

AN ANNOTATED CHECKLIST OF THE SCARABAEOIDEA  
OF TEXAS (COLEOPTERA)

Edward G. Riley  
Department of Entomology  
Texas A&M University  
College Station, Texas 77845  
egrchryso@tamu.edu

and

Charles S. Wolfe  
Department of Biology  
University of Texas at Arlington  
Arlington, Texas 76019

## ABSTRACT

A list of 544 species/subspecies of Scarabaeoidea recorded from Texas is presented. Each species on the list is annotated with within-state distributional data by recording its presence in each of seven regions of Texas, or by providing the source for less precise Texas records. Twelve species on the list are represented by dubious Texas records and are recommended for removal from future tabulations of Texas Coleoptera. Forty-eight species are documented from Texas for the first time. *Aphodius giuliani* Gordon, *Diplotaxis simplex* Blanchard and *Phanaeus adonis* Harold are recorded from America north of Mexico for the first time. *Phyllophaga opacita* Reinhard is placed in synonymy under *Phyllophaga arcta* (Horn) NEW SYNONYMY. Sixty-five species are recognized as being recorded only from Texas. Thirty-four of these are not likely to occur outside the state and are identified as Texas endemics. The south Texas plains region is home to more Texas endemics than any other region of the state. Of the genera represented by Texas endemics, the genus *Phyllophaga* is especially well represented with 13 species endemic to Texas.

## INTRODUCTION

The Superfamily Scarabaeoidea includes the familiar Scarabaeidae - "scarab beetles," the Lucanidae - "stag beetles," Passalidae - "bess beetles," and several of the traditional subfamilies of the Scarabaeidae that are now generally treated as separate families. The group is diverse in North America and worldwide. In Texas, the group comprises one of a few large, cohesive blocks of Texas beetle diversity. In addition to species diversity, their varied habitats, food preferences, and behavior make scarabaeoids an important group for a wide range of research areas, including behavioral ecology, biogeography, biodiversity, systematics and conservation.

There is a need among researchers, resource managers, collection curators and general coleopterists for a checklist of the Scarabaeoidea of Texas. Such a list should provide documentation for the species recorded from Texas, a coarse overview of the distribution of

each species within Texas, and a compilation of the species believed to be endemic to Texas. This publication is an attempt at such a list.

## METHODS AND FORMAT

*Data Collection:* The present list began with an extraction of Texas scarabaeoid records from a wide range of literature sources. Those publications found to contain records are included in the bibliography regardless of whether or not they are cited elsewhere in the text of this work. These records were refined by cross-referencing among multiple references and confirmed or not by examination of specimens from Texas. All literature records remaining unconfirmed for Texas are included on the list and are further annotated. Doubtful Texas records are also noted.

Scarabaeoidea were collected in Texas continually for roughly a 14-year period (1988-2002) during which time all corners of the state and a broad cross section of habitat types throughout Texas were visited. Collecting techniques employed were those commonly used for scarab beetles and thus are not presented here in detail. In general, there has been a heavy bias towards the use of ultra-violet light sources (blacklight and mercury vapor) and baited pit-fall traps. Flight intercept traps were operated sporadically at several sites and continuously at a few additional sites. Strictly diurnal species were obtained by examining flowers and vegetation or by use of fermented sugarbait traps. The most underutilized techniques include the sifting of soils and soil-surface litter, and the excavation or examination of various mammal nests and burrows.

A significant portion of the distribution data presented in this checklist comes from specimens examined or identified in various institutional and private collections (see Acknowledgements). Foremost among these collections is the collection of the Department of Entomology, Texas A&M University, in College Station, where the vast majority of specimens vouchering Texas collection records reside. Also examined were specimens from the private collections of several area scarab collectors (see Acknowledgements). Approximately 35,000 scarabaeoid specimens from Texas were examined during this study.

*Classification:* The classification used here follows the recent trend of recognizing several families in place of the traditional single family Scarabaeidae (following Lawrence and Newton, 1995). This arrangement is not universally accepted (see Jameson & Ratcliffe, 2002). The relatively small traditional families of Passalidae and Lucanidae are included here to complete the superfamily Scarabaeoidea. Classifications within families and subfamilies are a reflection of those used in most North American lists and faunal treatments and closely follow those found in the scarabaeoid chapters in Arnett, et al. (2002).

*Identifications:* Fortunately, the taxonomy of North American Scarabaeoidea is relatively well known compared to many groups of Coleoptera. Thus, we have been able to confidently identify to species or confirm the determinations made by others for the vast majority of material collected or examined during this study. However, there are serious gaps in the knowledge of some specific groups. For example, the large and complex genus *Aphodius* awaits a modern taxonomic revision, and numerous small taxonomic problems, including undetermined and possibly undescribed species, exist in a fair number of other genera. Where necessary, some comments on taxonomic problems and undetermined species are provided in the "Selected Annotations" section of this work. Where appropriate, determination labels were placed on specimens in various collections examined.

Many specialists on scarabaeoid taxonomy assisted us, either directly or indirectly, by providing identifications, opinions and comments on various taxonomic problems present in

the Texas scarabaeoid fauna (see Acknowledgements). However, we accept full responsibility for any inaccuracies found in the taxonomy upon which this checklist is based.

*Checklist Qualifications:* Only described genera and species are included on this list. The genus *Geopsammodius* is included without the listing of a known species from Texas, but it is the only case where a genus present in Texas is not represented by one or more described species. Junior synonyms and published misidentifications are not given on the list; however, a few junior synonyms that are prominent in popular literature are cited in order to help users reconcile the cited valid names. These synonyms are shown in parentheses below the valid name and are preceded with an equal sign (=). In a few cases the names for a few species/subspecies that we were unable to satisfactorily distinguish are also indicated under the main entry on the list. Such entries are given in parentheses and are preceded by the word "including ..." Our inability to adequately separate the taxa in these cases should not be taken as grounds for the establishment of new synonymies. However, in one case (see *Phyllophaga arcta*) a new species-group synonymy is proposed.

For a named species/subspecies to be placed on the present checklist, it must meet one of the following seven status categories (A-G):

Categories A-B: records from specimens examined.

A = Species/subspecies we collected in Texas.

B = Species/subspecies not in A above, for which we examined specimens from one or more collections labeled from "Texas" or more specific Texas locality.

Categories C-F: records from literature only.

C = Species/subspecies where "Texas" or a specific Texas locality is the given type locality.

D = Species/subspecies not in C above which are recorded in the literature from one or more specific Texas localities (at least county level) that are considered reliable records.

E = Species/subspecies not in C-D above, but which are recorded in the literature from "Texas" without specific localities which never-the-less are considered reliable records.

F = Species/subspecies not in C-D above, but which are recorded in the literature from "Texas" or one or more specific Texas localities that are considered as possibly reliable records but in need of confirmation.

Category G: records from the literature considered dubious.

G = Species/subspecies recorded in the literature from "Texas" or one or more specific Texas localities that are considered highly questionable. We recommend the removal of these species from future listings of Texas Coleoptera.

*Introduced species:* Fifteen species of exotic coprophagous scarabaeines have been deliberately released in Texas to aid in the removal of bovine manure (Fincher, 1990). These species are not listed here unless they are known or thought to be established in the state.

*Endemic Species:* One goal of this study was to recognize and highlight Texas species that are not found outside the state. The term "Texas endemic" is used throughout this work to refer to species that are not likely to be found outside the borders of Texas. The term "provisional Texas endemic" is used here to denote species that, although not presently recorded from outside the state, are likely to eventually be found beyond the boundaries of Texas. Determining whether or not a species recorded only from Texas is an endemic or a provisional endemic is, admittedly, not an entirely objective process. It can never be proven beyond a doubt that a particular species does not occur outside the state. In making our assignments, we followed a reasonable assumption: species occurring at or very near the

state's borders and in habitats that are continuous with those in adjacent political areas are likely to also be found in those adjacent political areas.

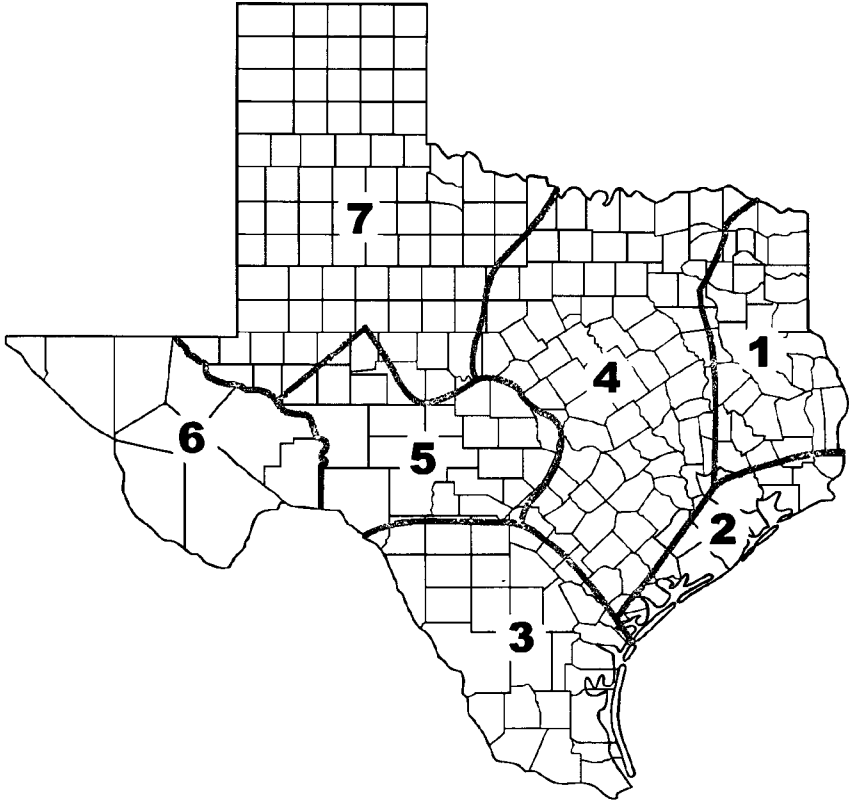


Figure 1. Texas county map with seven vegetational areas following Cory and Parks, 1937 (redrawn). Region 1, east Texas pineywoods or timber belt; Region 2, coastal prairie and marsh; Region 3, south Texas plains and lower Rio Grande valley; Region 4, blackland prairie and post oak savanna; Region 5, Edwards Plateau; Region 6, Trans-Pecos; and Region 7, northwest Texas rolling and high plains and north central cross timbers and prairies.

*Texas Regions Used in the Checklist:* For each species on the checklist we present geographical distribution data within Texas using a seven-region system following the seven vegetational areas given by Cory and Parks (1937). (Fig. 1). This system is essentially an earlier version of the ten vegetational areas of Texas recognized in later compilations of the Texas flora (Gould, 1962; Hatch et al., 1990) and differs little from the biotic provinces of Texas recognized by Blair (1950). The seven regions followed here are as follows: Region 1, east Texas pineywoods or timber belt; Region 2, coastal prairie and marsh; Region 3, south Texas plains and lower Rio Grande valley; Region 4, blackland prairie and post oak savanna; Region 5, Edwards Plateau; Region 6, Trans-Pecos; and Region 7, northwest Texas rolling

and high plains and north central cross timbers and prairies. Scarabaeoid beetle distributions are not necessarily expected to coincide with plant distribution patterns. None-the-less, this simplified distribution-reporting scheme will serve for generalizing within-state distribution data for beetles. For details on the vegetation and physiography of these regions, see the above-cited references.

Species were assigned to regions based on field collections, from localities found on specimen labels, and from cited localities and point or shaded distribution maps found in the pertinent literature. Point localities that are on the border between two or more regions are assigned to both regions unless the bulk of the evidence indicates that the species is unlikely to occur in one or the other. Some particular problems here are localities from the literature and from specimen labels such as "San Antonio," at the convergence of three regions; "Houston", on the border of two or three regions; and "Austin", on the border of two sharply differentiated regions.

*Checklist Format:* Each species is assigned to one of the seven status categories outlined above (A-G, see *Checklist Qualifications*) followed by the regions (if known) where the species has been recorded (Regions 1-7, see *Texas Regions used in Checklist*). If the present report is believed to be the first published record of a species from Texas, then the expression "NSRec." (for new state record) is added. Species considered to be Texas endemics, i. e., not likely to be found outside the state, are denoted by the bolded expression, "End." Species considered to be provisional Texas endemics, i. e., not recorded from outside the borders of Texas but likely to be found there, are denoted by the expression, "(End)." If further annotation is provided under the "Selected Annotations" section of this paper, then the expression "+A" is added. Species whose names are followed immediately by an asterisk (\*) are not native to North America. Species shown in brackets are considered dubious Texas records.

## ANNOTATED CHECKLIST OF TEXAS SCARABAEOIDEA

### Family Lucanidae

#### Subfamily Lucaninae

#### Tribe Lucanini

#### **Lucanus** Scopoli

(=*Pseudolucanus* Hope)

*L. capreolus* (Linnaeus) B, 14, +A

*L. elaphus* Fabricius A, 1

*L. placidus* (Say) A, 14

#### Tribe Dorcini

#### **Dorcus** MacLeay

*D. parallelus* (Say) E, +A

#### Tribe Platycerini

#### **Platycerus** Geoffroy

*P. virescens* (Fabricius) E, +A

### Family Passalidae +A

#### Subfamily Passalinae

#### Tribe Proculini

#### **Odontotaenius** Kuwert

(*Popilius*, of authors)

*O. disjunctus* (Illiger) A, 124

#### Tribe Passalini

#### **Passalus** Fabricius

[*P. interruptus* Linnaeus] G, +A

[*P. punctiger* Lepeletier & Serville] G, +A

### Family Glaresidae

#### **Glaresis** Erichson +A

*G. gordonii* Warner A, 6

(=*G. mendica*, of authors)

*G. inducta* Horn A, 3467

*G. medialis* Gordon A, 67, NSRec., +A

*G. phoenicis* Fall D, 6, +A

*G. texana* Gordon C, 356, (End.), +A

### Family Trogidae

#### **Omorgus** Erichson

*O. asper* LeConte A, 14

*O. carinatus* (Loomis) A, 3567

*O. fuliginosus* (Robinson) A, 345

*O. howelli* (Howden & Vaurie) A, 15

*O. inflatus* (Loomis) A, 56

*O. monachus* (Herbst) A, 124

*O. nodosus* (Robinson) A, 67

*O. punctatus* (Germar) A, 34567

*O. rubricans* (Robinson) A, 3

*O. scabrosus* (Beauvois) A, 134

*O. scutellaris* (Say) A, 6  
*O. suberosus* (Fabricius) A, 134567  
*O. tessellatus* LeConte A, 6  
*O. texanus* LeConte A, 23  
*O. tytus* (Robinson) A, 14, NSRec., +A  
*O. umbonatus* LeConte A, 3

**Trox** Fabricius

*T. aequalis* Say A, 134567  
*T. affinis* Robinson A, 4  
*T. atrox* LeConte A, 36  
*T. capillaris* Say D, 5, +A  
*T. contractus* Robinson A, 3457, (End.), +A  
*T. foveicollis* Harold A, 124  
*T. frontera* Vaurie A, 347, End., +A  
*T. hamatus* Robinson D, 3, +A  
*T. plicatus* Robinson A, 6  
*T. robinsoni* Vaurie A, 23457  
*T. scaber* (Linnaeus) F, +A  
*T. sonorae* LeConte A, 3567  
*T. sordidus* LeConte D, 1, +A  
*T. spinulosus* Robinson A, 123456  
(including *T. s. dentibus* Robinson)  
*T. tuberculatus* (Degeer) A, 134  
*T. unistriatus* Beauvois F, +A  
*T. variolatus* Melsheimer A, 1245

Family Geotrupidae

Subfamily Bolboceratinae

**Bolboceras** Kirby

*B. filicornis* (Say) A, 1, NSRec., +A  
*B. thoracicornis* (Wallis) A, 147

**Bolbocerastes** Cartwright

*B. imperialis* Cartwright A, 6  
*B. serratus* (LeConte) A, 3457

**Bolbocerosoma** Schaeffer

*B. biplagiatum* Dawson & McColloch A, 47  
*B. bruneri* Dawson & McColloch D, 4, +A  
*B. cartwrighti* Howden C, 6, (End.), +A  
*B. confusum* Brown A, 234  
*B. elongatum* Howden A, 6, End., +A  
*B. lepidissimum* Brown A, 14  
*B. pusillum* Dawson & McColloch A, 3457  
(including *B. p. townesi* Howden)  
*B. quadricornum* Robinson C, 45, End., +A  
*B. ritcheri* Howden C, 3, +A

**Bolbolasmus** Boucomont

*B. minor* (Linell) A, 3, (End.), +A

**Bolborhombus** Cartwright

*B. angulus* (Robinson) A, 6  
*B. sallaei magnus* Howden A, 37, +A  
*B. sallaei sallaei* (Bates) F, +A

**Bradycinetulus** Cockerell

*B. fossatus* (Haldeman) A, 123457  
*B. rex* Cartwright A, 3, End., +A

**Eucanthus** Westwood

*E. greeni* Robinson E, +A  
*E. impressus* Howden A, 123467  
*E. lazarus* (Fabricius) A, 13467

Subfamily Geotrupinae

**Geotrupes** Latreille

*G. blackburni excrementi* Say A, 124  
*G. opacus* Haldeman A, 1347

[*G. semiopacus* Jekel] G, +A  
*G. splendidus* (Fabricius) A, 1

Family Ochodaecidae

Subfamily Ochodaecinae

**Neochodaeus** Nikolayev

*N. frontalis* (LeConte) A, 12345  
*N. praesidii* (Bates) E, +A

**Ochodaeus** Dejean

*O. gnatho* Fall B, 6, NSRec., +A  
*O. mandibularis* Linell A, 67, NSRec., +A  
*O. musculus* (Say) A, 14, NSRec., +A  
*O. planifrons* Schaeffer A, 6, NSRec., +A  
*O. repandus* Fall A, 134567, NSRec., +A  
*O. simplex* LeConte A, 36  
*O. sparsus* LeConte A, 6, NSRec., +A

**Parochodaeus** Nikolayev

*P. biarmatus* (LeConte) A, 34567  
*P. howdeni* (Carlson) A, 3567  
*P. inarmatus* (Schaeffer) A, 37, NSRec., +A  
*P. kansanus* (Fall) A, 67  
*P. pectoralis* (LeConte) A, 567  
*P. ritcheri* (Carlson) C, 6, +A

Family Hybosoridae

**Hybosorus** MacLeay

*H. illigeri* Reiche\* A, 1234567

Family Ceratocanthidae

**Ceratocanthus** White

*C. aeneus* (MacLeay) B, 1, NSRec., +A

**Germanostes** Paulian

(= *Cloeotus*, of authors)  
*G. ophodioides* (Illiger) A, 1234  
*G. globosus* (Say) A, 124

Family Scarabaeidae

Subfamily Aphodiinae

Tribe Aphodiini

**Aphodius** Illiger +A

*A. abusus* Fall A, 124  
*A. acerbus* Horn B, 4, (End.), +A  
*A. acuminatus* Cartwright A, 135  
*A. anomaliceps* Brown B, 7  
*A. asellus* Schmidt A, 567, End., +A  
*A. atwateri* Cartwright B, 34, (End.), +A  
*A. bicolor* Say A, 14  
*A. bottimeri* Cartwright C, 5, End., +A  
*A. brimleyi* Cartwright B, 1, NSRec., +A  
*A. captivus* Cartwright C, 3, (End.), +A  
*A. claudus* Fall A, 6  
*A. crassuloides* Fall D, 5  
*A. crassulus* Horn F, +A  
*A. dentiger* LeConte A, 35  
*A. distinctus* (Muller)\* A, 67  
*A. femoralis* Say A, 14  
*A. fimetarius* (Linnaeus)\* A, 13457  
*A. formidatus* Gordon B, 7, (End.), +A  
*A. giulianii* Gordon A, 6, NSRec., +A  
*A. granarius* (Linnaeus)\* A, 1347  
*A. haemorrhoidalis* (Linnaeus)\* A, 134567  
*A. haldemani* Horn A, 14

*A. insolitus* Brown B, 4  
*A. kirni* Cartwright A, 1345  
*A. kiowensis* Gordon & Salsbury, A, 7  
*A. larreae* Horn A, 6  
*A. lentus* Horn A, 145  
*A. lividus* (Olivier)\* A, 1234567  
*A. lodingi* Cartwright E, +A  
*A. luteolus* Horn A, 6  
*A. lutulentus* Haldeman A, 145  
*A. nigrinus* (Fabricius) A, 356  
 (= *A. cuniculus* Chevrolat)  
*A. oklahomensis* Brown A, 14  
*A. peculiosus* Schmidt C, 36  
*A. plutonicus* Fall B, 6, NSRec., +A  
*A. pumilio* Schmidt A, 367  
*A. rossi* Cartwright A, 13, (End.), +A  
*A. rubeolus* (Beauvois) A, 13457  
*A. rusticola* Melsheimer A, 345  
 (= *A. ruricola*, of authors)  
*A. sallei* Harold A, 234  
*A. scabriceps* LeConte A, 2567  
*A. sepultus* Cartwright B, 34  
*A. serval* Say B, 45  
*A. stercorosus* Melsheimer A, 12345  
*A. stupidus* Horn A, 14  
*A. tenuistriatus* Horn A, 1234567  
*A. terminalis* Say, E +A  
*A. testaceiventris* Fall B, 3457  
*A. texensis* Cartwright A, 356  
*A. umbricollis* Fall C, 6  
*A. vittatus* Say A, 346  
**Xeropsamobeus** Saylor  
*X. ambiguus* (Fall) A, 6  
 Tribe Didactyliini  
**Aidophus** Balthasar  
*A. parvus* (Horn) A, 145  
 Tribe Eupariini  
**Ataenius** Harold  
*A. alternatus* (Melsheimer) A, 12  
*A. apicalis* Hinton A, 124  
*A. barberi* Cartwright D, 6, +A  
*A. brevicollis* (Wollaston) D, 4, +A  
*A. cognatus* (LeConte) A, 234567  
*A. confertus* Fall C, 6, NSRec., +A  
*A. convexus* Robinson A, 36  
*A. cylindrus* Horn A, 12  
*A. desertus* Horn A, 467  
*A. duncani* Cartwright A, 367  
*A. erratus* Fall D, 3, +A  
*A. fattigi* Cartwright A, 14  
*A. figurator* Harold A, 1234567  
*A. gracilis* (Melsheimer) A, 12346  
*A. griffini* Cartwright A, 3, End., +A  
*A. hesperius* Cartwright B, 2345, +A  
*A. hirsutus* Horn A, 467  
*A. imbricatus* (Melsheimer) A, 12345  
*A. inquisitus* Horn A, 23456  
*A. languidus* Schmidt E, +A  
*A. lobatus* Horn A, 6, NSRec., +A  
*A. miamii* Cartwright A, 14  
*A. nocturnus* (Nomura) A, 67  
*A. oklahomensis* Brown A, 124  
*A. ovatulus* Horn B, 4  
*A. parkeri* Cartwright D, 3, +A  
*A. picinus* Harold A, 12345

*A. platensis* (Blanchard) A, 1234567, +A  
 (including *A. integer* Harold)  
*A. pseudohirsutus* Cartwright A, 345  
*A. puncticollis* (LeConte) A, 234567  
*A. punctifrons* Cartwright A, 1234567  
*A. rhyticephalus* (Chevrolat) E, +A  
*A. robustus* Horn A, 4, NSRec., +A  
*A. rugopygus* Cartwright A, 36  
*A. semipilosus* Cartwright A, 6  
*A. spretulus* (Haldeman) A, 1234567  
*A. strigatus* (Say) A, 1245  
*A. texanus* Harold A, 23456  
*A. wenzelii* Horn A, 234  
**Euparia** LePeletier & Serville  
*E. castanea* Serville A, 3  
**Euparixia** Brown  
*E. moseri* Woodruff & Cartw. A, 4, NSRec., +A  
**Martineziella** Chalumeau  
 (= *Myrmecaphodius*, of authors)  
*M. dutertrei* (Chalumeau)\* A, 12345  
 (= *Myr. excavaticollis* Blanchard)  
**Parataenius** Balthasar  
*P. simulator* (Harold)\* A, 17, NSRec., +A  
**Pseudataenius** Brown  
*P. socialis* (Horn) D, 24, +A

#### Tribe Psammodiini

**Geopsammodius** Gordon & Pittino +A  
 undetermined sp./spp. A, 234  
**Neopsammodius** Rakovic +A  
*N. blandus* (Fall) C, 6, +A  
*N. mimeticus* (Fall) B, 6, NSRec., +A  
*N. quinqueplicatus* (Horn) B, 6  
*N. wernerii* (Cartwright) D, 45, +A  
**Odontopsammodius** Gordon & Pittino  
*O. bidens* (Horn) A, 3, NSRec., +A  
**Platytomus** Mulsant +A  
*P. longulus* (Cartwright) A, 12345  
*P. micros* (Bates) B, 346  
*P. notialis* (Cartwright) D, 1, +A  
**Pleurophorus** Mulsant  
*P. caesus* (Creutzer)\* A, 7, NSRec., +A  
**Rhyssemus** Mulsant +A  
*R. brownwoodi* Gordon & Cartw. C, 4, End., +A  
*R. neglectus* Brown B, 457

#### Subfamily Scarabaeinae

##### Tribe Onthophagini

##### **Onthophagus** Latreille

*O. alluvius* Howden & Cartwright A, 345  
*O. batesi* Howden & Cartwright B, 3, +A  
*O. brevifrons* Horn A, 367  
*O. browni* Howden & Cartwright A, 6  
*O. cavernicollis* Howden & Cartwright D, 5, +A  
*O. gazella* (Fabricius)\* A, 1234567  
*O. hecate hecate* (Panzer) A, 123457  
*O. knausi* Brown A, 456  
*O. landolti texanus* Schaeffer A, 35  
*O. medorensis* Brown A, 12345  
*O. mextexus* Howden & Cartwright A, 6  
*O. oklahomensis* Brown A, 2347  
*O. orpheus orpheus* (Panzer) A, 12345  
*O. pennsylvanicus* Harold A, 123457

- O. schaefferi* Howden & Cartwright A, 34  
*O. striatulus striatulus* (Beauvois) A, 124  
*O. subaeneus* (Beauvois) A, 14  
*O. subtropicus* Howden & Cartw. A, 3, (End.), +A  
*O. taurus* (Schreber)\* D, 1, +A  
*O. tuberculifrons* Harold A, 145  
*O. velutinus* Horn A, 34567

Tribe Oniticellini

***Euoniticellus* Janssens**

- E. intermedius* (Reiche)\* A, 356

Tribe Coprini

***Copris* Geoffroy**

- C. arizonensis* Schaeffer A, 6  
*C. fricator* (Fabricius) A, 234567  
*C. minutus* (Drury) A, 14  
*C. remotus remotus* LeConte A, 3

Tribe Phanaeini

***Coprophanaeus* d'Olsouffieff**

- C. phao* (Harold) A, 3, +A

***Phanaeus* MacLeay**

- P. adonis* Harold A, 3, NSRec., +A  
*P. difformis* LeConte A, 1234567  
*P. triangularis triangularis* (Say) A, 1  
*P. triangularis texensis* Edmonds A, 1234567  
*P. vindex* MacLeay A, 123457

Tribe Dichotomiini

***Ateuchus* Weber**

- A. histeroides* Weber A, 1245  
*A. texanus* (Robinson) A, 3

***Dichotomius* Hope**

- D. carolinus carolinus* (Linnaeus) A, 12345

Tribe Canthonini

***Canthon* Hoffmannsegg**

Subgenus ***Boreocanthon* Halffter**

- [*C. depressipennis* LeConte] G, +A  
*C. ebenus* (Say) A, 3457  
*C. integricollis* Schaeffer A, 3, (End.), +A  
*C. lecontei* Harold A, 345, (End.), +A  
*C. melanus* Robinson A, 6, NSRec., +A  
*C. mixtus* Robinson A, 367 (End.), +A  
*C. praticola* LeConte A, 5  
*C. probus* (Germar) A, 3467

Subgenus ***Canthon* Hoffmannsegg**

- C. humectus* (Say) A, 356  
*C. cyanellus* LeConte A, 2345  
*C. chalcites* (Haldeman) A, 1  
*C. imitator* Brown A, 134567  
*C. indigaceus* LeConte F, +A  
*C. pilularius* (Linnaeus) A, 137  
*C. vigilans* LeConte A, 1347

Subgenus ***Glaphyrocantion* Martínez**

- C. viridis viridis* (Beauvois) A, 12345

***Deltochilum* Eschscholtz**

- D. gibbosum gibbosum* (Fabricius) A, 124  
*D. scabriusculum* Bates A, 3, +A

***Malagioniella* Martínez**

- M. astyanax yucateca* (Harold) A, 3, +A

***Melanocanthon* Halffter**

- M. granulifer* (Schmidt) A, 5  
*M. nigricornis* (Say) A, 1345  
***Pseudocanthon* Bates**  
*P. perplexus* (LeConte) A, 12345

Subfamily Melolonthinae

Tribe Hopliini

***Hoplia* Illiger**

- H. laticollis* LeConte E, +A  
*H. trivialis* Harold D, 1, +A

Tribe Podolasiini

***Podolasia* Harold**

- P. ferruginea* (LeConte) A, 3, (End.)  
*P. pilosa* Howden A, 6  
*P. stillwellorum* Howden A, 6, (End.)

***Podostena* Howden**

- P. bottimeri* (Howden) A, 6, (End.)  
*P. rileyi* Howden A, 3, (End.)

Tribe Sericini

***Serica* MacLeay +A**

- S. aemula* Dawson A, 14, (End.), +A  
*S. aspera* Dawson A, 1  
*S. atranula atranula* LeConte A, 4, (End.), +A  
*S. atranula monita* Dawson A, 124  
*S. campestris* Dawson A, 1, NSRec., +A  
*S. contorta* Dawson A, 14  
*S. georgiana* LeConte E, +A  
*S. howdeni* Dawson A, 14, (End.) +A  
*S. intermixta* Blatchley A, 14, NSRec., +A  
*S. mystaca* Dawson E, +A  
*S. parallela* Casey A, 145  
*S. porcula* Casey A, 67  
*S. texana* LeConte A, 345, End., +A  
*S. vespertina accola* Dawson A, 1, NSRec., +A

Tribe Melolonthini

***Fossocarus* Howden**

- F. creoleorum* Howden A, 1, (End.), +A

***Hypothyce* Howden +A**

- H. mixta* Howden A, 1, +A

***Phyllophaga* Harris +A**

Subgenus ***Chlaenobia* Blanchard**

- P. vexata vexata* (Horn) A, 3

Subgenus ***Listrochelus* Blanchard**

- P. arenicola* Howden A, 6  
 [*P. arizona* Saylor] G, +A  
*P. bottimeri* Reinhard B, 6, End., +A  
*P. chapini* Saylor A, 6  
*P. cushmani* Saylor A, 56  
*P. disparilis* (Horn) A, 6, NSRec., +A  
*P. fimbripes* (LeConte) B, 7, +A  
*P. koehleriana* Saylor A, 6  
*P. macmurryi* Saylor A, 45  
*P. mucorea* (LeConte) A, 567  
*P. parilis* (Bates) A, 6  
*P. planeta* Reinhard A, 6, End., +A  
*P. pulcher* (Linell) A, 34, End., +A  
*P. reinhardi* Saylor A, 3  
*P. scuticeps* (Bates) A, 6  
*P. senex* (Horn) A, 67



*P. texensis* Saylor A, 35  
*P. wickhami* Saylor A, 6  
**Subgenus *Phyllophaga* Harris**  
*P. aemula* (Horn) A, 14  
*P. aequalis* (LeConte) A, 3, (End.), +A  
*P. affabilis* (Horn) A, 247  
*P. amplicornis* Reinhard A, 1345, End., +A  
*P. antennata* (Smith) A, 35, End., +A  
*P. anxia* (LeConte) A, 12  
*P. apicata* Reinhard A, 14  
*P. arcta* (Horn) A, 134, +A  
*P. arkansana* (Schaeffer) A, 14  
*P. bipartita* (Horn) A, 124  
*P. calceata* (LeConte) A, 1245  
[P. *clemens* (Horn)] G, +A  
*P. congrua* (LeConte) A, 123457  
*P. corrosa* (LeConte) A, 1457  
*P. crassissima* (Blanchard) A, 1247  
*P. crenulata* (Frolich) A, 14  
*P. cribrata* (LeConte) A, 3457  
*P. crinita* (Burmeister) A, 1234567  
[P. *cupuliformis* Langston] G, +A  
*P. curialis* Reinhard A, 124  
*P. delata* (Horn) A, 1, NSRec., +A  
*P. diffinis* (Blanchard) A, 14  
[P. *elizoria* Saylor] G, +A  
*P. ephillida* (Say) A, 124  
(including *P. e. virilis* Reinhard)  
*P. epigaea* (Wickham) A, 567  
*P. farcta* (LeConte) A, 4567  
*P. fervida* (Fabricius) B, 1  
*P. forsteri* (Burmeister) A, 14  
*P. fraternata* Harris A, 1  
*P. fusca* (Frolich) E, +A  
*P. futilis* (LeConte) A, 14  
*P. gaigei* Sanderson A, 6, End., +A  
*P. glabricula* (LeConte) A, 4567  
*P. gracilis* (Burmeister) A, 124  
*P. hamata* (Horn) A, 5, End., +A  
*P. hirticula* (Knoch) F, +A  
*P. hirtiventris* (Horn) A, 123457  
*P. idonea* Sanderson B, 6  
*P. ignava* (Horn) A, 3456  
*P. ilicis* (Knoch) E, +A  
*P. implicita* (Horn) A, 1  
*P. incuria* Sanderson A, 1  
*P. inepta* (Horn) E, +A  
*P. inversa* (Horn) F, +A  
*P. invisa* Riley & Wolfe A, 1234, End., +A  
*P. karlsioei* (Linell) A, 14  
*P. lenis* (Horn) F, +A  
*P. longitarsa* (Say) A, 13467  
*P. marginalis* (LeConte) F, +A  
*P. micans* (Knoch) A, 124  
*P. parvidens* (LeConte) A, 134  
*P. perlonga* Davis A, 1, NSRec., +A  
*P. pleroma* Reinhard A, 2, End., +A  
*P. praetermissa* (Horn) A, 124  
*P. profunda* (Blanchard) A, 124  
*P. prunina* (LeConte) A, 14  
*P. psiloptera* Sanderson A, 6, End.  
*P. pudorosa* Reinhard A, 1  
*P. pusillidens* Fall A, 6  
*P. quercus* (Knoch) A, 1, NSRec., +A  
*P. ravida guatemalica* (Moser) D, 3, +A  
*P. renodis* Reinhard A, 3, (End.), +A

*P. riviera* Reinhard A, 3, End., +A  
*P. rolstoni* Riley & Wolfe A, 6, (End.), +A  
*P. rubiginosa* (LeConte) A, 1234567  
*P. rubricosa* Reinhard A, 35, (End.), +A  
*P. rugosa* (Melsheimer) E, +A  
*P. sacoma* Reinhard A, 14  
*P. scitula* (Horn) A, 134  
*P. sodalis* Reinhard A, 34, +A  
*P. submucida* (LeConte) A, 123457  
*P. suttonana* Reinhard A, 56, (End.), +A  
*P. sylvatica* Sanderson B, 1  
*P. taxodii* Langston A, 1  
*P. temora* Saylor D, 5, +A  
*P. torta* (LeConte) A, 234567  
*P. tristis* (Fabricius) A, 1  
*P. tusa* (Horn) A, 3, End., +A  
*P. vehemens* (Horn) A, 14  
*P. vetula* (Horn) B, 6  
*P. zavalana* Reinhard A, 356  
**Subgenus *Phytalus* Erichson**  
*P. nosa* Blackwelder B, 3  
*P. obsoleta vanalleri* (Schaeffer) A, 14  
*P. trichodes* (Bates) A, 3  
**Subgenus *Tostegoptera* Blanchard**  
*P. lanceolata* (Say) A, 457  
*P. squamipilosa* Saylor B, 7, +A  
***Phyllophaga incertae sedis***  
*P. ecostata* (Horn) B, 3, End., +A  
***Polyphylla* Harris +A**  
*P. decemlineata* (Say) A, 6  
*P. hammondi* LeConte A, 1234567  
*P. monahansensis* Hardy A, 7  
*P. pottorum* Hardy A, 7  
*P. squamiventris* Cazier A, 6

***Thyce* LeConte**

*T. squamicollis* LeConte A, 36, +A

**Tribe Diplotaxini**

***Diplotaxis* Kirby +A**  
*D. aenea* Blanchard F, +A  
*D. angularis* LeConte A, 6  
*D. atratula* LeConte A, 56  
*D. aulacochela* Cazier A, 6  
*D. belfragei* Fall A, 4567  
*D. beyeri* Schaeffer A, 35  
*D. blanchardi* Vaurie A, 14, +A  
*D. brevicollis* LeConte A, 6  
*D. brevicornis* Cazier A, 567  
*D. brevisetosus* Linell A, 234, (End.), +A  
*D. carbonata* LeConte A, 56  
*D. chiricahuae* Fall A, 6, NSRec., +A  
*D. completa* Cazier A, 56  
*D. cribulosa cribulosa* LeConte A, 56  
*D. curvaticeps* Fall A, 35  
*D. denticeps* Bates A, 6  
*D. dubia* LeConte A, 14, End., +A  
*D. errans* Fall A, 3, (End.), +A  
*D. frondicola* (Say) A, 1234567  
*D. harperi* Blanchard A, 145  
*D. haydenii* LeConte A, 7  
*D. knausii* Schaeffer A, 367, NSRec., +A  
*D. lengii* Fall A, 124  
*D. levicosta* Fall A, 6  
*D. marginicollis* Fall] G, +A

*D. maura* Fall A, 3456  
*D. mentalis* Fall A, 567  
*D. misella* Fall A, 6, NSRec., +A  
*D. muricata* Schaeffer A, 567  
*D. puberula* LeConte A, 12345  
*D. pubipes* Schaeffer A, 3  
*D. punctata* LeConte A, 134567  
*D. punctatorugosa* Blanchard A, 14  
*D. puncticeps* Moser A, 456  
*D. punctipennis* LeConte A, 35, End., +A  
*D. rex* Vaurie A, 3, End., +A  
*D. rudis* (LeConte) A, 7, +A  
*D. rufiola* Fall A, 67  
*D. schaefferi* Fall A, 5, End., +A  
*D. simplex* Blanchard A, 3, NSRec., +A  
*D. statura* Cazier D, 6  
*D. subangulata* LeConte A, 567  
*D. subcostata* Blanchard A, 1, +A  
*D. sulcatula* Fall A, 56  
*D. texana* LeConte A, 3456, End., +A  
*D. thoracica* Fall A, 134567  
*D. tremantina* Fall A, 6  
*D. truncatula* LeConte A, 34567  
*D. unguata* Cazier A, 6

#### Tribe Macroductylini

***Dichelonyx*** Harris  
*D. elongata* (Fabricius) A, 1, NSRec., +A  
***Macroductylus*** Dejean  
*M. angustatus* (Beauvois) A, 14  
*M. subspinosus* (Fabricius) A, 14  
*M. uniformis* Horn A, 46

#### Tribe Pachydemini

***Benedictia*** Sanderson  
*B. pilosa* Sanderson A, 6

#### Melolonthinae, *insertae sedis*

***Acoma*** Casey  
*A. brunnea* Casey A, 6

#### Subfamily Rutelinae

##### Tribe Anomalini

***Anomala*** Samouelle +A  
 (= *Pachystethus* Blanchard)  
*A. antennata* Schaeffer A, 67  
*A. binotata* (Gyllenhal) A, 13467  
*A. carinifrons* LeConte B, 6  
*A. cavifrons* LeConte A, 234567  
*A. delicata* Casey A, 6  
*A. diabla* Potts A, 56, (End.), +A  
*A. flavipennis flavipennis* Burmeister A, 12345  
 (including *A. f. aransas* Potts)  
*A. flavipennis luteipennis* LeConte A, 347  
*A. foraminosa* Bates A, 134  
*A. innuba* (Fabricius) A, 124  
*A. insitiva* Robinson A, 3, (End.), +A  
*A. lucicola* (Fabricius) B, 1, NSRec., +A  
*A. ludoviciana* Schaeffer E, +A  
*A. marginata* (Fabricius) A, 124  
*A. suavis* Potts A, 67, +A  
*A. tibialis* Schaeffer B, 3, End., +A  
*A. undulata* Melsheimer A, 14  
***Popillia*** Dejean

*P. japonica* Newman\* B, 2457, +A  
***Strigoderma*** Burmeister  
*S. arvicola* (Fabricius) A, 123457  
*S. knausi* (Brown) B, 23  
*S. teapensis* Bates A, 4

#### Tribe Rutelini

***Chrycina*** Kirby  
 (= *Plusiotis* Burmeister)  
*C. gloriosa* (LeConte) A, 6  
*C. woodi* (Horn) A, 6  
***Cotalpa*** Burmeister  
*C. conclamara* Young A, 14, End., +A  
*C. lanigera* (Linnaeus) A, 14  
*C. subcribrata* Wickham B, 14, NSRec., +A  
***Parastasia*** Westwood  
*P. brevipennis* (LeConte) A, 124, NSRec., +A  
***Pelidnota*** MacLeay  
*P. punctata* (Linnaeus) A, 123457

#### Subfamily Dynastinae

##### Tribe Cyclocephalini

***Aspidolea*** Bates  
*A. singularis* Bates] G, +A  
 (= *A. texana* Hohné)  
***Cyclocephala*** Dejean  
*C. borealis* Arrow E, +A  
*[C. freudei* Endrodi] G, +A  
*C. hirta* LeConte A, 567  
*C. longula* LeConte A, 14567  
*C. lurida* Bland A, 1234567  
 (= *C. immaculata* Olivier)  
*C. melanocephala* (Fabricius) A, 34567, +A  
 (including *C. laminata* Burmeister)  
*C. nigricollis* Burmeister B, 12  
*C. pasadenae* (Casey) A, 4567  
*[C. testacea* Burmeister] G, +A  
***Dyscinetus*** Harold  
*D. morator* (Fabricius) A, 12457  
*D. picipes* (Burmeister) A, 67, NSRec., +A

#### Tribe Pentodontini

***Aphonides*** Rivers  
*A. dunnianus* (Rivers) A, 67  
***Aphonus*** LeConte  
*A. brevicurvis* Cartwright A, 1234, End., +A  
*A. texanus* Gill & Howden A, 12345, End., +A  
***Euethola*** Bates  
*E. humilis rugiceps* (LeConte) A, 12347  
***Orizabus*** Fairmaire +A  
*O. clunalis* (LeConte) A, 67  
*O. ligyroides* (Horn) A, 6  
*O. pyriformis* (LeConte) A, 6, NSRec., +A  
***Oxygryllus*** Casey  
*O. ruginasus* (LeConte) A, 356  
***Tomarus*** Erichson  
 (= *Ligyrrus* Burmeister)  
 (= *Bothynus*, of authors)  
*T. gibbosus* (Degeer) A, 1234567  
 (including *T. g. obsoletus* (LeConte))  
*T. morio* (LeConte) A, 23  
*T. relictus* (Say) A, 7, +A

*T. sallaei* (Bates) A, 2345

Tribe Oryctini

**Strategus** Kirby

*S. aloeus* (Linnaeus) A, 123456

*S. anteus* (Drury) A, 124

*S. mormon* Burmeister A, 1246

**Xyloryctes** Hope

*X. jamaicensis* (Drury) A, 46

Tribe Phileurini

**Archophileurus** Kolbe

*A. cribrosus* (LeConte) A, 356

**Hemiphileurus** Kolbe

*H. illatus* (LeConte) A, 6, NSRec., +A

**Phileurus** Latreille

*P. truncatus* (Beauvois) A, 124

*P. valgus* (Linnaeus) A, 123457

Tribe Dynastini

**Dynastes** MacLeay

*D. tityus* (Linnaeus) A, 1245

**Megasoma** Kirby

*M. vogli* Cartwright A, 3

Subfamily Cetoninae

Tribe Gymnetini

**Cotinis** Burmeister

Subgenus **Cotinis** Burmeister

*C. mutabilis* (Gory & Percheron) A, 3567

*C. nitida* (Linnaeus) A, 1247

Subgenus **Criniflava** Goodrich

*C. boylei* Goodrich A, 34, End., +A

**Gymnetis** MacLeay

*G. caseyi* Antoine A, 12345

(=*G. flavomarginata*, of authors, not Blanchard)

(=*G. sallaei* of authors, not Schaum)

Tribe Cetoniini

**Chlorixanthe** Bates

*C. propinqua* (Gory & Percheron) A, 6

(=*C. chapini* Cartwright)

**Euphoria** Burmeister

*E. casselberryi* Robinson B, 6, End., +A

*E. devulsa* Horn A, 345

*E. discicollis* (Thomson) B, 15, +A

*E. fulgida* (Fabricius) A, 124567  
(including *E. fuscocyanea* Casey)

*E. herbacea* (Olivier) A, 124

*E. hirtipes* Horn B, 7, NSRec., +A

*E. inda* (Linnaeus) A, 1457

*E. kerni* Haldeman A, 34567

*E. lineoligera* (Blanchard) B, 3, +A

*E. schotti* (LeConte) B, 36, (End.), +A

*E. s. sepulcralis* (Fabricius) A, 12457

*E. s. nitens* Casey A, 345

**Stephanucha** Burmeister

*S. annae* Howden A, 3, End., +A

*S. pilipennis* Kraatz A, 7

Tribe Cremastocheilini

**Cremastocheilus** Knoch

Subgenus **Cremastocheilus** Knoch

*C. harristii* Kirby B, 1, NSRec., +A

*C. retractus* LeConte C, 4,5

Subgenus **Myrmecotomus** Mann

*C. crinitus* LeConte, F, +A

*C. knochii* LeConte, B, 7, NSRec., +A

*C. mexicanus* Schaum C, 456

*C. pulverulentus* Cazier B, 46

Subgenus **Trinodia** Casey

*C. planipes* Horn A, 6

*C. quadricollis* (Casey) A, 347

*C. saucius* LeConte B, 7, +A

*C. spinifer* Horn A, 6

Tribe Trichiini

**Gnorimella** Casey

*G. maculosa* (Knoch) A, 1, NSRec., +A

**Trichiotinus** Casey

*T. lunulatus* (Fabricius) A, 124

*T. piger* (Fabricius) A, 14

*T. texanus* (Horn) A, 1234567

**Trigonopeltastes** Burmeister

*T. delta* (Forster) A, 124

Tribe Valgini

**Valgus** Scriba

*V. canaliculatus* (Olivier) A, 14, NSRec., +A

*V. seticollis* (Beauvois) B, 1, NSRec., +A

SELECTED ANNOTATIONS

Annotations are provided below for species designated on the list as Texas endemics, provisional Texas endemics, new state records, species known from Texas only from literature records, and for those whose records from Texas are considered dubious. A few additional noteworthy species (or higher taxa) are also annotated. Known county records for each species considered a Texas endemic or a provisional Texas endemic are given in their respective annotations. A county record map for each Texas species may be viewed at the TIARA website, (<http://www.csdl.tamu.edu/tiara/>).

## Lucanidae

*Lucanus elaphus*. - Staines (2001) provided records for several counties in Region 1 (East Texas) and also for Travis County. Also shown on the distribution map in that work is another spot north of Travis County. This location is not supported by data cited in the text. Given the eastern distribution of this species and the fact that this is a large showy beetle that is always saved by collectors, it is doubtful that it occurs in Travis County or at the point north of Travis.

*Dorcus paralellus*. - Literature record only. Maes (1992) listed this species from Texas without further locality. This species should be found in the northeastern portion of the state.

*Platycerus virescens*. - Literature record only. Maes (1992) listed this species from Texas without further locality. This species should be found in the northeastern portion of the state.

## Passalidae

**Passalidae:** Only one species of this family, *Odontotaenius disjunctus* (Illiger), is confirmed for the state. However, Schuster (1983) reported that *Ptichopus angulatus* (Percheron) was collected at Matamoros, in Tamaulipas, Mexico. This species is known to live in association with the leaf-cutting ants *Atta mexicana* F. Smith, and *A. cephalotes* (Linnaeus), but has not been recorded in association with the Texas leaf-cutting ant, *A. texana* (Buckley). *Atta texana* occurs in the lower Rio Grande valley. Large colonies have been observed on the banks of the Rio Grande in Starr County. We are especially interested in learning of records and seeing any specimens of any passalid beetles collected or labeled as having been collected in the lower Rio Grande valley of Texas. Four other passalid species are known to occur in Mexico within 100 miles of the Texas border (Schuster, 1983).

*Passalus interruptus*. - Dubious Texas record. Hincks and Dibb (1935) listed this species from Texas without further locality, but this is certainly an error. The known range of *P. interruptus* is South America north into Panama.

*Passalus punctiger*. - Dubious Texas record. Hincks and Dibb (1935) listed this species from Texas without further locality. Presently, it is known from no closer to Texas than the Gomez Farias area in southern Tamaulipas, Mexico (Schuster, 1983).

## Glaresidae

*Glaresis*: Gordon (1970) last reviewed the taxonomy of the North America species of this genus. Additional new species have since been described. In addition, several forms have been collected in Texas that remain unidentified. A comprehensive revision of the genus is needed.

*Glaresis medialis*. - New state record. We collected specimens at UV light in El Paso and Winkler counties.

*Glaresis phoenicis*. - Literature record only. Gordon (1970) recorded this species from Big Bend National Park (Brewster County).

*Glaresis texana*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Del Rio (Val Verde County), and it is also recorded from Brewster and Menard counties (Gordon, 1970).

## Trogidae

- Omorgus tytus***. - New state record. We collected this species in Brazos and Leon counties. This species is not unexpected in most regions of Texas. It is known to inhabit owl nests where it develops feeding on owl pellets. Our specimens were taken at uv light.
- Trox capillaris***. - Literature record only. Vaurie (1955) reported this species from New Braunfels (Comal County).
- Trox contractus***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is New Braunfels (Comal County). Vaurie (1955) reported records for Bee, Bexar, Blanco, Cameron, Lavaca, Menard, Taylor and Val Verde counties. To these records we add Bastrop, Garza, Kleberg, Starr and Uvalde counties.
- Trox frontera***. - Texas endemic. The type locality is Dimmit County (Vaurie, 1955). To this record we add Atascosa, Brooks, Erath, Frio, Kenedy, Leon and Milam counties. This species is fairly common in sandy areas.
- Trox hamatus***. - Literature record only. Vaurie (1955) reported this species from Brownsville (Cameron County), and cited Robinson (in litt.) for a Texas record without specific locality. Given the known range of this species, the Brownsville record is probably erroneous, but this species is likely to be found in the northeastern portion of the state.
- Trox scaber***. - Literature record only. Vaurie (1955) reported this species from Texas without specific locality. In North America, this is primarily a northern species.
- Trox sordidus***. - Literature record only. Vaurie (1955) cited Robinson (in litt.) for a Texas record without specific locality. Baker (1968) recorded it from Sabine County.
- Trox unistriatus***. - Literature record only. Vaurie (1955) reported examining one specimen from Texas without specific locality. She considered this Texas record "an accidental." If this species occurs in Texas, it should be found in the northeastern portion of state.

## Geotrupidae

- Bolboceras flicornis***. - New state record. We collected this species in Anderson, Jasper, Smith, and Tyler counties.
- Bolbocerosoma bruneri***. - Literature record only. Howden (1955a) cited five specimens from Fedor (Lee County).
- Bolbocerosoma cartwrighti***. - Provisional Texas endemic. This species is likely to occur in northern Mexico. The type locality is El Paso (El Paso County) (Howden, 1955a).
- Bolbocerosoma elongatum***. - Texas endemic. The type locality is Chisos Mts. (Brewster County) (Howden, 1955a).
- Bolbocerosoma quadricornum***. - Texas endemic. The type locality is New Braunfels (Comal County) (Robinson, 1941), a locality on the border of Regions 4 and 5.
- Bolbolasmus minor***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is San Diego (Duval County), and it is also recorded from Cameron, Hidalgo, Kleberg and McMullen counties (Cartwright, 1953). To these records we add Jim Wells, Live Oak, Maverick, Starr, Zapata and Zavala counties.
- Bolborhombus sallaei sallaei***. - Literature record only. This subspecies is listed based on the original records of Cartwright (1953) from "Alpine, El Paso, Ft. Davis, Kingsville and Round Mountain" under the name *Bolborhombus schaefferi* (Boucomont). Howden (1964) synonymized this name with *B. s. sallaei* and gave the range as Arizona to Oaxaca, Mexico. He also erected the new subspecies *B. s. magnus* from Mexico and Kingsville, Texas. However, he did not specifically address the placements of specimens from the other localities cited by Cartwright (1953). In a later publication, Howden (1984) lists Texas, without exact locality, for the nominotypical subspecies. If this subspecies really

does occur in Texas, it is likely to be confined to the western-most portions of the state. The record of *B. schaefferi* (= *B. sallaei*) from Round Mountain (probably our Region 5) in Cartwright (1953) probably refers to *B. s. magnus*.

***Bolborhombus sallaei magnus***. - The examined Texas specimens of this subspecies are from Maverick, McMullen, Potter, and Uvalde counties.

***Bradycinetulus rex***. - Texas endemic. The type locality is Sarita (Kenedy County). Specimens examined are from Brooks, Kenedy, Kleberg, San Patricio and Willacy counties.

***Eucanthus greeni***. - Literature record only. Ratcliffe (1991) gives the range of this species as "... Alberta and Manitoba in Canada south to Texas." We are not aware of specific records for Texas but given its known range, it is expected to occur in the Texas Panhandle.

***Geotrupes semiopacus***. - Dubious Texas record. Howden (1955a) cited one specimen from Texas without further data, and later (1984) repeated the Texas record. Since its established distribution is the northeastern United States, the Texas record is considered doubtful.

### Ochodaeidae

***Neochodaeus praesidii***. - Literature record only. Carlson (1975) cited this species from Texas with no specific locality.

***Ochodaeus gnatho***. - New state record. We examined one specimen from Presidio County.

***Ochodaeus mandibularis***. - New state record. We collected specimens from Andrews, El Paso and Ward counties.

***Ochodaeus musculus***. - New state record. We collected this species in Morris and Smith counties, and we examined additional specimens from Robertson and Walker counties.

***Ochodaeus planifrons***. - New state record. We collected this species in Jeff Davis County.

***Ochodaeus repandus***. - New state record. We collected this species in Brewster, Brooks, Dimmit, Frio, Hardeman and Leon counties, and we examined additional specimens from Cameron, Culberson, Gillespie, Hudspeth, Jeff Davis, Live Oak, Mason and Montgomery counties.

***Ochodaeus sparsus***. - New state record. We collected this species in El Paso County.

***Parochodaeus inarmatus***. - New state record. We collected this species in Maverick County, and we examined additional specimens from Live Oak, McMullen and Randall counties.

***Parochodaeus ritcheri***. - Literature record only. The type locality is Panther Junction, 4000 ft., Big Bend National Park (Brewster County) (Carlson, 1975).

### Ceratocanthidae

***Ceratocanthus aeneus***. - New state record. We examined one specimen from Sabine County taken in a malaise trap during July. This record extends the known range of this uncommon southeastern United States species to near its hypothetical western limit.

### Scarabaeidae

#### Aphodiinae

***Aphodius***: The North American species of this genus are in need of a thorough revision. A revision is underway (Robert Gordon, personal communication) and when available will significantly expand and improve the Texas list presented here. Several new species will likely be described from Texas. Most American workers have essentially ignored the subgeneric system in use for *Aphodius*, and subgenera are likewise ignored here. We are indebted to William Godwin for sharing his extensive knowledge of Texas *Aphodius* and

to Robert Gordon for providing numerous species identifications over the past several years.

- Aphodius acerbus***. - Provisional Texas endemic. This species will likely be found in Louisiana associated with the Texas leaf cutting ant, *Atta texana* (Buckley). Horn (1887a) gave the type locality as "Texas, probably near San Antonio." We examined specimens from Brazos, Freestone and McLennan counties. The specimens examined were taken during the winter months in unbaited pit-fall traps placed on and around the margins of *Atta texana* nests.
- Aphodius asellus***. - Texas endemic. *Aphodius asellus* is a replacement name for *A. nanus* Horn (Schmidt, 1907). The type locality of *A. nanus* is Carrizo Springs (Dimmit County) (Horn, 1887a). We examined specimens from Kimble and Reagan counties.
- Aphodius atwateri***. - Provisional Texas endemic. This species is likely to also occur in Oklahoma and Louisiana. The type locality is Somerset (Bexar County) where it was taken from nest chambers associated with burrows, and trapped in bait traps placed in burrows of the pocket gopher *Geomys breviceps atwateri* (Cartwright, 1944a). Blume & Aga (1975, 1979) recorded this species from Brazos County.
- Aphodius bottimeri***. - Texas endemic. The type locality is Camp Stanley (Bexar County) (Cartwright, 1957). Also recorded with the original description are records from Edwards, Gillespie and Kerr counties.
- Aphodius brimleyi***. - New state record. We examined one specimen taken in a flight intercept trap operated near Spurger (Hardin County). This record extends the range of this species from the southeastern United States to near its hypothetical western limit.
- Aphodius captivus***. - Provisional Texas endemic. This species is likely to be found in Oklahoma and Louisiana. The type locality is Somerset (Bexar County) where it was taken from nest chambers and trapped in bait traps placed in burrows of the pocket gopher *Geomys breviceps atwateri* (Cartwright, 1944a).
- Aphodius crassulus***. - Literature record only. The original localities given by Horn (1870) are Georgia and Florida. Later, (1887a) he gave the distribution for this species as Florida to Texas. Subsequent treatments of this species by Cartwright (1957, 1972) did not mention its occurrence in Texas.
- Aphodius formidatus***. - Provisional Texas endemic. This species is likely to occur in Oklahoma. The type locality is 12 mi. N Post (Garza County) (Gordon, 1976). We examined specimens from Fisher and Hardeman counties.
- Aphodius giulianii***. - New state record. This species was described from a collection made at the sand dunes south of Ciudad Juarez, Chihuahua, Mexico (Gordon, 1977). Our Texas specimens come from a single collection made at sand dunes north of Fabens (El Paso County) during April. Beetles were abundant at dusk, flying low over the sand and were observed accumulating at fresh disturbances in the sand surface. After nightfall, numerous specimens were attracted to uv light. This is the first report of this species from north of Mexico.
- Aphodius lodingi***. - Literature record only. Cartwright (1957) cited a specimen from Texas without further data.
- Aphodius plutonicus***. - New state record. We examined specimens from "The Bowl," Guadalupe Mountains (Culberson County).
- Aphodius rossi***. - Provisional Texas endemic. This species is likely to be found in Oklahoma and Louisiana. The type locality is Somerset (Bexar County) where it was taken from nests and refuse chambers and trapped in bait traps placed in burrows of the pocket gopher *Geomys breviceps atwateri* Merriam (Cartwright, 1944a). Specimens we collected are from Hardin County.

- Aphodius terminalis*. - Literature record only. This species was recorded from Texas without further locality by Horn, 1887a.
- Ataenius barberi*. - Literature record only. Cartwright (1974) recorded this species from Arizona and Texas. His Texas material consisted of three specimens from the Chisos Mts. (Brewster County) taken during July.
- Ataenius brevicollis*. - Literature record only. Cartwright (1974) recorded this species from Florida, Mississippi and Texas in the United States. He gives "Brazos" as the only Texas locality and we assume it is a reference to either the county (Region 4) or the river (mostly in Region 4). In Florida, this species has been taken in wood rat dung in the nests of the wood rat, *Neotoma floridana smalli* (Woodruff, 1973).
- Ataenius confertus*. - New state record. This Texas record is based on one specimen we examined from Presidio (Presidio County).
- Ataenius erratus*. - Literature record only. In addition to many localities in the southeastern United States, Cartwright (1974) recorded this species from Bishop (Nueces County).
- Ataenius griffini*. - Texas endemic. The type locality is San Patricio County, near junction of Texas Highway 9 and U.S. 77 (Cartwright, 1974). Cartwright (1974) examined 16 specimens, some were taken from an animal burrow, probably an armadillo, and others were from under cow dung. We collected this species in Kenedy County.
- Ataenius hesperius*. - Literature record only. Cartwright (1974) recorded this species from Colorado, Dallas, Duval, Travis, Uvalde and Victoria counties. We have been unable to recognize this species in our material.
- Ataenius languidus*. - Literature record only. Cartwright (1974) recorded this species from Alabama, Florida, Texas, Bahama Islands and Mexico. His Texas data is simply a state record with no further data.
- Ataenius lobatus*. - New state record. We collected this species at light in Presidio County.
- Ataenius parkeri*. - Literature record only. Cartwright (1974) recorded this species from Arizona, New Mexico, Texas and Mexico. His Texas record is from San Diego (Duval County).
- Ataenius platensis*. - If *Ataenius integer* Harold is a good species and really occurs in Texas, then any specimens we may have seen are mixed with our material of *A. platensis*. Cartwright (1974) recorded *A. integer* from Houston and Kerrville, Texas. See Woodruff (1973) and Cartwright (1974) for comments on the taxonomy of *A. platensis* and *A. integer*.
- Ataenius rhyticephalus*. - Literature record only. Cartwright (1974) recorded this species from Florida, South Carolina and Texas. His Texas record was without further locality data.
- Ataenius robustus*. - New state record. Our Texas material comes from a single locality in Brazos County where numerous specimens were taken crawling on bare soil of a worn pathway during February and March.
- Euparixia moseri*. - New state record. This species was described from material collected in the nests of the Texas leaf-cutting ant, *Atta texana* (Buckley) in central Louisiana (Woodruff and Cartwright, 1967). We collected a single specimen of this species at UV light, north of Flynn (Leon County) in an area of deep sandy soil supporting numerous colonies of *A. texana*.
- Parataenius simulator*. - New state record. Our Texas records are from Bowie, Hockley, Sabine, Smith, Tyler, Ward and Wood counties.
- Pseudataenius socialis*. - Literature record only. Cartwright (1974) recorded this species from Nebraska, Kansas, Oklahoma, Louisiana and Texas. His Texas localities are Columbus (Colorado County) and Houston (Harris County).



- Geopsammodius***: We sifted from sandy soils one or more unidentified species of this genus from locations in Cameron, Galveston, Leon, Kenedy, Refugio and San Patricio counties.
- Neopsammodius***: We examined a *Neopsammodius* specimen from Randall County and another from Culberson County that we believe represent a species different from those given on the list.
- Neopsammodius blandus***. - Literature record only. The type locality is El Paso (El Paso County) (Fall, 1932).
- Neopsammodius mimeticus***. - New state record. We examined a single specimen from the Davis Mountains (Jeff Davis County).
- Neopsammodius weneri***. - Literature record only. Cartwright (1955) recorded this species from Brazos, Brown and Travis counties. We have not recognized this species in the Texas material before us.
- Odontopsammodius bidens***. - New state record. We collected one specimen of this species at uv light from a location in Kenedy County with deep sandy soil.
- Platytomus***: We collected an unidentified species belonging to this genus in pit-fall traps in Brazos County.
- Platytomus notialis***. - Literature record only. Cartwright (1948) recorded this species from Tyler (Smith County).
- Pleurophorus caesus***. - New state record. We examined specimens from El Paso and Lubbock counties.
- Rhyssenus***: We collected and examined additional specimens of an undescribed species belonging to this genus. Specimens are from Brazos and Kenedy counties.
- Rhyssenus brownwoodi***. - Texas endemic. The type locality is Brownwood (Brown County) (Gordon & Cartwright, 1980).

#### Scarabaeinae

- Onthophagus batesi***. - Although this species can be considered common throughout much of its range in Mexico and Central America, it is apparently rare in south Texas. The only published records for Texas (and the United States) are those accompanying the original description in Howden and Cartwright (1963). In this work, six specimens are cited from Brownsville collected during June of 1954 and 1955. We recently examined a single female specimen of this species labeled "TX: Cameron County, Sabal Palm Grove Audubon Sanctuary, June 2-6, 1986, R. M. Brattain". This is the only specimen we examined from Texas despite our bait-trapping efforts at this and other localities in Cameron County.
- Onthophagus cavernicollis*** - Literature record only. Howden & Cartwright (1963) reported this species from "Cave Without a Name." in Kendall County
- Onthophagus subtropicus***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. Type locality "Laguna Madre, 25 mi. SE Harlingen" (=ca. 10 mi. NW Port Isabel) (Cameron County) and also recorded from Kleberg County (Howden & Cartwright, 1963). To these records we add Live Oak and San Patricio counties.
- Onthophagus taurus***. - Literature record only. This is a Palearctic species that was first detected in North America in Florida and thought to have been unintentionally introduced by man. It has subsequently been released elsewhere in the United States as part of a program to aid in the removal of livestock feces from pasturelands. At least one release was made in Texas during 1983 (Grimes County) (Hoebeke & Beucke, 1997). We have not taken this species in Texas during our study, but include it on this list because it is established in Louisiana and other southeastern states and may be established in eastern Texas.

- Coprophanæus pluto***. - This Mexican species was listed from Arizona in the Leng catalog (Leng, 1920) under the name *Phanaeus pluto* Harold. The source of Leng's Arizona record is unknown to us, and we have not seen material from Arizona nor are we aware on any word-of-mouth report of its capture in that state despite many years of collecting of southern Arizona by scarab beetle enthusiasts. Without further confirmation, we consider the Arizona record doubtful. Several separate Texas collections are known, mostly from Cameron County and single specimens have been seen from Starr and Willacy counties.
- Phanaeus adonis***. - New state record. Edmonds (1994) reported the range of *P. adonis* as "Mid- to high-elevation forests of the Sierra Madre Oriental from Nuevo León south to Hidalgo, and the eastern Mesa Central, Mexico. 350-2100 m." The following Texas records represent the first report of this species from the United States. A single minor male was taken in a swine feces-baited pit-fall trap at 15 miles east Rio Hondo, Cameron County, on June 13-14-1995 by C. Cate & M. Quinn. This location is adjacent to the dense brushland of Laguna Atascosa National Wildlife Refuge (LANWR) and is near sea level in elevation. Subsequent trapping with swine feces at this site during September and October, 1995, produced several additional specimens. During the following year, numerous specimens were collected from within LANWR (J. E. Wappes, pers. com.).
- Canthon (B.) depressipennis***. - Doubtful Texas record. Woodruff (1973) in a range map showed this species occurring from the southeastern United States to Texas and northward into the Great Plains region. It was not confirmed from Texas during this study. The Texas and Great Plains records are doubtful since this species was recorded only the southeastern United States by Robinson (1948). There is apparently some confusion about the type locality (Woodruff, 1973) and several older literature records from various eastern states cited by Woodruff need confirmation. The species group to which *C. depressipennis* belongs needs a thorough taxonomic revision.
- Canthon (B.) integricollis***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is "Hidalgo, Texas" (Hidalgo Co.). We collected this species in Hidalgo County.
- Canthon (B.) lecontei***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is "Texas" without further locality (Harold, 1868). We examined specimens from Cameron, Duval, Kleberg and McMullen counties.
- Canthon (B.) melanus***. - New state record. We collected numerous specimens of this species on active sand dunes in El Paso County.
- Canthon (B.) mixtus***. - Provisional Texas endemic. This species is likely to occur in northern Mexico and eastern New Mexico. The type locality is Marfa (Presidio County) (Robinson, 1948). We collected this species in Presidio County and have seen specimens from Brewster and Hidalgo counties and from the Texas Panhandle.
- Canthon (C.) indigaceus***. - Literature record only. Robinson (1948) recorded this species from Texas without further data. This is a common species in Arizona and Mexico and it would be easily detectable if it really occurred in Texas. The record needs confirmation.
- Deltochilum scabriusculum***. - According to Howden (1966), this large canthonine dung beetle ranges from "southern Texas down the east coast of Mexico to Guatemala and Costa Rica," but he did not provide details on the distribution within Texas. The first report of this species from the United States appears to be that of Leng (1920) who cites "Tex" as the range of the species. Texas specimens collected and examined during this study are all from Cameron County.
- Malagioniella astyanax yucateca***. - This large Canthonine ranges from Costa Rica to Brownsville, Texas. (Halffter, et al., 1960; Halffter & Martinez, 1966). It was first reported from the United States under the name "Megathopa yucateca Esch." by Leng

(1920) who listed its range as "Mex. Tex." Texas specimens collected and examined during this study are all from Cameron County.

### Melolonthinae

- Hoplia laticollis*. - Literature record only. Hardy (1977) recorded this species from Texas with no further data. This species is to be expected in the Panhandle area of the state.
- Hoplia trivialis*. - Literature record only. Recorded from "TEXAS: Grayson County, Sherman" by Hardy (1977). Hardy inadvertently switched the figure captions for the range maps of *H. modesta* and *H. trivialis*.
- Podolasia ferruginea*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Ringgold Barracks (Starr County) (LeConte, 1856). Other records are from Brooks, Webb and Zapata counties (Howden, 1997).
- Podolasia stillwellorum*. - Provisional Texas endemic. This species is likely to occur in northern Mexico along the Rio Grande. Type locality Stillwell RV Park on Hwy. 2627 (Brewster County). It is also recorded from Presidio County (Howden, 1997).
- Podostena bottimeri*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico along the Rio Grande. The type locality is Big Bend National Park, Hot Springs (Brewster County) (Howden, 1958a). It is also recorded from Presidio County (Howden, 1997).
- Podostena rileyi*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico along the Rio Grande. The type locality is Santa Margarita Ranch (Starr County) (Howden, 1997).
- Serica*: This genus needs a thorough revision, none-the-less the species seem to be readily identified. We thank Paul Lago who has provided us with many determinations and confirmations of our determinations over the past several years. We collected what we believe to be an undescribed species close to *S. contorta* in Milam County, and have examined a series of specimens representing an unidentified species from the Texas Panhandle.
- Serica aemula*. - Provisional Texas endemic likely to be found in Louisiana. The type locality is Conroe (Montgomery County) (Dawson, 1947) and Brazos County was also mentioned by Dawson. To these county records we add Burleson, Erath, Jasper, Johnson, Sabine, San Augustine, Tyler, Victoria, Wilbarger and Walker counties.
- Serica atratula atratula*. - The type locality is "Texas" (LeConte, 1856) and Dawson (1947) recorded it from Dallas County. We collected this species in Palo Pinto County and have seen another specimen from Batsrop County.
- Serica campestris*. - New state record. We collected this species at uv light in Bowie and Wood counties where it is not unexpected.
- Serica georgiana*. - Literature record only. Dawson (1952) listed this species from Texas without further data. We expect this species to be found in the eastern portion of the state.
- Serica howdeni*. - This species was originally known from only the type specimen taken near Tyler (Smith County). We collected it at Tyler State Park (Smith County) and in Brazos County where it was found in large numbers at a bottomland woodland area near College Station.
- Serica intermixta*. - New state record. We collected this species at uv light in Brazos, Sabine, Smith, Tyler and Wood counties.
- Serica mystaca*. - Literature record only. Dawson (1952) listed this species from Texas without further locality. We expect this species to be found in the eastern portion of the state.

- Serica texana*. - Texas endemic. The given type locality is "Fort Gates, Texas" (Coryell County) (LeConte, 1856). Dawson (1967) reported it from Bastrop, Gillespie and Lee counties. To these records we add Bexar, Burlleson, Burnet, Caldwell, Kerr, Leon, Medina, Milam and Robertson counties. This species is abundant at uv light.
- Serica vespertina accola*. - New state record. We collected this species at uv light in Morris and Smith counties.
- Fossocarus creoleorum*. - Provisional Texas endemic. This species is likely to occur in southwestern Louisiana. The type locality is Weirgate (Newton County) (Howden, 1961), and it was later recorded from Hardin County (Howden, 1971). As predicted by Howden (1961), this species is active during the cool-season although not exclusively. Our specimens (all males) were taken in October, March and as late as April and May. It also flies during rainy weather and even during driving rainstorms, and it may fly exclusively under these conditions. We collected or examined male specimens from Hardin, Jasper and Tyler counties taken mostly at lights.
- Hypothyce mixta*. - The type locality is Tennessee Colony (Anderson County) (Howden, 1968a). Paratypes cited by Howden are from other localities in Anderson County, as well as in Harris, Nacogdoches and Wood counties. Hardy (1974) added Gonzales County. Currently only one species is recognized in Texas; however, preliminary study indicates it is either a highly polytypic species or multiple species are present. We collected or have seen *Hypothyce* specimens from Anderson, Bastrop, Burlleson, Caldwell, Lee, Leon, Limestone, Newton, Nacogdoches, Robertson, Smith and Wood counties in Texas, and Winn Parish, Louisiana. Further taxonomic and biological studies are needed to assess the status of these populations and to determine which of these are true *H. mixta*.
- Phyllophaga*: With over 100 species recorded from Texas, this genus has far more species in Texas than any other scarabaeoid genus in the state. We recognize the traditional subgenera here except we include *Eugastra* LeConte in *Phyllophaga s. str.* One species from Texas is currently without a subgeneric assignment (*P. ecostata* Horn, see Warner & Morón, 1992). In addition to the described species listed below, we believe there are a few additional unnamed species occurring in the state. We propose one new species-group synonymy below (see *P. arcta* Horn).
- Phyllophaga (L.) arizona*. - Dubious Texas record. Saylor (1940a) cited the locality of "Texas, Fedor" for this species. Fedor is in Lee County in central Texas. Other published localities for this species are from Arizona and Saylor (1940a) also listed "Fort Wingate, New Mexico." This species would be easily detectable if it really occurred in central Texas. The Texas record is most likely an error.
- Phyllophaga (L.) bottimeri*. - Texas endemic. The type locality is Big Bend National Park (Brewster County) (Reinhard, 1950). This species is found at the higher elevations in the Chisos Mts. (Howden, 1960).
- Phyllophaga (L.) disparilis*. - New state record. We collected this species in Jeff Davis County in the Davis Mountains.
- Phyllophaga (L.) fimbripes*. - Saylor (1940a) recorded this species from Comal County and Reinhard (1950) cited Saylor and also reported a specimen from Fort Davis (Jeff Davis County). The Comal County record is highly doubtful given the known range of this species. Furthermore, we suspect the Jeff Davis County record may be based on a misidentification of *P. (L.) koehleriana* Saylor, since *P. koehleriana* is the only species of the *fimbripes* complex that we know from Jeff Davis County. We have confirmed a record of *P. fimbripes* from Dalham County based on dissection and examination of male specimens.
- Phyllophaga (L.) planeta*. - Texas endemic. The type locality is Fort Davis (Jeff Davis County) (Reinhard, 1950). We collected this species in Jeff Davis County and Howden

(1960) reported specimens from Brewster County that he believed were intermediate between *P. (L.) meadei* Saylor from Arizona and *P. planeta* from Fort Davis. This species complex of *Listrocheilus* needs further taxonomic study.

*Phyllophaga (L.) pulcher*. - Texas endemic. The type locality is Skidmore (Bee County) (Linell, 1896). Reinhard (1950) recorded this species from Bee, Bexar, Erath, Kaufman, Milam and Van Zandt counties. To these records we add Atascosa and San Patricio counties.

*Phyllophaga (s. str.) aequalis*. - Provisional Texas endemic. This species is likely to be found in northeastern Mexico. The type locality is Eagle Pass (Maverick County) (LeConte, 1856), not El Paso as erroneously cited by Horn (1887b). Reinhard (1950) recorded specimens from Dimmit and Zavala counties. To these records we add Frio County.

*Phyllophaga (s. str.) amplicornis*. - Texas endemic. The type locality is Stephenville, (Erath County) (Reinhard, 1939). Other counties given with the original description include Atascosa, Bexar, Colorado, Milam and Smith counties. We have confirmed the records for Milam and Smith counties, and we add Anderson, Bastrop, Brazos, Brooks, Burleson, Burnett, De Witt, Gillespie, Kenedy, Mason, Palo Pinto, San Patricio and Wood counties. Although originally described as a subspecies of *P. tristis* (Fabricius), this is actually a distinct full species.

*Phyllophaga (s. str.) antennata*. - Texas endemic. The type locality is Texas without further location (Smith, 1889). Reinhard (1950) recorded this species from Cameron, Coleman, Kerr, Gillespie, Kimble, Menard and Tom Green counties. The Cameron County record is likely an error given our observations on the habitat preference of this species. To these records we add Kinney and Sutton counties.

*Phyllophaga (s. str.) arcta*. - (= *Phyllophaga opacita* Reinhard, 1939. **New Synonymy**). The type locality of *P. opacita* is Bastrop (Bastrop County). Reinhard (1950) recorded *P. arcta* from Morris, Nacogdoches and Leon counties. We place *P. opacita* in synonymy under *P. arcta* because we find the shape of the lower explanate margin of the parameres, the only character used to separate the two species, to be variable, and we have been unable to find other morphological characters to distinguish two species. The variation in shape of the parameres is by no means random. Specimens from the eastern localities are typical *P. arcta* (sensu Reinhard, 1939), those from Milam and Parker counties are intermediate between eastern populations and typical "*opacita*" from Bastrop County and southward. Another form possessing the most strongly narrowed lower parameral margin is represented by specimens from Welder Wildlife Refuge (San Patricio County). Externally, all these beetles are essentially identical. The internal sac of the male median lobe is unique among North America *Phyllophaga*. *Phyllophaga arcta* also occurs in central Louisiana (Riley, 1988) but the record from Alabama (Luginbill and Painter, 1953) is probably an error. In Texas this species is a "summer-active" species and is rather common in areas with sandy substrates. To the above Texas county records, we add Angelina, Atascosa, Brazos, Bexar, Burleson, Cherokee, Caldwell, Freestone, Guadalupe, Hardin, Houston, Jasper, Lee, Liberty, Montgomery, Parker, Smith, San Augustine, Willacy and Wilson counties.

*Phyllophaga (s. str.) clemens*. - Dubious Texas record. Horn (1887b) recorded this species from Florida and Texas with no further data. This is a southeastern species recorded from Florida, Georgia and South Carolina (Luginbill and Painter, 1953). Horn's original Texas record is likely an error.

*Phyllophaga (s. str.) cupuliformis*. - Dubious Texas record. Reinhard (1950) recorded this species from Angelina and Walker counties. Woodruff and Beck (1989) cited Reinhard's records for Texas. Reinhard's specimens can not be located. It is recorded from the southeastern United States west to Louisiana. Riley (1988) found this species only in the

- extreme southeastern corner of Louisiana. Given its known range and the fact that it was not taken in Texas during this study, Reinhard's Texas records are believed to be in error. His records are most likely misidentifications of *P. micans* or *P. sacoma*.
- Phyllophaga (s. str.) delata***. - New state record. We collected this species in Harrison and Wood counties.
- Phyllophaga (s. str.) elizoria***. - Dubious Texas record. Reinhard (1950) recorded this species from Menard County. Reinhard's Texas specimens can not be located. This species is restricted to central Florida (Woodruff & Beck, 1989). It is likely that Reinhard's original record was based on misidentification of small individuals of *P. parvidens*, a species that resembles *P. elizoria* in general appearance.
- Phyllophaga (s. str.) fusca***. - Literature record only. Luginbill and Painter (1953) recorded this species from Texas with no further data. Riley (1988) recorded this species from two parishes in northern Louisiana. This species could possibly occur in northeastern Texas.
- Phyllophaga (s. str.) gaigei***. - Texas endemic. The type locality is Juniper Canyon, Chisos Mts. (Brewster County) (Sanderson, 1948). This species is known only from the higher elevations of the Chisos Mountains.
- Phyllophaga (s. str.) hamata***. - Texas endemic. The type locality is Texas without further locality (Horn, 1887b). Reinhard (1939, 1950) reported this species from Bexar, Menard, Sutton and Tom Green counties. To these records we add Bandera, Bell, Kerr and Val Verde counties.
- Phyllophaga (s. str.) hirticula***. - Literature record only. Horn (1887b) recorded this species from Texas without further data. Riley (1988) recorded it from southeastern and central Louisiana. This species could possibly occur in northeastern Texas.
- Phyllophaga (s. str.) ilicis***. - Literature record only. Luginbill and Painter (1953) recorded this species from Texas without further data. We have taken this species commonly in southeastern Oklahoma, and Riley (1988) recorded it from northeastern Louisiana. It is expected in northeastern Texas.
- Phyllophaga (s. str.) inepta***. - Literature record only. Luginbill and Painter (1953) recorded from Texas without further data. Given the rarity of this species, we feel it will eventually be found in eastern Texas.
- Phyllophaga (s. str.) inversa***. - Literature record only. Horn (1887b) recorded this species from Texas without further data and Reinhard (1950) added no new Texas data. The Texas record of this primarily northern species needs confirmation.
- Phyllophaga (s. str.) invisa***. - Texas endemic. The type locality is 5 mi. S Sarita (Kenedy County) (Riley and Wolfe, 1997). Also cited with the original description are records from Aransas, Atascosa, Bastrop, Bexar, Brooks, Caldwell, Kleberg, Leon, Medina, Milam, San Patricio and Starr counties. To these records we add Brazos County.
- Phyllophaga (s. str.) lenis***. - Literature record only. Luginbill and Painter (1953) recorded this species from Texas without further data. If actually in Texas, this species will be found in the far western portion of the state. The Texas record needs confirmation.
- Phyllophaga (s. str.) marginalis***. - Literature record only. Luginbill and Painter (1953) recorded this species from Texas without further data. Riley (1988) recorded this primarily northern species from one parish in eastern Louisiana. The Texas record needs confirmation.
- Phyllophaga (s. str.) perlonga***. - New state record. We collected this species along the Red River in Bowie County.
- Phyllophaga (s. str.) pleroma***. - Texas endemic. This name is a replacement name for *Phyllophaga plena* Reinhard. The type locality is San Patricio County (Reinhard, 1939). Nueces County was another county given with the original description.

- Phyllophaga (s. str.) psiloptera*. - Texas endemic. The type locality is Chisos Mountains, Blue Creek, elevation 6,000 ft. (Brewster County). Howden (1960) also recorded it from the Chisos Mountains. We collected this species in the Davis Mountains at elevations ranging from 4,900 to 6,180 feet.
- Phyllophaga (s. str.) quercus*. - New state record. We collected this species in Sabine County.
- Phyllophaga (s. str.) renodis*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Fowlerton (LaSalle County) (Reinhard, 1939). We have collected and/or seen specimens from Atascosa, LaSalle, McMullen and Webb counties.
- Phyllophaga (s. str.) ravida guatemalica*. - Literature record only. The only Texas record for this Mexican species is from Sanderson (1942) who reported it from Laredo (Webb County).
- Phyllophaga (s. str.) riviera*. - Texas endemic. The type locality is Riviera (Kleberg County) (Reinhard, 1950). We collected this species in Brooks, Kenedy and Kleberg counties. The female remains unknown. The species description was based on 37 male specimens and the four hundred or so specimens we collected are all males.
- Phyllophaga (s. str.) rolstoni*. - Provisional Texas endemic. This species is likely to occur in northern Mexico along the Rio Grande. The type locality is Madera (Monilla) Canyon river access, Big Bend Ranch State Natural Area (Presidio County). Some paratypes are from Brewster County (Riley & Wolfe, 1997).
- Phyllophaga (s. str.) rubricosa*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Dimmit County (Reinhard, 1939). We have collected and/or seen specimens from Atascosa, Brooks, Dimmit, Duval, Frio, Goliad, Kleberg, La Salle, Starr, Zapata, and Zavala counties.
- Phyllophaga (s. str.) rugosa*. - Literature record only. Horn (1887b) recorded this species from Texas without further data. Reinhard (1950) cited the Horn record and a specimen from Austin (Travis County). Given the known range of this species, the Austin record is doubtful. If this species actually occurs in Texas, it should be found in the northeastern corner of the state.
- Phyllophaga (s. str.) sodalis*. - The type locality is Milano (Milam County) (Reinhard, 1940). Also cited with the original description are records from Atascosa, Brazos, Colorado, Eastland, Erath and Travis counties. Bastrop County was added later (Reinhard, 1950). To these records we add Burleson county in Texas, and Love and Carter counties in eastern Oklahoma. The Oklahoma specimens are the first records from outside of Texas. This species is very close to, and perhaps not distinct from, *P. corrosa* (LeConte).
- Phyllophaga (s. str.) suttonana*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Sonora (Sutton County) and paratypes are from Tom Green County (Reinhard, 1939). To these records we add Jeff Davis, Kerr, Kinney, Menard, Uvalde and Val Verde counties. Although originally described as a subspecies of *P. tristis* (Fabricius), this is actually a distinct full species.
- Phyllophaga (s. str.) temora*. - Literature record only. The Texas record for this Mexican species is from Saylor (1943) who reported this species from Val Verde County.
- Phyllophaga (s. str.) tusa*. - Texas endemic. The type locality is "nr. San Antonio" (probably Bexar County) (Horn, 1887b). Reinhard (1939, 1950) listed it from Dimmit County. To these records we add Live Oak and San Patricio counties.
- Phyllophaga (T.) squamipilosa*. - This species was described from Texas without further locality (Saylor, 1936), and no additional details regarding its distribution have appeared since. We examined five specimens from Hemphill County, Texas, one specimen from western Oklahoma, and two specimens from Stevens County, Kansas. This species is closely related to *P. lanceolata* and will probably be found to be diurnal as in that species.

- Phyllophaga ecostata*. - Texas endemic. The type locality is "southwestern Texas" (Horn, 1887b). We examined one specimen from Jim Hogg County.
- Polyphylla*: The *P. hammondi* species complex in Texas needs further study for there appear to be two distinctly different species present. A large bodied, distinctly vittate form with bidentate foretibiae occurs along the Colorado River at Bastrop and Smithville (Bastrop County), at Langs Mill (Gillespie County), along the Llano River in Mason County, and along the Pedernales River in Blanco County. These specimens are remarkably homogeneous as opposed to the extremely variable *P. hammondi*. They match very closely Casey's (1889) description of *P. speciosa*, considered a junior synonym of *P. hammondi* by Young (1988). This synonymy and the identity of the above-mentioned Texas populations need to be reinvestigated.
- Thyce squamicollis*. - Hardy (1974) recorded this species from El Paso, Reeves and Nueces counties in Texas. We collected this species in El Paso County. Given that all other localities are from far western Texas and New Mexico, the Nueces County record seems doubtful.
- Diplotaxis*: This large and taxonomically complicated genus has a great concentration of species in the southwestern United States and Mexico. Mr. Scott McCleve of Douglas Arizona has studied the taxonomy of the genus for many years, and during the last several years has determined thousands of Texas specimens for us. He has informed us of the presence of a few undescribed species in Texas.
- Diplotaxis aenea*. - Literature record only. This species was reported by Fall (1909) from Texas without further locality, otherwise it is known only from Mexico. Vaurie (1958a) did not report it from any of the Mexican states that border Texas. Its presence in Texas needs confirmation.
- Diplotaxis blanchardi*. - Vaurie (1956 & 1960) reported a record from Jeff Davis County. Given the known eastern United States distribution, it is unlikely that this species really occurs this far west in Texas.
- Diplotaxis brevisetosa*. - Provisional Texas endemic. The type locality is Brighton, (Nueces County) (Linell, 1897) and Vaurie (1960) recorded it from Milam and Wilson counties. To these records we add Aransas, Brooks, Burleson, Cameron, Duval and Kenedy counties.
- Diplotaxis chiricahuae*. - New state record. We collected one specimen at uv light from nine miles north of Van Horn (Culberson County).
- Diplotaxis dubia*. - Texas endemic. Vaurie (1960) restricted the type locality to "Texas" and reported examining specimens from Brazos, Cherokee, Colorado, Lee, Walker and Van Zandt counties. To these records we add Anderson, Erath, Nueces, Smith and Wood counties.
- Diplotaxis errans*. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Texas without further data (Fall, 1909). Vaurie (1960) saw only three specimens, two of which were from Eagle Pass (Maverick County). We have taken a few specimens at uv light along the Rio Grande in Starr County.
- Diplotaxis knausii*. - New state record. We have collected and/or examined specimens of this species from El Paso, Hardeman, Live Oak, Pecos, Randall, and Starr counties.
- Diplotaxis marginicollis*. - Dubious Texas record. Vaurie (1960) saw a single female specimen from Medina County and she considered the record questionable. If this species is to be confirmed for Texas, it will probably be found in the far western portion of the state.
- Diplotaxis misella*. - New state record. We collected specimens of this species from Presidio County.



- Diplotaxis punctipennis***. - Texas endemic. The given type locality is Texas without further locality (LeConte, 1856) and Vaurie (1960) recorded it from Travis, Uvalde and Val Verde counties. To these records we add Duval and Live Oak counties.
- Diplotaxis rex***. - Texas endemic. The type locality is "Norias Division, King Ranch (Kleburg County)" (Vaurie, 1960). We examined specimens from Brooks and Kenedy counties.
- Diplotaxis rudis***. - Vaurie (1960) recorded this species from Texas without further data. We collected this species in Potter County and have examined other specimens from that county. Most of these were collected in pit-fall traps at McBride Canyon, Lake Meredith, Texas.
- Diplotaxis schaefferi***. - Texas endemic. The type locality is New Braunfels (Comal County) (Fall, 1909) and Vaurie (1960) recorded it from Llano County. We examined specimens from Mason and Medina counties.
- Diplotaxis simplex***. - New state record. It was previously recorded only from Mexico, including the state of Tamualipas (Vaurie, 1958a). Our records are from Brooks, Cameron, Kenedy, Live Oak and San Patricio counties. This report represents the first record of this species from north of Mexico.
- Diplotaxis subcostata***. - This species was recorded from Texas without further locality by Fall (1909). We collected this species in Hardin and Jasper counties and have seen a specimen from San Jacinto County.
- Diplotaxis texana***. - Texas endemic. The type locality is New Braunfels (Comal County) (LeConte, 1856) and Vaurie (1960) recorded it from Bexar, Brewster, Burnet, Jeff Davis, Kerr, Menard and Uvalde counties. To these records we add Bandera, Bell, and Travis counties.
- Dichelonyx elongata***. - New state record. This species ranges widely over the eastern United States, but we are unaware of any previous report of its occurrence in Texas. We collected this species in Harrison and Smith counties.

#### Rutelinae

- Anomala***: There appear to be as many as three unnamed species of *Anomala* present in Texas.
- Anomala diabla***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Devil's River near Del Rio (Val Verde County) (Potts, 1976). Maverick County was also cited with the original description. Our specimens are from Brewster, Terrell, and Val Verde counties.
- Anomala insitiva***. - Provisional Texas endemic. This species is likely to occur in northeastern Mexico. The type locality is Brownsville (Cameron County) (Robinson, 1938). To these records we add Bexar and Hidalgo counties.
- Anomala lucicola***. - New state record. This species ranges widely over the eastern United States, but we are unaware of any previous report of its occurrence in Texas. We examined one specimen taken in Bowie County.
- Anomala ludoviciana***. - This species is listed from Texas without further data by Potts (1977a). We have been unable to confidently recognize this species among our Texas *Anomala* material.
- Anomala suavis***. - We have taken this species in sand dune habitats of Ward and Winkler counties, Texas and from Chaves and Eddy counties, New Mexico. The New Mexico records are the first report of this species outside of Texas.
- Anomala tibialis***. - Texas endemic. This species was described from Texas without further data (Schaeffer, 1906) and has remained unknown. We examined one specimen representing this distinctive species, labeled "Padre Island, Kleberg County TX, V-19-1976, J. E. Gillaspay Coll."

***Popillia japonica***. - The Japanese beetle. This introduced pestiferous species, abundant in the northeastern United States, has been intercepted at Austin (Travis County) and the Dallas/Fort Worth metroplex during 1997 (Nash, 1997). It is presently considered established in the Dallas/Fort Worth area, and in Harris, Lubbock, Travis and Van Zandt counties (G. H. Nash, personal communication, Sept. 2000). We examined a specimen from Denton County that we believe is a valid collection record.

***Cotalpa conclamara***. - Texas endemic. The type locality is Engeling Wildlife Management Area (Anderson Co.) (Young, 2002). Young (2002) also cited records for Tyler and Roberston counties. To these records we add Bexar and Wilson counties.

***Cotalpa subcibrata***. - New State Record. Saylor (1940b) mentioned seeing a specimen from Lovelady (Houston County) that he thought might be this species. The specimen Saylor saw could actually be the recently described species, *C. conclamara* Young. None-the-less, we examined one *Cotalpa subcibrata* specimen from Williamson County.

***Parastasia brevipes***. - New state record. We collected this species in Brazos, Caldwell, Leon and Smith counties, and additional specimens were examined from Dallas, Fort Bend, Hardin, Harris and Shelby counties.

### Dynastinae

***Aspideola singularis***. - Dubious Texas record. The type locality of *Aspideola texana* Höhne (a junior synonym of *A. singularis*) is "San Antonio, Texas." This is a distinctive and common Central American species, and it is doubtful that it ever occurred in the United States.

***Cyclocephala borealis***. - Literature record only. Hardy (1991) cited this species from Texas without further data. This species is expected in northern Texas.

***Cyclocephala freudei***. - Dubious Texas record. Endrödi (1985) recorded this species from Texas without further locality, but this record is highly questionable.

***Cyclocephala melanocephala***. - *Cyclocephala laminata* Burmeister has been reported from Texas without further data (Endrödi, 1985, and Hardy, 1991). *Cyclocephala laminata* seems very close to and difficult to separate from *C. melanocephala*. If Texas specimens of *C. laminata* were seen by us during this study, they were confused and mixed with specimens we determined as *C. melanocephala*.

***Cyclocephala testacea***. - Dubious Texas record. Endrödi (1985) recorded it from Texas without further locality, but this record is considered highly questionable.

***Dyscinetus picipes***. - New state record. We collected this species at light in Brewster, Hemphill, Jeff Davis and Wheeler counties.

***Aphonus brevicruris***. - Texas endemic. The type locality is Austwell (Refugio County) (Cartwright, 1944b). Gill and Howden (1985) added Austin and San Patricio counties. To these records we add Brooks, Falls, Kenedy, Lee, Milam, San Patricio and Walker counties.

***Aphonus texanus***. - Texas endemic. The type locality is Fredericksburg (Gillespie County) (Gill and Howden, 1985). Also given with the original description are records for Bastrop, Frio and Henderson counties. To these records we add Anderson, Atascosa, Brazos, Caldwell, Erath, Fort Bend, Galveston, Goliad, Johnson, Lee and Walker counties.

***Orizabus***: In addition to the listed species, we collected an additional species in Texas that is apparently undescribed (W. B. Warner, personal communication).

***Orizabus pyrifformis***. - New state record. We collected specimens of this species in Jeff Davis County.

***Tomarus relictus***. - The distribution for one of the Casey names now considered a junior synonym of *T. relictus* includes "Texas" (Hardy, 1991). Other than this, we can find no

report of this species from Texas. Our specimens were collected in Hemphill and Wheeler counties where this species is not unexpected.

***Hemiphileurus illatus***. - New state record. We collected this species at light on sand dunes in El Paso County.

### Cetoninae

***Cotinis (C.) boylei***. - Texas endemic. The type locality of this species is Bastrop State Park (Bastrop County) (Goodrich, 1966). Also given with the original description are records from Kleberg and Victoria counties. Most of the specimens we have seen are from Brooks County where they were found at a rest stop parking area along highway 281 south of Falfurrias. Other specimens examined are from Bexar and Kenedy counties.

***Euphoria casselberryi***. - Texas endemic. The type locality of this species is the Davis Mountains (Jeff Davis County) (Robinson, 1937). The single specimen we examined of this species is from the Davis Mountains Resort area, Davis Mts., at ca. 5800 ft. (Jeff Davis County), taken during June.

***Euphoria discicollis***. - We examined specimens of this species from Nacogdoches and Wood counties. Its larvae develop within the dung chambers of *Geomys* pocket gophers (Godwin, 2000; Skelley & Gordon, 2002).

***Euphoria hirtipes***. - New state record. We examined one specimen from Deaf Smith County in the Panhandle where this species is not unexpected.

***Euphoria lineoligera***. - We examined one specimen of this species from Hidalgo County.

***Euphoria schotti***. - Provisional Texas endemic likely to be found in northeastern Mexico. The type locality is Eagle Pass (Maverick County) (LeConte, 1853). We examined one specimen from Big Bend National Park (Brewster County).

***Stephanucha annae***. - Texas endemic. The type locality is "Two miles south Olmos Creek and U. S. Rt. 77" (Kenedy County) (Howden, 1955b). Our specimens are from Kenedy County where they were either sifted from *Geomys* pocket gopher pushups during February or reared to adult from larvae recovered from this microhabitat. We examined another specimen from Welder Wildlife Refuge in San Patricio County.

***Cremastocheilus (C.) harrisii***. - New state record. We examined a single specimen of this species labeled "Texas: Jasper County, Neches Riv. at Graham Creek, X-30-1990, floating in river, Col. by Drschel leg."

***Cremastocheilus (M.) crinitus***. - Literature record only. Alpert (1994) treated this species as a species complex without further subdivision. Arnett (1983) listed this species from Texas without further data.

***Cremastocheilus (M.) knochii***. - New state record. Alpert (1994) treated this species as a species complex without further subdivision. We examined one specimen from McBride Canyon, Lake Meredith (Potter County) and another from Hereford (Deaf Smith County). This species is not unexpected in the Texas Panhandle.

***Cremastocheilus (T.) saucius***. - Arnett (1983) listed this species from Texas without further data. We examined one specimen from Palo Duro Canyon (probably Randall County) in the Panhandle where this species is not unexpected.

***Gnorimella maculosa***. - New state record. We collected one specimen in a Lindgren funnel trap in Sabine County, and we examined another specimen from Nacogdoches County. We also collected this species in Louisiana. These records indicate that *G. maculosa* occurs much further south than is indicated on the range map shown by Howden (1968b).

***Valgus canaliculatus***. - New state record. This species ranges widely over the eastern United States, but we are unaware of any previous report of its occurrence in Texas. The Texas

records collected and/or examined are from Anderson, Brazos and Smith counties. We are indebted to Paul Lago for his identification of these specimens.

*Valgus seticollis*. - New state record. This species ranges widely over the eastern United States, but we are unaware of any previous report of its occurrence in Texas. The Texas records examined are from Sabine County. We are indebted to Paul Lago for his identification of these specimens.

### Summary and Discussion

The present list of Texas Scarabaeoidea includes 532 species/subspecies documented from Texas (two species are represented by two subspecies each). This figure is exclusive of the 12 species we here consider dubious Texas records which, in the absence of new data, should be removed from future listings of the Texas Coleoptera fauna. Four hundred sixty-eight species/subspecies (ca. 88%) are herein documented from Texas through our collecting efforts or through examination of Texas specimens in various collections. Sixty-four species/subspecies (ca. 12%) are known only from literature records (not including the dubious records). Forty-eight species are herein reported from Texas for the first time. Thirteen species found in the state are not native to North America.

The Texas scarabaeoid fauna is large, and certainly the largest of any of state of the United States. William B. Warner (personal communication, 2001) recorded ca. 370 species for Arizona; Arthur Evans (personal communication, 2001) recorded 354 species from California; Paul Lago (personal communication, 2001) recorded ca. 283 species from Mississippi; Peck and Thomas (1998) recorded 300 species/subspecies from Florida; and Ratcliffe (1991) recorded 197 species/subspecies from Nebraska. Poole & Gentili (1995) list 1,484 species of Scarabaeoidea from America north of Mexico (while there are certainly some inaccuracies in the details of this listing, their number of species is probably reasonably accurate). The number of species herein documented from Texas represents 37% of the Poole & Gentili figure, therefore, we conclude that slightly more than 1/3 of the species recorded from America north of Mexico are found in Texas. Only three families of the twelve scarabaeoid families found in temperate North America (following Arnett, 2002) do not occur in Texas. These three families are from mostly far-western North America (primarily California) and are small, enigmatic groups (Diphyllostomatidae, Pleocomidae, and Glaphyridae).

The high percentage of North American scarabaeoid species found in Texas can be attributed to two factors: 1) the high level of habitat diversity found in the state, and 2) the location of Texas relative to major biotic regions of North America. The second factor is quite apparent in our data summarized in table 1 (column B), where regions 1 (East Texas), 3 (South Texas) and 6 (West Texas) each contain high percentages of Texas species which are not found in other Texas regions. These subsets of species are comprised in small part by endemics (see below) but more importantly by species whose ranges occur primarily in the Austroriparian, Tamaulipan, and Chihuahuan biotic provinces, respectively (after Blair, 1950).

Table 1 (column A) displays the number of species recorded from each of the seven regions. Region 7 which is the greatest in size and Region 2 which is the smallest in size (Table 1) have the lowest number of species, 135 and 117 respectively. This figure may reflect the actual species diversity of scarab beetles in these areas; however, in view of the diversity of available habitats present in these regions, these low numbers are more likely due to the lack of collecting effort. We have not adequately sampled these two regions and believe that most collectors who visit Texas rarely spend much field time in these regions, favoring the more traditional collecting grounds in southern and western Texas.

In contrast to Regions 2 and 7, Region 4 has the highest species diversity with 250 species recorded, approaching half the total scarabaeoid species of the state (Table 1). This is the second largest region in area, but more important is its position, which is essentially a broad east-west and north-south blending zone wherein elements from several regions converge. Additionally, this area has received considerably more collecting effort than Regions 2 and 7.

	A	B	C	D	E
<b>Region 1</b>	206 (38.7%)	33 (16.0%)	10	6	0
<b>Region 2</b>	117 (22.0%)	1 (00.9%)	5	4	1
<b>Region 3</b>	209 (39.3%)	42 (20.1 %)	38	19	8
<b>Region 4</b>	250 (47.0%)	11 (04.4%)	21	13	1
<b>Region 5</b>	173 (32.5%)	9 (05.2%)	17	11	3
<b>Region 6</b>	196 (36.8%)	73 (37.2%)	17	8	6
<b>Region 7</b>	135 (25.3%)	14 (10.4%)	5	2	0

**Table 1.** Species diversity and endemism by Texas region. Column A, total number of species recorded from region and as a % of total number of species found in Texas (532 total in Texas); column B, total number of species unique to region within Texas and as a % of total number of species recorded from that region; column C, total number of species not found outside of Texas recorded from region; column D, total number of Texas endemics found in region, and column E, total number of Texas endemics unique to region (see Fig. 1 for explanation of regions).

Of the 532 Texas scarabaeoid species/subspecies, 65 (12.2%) are not recorded from outside the boundary of Texas. Thirty-one of these have been collected at locations very near the border with Mexico or adjacent states and from habitats that are continuous with those in adjacent areas. Such species are here considered provisional Texas endemics, since the possibility of their occurrence outside the state seems likely. Many of these provisional Texas endemics occur on or near the lengthy Texas-Mexico border, but have not been recorded from Mexico. This is firm evidence pointing to the need for much more sampling in extreme northern Mexico adjacent to the Texas border. Species such as *Anomala insitiva*, *A. diabla*, *Phyllophaga rolstoni*, *Podolasia ferruginea*, *P. stillwellorum*, *Podostena bottimeri*, *P. rileyi* and others will certainly be found on the opposite bank of the Rio Grande. Of the 65 species not known from outside Texas, 34 of them are here judged to be true Texas endemics, i. e., not likely to occur outside the boundary of the state.

<b>Region 2</b>	<i>Phyllophaga riviera</i>	<i>Diplotaxis schaefferi</i>
<i>Phyllophaga pleroma</i>	<i>Phyllophaga tusa</i>	<b>Region 6</b>
<b>Region 3</b>	<i>Stephanucha annae</i>	<i>Bolbocerosoma elongata</i>
<i>Bradycinetulus rex</i>	<b>Region 4</b>	<i>Euphoria casselberryi</i>
<i>Diplotaxis rex</i>	<i>Rhyssenus brownwoodi</i>	<i>Phyllophaga bottimeri</i>
<i>Anomala tibialis</i>	<b>Region 5</b>	<i>Phyllophaga gaigei</i>
<i>Ataenius griffini</i>	<i>Aphodius bottimeri</i>	<i>Phyllophaga planeta</i>
<i>Phyllophaga ecostata</i>	<i>Phyllophaga hamata</i>	<i>Phyllophaga psiloptera</i>

**Table 2.** Texas endemic scarabaeoid species unique to each Texas region (see Fig. 1 for explanation of regions).

Texas scarabaeoid endemism by region is shown in Table 1. The highest number of Texas species not known from outside the state is found in Region 3, the south Texas plains and lower Rio Grande valley (Table 1, column C). Furthermore, this region also contains the greatest number of Texas endemics that are not found in any other Texas region (Table 1, column E). Region 4, in contrast, contains only one Texas endemic that is unique to the

region. This sharp contrast is likely related to the "erg" or eolian sand sheet which is a highly unique geological zone contained entirely within Region 3 (Price, 1958). This area of deep sandy soils provides favorable habitat for a number of special Texas scarabaeoids. No such unique zone is found entirely within Region 4. Based on our field experience, we believe that most of the endemic scarabaeoid species that are unique to Region 3 (Table 2) are obligate sand dwellers with their ranges limited to this "sand sheet" or adjacent sandy locales in the region. Region 6, the Trans-Pecos, is a close second to Region 3, containing eight species not found outside the state, six of which are not found in any other Texas region. In this case, the unique zone is the higher elevations of the mountain systems. The Trans-Pecos supports the most unique scarabaeoid fauna among the Texas regions, in that 37% of the species found there are not found in any other Texas region (Table 1, column B).

Of the genera represented by species not found outside the state, the genus *Phyllophaga* is especially well represented with 5 provisional Texas endemics and 13 endemic Texas species. Additionally, nine of the nineteen Texas endemics that are restricted to a single region (Table 2) are *Phyllophaga* species.

### CONCLUDING REMARKS

To the beginning student, the present work may appear to be a definitive checklist of Texas scarabaeoids. However, this is not the case. We wish to emphasize that before Texas scarabaeoid beetles can be considered "well known," considerable additional research will be needed. The necessary research falls into two broad categories: 1) additional field sampling, and 2) additional taxonomic work on the North American fauna.

The fact that more collecting should be focused in some of the less collected regions of the state seems quite obvious. Efforts are needed in the Panhandle, the rolling and high plains and in north Texas in general. Additional effort in northeastern Texas should confirm the presence of several species suspected to occur there. The Texas coastal areas have been very inadequately sampled. Additional efforts should be made to locate and gain access to under-sampled microhabitats throughout the state. Areas of sand substrates should be a particular focus. There will remain a need to continually sample from many of the "well-collected" areas of the state. Collecting during the cooler times of the year and using a number of the less traditional methods should result in new discoveries and additions to the current list. The more exciting discoveries are likely to come from the further investigation of specific microhabitats such as mammal nests and burrows and from gaining access to specialized habitats at uncollected localities, especially sand dunes and other sandy substrates.

Revisionary work and basic taxonomy are needed in a number of scarab genera found in Texas. Most notable case is with the genus *Aphodius*, currently under revision (Robert Gordon and William Godwin, personal communications). When complete, this revision should add a number of additional species to the Texas fauna, primarily through the description of unnamed forms. There appear to be a number of undescribed Texas species residing in other genera as well, namely *Anomala*, *Diploptaxis*, *Geopsammodius*, *Orizaba*, *Phyllophaga*, *Rhyssemus*, *Serica* and possibly *Hypothyce*.

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#### BIBLIOGRAPHY AND LITERATURE CITED

- Alpert, G. D. 1994. A comparative study of the symbiotic relationships between beetles of the genus *Cremastocheilus* (Coleoptera: Scarabaeidae) and their host ants (Hymenoptera: Formicidae). *Sociobiology* 25:1-276.
- Antoine, P. 2001. Contribution à la connaissance des Gymmetini (Coleoptera, Cetoniidae). *Coléoptères* 7(9):113-136.
- Arnett, R. H. 1983. Volume 3. The scarab beetles, buprestid beetles, and related groups, 120 pp. in Arnett, R. H. (ed.), Checklist of the beetles of North and Central America and the West Indies. Flora and Fauna Publications, Gainesville, Florida [This work is an unchanged reprint of an uncommon earlier work: Blackwelder, R. E. and R. H. Arnett. 1974. Checklist of the beetles of Canada, United States, Mexico, Central America and the West Indies. Volume 1, Part 3, The Scarab beetles, ant-loving beetles, clown beetles, and related groups (Red Version), families paged separately].
- Arnett, R. H., M. C. Thomas, P. E. Skelley, and J. H. Frank (eds.). 2002. Volume 2. American Beetles. Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press. xiv + 861 pp.
- Baker, C. W. 1968. Larval taxonomy of the Troginae in North America with notes on biologies and life histories (Coleoptera: Scarabaeidae). *Bulletin of the United States National Museum* no. 279: v + 79 pp.
- Bader, A. M. 1992. A review of the North and Central American *Strigoderma* (Coleoptera: Scarabaeidae). *Transactions of the American Entomological Society* 118:269-355.
- Barfield, C. S. and W. M. Gibson. 1975. Observations on the life history of *Hypothyce mixta* Howden (Coleoptera: Scarabaeidae). *The Coleopterists Bulletin* 29:251-256.
- Blair, W. F. 1950. The biotic provinces of Texas. *Texas Journal of Science* 2: 93-117.
- Blume, R. R. and A. Aga. 1975. *Aphodius* from burrows of a pocket gopher in Brazos County, Texas (Coleoptera: Scarabaeidae). *The Coleopterists Bulletin* 29:161-162.

- Blume, R. R. and A. Aga. 1979. Additional records of *Aphodius* from pocket gopher burrows in Texas (Coleoptera: Scarabaeidae). The Coleopterists Bulletin 33:131-132.
- Carlson, D. C. 1975. Taxonomic characters of the genus *Ochodaenus* Serville with descriptions of two new species in the *O. pectoralis* LeConte species complex (Coleoptera: Scarabaeidae). Bulletin of the Southern California Academy of Sciences 74(2):49-65.
- Carrillo S., J. L. and W. W. Gibson. 1960. Repaso de las especies mexicanas del género *Macroductylus* (Coleoptera, Scarabaeidae), con observaciones biológicas de algunas especies. Secretaría de Agricultura y Ganadería, Folleto Técnico no. 39: 1-102.
- Cartwright, O. L. 1944a. New *Aphodius* from Texas gopher burrows. Entomological News 55:129-135, 146-150.
- Cartwright, O. L. 1944b. New Scarabaeidae from the United States. Annals of the Entomological Society of America 37:28-36.
- Cartwright, O. L. 1948. The American species of *Pleurophorus* (Coleoptera: Scarabaeidae). Transactions of the American Entomological Society 74:131-145.
- Cartwright, O. L. 1953. Scarabaeid beetles of the genus *Bradycinetulus* and closely related genera in the United States. Proceedings of the United States National Museum 103 (no.3318):95-120, 2 pls.
- Cartwright, O. L. 1955. Scarab beetles of the genus *Psammodius* in the Western Hemisphere. Proceedings of the United States National Museum 104 (no. 3344): 413-462.
- Cartwright, O. L. 1957. Three new American *Aphodius* with notes and a key to related species (Scarabaeidae). The Coleopterists Bulletin 11:55-61.
- Cartwright, O. L. 1959. Scarab beetles of the genus *Bothymus* in the United States (Coleoptera: Scarabaeidae). Proceedings of the United States National Museum 108 (no. 3409):515-541.
- Cartwright, O. L. 1963. Two new species of *Megasoma* from the United States and Mexico (Coleoptera: Scarabaeidae). The Coleopterists Bulletin 17:25-29.
- Cartwright, O. L. 1972. A key to the *crassulus* group of *Aphodius* with descriptions of new species from Texas and Maryland (Coleoptera: Scarabaeidae: Aphodiinae). Proceedings of the Biological Society of Washington 85:57-61.
- Cartwright, O. L. 1974. *Ataenius*, *Aphotaenius*, and *Pseudataenius* of the United States and Canada (Coleoptera: Scarabaeidae: Aphodiinae). Smithsonian Contributions to Zoology no. 154:1-106.
- Cazier, M. 1953. A review of the scarab genus *Acoma* (Coleoptera: Scarabaeidae). American Museum Novitates no. 1624:1-13.
- Chapin, E. A. 1935. Review of the genus *Chlaenobia* Blanchard (Coleoptera: Scarabaeidae). Smithsonian Miscellaneous Collections 94:1-20.
- Cory, V. L. and H. B. Parks. 1937. Catalogue of the Flora of the state of Texas. Texas Agricultural Extension Service Bull. no. 550, 130 pp.
- Dawson, R. W. 1919. New species of *Serica* (Scarabaeidae).-I. Journal of the New York Entomological Society 27:32-38, pls. vi-ix.
- Dawson, R. W. 1921. New species of *Serica* (Scarabaeidae). IV. Journal of the New York Entomological Society 29:160-168, pls. ix-xiv.
- Dawson, R. W. 1922. New species of *Serica* (Scarabaeidae). V. Journal of the New York Entomological Society 30:154-169, pls. xi-xxiii.
- Dawson, R. W. 1932. New species of *Serica* (Scarabaeidae). VI. Journal of the New York Entomological Society 40:529-548, pls. xxiii-xxxv.
- Dawson, R. W. 1933. New species of *Serica* (Scarabaeidae). VII. Journal of the New York Entomological Society 41:435-440, pls. xla-xlvi.
- Dawson, R. W. 1947. New species of *Serica* (Scarabaeidae). VIII. Journal of the New York Entomological Society 45:223-235, pls. ix-xx.
- Dawson, R. W. 1952. New species of *Serica* (Scarabaeidae). VIII. Journal of the New York Entomological Society 60:65-77, pls. iii-xiv.
- Dawson, R. W. 1967. New and little known species of *Serica* (Coleoptera: Scarabaeidae). X. Journal of the New York Entomological Society 75:161-178.



- Dellacasa, M., R. D. Gordon, P. J. Harpootlian, Z. Stebnicka, and G. Dellacasa. 2001 (2002). Systematic redefinition of the New World tribe Didactyliini (Coleoptera: Scarabaeidae: Aphodiinae) with descriptions of two new species of *Aidophus* Balthasar. *Insecta Mundi* 15(4):193-216.
- Edmonds, W. D. 1994. Revision of *Phanaeus* Macleay, a New World genus of scarabaeine dung beetles (Coleoptera: Scarabaeidae, Scarabaeinae). *Natural History Museum of Los Angeles County Contributions in Science*, no. 443: 105 pp.
- Endrödi, S. 1985. *The Dynastinae of the World*. Dr. W. Junk, The Hague. 800 pp., 46 pls.
- Fall, H. C. 1909. Revision of the species of *Diplotaxis* of the United States. *Transactions of the American Entomological Society* 35:1-97.
- Fall, H. C. 1932. New North American Scarabaeidae, with remarks on known species. *Journal of the New York Entomological Society* 40:183-204.
- Fall, H. C. and T. D. A. Cockerell. 1907. The Coleoptera of New Mexico. *Transactions of the American Entomological Society* 33:145-272.
- Fincher, G. T. 1990. Biological control of dung-breeding flies: pests of pastured cattle in the United States, pp. 137-151 in Rutz, D. A. and R. S. Patterson, *Biocontrol of Arthropods affecting livestock and poultry*. Westview Studies in Insect Biology, Boulder, Colorado. 316 pp.
- Fincher, G. T., R. R. Blume, J. S. Hunter, and K. R. Beerwinkle. 1986. Seasonal distribution and diel flight activity of dung-feeding scarabs in open and wooded pasture in east-central Texas. *Southwestern Entomologist*, Supplement No. 10: 35 pp.
- Gill, B. D. and H. F. Howden. 1985. A review of the North American genus *Aphonus* LeConte (Coleoptera: Scarabaeidae: Dynastinae). *The Coleopterists Bulletin* 39:119-129.
- Godwin, W. B. 2000. Second record of *Euphoria aestuosa* Horn 1880 reared from dung chambers of *Geomys breviceps* Baird. *Southwestern Entomologist* 25:145-147.
- Goodrich, M. A. 1966. A revision of the genus *Cotinis* (Coleoptera: Scarabaeidae). *Annals of the Entomological Society of America* 59:550-568.
- Gordon, R. D. 1970. A review of the genus *Glareis* in the United States and Canada (Coleoptera: Scarabaeidae). *Transactions of the American Entomological Society* 96:499-517.
- Gordon, R. D. 1976. Studies on the genus *Aphodius* of the United States and Canada (Coleoptera: Scarabaeidae). IV A taxonomic revision of Horn's Group A. *Proceedings of the Biological Society of Washington* 78:458-478.
- Gordon, R. D. 1977. A new species of *Aphodius* (Coleoptera: Scarabaeidae) from sand dunes in Chihuahua, Mexico. *Proceedings of the Biological Society of Washington* 60:232-236.
- Gordon, R. D. 1983. Studies on the genus *Aphodius* of the United States and Canada (Coleoptera: Scarabaeidae). VI. Food and habitat; distribution; key to eastern species. *Proceedings of the Biological Society of Washington* 85:633-652.
- Gordon, R. D. and O. L. Cartwright. 1980. The Western Hemisphere species of *Rhyssemus* and *Trichiorhyssemus* (Coleoptera: Scarabaeidae). *Smithsonian Contributions to Zoology*, no. 317: 29 pp.
- Gordon, R. D. and Pittino. 1992. Current status of the American genera and species of Psammodiini (Coleoptera: Scarabaeidae: Aphodiinae). *The Coleopterists Bulletin* 46:260-273.
- Gordon, R. D. and G. A. Salsbury. 1999. Studies on the genus *Aphodius* of the United States and Canada (Coleoptera: Scarabaeidae). IX. A new species from Kansas and Texas. *Journal of the New York Entomological Society* 107(1): 64-67.
- Gould, F. W. 1962. Texas plants - a checklist and ecological summary. Texas Agricultural Experiment Station publication MP-585, 112 pp.
- Halfter, G. and A. Martínez. 1966. Revisión monográfica de los Canthonina Americanos (Coleoptera, Scarabaeidae) (1a. parte). *Revista de la Sociedad Mexicana Historia Natural* 27:114-175.
- Halfter, G., F. S. Pereira and A. Martínez. 1960. *Malathopa astyanax* (Olivier) y formas afines (Coleop. Scarab.) *Ciencia (Mex.)* 20(7-8):202-204.
- Hardy, A. R. 1972. A brief revision of the North and Central American species of *Megasoma* (Coleoptera: Scarabaeidae). *The Canadian Entomologist* 104:765-777.
- Hardy, A. R. 1974. Revisions of *Thyce* LeConte and related genera (Coleoptera: Scarabaeidae). *Occasional Papers in Entomology* no. 20: 47 pp.

- Hardy, A. R. 1977. A revision of the *Hoplia* of the Nearctic Realm (Coleoptera: Scarabaeidae). Occasional Papers in Entomology no. 23: 48 pp.
- Hardy, A. R. 1991. A catalog of the Coleoptera of America north of Mexico. Family Scarabaeidae, subfamilies Rutelinae and Dynastinae. United States Department of Agriculture Handbook no. 529-34b, 56 pp.
- Hardy, A. R. 2001. Studies in the Euphoriina of the Americans (Coleoptera: Scarabaeidae) II. Status of names in *Euphoria*, types and synonymies, with notes on the South American species. Pan-Pacific Entomologist 77(3):127-143.
- Hardy, A. R. and F. G. Andrews. 1978. Studies in the Coleoptera of western sand dunes I. Five new species of *Polyphylla* Harris. The Pan-Pacific Entomologist 54(1):1-8.
- Harold, E. von. 1868. Monographie der Gattung *Canthon*. Berliner Entomologische Zeitschrift 12:1-144.
- Hatch, S. L., K. N. Gandhi and L. E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agricultural Experiment Station publication MP-1655. iv + 158 pp.
- Hincks, W. D. and J. R. Dibb. 1935. Coleopterorum Catalogus. Pars. 142: Passalidae.. W. Junk, 's-Gravenhage. 118 pp.
- Hoebcke, E. R. and K. Beucke. 1997. Adventive *Onthophagus* (Coleoptera: Scarabaeidae) in North America: geographical ranges, diagnoses, and new distribution records. Entomological News 108:345-362.
- Hoffmann, C. H. 1935. The biology and taxonomy of the genus *Trichiotinus* (Scarabaeidae; Coleoptera). Entomologica Americana 15:133-214.
- Horn, G. H. 1870. Description of the species of *Aphodius* and *Dialytes* of the United States. Transactions of the American Entomological Society 3:110-134.
- Horn, G. H. 1871. Synopsis of the Aphodiini of the United States. Transactions of the American Entomological Society 2:284-297.
- Horn, G. H. 1887a. A monograph of the Aphodiini inhabiting the United States. Transactions of the American Entomological Society 14:1-110.
- Horn, G. H. 1887b. Revision of the species of *Lachnosterna* of America north of Mexico. Transactions of the American Entomological Society 14:209-296.
- Howden, H. F. 1954. A review of the genus *Podolasia* Harold (Coleoptera: Scarabaeidae). American Museum Novitates no. 1661:1-11.
- Howden, H. F. 1955a. Biology and taxonomy of North American beetles of the subfamily Geotrupinae, with revisions of the genera *Bolboceosoma*, *Eucanthus*, *Geotrupes* and *Pelotrupes* (Scarabaeidae). Proceedings of the United States National Museum 104 (no. 3342):151-319.
- Howden, H. F. 1955b. Some new species and records of North American Scarabaeidae (Coleoptera). Proceedings of the Entomological Society of Washington 57:257-264.
- Howden, H. F. 1958a. A seventh species of *Podolasia* Harold (Coleoptera: Scarabaeidae). The Canadian Entomologist 90:291-292.
- Howden, H. F. 1958b. Species of *Acoma* Casey having a three-segmented antennal club (Coleoptera: Scarabaeidae). The Canadian Entomologist 90:377-401.
- Howden, H. F. 1960. A new species of *Phyllophaga* from the Big Bend Region of Texas and Coahuila, with notes on other Scarabaeidae of the area. The Canadian Entomologist 92:457-464.
- Howden, H. F. 1961. New species and a new genus of Melolonthinae from the southeastern United States (Coleoptera: Scarabaeidae). The Canadian Entomologist 93:807-812.
- Howden, H. F. 1964. The Geotrupinae of North and Central America. Memoires of the Entomological Society of Canada, no. 39:1-91.
- Howden, H. F. 1966. Notes on the Canthonini of the Biologia Centrali-Americana and descriptions of new species (Coleoptera: Scarabaeidae). The Canadian Entomologist 98:725-741.
- Howden, H. F. 1968a. Generic relationships of *Thyce*, *Plectrodes*, *Dinacoma*, and *Hypotrichia*, with a description of a new genus from species from eastern Texas (Coleoptera: Scarabaeidae: Melolonthinae). The Canadian Entomologist 100:542-548.

- Howden, H. F. 1968b. A review of the Trichiinae of North and Central America (Coleoptera: Scarabaeidae). Memoires of the Entomological Society of Canada no. 54:1-77.
- Howden, H. F. 1971. Five unusual genera of New World Scarabaeidae (Coleoptera). The Canadian Entomologist 103:1463-1471.
- Howden, H. F. 1984. A catalog of the Coleoptera of America north of Mexico. Family Scarabaeidae, subfamily Geotrupinae. United States Department of Agriculture Handbook No. 529-34a: 17 pp.
- Howden, H. F. 1997. Podolasiini Howden, new tribe, and a revision of the included genera, *Podolasia* Harold and *Podostena* Howden, new genus (Coleoptera: Scarabaeidae: Melolonthinae). The Coleopterists Bulletin 51(3):223-255.
- Howden, H. F. and O. L. Cartwright. 1963. Scarab beetles of the genus *Onthophagus* Latreille north of Mexico (Coleoptera: Scarabaeidae). Proceedings of the United States National Museum 114(no. 3467):1-135.
- Howden, H. F. and C. H. Scholtz. 1986. Changes in a Texas dung beetle community between 1975 and 1985 (Coleoptera: Scarabaeidae, Scarabaeinae). The Coleopterists Bulletin 40(4):313-316.
- Howden, H. F. and P. Vaurie. 1957. Two new species of *Trox* from Florida (Coleoptera, Scarabaeidae). American Museum Novitates No. 1818: 6 pp.
- Jameson, M. L. and B. C. Ratcliffe. 2002. Series Scarabaeiformia Crowson 1960 (=Lamellicornia). Superfamily Scarabaeoidea Latreille 1802. Introduction, pp. 1-5 in Arnett, R. H., et al. (eds.) 2002. Volume 2. American Beetles. Polyphaga: Scarabaeoidea through Curculionioidea. CRC Press. xiv + 861 pp.
- Kohlmann, B. 1984. Biosistemática de las especies norteamericanas del género *Ateuchus* (Coleoptera: Scarabaeidae: Scarabaeinae). Folia Entomológica Mexicana 60: 3-81.
- La Rue, D. A. 1998. Notes on *Polyphylla* Harris with a description of a new species (Coleoptera: Scarabaeidae: Melolonthinae). Insecta Mundi 12(1-2):23-37.
- Lawrence, J. F. and A. F. Newton. 1995. Families and subfamilies of Coleoptera (with selected genera, notes, references and data on family-group names), pp. 779-1006 in Pakaluk, J. and S. A. Slipinski (eds.), Biology, phylogeny, and classification of Coleoptera. Papers celebrating the 80<sup>th</sup> birthday of Roy A. Crowson. Volume 2. Muzeum I Instytut Zoologii PAN, Warszawa.
- LeConte, J. L. 1853. Descriptions of some new Coleoptera from Texas, chiefly collected by the Mexican Boundary Commission. Proceedings of the Academy of Natural Sciences Philadelphia 6:439-448.
- LeConte, J. L. 1856. Synopsis of the Melolonthinae of the United States. Journal of the Academy of Natural Sciences Philadelphia (ser. 2) 4:9-42.
- Leng, C. W. 1920. Catalogue of the Coleoptera of America north of Mexico. John D. Sherman, Mount Vernon. x + 470 pp.
- Linell, M. L. 1895 (1896). New species of North American Coleoptera of the family Scarabaeidae. Proceedings of the United States National Museum 18 (no. 1096):721-731.
- Linell, M. L. 1897. Descriptions of new species of North American Coleoptera in the families Cerambycidae and Scarabaeidae. Proceedings of the United States National Museum 19 (no. 1113):393-401.
- Luginbill, P. and H. R. Painter. 1953. May beetles of the United States and Canada. United States Department of Agriculture Technical Bulletin No. 1060: 1-102, pls. 1-78.
- Maes, J.-M. 1992. Lista de los Lucanidae (Coleoptera) del mundo. Revista Nicaraguense de Entomologia (no. 22A): 1-60, (no. 22b):61-121.
- Matthews, E. G. 1961. A revision of the genus *Copris* Müller of the Western Hemisphere (Coleoptera, Scarabaeidae). Entomologica Americana 41:1-139.
- Nash, G. H. 1997. First report of Japanese beetle in Texas. United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (<http://www.CERIS.purdue.edu/napis/pests/jb/news97/970805.tx>).
- Peck, S. B. and M. C. Thomas. A distributional checklist of the beetles (Coleoptera) of Florida. Arthropods of Florida and Neighboring Land Areas. vol. 16. viii + 180 pp.

- Pool, R. W. and P. Gentili (eds.). 1995. *Nomina Insecta Nearctica*. A check list of insects of North America. Volume 1: Coleoptera, Strepsiptera. Entomological Information Services, Rockville. 827 pp.
- Potts, R. W. L. 1945. A key to the species of Cremastocheilini of North America and Mexico (Coleoptera: Scarabaeidae). *Bulletin of the Brooklyn Entomological Society* 40:72-78.
- Potts, R. W. L. 1974. Revision of the Scarabaeidae: Anomalinae 1. The genera occurring in the United States and Canada. *Pan-Pacific Entomologist* 50(2):148-154.
- Potts, R. W. L. 1976. New species of North American *Anomala* (Scarabaeidae: Anomalinae). *Pan-Pacific Entomologist* 52(3): 220-226.
- Potts, R. W. L. 1977a. Revision of the Scarabaeidae: Anomalinae 2. An annotated checklist of *Anomala* for the United States and Canada. *Pan-Pacific Entomologist* 53(1):34-42.
- Potts, R. W. L. 1977b. Revision of the Scarabaeidae: Anomalinae 3. A key to the species of *Anomala* of America north of Mexico. *Pan-Pacific Entomologist* 53(2):129-134.
- Price, W. A. 1958. Sedimentology and Quaternary geomorphology of south Texas. Supplementary to field trip manual "Sedimentology of South Texas" Corpus Christi Geological Society spring field trip, 1958. Gulf Coast Association of Geological Societies, Transactions 8:41-75.
- Ratcliffe, B. C. 1976. A revision of the genus *Strategus* (Coleoptera: Scarabaeidae). *Bulletin of the University of Nebraska State Museum* 10(3):93-204.
- Ratcliffe, B. C. 1991. The scarab beetles of Nebraska. *Bulletin of the University of Nebraska State Museum* 12:1-333.
- Reinhard, H. J. 1939. New and little known *Phyllophaga* from Texas (Scarabaeidae, Coleoptera). *Journal of the Kansas Entomological Society* 12(2):47-63.
- Reinhard, H. J. 1940. Notes on Texas *Phyllophaga* with description of one new species (Coleoptera, Scarabaeidae). *Journal of the Kansas Entomological Society* 13(1):4-5.
- Reinhard, H. J. 1950. The *Phyllophaga* of Texas (Scarabaeidae Coleoptera). *Journal of the Kansas Entomological Society* 23(1):27-40, (2):41-51.
- Riley, E. G. 1988. The *Phyllophaga* of Louisiana (Coleoptera: Scarabaeidae). unpublished Thesis, Louisiana State University. xiv + 436 pp.
- Riley, E. G. and C. S. Wolfe. 1995 (1997). A review of the *Phyllophaga ignava* species group with descriptions of two new species from Texas (Coleoptera: Scarabaeidae; Melolonthinae). *Journal of the New York Entomological Society* 103(4):421-434.
- Robinson, M. 1937. A new *Euphoria* from Texas. *Entomological News* 48: 163.
- Robinson, M. 1938. Studies in the Scarabaeidae. I. *Transactions of the American Entomological Society* 64:107-115.
- Robinson, M. 1941. Studies in the Scarabaeidae of North America (Coleoptera). Parts I & II. *Transactions of the American Entomological Society* 67:127-136.
- Robinson, M. 1948. A review of the species of *Canthon* inhabiting the United States (Scarabaeidae: Coleoptera). *Transactions of the American Entomological Society* 74:83-100.
- Sanderson, M. W. 1939. A new genus of Scarabaeidae with descriptions and notes on *Phyllophaga*. *Journal of the Kansas Entomological Society* 12(1):1-15.
- Sanderson, M. W. 1942. Descriptions and records of distribution of *Phyllophaga* (Coleoptera: Scarabaeidae). *Journal of the Kansas Entomological Society* 15(2):49-55.
- Sanderson, M. W. 1948. Two undescribed species of *Phyllophaga* from Texas (Coleoptera; Scarabaeidae). *Occasional Papers of the Museum of Zoology, University of Michigan* no. 504:1-6.
- Saylor, L. W. 1936. A new Texas scarab (Coleoptera). *The Canadian Entomologist* 68:280.
- Saylor, L. W. 1939. Revision of the beetles of the melolonthine subgenus *Phytalus* of the United States. *Proceedings of the United States National Museum* 86 (no. 3048):157-167, pls. 9-10.
- Saylor, L. W. 1940a. Revision of the scarabaeid beetles of the *Phyllophagan* subgenus *Listrochelus* of the United States, with discussion of related subgenera. *Proceedings of the United States National Museum* 89 (no. 3095):59-130.
- Saylor, L. W. 1940b. Synoptic revision of the beetle genera *Cotalpa* and *Paracotalpa* of the United States, with description of a new subgenus. *Proceedings of the Entomological Society of Washington* 42(9):190-200.

- Saylor, 1943. Revision of the *rorulenta* group of the scarab beetle genus *Phyllophaga*. Proceedings of the Biological Society of Washington 56:129-142.
- Schaeffer, C. 1906. Notes on some species of the genus *Anomala* with descriptions of new species. Journal of the New York Entomological Society 14(1):1-5.
- Schuster, J. C. 1983. The Passalidae of the United States. The Coleopterists Bulletin 37(4): 302-305.
- Schmidt, A. 1907. Namensänderungen in der Gattung *Aphodius* und eine Neubeschreibung. (Col.). Deutsche Entomologische Zeitschrift 68(2):201-203
- Smith, J. B. 1889. Notes on the species of *Lachnosterna* of Temperate North America, with descriptions of new species. Proceedings of the United States National Museum 88:481-525, 13 pls.
- Staines, C. L. 2001 (2002). Distribution of *Lucanus elephus* Linnaeus (Coleoptera: Lucanidae) in North America. The Coleopterists Bulletin 55(4):297-404.
- Summerlain, J. W. 1978. Beetles of the genera *Myrmecaphodius*, *Rhyssemus*, and *Blapstinus* in Texas fire ant nests. The Southwestern Entomologist 3(1): 27-29.
- Vaurie, P. 1955. A revision of the genus *Trox* in North America (Coleoptera, Scarabaeidae). Bulletin of the American Museum of Natural History 106:1-89.
- Vaurie, P. 1956. *Diplotaxis* of the eastern United States, with a new species and other notes (Coleop., Scarabaeidae). The Coleopterists Bulletin 10(1):1-9.
- Vaurie, P. 1958a. A revision of the genus *Diplotaxis* (Coleoptera, Scarabaeidae, Melolonthinae), Part 1. Bulletin of the American Museum of Natural History 115:265-396.
- Vaurie, P. 1958b. New distribution records of North American *Trox* (Coleoptera: Scarabaeidae). The Coleopterists Bulletin 12:43-46.
- Vaurie, P. 1960. A revision of the genus *Diplotaxis* (Coleoptera, Scarabaeidae, Melolonthinae), Part 2. Bulletin of the American Museum of Natural History 120:163-433.
- Wallis, J. B. 1929. Revision of the genus *Odontaeus*, Dej. (Scarabaeidae, Coleoptera). The Canadian Entomologist 60:119-128, 151-156, 168-176.
- Warner, W. B. 1995. Two new *Glaresis* from the desert Southwest, with notes on the identity of *Glaresis mendica* Horn (Coleoptera: Scarabaeidae: Glaresinae). Insecta Mundi 9(3-4):267-271.
- Warner, W. B. and M. A. Moron. 1992. A revision of the *Phyllophaga* subgenus *Triodonyx* Saylor (Coleoptera: Scarabaeidae). Journal of the Kansas Entomological Society 65(3):321-340.
- Woodruff, R. E. 1973. The scarab beetles of Florida (Coleoptera: Scarabaeidae). Part I. the Lapparosticti (subfamilies: Scarabaeinae, Aphodiinae, Hybosorinae, Ochodaeninae, Geotrupinae, Acanthocerinae). Arthropods of Florida and Neighboring Land Areas, vol. 8. xi + 220 pp.
- Woodruff, R. E. and Beck, B. M. 1989. The scarab beetles of Florida (Coleoptera: Scarabaeidae) Part II. The May or June Beetles (genus *Phyllophaga*). Arthropods of Florida and Neighboring Land Areas, vol. 13. vi + 225 pp.
- Woodruff, R. E. and O. L. Cartwright. 1967. A review of the genus *Euparixia* with description of a new species from the nests of leaf-cutting ants in Louisiana (Coleoptera: Scarabaeidae). Proceedings of the United States National Museum 123(no. 3616):1-21.
- Young, R. M. 1988. A monograph of the genus *Polyphylla* Harris in America North of Mexico (Coleoptera: Scarabaeidae: Melolonthinae). Bulletin of the Nebraska State Museum 11(2):1-115.
- Young, R. M. 2003. A new *Cotalpa* Burmeister taken on post oak in eastern Texas with notes and a key to species in the genus (Scarabaeidae: Rutelinae). The Coleopterists Bulletin 56(4):473-479.