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Discovery of new species and country records for the North American sap beetle fauna (Coleoptera: Nitidulidae)

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Abstract

Brachypeplus habecki Cline and Skelley, **sp. nov.** is described from southern Texas, and *Brachypeplus glaber* LeConte is rediagnosed and discussed. *Cyllodes thomasi* Cline and Skelley, **sp. nov.** is described from southern Arizona, and *Cyllodes biplagiatus* is discussed. Habitus and genitalic photographs are provided as well as images of key diagnostic features for these species. An identification key is provided to distinguish the *Brachypeplus* and *Cyllodes* present in North America. *Cryptarcha omisitoides* Reitter, a previously unreported Central American nitidulid, is newly recorded from Arizona; and *Carpophilus opthalmicus* Murray, a previously unreported Caribbean species, is newly recorded from Florida. A discussion of *Cryptarcha omisitoides* and *Carpophilus opthalmicus* is also provided.

Key words: Nitidulidae, taxonomy, new species, biodiversity, fungivore

Introduction

The New World Nitidulidae fauna comprises an interesting blend of Global, Holarctic, and endemic genera. The widespread genera *Epuraea* Erichson and *Carpophilus* Stephens are well-represented in the Holarctic (Parsons 1943; Jelínek & Audisio 2007), but not diverse in the Neotropics (Blackwelder 1945). Conversely, the widespread genus *Cyllodes* Erichson is depauperate in the Nearctic (Parsons 1943), but species-rich in the Neotropics (Blackwelder 1945). *Cryptarcha* Shuckard, which also has a cosmopolitan distribution, is similar to *Cyllodes* with a majority of species present in the Neotropics but proportionately underrepresented in the Nearctic. The Meligethinae did not undergo a major radiation in the New World, and only a few species are present in the Nearctic with some ranges extending into parts of Mexico bordering the Neotropics. The Nitidulinae flourished in the New World, and no other region can boast the generic diversity present in the Western Hemisphere. The endemic genus *Camptodes* Erichson possesses more than 100 species with numerous new species awaiting formal description. The new distribution records below are indicative of Neotropical elements extending into southern portions of the United States, which has been previously reported for other nitidulid taxa (Cline 2004), as well as other Cucujoidea (Cline & McHugh 2010). Invasive Palearctic species have also entered the Nearctic, but less frequently (Majka & Cline 2006; Cline & Audisio 2011) although historical accounts of introductions are not readily available.

Brachypeplus Erichson (Coleoptera: Nitidulidae) is a large genus of sap beetle, comprising approximately 100 described species (Grouvelle 1913; Cline unpub. catalogue). The genus occurs in most major biogeographic zones with highest species diversity in tropical areas. These small beetles are typically less than 7 mm long, and possess a body form that is moderately to distinctly compressed dorsoventrally. This attribute undoubtedly is coupled to their prevalence in subcortical spaces. Two identification keys (Parsons 1943; Habeck 2002) for the nitidulids of North America use the following combination of characters to delimit this genus: body form elongate and dorsoventrally flattened, hypopygidium and pygidium short and depressed, elytra shortened exposing pygidium and preceding

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two abdominal tergites. Other helpful diagnostic characters include the presence of wide and distinct latersternites of the abdomen positioned in a dorsal orientation; antennal groove distinct and convergent; antennae short, not typically longer than head length; prosternal process slightly expanded laterally posterior to procoxal cavities; and lateral apical angles of tibiae not produced or expanded. These characters however do not adequately diagnose all members of the genus worldwide, due to the likely paraphyletic nature of this taxon. Previously, only one rarely collected species was known to be present in the United States, *B. glaber* LeConte (Parsons 1943). The rarity of the beetle in collections is primarily due to its secluded habits in inflorescence stalks of cabbage palms (*Sabal palmetto* (Walt.) Lodd.; Arecaceae) in the Gulf Coast region. This was discovered but never published by the late Dr. Dale H. Habeck. Our work to complete the natural history study he began lead to discovery of the new species reported here.

Cyllodes is similar to *Brachypeplus* in being a broadly distributed genus with highest species diversity in tropical regions. Less than 100 described species are currently known for the genus. These beetles typically range in size from approximately 3–6 mm in length, and possess a strongly convex, glabrous body. *Cyllodes* is currently placed in the Nitidulinae tribe Cyllodini Everts, which has had some recent phylogenetic reconstructions (Leschen 1999). In these reconstructions *Cyllodes* was consistently placed as sister to *Neopallodes* Reitter, an Old World genus, and in one successive weighting tree it was placed as sister to *Vietterchnus* Kirejtshuk, a southeastern Asian genus. In a generic key to the Italian nitidulid fauna (Audisio 1993), *Cyllodes* was distinguished by the following combination of characters: tarsal claws never bipartite, body hemispherical, strongly convex above, flat ventrally with dorsal surface entirely glabrous. In the Nearctic, two generic keys are available (Parsons 1943; Habeck 2002) and both use these additional characters to distinguish *Cyllodes* from other genera: metasternum protuberant and widely separating mesocoxae, and prosternum not prolonged at tip. Leschen (1999) provided a key to world Cyllodini genera, and included the following characters to aid in delimiting *Cyllodes*: pygidium visible in dorsal view, elytra with well-developed punctate striae; axillary sclerites present on mesosternum; and posterior prosternal wall present.

Materials and methods

Materials studied are deposited in the following institutions:

ARCC	Andrew R. Cline Collection, Sacramento, CA, USA
BMNH	Natural History Museum, London, England
CAS	California Academy of Sciences, San Francisco, CA, USA
CNC	Canadian National Collection of Insects, Ottawa, Ontario, Canada
CSCA	California State Collection of Arthropods, Sacramento, CA, USA
EIUC	Eastern Illinois University Collection, Charleston, IL, USA
FMNH	Field Museum of Natural History, Chicago, IL, USA
FSCA	Florida State Collection of Arthropods, Gainesville, FL, USA
HNHM	Hungarian Natural History Museum, Budapest, Hungary
INHS	Illinois Natural History Survey, Champaign, IL, USA
KDKC	Ken Karns, Lancaster, OH, USA
KESC	Kyle E. Schnepp Collection, Lafayette, IN, USA
LSAM	Louisiana State Arthropod Museum, Baton Rouge, LA, USA
MBPC	Michele B. Price Collection, Lewiston, ID, USA
MCZ	Museum of Comparative Zoology, Cambridge, MA, USA
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MSUC	A.J. Cook Arthropod Research Collection, Michigan State University, East Lansing, MI, USA
OSUC	Museum of Biological Diversity, Ohio State University, Columbus, OH, USA
PURC	Purdue University, Lafayette, IN, USA
RMBC	R. Michael Brattain, Lafayette, IN, USA
RWC	Reginald Webster Collection, Charters Settlement, New Brunswick, Canada
TAMU	Insect Collection, Texas A&M University, College Station, TX, USA

UCDC	R.M. Bohart Museum of Entomology, University of California-Davis. CA, USA
UCRC	Entomology Research Museum, University of California-Riverside, Riverside, CA, USA
UNHC	University of New Hampshire, Durham, NH, USA
UMMZ	University of Michigan, Museum of Zoology, Ann Arbor, MI, USA
USNM	United States National Museum, Smithsonian Institution, Washington, DC, USA
WIRC	University of Wisconsin Insect Research Collection, Madison, WI, USA
CMNH	Carnegie Museum of Natural History, Pittsburg, PA, USA
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

Habitus images were captured using a RT Spot® color camera (Diagnostic Instruments®, Inc.) attached to a Nikon® SMZ 1500 stereo microscope. Multiple images were acquired and then montaged with CombineZ® and edited using Adobe Photoshop®.

Total length and width measurement values are averaged for the entire type series of specimens for the new *Cyllodes* species (n = 20). Total length is defined as the distance from the anterior margin of the labrum to the apex of the elytra in the *Cyllodes* species and the apex of the pygidium in the *Brachypeplus* species, and total width was measured at the widest point across the elytra in both new species. Pronotal length was the length measured at the midline from the anterior to posterior margin, and pronotal width was measured at the widest point across the pronotum. Metasternal length was the length measured at the midline from the anterior to posterior margin, and metasternal width was measured at the widest point across the metaventrite. Scale bars were calibrated with an ocular micrometer using SPOT® Advanced software on the habitus images, which were taken with a digital camera attached to a Nikon® SMZ1500 dissecting microscope. Genitalia and mouthparts were extracted, manually cleaned with minuten pins and KOH, and placed on glycerin slide mounts for observation and imaging.

Specimen label data was reported verbatim with the following conventions: semicolons (;) were used to designate line breaks, and back slashes (/) to designate different labels. Information contained within brackets corresponds to additional information about that particular specimen or label characteristic information. All holotype labels were printed on red paper, whereas all paratype labels were printed on yellow paper.

New North American records

1) *Cryptarcha* (*Lepiarcha*) *omisitoides* Reitter 1873

This species was originally described as a member of *Cryptarcha* and subsequently transferred to *Lepiarcha* by Sharp (1890), and later transferred back to *Cryptarcha* by Parsons (1943) as *C.* (*Lepiarcha*) *omisitoides*. Prior to this new record, this species was known from Mexico and Guatemala (Sharp 1890; Grouvelle 1913, misspelled as *Lipiarcha*; Blackwelder 1945). The species is similar to the widespread Nearctic species *C. concinna* Melsheimer (Parsons 1943) and both are considered to be in the same subgenus, however it differs in several characters, including: a truncate prosternal apex; male mandibles equal in size and shape; metasternal disc with coarsely punctate surface sculpturing; and elongate apical setae present on the male tegmen.

New Distribution Record: ARIZONA: Cochise; Co. Chiricahua; Mts. Near Portal; July 28–Aug. 7 1966 / K. Stephan leg.; Black Light (FSCA). ARIZONA Santa; Catalina Mts.; Bear Cyn. 15Jul70; K.Stephan coll. (FSCA).

2) *Carpophilus opthalmicus* Murray 1864

This species was originally known to be present in Mexico and Trinidad. Sharp (1890) remarked that Murray's account of the species in Mexico was likely erroneous and considered the type locality of Trinidad as indicative of the true range of the species. The record below indicates the first record of the species in the United States. This record also provides new host information as well, i.e. an association with members of Cactaceae. Many members of the genus are known from cactus flowers, especially *Opuntia* species.

New Distribution Record: FLORIDA, Monroe Co.; Big Pine Key. 18–V–1988; D. H. Habeck, M. Hennessey; *Cereus gracilis* flowers; open night before (FSCA). FLORIDA: Miami-Dade; Co., Kendall, USDA Station; Bldg. 8, 1–X–2011, P. Skelley; [night] bloom of epiphytic cactus (FSCA).

Key to *Cyllodes* Adults Occurring in North America

1. Elytra black to dark brown with dark red to orange-red spot near humeri (Fig. 1); anterior margin of metasternum truncate; tegmen of male genitalia with setae evenly distributed along apical region; occurring in eastern North America from New York and Ontario west to Wisconsin and Indiana, but not present in the southeastern states or west of the Mississippi River . . . . . *C. biplagiatus* LeConte
- Elytra unicolorous with no markings (Fig. 2); anterior margin of metasternum concave for reception of the prosternal process; tegmen of male genitalia with two distinct patches of setae at apicolateral angles as well as setae along apical region (Fig. 7); occurring only in southern Arizona. . . . . *C. thomasi* Cline and Skelley, **n. sp.**

Cyllodes species treatments

Cyllodes biplagiatus LeConte 1866
(Fig. 1, 11)

Cyllodes biplagiatus LeConte 1866: 377**;** Henshaw 1885: 59; Leng 1920: 196; Parsons 1943: 248; Arnett 1963: 763; McNamara 1991: 217; Habeck 2002: 314; Sikes 2004: 170; Price & Young 2006: 77.

Distribution. Parsons (1943) states "This species occurs (May–July) from New Hampshire (Three Mile Island) to New Jersey (Orange Mt., Monmouth Jct.), west through New York (Buffalo), Michigan (Detroit, Marquette), Wisconsin (Bayfield), Minnesota (Fillmore Co.), and Manitoba (Aweme, Winnipeg, Victoria Beach)." Unfortunately this listing was only a distribution range that did not cite vouchers for any of the localities. The species is notably lacking from Blatchley's (1910) listing of the beetles of Indiana, and it is also absent from a current treatment of the fauna of Nova Scotia (Majka & Cline 2006) and Maine (Majka *et al*. 2011), but was found in New Brunswick (Majka *et al.* 2008). The host fungus is present in Nova Scotia (Wehmeyer 1950); however the beetle has not been collected there (Majka pers. comm.). Sikes (2004) did not find it in Rhode Island during his survey from 1995–2000, but noted it being reported as rare in the early 20th century (Davis 1904). Price and Young (2006) provide an up to date county listing for the species in Wisconsin. We compiled data from many North American museums and private collections to present more detailed distributional records and document the depositories of those specimens. The data (Appendix 1) presented herein are not verbatim label data, but have been altered into a standardized form and only represent locality and date of capture (if available). The current distribution of *C. biplagiatus* is depicted in Figure 11.

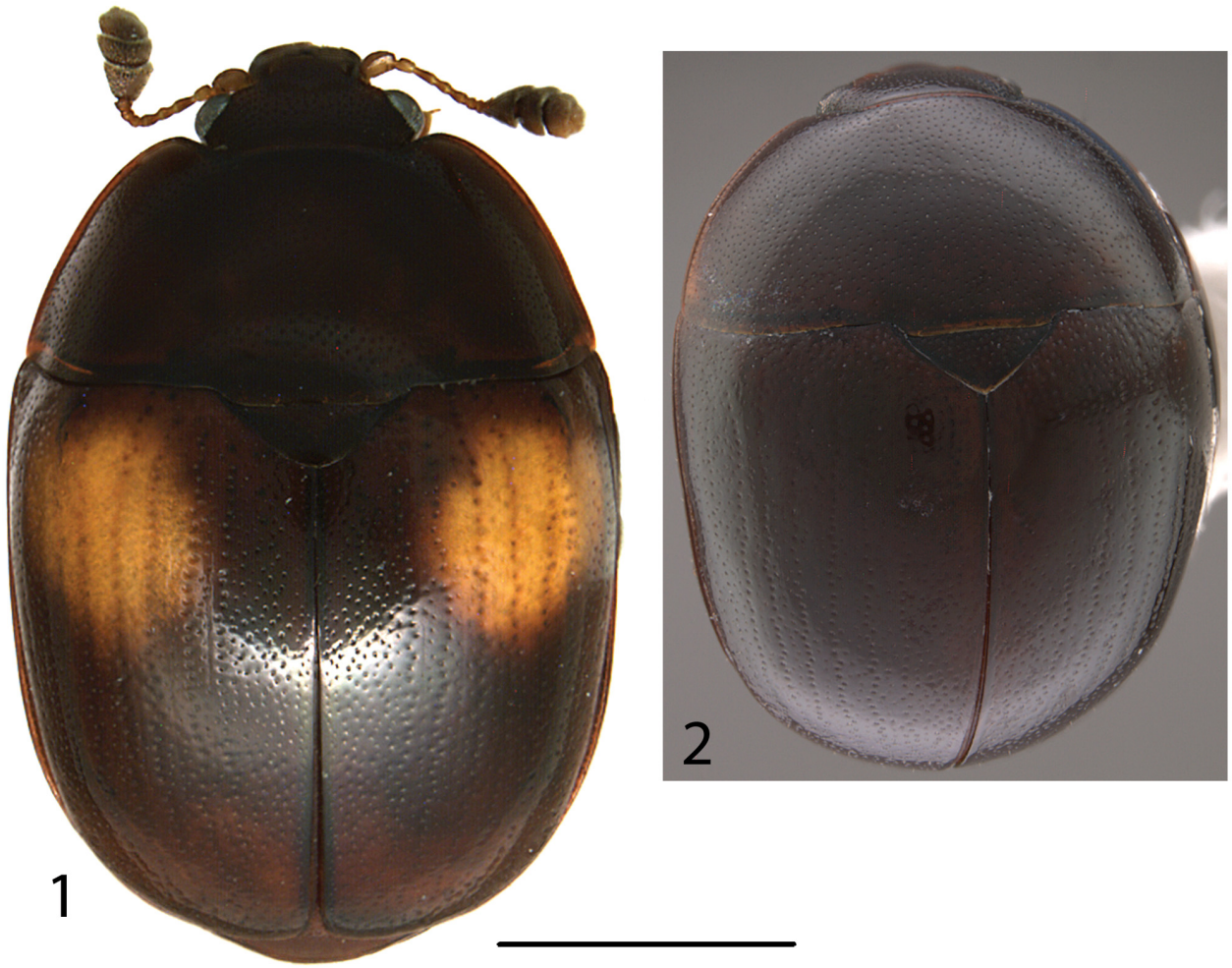
Biology. This species is known to be associated with oyster mushrooms, *Pleurotus ostreatus* Fries, with adult feeding occurring on the sporocarp (Downie & Arnett 1996; Cline & Leschen 2005; Price & Young 2006; Majka *et al.* 2008). Larvae of this species were described (Wickham 1894); however, species-level details are lacking and the line drawings are insufficient to determine any valid characters. The majority of collection records (Appendix 1) are from the early to middle 1900s. This fact may be indicative of a decline in *C. biplagiatus* in natural ecosystems or may conversely represent a reduction in the number of collections being made due to the loss of interest in natural history by recent generations. As mentioned above, Sikes (2004) indicated the species was present at the turn of the last century, albeit rarely, but was not collected during his recent intensive survey of the beetles of Rhode Island. This evidence may support an actual decline in this species in natural ecosystems and not a loss of interest in natural history collections. As noted by Cline and Leschen (2005) *Pleurotus* fungi are among some of the longest-lived fungi with sporocarps persisting for months if conditions are favorable. *Pleurotus* fungi also provide shelter or subsistence to at least 136 species of beetles in North America (Cline & Leschen 2005). Thus, even though the sporocarp may be long-lived, if fewer are present in nature, some species (e.g. *Cyllodes biplagiatus*) may be competitively excluded from feeding on the fungus and thus suffer correspondingly in reproductive output.

Cyllodes thomasi Cline and Skelley, n. sp.
(Figs. 2–10)

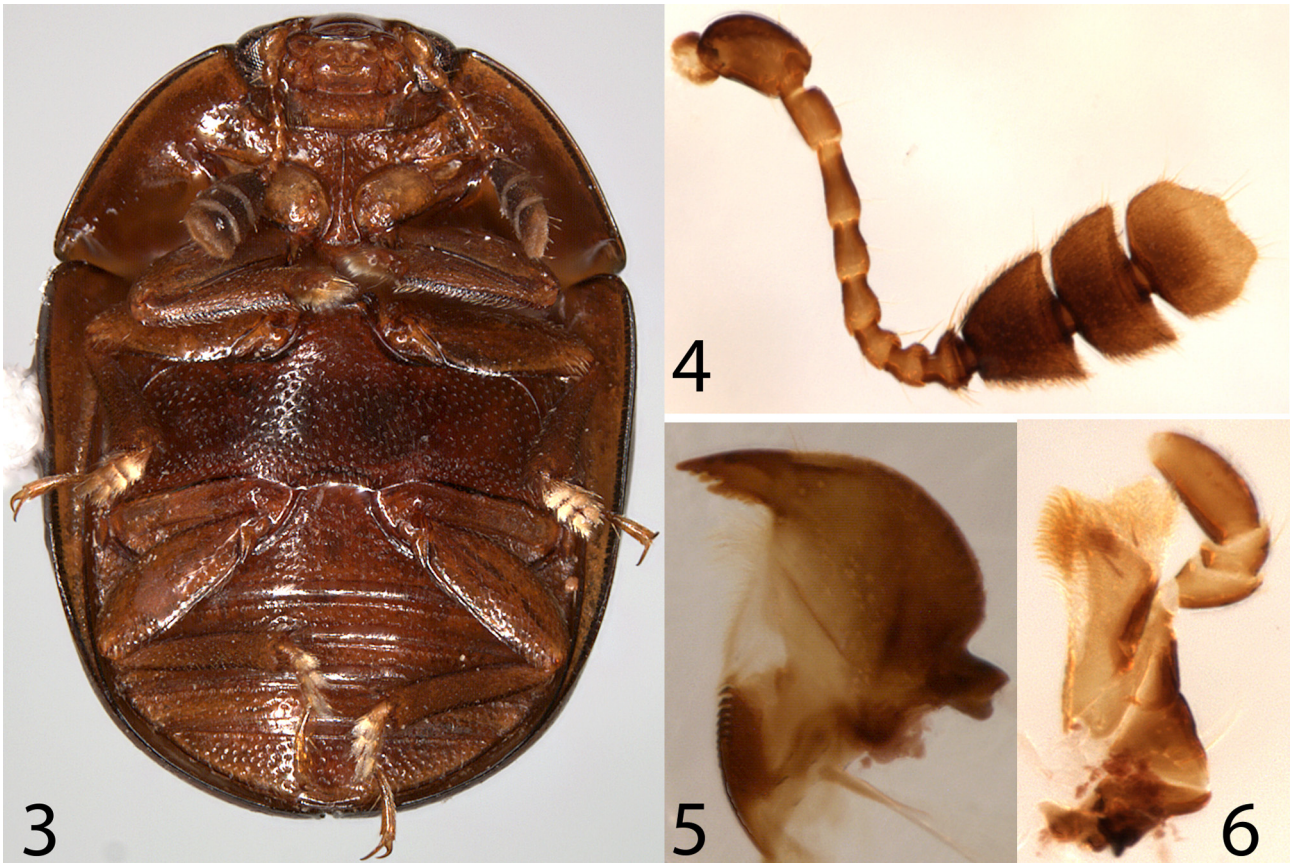
Specimens examined. Holotype (FSCA) Arizona: Santa; Rita Mts.; Madera Cyn.; Aug. 3 1968 / gilled fungus; K.

Stephan leg. / HOLOTYPE; *Cyllodes*; *thomasi*; Des. 2012 Cline and Skelley [the "gilled fungus" portion of the second label is handwritten on this label and all subsequent paratype labels with the same phrase].

Paratype—1 specimen: (ARCC) Arizona: Santa; Rita Mts.; Madera Cyn.; Aug. 3 1968 / gilled fungus; K. Stephan leg. Paratype—1 specimen (FSCA) Arizona: Santa; Rita Mts.; Madera Cyn.; Aug. 31 1968 / gilled fungus; K. Stephan leg. [anterior half of specimen missing, but rest of body corresponds to rest of type series]. Paratype–1 specimen (FSCA) Arizona: Santa; Rita Mts.; Madera Cyn.; July 28 1968 / gilled fungus; K. Stephan leg. Paratype—1 specimen (FSCA) Arizona: Pajarito Mts.; Pena Blanca; Sept. 9 1969 / K. Stephan leg.; fungus. Paratype—1 specimen (FSCA) ARIZONA Pajarito; Mts. Pena Blanca; Cyn. 15 Aug 1970; K. Stephan coll. / Cyllodes; **n. sp.** [the last label is handwritten]. Paratype–1 specimen (FSCA) ARIZONA: Cochise Co.; Chiricahua Mts. jct.; to Methodist Camp; Pinery Cyn., 6000; ft., 16–VIII–1989; P.E. Skelley. Paratype–13 specimens (CAS), 2 specimens (ARCC): U.S.A.: Arizona; Cochise Co.; Portal / 17 Sept. 1984; L.R. Gillogly / LORIN R. GILLOGLY; COLLECTION; DONATED TO THE; CALIF. ACADEMY OF SCIENCES; MAY 1990 / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley. Paratype–5 specimens (UCDC): AZ. Pima Co.; Madera Can.; 23 Aug 75; RB Kimsey / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley. Paratype–1 specimen (UCDC): Ramsay Cyn Ariz.; Huachuca Mts.; VIII–13–1947 / L.R. Gillogly; Collector / A.T. McClay; Collector / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley. Paratype–1 specimen (UCDC): Madera Cyn.; Santa Cruz; Co. Ariz. 4880; ft. VIII–28–1963 / V.L. Versterby; Collector / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley. Paratype–1 specimen (ARCC): ARIZONA: Cochise Co.; Chiricahua Mts., SW Res. Stn.; 31°53'N 109°12'W; 15–22 July 2001; A. Tishechkin, FIT #2 / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley. Paratype–2 specimens (LSAM): USA: AZ: Cochise Co.,; Chiricahua Mts., South; Fork, 31°52.066'N; 109°11.333'W, 30VII2010; Park 10–035, J.-S. Park,; ex) under bark / PARATYPE; *Cyllodes*; *thomasi*; Det. 2012 Cline and Skelley.



FIGURES 1–2. Dorsal habitus images of North American species of *Cyllodes*. **(1)** *C. biplagiatus* LeConte. **(2)** *C. thomasi* **n. sp.** Scale bar = 1 mm.



FIGURES 3–6. External characters of *C. thomasi* n. sp. **(3)** Ventral habitus; **(4)** right antenna; **(5)** right mandible; **(6)** right maxilla.

Description. Overall, body circular to slightly elliptical and highly convex dorsally. Length 2.8 mm (n = 19; one specimen missing head), width 2.0 mm (n = 20). Body unicolorous dark chestnut brown with abdomen and thoracic ventrites somewhat lighter. Surface sculpturing on dorsum consisting of minute punctures with finely granular to microreticulate interspaces between punctures. Body setation absent on dorsum; entire surface glossy and shining (Fig. 2).

Head moderately transverse (W:L = 1.45:1.00), with shallow depression across anterior part of vertex near frontoclypeal area. Surface punctures small and circular with some crescent shaped, irregular, approximately 1.5 eye facet width in diameter. Punctures more distinctly impressed medially and faintly impressed anteriorly and laterally; appearing evenly distributed across vertex. Interspaces granular to microreticulate, and approximately 1.0–1.5 puncture diameters apart. Antennal grooves present, convergent, and moderately well-defined. Eyes prominent, finely faceted, interfacetal setae absent. Antennal club shape elongate elliptical; club 0.60 length of segments 1–8 combined (Fig. 4). Terminal antennomere shorter than previous two segments combined; apex of terminal segment concave. Scape slightly curved with anterior margin convex; approximately 2 times longer than to pedicel. Pedicel small, barrel-shaped, shorter than segment 3. Clypeolabral junction shallowly concave. Labrum with anterior margin broadly concave with a shallow median indentation. Mandible with multi-dentate cutting apical edge; setigerous furrow with two prominent setae; molar region with large transverse ridges; prostheca with dense setal brush (Fig. 5). Maxillary palpi with terminal segment elongate and somewhat conical, longer than segments 1–2 combined; lacinia with apical margin indentate and setal brush confined to apicomedial region only not extending beyond basal half of structure (Fig. 6). Labial palpi with terminal segment somewhat barrel-shaped and subequal in length to segments 1–2 combined. Mentum moderately transverse with anterior margin possessing a medial point; surface punctuation consisting of faint minute punctures along posterior margin; interspaces smooth to finely microreticulate, surface shining. Submentum with punctures 2 times diameter of those on vertex; surface sculpturing similar to that of mentum.

FIGURES 7–10. Genitalia of *C. thomasi* n. sp. **(7)** Male tegmen; **(8)** Male median lobe; **(9)** male internal sac sclerites; **(10)** female ovipositor.

Pronotum somewhat transverse (L:W = 1.0:2.2), widest near posterior angles, highly convex across disc; punctures circular and similar in size to circular punctures on vertex, surface sculpturing smooth to finely microreticulate and slightly granular along posterior margin. Anterior angles evenly rounded, not projecting. Posterior angles evenly rounded, not projecting. Lateral margins evenly arcuate to posterior angles. Anterior margin with deep trapezoidal notch in medial region for reception of head. Posterior margin almost straight with slight expansion in medial region adjacent to scutellum. Prosternum with space between coxae and anterior margin approximately 2 times width of procoxal process between coxae. Prosternal process slightly expanded posterior to procoxae; a longitudinal carina is present in lateral posterior margin with evenly sloped vertical face. Mesonotum with scutellum obtusely triangular; surface punctation similar to that on pronotum, surface sculpturing granular with some faint microreticulation present. Mesosternum carinate, lower level than metasternum and prosternum; typically obscured by prosternal process. Meso-metasternal junction broadly concave. Metasternum overall transverse (W:L = 1.0:2.5); metasternal disc surface punctation dense with punctures circular and separated by 1–2 puncture diameters, each puncture associated with fine golden seta; surface sculpturing granular. Postcoxal lines of mesocoxae present, diverging from coxal cavities to middle of lateral margin of metasternite; a definitive, large triangular axillary space formed. Elytra completely covering pygidium or with only apex of pygidium exposed; elytral apices separately rounded; lateral margins not explanate; some serially punctate striae visible but other punctures randomly distributed; punctures similar to those on pronotum; sculpturing granular to smooth, shining, glabrous. Humeral angles not developed.

Visible abdominal ventrite 1 projecting between metacoxae with broadly rounded apex (Fig. 3). Metacoxal lines not diverging from metacoxal cavities. Visible abdominal ventrites 2–4 equal in length. Hypopygidium with posterior margin evenly rounded. Pygidium with posterior margin evenly rounded, and bearing short fine golden setae.

Legs unmodified, no sexual dimorphism apparent. Each femora canaliculate for reception of tibiae; widest near middle. Protibiae with crenulate lateral margin and two unequal apical spurs, apical 0.33 of structure more densely setose. Mesotibiae with row of short blunt spines along apical margin; lateral margin, apical margin and distal half of inner margin with thick stiff seta-like spines present. Metatibial armature similar to mesotibiae; inner margin straight with slight apical curvature. Tarsomeres 1–3 lobed with dense empodium ventrally possessing short setae and longer lateral seta; claws simple.

Female genitalia as observed in other *Cyllodes* species with fused gonocoxites along midline (Fig. 10), and gonocoxites broadly widened at base (L:W = 1.4:1.0).

Male genitalia moderately well sclerotized. Tegmen with two distinct apicolateral tufts of setae, as well as uniformly distributed setae along apical margin (Fig. 7). Tegmen overall short and broad (L:W = 1.45:1.0). Median lobe with apex slightly produced and truncate (Fig. 8). Internal sac sclerites with paired highly sclerotized ejaculatory rods; each end of ejaculatory rod divergent; large fields of callosities present around ejaculatory rods and proximal to ejaculatory rods (Fig. 9).

Diagnosis. *Cyllodes thomasi* differs from other members of the genus by possessing the following combination of characters: body small, <3 mm in length, mesosternum deeply concave for reception of the prosternal process; terminal antennomere with apical margin concave; maxillary galea with apical margin concave; apex of mandible appearing multi-dentate; mandible with apical setigerous furrow comprising only two elongate setae; male genitalia with tegmen possessing two distinct apicolateral setal tufts.

Variation. Male specimens sometimes, but not always, have the anal sclerite (tergite VIII) partially extruded from the body cavity.

Geographical distribution. The species is known only from the type localities in southern Arizona.

Biology. Label data indicates the species is found under bark or in association with “gilled fungi”. Although this doesn’t necessarily suggest the same host, i.e. *Pleurotus ostreatus*, as *C. biplagiatus*, other members of *Cyllodes*, e.g. the Palearctic *C. ater* (Herbst), are also known from *Pleurotus* (Audisio 1993) in addition to Agaricaeae and Polyporaceae. Other species of *Pleurotus* are present in the southwestern United States, and likely this species is associated with one of those taxa and not *P. ostreatus*. Label data also indicates a summer occurrence of this species from July through September. The appearance of these beetles likely coincides with summer rains in the region and the emergence of host fungi. Summer rains typically represent the most significant precipitation for this area. The specimens found under bark may indicate that the rains had not yet begun, and the beetles were seeking refuge in subcortical spaces.

Etymology. The specific epithet honors our colleague and friend, Dr. Michael Thomas, who has been a major contributor to Cucujoidea taxonomy and systematics.

Discussion/Notes. *Cyllodes thomasi* apparently does not share a close relationship with *C. biplagiatus* based on shared adult morphological features. A stronger affinity is shared between this species and *Cyllodes camptoides* Reitter from Mexico.

Key to *Brachypeplus* Adults Occurring in North America

1. Body appearing bicolored with the abdomen, metasternum and portions of the meso- and prosternum darker brown than rest of body, elytra light brown to testaceous in color (Fig. 14); scutellum pentagonal, apex prominent; sculpturing on femora not similar (fine transverse lines) to that on metasternum. Occurs along coastal regions of the southeastern USA . . . . . *B. glaber* LeConte
- Body appearing entirely dark piceous brown with the abdomen (Fig. 12), metasternum and portions of the meso- and prosternum similar in color to rest of body; scutellum broadly, obtusely triangular, apex not prominent; sculpturing on femora similar (scale-like) to that on metasternum. Occurs in extreme southern Texas. . . . . *B. habecki* Cline and Skelley, **n. sp.**

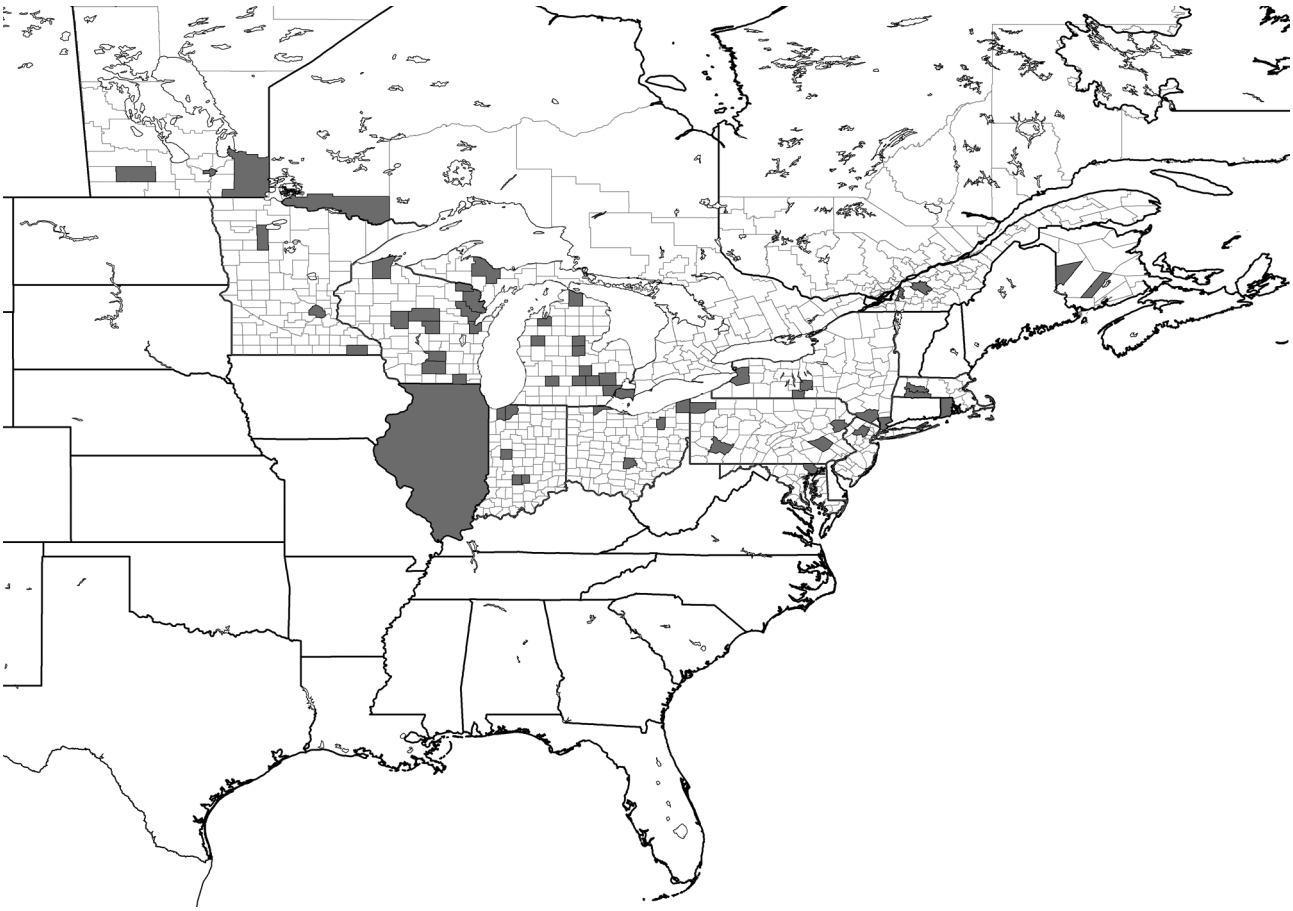


FIGURE 11. Distribution map of *C. biplagiatus*. Shaded areas indicate counties or states with specimen vouchers or published records. Completely shaded states, i.e. Illinois and Rhode Island, indicate states with no specific county records.

Brachypeplus species treatments

Brachypeplus glaber LeConte, 1878

(Fig. 14)

Brachypeplus glaber LeConte, 1878: 398; Henshaw 1885: 58; Leng 1920: 195; Parsons 1943: 155; Arnett 1963: 762; Habeck 2002: 313.

Specimens examined. Holotype (MCZ) "/Enterprise 8.6 Fla/ 1568 / [red paper] Type 6961 / [hand written] Brachypeplus glaber Lec./" (type examined, image available at MCZ type database, Perkins 2010). More than 100 other specimens were examined from the FSCA. These data are included in an upcoming manuscript on the biology of *B. glaber* (Cline et al. in prep.).

Diagnosis. *Brachypeplus glaber* is easily distinguished by its diminutive size, <4mm in length; lack of prominent body setation; scale-like micoreticulation on body proper; bicolored appearance; pentagonal scutellum; male genitalia with tegmen in lateral view evenly arcuate from base to apex, in ventral view with definitive row of sub-apical setae not extending beyond tegminal apex; median lobe of male genitalia possessing an acuminate apex with well-defined apicolateral angles, and with basal third of structure narrower than apical two-thirds.

Discussion/Notes. *Brachypeplus glaber* can be found wherever the cabbage palmetto occurs in the southeastern U.S. Specimens collected by D. Habeck are deposited in collections across the U.S., but most reside in the FSCA.

***Brachypeplus habecki* Cline and Skelley, n. sp.**
(Figs. 12–13)

Material examined. Holotype (TAMU) ♀ - USA: TEXAS: Cameron Co. / Sabal Palm Grove Ref. (site 1) / 25.84799°N, 97.41881°W / V–7–21–2009, FIT-ground / palm for. King & Riley-1015 // TAMU-ENTO / X0842606 [bar code label] // Brachypeplus / sp. / Det. E.G. Riley, 2010 // HOLOTYPE / Brachypeplus / habecki / Cline & Skelley Des. 2012 [red type label].

Description. Overall, body elongate, >3 times as long as wide, and flattened. Length 3.9 mm, width 0.9 mm. Body distinctly unicolored with abdomen and thoracic ventrites dark brown to piceous. Surface sculpturing on dorsum distinct and consisting of "scale-like" microreticulations between punctures on the head, pronotum, and elytra. Body setation minute and only apparent at high magnification; entire surface glossy and shining (Figs. 12–13).

Head transverse (W:L = 1.6:1.0), with paired depressions across the anterior part of vertex and frontoclypeal area. Surface punctures circular to slightly elliptical, irregular, approximately 2 eye facet widths in size. Punctures smaller and more vaguely impressed anteriorly, and more densely distributed along lateral and posterior margins. Interspaces microreticulate with scale-like sculpturing, and approximately 0.5–1.0 puncture diameter apart. Antennal grooves present, convergent, and well-defined by medial and lateral carinae. Vertex flat to slightly concave with shallow depressions on each side of midline near frontoclypeal region. Temples present and prominent, extending slightly beyond posterior lateral edge of eye. Eyes prominent, finely faceted, interfacetal setae absent. Antennal club shape slightly ovate; club 0.30 length of segments 1–8 combined. Terminal antennomere shorter than previous two segments combined; apex of terminal segment acuminate. Scape "hunch-backed" with anterior margin distinctly convex and >2 times longer than to segment 2. Pedicel small, shorter than segment 3. Clypeolabral junction shallowly concave. Labrum with anterior margin broadly concave and bearing single median point. Maxillary palpi with terminal segment elongate and conical, longer than segments 1–2 combined. Labial palpi with terminal segment somewhat barrel-shaped and shorter than segments 1–2 combined. Mentum highly transverse with anterior margin broadly convex medially; surface punctuation consisting of fine minute punctures with some bearing short fine setae; interspaces smooth and shining no scale-like microreticulations present. Submentum with punctures similar to vertex of head with some bearing fine minute setae; surface sculpturing similar to that of mentum.

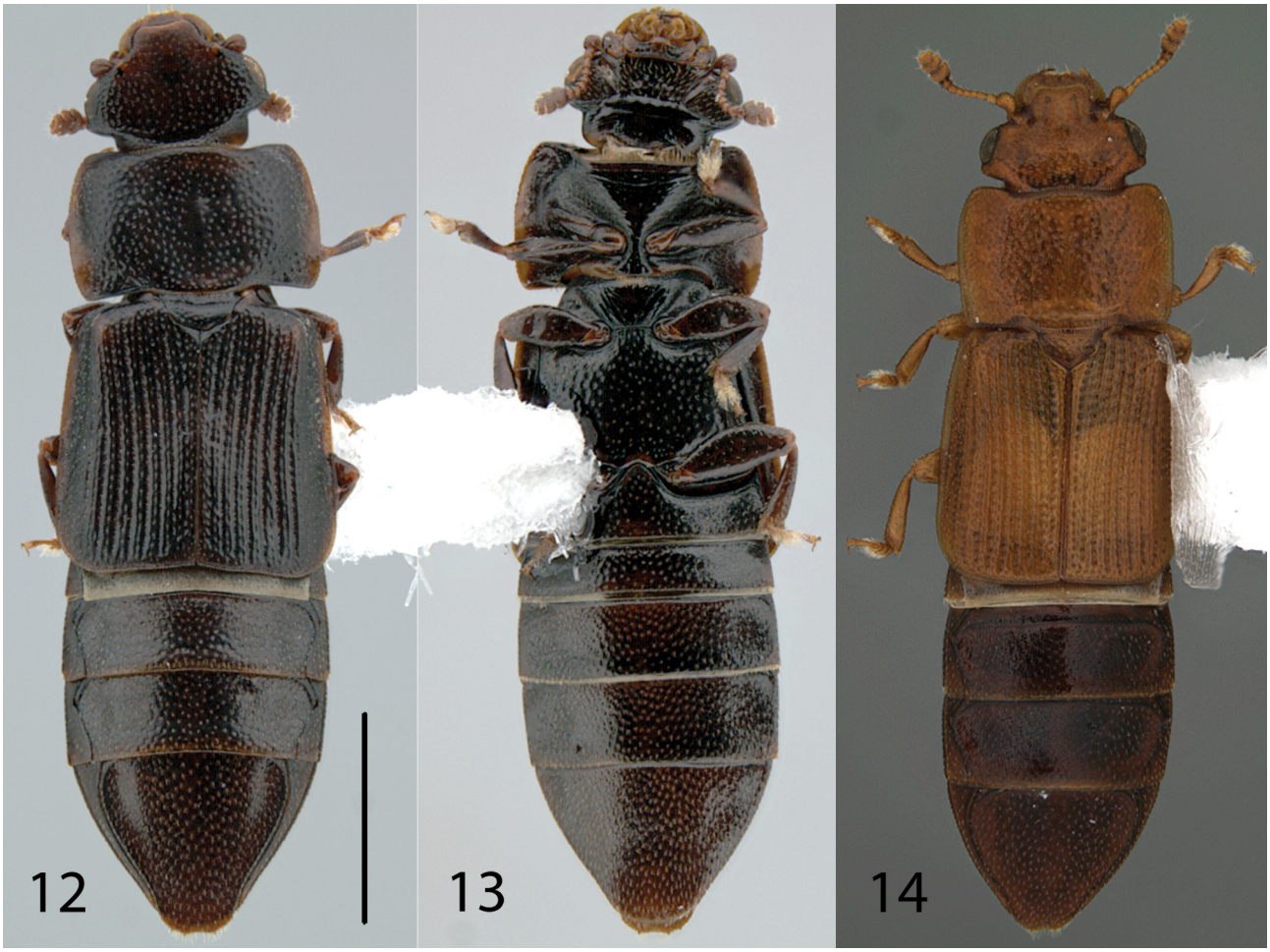
Pronotum overall subquadrate (W:L = 1.00:0.63), widest near middle, flat to faintly concave across disc. Anterior angles distinct, evenly rounded, not projecting. Posterior angles distinct, evenly rounded, not projecting. Lateral margins evenly arcuate to anterior and posterior angles. Anterior margin bisinuate with broadly convex medial region. Posterior margin bisinuate with broadly convex medial region. Prosternum with space between coxae and anterior margin 3 times width of procoxal process between coxae. Prosternal process slightly expanded posterior to procoxae; in lateral view flat over procoxae, posterior margin with no vertical face. Mesonotum with scutellum hemispherical; pubescence, surface punctation and sculpturing similar to that on pronotum. Mesosternum flat, at same level as metasternum; surface punctation consisting of minute punctures anteriorly and laterally, but disc smooth; surface sculpturing consisting of oblique lines on lateral regions. Meso-metasternal junction broadly concave. Metasternum overall transverse (W:L = 1.54:1.00); metasternal disc surface punctation and sculpturing similar to pronotum with punctures 1–2 diameters apart. Postcoxal lines of mesocoxae present, slightly diverging from coxal cavities, and faintly apparent along medial 0.5 of mesocoxae; no definitive axillary space formed. Elytra short, exposing all of pygidium and last 2, and small portion of third, visible tergites; lateral margins narrowly explanate; serially punctuate/striate with punctures similar to those on pronotum, punctures within rows separated by 1–2 puncture diameters and puncture rows separated by 2–3 puncture diameters; sculpturing similar to pronotum with scale-like microreticulations present throughout. Humeral angles prominent. Fine minute light colored setae associated with some punctures, as well as along lateral margin of elytra. Elytra not separately rounded, forming straight line at junction where each elytron meets.

Visible abdominal ventrite 1 projecting between metacoxae with broadly rounded apex. Metacoxal lines not apparent. Visible abdominal ventrites 2–4 not equal in length, with following relative lengths 1.7/2.4/2.7. Hypopygidium with posterior margin convex. Pygidium with posterior margin medially concave, and bearing small tubercles on edge.

Legs unmodified. Each femora canaliculate for reception of tibiae; widest near middle. Protibiae with short

stout hair-like spines along inner margin in distal 0.5 of segment, and row of short spines present along apical margin near spurs; inner margin of protibiae slightly curved. Mesotibiae with row of short spines along apical margin extending proximally around outer apical angle in distal 0.1 of segment; inner margin straight. Metatibiae with row of short spines along apical margin extending proximally around outer apical angle in distal 0.2 of segment; inner margin straight. Tarsomeres 1–3 lobed with dense empodium ventrally possessing short setae and longer lateral seta; claws simple.

Female genitalia not dissected in unique holotype. Male unknown.



FIGURES 12–14. Habitus images of North American *Brachypeplus*. **(12)** *B. habecki* **n. sp.**, dorsal habitus; **(13)** *B. habecki* **n. sp.**, ventral habitus; **(14)** *B. glaber*, dorsal habitus. Scale bar = 1 mm.

Diagnosis. *Brachypeplus habecki* differs from other members of the genus by possessing the following characters: scale-like body and leg microsculpture, reduced body setation, hemispherical scutellum, acute temples, and a labrum with a distinct medial point. This species appears most similar to *B. glaber* based on the following shared characters: diminutive size, reduced body setation, and similar surface microsculpture on the body proper. However, the identification key above separates the two species. These species are likely allied to *B. staphylinoides* Sharp based on the condition of the mentum, antennae, diminutive size and body setation, however that species does not possess the scale-like microreticulations of *B. glaber* and *B. habecki*. *Brachypeplus staphylinoides* is widespread throughout most of Central America (Blackwelder 1945, Cline unpub. catalogue).

Variation. Only one specimen is presently known.

Geographic distribution. The species is known only from the type locality in southern Texas.

Biology. Label data indicates the species is found in association with *Sabal mexicana* Mart. stands, which only persists in southern Texas and northern Mexico.

Etymology. The specific epithet honors the late Dale H. Habeck. Dale was a specialist on larval Nitidulidae as well as larval Lepidoptera, and collected much of the preserved material of *B. glaber* that is present in many museums in North America. Dale was a good friend and colleague.

Discussion/Notes. *Brachypeplus habecki* may represent a link between *B. glaber* from the southeastern United States and *B. staphylinoides* from the Neotropics, or conversely, an extreme southern population of *B. glaber* that underwent isolation and subsequent speciation on a different palm host species. No phylogenies, or molecular datasets, of *Brachypeplus* are available to test either hypothesis. However, these three species do share characters that other Neotropical *Brachypeplus* do not, suggesting sister-group affinities. Performing a phylogenetic analysis for all 100+ species of *Brachypeplus* worldwide is beyond the scope of this paper, but would be an interesting avenue of research we hope others will pursue.

The following notes are derived from correspondence with Ed Riley of Texas A&M University. The "Sabal Palm Grove" where the new species was collected is now correctly called the "Sabal Palm Grove Preserve" and is managed by the Gorgas Foundation which is associated with the University of Texas at Brownsville. This spot is well known to beetle collectors, as it was a place that Schaeffer, Barber, Wickham and undoubtedly other early collectors visited at the turn of 20th century when they made trips to Brownsville. During that time period, the grove was known as the "San Thomas Plantation" and is cited on labels by these early collectors variously as "Brownsville, S. Tom." or "San Thomas." Most of these early collections are currently housed at the Smithsonian Institution.

This Sabal Palm Grove Preserve is now well known for being the largest and best preserved tract of the original Sabal palm forest (*Sabal mexicana* Martius) of extreme southern Texas, a forest type that was once considerably more extensive before agriculture and other landscape disruptions altered the local habitat. The total preserve is approximately 500 acres and the US Fish and Wildlife Service has purchased the surrounding farmland and revegetated much of the area over the past several years. The original core of old growth palms is quite small, and when first visited by Ed Riley in 1979 it was surrounded by farmland with almost no buffer.

The beetle project that yielded the new *Brachypeplus* species was in operation from late summer 2008 to spring of 2010 and was generally known as the "Lower Rio Grande Valley beetle project." Flight intercept traps (and other passive traps) were operated in the old growth core of the palm grove sanctuary for three months during late summer–fall (2008, 2009) and three months during spring (2009, 2010). *Brachypeplus habecki* was collected from the spring collecting event in 2009.

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APPENDIX 1. Label data for non-type material of *Cyllodes biplagiatus* LeConte.

CANADA:
Manitoba:
Division No. 1, Victoria Beach, 13–VI–1924 (1–CNC)
Division No. 1, Victoria Beach, 7–VII–1924 (2–CNC)
Division No. 7, Aweme, 4–VII–1910 (1–CNC)
Division No. 7, Aweme, 14–VI–1918 (3–CNC)
Division No. 7, Aweme, 20–VI–1920 (3–CNC)
Division No. 11, Winnipeg, 12–VI–1912 (1–CNC)
Division No. 11, Winnipeg, 27–VI–1915 (3–CAS)
Division No. 11, Winnipeg, 27–VI–1925 (1–CNC)
New Brunswick:
Carleton Co., Belleville, Meduxnekeeg Valley Nature Preserve, 46.1940°N, 67.6800°W, 3.VII.2006, mixed forest, on slightly dried *Pleurotus* mushrooms on dead standing *Populus* sp. (2–RWC)
Sunbury Co., near Sunpoke Lake, 45.7658°N, 66.5546°W, 27.VI.2007, oak forest, on slightly dried *Pleurotus* mushrooms on dead standing *Populus* sp. (7–RWC)
Ontario:
Essex Co., Wheatley, 2–VIII–1967 (1–ARCC)
Essex Co., Wheatley, 2–VIII–1967 (3–FSCA)
Rainy River District, 22–VI–1924 (2–CNC)
Québec:
Drummond Co., Saint-Cyrille, 6–VI–1980 (1–CNC)
La Vallée-du-Richelieu Co., Mont-St-Hilaire (Rouville), 15–VII–1992 (1–Roch 1997)
La Vallée-du-Richelieu Co., Mont-St-Hilaire (Rouville), 26–V–1992 (1–Roch 1997)

USA:
Illinois:
[state only] (1–CMNH)
Indiana:
Brown Co., 5–VI–1969 (1–ARCC)
Brown Co., 8–VI–1969 (1–FMNH)
Brown Co., 21–V–1976 (2–FMNH)
Brown Co., 24–V–1976 (1–FMNH)
Brown Co., Bear Wallows, 10–VI–1972 (1–FSCA)
Brown Co., 10–V–2011, in/on fungus (1–KESC)
La Porte Co., La Porte (2–CMNH)
Monroe Co., Bloomington, 3–VIII–1973 (1–FSCA)
Monroe Co., Morgan-Monroe State Forest, 29–IV–1964 (1–FSCA; Downie & White 1966)
Montgomery Co., Shades St. Pk., 24–V–1987, R.M. Brattain, litter sample (1–RMBC)
Montgomery Co., Shades St. Pk., 11–VI–2001, litter sample (1–RMBC)
Porter Co., Dunes State Park, 31–V–1937 (1–FMNH)
Porter Co., Tremont, 31–V–1937 (3–FMNH)
Maryland:
Harford Co., Edgewood Arsenal, 20–VII–1969 (2–CAS)
Massachusetts:
[state only] (5–CMNH; 1–FMNH; 1–INHS; 6–USNM)
[state only] 6–VI–1915 (1–FMNH)
Hampden Co., Springfield (6–USNM)
Hampden Co., Springfield, ?–VI–? (5–CAS)
Hampden Co., Springfield, 6–VI–1901(1–USNM)
Hampden Co., Mt. Tom (3–MSUC)
Hampshire Co., Belchertown, 7–VI–1941 (4–UNHC)
[state only] (1–MSUC)
Michigan:
Barry Co., Yankee Springs Game Area, 20–V–1960 (15–MSUC)
Cheboygan Co., 1–VII–1953 (1–WIRC)
Gladwin Co., 21–V–1940 (2–MSUC)
Grand Traverse Co., Fife Lake, 12–VI–1967 (2–MSUC)
Ingham Co., 4–VI–1948 (1–MSUC)
Lake Co., 9–VI–1940 (2–MSUC)

Lake Co., 9–VI–1940 (1–UCRC)
Lake Co., Branch, 6–V–1977 (3–MSUC)
Lake Co., 4–VI–1940 (1–UMMZ)
Livingston Co., Edwin S. George Reserve, ?–X–1935 (3–MSUC)
Marquette Co., Marquette, 29–VI–? (1–USNM)
Midland Co., 21–V–1940 (1–MSUC)
Midland Co., 5–VI–1948 (1–MSUC)
Oakland Co., 14–V–1922 (8–MSUC)
Oakland Co., 14–V–1924 (1–MSUC)
Oakland Co., 1–X–1920 (1–UMMZ)
Shiawassee Co., Rose Lake Wildlife Station, 16–V–1976 (4–WIRC)
Wayne Co., Detroit (30–USNM)
Minnesota:
Clearwater Co., Itasca State Park, 16–VI–1938 (1–FSCA; 3–USNM)
Fillmore Co. (1–TAMU)
Fillmore Co., 25–V–1936 (1–CAS; 2–WIRC)
Fillmore Co., Preston, 1–VI–1941 (1–USNM)
Hennepin Co., Ft. Snelling, 8–VI–? (2–UNHC)
New Jersey:
Morris Co., Dover, VI–7–1934 (1–UNHC)
New York:
[state only] (2–CMNH; 4–INHS; 1–OSUC)
Chemung Co., 17–IX–1919 (1–FMNH)
Chemung Co., Breesport, 26–VII–1937 (1–CAS)
Erie Co., Buffalo (4–CMNH; 1–INHS; 3–USNM)
Erie Co., Buffalo (4–PURC)
Ontario Co., Flint (1–USNM)
Orange Co., Bear Mountain, 30–V–1920 (1–UNHC)
Orange Co., West Point, 4–VI–1911 (2–USNM)
Orange Co., West Point, 26–V–1912 (13–USNM)
Orange Co., West Point, 15–VI–1912 (1–FMNH; 3–USNM)
Orange Co., West Point, 26–VI–1912 (2–FMNH)
Orange Co., West Point, 15–VI–1912 (1–UMMZ)
Tompkins Co., Ithaca, 25–V–1941 (2–ARCC)
Tompkins Co., Ithaca, 18–V–1936 (1–USNM)
Tompkins Co., Ithaca, 25–V–1938 (4–CAS; 1–USNM)
Tompkins Co., Ithaca, 29–V–1938 (1–FMNH)
Tompkins Co., Ithaca, 31–V–1938 (2–CAS)
Tompkins Co., Ithaca, 1–VII–1938 (3–CAS)
Tompkins Co., Ithaca, 22–V–1941 (1–FSCA)
Tompkins Co., McLean Bogs Reserve, 7–VI–1941 (1–FSCA)
Westchester Co., Croton Falls, 26–V–1939 (1–FMNH)
Ohio:
Ashtabula Co., 24–VI–1931 (9–OSUC)
Ashtabula Co., 4–VII–1931 (10–OSUC)
Fairfield Co., 9–V–1942 (4–OSUC)
Fairfield Co., Lancaster, Greenfield Lake Wildlife Area, 39°46.253’N, 082°37.844’W, 14–VI–2007 (1–KDKC)
Lucas Co., Toledo, Wildwood MetroPark, 19–VIII–1995, R.N. Ferreira (3–EIUC)
Lucas Co., Oak Openings Metro Park, 41°33.318’N, 83°51.176’W, 8–V–2004 (2–KDKC)
Summit Co., 1–VI–1963 (3–FSCA)
Summit Co., 1–VI–1963 (1–ARCC)
Pennsylvania:
“North East PA”, 27–VIII–? (1–CMNH)
Berks Co., Stony Creek Mills, 4–VI–1951 (3–CAS)
Crawford Co., Linesville, ?–V–1933 (18–CMNH).
Monroe Co., 3.6 km WSW Long Pond, Long Pond Barrens, 41°02’25” N, 75°30’09”W, 570 m., 1–11–VI–1997 (1–CMNH)
Monroe Co., Mount Pocono, 7–VI–1936 (10–CAS)
Monroe Co., Mount Pocono, 7–VII–1936 (4–CAS; 4–UCDC)
Westmoreland Co., Jeannette, ?–V–1900 (8–CMNH)
Rhode Island:
[state only] (Davis 1904)

Wisconsin:
Bayfield Co., Bayfield (1–CAS; 1–USNM)
Columbia Co., Columbus, 15–VI–1924 (1–FMNH)
Brown Co., 7 miles north of Howard Reforestation Camp, 44.66ºN 88.08861ºW, 8–VI–2000 (1–WIRC)
Clark Co., 23–V–1971, M. Hanzlik (1–EIUC)
Dane Co. (1–CAS)
Dane Co., 4–VI–1898 (2–WIRC)
Dane Co., 22–V–1899 (1–WIRC)
Dane Co., 30–V–1899 (1–WIRC)
Dane Co., 26–V–1923 (3–WIRC)
Dane Co., 29–V–1923 (4–PURC; 3–RMBC)
Dane Co., Middleton, 30–V–1916 (10–WIRC)
Florence Co., Morgan Lake, 45.75806ºN 88.52667ºW, 12–VI–2001 (1–WIRC; 3–MBPC)
Marathon Co., Dells of the Eau Claire, River State Natural Area, 45.005833ºN –89.339167ºW [WGS84], 28–V–1–VI–2009 (2–WIRC) Marinette Co., Craig's Cabin, 45.467ºN 88.26444ºW, 21–VII–1999 (1–WIRC)
Oconto Co., Mountain, 18–VI–1935 (2–FMNH) Portage Co., Dewey Marsh State Wildlife Area, 44.66389ºN 89.58667ºW, 11–VII–2001 (2–WIRC; 4–MBPC) Walworth Co., Lake Geneva, 21–V–1916 (1–WIRC)