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RESEARCH ARTICLE

AN ANNOTATED CHECKLIST OF THE COLEOPTERA OF THE SMITHSONIAN ENVIRONMENTAL RESEARCH CENTER: THE ELATEROIDEA

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ABSTRACT

A three year inventory at the Smithsonian Environmental Research Center, Edgewater, Maryland resulted in 45 species of Elateroidea representing five families (Cantharidae- 10; Elateridae- 21; Eucnemidae- 2; Lampyridae- 9; Lycidae- 3). Two new Maryland records are reported.

Keywords: Biodiversity, insects, Maryland.

INTRODUCTION

The Elateroidea is a large superfamily containing 17 extant families. At first glance this group of families does not appear to be related but both morphological and genomic studies have resulted in the current superfamily (Lawrence et al., 2010). Nine Elateroidea families are reported from Maryland (Maryland Biodiversity Project, 2020). Four families were collected at the Smithsonian Environmental Research Center (SERC).

Cantharidae, soldier beetles, adults are often abundant on vegetation in a wide variety of open and forested habitats. Adults of most species emerge in the spring or summer, are fairly short-lived, and are most active diurnally. Adults feed on flowers, nectar, and pollen; larvae are predaceous and are common in leaf litter, beneath rocks or debris, and in decaying wood where they prey on soft-bodied invertebrates. There are 5083 described species worldwide with 473 species in America north of Mexico (Ramsdale, 2002). Ulke (1902) reported 13 species from the District of Columbia and vicinity. Steury (2019, 2020, 2021) and Steury et al. (2018) reported 41

species from the George Washington Memorial Parkway, Fairfax County, Virginia. The Maryland Biodiversity Project (2020) reported 30 species from Maryland.

Elateridae, click beetles, adults are relatively common and are collected in various traps, on vegetation or at light. Many species are nocturnal and adults fly well. Adults feed on insects, decaying vegetation, pollen, floral parts, and fungi. Larvae are found in the soil, forest duff, or decaying organic matter. Larvae that occur in rotting wood are predaceous and some soil dwelling larvae are herbivorous on sprouting seeds or plant roots and tubers. There are over 12,000 described species worldwide (Kirsme & Johnson, 2020) with 965 in the United States and Canada (Johnson, 2002). Ulke (1902) reported 110 species from the District of Columbia and vicinity. The Maryland Biodiversity Project (2020) reported 97 species from Maryland.

Eucnemidae, false click beetles, larvae are found in rotten wood where they feed on fungi. There are 1300 species worldwide with 85 north of Mexico (Muona, 2002). Ulke (1902) reported 20 species from the District of Columbia and vicinity. Hoffman et al. (2009) reported 32 species for the state of Virginia. The Maryland Biodiversity Project (2020) reported five species from Maryland.

Lampyridae, fireflies, lightningbugs, glowworms, are often observed flying at dusk where they use their bioluminescent flashes to locate mates. The complete biology is not known for most species. Both adults and larvae are bioluminescent and predaceous. There are 2000 species worldwide with 124 in the United States (Lloyd, 2002). Ulke (1902) reported 24 species from the District of Columbia and vicinity. McDermott (1948) reported 12 species commonly found in Delaware. Barrows et al. (2008) reported on the ecology and flight times of eight species in a freshwater tidal marsh in Fairfax County, Virginia. Brown (2008) reported seven species from Plummers Island (Montgomery County) Maryland from 1901 to 2007. Heckscher (2012) reported on the ecology of six *Photuris* species in Delaware. The Maryland Biodiversity Project (2020) reported six species from Maryland.

Lycidae, net-winged beetles, larvae feed on fungi in rotten wood, leaf litter, and under bark. Both larvae and adults are distasteful and are often involved in mimetic complexes. There are more than 3500 species worldwide with 76 in America north of Mexico (Miller, 2002). Ulke (1902) reported two species from the District of Columbia and vicinity. The Maryland Biodiversity Project (2020) reported 10 species from Maryland.

MATERIALS AND METHODS

The Smithsonian Environmental Research Center (SERC) [38°53'13"N; 76°32'21"W] consists of approximately 1,477 ha of hardwood-dominated forest, ponds, creeks, rivers, tidal marshes, and 19.3 km of protected shoreline along the Rhode River and upper Chesapeake Bay in Anne Arundel County, Maryland (SERC, 2018). Forests on the main campus of SERC can be broadly classified into three main types: (1) the majority (~85%) is a tulip-poplar (*Liriodendron tulipifera* L., Magnoliaceae) association; (2) a moist lowland assemblage, comprised of American sycamore (*Platanus occidentalis* L., Platanaceae), ash (*Fraxinus* spp., Oleaceae), elms (*Ulmus* spp., Ulmaceae), river birch (*Betula nigra* L., Betulaceae), and other woody vegetation along freshwater streams; and (3) a semi-xeric assemblage that fringes tidal marshes, consisting of chestnut oak (*Quercus prinus* L.), white oak (*Quercus alba* L., Fagaceae), black gum (*Nyssa sylvatica* Marshall, Nyssaceae), mountain laurel (*Kalmia latifolia* L., Ericaceae), blueberries (*Vaccinium* spp., Ericaceae) and other woody vegetation (McMahon et al., 2010; Higman et al., 2016).

Like much of the eastern United States, SERC's forest age and structure reflect historical agricultural activities and local history. SERC's main campus was mostly fallow from the end of the Civil War (1865) to approximately 1915, when it was used as a dairy farm with grazing pastures and fields for feed production until 1945. Thus, the majority of the SERC contemporary forests are from 70-150 years old (McMahon et al., 2010; Higman et al., 2016).

Freshwater inputs into the Rhode River are primarily from the North Fork Muddy Creek, South Fork Muddy Creek, and their lower order streams. These streams are associated with several swamps, beaver impoundments, and seasonal wetlands which range from small, tannin-rich, ephemeral wetlands, to larger and clear-water permanent ponds.

On the south side of the Rhode River the BiodiversiTREE plots are about 30 acres containing 24,000 trees of 16 species of ecologically important deciduous trees planted in 75 plots. Established in 2013, the trees in these plots are rather stunted probably due to deer (*Odocoileus virginianus* (Zimmermann), Mammalia: Cervidae) browse and poor soil nutrients (SERC, 2018). In the annotated species list this area is referred to as Zones 5 and 6.

The goal of this project was to inventory the Coleoptera of the SERC. Hopefully this data will provide a baseline for future ecological work on changing insect populations.

Collecting techniques include visual survey followed by sweeping or beating the vegetation of the area. Other collecting techniques used were pitfall traps (both baited and unbaited), head lamping, black lighting, and checking lights around buildings on the main campus. Two Malaise traps were operated for 72 hour periods in May and June 2020.

Field work was conducted from 11 May to 24 October 2018, 30 March to 23 October 2019, 19-20 March 2020, and 26 August to 31 October 2020. Voucher specimens are deposited in the SERC and the Department of Entomology Collection, Natural History Museum, Smithsonian Institution.

Identifications were made by the senior author. Specimens were first keyed to genus using Ramsdale, (2002), Johnson (2002), Muona (2002), Lloyd (2002), and Miller (2002). If available, species identifications were done using the most recent generic revision. When generic revisions were not available, identifications were made using the keys in Downie & Arnett (1996) followed by visual comparison to identified specimens in BugGuide (<https://bugguide.net/>).

RESULTS

Family Cantharidae

Atalantycha bilineata (Say) is found in hardwood and pine forests and collected on *Betula populifolia* Marshall (Betulaceae), *Pinus resinosa* Sol. ex. Aiton (Pinaceae), and *Salix* sp. (Salicaceae) (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 23 April 2019 in Zones 5 and 6.

Atalantycha neglecta (Fall) is common in hardwood forests, forest edges, pine forests and sandy open areas with shrubs. Collected on *Pinus resinosa* and flowers of *Prunus pennsylvanica* L., *P. virginiana* L. (Rosaceae), and *Rhus typhina* L. (Anacardiaceae) (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 23 April 2019 in Zones 5 and 6.

Chauliognathus marginatus (Fabricius) has been collected on *Asclepias syriaca* L. (Apocynaceae) and *Napaea dioica* L. (Malvaceae) (Williams, 2006a). SERC specimens were taken sweeping

vegetation along Contees Wharf Road on 16 May 2019, at the intersection of Contees Wharf and Dock Roads on 5 June 2018, around Java House ruins on 8 June 2018, and in Malaise traps in the field opposite Sellman House from 12–15 June 2020.

Chauliognathus pensylvanicus (DeGeer) has been collected on flowers of 183 species in 29 families in Wisconsin (Williams, 2006b). SERC specimens were taken sweeping vegetation on 23 August 2018 in forest plots in Zone 5.

Podabrus basilaris (Say) has been found in maple (*Acer*) forests and possibly oak (*Quercus*) forests (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 24 May 2018 along Contee Watershed Trail, on 20 May 2019 at Frog Haven, and in Malaise traps in the field opposite Sellman House from 1–3 May 2020.

Podabrus brunnicollis (Fabricius) has been found in wet oak (*Quercus*) forests (Pelletier & Hébert, 2014). Collected on *Quercus* (Fagaceae), *Carya* (Juglandaceae), and *Vitis riparia* Michx. (Vitaceae) (Blatchley, 1910). SERC specimens were taken sweeping vegetation along Contee Watershed Trail on 24 May 2018, on 6 June 2018 around Frog Haven, on 16 May 2019 along Contees Wharf Road, and 20 May 2019 at Frog Haven.

Podabrus rugosulus LeConte is common in semi-open areas, thicket and second growth fields, fir plantations, apple orchards, tamarack bogs, alvars, and river shores. Collected on *Cornus alternifolia* L. (Cornaceae), *Crataegus* (Rosaceae), *Solidago* (Asteraceae), and *Salix* (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 11 May 2018 in the field behind Sellman House, on 6 June 2018 at Frog Haven, and 3 May–2 June 2020 in a Malaise trap in the field opposite Sellman House.

Rhagonycha lineola (Fabricius) has been found in grassy, scrub and shrubby areas; in oak (*Quercus*) forests; collected on *Ilex* (Aquifoliaceae) and *Quercus* (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 23 April 2019 at Frog Haven and on 23 April 2019 in Zone 6.

Rhaxonycha carolina (Fabricius) has been found in open shrubby fields at the edge of hardwood forests and maple forests; collected on *Corylus cornuta* Marshall (Betulaceae), *Salix*, *Ulmus americana* L., *Aronia melanocarpa* (Michx.) Elliott, *Physocarpus opulifolius* (L.) Maxim., *Prunus pennsylvanica* L., *Spiraea latifolia* (Aiton.) Borkh. (Rosaceae), *Fraxinus americana* L. (Oleaceae), *Cornus alternifolia* L., *Cornus obliquus* Raf. (Cornaceae), and *Poa* (Poaceae) (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation on 6 June 2018 at Frog Haven.

Silis percomis (Say) is very common in maple forests, uncommon in oak and balsam fir forests, rare in black spruce (*Picea mariana* (Mill.) BSP, Pinaceae) forests; collected on *Acer saccharum* Marshall, *Acer pennsylvanicum* L., *Corylus cornuta*, *Quercus rubra* L., *Fagus grandifolia* Ehrh. (Fagaceae), *Salix*, *Prunus virginiana* L., *Abies balsamea* (L.) Mill. (Pinaceae), *Pinus banksiana* Lamb., and *Aster* (Asteraceae) (Pelletier & Hébert, 2014). SERC specimens were taken sweeping vegetation along Contee Watershed Trail on 24 May 2018.

Family Elateridae

Aeolus mellillus Say is found in grasslands and gardens over much of North America. The larvae were originally reported to feed on the roots of corn, potatoes, wheat and other cereal crops (Forbes, 1894; Luggler, 1899). Subsequent research showed that they are predators (King, 1928; Stirret, 1936; Doane, 1977). Males are very uncommon and the species is thought to be parthenogenetic (Jewett, 1940). A single SERC specimen was taken in a Malaise trap in the field opposite Sellman House from 10-13 May 2020.

Agriotes oblongicollis (Melsheimer) has been found on *Crataegus* (Rosaceae) flowers and other vegetation (Blatchley, 1910) and beating *Myrica cerifera* L. (Myricaceae) (Blatchley, 1920). Larvae of other species of *Agriotes* are reported as crop pests or as predaceous (Becker, 1956). SERC specimens were taken sweeping vegetation on 6 June 2018 around Frog Haven, on 25 April 2019 in fields around Sellman House, on 30 April 2019 in Zone 6, and on 16 May 2019 along Contees Wharf Road.

Ampedus fuscatus (Melsheimer) has been found in red (*Picea rubens* Sarg.) and black spruce (*Picea mariana* (Mill.) BSP.) forests (Majka & Johnson, 2008); beaten from spruce (Ramberg, 1979); in flight intercept traps (Levesque & Levesque, 1993). SERC specimens were taken at black light along Back Road on 12 August 2019. Maryland Biodiversity Project does not report this species from Maryland. However, it is widespread from Quebec to Florida (Peck & Thomas, 1998).

Ampedus nigricollis (Herbst) has been found under loose bark or other cover (Dietrich, 1945); collected from rotting wood of sweet birch (*Betula lenta* L.), chestnut (*Castanea* sp., Fagaceae), maple (*Acer* sp., Sapindaceae), tupelo (*Nyssa* sp., Cornaceae), trembling aspen (*Populus tremuloides* Michx., Salicaceae), pine (*Pinus* sp.), oak (*Quercus* sp.), willow (*Salix* sp.), hemlock (*Tsuga* sp., Pinaceae), elm (*Ulmus americana* L.), on flowers of purple angelica (*Angelica atropurpurea* L., Apiaceae), from fungus (Ramberg, 1979); in pitfall traps (Levesque & Levesque, 1993). SERC specimens were taken sweeping vegetation at Frog Haven on 23 April 2019.

Athous cucullatus (Say) larvae are found under bark on downed logs where they feed on woodboring beetle larvae (Kirk, 1922); and in forest litter and rotting logs (Glen, 1950); adults are attracted to lights (Becker, 1974). SERC specimens were taken at black light on 25 July 2019 along Contee Watershed Trail and sweeping vegetation around Java House ruins on 31 August 2020.

Cardiophorus gagates (Erichson) has been collected in sandy habitats including beach dune scrub, turkey oak (*Quercus laevis* Walter) scrub, pine barrens, oak savannah, sandy old field, and an abandoned sandpit on vegetation including *Amelanchier* sp., *Crataegus* sp. flowers, *Rosa* sp. (Rosaceae), flowering *Ilex* sp. (Aquifoliaceae), *Iris* sp. (Iridoideae), *Verbascum thapsus* L. (Scrophulariaceae), *Pinus strobus* L., *P. virginiana* Mill., under loose bark of *Pinus* sp., *Quercus* spp., *Rhus typhina* L. flowers (Anacardiaceae), *Viburnum rafinesquianum* Schult. flowers (Adoxaceae), and also on sand and gravel surfaces (Douglas, 2003). SERC specimens were taken at black light on Back Road opposite the NEON tower on 27 June 2019.

Conoderus bellus Say adults hibernate beneath rubbish in damp locations, adults are taken at lights (Blatchley, 1910); larvae have been collected in corn fields in Indiana (Belcher & Tenne, 1987). SERC specimens were taken sweeping vegetation on 26 June 2019 in the fields opposite Sellman House, on 19 March 2020 in the meadow in front of Mathais Lab, and in a Malaise trap in the field opposite Sellman House from 30 May–2 June 2020.

Conoderus lividus (DeGeer) has been beaten from branches of walnut (*Juglans*), hickory (*Carya*), and other trees (Blatchley, 1910); larvae have been found in corn fields in Indiana (Belcher & Tenne, 1987). SERC specimens were taken at black light on 23 June 2018 at Reed Education Center, sweeping vegetation in forest plots in Zone 6 on 9 July 2018, under bark on 12 April 2019 at the intersection of Back Road and 11-6, at black light on 20 May 2019 at Frog Haven, and sweeping vegetation 27 May 2019 on Connector Trail between Fox Point Road and Java History Trail.

Ctenicera pyrrhos (Herbst) has been taken on walnut (*Juglans*), hickory (*Carya*), and other trees (Dillon & Dillon, 1961). The exact generic placement of this species is unknown (Johnson, 2002). A single SERC specimen was taken in a Malaise trap in the field opposite Sellman House from 12–15 June 2020.

Dalopius pennsylvanicus Brown is found most commonly in ecotones or in open areas of mixed deciduous and coniferous forest (Majka & Johnson, 2008). Glen et al. (1943) reported that the larvae of some species of *Dalopius* are crop pests while others are found in leaf litter or under horse or cow manure. SERC specimens were taken in Malaise traps in the field opposite Sellman House from 30 May–2 June 2020. Brown (1934) described this species from 16 specimens from Pittsburgh, Pennsylvania. Using Brown's (1934) key, short description, and illustrations the specimens keyed easily to *D. pennsylvanicus*. The only published records we could find are from New England and eastern Canada (Majka & Johnson, 2008). **NEW STATE RECORD.**

Dalopius virginicus Brown has an unknown biology. Glen et al. (1943) reported that the larvae of some species of *Dalopius* are crop pests while others are found in leaf litter or under horse or cow manure. SERC specimens were taken in a Malaise trap in the field opposite Sellman House from 1–3 May 2020 and 12–15 June 2020. Brown (1934) described this species from two specimens from Fairmont, West Virginia. We have been able to find no other literature references to the species. Using Brown's (1934) key, short description, and illustrations the specimens keyed easily to *D. virginicus*. The Maryland Biodiversity Project (2020) has *Dalopius* sp. listed with a photograph which appears to be *D. virginicus* from Frederick County. This is the first published record of the species from Maryland. **NEW STATE RECORD.**

Gambrinus griseus (Beauvois) has been taken sweeping grasses and beating vegetation (Blatchley 1910); on vegetation and under objects (Blatchley, 1910 as *Limonius interstitialis*); sifting forest litter, at light, in mixed forests, sweeping vegetation (Al Dhafer, 2009). SERC specimens were taken sweeping vegetation on 16 May 2019 along Contee Watershed Trail, on 26 June 2019 in the fields opposite Sellman House; at black light on 25 May 2019 at the intersection of Back Road and 11-6, on 19 June 2019 at Mathais Lab, on 25 July 2019 on Contee Watershed Trail, on 26 July 2019 at Java History Trail and boardwalk; and by head lamping on 26 June 2019 along Contee Watershed Trail.

Hemicrepidius memnonius (Herbst) adults have been collected under stones (Kirk, 1922); Glen et al. (1943) reported that the larvae prefer moist situations; larvae have been found in corn fields in Indiana (Belcher & Tenne, 1987); at light, black light, mercury vapor light, in pitfall traps, Malaise traps, bait traps, canopy traps, Lindgren funnel traps, and under bark (Etzler, 2020). SERC specimens were taken under bark on 9 April 2019 on the forest road to sites 6, 7, and 8, at black light on 17 June 2019 along Java History Trail, and at black light on 25 July 2019 along Contee Watershed Trail.

Lacon marmoratus (Fabricius) has been swept from vegetation, collected at light (Smith & Enns, 1977), and collected under bark of logs (Evans, 2014). SERC specimens were taken under bark on 10 April 2019 along Connector Trail between Fox Point Road and Java History Trail. Maryland Biodiversity Project (2020) does not record this species from Maryland. However, the species is widespread from eastern Canada to Florida and Texas (Evans, 2014).

Limonius quercinus (Say) adults have been collected on the leaves of hazel (*Corylus*) and oak (*Quercus*) (Blatchley, 1910); and beating and sweeping vegetation (Al Dhafer, 2009). The larvae of some species of *Limonius* are thought to be crop pests (Glen et al., 1943). SERC specimens were taken sweeping vegetation along Discovery Trail on 4 June 2018 and 2 May 2019 on Hog Island.

Melanotus castanipes (Paykull) adults have been collected beneath bark of *Pinus* (Blatchley, 1910); in flight intercept traps (Levesque & Levesque, 1993). Glen et al. (1943) reported that larvae of many *Melanotus* prefer heavier, wetter soils. SERC specimens were taken at black light on 20 May 2019 at Frog Haven and in a Malaise trap in the field opposite Sellman House from 1-3 May 2020 and 30 May-2 June 2020.

Melanotus communis (Gyllenhal) larvae feed on corn and adults are taken at lights (Blatchley, 1910). Fenton (1926) reported that overwintering adults are found in rotting logs and under bark and readily feed on pollen; larvae preferred wet soils and overwinter in the soil; and pupation occurred in the soil. SERC specimens were taken in Malaise traps in the field opposite Sellman House from 1-3 May 2020, 10-13 May 2020, 30 May-2 June 2020, and 12-15 June 2020.

Melanotus similis (Kirby) has been collected in raspberry (*Rubus*, Rosaceae) plantations and pine woods (Levesque & Levesque, 1993). This is the so-called “corn wireworm” of midwestern and southern regions. The larva is a soil predator in meadow, field, and ecotonal areas, and facultatively feeds on sprouting corn and other seeds in agricultural situations (Majka & Johnson, 2008). SERC specimens were taken sweeping vegetation on vegetation on 6 June 2018 at Frog Haven, on 30 April 2019 along Contee Watershed Trail, on 30 May 2018 along Java History Trail, on 17 June 2019 along Java History Trail, at black light on 23 June 2018 at Reed Education Center, and on 26 July 2019 at Java History Trail and boardwalk, and in Malaise traps in the field opposite Sellman House from 30 May-2 June 2020.

Neopristilophus aethiops (Herbst) has been found beneath stones as rubbish, on Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch., Vitaceae) (Dillon & Dillon, 1961). SERC specimens were taken sweeping vegetation on 5 June 2019 along Java History Trail and in a Malaise trap in the field opposite Sellman House from 30 May-2 June 2020.

Parallelostethus attenuatus (Say) has been found beneath bark of decaying walnut (*Juglans*, Juglandaceae), mulberry (*Morus*, Moraceae), and other logs (Blatchley, 1910); and is commonly found in rotting logs feeding on decaying wood (Kirk, 1922). SERC specimens were taken at black light on 25 May 2019 at the intersection of Back Road and 11-6.

Sylvanelater cylindriformis (Herbst) has been found in montane, subalpine, and boreal forests; on spruce (*Picea* sp.), pine (*Pinus* sp.), and larch (*Larix* sp, Pinaceae) (Brooks, 1960). A single SERC specimen was taken 19 March 2020 in the field at the intersection of Contees Wharf and Dock Roads.

Family Eucnemidae

Deltometopus amoenicornis (Say) breeds in a variety of trees possibly even conifers. Adults have been reared from a decaying log of *Fagus grandifolia* Ehrh. (Fagaceae) (Knull, 1947); beaten from vegetation mostly in damp situations (Blatchley, 1910); in flight intercept traps (Levesque & Levesque, 1993); and collected from *Platanus occidentalis*, *Acer saccharum*, *Fagus*, *Quercus alba*, and rotten *Pinus* (Muona, 2000). SERC specimens were taken sweeping vegetation in the fields opposite Sellman House on 23 April 2019.

Nematodes atropos (Say) adults have emerged from fallen or dead *Acer*, *Fagus*, and *Ulmus* (Dury, 1904); larvae and adults have been found in *Quercus velutina* Lam. (Van Horn, 1909); adults have been collected at night from dead hickory (*Carya*, Juglandaceae) (Kirk, 1922); collected from *Carya*, *Quercus*, window trap, sticky trap, and black light (Muona, 2000). SERC specimens were taken head lamping on 27 May 2019 along Connector Trail between Fox Point Road and Java History Trail.

Family Lampyridae

Lucidota atra (Olivier) has been captured in pitfall traps (Levesque & Levesque, 1997); is found in low herbage and trunks of trees in woods (Blatchley, 1910); and in open woodlands (Luk et al., 2011). SERC specimens were taken sweeping vegetation on 30 May 2018 along Java History Trail and 4 June 2018 along Discovery Trail.

Lucidota punctata (LeConte) is found by sweeping low-ground herbage (Blatchley, 1910); and in woodlands near streams (Lloyd, 1990). SERC specimens were taken sweeping vegetation on 9 September 2020 along Contees Wharf Road. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Ontario to North Carolina.

Photuris cinctipennis Barber has been found in moist floodplain forests (Heckscher, 2012). SERC specimens were taken sweeping vegetation on 9 July 2018 in the forest plots of Zone 6 and on 12 July 2019 along Java History Trail. Maryland Biodiversity Project (2020) does not list this species. It was described from specimens from Anne Arundel and St. Mary's Counties, Maryland (Barber, 1951).

Photuris frontalis LeConte has been found in well-drained semi-xeric forests with *Carya pallida* (Ashe) Engelm. & Graebn. (Heckscher, 2012). SERC specimens were taken sweeping vegetation

on 9 July 2018 in the forest plots of Zone 6. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Maryland and Georgia.

Photuris lucicrescens Barber is found in forested floodplains and adjacent upland forest including urban areas (Heckscher, 2012). A single SERC specimen was taken in a Malaise trap in the field opposite Sellman House from 30 May-2 June 2020. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Maryland, District of Columbia, and Virginia.

Photuris pennsylvanicus (DeGeer) larvae are found in subterranean burrows during the day, feeding on soft-bodied insects, earthworms, and snails on the surface at night (Keiper & Solomon, 1972); has been captured in pitfall traps (Levesque & Levesque, 1997); found in high quality freshwater emergent, shrub, and floodplain peatlands (Heckscher, 2012). SERC specimens were taken at black light on 25 July 2019 along Contee Watershed Trail and by sweeping vegetation on 9 July 2018 in the forest plots in Zone 6. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Delaware and Maryland.

Photuris salinus Barber is found in the drier portions of brackish coastal marshes (Heckscher, 2012). SERC specimens were taken in Malaise traps in the field opposite Sellman House on 12-15 June 2020. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Maryland.

Pyractonema dispersa Green has been found in ponds, river inlets, and swampy marsh habitats (Pacheco et al., 2014). SERC specimens were taken sweeping vegetation on 30 April 2019 along Contee Watershed Trail. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Maine to Delaware and District of Columbia.

Pyropyga decipiens (Harris) has been taken in fields and along the margins of streams and ponds, and in Malaise traps (Barrows et al., 2008; Majka, 2012). A single SERC specimen was taken in a Malaise trap in the field opposite Sellman House from 12-15 June 2020. This species is not listed in Maryland Biodiversity Project (2020). Downie & Arnett (1996) reported the species from Maryland.

Family Lycidae

Calopteron discrepans (Newman) has been collected in moist woods on the leaves of trees and shrubs (Dillon & Dillon, 1961). Hall & Branham (2008) reported a large larval aggregation just prior to pupation. SERC specimens were taken by visual survey on 21 May 2019 at Sellman House.

Calopteron reticulatum (Fabricius) larvae are often found in leaf litter or decomposing wood where they feed on snails; adults are often seen on foliage and flowers; there are large larval aggregations just prior to pupation (Miller, 1988). SERC specimens were taken by visual survey on 2 September 2020 at the intersection of Back Road and 11-6.

Punicealis munda (Say) is found in deciduous or mixed forests; adults are found in the spring on tree trunks and understory foliage (Evans, 2014). A single SERC specimen was taken in a Malaise trap in the field opposite Sellman House from 10-13 May 2020.

DISCUSSION

The results of this three year inventory show a rather robust and diverse Elateroidea fauna at SERC. Of the 148 Elateroidea species recorded in Maryland, we collected 45 (30.4%). There are numerous species which may occur and future inventory work will expand the totals. None of the species collected were surprising. Except for the two *Dalopius* species, all had been reported from Maryland and these were described from adjacent states.

The Elateridae genus *Dalopius* is one of the most diverse in North America and needs revision (Johnson, 2002). Our identifications made using the key in Brown (1934) are at the current condition of the taxonomy of the genus.

The global biodiversity crisis represents one of the most critical challenges in the 21st century (Díaz et al., 2019). Achieving conservation goals and prioritizing efforts requires appropriate metrics to quantify biodiversity and identify the factors driving the declines. The most commonly used measure is observed species richness which depends on field surveys to count the individual species (biotic inventories). These inventories seek to answer three basic questions: 1. What species are present? 2. Where is it? 3. How rare and common is each species?

Two of these questions are potentially endless pursuits to which more and more detail could be added. We are looking for only the most basic answers in this project.

Without this information on important components of biological systems, informed and scientific management decisions cannot be made. This project and other biotic inventories throughout the world strive to provide this data. By recording our data, we hope it will be available and useful for subsequent comparison inventories

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