin (1 MAIC). PANAMA: Cerro Campana, 2,900', VIII.2.1970, J. M. Campbell (2 CNCI); C.Z. 5.0-8.0 mi. NW Gamboa, Pipeline Rd., 28 May 72, T. L. and L. J. Erwin, expedition #29 in notebook #1 (3 NMNH); Portobelo, 1-26-70, Island P3, D. Simberloff, P3-13 (1 MCZC); Cocle, El Valle, 829 m, 26 May 1983, W. E. Steiner, under bark of large log in forest (1 NMNH); Paraiso CZ, Mar 4, [19]11, E. A. Schwarz (1 NMNH). COLOMBIA: Cundinamarca, Finca Bella Vista nr. Sasaima, 7-IV-1965, P. R. Craig, collected under rocks and leaves on ground (1 CASC); Buenaventura, XI-4-1950, E. S. Ross (1 CASC). VENEZUELA: Cuyagua, litoral (Edo. Aragua), Bordón leg., 1 XII 1979 (6 on single card MIZA).

Remarks. *Tyrtaeus rufus* was originally described from Guatemala and Cuba, and except for a record from Guadeloupe by Dajoz (1981), who redescribed it as *Tyrtaeus guadeloupensis*, inclusion in a key by Hinton (1947) and a few lists, it has not had any notice in the literature. It was taken in Florida under bark of red mangrove (*Rhizophora mangle* L., Rhizophoraceae) in January 1977, and other than an interception at the Texas/Mexico border in 1945, this is the only record of the species from the United States. *Tyrtaeus rufus* has also been taken in Mexico, Costa Rica, Panama, Colombia, Venezuela, Grand Cayman, and Dominica.

Tyrtaeus dobsoni Hinton

Figs. 2, 4

Tyrtaeus dobsoni Hinton 1947: 852.

Diagnosis. Distinguished from its described congeners by the combination of the antennal club of 4 fused segments (*i.e.*, there are 3 pairs of white pits [Fig. 4], plus the apical series, which at high magnification can be seen to contain stellate sensoria), with 5 free segments before the club; elongate form (Fig. 2); shining rufo-testaceous color; dorsal surface moderately densely clothed with setae, those of the pronotum long and directed mesally from both sides (Fig. 2); head with punctures approximately a third coarser than facets of the eyes; pronotum broadly margined at sides, punctures as coarse as those of head; elytra with strong stria punctures with the striae occasionally confused (Fig. 2); labrum triangular; lack of male setal patches on the first 2 ventrites; and unmodified ventrites of the female.

Description. See Hinton (1947) for description.

Distribution. Florida, Scotland (Glasgow harbor), Philippines (Luzon, Leyte, and Samar), and Marshall Islands (Majuro Atoll).

Biology. Label data indicate a large series was taken out of an aphid suction trap sampling flying insects at 8 m above the ground.

Types. Holotype and seven paratypes deposited in BMNH (not examined).

Material Examined. FLORIDA: Dade Co., Kendall 14-21-VI-2002, Gwen Myers, 26 ft. suction trap (1 WIBF); Dade Co., Kendall, Old Cutler Rd., 1-8-VI-2007, S. Halbert, suction trap (1 FSCA); *ibid.* 29/VI-6/VII-2007 (1 FSCA); *ibid.* 13-20-VII-2007 (1 WIBF [disarticulated]); *ibid.* 20-27-VII-2007 (1 FSCA, 1 WIBF

[disarticulated]); *ibid.* 17-24-VIII-2007 (1 WIBF); *ibid.* 31-VIII-7-IX-2007 (1 FSCA); *ibid.* 14-21-IX-2007 (1 FSCA); Palm Beach Co., Lake Worth Harbour Greens Drive, July 12, 2007, Vince Golia, black light (1 VGPC); Palm Beach Co., West Palm Beach, Haverhill Road & Tyler Lakes Blvd., April 24, 2007, Vince Golia, wood litter (1 VGPC). PHILIPPINE ISLANDS: Quezon Park Tayabas, Alt. 1,000 ft., X-26-31, F. C. Hadden (1 CASC); Tacloban, Leyte, XI-1944, E. S. Ross (1 CASC); Samar, IV-1945, J. R. Stuntz (1 CASC). MARSHALL ISLANDS: Majuro Atoll, the airfield, VIII-27-46, Townes 1979 (2 NMNH).

Remarks. *Tyrtaeus dobsoni* has been repeatedly taken by suction trap and once each in wood litter and at black light. In Florida, it was initially taken from Dade Co. in June 2002, and has more recently been taken in both Dade and Palm Beach Counties throughout the summer of 2007.

In an unusually good description, Hinton (1947) figured the antenna, mandible, tarsus, palpi, and male genitalia of this homeless beetle, which was described from specimens found in the cracks between the floor boards over the bilge of the lower hold of a ship at Glasgow, Scotland. Apparently the harbor does not count as part of Britain, as it is not listed as a British beetle (Pope 1977), yet is reported from nowhere else. Hinton (1947) reported that crushed bones from India were carried in another part of the same hold, and therefore suspected this species might be a native of India. Subsequent citations have actually listed it from India (e.g., Dajoz 1981), but there is no actual evidence of it occurring there, leaving Glasgow harbor as the only previously verified locale for the species. Based on specimens we have seen, we can add Luzon, Leyte, and Samar in the Philippines and Majuro Atoll in the Marshall Islands to the Florida and Scottish ship records.

Discussion of Distributions

Are *T. rufus* and *T. dobsoni* alien species in the New World? The evidence is not conclusive, but strongly supports the hypothesis that these species have been spreading through the agency of humans for the last 100 years. The interception of *T. rufus* with orchids from Mexico at the Texas border and the presence of *T. dobsoni* in floor boards on a ship and at the airfield on Majuro Atoll establish the absolute possibility that they can be, and have been, moved around by humans.

These species are generalist feeders in situations of fungus-infested wood, bark and litter, and are easily collected when present. As such, they would not be expected to be naturally widespread unless they were reported from all over the tropics at a very early date.

The known distribution of *T. dobsoni* – a ship in Glasgow, three islands in the Philippines, an atoll airstrip in the Pacific, and south Florida – leave little doubt about the association of this species with human activity. *Tyrtaeus rufus* requires a bit more thought. The current distribution is more-or-less circum-Caribbean, yet it does not exhibit the distribution expected of a naturally circum-Caribbean species. As mentioned above, MAI has been actively assembling specimens of this group for 20 years. During that time, most of the existing West Indian collections have been checked. Furthermore, others know of this interest, and call attention to specimens they find. Members of our laboratory have been very actively collecting in the West Indies for 30 years, and have done in-depth surveys of the Virgin Islands and Montserrat, extensive collecting in Puerto Rico, Hispaniola, and Anguilla, and some collecting on many other islands. In spite of its small size, *T. rufus* is easily seen when present because its bright reddish color reflects like a garnet when the light hits it, and when present, *T. rufus* is neither rare nor cryptic.

Yet, the MAI collections on Cuba and Guadeloupe are from islands with some of the least collecting by our group of any islands visited. Warren Steiner has also visited several islands in the West Indies, and obviously knows how to collect this species, but has found it only on Grand Cayman and in Florida. If *T. rufus* were truly a widespread native to the region, it should have been found on all the islands with appropriate habitat – *i.e.*, virtually all of them.

The history of the discovery of the Florida population also indicates a recent arrival. Collecting began in Florida in the 1870s when E. A. Schwarz collected in the region (Peck and Thomas 1998). This species' habitat fell into the range of Schwarz's collecting preferences, as shown by the fact that he collected *T. rufus* in both Cuba and Panama. Lastly, the Everglades City specimens were from under bark of red mangrove, a habitat extensively sampled by Daniel Simberloff (1976) in his famous study of island biogeography in Florida Bay in the 1960s. Simberloff collected not only on manglars (islands of mangrove trees), but also in fringing swamps, and employed Robert Silberglied to census this habitat extensively in his effort to understand the species pool in that habitat (D. Simberloff, *in litt.*), and no *Tyrtaeus* were recovered. These collections were deposited in the MCZ while John Lawrence was employed there, and he had a special interest in this group.

While Simberloff did not find it in Florida mangroves, he collected this species from red mangrove in Panama (see material examined above, habitat data from D. Simberloff, pers. com.). The Panamanian specimen is labeled in John Lawrence's handwriting, supporting the idea that he would have pulled specimens of this odd group if they had been in the Florida collections. Why did Schwarz and the many that followed him not collect it in Florida? Perhaps because the species was not there yet.

Further indication of the exotic nature of *T. rufus* in Florida is not only for it to have been detected so late, but also the failure to recollect it. Often, exotic tropical species are introduced into the temperate zone, only to die out because of cold winter temperatures. Although the average low in Everglades City is 12°C, temperatures as low as –5°C have been recorded, and that record dates to 1996. In the last several decades, many coleopterists have regularly collected in south Florida, as documented by Peck and Thomas (1998). It seems that either a small local population has established near the marina at Everglades City, or the incipient population there has died out, failing to spread in a temperate-zone area beyond its tropical habitat. That a species so general in its tastes would be native in the area, and missed by all but one collector, and that collector (beetle collector extraordinaire Warren Steiner) has found it only once, is highly unlikely.

Lastly, all specimens from the West Indies and Florida are from disturbed habitats near ports, the exact place a non-native species is expected to be detected. It seems obvious that the distribution of Cuba, Grand Cayman, Guadeloupe, and Dominica, plus south Florida, is not a natural one.

So, if indeed these species are not native to Florida and, for *T. rufus*, the West Indies, where is their geographic origin? A phylogenetic hypothesis is needed, but not available now, nor expected in the near future. *Tyrtaeus rufus* and *T. dobsoni* are the most similar looking to each other of the New World species we have seen, with the exception of two singletons in the FSCA and NMNH from Amazonian Brazil, which may prove to be *T. rufus*. In fact, if it was not for the long series of specimens lacking intermediates, the suspicion that the two forms are conspecific would not be out of the question. All other New World species are quite different in shape from these two. The other three species with the distinctive shape of

pronotum, triangular labrum, and elongate parallel body shared by these two are all from the Oriental region, but the types of those species have not been available. These three were described by Dajoz from single specimens from India, Sulawesi, and Sumatra. They may yet prove to be synonyms of our two species. Therefore, the original home may be the Central American distribution of *T. rufus*, the Philippine distribution of *T. dobsoni*, or some other place as yet undiscovered. The ship in Glasgow harbor and south Florida can, however, be safely excluded from the possibilities.

Acknowledgments

The impetus for this paper's completion was the discovery and subsequent loans of the Florida specimens by Warren E. Steiner, Jr. and Michael C. Thomas. The accumulation of data that allowed the interpretation of these findings was through the help of many people over two decades. First, we thank the curators listed with the museum codens above, who made the material available. Specimens from CASC, CNCI and MCZC were studied via materials received from the Muséum National d'Histoire Naturelle in Paris, thanks to N. Berté and C. Girard. Field work in Costa Rica was organized and funded by INBio; travel in Cuba was made possible by Luis R. Hernandez, Luis de Armas Chaviano, the Instituto de Ecología y Sistemática, and the Museo Nacional de Historia Natural in Havana; Fortuné Chalumeau and Bernard Brochier made work in Guadeloupe possible. Study of material in Paris, which started interest in the group, was funded by an NSF Dissertation Improvement Grant to MAI. In addition to those mentioned above and in the text, John T. Doyen, John F. Lawrence and S. Adam Ślipiński have all directed specimens our way over the years. Daniel Simberloff was kind enough to look up and allow us to use unpublished data from his 1970 work in Panama. Thanks to the late Alistair S. Ramsdale, as well as Rolf L. Aalbu, Maxwell V. L. Barclay, Daniel Simberloff, and Paul E. Skelley for reviewing an earlier version of the manuscript. This is a contribution of the Montana Agricultural Experiment Station.

Literature Cited

- Aalbu, R. L., C. A. Triplehorn, J. M. Campbell, K. W. Brown, R. E. Somerby, and D. B. Thomas. 2002. Tenebrionidae Latreille 1802, [pp. 463–509]. In: (R. H. Arnett, M. C. Thomas, P. E. Skelley, and J. H. Frank, editors). *American Beetles*. Volume 2. CRC Press, Boca Raton, Florida.
- Blackwelder, R. E. 1945. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 3. Bulletin of the United States National Museum 185:343–550.
- Bouchard, P., J. F. Lawrence, A. E. Davies, and A. F. Newton. 2005. Synoptic classification of the world Tenebrionidae (Insecta: Coleoptera) with a review of family-group names. *Annales Zoologici (Warszawa)* 55:499–530.
- Champion, G. C. 1913. Notes on various Central American Coleoptera, with descriptions of new genera and species. *Transactions of the Entomological Society of London* 1913:58–169 plates III–IV.
- Costa Lima, A. da. 1956. Nova especie de *Lapethus* (Coleoptera: Colydiidae, Murmiidiida, Lapethini). *Memorias de Instituto Oswaldo Cruz* 54:429–432.
- Dajoz, R. 1977. Deux nouveaux genres de Colydiidae Anopidiini du Cameroun et de l'île Maurice (Insectes, Coléoptères). *Bulletin mensuel de la Société Linnéenne de Lyon* 46:240–245.
- Dajoz, R. 1981. Description d'espèces nouvelles du genre *Tyrtaeus* Champion (Coléoptères, Tenebrionidae). *Bulletin mensuel de la Société Linnéenne de Lyon* 50:227–230.

- Doyen, J. T., and J. F. Lawrence. 1979.** Relationships and higher classification of some Tenebrionidae and Zopheridae (Coleoptera). *Systematic Entomology* 4:333–337, 54 figures.
- Doyen, J. T., and G. O. Poinar, Jr. 1994.** Tenebrionidae from Dominican Amber (Coleoptera). *Entomologica Scandinavica* 25:27–51.
- Grouvelle, A. 1918.** Coleoptera of the families Ostomidae, Monotomidae, Colydiidae and Notiophygidae from the Seychelles and Aldabra Islands. *Transactions of the Entomological Society of London* 1918:1–57.
- Hetschko, A. 1930.** *Coleopterorum Catalogus*, pars 107. Colydiidae, 124, Junk, the Hague.
- Hinton, H. E. 1947.** A new species of Colydiidae associated with stored products, with key to the species of *Tyrtaeus* Champion (Coleoptera). *The Annals and Magazine of Natural History* 13:851–856.
- Matthews, E. G., and J. F. Lawrence. 2005.** New taxa, new synonymy and new generic records for Australian Tenebrionidae (Coleoptera). *Annales Zoologici (Warszawa)* 55:531–547.
- Peck, S. B. 2005.** A Checklist of the Beetles of Cuba. *Arthropods of Florida and Neighboring Land Areas* 18:i–vi + 1–241.
- Peck, S. B., and M. C. Thomas. 1998.** A Distributional Checklist of Beetles (Coleoptera) of Florida. *Arthropods of Florida and Neighboring Land Areas* 16:1–180.
- Pope, R. D. 1977.** Kloet and Hincks's A Check List of British Insects: Coleoptera and Strepsiptera. *Handbooks for the identification of British insects*, vol. XI, Part 3. Royal Entomological Society of London, xiv + 105 pp.
- Simberloff, D. 1976.** Experimental zoogeography of islands – effects of island size. *Ecology* 57:629–648.

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