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Annotated Checklist of Checkered Beetles from the George Washington Memorial Parkway, Virginia (Coleoptera, Cleridae)

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ABSTRACT

Malaise trap samples collected during a 19-year period (1998–2017) from four national park sites in northern Virginia were sorted for checkered beetles (Coleoptera, Cleridae). Eighteen species and one subspecies were documented, including the first published record of *Phyllobaenus verticalis* Say from the Commonwealth. Periods of adult activity, based on dates of capture, are given for each species. Relative abundance is noted for each species based on the number of captures.

Keywords: Fairfax County, Malaise trap, national park, new state record, Potomac River Gorge.

INTRODUCTION

Most adult and larval checkered beetles (Coleoptera, Cleridae) are large-jawed predators of adult and larval wood-boring insects. Diverse and generalist predators, checkered beetles are often observed feeding on pollen as a secondary protein source. Some genera are associated with carrion and stored animal products, and there are several anecdotal observations of predation on Hymenoptera (Leavengood, 2008). Some species have been introduced to control beetles infesting conifers (Hopkins, 1899). Many are brightly colored with red and yellow patterns, and most possess a dense vesture of long setae. Some species may be velvet ant (Hymenoptera, Mutillidae) mimics and are presumed to be a part of a mimicry ring that includes other beetles in the families Lampyridae and Lycidae (Mawdsley, 2002).

Clerids occur in all areas of the world and over 290 species inhabit North America north of Mexico (Opitz, 2002; W. F. Barr, *in litt*., 2018). They are most diverse in the southwestern United States and Mexico. The purpose of this paper is to increase our knowledge of checkered beetle distribution, particularly of the parklands of the George Washington Memorial Parkway (GWMP) in Virginia.

STUDY SITES

The study sites include lands managed by the National Park Service as units of the George Washington Memorial Parkway (GWMP) in Fairfax County, Virginia. Malaise traps were placed at four sites within GWMP: Dyke Marsh Wildlife Preserve, Great Falls Park, Little Hunting Creek, and Turkey Run Park. A map of these park sites is provided in Steury (2011). Great Falls and Turkey Run parks fall within the Piedmont physiographic province and Dyke Marsh Wildlife Preserve and Little Hunting Creek are on the Coastal Plain. All sites are situated near the shore of the Potomac River. Most of the study sites are dominated by maturing, secondary growth, primarily upland, deciduous woodlands with a band of floodplain forest along the Potomac River. However, older-age stands, with dominant trees over 100 years old, occur on ridges

at the northern and southern ends of Great Falls Park. Abrams & Copenheaver (1999) documented white oak (*Quercus alba* L.) individuals between 208 and 251 years old and a black gum (*Nyssa sylvatica* Marshall) 166 years old along the northern ridge. Counts of radial growth rings on a short-leaf pine (*Pinus echinata* Mill.) that fell in 1994 from a ridge along the southeastern edge of the Park, dated to at least 220 years old. More open, herbaceous dominated, habitats can be found along the river shores and in the tidal, freshwater marsh habitats at Dyke Marsh. The vascular flora of the GWMP is diverse, with more than 1,313 taxa recorded (Steury et al., 2008; Steury, 2011).

Traps at Dyke Marsh were located in tidal, freshwater marsh dominated by narrow-leaf cattail (*Typha angustifolia* L.), in floodplain forest dominated by red and silver maple (*Acer rubrum* L. and *A. saccharinum* L.) and tulip poplar (*Liriodendron tulipifera* L.), and at the marsh/forest ecotone. In Great Falls Park, a trap was set in each of three habitats: dry, upland forest; swamp dominated by red maple; and floodplain forest dominated by oaks (*Quercus* spp.) and tulip poplar. In Turkey Run Park one trap was set in upland forest dominated by oaks and tulip poplar and two traps in floodplain forest along the Potomac River, dominated by oaks, basswood (*Tilia americana* L.), and sycamore (*Platanus occidentalis* L.). At Little Hunting Creek, four traps were set in upland forest dominated by an ericaceous understory and a canopy of oaks, hickory (*Carya* sp.), American beech (*Fagus grandifolia* Ehrh.), and some Virginia pine (*Pinus virginiana* Mill).

MATERIALS AND METHODS

Six Townes style Malaise traps were set at Dyke Marsh (April 1998–December 1999), three each at Great Falls and Turkey Run parks (March 2006-November 2009), and four at Little Hunting Creek (March–November 2017). Beetles were removed from the samples by citizen science volunteers and clerid beetles were removed from these subsamples by the first author. Three specimens were added to this study by hand collecting, and one was collected only in this manner. Collectors included C. Acosta, E. Barrows, C. Davis, A. Evans, S. Lingafelter, D. Smith, W. Steiner, B. Steury, J. Swearingen, and N. Woodley. Specimens were pinned, labeled, and deposited in the collections maintained at the GWMP, Turkey Run Park Headquarters in McLean, Virginia. The state record determination was based on reviews of Knull (1951), Downie & Arnett (1996), Hoffman et al. (2002), Leavengood (2008), and Burke et al. (2015), among other literature.

RESULTS AND DISCUSSION

Six subfamilies containing 10 genera, 18 species, and one subspecies were documented from the study areas. Despite having well-developed wings, clerids were uncommon in Malaise trap samples. By comparison, Knull (1951) recorded 41 clerid species from Ohio and nine additional species that could possibly occur in the state. Majka (2006) reported 15 species from the Maritime Provinces of Canada, and 42 species were documented from Florida (Leavengood, 2008). One species collected in Great Falls Park, *Phyllobaenus verticalis*, represents a new record for Virginia. Brown (2008) did not include clerid beetles in the checklist of the invertebrate fauna of the Potomac River Gorge, located between Maryland and Virginia, an area with over 100 years of biodiversity studies. Thus, all species captured during this study from Great Falls and Turkey Run parks represent the first reported records for the gorge. *Enoclerus nigripes nigripes* was the most commonly collected species. Five species were documented by single specimens. All of the genera recorded from the study area are known predators of beetle larvae that live under loose bark of dead wood (Knull, 1951; Evans, 2014). Additionally, scattered anecdotal accounts of *Cymatodera* and *Phyllobaenus* report rearing from galls or predation on insect larvae inside galls, mostly observed in cynipid wasps (Osten Sacken, 1861; Balduf, 1926; Sabrosky, 1934; Knull, 1951; Eliason & Potter, 2000).

Thirteen other clerid genera are recorded from Virginia or nearby states, or the District of Columbia, but have not yet been found in the study area. Most of these also feed on beetle larvae and adults under loose bark, but may also opportunistically prey on bee larvae, larval insects developing inside plant galls, insects (particularly larvae) on carrion, dung, and detritus, or their diet is unknown (Table 1).

LIST OF SPECIES

Species are listed alphabetically within subfamilies following Opitz (2010). The number of specimens in the collection is indicated in parentheses after each taxon. Sites where specimens were collected are abbreviated Dyke Marsh Wildlife Preserve (DM), Great Falls Park (GF), Little Hunting Creek (LH), and Turkey Run Park (TR). All collections are from Malaise traps, or indicated as collected with a beating sheet (bs) or Lindgren funnel (lf). Label data for hand-picked specimens (hp) are provided when available. Dates separated by a hyphen indicate that the taxon was documented on at least one day during each month within this continuum of months,

Table 1. Clerid genera not documented from the George Washington Memorial Parkway, with known occurrence in or near Virginia (Downie & Arnett, 1996; Hoffman et al., 2002; Burke et al., 2015), and reported diet (Opitz, 2002).

Genus	Occurrence	Diet (in part)
Ababa	District of Columbia	Unknown; adults reared from bracket fungi.
Isohydnocera	Virginia	Lepidopteran larvae, coleopteran larvae inside herbs, hymenopteran larvae inside galls.
Lebasiella	Pennsylvania	Unknown; collected on various hardwoods.
Lecontella	Virginia	Hymenopteran (bee and wasp) larvae in hives.
Monophylla	Virginia	Coleopteran larvae and adults (bark beetles, subfamily Scolytinae).
Necrobia	Cosmopolitan	Insect larvae associated with carrion (hides), dung, and detritus.
Opilo	Pennsylvania	Introduced from Europe; North American prey unknown.
Pelonium	Pennsylvania	Probably coleopteran larvae found under loose bark of dead wood, especially in moist areas with cypress.
Tarsostenus	Cosmopolitan	Powder post beetles, genera *Lyctus* and *Xylobius.*
Thanasimus	Virginia	Coleopteran larvae and adult bark beetles found under loose bark of dead wood, especially conifers.
Trichodes	Virginia	Bee larvae, orthopteran (grasshopper) egg pods; adults frequently found on flowers.
Wolcottia	Virginia	Unknown; collected on herbs and oaks.
Zenodosus	North Carolina	Coleopteran larvae found under loose bark of dead wood.

whereas dates separated by a comma represent a gap in months between collection dates. For traps set over multiple weeks, the first day of the set is used as the earliest date and the last day of the set as the latest date. Taxa newly recorded for the Potomac River Gorge are marked by an asterisk.

Cleridae

Tillinae

**Cymatodera bicolor* (Say) – (11); DM, GF, LH, TR; 23 Apr–21 Jul. Four of these specimens possess the "light transverse band at middle of elytron" as described by Knull (1951) for this species in Ohio; the others have all black elytra as is more typical for *C. bicolor* in Florida (Leavengood, 2008).

**Cymatodera inornata* (Say) – (5); GF, LH; 21 May–13 Jul. Burke et al. (2015) reported the first Virginia record for this species (using the abbreviation VI, and TE for Tennessee; Burke, *in litt*., 2018).

Cymatodera undulata (Say) – (1); LH; 17–28 Jul. (Fig. 1a).

**Cymatodera wolcotti* Barr – (9); DM, GF, LH; 19 May–10 Oct. (Fig. 1b). This species was only recently reported from Virginia (Burke et al., 2015). These specimens represent the northernmost records to our knowledge. We used Burke & Zolnerowich (2014) to distinguish *C. undulata* from *C. wolcotti* based on the shape of the male sixth abdominal segment. Additionally, in *C. wolcotti*, the punctures on the head are dense and the spaces between them are rugulose, while on the center of the apical portion of the pronotum (especially near the attachment of the head), the punctures are more widely spaced and the surface between them is smooth (Fig. 1b). In contrast, the density of the punctures in *C. undulata* is similar on the head and pronotum (both being dense and rugulose) (Fig. 1a) as described by Leavengood (2008). Also, the apical fasciae of the elytra are typically more zig-zag in *C. undulata* as opposed to more smooth-edged in *C. wolcotti* (Fig. 2a-b). Only one of our specimens of *C. wolcotti* is from the Piedmont, the others were captured in, or near, freshwater, tidal marsh habitat on the Coastal Plain.

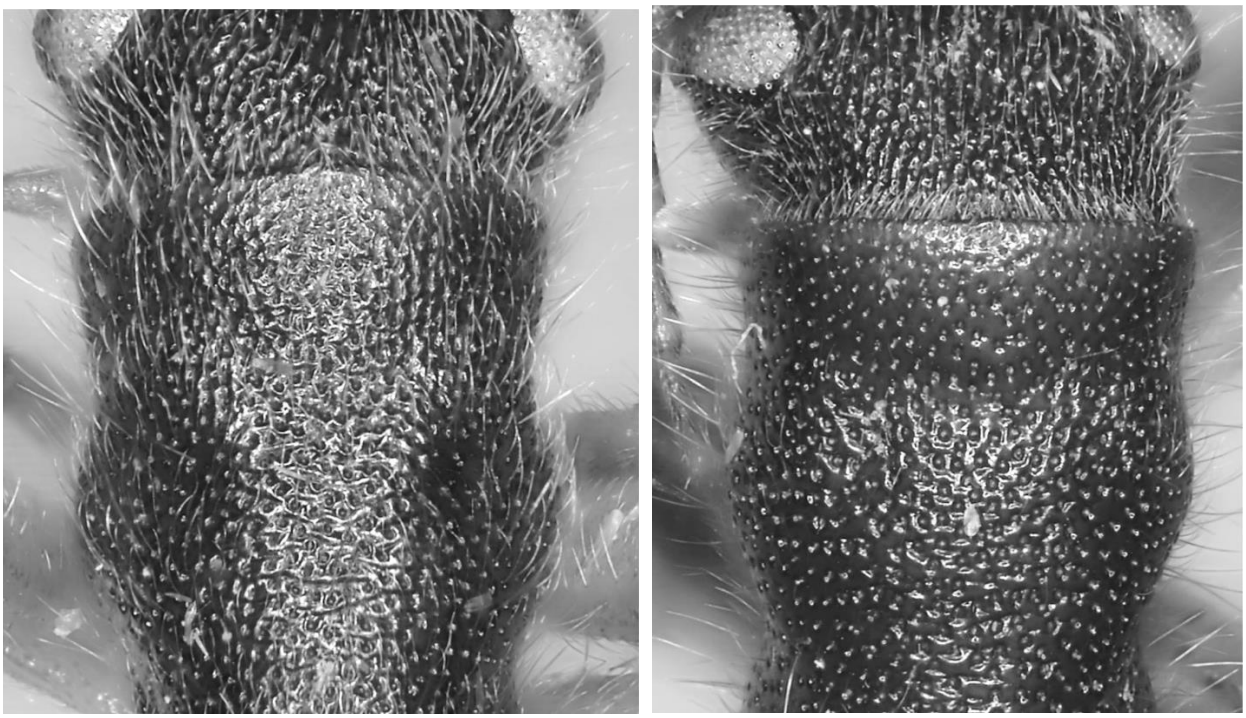

Fig. 1a-b. *Cymatodera undulata* (Say), left, showing similar rugulose punctuation on neck and pronotum. Specimen is from Little Hunting Creek, Fairfax County, Virginia. Right, *Cymatodera wolcotti* Barr, showing dissimilar punctuation on neck and center of the apical portion of the pronotum, which is smooth between punctures. Specimen is from Dyke Marsh Wildlife Preserve, Fairfax County, Virginia.

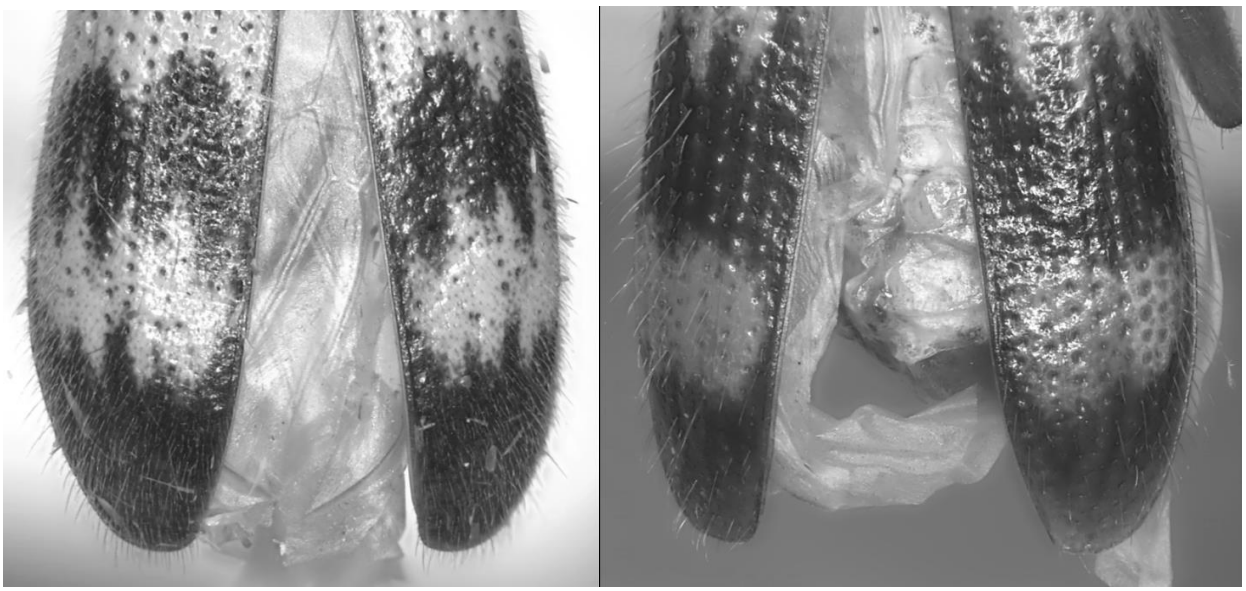

Fig. 2a-b. Apical elytral band of *Cymatodera undulata* (Say) (left) and *Cymatodera wolcotti* Barr (right) showing more zig-zag edge to band in *C. undulata*. Same specimens as in Figure 1a-b.

Hydnocerinae

Phyllobaenus humeralis (Say) – (1); Riverside Park; 10 Jun; hp (grassy area along river).

**Phyllobaenus maritimus* (Wolcott) – (1); TR; 5–25 Aug. (Fig. 3). This species and *P. lecontei* (Wolcott) were recently synonymized by Barr (2018).

Phyllobaenus verticalis* Say – (1); GF; 19–30 Jun. (Fig. 4). **NEW STATE RECORD. This species has been documented from Prince Edward Island, Canada **(**Majka, 2006), south along the east coast to Florida, and west to Kansas (Leavengood, 2008). Knull (1951) recorded it from a number of woody plants that are common in Great Falls Park (Steury et al., 2008), including grape (*Vitis* sp.) and linden (*Tilia* sp.) infested with longhorned beetle larvae (Cerambycidae), black oak (*Quercus velutina* Lam.) infested with jewel beetle larvae (Buprestidae), and hickory (*Carya* sp.) infested with undetermined wood-boring beetle larvae. It was also recorded from a cynipid wasp gall on white oak (*Quercus alba* L.).

Clerinae

Enoclerus nigripes dubius Spinola – (1); DM; 25 Apr–9 May. (Fig. 5). This subspecies is characterized by having a dark spot between the eyes and having the basal elytral coloration not extending to the midpoint of the elytra.

**Enoclerus nigripes nigripes* (Say) – (24); DM, GF, TR; 10–30 Apr.

**Enoclerus ichneumoneus* (Fabricius) – (16); LH, GF, TR; 10 Apr–25 Aug.

**Enoclerus rosmarus* (Say) – (4); GF, TR; 15 Jun–26 Jul.

**Placopterus thoracicus* (Oliver) – (3); DM, GF; 28 Apr–5 Jun.

**Priocera castanea* (Newman) – (7); GF, TR; 19 Jun–26 Jul.

Epiphloeinae

**Madoniella dislocata* (Say) – (19); DM, LH, TR; 5 May–21 Jul; bs (1).

Pyticeroides laticornis (Say) – (2); DM, LH; 3–16 Jun, 26 Sep–11 Oct, lf (1).

Fig. 3. *Phyllobaenus maritimus* Wolcott, dorsal habitus. Length 3.6 mm. Specimen is from Turkey Run Park, Fairfax County, Virginia.

Fig. 4. *Phyllobaenus verticalis* Say, dorsal habitus. Length 4 mm. Specimen is from Great Falls Park, Fairfax County, Virginia.

Fig. 5. Dorsal habitus of *Enoclerus nigripes dubius* Spinola (top) and front of head (bottom). Length 5.5 mm. Specimen is from Dyke Marsh Wildlife Preserve, Fairfax County, Virginia.

Peloniinae

**Chariessa pilosa* (Forster) – (4); LH, TR; 18 Apr–20 Jun; hp (1). Two specimens each have either all black elytra or pale-margined elytra.

**Cregya mixta* LeConte – (8); DM, GF, TR; 19 Jun–25 Aug.

**Cregya oculata* (Say) – (19); DM, GF, LH, TR; 14 Jun–9 Aug; hp (1; mature forest on bluff above river).

Orthopleurinae

**Neorthopleura thoracica* (Say) – (7); DM, GF, LH, TR; 19 May–26 Jul.

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