

An annotated checklist of Wisconsin Scarabaeoidea (Coleoptera)

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Abstract. A survey of Wisconsin Scarabaeoidea (Coleoptera) conducted from literature searches, collection inventories, and three years of field work (1997-1999), yielded 177 species representing nine families, two of which, Ochodaeidae and Ceratocanthidae, represent new state family records. Fifty-six species (32% of the Wisconsin fauna) represent new state species records, having not previously been recorded from the state. Literature and collection distributional records suggest the potential for at least 33 additional species to occur in Wisconsin.

Introduction

The superfamily Scarabaeoidea is a large, diverse group of beetles, comprising more than 30,000 species in 13 families worldwide. Over 1,530 species occur in the continental United States. Despite this superfamily's popularity among scientists and hobbyists, and its incredible diversity (or perhaps, because of it), few scarabaeoid surveys have been conducted in the United States. Blatchley (1910) surveyed the Coleoptera of Indiana; Dawson (1922b) catalogued the scarabs of Nebraska; Blatchley (1927 a,b, 1928 a-d, 1929 a-c, 1930 a,b) catalogued the scarabs of Florida; Rogers (unpublished M.S. thesis, 1946) surveyed the scarabs of Washington State, which served as the basis of Hatch's (1971) treatment of scarabs in his volumes on Coleoptera of the Pacific Northwest; Helgesen and Post (1967) surveyed the saprophagous scarabs of North Dakota, which was followed by the phytophagous scarabs and trogids (Lago *et al.* 1979). Following Blatchley's works, Woodruff (1973) and Woodruff and Beck (1989) published more detailed surveys of Florida laprostick scarabs and June beetles, respectively. Expanding on Dawson's catalogue, Ratcliffe (1991 a,b) published the most comprehensive (Nebraskan) scarabaeoid surveys to date. Harpootlian (2001) surveyed the scarabaeoids of South Carolina.

No comprehensive scarabaeoid surveys have been conducted in Wisconsin, much less the Great Lakes region. Rauterberg (1885-1889) recorded a passalid and some stag beetles from Milwaukee County; Snyder (1897) recorded 30 species from Dodge County; Dahl and Mahr (1991) conducted a limited survey of June beetles (*Phyllophaga* spp.); Katovich (1995) and Katovich *et al.* (1998) surveyed the larvae of Wisconsin *Phyllophaga*. Until now,

however, most of Wisconsin's scarabaeoid species diversity, life histories, and distributions were virtually unknown.

Methods

To determine what species had been taken in Wisconsin, historical collection and literature records, as well as data from private regional collections [e.g. University of Wisconsin-Madison Insect Research Collection (WIRC) (including the collection of Daniel K. Young), Milwaukee Public Museum (MPMC), and Field Museum of Natural History (FMNH)] were compiled. Field sampling focused on regions of Wisconsin that had unique records or were thought to be historically under-sampled. A variety of collecting methods was employed, including blacklight, flight intercept traps (Malaise and window-pane), Lindgren funnel, unbaited and baited pitfall traps, leaf litter and sand sifting, and hand collecting from flowers and foliage during both daylight and evening hours. To expand geographical and temporal species distributions, specific sites were chosen for more in-depth examinations due to apparent species rarity or uniqueness of habitat types. Collecting efforts were modified for specific taxa, and natural history information was gathered for each species.

Field samples from broader, ongoing surveys [e.g. joint projects with the Wisconsin Department of Natural Resources, Nature Conservancy surveys (e.g. Hemlock Draw), Fort McCoy inventory project, and inventory work at the Necedah National Wildlife Refuge] also contributed significantly to this study.

Results

This survey yielded 177 Wisconsin scarabaeoid species representing nine families. The familial phylogenetic arrangement of Scarabaeoidea adopted herein is based primarily on the works of Browne and Scholtz (1999). Subfamilial, tribal, and generic arrangements are primarily based on Lawrence and Newton (1995) and Ratcliffe (1991b), respectively. Vouchers of specimens taken during this survey are housed in the WIRC. A website has been developed for Wisconsin scarabaeoids, and it includes information on their distributions in the form of printable maps; it can be accessed at the following address:

<http://entomology.wisc.edu/~young/scarab/wiscarab.html>

Additionally, a specimen-level database for all Wisconsin records has been completed as part of a larger project for Wisconsin's Coleoptera fauna. The data reside with the authors and the WIRC under the BIOTA software (Colwell 1996).

In the following checklist of Wisconsin Scarabaeoidea, the 56 **new state species records** are indicated in **boldface**. Species previously recorded in the literature from Wisconsin are followed by the pertinent literature reference. Those species with a literature record only (no specimens found and no locality data available) are marked with an asterisk (*) following the literature citation. To simplify county associations, Wisconsin has been divided into nine, 8-county regions (Map 1) after Hilsenhoff (1995). Life history and phenological information pertain solely to adult Wisconsin scarabaeoid records and has been taken directly from labels accompanying specimens. Thus, in reporting plant associations, we report the data as indicated by specimen labels. However, we also commonly indicate an appropriate vernacular name when the specimen bears a latin binomial, and *vice versa* [e.g., on the trunk of a standing dead hackberry tree (*Celtis* sp.)] or [on the trunk of *Quercus rubra* (Linnaeus) (red oak)]. Many scarabaeoid species are long-lived as adults, and many phenologies are likely artifacts of human activity. We still lack sound natural history information for some species in Wisconsin.

Family Glaresidae

Glaresis inducta Horn – Gordon (1970). All specimens taken at UV light. June-September. **NE:**

Oconto; **WC:** Monroe; **C:** Wood; **SW:** Richland; **SC:** Green.

Family Passalidae

Odontotaenius disjunctus (Illiger) – Schuster (1983)*. Rauterberg (1889) reported this species to be widely encountered in Wisconsin, however, he provided no further locality data, and no Wisconsin specimens have been found. It is possible that this species has been extirpated from Wisconsin due to the loss of mature, old growth forests with downed timber of moderate to large diameter in the southern half of Wisconsin.

Family Lucanidae

Subfamily Lucaninae

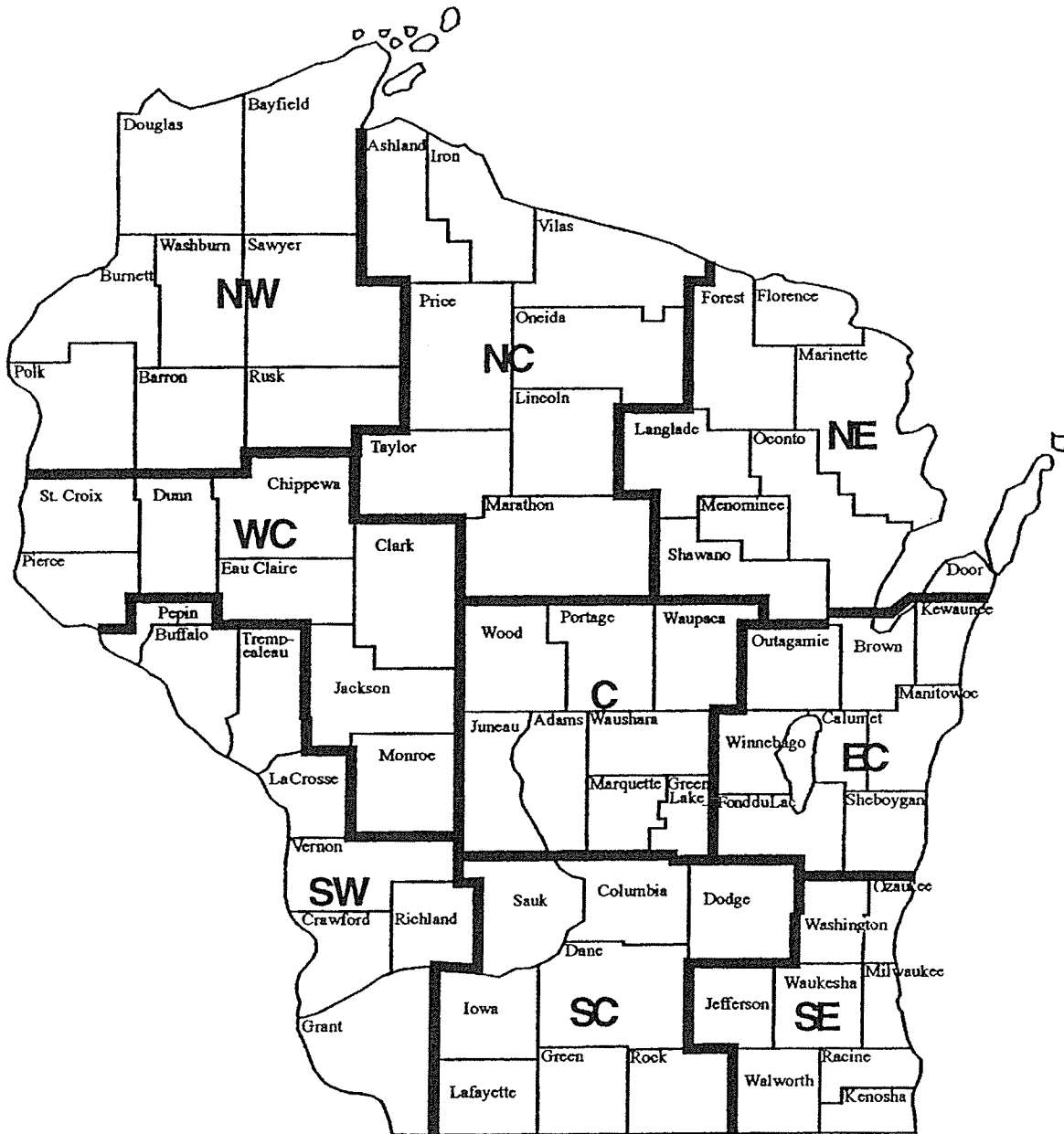
Dorcus parallelus (Say) – Benesh (1960). Hand collected at night, on the trunk of a standing dead hackberry tree (*Celtis* sp.) and on the trunk of *Quercus rubra* (Linnaeus) (red oak). June-July. **NC:** Lincoln, Taylor; **SW:** Grant, La Crosse; **SC:** Dane, Sauk; **SE:** Milwaukee.

Lucanus capreolus (Linnaeus) – Benesh (1960). Taken at UV light, hand collected at night from porches, sidewalks, and sandy roads. May-August. **WC:** Monroe; **SW:** Crawford, Grant, Richland, Vernon; **SC:** Columbia, Dane, Iowa, Rock; **SE:** Jefferson, Kenosha, Milwaukee, Racine, Waukesha.

Lucanus placidus Say – Benesh (1960). Shenefeldt and Simkover (1950) reported conifer damage in tree nurseries in Wisconsin by the larvae feeding on the roots. On one occasion, an aggregation of about 15 males and females was found under *Quercus velutina* Lamarck (black oak) shortly after dusk. May-August. **NW:** Burnett, Rusk; **NE:** Marinette, Oconto; **WC:** Monroe, Pierce; **C:** Adams, Juneau, Portage, Waupaca, Wood; **EC:** Winnebago; **SW:** Grant, La Crosse, Richland, Vernon; **SC:** Columbia, Dane, Lafayette, Rock, Sauk; **SE:** Racine, Walworth.

Platycerus piceus (Kirby) – Benesh (1960). Found along the shore of Lake Superior. May-July. **NW:** Bayfield, Douglas; **NE:** Marinette.

Platycerus virescens (Fabricius) – Benesh (1960). On the surface of rotting oak logs. April-September. **NW:** Bayfield; **NC:** Oneida; **NE:** Door, Oconto; **WC:** Eau Claire; **C:** Waupaca, Waushara; **SW:** Grant; **SC:** Dane, Green, La Fayette, Sauk; **SE:** Ozaukee, Racine.



Map 1. Regional divisions (nine, 8-county areas) of Wisconsin (after Hilsenhoff 1995)

Subfamily Nicaginae

Nicagus obscurus (LeConte) – Katovich and Kriska (2002). Dead and live specimens discovered amongst driftwood and beach debris on the shore of Lake Superior. May-July. NW: Douglas, Bayfield.

Subfamily Syndesinae

Ceruchus piceus (Weber) – Benesh (1960). Found in oak logs in an advanced red-rot stage of decay. Active year around. NW: Bayfield, Polk; NC: Price, Taylor; NE: Door, Florence, Oconto; WC: Eau Claire, Jackson, Monroe; C: Juneau; SW: Grant, Richland; SC: Columbia, Dane, La Fayette, Rock, Sauk; SE: Milwaukee, Racine, Waukesha.

Family Trogidae

- Omorgus scabrosus* (Beauvois) – In a pitfall trap baited with pig dung, malt, and molasses. June-August. **SW:** Grant, Richland.
- Omorgus suberosus* (Fabricius) – Vaurie (1955). At light and in pitfall traps baited with pig dung, malt, and molasses. May-September. **C:** Wood; **SW:** Grant, Richland; **SC:** Columbia, Dane, Sauk; **SE:** Jefferson.
- Trox aequalis* Say – At light and in tree hole leaf litter material. May-September. **NW:** Bayfield, Burnett; **NC:** Taylor; **NE:** Oconto; **WC:** Jackson, Monroe, Pierce; **C:** Marquette, Waupaca, Wood; **SW:** Crawford, Grant, Richland; **SC:** Columbia, Dane, Green, Sauk; **SE:** Racine, Walworth, Waukesha.
- Trox atrox* LeConte – At light. April-August. **NW:** Burnett, Douglas; **NE:** Oconto; **C:** Waushara, Wood; **WC:** Monroe; **SW:** Grant, Vernon; **SC:** Columbia, Dane, Sauk; **SE:** Kenosha, Walworth, Waukesha.
- Trox capillaris* Say – On a dead dog in a ditch along a county highway. April-July. **SW:** Richland; **SC:** Dane, Sauk.
- Trox foveicollis* Harold – Vaurie (1955). At light, in carrion-baited pitfall traps, and on dried carnivore dung. May-August. **WC:** Monroe; **C:** Wood; **SW:** Richland; **SC:** Columbia, Dane, Iowa, Sauk.
- Trox hamatus* Robinson – In flight intercept traps, pitfall traps baited with carrion or pig dung/malt/molasses, and at light. May-August. **NW:** Douglas; **NE:** Marinette, Oconto; **WC:** Monroe, Pierce; **C:** Juneau, Marquette, Portage, Waushara, Wood; **SW:** Grant, Richland, Vernon; **SC:** Dane, Green, Rock, Sauk; **SE:** Waukesha.
- Trox laticollis* LeConte – No ecological information available. April-June. **SW:** Crawford, **SC:** Dane.
- Trox robinsoni* Vaurie – Vaurie (1955). In pitfall traps baited with carrion or pig dung/malt/molasses. April-September. **NW:** Douglas; **NC:** Vilas; **NE:** Door; **C:** Wood; **SW:** Grant.
- Trox scaber* (Linnaeus) – Vaurie (1955). At light. May-August. **NW:** Douglas; **NC:** Vilas; **NE:** Oconto; **C:** Wood; **SW:** Richland, Vernon; **SC:** Dane, Sauk; **SE:** Jefferson.
- Trox sordidus* LeConte – On a deer carcass. May-June. **SC:** Iowa.
- Trox striatus* Melsheimer – At UV light. May-July. **SW:** Richland.

- Trox unistriatus* Beauvois – Vaurie (1955). At light and in pitfall traps baited with carrion or human dung or pig dung. April-August. **NW:** Burnett, Douglas; **NC:** Oneida, Vilas; **NE:** Florence, Forest, Oconto; **WC:** Jackson, Monroe; **C:** Juneau, Portage, Waushara, Wood; **EC:** Fond du Lac, Sheboygan; **SW:** Crawford, Grant, Richland, Vernon; **SC:** Columbia, Dane, Green, Iowa, Rock, Sauk; **SE:** Kenosha, Racine.
- Trox variolatus* Melsheimer – Vaurie (1955). On dried carnivore dung containing hair and bone fragments, on a dead raccoon, in pitfall traps baited with carrion or human dung or pig dung, and in flight intercept traps. April-September. **NE:** Florence, Forest, Menominee; **NC:** Oneida, Vilas; **WC:** Eau Claire, Monroe; **C:** Green Lake, Waupaca, Waushara, Wood; **SW:** Grant, La Crosse, Richland, Vernon; **SC:** Columbia, Dane, Green, Iowa, La Fayette, Rock, Sauk; **SE:** Racine, Walworth, Washington, Waukesha.

Family Bolboceratidae

- Bolboceras falli* (Wallis) – Howden (1955). In unbaited pitfall traps partially filled with propylene glycol and hand collected on a deer path in northern mesic hardwood forest. June-July. **NC:** Vilas; **NE:** Marinette; **C:** Wood.
- Bolboceras filicornis* (Say) – Howden (1955). No ecological information available. May-September. **NW:** Douglas; **EC:** Fond du Lac.
- Bolboceras liebecki* (Wallis) – Howden (1955). Flying low over a footpath at dusk in small oak and maple woods with organic, compacted, clay soil. May-September. **WC:** Eau Claire, Jackson; **SC:** Dane, Green, Iowa, La Fayette, Sauk.
- Bolbocerosoma biplagiatum* Dawson and McColloch – Howden (1955)*. No ecological information available. June-September. **NC:** Vilas.
- Bolbocerosoma bruneri* Dawson and McColloch – Howden (1955). At UV lights near agriculture stations, privately owned farms, and state-owned nurseries. April-October. **SW:** Crawford, Grant, La Crosse, Vernon; **SC:** Columbia, Dane, Sauk; **SE:** Racine.
- Bradycinetulus fossatus* (Haldeman) – At UV light near state-owned nursery near Boscobel, sandy savanna. May-August. **SW:** Grant, La Crosse.
- Eucanthus lazarus* (Fabricius) – Howden (1955). At UV light and in flight intercept traps. April-September. **NW:** Burnett; **WC:** Chippewa, Eau

Claire, Pierce; **C:** Wood; **EC:** Fond du Lac; **SW:** Grant, Richland; **SC:** Columbia, Dane, Iowa, Sauk; **SE:** Racine, Walworth, Waukesha.

Family Geotrupidae

Subfamily Geotrupinae

Geotrupes balyi Jekel – Howden (1955). At light and in carrion-baited pitfall traps. June-September. **NW:** Bayfield, Burnett; **NC:** Iron, Marathon, Oneida, Vilas; **NE:** Forest, Marinette, Menominee, Oconto; **WC:** Eau Claire, Monroe; **C:** Juneau, Marquette, Waupaca, Waushara, Wood; **SW:** Richland; **SC:** Dane, Iowa, La Fayette.

Geotrupes blackburnii (Fabricius) – Howden (1955)*. No ecological information available. September-May.

Geotrupes hornii Blanchard – Howden (1955). Hand collected in flight and in flight intercept traps. May-September. **NW:** Bayfield; **NC:** Vilas; **NE:** Shawano; **WC:** Eau Claire, Monroe; **C:** Juneau, Wood; **SC:** Sauk.

Geotrupes opacus Haldeman – Howden (1955). In pitfall traps baited with human dung or pig dung. March-June and July-September. **C:** Adams, Marquette; **SW:** Grant, Richland; **SC:** Dane, Rock, Sauk.

Geotrupes semiopacus Jekel – Howden (1955). In pitfall traps baited with human dung or pig dung. May-September. **NW:** Burnett, Polk; **NC:** Vilas; **NE:** Menominee; **WC:** Eau Claire; **C:** Juneau, Waupaca, Wood; **EC:** Sheboygan; **SW:** Crawford, Richland, Vernon; **SC:** Dane, Green, Iowa, La Fayette, Rock, Sauk; **SE:** Waukesha.

Geotrupes splendidus (Fabricius) – Howden (1955). In pitfall traps baited with carrion or human dung or pig dung, on stems of fungi, and at light. March-October. **NW:** Burnett, Douglas, Polk; **NC:** Vilas; **NE:** Forest, Marinette, Menominee, Oconto; **WC:** Eau Claire, Monroe; **C:** Juneau, Marquette, Portage, Waupaca, Waushara, Wood; **SW:** Grant, La Crosse, Richland; **SC:** Dane, Dodge, Green, Iowa, Rock, Sauk; **SE:** Racine.

Family Ochodaeidae

Ochodaeus musculus Say – At UV light, in a window-pane trap and a Malaise trap, all located in sandy, savanna habitat. June-September. **NW:**

Douglas, Sawyer; **WC:** Monroe; **SW:** Richland; **SC:** Columbia, Dane, Sauk.

Family Ceratocanthidae

Germarostes aphodioides (Illiger) – At light and hand collected at night from the bark of standing, dead oak trees. May-July. **SW:** Richland; **SC:** Dane.

Family Scarabaeidae

Subfamily Aphodiinae

Tribe Aegialiini

Aegialia conferta Horn – Among driftwood and beach debris along the shore of Lake Michigan. May-August. **NE:** Door; **EC:** Manitowoc; **SE:** Milwaukee.

Aegialia criddlei Brown – In pitfall traps in sandy, oak-pine savanna. May-August. **WC:** Jackson; **C:** Wood.

Aegialia latispina LeConte – Sifted from leaf litter in sandy, oak barrens. May-August. **SW:** Richland.

Aegialia rufa (Fabricius) – Found dead amongst beach debris on the shore of Lake Michigan. May-June. **EC:** Sheboygan.

Tribe Aphodiini

Aphodius alternatus Horn – Rogers (1997)*. No ecological information available. January-May. **SC:** Columbia.

Aphodius badipes Melsheimer – In a gray squirrel nest in a hollowed, fallen tree and in tree hole leaf litter in oak barrens and savanna. March-November. **NE:** Oconto; **C:** Waupaca, Wood; **SW:** Grant, La Crosse, Richland; **SC:** Sauk, Green.

Aphodius bicolor Say – Under scat, in human dung-baited pitfall traps, and in flight intercept traps. September-April. **SC:** Green, La Fayette, Sauk.

Aphodius distinctus (Müller) – Gordon (1983). In pitfall traps baited with human dung or pig dung and among tall grasses in barrens-type habitat. March-December. **NW:** Burnett, Douglas, Polk; **NE:** Door; **WC:** Monroe, St. Croix; **C:** Green Lake, Marquette, Waushara, Wood; **SW:** Grant, Pepin, Richland, Vernon; **SC:** Colum-

- bia, Dane, Iowa, Rock, Sauk; **SE:** Jefferson, Milwaukee, Waukesha.
- Aphodius erraticus* (Linnaeus) – Gordon (1983). In pitfall traps baited with human dung or pig dung and in flight intercept traps. April-May. **NW:** Burnett; **NC:** Vilas; **NE:** Door, Oconto; **WC:** Eau Claire, Monroe; **C:** Marquette, Waushara; **SW:** Grant; **SC:** Columbia, Dane, Iowa, Rock; **SE:** Jefferson, Walworth.
- Aphodius fimetarius* (Linnaeus) – Gordon (1983). In pitfall traps baited with human dung or pig dung, in flight intercept traps, and found dead in beach debris on the shore of Lake Michigan. March-October. **NW:** Polk; **NC:** Marathon; **NE:** Door, Oconto; **WC:** Clark, Jackson, Monroe; **C:** Marquette, Portage, Waupaca, Wood; **EC:** Kewaunee, Manitowoc; **SW:** Crawford, Grant, Vernon; **SC:** Columbia, Dane, Green, Iowa, La Fayette; **SE:** Jefferson, Walworth, Waukesha.
- Aphodius fossor* (Linnaeus) – Gordon (1983). In pitfall traps baited with human dung or pig dung and in cow dung in open pastures. April-August. **NW:** Burnett; **NE:** Door, Oconto; **C:** Waupaca, Wood; **EC:** Kewaunee; **SC:** Dane; **SE:** Walworth.
- Aphodius granarius* (Linnaeus) – Gordon (1983). At light, in pitfall traps baited with human dung or pig dung, in flight intercept traps, on a dead raccoon and a dead deer, and among beach debris on the shore of Lake Michigan. April-September. **NW:** Bayfield, Douglas; **NC:** Taylor; **NE:** Oconto; **WC:** Dunn, Jackson, Monroe; **C:** Juneau, Marquette, Waupaca, Wood; **EC:** Manitowoc, Sheboygan; **SW:** Buffalo, Crawford, Richland; **SC:** Columbia, Dane, Grant, Iowa; **SE:** Milwaukee, Ozaukee, Racine, Walworth, Waukesha.
- Aphodius haemorrhoidalis* (Linnaeus) – In cow dung in open pasture, in pitfall traps baited with human dung or pig dung, and among beach debris on the shore of Lake Superior. May-September. **NW:** Douglas; **NE:** Marinette; **SC:** Iowa, Sauk; **SE:** Jefferson, Walworth.
- Aphodius hyperboreus* LeConte – About a foot inside the opening of a woodchuck burrow located in open sandy grassland/oak barrens. May-September. **NW:** Douglas; **NC:** Iron; **NE:** Door.
- Aphodius insolitus* Brown – Taken in pig dung/malt/molasses-baited pitfall traps established in pocket gopher burrow systems. August-December. **NW:** Burnett, Douglas, Polk; **WC:** Jackson, Monroe; **SW:** La Crosse, Richland; **SC:** Sauk.
- Aphodius iowensis* Wickham – In a Malaise trap and in pig dung/malt/molasses-baited pitfall traps established in pocket gopher burrow systems. September-December. **NW:** Bayfield, Burnett, Polk; **WC:** Jackson; **SW:** Richland, **SC:** Sauk.
- Aphodius kirni* Cartwright – In window pane traps and in pig dung/malt/molasses-baited pitfall traps established in pocket gopher burrow systems. April-December. **NW:** Burnett, Polk; **WC:** Jackson, Monroe; **SW:** Richland; **SC:** Sauk.
- Aphodius lentus* Horn – At light, in pitfall traps baited with human dung or pig dung, in flight intercept traps, and on deer dung. April-August. **NW:** Douglas; **NE:** Oconto; **WC:** Monroe; **C:** Waushara; **SW:** Buffalo, Grant, Richland; **SC:** Columbia, Dane, Green, Iowa, Rock.
- Aphodius leopardus* Horn – Gordon (1983). On deer dung, in pitfall traps baited with human dung or pig dung, and in flight intercept traps. August-June. **NW:** Burnett, Douglas, Polk; **NE:** Florence; **WC:** Eau Claire, Monroe; **C:** Waupaca, Wood; **SC:** Sauk.
- Aphodius magnificens* Robinson – In pig dung/malt/molasses-baited pitfall traps established in pocket gopher burrow systems. August-December. **NW:** Polk; **WC:** Jackson, Monroe; **SW:** La Crosse, Richland; **SC:** Sauk.
- Aphodius peculiaris* Schmidt – Larvae and adults were sifted from a pocket gopher mound. September-May. **WC:** Monroe.
- Aphodius prodromus* (Brahm) – Gordon (1983). In scat, under a dead raccoon, and in pitfall traps baited with carrion or human dung or pig dung. April-November. **NC:** Iron; **NE:** Oconto, Shawano; **EC:** Manitowoc; **WC:** Dunn, Monroe; **C:** Green Lake, Marquette, Waupaca, Waushara, Wood; **EC:** Sheboygan; **SW:** Grant, Richland; **SC:** Columbia, Dane, Green, Iowa, La Fayette, Rock, Sauk; **SE:** Racine, Walworth.
- Aphodius punctissimus* Brown – In pig dung/malt/molasses-baited pitfall traps established in pocket gopher burrow systems. October. **NW:** Burnett.
- Aphodius rubeolus* Beauvois – In pig dung/malt/molasses-baited pitfall traps in oak savanna. April-September. **SC:** Columbia.
- Aphodius rubripennis* Horn – In pitfall traps baited with human dung or pig dung, in flight intercept traps, and on deer dung. June-October. **NW:** Burnett, Polk; **NC:** Vilas; **NE:** Mari-

nette, Oconto; WC: Clark, Eau Claire, Jackson, Monroe; C: Juneau, Marquette, Waupaca, Wood; SC: Columbia, Iowa, Sauk.

Aphodius rusicola Melsheimer – Gordon (1983). At light, in pitfall traps baited with human dung or pig dung, and in flight intercept traps. April-November. NW: Burnett, Douglas; NC: Taylor, Vilas; NE: Florence, Oconto; WC: Clark, Dunn, Eau Claire, Jackson, Monroe, Pierce; C: Juneau, Waupaca, Waushara, Wood; SW: Grant, La Crosse, Richland; SC: Columbia, Dane, Green, Iowa, La Fayette, Racine, Rock, Sauk; SE: Walworth, Waukesha.

Aphodius stercorosus Melsheimer – Gordon (1983). At light, in pitfall traps baited with human dung or pig dung, and in leaf litter near a fallen tree in mesic hardwood forest. April-August. NW: Douglas; NC: Vilas; WC: Jackson, Monroe, Pierce; SW: Grant, Richland, Vernon; SC: Dane, Green, Rock, Sauk.

Aphodius terminalis Say – On bones and hide of a deer carcass. January-April, November. SW: Grant.

Aphodius walshii Horn – In pitfall traps baited with carrion or human dung or pig dung. May-June. WC: Monroe; C: Marquette, Waushara; SW: Grant; SC: Dane, Rock.

Dialytellus dialytoides (Fall) – In rotting fungi, leaf litter, and flight intercept traps. June-August. NE: Marinette; WC: Eau Claire, Jackson; C: Waupaca.

Dialytes striatulus (Say) – In pitfall traps baited with human dung or pig dung and in flight intercept traps. June-October. NW: Burnett, Polk; NE: Florence; WC: Eau Claire, Monroe; C: Juneau, Marquette, Waupaca, Waushara, Wood; SW: Grant; SC: Iowa, Sauk.

Dialytes truncatus (Melsheimer) – Gordon (1983). In pitfall traps baited with human dung or pig dung and in flight intercept traps. June-October. NW: Burnett, Polk; NE: Florence, Oconto; WC: Monroe, Pierce; C: Juneau, Wood; SW: Grant, Richland; SC: La Fayette, Sauk.

Dialytes ulkei Horn – Under scat, in pitfall traps baited with human dung or pig dung, and in flight intercept traps. June-September. WC: Eau Claire, Monroe; C: Waupaca, Wood; SC: Green, La Fayette, Sauk.

Tribe Didactylini

Aidophus parvus (Horn) – No ecological information available. SW: Grant.

Tribe Eupariini

Ataenius fattigi Cartwright – Cartwright (1974)*. No ecological information available. February-October. C: Wood.

Ataenius gracilis (Melsheimer) – Cartwright (1974). At UV light. May-October. NC: Price; WC: Monroe; C: Wood; SW: Richland, Vernon; SC: Dane.

Ataenius imbricatus (Melsheimer) – Cartwright (1974). At light and sifted from leaf litter in sandy, oak barrens. April-September. NW: Douglas; NE: Oconto; WC: Monroe; C: Wood; SW: Grant, Richland, Vernon; SC: Columbia, Dane, Green.

Ataenius miamii Cartwright – Sifted from leaf litter in sandy oak barrens and among driftwood and beach debris along the shore of Lake Michigan. March-December. SW: Grant, Richland; SC: Sauk; SE: Milwaukee.

Ataenius punctifrons Cartwright – Cartwright (1974). At light, in pan traps and flight intercept traps, and among beach debris on the shore of Lake Michigan. April-September. NE: Door, Oconto; WC: Monroe; C: Wood; SW: Grant, La Crosse, Richland, Vernon; SC: Dane, Green, Iowa, Sauk; SE: Kenosha, Milwaukee, Ozaukee, Racine.

Ataenius robustus Horn – Cartwright (1974). No ecological information available. March-July. SC: La Fayette.

Ataenius spretulus (Haldeman) – Cartwright (1974). At light and hand collected in flight from cultivated grasses (sports fields, golf courses, lawns). March-September. NE: Oconto; C: Wood; SW: Richland, Vernon; SC: Dane, Green, Iowa, Sauk; SE: Kenosha, Racine.

Ataenius strigatus (Say) – Cartwright (1974). At light, in pitfall traps baited with human dung or pig dung, sifted from leaf litter, and hand collected in flight at dusk over old fields. March-October. NW: Bayfield, Douglas; NE: Door, Oconto; WC: Monroe; C: Waupaca, Wood; EC: Fond du Lac, Outagamie, Sheboygan, Winnebago; SW: Crawford, Grant, Richland, Vernon; SC: Dane, Columbia, Green, Iowa, La Fayette, Rock, Sauk; SE: Jefferson, Kenosha, Milwaukee, Ozaukee, Walworth, Waukesha.

Tribe Psammodiini

Neopsammodius interruptus (Say) – Sifted from leaf litter and in pan traps and barrier pitfall

traps, in sandy, oak barrens and in dune habitat near Lake Michigan. May-July. **WC:** Monroe; **SW:** Richland; **SE:** Kenosha.

***Platytomus notialis* (Cartwright)** – Sifted from leaf litter and in barrier pitfall traps in oak barrens and oak savanna habitats. June-October. **NW:** Burnett; **WC:** Monroe; **SW:** Grant, Richland; **SC:** Columbia, Green, Sauk; **SE:** Kenosha.

***Pleurophorus caesus* (Creutzer)** – Jerath (1960). In beach debris along the shore of Lake Michigan and the Wisconsin River. April-December. **NE:** Door; **EC:** Manitowoc; **SC:** Dane, Iowa; **SE:** Milwaukee.

***Rhyssalus germanus* (Linnaeus)** – Among beach debris along the shore of Lake Michigan. May-August. **EC:** Sheboygan.

Subfamily Scarabaeinae

Tribe Canthonini

***Canthon chalcites* (Haldeman)** – In pitfall traps baited with human dung or pig dung and in flight intercept traps. May-August. **NW:** Burnett, Douglas; **NE:** Oconto; **WC:** Eau Claire, Jackson, Monroe; **C:** Juneau, Washburn, Wood.

***Canthon vigilans* LeConte** – No ecological information available. May-July. **C:** Wood; **EC:** Fond du Lac.

***Canthon viridis* (Beauvois)** – In pitfall traps baited with human dung or pig dung and in flight intercept traps. April-June. **SW:** Grant, Richland; **SC:** Sauk.

***Melanocanthon nigricornis* (Say)** – Williams and Kriska (2001). In pitfall traps baited with human dung or pig dung, on a dead lizard, observed rolling a ball of carrion, and observed breaking down, bundling, and rolling away pieces of a gill cap mushroom. May-September. **NW:** Burnett, Douglas; **NE:** Oconto, Shawano; **WC:** Monroe; **C:** Marquette, Portage; **SW:** Grant, Richland; **SC:** Columbia, Dane, Iowa, Sauk.

Tribe Coprini

***Copris fricator* (Fabricius)** – Matthews (1961). Hand collected from tall grass stems at night, at light, in pitfall traps baited with carrion or human dung or pig dung, and in flight intercept traps. April-October. **NW:** Burnett; **NE:** Oconto; **WC:** Eau Claire, Monroe, Pierce; **C:** Green Lake, Wood; **SW:** Crawford, Grant, Richland, Ver-

non; **SC:** Columbia, Dane, Iowa, Rock, Sauk; **SE:** Kenosha, Walworth, Waukesha.

***Dichotomius carolinus* (Linnaeus)** – No ecological information available. August. **SC:** Dane.

Tribe Onthophagini

***Onthophagus hecate* (Panzer)** – Howden and Cartwright (1963). At UV light, in pitfall traps baited with carrion or human dung or pig dung, and in flight intercept traps. March-October. **NW:** Burnett, Douglas, Polk, Washburn; **NC:** Vilas; **NE:** Florence, Marinette, Oconto, Menominee, Shawano; **WC:** Clark, Eau Claire, Jackson, Monroe; **C:** Juneau, Marquette, Portage, Waushara, Wood; **EC:** Brown, Sheboygan; **SW:** Buffalo, Grant, La Crosse, Richland, Vernon; **SC:** Columbia, Dane, Green, Iowa, La Fayette, Rock, Sauk; **SE:** Jefferson, Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Waukesha.

***Onthophagus nuchicornis* (Linnaeus)** – Howden and Cartwright (1963). At UV light and in pitfall traps baited with human dung or pig dung. April-October. **NW:** Burnett, Douglas; **NE:** Door, Oconto, Shawano; **WC:** Clark, Eau Claire, Jackson, Monroe; **C:** Adams, Juneau, Marquette, Waushara; **SW:** Grant, Richland; **SC:** Columbia, Dane, Iowa, Rock, Sauk.

***Onthophagus orpheus* (Panzer)** – Howden and Cartwright (1963). In deer dung, pitfall traps baited with human dung or pig dung, flight intercept traps, and Lindgren funnel traps. April-September. **NW:** Burnett, Douglas, Polk; **NE:** Oconto; **WC:** Eau Claire, Jackson, Monroe; **C:** Juneau, Marquette, Waupaca, Waushara, Wood; **SW:** Grant, La Crosse, Richland; **SC:** Columbia, Dane, Green, Iowa, La Fayette, Rock, Sauk; **SE:** Walworth.

***Onthophagus pennsylvanicus* Harold** – Howden and Cartwright (1963). In flight intercept traps, in pitfall traps baited with carrion or human dung or pig dung, and on turkey dung and dog feces. April-September. **WC:** Eau Claire, Jackson, Monroe; **C:** Juneau, Marquette, Waushara, Wood; **SW:** Grant, La Crosse, Richland; **SC:** Columbia, Dane, Iowa, Rock, Sauk; **SE:** Kenosha.

***Onthophagus striatulus* (Beauvois)** – In flight intercept traps, in pitfall traps baited with human dung or pig dung, and in a jug trap baited with pinene and 75% EtOH. May-July.

WC: Monroe; **SW:** La Crosse, Richland; **SC:** Dane, Green, La Fayette, Sauk; **SE:** Walworth.
Onthophagus tuberculifrons Harold – Howden and Cartwright (1963)*. No ecological information available. April-October.

Tribe Phanaeini

Phanaeus vindex MacLeay – In pitfall traps baited with human dung or pig dung. April-September. **WC:** Monroe; **C:** Marquette, Waushara; **SW:** Grant, Richland, Trempealeau, Vernon; **SC:** Sauk.

Subfamily Melolonthinae

Tribe Dichelonychini

Dichelonyx albicollis (Burmeister) – At UV light, in flight intercept traps and Lindgren funnel traps, and hand collected feeding diurnally on needles of *Pinus strobus* Linnaeus (white pine) in sandy oak/pine forest. May-July. Cornell (unpublished Ph.D. thesis, 1972) also listed this species from Wisconsin. **NW:** Burnett, Douglas, Sawyer; **NC:** Oneida; **NE:** Marinette, Oconto; **WC:** Clark, Jackson, Monroe; **C:** Marquette, Waushara; **SW:** Grant, Richland; **SC:** Iowa, Sauk; **SE:** Waukesha.

Dichelonyx canadensis (Horn) – No ecological information available. May-July. **C:** Waushara.

Dichelonyx elongatula (Schönherr) – At UV light, in flight intercept traps, and hand collected feeding diurnally on *Acer rubrum* Linnaeus (red maple), *Lupinus perennis* Linnaeus (lupine), and *Geranium* sp. (geranium). April-June. Cornell (unpublished Ph.D. thesis, 1972) also listed this species from Wisconsin. **NW:** Bayfield, Douglas; **NE:** Oconto; **WC:** Monroe; **SC:** Sauk; **SE:** Walworth.

Dichelonyx subvittata (LeConte) – At UV light. May-July. Cornell (unpublished Ph.D. thesis, 1972) also listed this species from Wisconsin. **WC:** Jackson; **SW:** Grant, La Crosse, Richland, Vernon; **SC:** Dane, Green, Sauk; **SE:** Walworth.

Tribe Diplotaxini

Diplotaxis frondicola (Say) – Vaurie (1956). At UV light and hand collected at night from *Coreop-*

sis sp. (tickseed). May-October. **WC:** Pierce; **SC:** Crawford, Grant, Richland; **SC:** Sauk.

Diplotaxis harperi Blanchard – Vaurie (1956). At UV light and hand collected feeding on *Cornus racemosa* Lamarck (dogwood). April-August. **SC:** Dane, Green; **SE:** Racine, Waukesha.

Diplotaxis obscura LeConte – At UV light. June-August. **NW:** Burnett, Douglas; **WC:** Jackson; **C:** Waushara.

Diplotaxis sordida (Say) – Vaurie (1956). At UV light and in pig dung/malt/molasses-baited pitfall traps. May-August. **NW:** Burnett, Douglas; **NE:** Oconto; **WC:** Monroe; **C:** Marquette, Waushara, Wood; **SW:** Grant, Richland; **SC:** Dane, Iowa, Sauk.

Diplotaxis tristis Kirby – Vaurie (1956). At light and found under a stone partially buried in the sand in oak savanna habitat. May-August. **NW:** Douglas; **NE:** Door, Oconto; **WC:** Clark, Monroe; **C:** Wood; **SW:** Grant, La Crosse.

Tribe Hopliini

Hoplia modesta Haldeman – Hardy (1977). Found amongst beach debris on the shore of Lake Michigan and hand collected from *Rosa* sp., *Sambucus racemosa* Linnaeus (red elder), *Rhus* sp. (sumac), and *Cornus racemosa* Lamarck (dogwood). June-July. **NW:** Bayfield, Burnett, Douglas; **NE:** Oconto; **WC:** Jackson, Monroe; **C:** Juneau, Washburn, Wood; **EC:** Manitowoc; **SW:** Grant, Richland, Vernon; **SC:** Dane, Iowa, Sauk.

Hoplia trifasciata Say – Hardy (1977). Found nectaring on *Prunus* sp. (cherry) flowers. May-July. **NW:** Burnett; **NE:** Brown, Marinette, Oconto, Shawano; **WC:** Monroe; **C:** Juneau, Waupaca; **SW:** Richland, Vernon; **SC:** Rock, Sauk.

Hoplia trivialis Harold – Hardy (1977)*. No ecological information available. May-July.

Tribe Macroductylini

Macroductylus subspinosus (Fabricius) – Carrillo and Gibson (1960). In dung-baited pitfall traps, hand collected feeding diurnally on *Rosa* sp. (rose), *Salix* sp. (willow), *Quercus* sp. (oak), *Apocynum* sp. (dogbane), *Verbascum* sp. (mullein), and on ornamental composites in a flower garden, and a mating aggregation was observed during late summer on common milkweed (*Asclepias* sp.). June-July. **NW:** Burnett; **NC:** Onei-

da; **NE:** Brown, Door, Oconto, Shawano; **WC:** Eau Claire, Jackson, Monroe; **C:** Juneau, Marquette, Portage, Wood; **EC:** Sheboygan, Winnebago; **SW:** Grant, La Crosse, Richland, Vernon; **SC:** Columbia, Dane, Iowa; **SE:** Jefferson, Sauk.

Tribe Melolonthini

- Phyllophaga anxia* (LeConte) – Luginbill and Painter (1953). At UV light; larvae were the only *Phyllophaga* species occurring in Wisconsin cranberry beds (Katovich 1995; Katovich *et al.* 1998), and they were also found in turf grasses and irrigated siccultural sites (balsam fir and white pine plantations). March-August. **NW:** Barron, Bayfield, Douglas, Polk; **NC:** Ashland, Marathon, Price, Vilas; **NE:** Door, Florence, Forest, Oconto; **WC:** Jackson, Monroe; **C:** Waupaca, Wood; **EC:** Brown, Fond du Lac; **SW:** Crawford, Grant, Richland; **SC:** Dane, Green, Iowa, La Fayette, Sauk; **SE:** Jefferson, Milwaukee, Racine, Waukesha.
- Phyllophaga balia* (Say) – Luginbill and Painter (1953). At UV light. April-July. **WC:** Monroe; **C:** Washburn; **SW:** Crawford, Grant; **SC:** Dane, Iowa, Rock.
- Phyllophaga barda* (Horn) – Luginbill and Painter (1953)*. No ecological information available. April-July.
- Phyllophaga bipartita* (Horn) – Luginbill and Painter (1953). No ecological information available. May-July. **NW:** Barron.
- Phyllophaga corrosa* (LeConte) – Luginbill and Painter (1953). No ecological information available. March-July. **SC:** Dane.
- Phyllophaga crassissima* (Blanchard) – Luginbill and Painter (1953)*. No ecological information available. March-August.
- Phyllophaga crenulata* (Froelich) – Luginbill and Painter (1953). At UV light, in flight intercept traps, and feeding on oak leaves at night in sandy, oak barrens and savanna habitat. March-August. **NW:** Barron, Douglas; **WC:** Jackson, Monroe, Pierce; **C:** Waushara, Wood; **EC:** Fond du Lac; **SW:** Grant, Richland, Vernon; **SC:** Columbia, Dane, Green, Iowa, Rock, Sauk; **SE:** Washington.
- Phyllophaga drakii* (Kirby) – Luginbill and Painter (1953). At UV light and in flight intercept traps; larvae were found in turf grass and siccultural sites (Katovich 1995; Katovich *et al.* 1998). March-July. **NW:** Burnett, Douglas, Polk; **NC:** Iron; **NE:** Florence, Oconto; **WC:** Jackson, Monroe; **C:** Adams, Juneau, Marquette, Washburn, Waushara, Wood; **EC:** Fond du Lac, Sheboygan; **SW:** Crawford, Grant, La Crosse, Richland; **SC:** Columbia, Dane, Green, Rock, Sauk; **SE:** Ozaukee, Waukesha.
- Phyllophaga forsteri* (Burmeister) – Luginbill and Painter (1953). At UV light. April-July. **SW:** Crawford; **SC:** Columbia, Dane.
- Phyllophaga fraternata* Harris – Luginbill and Painter (1953). No ecological information available. March-July. **C:** Portage.
- Phyllophaga fusca* (Froelich) – Luginbill and Painter (1953). At UV light and found feeding on *Cornus racemosa* Lamarck (dogwood); larvae of *P. fusca* are the primary species responsible for damage to turf grass (Katovich 1995; Katovich *et al.* 1998). March-July. **NW:** Polk; **NC:** Marathon; **NE:** Door, Florence, Marinette, Oconto; **WC:** Chippewa; **C:** Marquette, Waupaca, Waushara, Wood; **EC:** Fond du Lac; **SW:** Crawford, Grant, La Crosse, Richland; **SC:** Columbia, Dane, Green, Iowa, Rock, Sauk; **SE:** Kenosha, Milwaukee, Washington, Waukesha.
- Phyllophaga futilis* (LeConte) – Luginbill and Painter (1953). At light; adults are common in gardens and at porch lights. March-July. **NW:** Burnett; **NE:** Brown, Door, Oconto; **WC:** Monroe; **C:** Portage; **EC:** Fond du Lac; **SW:** Grant, Richland; **SC:** Columbia, Dane, Green, Iowa, La Fayette; **SE:** Kenosha, Walworth.
- Phyllophaga gracilis* (Burmeister) – Luginbill and Painter (1953). At UV light and in flight intercept traps, in oak barrens and savanna habitat. June-August. **NW:** Douglas; **WC:** Monroe, Pierce; **SW:** Grant; **SC:** Dane.
- Phyllophaga hirticula* (Knoch) – Luginbill and Painter (1953). At UV light. March-July. **C:** Wood; **EC:** Fond du Lac; **SW:** Crawford, Grant, Vernon; **SC:** Columbia, Dane, Iowa, La Fayette, Rock, Sauk.
- Phyllophaga hornii* (Smith) – Luginbill and Painter (1953)*. No ecological information available. March-June.
- Phyllophaga ilicis* (Knoch) – Luginbill and Painter (1953). At UV light. April-July. **WC:** Pierce, Wood; **SW:** Crawford, Grant; **SC:** Dane, Iowa, Sauk.
- Phyllophaga implicita* (Horn) – Luginbill and Painter (1953). At UV light. March-July. **SW:** Crawford, Grant, La Crosse, Richland; **SC:** Dane, Green, Iowa; **SE:** Jefferson.

- Phyllophaga inversa* (Horn) – Luginbill and Painter (1953). At UV light. April-June. **NW**: Crawford, Grant, Richland; **SC**: La Fayette, Sauk.
- Phyllophaga longitarsa* (Say) – Luginbill and Painter (1953). At UV light, in sandy oak barrens and savanna habitat. May-July. **NW**: Grant; **SC**: Iowa.
- Phyllophaga marginalis* (LeConte) – Luginbill and Painter (1953). At UV light in forested habitats. March-July. **NE**: Florence; **WC**: Monroe; **C**: Wood; **SC**: Columbia, Dane, Iowa.
- Phyllophaga micans* (Knoch) – Luginbill and Painter (1953)*. No ecological information available. March-June.
- Phyllophaga nitida* (LeConte) – Luginbill and Painter (1953). At UV light. April-July. **NW**: Douglas, Sawyer; **WC**: Eau Claire, Pierce; **EC**: Fond du Lac; **SW**: Crawford, Grant; **SC**: Columbia, Dane, Iowa, Rock.
- Phyllophaga prunina* (LeConte) – Luginbill and Painter (1953). At UV light in sandy oak barrens and oak savanna habitat. March-July. **WC**: Monroe; **C**: Wood; **SW**: Grant, Richland; **SC**: Columbia, Dane, Iowa, Sauk.
- Phyllophaga rugosa* (Melsheimer) – Luginbill and Painter (1953). At light, in pan and flight intercept traps, and among beach debris and leaves on the shore of Lake Michigan; larvae are economically important in Wisconsin, feeding in turf grasses and siccicultural sites (Katovich 1995; Katovich *et al.* 1998). April-July. **NW**: Burnett, Douglas; **NC**: Ashland, Iron; **NE**: Brown, Door, Florence, Marinette, Oconto; **WC**: Jackson, Monroe; **C**: Portage, Waushara, Wood; **EC**: Fond du Lac, Manitowoc; **SW**: Crawford, Grant, La Crosse, Richland, Vernon; **SC**: Columbia, Dane, Iowa, Rock, Sauk; **SE**: Kenosha, Milwaukee, Ozaukee, Walworth.
- Phyllophaga spreta* (Horn) – Luginbill and Painter (1953). No ecological information available. April-May. **SW**: Crawford.
- Phyllophaga subtonsa* (LeConte) – Luginbill and Painter (1953). No ecological information available. June-July. **SC**: Dane.
- Phyllophaga tristis* (Fabricius) – Luginbill and Painter (1953). At UV light in sandy oak barrens and savanna habitats. March-June. **NW**: Burnett, Polk, Washburn; **WC**: Jackson, Juneau, Monroe, Pierce; **C**: Marquette, Waupaca, Waushara, Wood; **SW**: Crawford, Grant, Richland; **SC**: Columbia, Dane, Dodge, Iowa, La Fayette, Rock, Sauk; **SE**: Waukesha.
- Phyllophaga vehemens* (Horn) – Luginbill and Painter (1953)*. No ecological information available. March-June.
- Phyllophaga vilifrons* (LeConte) – Luginbill and Painter (1953). At UV light. April-June. **NW**: Bayfield; **SC**: Dane, Green, Iowa; **SE**: Ozaukee.
- Polyphylla hammondi* LeConte – Young (1988). At UV light in mid-summer, active from 11 p.m. to about 2 a.m., in sandy oak savanna habitats near the Mississippi and Wisconsin rivers. May-September. **SW**: La Crosse; **SC**: Sauk.

Tribe Sericini

- Serica atracapilla* (Kirby) – Dawson (1919a). At UV light. May-July. **NW**: Bayfield, Douglas, Polk; **NC**: Lincoln, Oneida, Price, Vilas; **NE**: Door, Florence, Oconto; **WC**: Jackson; **C**: Juneau, Monroe, Waupaca, Wood; **SC**: Sauk.
- Serica georgiana* Leng – Dawson (1932). At light and in flight intercept traps in sandy oak barrens and savanna. May-August. **NW**: Bayfield, Douglas, Sawyer; **NC**: Lincoln; **NE**: Brown, Oconto; **WC**: Clark, Eau Claire, Jackson, Monroe; **C**: Juneau, Marquette, Wood; **SW**: Buffalo, La Crosse, Richland; **SC**: Columbia, Dane, Sauk; **SE**: Waukesha.
- Serica intermixta* Blatchley – Dawson (1932). At UV light, in flight intercept and unbaited Lindgren funnel traps, and under leaf litter in a sandy blow. May-August. **NW**: Bayfield, Burnett, Douglas; **NC**: Oneida, Vilas; **NE**: Brown, Florence; **WC**: Dunn, Eau Claire, Jackson, Monroe; **C**: Marquette, Portage, Waupaca, Waushara, Wood; **SW**: Grant, La Crosse, Richland; **SC**: Dane; **SE**: Waukesha.
- Serica loxia* Dawson – Dawson (1920). At UV light in sandy oak barrens and savanna habitats. June-July. **NW**: Bayfield, Douglas; **NE**: Oconto.
- Serica mystaca* Dawson – At UV light in sandy oak barrens and savanna habitats. April-June. **SW**: La Crosse, Pierce; **SC**: Dane, Sauk.
- Serica parallela* Casey – Dawson (1922a). At UV light, in flight intercept and unbaited Lindgren funnel traps, and observed feeding and mating on leaves of *Quercus velutina* Lamarck (black oak), *Prunus serotina* Ehrhart (black cherry), and an aster at night. April-July. **NE**: Brown, Oconto; **WC**: Jackson, Monroe, Pierce; **C**: Juneau, Portage, Wood; **SW**: Grant, La Crosse, Richland, Vernon; **SC**: Dane, Green, Sauk; **SE**: Walworth, Waukesha.

Serica sericea (Illiger) – Dawson (1922a). At UV light, in flight intercept and unbaited Lindgren funnel traps, and observed feeding and mating on leaves of *Prunus serotina* Ehrhart (black cherry) at night. April-August. **NW:** Burnett, Douglas, Washburn; **NC:** Taylor, Vilas; **NE:** Door, Florence, Langlade, Oconto; **WC:** Chippewa, Clark, Jackson, Monroe, Pierce; **C:** Adams, Juneau, Marquette, Waupaca, Waushara, Wood; **SW:** Crawford, Grant, La Crosse, Richland; **SC:** Dane, Green, Sauk; **SE:** Kenosha, Milwaukee, Racine, Walworth, Waukesha.

Serica sponsa Dawson – Dawson (1919b). At UV light, in flight intercept traps, and observed feeding on leaves of *Acer rubrum* Linnaeus (red maple) and *Prunus serotina* Ehrhart (black cherry). April-July. **SW:** Crawford, La Crosse, Pierce, Richland, Vernon; **SC:** Dane, Green, Sauk; **SE:** Racine, Waukesha.

Serica tristis LeConte – Dawson (1922a). At UV light and in flight intercept traps. April-August. **NW:** Bayfield, Washburn; **NC:** Vilas; **NE:** Florence, Langlade, Oconto, Shawano; **WC:** Jackson, Pierce; **SC:** Sauk; **SE:** Racine.

Serica vespertina (Gyllenhal) – Dawson (1921). At UV light in sandy oak barrens and savanna habitats. May-June. **WC:** Pierce; **C:** Wood; **SW:** Crawford; **SC:** Sauk.

Subfamily Rutelinae

Tribe Anomalini

Anomala binotata (Gyllenhal) – Potts (1977). In pitfall and flight intercept traps, found along sandy hiking trails, found in the mound of a pocket gopher push-up, and observed nectaring on flowers of *Prunus* sp. (cherry). May-July. **WC:** Monroe; **C:** Marquette, Wood; **SW:** Grant, Pepin, Richland; **SC:** Columbia, Dane, Iowa, Rock, Sauk.

Anomala innuba (Fabricius) – Potts (1977). Occurring in prairie habitats, on *Apocynum* sp. (dogbane) and in tall grass. June-July. **SW:** Crawford; **SC:** Rock.

Anomala ludoviciana Schaeffer – Potts (1977). In sandy blows and on sandy trails in oak barrens and savanna habitats. June-July. **NW:** Burnett; **WC:** Jackson, Monroe; **C:** Portage, Wood; **SW:** Richland; **SC:** Columbia, Dane, Iowa, Sauk.

Anomala undulata Melsheimer – Potts (1977). At UV light in sandy oak barrens and savanna habitats, and in a mound of a pocket gopher

push-up. March-May. **WC:** Monroe; **C:** Wood; **SW:** Grant, Richland; **SC:** Dane, Sauk.

Exomala orientalis (Waterhouse) – A series of adults was collected in a Japanese beetle trap. June-August. **SE:** Milwaukee.

Popillia japonica Newman – Large series collected in Japanese beetle traps, and found feeding on ornamental flowers in gardens and nurseries. June-August. **NW:** Polk; **NE:** Door; **WC:** Eau Claire; **SW:** Grant; **SC:** Dane, Rock; **SE:** Kenosha.

Strigoderma arvicola (Fabricius) – Blackwelder and Arnett (1974). In pan, flight intercept, and barrier pitfall traps, all in sandy, open habitats, and observed feeding on flowers of *Monarda* sp. (horsemint), *Rosa* sp. (rose), and nectaring on flowers of *Asclepias* sp. (milkweed). June-July. **NW:** Barron, Burnett, Douglas, Washburn; **NC:** Ashland; **NE:** Oconto, Shawano; **WC:** Dunn, Eau Claire, Jackson, Monroe; **C:** Adams, Green Lake, Juneau, Portage, Waushara, Wood; **SW:** Crawford, Grant, Pepin, Richland; **SC:** Columbia, Dane, Green, Iowa, Rock, Sauk; **SE:** Jefferson, Kenosha, Waukesha.

Tribe Rutelini

Cotalpa lanigera (Linnaeus) – Saylor (1940). At UV light and found dead on sandy trails and roads. April-July. **NW:** Bayfield, Burnett, Douglas, Sawyer; **NC:** Ashland; **NE:** Door, Marinette, Oconto; **WC:** Monroe; **C:** Adams, Green Lake, Juneau, Marquette, Portage, Waushara, Wood; **SW:** Crawford, Richland, Vernon; **SC:** Columbia, Dane, Sauk; **SE:** Milwaukee, Ozaukee, Waukesha.

Pelidnota punctata (Linnaeus) – Hardy (1975). At light, and three adults reared from pupae found in an unidentified, advancedly decayed tree stump. June-August. **NE:** Oconto; **EC:** Fond du Lac, Winnebago; **C:** Wood; **SW:** Buffalo, Crawford, Grant, Richland; **SC:** Dane, Rock; **SE:** Racine, Walworth, Waukesha.

Subfamily Dynastinae

Tribe Oryctini

Xyloryctes jamaicensis (Drury) – Endrödi (1985). At light and found dead on sidewalks. July-August. **NC:** Vilas; **NE:** Door; **C:** Wood; **SW:** Grant, Richland; **SC:** Dane, Iowa; **SE:** Milwaukee, Racine.

Tribe Pentodontini

- Aphonus tridentatus* (Say) – Gill and Howden (1985). At UV light. June-August. **NW**: Burnett, Douglas; **NE**: Oconto; **WC**: Jackson, Monroe; **C**: Juneau, Wood; **SW**: Crawford; **SC**: Columbia, Dane.
- Ligyryus gibbosus* (DeGeer) – Endrödi (1985). At UV light and found dead on sidewalks and under gas station lights. April-October. **WC**: Monroe; **C**: Marquette, Waushara, Wood; **SW**: Grant, La Crosse, Richland; **SC**: Columbia, Dane, Sauk; **SE**: Jefferson.
- Ligyryus relictus* (Say) – Endrödi (1985). At UV light. April-October. **NW**: Polk; **WC**: Clark, Jackson, Monroe; **C**: Wood; **SW**: Grant, Richland; **SC**: Columbia, Dane, Sauk, Jefferson, Racine, Waukesha.

Subfamily Cetoniinae

Tribe Cetoniini

- Euphoria fulgida* (Fabricius) – Ratcliffe (1991a). In flight intercept traps and hand collected in flight through a sandy oak savanna site. May-July. **NW**: Polk; **NC**: Iron; **NE**: Door; **WC**: Monroe; **SW**: Crawford; **SC**: Dane, Iowa, Rock; **SE**: Racine.
- Euphoria inda* (Linnaeus) – Ratcliffe (1991a). In flight intercept and baited pitfall traps, sifted from pocket gopher mounds, hand collected in flight along sandy paths, and larvae and adults observed in the vicinity of *Formica* thatch ant nests. March-September. **NW**: Burnett, Sawyer, Washburn; **NC**: Iron; **NE**: Brown, Oconto; **WC**: Jackson, Monroe; **C**: Adams, Portage, Waupaca, Waushara, Wood; **EC**: Sheboygan; **SW**: Crawford, Grant, Richland, Vernon; **SC**: Columbia, Dane, Rock, Sauk; **SE**: Milwaukee, Washington, Waukesha.
- Euphoria selpulchralis* Fabricius – No ecological information available. May-September. **SE**: Racine.

Tribe Cremastocheilini

- Cremastocheilus castaneus* Knoch – Alpert (1994). Observed in flight in oak savanna, found on the surface of *Formica* sp. nests, and a single adult reared from a sandy mound of a pocket gopher burrow. April-September. **NW**: Bayfield; **NE**:

Oconto; **WC**: Monroe; **C**: Marquette, Waushara; **SC**: Rock.

- Cremastocheilus harrisii* Kirby – One adult reared from a pupa taken in a soil sample, and hand collected in flight over a small sand dune in oak barrens habitat. April-September. **WC**: Monroe; **C**: Wood.
- Cremastocheilus knochi* LeConte – Alpert (1994). Found in a sandy pocket gopher push-up. March-September. **WC**: Monroe; **C**: Waushara; **SC**: Dane; **SE**: Milwaukee.
- Cremastocheilus wheeleri* LeConte – Found atop a *Formica obscuripes* Forel thatch nest, the surface of the nest swarming with ants. June-August. **C**: Waushara; **SC**: Iowa.
- Psilocnemis leucosticta* Burmeister – One specimen found dead in a backyard swimming pool and another found alive on a sandy road, adjacent to a subterranean nest of the ant *Dolichoderus taschenbergi* (Mayr). May-July. **WC**: Jackson; **C**: Waushara.

Subfamily Trichiinae

Tribe Osmodermini

- Osmoderma eremicola* (Knoch) – Howden (1968). At light; larvae commonly encountered in large, rotted stumps and fallen tree trunks. March-September. **NW**: Burnett, Washburn; **NE**: Oconto; **WC**: Monroe; **SW**: Crawford, Grant, Richland; **C**: Green Lake, Wood; **SC**: Dane, Sauk; **SE**: Jefferson, Kenosha, Racine, Walworth.
- Osmoderma scabra* Beauvois – Howden (1968). Found on a gravel road in northern mesic hardwood forest, and reared from larvae found in a large rotted stump. April-September. **NW**: Bayfield; **NC**: Oneida, Vilas; **WC**: Monroe; **SW**: Crawford; **SC**: Dane, Sauk.

Tribe Trichiini

- Gnorimella maculosa* (Knoch) – Howden (1968). In Lindgren funnel traps in forested areas, and a single adult was observed nectaring on ninebark (*Physocarpus opulifolius* (Linnaeus)) in an area of northern mesic hardwood forest. May-July. **WC**: Jackson, Monroe; **C**: Wood; **SC**: Sauk.
- Trichiotinus assimilis* (Kirby) – Howden (1968). In Malaise traps and observed feeding on flowers of *Monarda* sp. (horsemint), *Phlox* sp. (phlox), *Prunus* sp. (cherry), and *Rosa* sp. (rose). June-July. **NW**: Polk, Rusk, Sawyer, Washburn; **NC**:

Oneida, Vilas; **NE:** Marinette, Oconto; **WC:** Monroe, St. Croix; **C:** Wood; **EC:** Manitowoc; **SE:** Milwaukee.

Trichiotinus piger (Fabricius) – Howden (1968).

Observed feeding on a raspberry flower. May-August. **NW:** Polk; **WC:** Monroe; **C:** Portage, Waupaca, Wood; **SW:** Grant; **SC:** Columbia, Dane, Iowa, Sauk; **SE:** Milwaukee, Outagamie.

Trichiotinus viridans (Kirby) – Observed feeding on flowers of *Anemone* sp. (anemone), *Asclepias* sp. (milkweed), *Physocarpus opulifolius* (Linnaeus) (ninebark), *Ceanothus americanus* Linnaeus (New Jersey tea), *Cornus racemosa* Lamarck (dogwood), *Rosa* sp. (rose), and *Rhus* sp. (sumac). May-July. **NW:** Burnett, Polk; **WC:** Eau Claire, Jackson, Monroe; **C:** Juneau, Wood; **SW:** Grant, La Crosse; **SC:** Dane, Iowa, Sauk.

The following species have distributions that could potentially extend into Wisconsin. This list is based on known distributions, published literature, and specimens examined during the course of this study. The most pertinent literature relating to the development of this list includes Cornell (1972), Endrödi (1985), Gordon (1983), Gordon and Cartwright (1980), Howden (1955, 1968), Luginbill and Painter (1953), Ratcliffe (1991a), and Vaurie (1956). Each species listed is followed by the state(s) and province(s) from which it is currently known that show a reasonable proximity to Wisconsin.

Family Bolboceratidae

Bolboceras simi (Wallis): Indiana, Michigan, Minnesota.

Bolboceras thoracicornis (Wallis): Illinois, Indiana, Iowa, Michigan.

Bolbocerosoma confusum Brown: Illinois, Indiana, Iowa.

Family Scarabaeidae

Subfamily Aphodiinae

Tribe Aegialiini

Aegalia humeralis Brown: Michigan.

Tribe Aphodiini

Aphodius borealis Gyllenhal: Southcentral Canada (Ontario, Manitoba), possibly northern Michigan, Minnesota.

Aphodius concavus Say: Iowa.

Aphodius femoralis Say: Illinois, Indiana, Michigan.

Aphodius manitobensis Brown: Southcentral Canada (Ontario, Manitoba), possibly in northern Michigan, Minnesota.

Aphodius pinguis Haldeman: Michigan, Minnesota, North Dakota.

Aphodius serval Say: Illinois, Indiana, Iowa.

Aphodius vittatus Say: Illinois, Indiana.

Tribe Psammodiini

Rhyssemus sonatus LeConte: Illinois, Iowa.

Subfamily Scarabaeinae

Tribe Ateuchini

Ateuchus histeroides Weber: Illinois, Indiana, Iowa.

Tribe Canthonini

Canthon pilularius (Linnaeus): Illinois, Indiana, Iowa, Michigan, Minnesota.

Subfamily Melolonthinae

Tribe Dichelonychini

Dichelonyx diluta (Fall): Michigan.

Dichelonyx fuscula (LeConte): Illinois.

Dichelonyx macclayi Fraser: Illinois, Indiana.

Tribe Diplotaxini

Diplotaxis atlantis Fall: Illinois, Iowa.

Diplotaxis basalis Fall: Illinois, Indiana.

Diplotaxis blanchardi Vaurie: Illinois, Iowa.

Tribe Melolonthini

Phyllophaga congrua (LeConte): Illinois, Indiana, Iowa.

Phyllophaga ephilida (Say): Illinois, Indiana, Iowa.

Phyllophaga fervida (Fabricius): Illinois, Indiana, Iowa, Michigan, Minnesota.

Phyllophaga hirtiventris (Horn): Indiana, Iowa.

Phyllophaga lanceolata (Say): Iowa.

Phyllophaga praetermissa (Horn): Illinois.

Phyllophaga rubiginosa (LeConte): Michigan.

Subfamily Dynastinae

Tribe Cyclocephalini

Cyclocephala borealis Arrow: Illinois, Indiana
Cyclocephala lurida Bland: Illinois, Indiana, Iowa
Dyscinetus morator (Fabricius): Illinois, Iowa, Indiana

Subfamily Cetoniinae

Tribe Cetoniini

Stephanuca pilipennis Kraatz: North Dakota, Minnesota.

Subfamily Trichiinae

Tribe Trichiini

Trichiotinus affinis (Gory and Percheron): Illinois, Indiana, Michigan
Trichiotinus bibens (Fabricius): Illinois, Indiana, Michigan

Discussion

The scarabaeoid fauna of Wisconsin ranges from common, widespread species to species which are uncommonly encountered and strongly influenced by Wisconsin's unique abiotic and biotic features, such as physical geography, climate, natural boundaries of the Great Lakes and Mississippi River, vegetation, and soils. Many Wisconsin species are widespread throughout the United States, but there are many species representing northern, southern, eastern, or western faunas whose ranges include Wisconsin.

Certain portions of the state host a greater number of species because of the vegetational and soil components occurring there, particularly oak barrens and oak savanna with sandy and silty loam soil. Of the 177 Wisconsin species, 108 were collected in areas containing oak barrens or savanna habitat; 27 of those 108 species include new state records. The "dung beetles" (subfamilies Aphodiinae and Scarabaeinae) not only comprise the majority of new state records, but they comprise the majority of species encountered in the barrens and savanna habitats. Many of these species are tied to the mammals and birds that inhabit these areas. One such mammal, *Geomys bursarius* (Shaw), the pocket gopher, is endemic to the rich, sandy soils

associated with these habitats. These gophers rely on the deep soils for tunnelling, and they feed on roots of grasses in shallow feeding tunnels. Numerous subspecies of pocket gophers in the United States are associated with aphodiine dung beetles endemic to their tunnel systems. Wisconsin pocket gopher populations not only host five of these aphodiine species (*Aphodius insolitus*, *A. iowensis*, *A. kirni*, *A. magnificens*, *A. peculiosis*), but numerous other scarabaeoids take advantage of the microhabitat provided by the pocket gophers in the form of sandy mounds or "push-ups" created when the gophers clear out their tunnels. The investigation of these unique habitats and associations using particular collecting methods contributed significantly to this survey, and it provides a springboard for further studies both in Wisconsin as well as surrounding regions.

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