

The Curculionoidea (Weevils) of the George Washington Memorial Parkway, Virginia

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ABSTRACT: One-hundred thirty-five taxa (130 identified to species), in at least 97 genera, of weevils (superfamily Curculionoidea) were documented during a 21-year field survey (1998–2018) of the George Washington Memorial Parkway national park site that spans parts of Fairfax and Arlington Counties in Virginia. Twenty-three species documented from the parkway are first records for the state. Of the nine capture methods used during the survey, Malaise traps were the most successful. 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. Sixteen species adventive to North America are documented from the parkway, including three species documented for the first time in the state. Range extensions are documented for two species. Images of five species new to Virginia are provided.

Keywords: beetles, biodiversity, Malaise traps, national parks, new state records, Potomac Gorge.

INTRODUCTION

This study provides a preliminary list of the weevils of the superfamily Curculionoidea within the George Washington Memorial Parkway (GWMP) national park site in northern Virginia.

Although there are more recent, phylogenetically-based classifications (e.g., Gillett et al. 2014, Gunter et al. 2016, Shin et al. 2018), we use the classification of Curculionoidea as utilized in *American Beetles* (Arnett et al. 2002) since this is the reference most likely to be used by, and most available to, readers of this paper.

The superfamily Curculionoidea contains seven North American families of weevils and weevil-like beetles, characterized by an elongated rostrum (Arnett et al. 2002). Of the seven families, six were documented from habitats within the GWMP.

The Nemonychidae (long-toothed or pine flower snout beetles) is a small family with a worldwide distribution (Oberprieler et al. 2007), containing only five North American genera. Adults are found in association with pollen of *Pinus* L. species (Pinaceae). They are similar to the Anthribidae in possessing straight antennae and a distinct labrum, but differ in the form of the rostrum which is elongate in the nemonychids but short, very broad and flat in anthribids (Anderson 2002c). Although treated as a subfamily in this paper per Arnett et al. (2002), the Cimberidinae has recently been elevated to family status as Cimberididae (Shin et al. 2018).

The Anthribidae (fungus weevils) comprise over 4,000 species and have a worldwide distribution. They are primitive weevils characterized by straight (not geniculate) antennae, very broad flat rostrum, exposed pygidium, and pronotal pubescence that is directed anteriorly (Valentine 2002). Like Nemonychidae, the adults possess a separate labrum and clypeus, unlike other Curculionoidea where these two parts of the head are fused together. Adults feed on the pollen of larval host plants or, in fungivorous species, on the fungi in which the larvae develop (Valentine 2002).

The Attelabidae (leaf-rolling weevils, tooth-nose snout beetles, and thief weevils) are represented in GWMP by all three known subfamilies (Attelabinae, Rhynchitinae, and Pterocolinae). They are considered primitive weevils based on their straight antennae. Familial characteristics include a concealed eighth tergite and exposed pygidium in both sexes; abdominal ventrites decreasing in length, the proximal three or four fused; and a body that is setose and without broad scales, and often metallic or otherwise brightly colored in many species (Hamilton 2002). The females of Attelabinae (leaf-rolling weevils) lay eggs on leaves that they have prepared by cutting with their mandibles so that the leaf can be rolled into a barrel-shaped structure that nourishes and protects the developing larvae (Hamilton 2002). In Rhynchitinae (tooth-nose snout beetles), the female oviposits in plant stems, leaves, or flowers and the larvae develop as miners of the living or dead tissue. The plant part containing the developing larvae is cut by the adult female using her mandibles and is either severed from the plant or latter dies and eventually drops. In the New World, 180 species of leaf-rolling weevils and 162 species of tooth-nose snout beetles have been described (Hamilton 2002). The female Pterocolinae (thief weevils) of the genus *Pterocolus* Say parasitize attelabid leaf-rolling weevils, preying on the eggs of the host and ovipositing in the leaf rolls prepared for the host larva. The pterocoline larvae feeds on the decaying leaf tissue and falls out to pupate in the ground (Vogt 1992).

The Brentidae (straight-snouted weevils and pear-shaped weevils) are represented in GWMP by two of the six North American subfamilies. The Apioninae are small pear-shaped weevils recognized by a long cylindrical trochanter with the femur attached at its apex. It contains approximately 140 species in North America (Anderson and Kissinger 2002). The Brentinae have elongate, parallel-sided bodies and a long, generally straight rostrum that often exhibits sexual dimorphism. The subfamily contains three species in three genera in North America (Anderson and Kissinger 2002).

The Ithyceridae (The New York Weevil) contains a single species recognized by its large size (12–18 mm [0.5–0.7 in]), distinct pubescence, and straight antennae (Anderson

2002b). This family is included in the Brentidae by some authors (e.g., Oberprieler et al. 2007).

The Curculionidae (true weevils, and snout, bark, and ambrosia beetles) are one of the most diverse beetle families in the world, following perhaps only the Staphylinidae (rove beetles) or Carabidae (ground beetles). More than 60,000 species have been described worldwide (Arnett et al. 2002). Eighteen subfamilies occur in the Nearctic, twelve of which are found in GWMP. The Curculionidae are recognized by the combination of their elongate rostrum with mouthparts that are situated at the apex and by their geniculate antennae with a compact antennal club, however some subfamilies, especially Scolytinae and Platypodinae, have the rostrum reduced and not markedly produced anteriorly (Anderson 2002a).

STUDY SITES

The study site includes lands managed by the National Park Service as units of the GWMP in Fairfax County, Virginia. Park sites that received the greatest inventory effort included Dyke Marsh Wildlife Preserve, Great Falls Park, Little Hunting Creek, and Turkey Run Park. Additionally, one species (*Trachyphloeosoma advena* Zimmerman) was documented from the study site in Arlington County. A map of these sites is provided in Steury (2011). The area is located between latitudes 38.985° and 38.717° and longitudes -77.246° and -77.078°. The site covers an area of approximately 1,615 ha (3,991 ac). Great Falls Park and Turkey Run Park fall within the Piedmont Plateau physiographic province while all other collection sites are on the Coastal Plain. Most sites are situated along the shore of the Potomac River, and the Piedmont Plateau sites border the Potomac Gorge, an area known for high species richness of plants and animals (Evans 2008). The Potomac Gorge (Cohn 2004) is a 24 km (15 mi) long, area of the Potomac River located just west of Washington, District of Columbia, and includes a steeply dissected landscape of bluffs, ravines, and floodplains along a high-gradient reach of the river (Fleming 2007). Most of the study sites are dominated by maturing, second growth, primarily upland, deciduous woodlands. More open, herbaceous-dominated, habitats can be found along the shore of Potomac River and in the freshwater, tidal, swamp, and marsh habitats at Dyke Marsh. More than 1,313 vascular plant taxa have been recorded in GWMP and 1,020 from Great Falls Park alone (Steury et al. 2008, Steury 2011).

MATERIALS AND METHODS

Specimens were collected during a 21-year period (1998–2018) using a variety of sporadic survey methods targeting arthropods, including: Malaise traps, Lindgren funnel traps, blacklight (UV) bucket traps, blacklight shone on sheets, leaf litter samples processed in Berlese funnels, beating sheets, pitfall traps, hand collecting, and bee bowls (96 ml [3.25 oz] white soufflé cups painted fluorescent yellow, fluorescent blue, or left non-fluorescent white and filled with a dilute mixture of detergent and water). Six Townes-style Malaise traps (Townes 1962) were set at Dyke Marsh, April 1998–December 1999; three each at Great Falls and Turkey Run Parks (March 2006–December 2009); and four at Little Hunting Creek (March–November 2017 and 2018). Traps at Dyke Marsh were set each year in the same locations: in open, tidal, freshwater marsh

dominated by narrowleaf cattail (*Typha angustifolia* L. [Typhaceae]); in floodplain forest dominated by red maple and silver maple (*Acer rubrum* L. and *A. saccharinum* L. [Aceraceae]) and tuliptree (*Liriodendron tulipifera* L. [Magnoliaceae]); and at the marsh/forest ecotone. In Great Falls Park, a trap was set in each of three habitats: quarry site (dry, upland, mixed deciduous/coniferous forest), swamp (dominated by red maple), and floodplain forest (dominated by oaks [*Quercus* L. sp. (Fagaceae)], and tuliptree). In Turkey Run Park, one trap was set in upland forest dominated by oaks and tuliptree and two traps in floodplain forest along the Potomac River (dominated by oaks, American basswood [*Tilia americana* L. (Tiliaceae)], and American sycamore [*Platanus occidentalis* L. (Platanaceae)]). At Little Hunting Creek, four traps were set in upland forest dominated by an ericaceous understory and a canopy of oaks, hickory (*Carya* Nutt. sp. [Juglandaceae]), American beech (*Fagus grandifolia* Ehrh. [Fagaceae]), and some Virginia pine (*Pinus virginiana* Mill. [Pinaceae]).

Additional collections were also made by sporadically using other collecting methods, including pitfall traps set at Dyke Marsh (five years), and at Little Hunting Creek, Great Falls Park, and Turkey Run Park (three years); Lindgren funnel traps and blacklight (UV) bucket traps set at Dyke Marsh, Great Falls Park, Little Hunting Creek, and Turkey Run Park (two years); blacklight shone on sheets at Great Falls Park and Turkey Run Park (three years); leaf litter from Dyke Marsh, Great Falls Park, and Turkey Run Park processed in Berlese funnels (two years); bee bowls set in riverside prairie at Great Falls Park (one year; Steury et al. 2009); and using beating sheets and hand collecting at all sites over seven years. Collectors included Christopher Acosta, Edward M. Barrows, Michael J. Blymyer, Karolyn Darrow, Colin Davis, Arthur V. Evans, Cristina Francois, Christy Jo Geraci, Steven W. Lingafelter, Jerry A. Louton, Deblyn Mead, Erik T. Oberg, David R. Smith, Warren E. Steiner, Brent W. Steury, Jil M. Swearingen, Jessica L. Ware, and Christopher C. Wirth. Citizen scientist volunteers in the GWMP bug lab sorted weevils from Malaise trap collection jar samples. Specimens were determined by Robert S. Anderson, Arthur V. Evans, Jens Prena, Charles L. Staines, and Brent W. Steury using a variety of literature sources, most notably: Blatchley and Leng (1916), O'Brien and Wibmer (1982), Downie and Arnett (1996), and Ciegler (2010). In addition, when possible, identifications were made or confirmed by comparison of GWMP specimens with specialist-identified specimens in the Canadian Museum of Nature Insect Collection (CMNC), Ottawa, Ontario, Canada, and the Department of Entomology, National Museum of Natural History (USNM), Smithsonian Institution, Washington, DC. In spite of these efforts, four taxa could be identified reliably only to genus in the list below. New state record determinations are based on examination of the collections and the literature (mainly O'Brien and Wibmer [1982]). Specimens from GWMP were pinned, labeled, and deposited in the collections maintained at the GWMP, Turkey Run Park Headquarters in McLean, Virginia.

RESULTS AND DISCUSSION

LIST OF SPECIES

Subfamilies, genera, and species are listed alphabetically within each family for the 604 specimens collected. Tribe and subtribe are included alphabetically when these are used within a subfamily. An exclamation mark (!) is used to indicate taxa not previously

documented in Virginia. A double dagger (‡) indicates the six new Virginia records reported from the 2006 Potomac Gorge BioBlitz (Evans 2008) and includes one species, *Perigaster cretura* (Herbst), not then noted as a new state record. Adventive (non-native) species are indicated by a dagger (†). The number of specimens in the collection at GWMP is indicated in parentheses after each taxon. Collection sites are abbreviated as Dyke Marsh Wildlife Preserve (DM), Little Hunting Creek (LH), Great Falls Park (GF), and Turkey Run Park (TR). Other locations or collection methods are spelled out if necessary. The periods of adult activity are based on dates when live individuals were captured in the park. Dates separated by an en dash (–) indicate that the taxon was documented on at least one day during each month within this continuum of months, whereas dates separated by a comma represent individual observation 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. Collection methods are designated as: bb (bee bowl), bf (Berlese funnel), bl (black-light shown on sheet), bs (beating sheet), bt (black-light bucket trap), hc (hand collected), lf (Lindgren funnel trap), mt (Malaise trap), and pf (pitfall trap). Some specimens of Apioninae were unidentifiable to species as species level identifications require examination of males and only females were available. Additionally, some specimens of the genus *Baris* Germar (Curculionidae) were unidentifiable to species as this genus requires taxonomic revision.

Superfamily CURCULIONOIDEA

Family NEMONYCHIDAE (long-toothed or pine flower snout beetles)

Subfamily CIMBERIDINAE

Tribe CIMBERIDINI

Chimberis pilosa (LeConte) – (6); DM; 12 Apr–10 May; mt.

Family ANTHRIBIDAE (fungus weevils)

Subfamily ANTHRIBINAE

Tribe CRATOPARINI

Euparius marmoreus (Olivier) – (11); DM, GF, LH, TR; 9 Apr–11 Sep; mt.

Euparius paganus Gyllenhal – (1); DM; 12–28 Aug; mt.

Tribe ISCHNOCERINI

Ischnocerus infuscatus Fåhraeus – (7); GF, TR; 22 Jun–30 Jul; bs, mt.

Tribe PIESOCORYNINI

Brachycorynus rectus (LeConte) – (1); TR; 19–30 Jun; mt.

Piesocorynus mixtus LeConte – (1); GF; 27 Jul–14 Aug; mt.

Piesocorynus plagifer Jordan – (1); TR; 24 Jun; bs.

Tribe PLATYSTOMINI

Toxonotus cornutus (Say) – (3); GF, TR; 10–30 Apr, 24 Jun–21 Jul; bs, mt.

Tribe TROPIDERINI

Eurymycter tricarinatus Pierce – (5); GF, TR; 21 May–24 Aug; bs, mt.

Tribe ZYGAENODINI

Eusphyrus walshi LeConte – (15); DM, GF, LH, TR; 10 Apr–4 Sep; mt.

Ormiscus saltator LeConte – (1); LH; 1–14 Jun; mt.

Subfamily CHORAGINAE

Tribe CHORAGINI

! *Choragus harrisi* LeConte – (1); LH; 1–14 Jun; mt. Valentine (1998) reported this species in the United States from Massachusetts to Maryland, west to Michigan and Oklahoma; it has also been recorded in Louisiana (Ferro and Nguyen 2016).

! *Choragus zimmermanni* LeConte – (2); LH, GF; 1–14 Jun, 15–30 Jul; mt. Valentine (1998) recorded this species in the United States as occurring from Massachusetts to Florida, west to Ohio and Texas. Although these two specimens are the first published records for Virginia, Chamorro (in litt., 12 March 2020) stated that Virginia specimens exist in the USNM as part of the recently acquired Barry D. Valentine collection.

Family ATTELABIDAE (leaf-rolling weevils, tooth-nose snout beetles, and thief weevils)

Subfamily ATTELABINAE

Synolabus bipustulatus (Fabricius) – (5); GF, LH; 21 May–30 Jul; mt. Hamilton (2002) mentions this species as *Attelabus bipustulatus* Fabricius, but Riedel and Hamilton (2007) have elevated the former subgenus *Synolabus* Jekel to generic status.

Subfamily RHYNCHITINAE

Tribe RHYNCHITINI

Eugnamptus angustatus (Herbst) – (10); DM, GF, TR; 10 Apr–14 Aug; bs, mt.

Subfamily PTEROCOLINAE

Pterocolus ovatus (Fabricius) – (1); GF; 21 May–18 Jun; mt.

Family BRENTIDAE (straight-snouted and pear-shaped weevils)**Subfamily APIONINAE****Tribe APIONINI**

Apionini sp. 1 – (4); DM, GF, TR; 19 Apr–30 Jun, 19 Sep–21 Oct; mt.

Apionini sp. 2 – (2); DM; 8 Aug–21 Sep; mt. Many subgenera of *Apion* Herbst were recently elevated to genera. Genera formerly assigned to *Apion* documented in North America include: *Apion*, *Apionion* Kissinger, *Bothryopteron* Wagner, *Chrysapion* Kissinger, *Coelocephalapion* Wagner, *Stenapion* Wagner, and *Trichapion* Wagner (Anderson and Alonso-Zarazaga 2019, de Sousa et al. 2019).

Tribe PIEZOTRACHELINI

Fallapion Kissinger sp. – (2); DM, LH; 28 Jul–11 Aug, 11–26 Oct; mt.

Tribe OXYSTOMATINI**Subtribe Synapiina**

† *Ischnopterapion virens* (Herbst) – (3); Collingwood Picnic Area, TR; 2 Jun, 22 Oct–1 Dec; hc (dry turf grass), mt.

Subtribe Trichapiina

Trichapion nigrum (Herbst) – (6); DM; 30 Jul–12 Sep; mt.

Trichapion rostrum (Say) – (5); DM, TR; 1–20 May; mt.

Subfamily BRENTINAE**Tribe ARRHENODINI**

Arrenodes minutus (Drury) – (9); GF, TR; 21 May–26 Jul; bs, mt.

Family ITHYCERIDAE (The New York Weevil)

Ithycerus noveboracensis (Forster) – (1); GF; 23 Jun; bs.

Family CURCULIONIDAE (weevils, and snout, bark, and ambrosia beetles)**Subfamily BAGOINAE**

Bagous magister LeConte – (1); DM; 2–18 Jul; mt.

Subfamily BARIDINAE**Tribe BARIDINI**

! *Baris aeneomicans* Casey – (1); GF; 19 Sep–21 Oct; mt. This species occurs from Massachusetts to Florida, west to Illinois and Louisiana (O'Brien and Wibmer 1982).

Baris Germar sp. – (2); TR; 7–30 Jul; mt.

Desmoglyptus crenatus (LeConte) – (1); DM; 29 Aug–12 Sep; mt.

Tribe MADARINI**Subtribe Madarina**

Ampelogypter ampelopsis (Riley) – (2); TR; 6–30 Jul; mt.

Glyptobaris lecontei Champion – (10); GF, TR; 1–20 May, 19–30 Jun, 7 Jul–7 Sep; mt.

Madarellus undulatus (Say) – (6); DM, GF, TR; 10 Apr–2 Jul; mt.

Tribe MADOPTERINI**Subtribe Torcina**

! *Sibariops concinna* (LeConte) – (2); DM; 14–24 Jun, 21 Nov–5 Dec; mt. (Figure 1).

This species occurs from New York to Florida, west to Texas (O'Brien and Wibmer 1982).

! *Sibariops confinis* (LeConte) – (1); DM; 10–17 May; mt. (Figure 2). This record documents a slight southern range extension along the East Coast from New Jersey to northern Virginia. It was previously recorded from New York and New Jersey west to Iowa (O'Brien and Wibmer 1982).

Subtribe Zygoberidina

Buchananius striatus (LeConte) – (1); LH; 5–19 May; mt.

! *Buchananius sulcatus* (LeConte) – (4); LH, TR; 5 May–17 Jul; mt. O'Brien and Wibmer (1982) recorded this species from New York to Florida, west to Missouri and Louisiana.

Geraeus penicillus (Herbst) – (1); GF; 23 Jul; netted on nodding onion, *Allium cernuum* Roth (Liliaceae).

Geraeus picumnus (Herbst) – (1); DM; 24 Jun–8 Jul; mt.

! *Nicentrus lecontei* Champion – (1); GF; 27–28 Aug; bb. This species occurs from New Jersey and New York to South Carolina, west to Indiana (O'Brien and Wibmer 1982).

Odontocorynus salebrosus (Casey) – (1); GF; 11–12 Jul; bb.

Plocamus echidna (LeConte) – (1); LH; 16 Oct; hc (in leaf litter).

Subfamily CEUTORHYNCHINAE**Tribe CEUTORHYNCHINI**

! *Ceutorhynchus americanus* Buchanan – (1); TR; 23 May–5 Jun; mt. A widespread species in North America that reaches to South Carolina and Texas in the eastern United States (O'Brien and Wibmer 1982).

! *Ceutorhynchus anthonomoides* Dietz – (1); TR; 10–30 Apr; mt. This species was previously recorded from Indiana, Kansas, Missouri, Ohio, and the District of Columbia (O'Brien and Wibmer 1982).

† *Ceutorhynchus obstrictus* (Marsham) – (1); DM; 17–28 May; mt. Earlier North American records for this European species are under the name *C. assimilis* (Paykull). It has been recorded throughout western and eastern North America (Gillespie et al. 2006).

Glodianus punctiger (Sahlberg) – (1); TR; 28 Apr–12 May; mt.



Figure 1. *Sibariops concinna* (LeConte). Dyke Marsh Wildlife Preserve, ecotone, Malaise trap, 21 November–5 December 1999, E. M. Barrows. Left, dorsal view, right, lateral; length 3 mm (0.12 in). This is the first record of this species in Virginia.

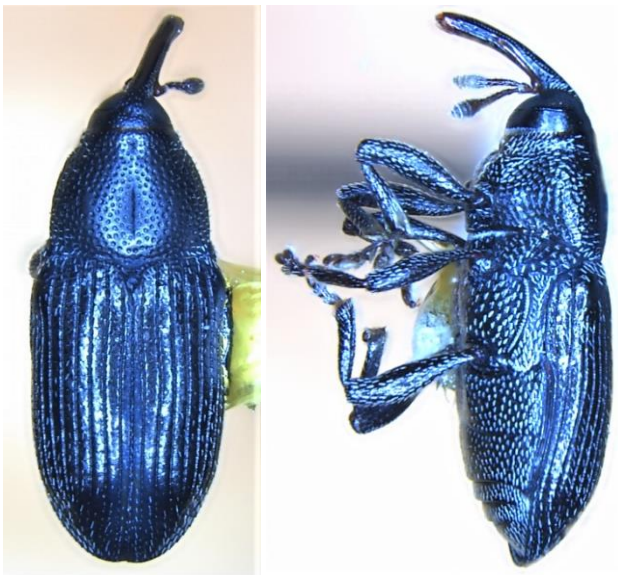


Figure 2. *Sibariops confinis* (LeConte). Dyke Marsh Wildlife Preserve, marsh, Malaise trap, 10–17 May 1998, E. M. Barrows. Left, dorsal view, right, lateral; length 3.3 mm (0.13 in). This is the first record of this species in Virginia.

Tribe CNEMOGONINI

Orchestomerus eisemanni Yoshitake and Anderson – (4); GF, TR; 3 Jul–14 Aug; mt.

! *Parauleutes nebulosus* (LeConte) – (2); DM, GF; 10–17 May, 27–28 Aug; bb, mt. This species also occurs throughout the eastern United States from New York to Florida, west to Nebraska and Texas (O'Brien and Wibmer 1982).

‡ *Perigaster cretura* (Herbst) – (1); GF; 24 Jun; bs. This species occurs from Ontario to Florida, west to Kansas and Texas (O'Brien and Wibmer 1982).

Tribe PHYTOBIINI

Pelenomus pusillus Dietz – (1); DM; 12–26 Sep; mt.

Subfamily CONODERINAE**Tribe LECHRIOPINI**

‡ *Acoptus suturalis* LeConte – (5); GF, LH, TR; 14 Apr–21 Jul; bs, mt. This species is widely distributed in the east from Georgia and North Carolina, north into Ontario and Quebec (O'Brien and Wibmer 1982).

Lechriops oculata (Say) – (22); DM, GF, LH, TR; 10 Apr–1 Dec; mt, pf.

Tribe ZYGOPINI

! *Cylindrocopturus binotatus* (LeConte) – (1); DM; 8–21 Nov; mt. This species occurs from New Jersey and New York south to Georgia, west to Ohio and Texas (O'Brien and Wibmer 1982).

Subfamily COSSONINAE**Tribe COSSONINI**

Cossonus impressifrons Boheman – (23); DM, GF, TR; 23 May–26 Jul; bs, mt.

Tribe DRYOTRIBINI

! *Caulophilus dubius* (Horn) – (2); DM, GF; 15 Jun–8 Aug; mt. This species is widespread in eastern North America, occurring in Quebec and New York to Florida, west to Illinois, Kentucky, and Texas (O'Brien and Wibmer 1982, Douglas et al. 2013).

Tribe ONYCHOLIPINI

! *Pseudopentarthrum nitens* Horn – (1); TR; 19–30 Jun; mt. (Figure 3). O'Brien and Wibmer (1982) recorded this species as *Pentarthrinus nitens* (Horn) from the District of Columbia and Florida.

! *Pseudopentarthrum simplex* (Casey) – (1); TR; 19–30 Jun; mt. This species was previously known from Indiana, Mississippi, Nebraska, North Carolina, and South Carolina (O'Brien and Wibmer 1982).

Stenoscelis brevis (Boheman) – (7); DM, GF, LH; 18 May–15 Jul; lf, mt, pf.



Figure 3. *Pseudopentarthrum nitens* (Horn). Turkey Run Park, river, Malaise trap, 19–30 June 2009, D. R. Smith. Lateral view; length 2.0 mm (0.08 in). This is the first record of this species in Virginia.

Tribe RHYNCOLINI

Subtribe Rhyncolina

! *Tomolips quercicola* (Boheman) – (1); TR; 19–30 Jun; mt. This species occurs throughout eastern North America from New England to Florida, west to Indiana, Missouri, and Texas (O'Brien and Wibmer 1982).

Subfamily CRYPTORHYNCHINAE

Tribe CRYPTORHYNCHINI

Subtribe Cryptorhynchina

Apteromechus ferratus (Say) – (23); DM, GF, LH, TR; 10 Apr–26 Jul; lf, mt.

Cryptorhynchus obliquus (Say) – (13); DM, GF, TR; 28 May–21 Oct; mt.

Cryptorhynchus fuscatus LeConte is a junior synonym of *C. obliquus* (Say) (fide Prena [2018]).

Cryptorhynchus tristis LeConte – (2); GF; 23 Jun; bt.

Eubulus bisignatus (Say) – (8); GF, LH; 10 Apr–23 Jun; bt, mt.

Eubulus obliquefasciatus (Boheman) – (41); DM, GF, LH, TR; 10 Apr–19 May; mt.

Thirty-three of these were captured in the same malaise trap set in Great Falls swamp from 10–30 April.

! *Phyrdenus divergens* (Germar) – (1); TR; 7–12 Jul; mt. This species is widely distributed in the eastern United States from New Jersey to Florida, west to Indiana and Texas (O'Brien and Wibmer 1982).

Subtribe Tylodina

‡ *Acalles carinatus* LeConte – (6); GF, TR; 28 Apr–30 Jul; bs, mt, pf. O'Brien and Wibmer (1982) recorded this species from New Jersey to Georgia, west to Ohio, Nebraska, Missouri, and Arkansas.

Acalles minutissimus LeConte – (1); GF; 27 Jul–14 Aug, mt.

Tribe GASTEROCERCINI

Cophes fallax (LeConte) – (2); GF, TR; 25 Jun, 19 Sep–21 Oct; hc, mt.

‡ *Cophes obtentus* (Herbst) – (3); LH, TR; 1 Jun–30 Jul; bs, mt. This species is widespread in the eastern United States, occurring from New Jersey to Florida, west to Illinois, Missouri, Arkansas, and Texas (O’Brien and Wibmer 1982).

Subfamily CURCULIONINAE

Tribe ANTHONOMINI

Anthonomus signatus Say – (2); DM; 28 Apr–20 Jun; mt.

‡ *Anthonomus suturalis* LeConte – (3); GF, LH; 10 May–24 Jun; bs, mt. This species is widespread in eastern North America, ranging from Ontario and Québec to Florida, west to Kansas and Texas (O’Brien and Wibmer 1982, Bousquet et al. 2013).

Pseudanthonomus helvolus (Boheman) – (1); GF; 22 Oct–1 Dec; mt.

Pseudanthonomus rufulus Dietz – (4); GF; 16–30 Jul; mt.

Pseudanthonomus validus Dietz – (1); GF; 16–30 Jul; mt.

Tribe CURCULIONINI

Curculio caryae (Horn) – (1); DM; 12–27 Aug; mt.

Curculio confusor (Hamilton) – (1); DM; 18–23 Jul; mt.

Curculio strictus (Casey) – (1); LH; 19 Sep–10 Oct; mt.

Curculio sulcatulus (Casey) – (3); DM; 12 Aug–26 Oct; mt.

Tribe ELLESCINI

Subtribe Ellescina

Ellescus ehippiatus Say – (1); GF; 10–30 Apr; mt.

Tribe MECININI

† *Mecinus pyraster* (Herbst) – (4); DM; 11–28 Apr; mt.

Tribe OTIDOCEPHALINI

Myrmex myrmex (Herbst) – (7); GF, LH; 5 May–14 Aug; bs, mt.

Tribe SMICRONYCHINI

Smicronyx amoenus (Say) – (2); DM, TR; 1–20 May, 23 Jul–8 Aug; mt.

Tribe TYCHIINI

Subtribe Tychiina

† *Tychius picirostris* (Fabricius) – (8); DM, GF; 19 Apr–23 Jun, 11–26 Oct; bt, mt.

Subtribe Lignydina

Lignyodes fraxini (LeConte) – (2); DM; 12–28 Apr; mt. This species was previously recorded as occurring from Quebec to New Jersey, west to Saskatchewan, Kansas, and Missouri (O’Brien and Wibmer 1982, Bousquet et al. 2013).

Lignyodes helvolus (LeConte) – (1); GF; 27 Jul–14 Aug; mt.

Subfamily CYCLOMINAE

Tribe RHYTHIRRININI

Subtribe Listroderina

! *Listronotus frontalis* LeConte – (7); GF; 6 Aug; bl. This species is widely distributed in North America (O'Brien and Wibmer 1982, Bousquet et al. 2013).

‡ *Listronotus humilis* Gyllenhal – (2); DM, GF; 23 Jun, 24 Oct–8 Nov; bt, mt. This species is widely distributed in North America (O'Brien and Wibmer 1982, Bousquet et al. 2013).

Listronotus punctiger LeConte – (1); DM; 20 Jun–2 Jul; mt.

Subfamily DRYOPHTHORINAE

Tribe DRYOPHTHORINI

Dryophthorus americanus Bedel – (1); GF; 1 May; bs.

Tribe RHYNCHOPHORINI

Subtribe Sphenophorina

Rhodobaenus quinquepunctatus (Say) – (3); DM, GF; 21 May–2 Jul; mt.

! *Sphenophorus sayi* Gyllenhal – (2); TR; 10 Apr–20 May; mt. This widespread North American species occurs in the East as far south as Georgia and Louisiana (O'Brien and Wibmer 1982).

Sphenophorus venatus vestitus Chittenden – (5); DM, TR; 8 May–4 Aug; mt.

Subfamily ENTIMINAE

Tribe CYPHICERINI

Subtribe Acanthotrachelina

† *Calomycterus setarius* Roelofs – (1); GF; 24 Jun; bs.

Subtribe Cyphicerina

† *Cyrtepidomus castaneus* (Roelofs) – (26); GF, LH, TR; 10 Apr–1 Dec; mt.

!† *Myosides seriehispidus* Roelofs – (3); LH, TR; 15 Apr, 16 Oct; bf, hc (in leaf litter).

This Asian species has been recorded from Québec, Connecticut, District of Columbia, Maryland, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, and West Virginia (O'Brien 2000, Carlton and Anderson 2004, de Tonnancour et al. 2017).

† *Pseudoedophrys (Oedophrys) hilleri* (Faust) – (21); DM, GF, TR; 14 Jun–21 Oct; bs, mt, pf.

Tribe EUSTYLINI

Brachystylus sayi Alonso-Zarazaga – (2); DM, LH; 5 May–6 Jun; mt.

Tribe PHYLLOBIINI

Aphrastus taeniatus Say – (8); GF, TR; 23 Jun–30 Jul; bs, bt, mt.

Tribe SCIAPHILINI

† *Barypeithes pellucidus* (Boheman) – (5); Collingwood Picnic Area, LH, TR; 24 Mar–16 Jun; hc, pf.

Tribe SITONINI

† *Sitona hispidulus* (Fabricius) – (8); DM, TR; 12 Sep–8 Nov; mt, pf.

† *Sitona lineatus* (Linnaeus) – (2); DM; 26 Sep–5 Dec; mt.

Tribe TANYMECINI**Subtribe Tanymecina**

Pandeleiteius hilaris (Herbst) – (5); LH; 5 May–28 Jun, 19 Sep–10 Oct; mt.

Tribe TRACHYPHLOEINI**Subtribe Trachyphloeina**

† *Pseudocneorhinus bifasciatus* (Roelofs) – (12); DM, GF, TR; 25 Apr–17 Aug; bs, mt.

!† *Trachyphloeosoma advena* Zimmerman – (1); Roaches Run; 15 Apr; hc. (Figure 4).

Originally described from Hawaii, O'Brien (1984) first reported this species in the continental United States based on specimens collected in Alabama and Florida. It also occurs in South Carolina (Ciegler 2010). This record documents a northern range extension of at least 643 km (400 mi).

Subfamily ERIRHININAE**Tribe ERIRHININI****Subtribe Stenopelmina**

Onychylis nigrirostris (Boheman) – (1); DM; 20 Jun–2 Jul; mt.

Subtribe Tanysphyrina

!† *Tanysphyrus lemnae* (Fabricius) – (1); GF; 6 Aug; bl. (Figure 5). This European species is widespread across the eastern half of the United States (O'Brien and Wibmer 1982).

Subfamily HYPERINAE**Tribe HYPERINI**

† *Hypera nigrirostris* (Fabricius) – (3); DM; 21 Nov–5 Dec; mt.

Subfamily LIXINAE**Tribe LIXINI**

Lixus concavus Say – (1); DM; 23 May; mt.

Lixus scrobicollis Boheman – (2); GF; 19 Jun–30 Jul, mt.

Subfamily MESOPTILIINAE**Tribe LAEMOSACCINI**

Laemosaccus nephele (Herbst) – (4); LH, 1–14 Jun, mt.



Figure 4. *Trachyphloeosoma advena* Zimmerman. Roaches Run Waterfowl Sanctuary, 15 April 2012, B. W. Steury. Left, dorsal view, right, lateral; length 2.5 mm (0.10 in). This is the first record of this non-native species in Virginia.



Figure 5. *Tanysphyrus lemnae* (Fabricius). Great Falls Park, blacklight in mixed forest gap near river, 6 August 2007, W. E. Steiner and J. M. Swearingen. Left, dorsal view, right, lateral; length 1.5 mm (0.06 in). This is the first record of this non-native species in Virginia.

Tribe MAGDALIDINI

! *Magdalis barbata* (Say) – (1); DM; 8–21 Nov; mt. This species is widely distributed throughout eastern North America south to Georgia and Texas (O'Brien and Wibmer 1982, Bousquet et al. 2013).

Subfamily MOLYTINAE**Tribe CLEOGONINI**

Rhysomatus lineaticollis (Say) – (1); TR; 1–17 Jun; mt.

Tribe CONOTRACHELINI

Conotrachelus affinis Boheman – (4); TR; 19 Jun–4 Aug, mt.

Conotrachelus anaglypticus (Say) – (9); GF, LH, TR; 1 May–21 Oct; lf, mt.

Conotrachelus buchanani Schoof – (5); TR; 19 Sep–1 Dec; mt.

Conotrachelus elegans (Say) – (8); DM, GF, LH, TR; 10 Apr–18 Jun; bl, mt.

Conotrachelus geminatus LeConte – (7); DM, LH; 1–14 Jun, 8–15 Aug; mt.

Conotrachelus naso LeConte – (3); LH; 28 Jul–10 Oct; mt.

Conotrachelus nenuphar (Herbst) – (3); DM, GF, TR; 19–28 Apr, 16 Jul–17 Aug; mt.

Conotrachelus posticatus Boheman – (11); GF, LH, TR; 21 May–11 Aug; lf, mt.

Conotrachelus seniculus LeConte – (1); GF; 25 Jun; bs.

Microhyus setiger LeConte – (8); GF, LH, TR; 10–30 Apr, 1 Jun–20 Jul; mt.

Tribe HYLOBIINI**Subtribe Hylobiina**

Hylobius pales (Herbst) – (1); LH; 18 May–3 Jun; pf.

Tribe PIAZORHININI

! *Piazorhinus pictus* LeConte – (4); DM, GF, LH; 1 Jun–13 Jul, 22 Oct–1 Dec; mt. A species widespread in eastern North America that occurs from Atlantic Canada to Florida, west to Manitoba, Wisconsin, and Missouri (O'Brien and Wibmer 1982, Bousquet et al. 2013).

Piazorhinus scutellaris (Say) – (2); GF; 10–30 Apr, 15 Aug–7 Sep, mt.

Subfamily PLATYPODINAE**Tribe PLATYPODINI**

Euplatypus compositus (Say) – (13); GF, TR; 10 Apr–1 Dec; mt.

Subfamily SCOLYTINAE**Tribe HYLESININI****Subtribe Hylastina**

Hylastes Erichson sp. – (1); DM; 21 Nov–5 Dec; mt.

Subtribe Hylesinina

Hylesinus aculeatus Say – (4); DM, GF, TR; 10 Apr–8 May; mt.

Subtribe Tomicina

Dendroctonus valens LeConte – (2); LH; 12 Apr–18 May; lf, pf.

Tribe SCOLYTINI**Subtribe Corthyliina**

Corthylyus columbianus Hopkins – (1); DM; 11–27 Sep; mt.

Monarthrum fasciatum (Say) – (22); DM, GF, LH; 15 Jan, 1 Mar–14 Aug, 8–21 Nov; hc (dry leaf clusters on fallen branch of northern red oak, *Quercus rubra* L. [Fagaceae]), mt.

Subtribe Scolytina

Scolytus multistriatus (Marsham) – (1); LH; 10 Jun; hc (tidal gravel shore with driftwood).

Subtribe Xyleborina

Anisandrus sayi Hopkins – (1); DM; 25 Apr–8 May; mt.

Cnestus mutilatus (Blandford) – (2); LH; 5 May–14 Jun; mt.

Xyleborus celsus Eichhoff – (2); GF; 23 Jun; bt.

Xyleborus ferrugineus (Fabricius) – (1); GF; 23 Jun; bt.

† *Xylosandrus crassiusculus* (Motschulsky) – (3); DM, GF; 25 Apr–23 Jun; bt, mt.

CONCLUDING COMMENTS

The first published record of Curculionoidea from GWMP was by Evans (2008), who documented 26 taxa (25 identified to species) during a 30-hour BioBlitz of the Potomac Gorge: Anthribidae (3 species), Attelabidae (1 species), Brentidae (1 species), Ithyceridae (1 species), and the Curculionidae (20 taxa, 19 identified to species, including six species new to Virginia. Evans also documented three additional species from the Maryland side of the Gorge).

The current study, spanning 21 years of collection effort targeting the superfamily Curculionoidea from GWMP, documented 604 specimens comprising 135 taxa (130 identified to species) in at least 97 genera. Approximately 100 Scolytini specimens remain unidentified and are not included in the list of species. Within GWMP, the Curculionoidea contains six families consisting of the Nemonychidae (1 species), Anthribidae (12 species), Attelabidae (3 species), Brentidae (7 taxa, 4 identified to species), Ithyceridae (1 species), and the Curculionidae (111 taxa, 109 identified to species). The tribes with the most species were Conotrachelini (10), Madopterini (9), and Cryptorhynchini and Scolytini (8 each). The most species-rich genera were *Conotrachelus* Dejean (9), *Curculio* Linnaeus (4), and *Ceutorhynchus* Germar and *Pseudanthonomus* Dietz (3 each). The most abundant species collected in the survey area were the native species *Eubulus obliquefasciatus* (Boheman) (41), *Apteromechus ferratus* (Say) (23), and *Monarthrum fasciatum* (Say) (22), and the non-native species *Cyrtepistomus castaneus* (Roelofs) (26) and *Pseudoedophrys (Oedophrys) hilleri* (Faust) (21). Twenty-three species are first records for the Commonwealth of Virginia. Range extensions are documented for a native species, *Sibariops confinis* (LeConte), and a non-native species, *Trachyphloeosoma advena*.

The GWMP sites with the highest species richness were Great Falls Park (68 taxa), Dyke Marsh Wildlife Preserve (58), Turkey Run Park (54), and Little Hunting Creek (38). Sixteen species (11.9%; N = 135) found in GWMP are considered adventive (non-native)

to Virginia, including three species new to the state: *Myosides seriehispidus* Roelofs, *Tanysphyrus lemnae* (Fabricius), and *Trachyphloeosoma advena*. For comparison, 6.8% (4 of 59) of the weevils documented from the Potomac Gorge are non-native (Brown 2008). These four species include one species, *Sitona hispidulus* (Fabricius), documented from GWMP and three species not yet recorded from the park: *Gymnetron tetrum* (Fabricius), *Hypera punctata* (Fabricius), and *Mecinus pascuorum* (Gyllenhal). Malaise traps proved to be the most successful method of capturing weevils during this study, yielding 114 taxa. Results of the other most productive sampling methods were: beating sheets (20) and black-light bucket traps, pitfall traps, and hand collecting (8 each).

Evans (2008) documented 26 taxa from the Piedmont Plateau sites along the Potomac Gorge at Great Falls and/or Turkey Run Parks, two species of which, *Eurymycter fasciatus* (Olivier) and *Myloccerus hilleri* Faust (both Curculionidae), were not observed in the current study. Evans (2008) also documented four additional Curculionidae from the Maryland side of the Gorge, three of which, *Listronotus oregonensis* (LeConte), *Sphenophorus minimus* Hart, and *Xyleborus pubescens* Zimmermann, were not observed in the current study. Brown (2008) documented 59 species at Plummers Island on the Maryland side of the Gorge, 37 of which were not observed in the current study. Of the 92 taxa documented from Piedmont Plateau sites along the Potomac Gorge at Great Falls or Turkey Run Parks in the current study, 51 are first records for the Gorge, increasing the number of Curculionoidea documented from the Gorge to 134 (i.e., 2+3+37+92) taxa (coincidentally, the same number of taxa as are documented from GWMP).

Despite 21 years of sporadic survey effort using nine collecting techniques, 53 taxa (39.6%) documented by the current study are represented by a single specimen, indicating that the list of GWMP Curculionoidea is preliminary and much remains to be learned concerning the fauna of the parkway and of Virginia.

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