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Notes on Eastern North American Butterflies.

Parts by

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Editor's Note (HP). New natural history elements and distribution records of several eastern North American butterflies are reported. While diversity and distribution of butterflies in the eastern United States are commonly believed to be fully known, the findings presented here show that much is yet to be learned of our butterfly fauna.

Lethe eurydice and *L. appalachia* larvae (Nymphalidae: Satyrinae) eat their shed cuticle (exuvia) soon after molting in Vermont, USA

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ABSTRACT. Larvae of *Lethe eurydice* and *L. appalachia* were observed eating their newly shed cuticle (exuvia). Further studies are needed to examine the extent of this unique dietary habit within the Satyrinae.

Additional key words: *Lethe eurydice*, *Lethe appalachia*, *Lethe anthedon*, larva, instar, molt, cuticle, exuvia.

INTRODUCTION

During previous years of rearing satyrid larvae in Vermont, I noticed some post-molt *Lethe eurydice* larvae ate their shed exoskeleton cuticle (exuvia) prior to consuming their sedge hostplant. Throughout this period, I also reared many *L. appalachia* and *L. anthedon* larvae (Hoag, 2014), but failed to pay close attention to their immediate post-molt activity. Thus, an additional study of this larval behavior was undertaken.

OBSERVATIONS

Lethe (Satyrodes) eurydice: In the summer of 2020 (July-Sept), thirty *Lethe eurydice* larvae were reared ex ova deposited on some *Carex tuckermanii* sedge plants, which had been transplanted from a drying vernal pool into containers on the author's porch. Without exception, soon after a molt each larva turned around 180° and devoured its shed cuticle (**Fig. 1**). Typically a larva consumed its entire cuticle except the head capsule. Thereafter each larva invariably turned around again. One larva upon approaching a newly shed exuvia of another larva started eating the tail. However, this larva soon moved on, leaving most of the cuticle for the previous occupant to eat.



Fig. 1. Series of photos showing a *Lethe eurydice* third instar larva eating its shed cuticle. 5 Aug 2020.

Lethe (Satyrodes) appalachia: In the summer of 2020 (July-Sept), eight larvae, including a first instar, of *Lethe appalachia* were found on *Carex tuckermanii*, *C. lupulina*, and an unidentified *Carex* species. The first instar was identified as *L. appalachia* by its habitat (Shapiro and Cardé, 1970), a woodland vernal pool, and was differentiated from *L. anthedon* by its dark head capsule. The older *appalachia* larvae were differentiated from *anthedon* larvae by head shape and body stripes. All instars had the same unique dietary habit of consuming their post-molt shed cuticle. (**Fig. 2**).



Fig. 2. *Lethe appalachia* fourth instar larva eating its shed cuticle. 8 Sep 2020.

Lethe (Enodia) anthedon: In late summer of 2020 (Aug-Sept), seven larvae of *Lethe anthedon* were found on *Carex tuckermanii*, *C. lupulina*, and an unidentified *Carex* species. Since no exuviae were found on the sedges from prior molts, it is proposed that larvae of this species may also consume their post-molt exuviae.

DISCUSSION

Many insects eat their shed cuticle (exuvia) after molting. It is currently believed exuviae-eating allows the insect to recycle nitrogenous compounds contained within the cuticle, such as chitin and specialized proteins (Mira, 2000). Recycling of nutrients obtained from monocotyledons like sedges, is presumably critical to larval growth and survival. Unlike larvae of many other nymphalid subfamilies, *Lethe* larvae have no toxins or irritating hairs or spines to deter predators (Scott, 1986). Removal of the pale-colored exuviae from sedges may lessen the risk of discovery by a predator. Reports of satyrine larvae eating their shed cuticle (exuvia) are unknown to the author. Further studies are needed to examine how common this unique dietary habit is distributed within the Satyrinae.

POST NOTE

Masters (1971) stated, “The foodplant of *Lethe anthedon borealis* is not known ... The actual foodplant may prove to be *B. erectum* or another grass, but I would not be suprised [sic] to learn that it was a sedge instead, since several species of sedge are common in the *borealis* habitats.”

In 2020, I discovered four late-instar *L. anthedon* larvae on *Carex*, 22-24 May & 2 June, plus five early-instar *anthedon* larvae on *Carex*, September, at a vernal pool. In 2021, I monitored eleven post-diapause *anthedon* larvae on *Carex*, 14-23 May, confirming the acceptance of sedges by this Vermont *anthedon* population as an alternative to grasses as host plant. Late *anthedon* instars turned around to eat their shed exuviae and then turned back to eat sedge, confirming the same unique dietary habit as in *L. eurydice* and *L. appalachia*.

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Virginia state record of *Phyciodes phaon* (W. H. Edwards, 1864) (Nymphalidae: Limenitidinae).

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ABSTRACT: A state record specimen of *Phyciodes phaon*, originally reported by the author in the Virginia Butterfly Bulletin (Pavulaan, 2000), is illustrated for the first time with a view of location collected.

INTRODUCTION

Phyciodes phaon (Phaon Crescent) is a common species of the coastal region of southeastern United States and peninsular Florida. It has been recorded along the North Carolina coast as far north as the Outer Banks (LeGrand & Howard, 2021). The hostplant along the southeast coast is *Phyla nodiflora* (Frogfruit).

OBSERVATIONS

On Little Island City Beach in Virginia Beach, VA, 10 Sep 2000, along a weedy strip between Sandpiper Road and Little Island Beach parking lot (**Fig. 1**), I collected a male *Phyciodes phaon* (**inset**), a state record.



Fig. 1. Habitat in Virginia Beach, VA, where *Phyciodes phaon* (**inset**) was collected, 10 Sep 2000.

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Butterflies of the Potomac River woodlands in Leesburg, Loudoun Co., Virginia: a depauperate fauna?

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ABSTRACT. Butterfly observations made over a 16-year period (2005-2020) in the deciduous woodland habitat along the Potomac River in Leesburg, VA. reveal a depauperate butterfly fauna in a region otherwise known for its rich butterfly diversity. While the forest canopy contains a high diversity of deciduous tree species, and patches of understory shrubs show limited variety, the herb flora of the forest floor is severely lacking due to uncontrolled deer browsing, poor soil conditions and prolonged annual summer droughts. The butterfly fauna is summarized here.

Additional key words: deciduous forest, forest edge, butterfly garden.

INTRODUCTION

Upon establishing my current residence in Leesburg, VA. at the end of 2004, I promptly began familiarizing myself with the park complex behind my property, comprised of Balls Bluff Battlefield Regional Park, Edward's Landing Park and Veterans Park. These three parks form a continuous expanse of forested habitat between the Potomac River and the adjacent residential neighborhood (**Fig. 1**). The parks are traversed by miles of foot trails and are characterized by many hollows in which intermittent and small rocky perennial streams flow into the Potomac River.

The forest type is predominantly deciduous (**Fig. 2**), dominated by several species of *Quercus* (Oaks), *Fraxinus* (Ashes), and *Carya* (Hickories). *Ulmus americana* (American Elm), *Juglans nigra* (Black Walnut), *Acer rubrum* (Red Maple) also occur. *Acer saccharinum* (Silver Maple) and *Platanus occidentalis* (American Sycamore) are present along the Potomac River with most trees achieving great age and considerable heights.

In the forest understory, young *Fagus grandifolia* (American Beech) trees are very common. In upland locations, there are scattered *Celtis occidentalis* (Hackberry), *Lindera benzoin* (Spicebush), *Hamamelis virginiana* (Witch Hazel), *Prunus serotina* (Black Cherry), *Cornus florida* (Flowering Dogwood) (**Fig. 4**) which is resistant to the Dogwood Anthracnose fungal blight, and *Viburnum prunifolium* (Blackhaw) which has noticeably increased its presence over the study period (**Fig. 4**). One small area of understory contains a large stand *Cercis canadensis* (Redbud). *Asimina triloba* (Paw Paw) is abundant in groves in both upland and lowland situations, and grows in thickets of great height along the Potomac River (**Fig. 5**). *Robinia pseudoacacia* (Black Locust) occurs in more recently forested second growth stands and *Elaeagnus angustifolia* (Russian Olive) manages a foothold along forest edge habitats and in sunny open places in the forest. Low-growing species of *Gaylussacia* (Huckleberries) and *Vaccinium* (Blueberries) are frequent atop the cliffs above the Potomac River. Within the forest are large growths of *Symphoricarpos orbiculatus* (Coralberry) and invasive *Rubus phoenicolasius* (Wineberry). In sunny places near the forest edge and along wide pathways, thickets of invasive *Rosa multiflora* (Multiflora Rose) (**Fig. 3**), *Rubus*



Fig. 1. Map study area. Red = Author's residence. Yellow = Residential and commercial development.

fruticosus (Blackberry), and *Lonicera japonica* (Japanese Honeysuckle) climb over everything. A naturalized stand of native *Ptelea trifoliata* (Wafer Ash or Hop Tree) occurs in one small area; saplings have been identified in other parts of the forest especially atop the river cliffs. Similarly, *Juniperus virginiana* (Eastern Red Cedar) occurs as scattered trees throughout the area, but mainly along forest edge habitats. In some places they form small thickets of young shrubs.



Fig. 2. Deciduous forest.



Fig. 3. *Rosa multiflora* thickets dominate forest edges.

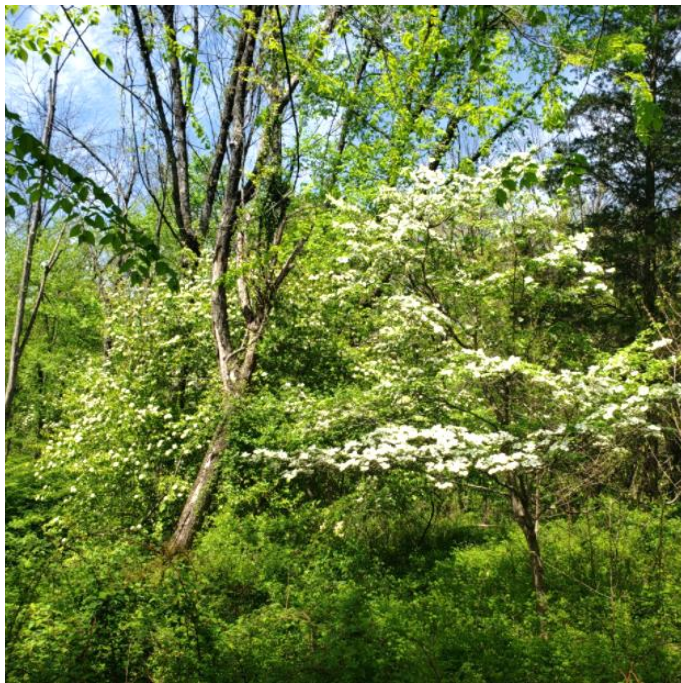


Fig. 4. Upland forest with understory of *Viburnum prunifolium* (host *Celastrina neglecta*) in bloom at left, and *Cornus florida* (host of *C. ladon*) at right.



Fig. 5. *Asimina triloba* along the Potomac River. (Host of *Eurytides marcellus*.)

The forest floor contains a variety of small, white-flowered (and apparently deer-resistant) plants that bloom almost carpet-like in early spring, among them are *Claytonia virginica* (Spring Beauty), *Dentaria diphylla* (Broad-leaved Toothwort) and less commonly *Stellaria pubera* (Star Chickweed). In some areas, non-native invasives *Veronica hederefolia* (Ivyleaf Speedwell) and *Stellaria media* (Common Chickweed), plus native *Galium aparine* (Sticky Willie) join the blooming forest floor in spring. *Viola sororia* (Common Blue Violet) is common throughout, while *Antennaria plantaginifolia* (Pussytoes) grows in small patches within the forest. *Alliaria petiolata* (Garlic Mustard) is starting to dominate many parts of the forest. Late spring and summer are essentially devoid of nectar sources within the forest. In late summer and early fall, various widely-scattered woodland species of *Asteraceae* (Asters) and *Solidago* (Goldenrods) bloom. *Verbesina alternifolia* (Wingstem) is common along the forest edge, as well as *Eupatorium perfoliatum* (Common Boneset). *Urtica dioica* (Stinging Nettle) abounds in dense growths along the shore of the Potomac River and serves as host to *Polygonia comma* and *Vanessa atalanta*. Varieties of unidentified grasses abound throughout, usually in patches or in one large field of harvested unidentified monoculture grass, while invasive *Microstegium vimineum* (Japanese Stiltgrass) has established itself in scattered large patches on forested slopes and low areas near streams.

Included in the observations are those in my residential butterfly garden, which functions as forest-edge habitat immediately bordering the park complex and offers a broad range of nectar sources and host plants. The favorite nectar sources are varieties of *Buddleia* (Butterfly Bush), varieties of *Zinnia* (Annual Zinnias), *Echinacea purpurea* (Purple Coneflower), *Cosmos bipinnatus* (Garden Cosmos), *Symphyotrichum novae-angliae* (New England Aster), *Tithonia rotundifolia* (Mexican Sunflower), *Calendula officinalis* (Garden Marigold), *Verbena bonariensis* (Purpletop Vervain) and *Cirsium japonicum* (Japanese Thistle). Several types of annuals were grown over the observation period, but they were less attractive for butterflies. Productive butterfly hostplants include *Foeniculum vulgare* (Fennel), *Baptisia australis* (Blue False Indigo), *Verbesina alternifolia* (Wingstem), *Helianthus annuus* (Common Sunflower) and *Senna marilandica* (Maryland Senna).

METHODS

Commencing in the winter of 2005, I hiked trails in the park complex for approximately ½ to 2 hours during mid-day whenever the weather was sunny to partly cloudy, with temperatures over 32°F. When the air temperature exceeded 50°F, a net accompanied my hikes. No consistent count was recorded over the period, though general notes were kept. All photos are by the author.

OBSERVATIONS

Sixty-three species of butterflies were observed during the 16-year period of 2005-2020. This is roughly half of the species recorded in the surrounding region. Many species that are common in other woodlands in the region were observed in very low numbers in this area. Only 33 species recorded here are considered interior forest dwellers here. Yet some species such as *Celastrina neglecta* and *Chlosyne nycteis* had dramatic irruptions in some years (**Fig. 8**). Despite a diverse tree canopy and shrub understory, heavy deer browse and prolonged summer droughts resulted in nearly complete lack of herb foliage and nectar sources except in early spring. The forest soil is also very thin, and underlying shale and clay hardened to rocklike consistency in summer. The forest edge habitats provided some ground-level foliage and nectar sources, mainly in spring and late summer. Overall, edge habitats showed more diversity and higher numbers of butterflies than the interior forest; my forest-edge butterfly garden produced the greatest variety of species. Another factor that likely contributed to low butterfly numbers in this particular forest habitat was an astonishingly large number of predatory Assassin Bugs (Reduviidae), especially the Wheel Bug (*Arilus cristatus*).

SPECIES ACCOUNTS

HESPERIIDAE

Urbanus proteus – Non-resident vagrant infrequently observed in my butterfly garden on *Verbena bonariensis* and *Buddleia*. Several were observed over the period of 9/17/2012-10/27/2012, also one each on 8/6/2010, 7/9/2017 and 10/22/2020.

Epargyreus clarus clarus – Mainly a forest edge species. Apparently three broods, though exact brood sequence is unclear. The first brood emerged as early as 3/29 (in 2012), flying until mid-MAY. The second brood emerges in JUL and then increased in abundance throughout the summer until late-AUG. A partial late brood frequently emerged in late-SEP and OCT (10/6/2012 to 10/23/2012; 10/7/2015, 9/27/2016 to 11/11/2016, 10/5/2020). Host is *Robinia pseudoacacia*. Adults are frequent on *Buddleia* flowers in my garden.

Burnsius communis communis – Only observed as infrequent single individuals in a broad open area of Veterans Park and infrequently in my garden. Only the fall brood has been observed in OCT, flying as late as 11/6 (in 2020).

Erynnis icelus – Interior forest dweller, found along trails and streams. One brood: generally late-MAR through APR.

Gesta juvenalis juvenalis – Mainly found along larger forest trails. One brood: generally late-MAR through APR, but emerging as early as 3/13 (in 2012) and flying as late as 5/15 (in 2019).

Gesta baptisiae – Frequent ovipositing females seen in my garden around host *Baptisia australis* and *Lupinus perennis* with only a single male confirmed in woodlands. Multiple broods, seen ovipositing as early as 4/23 (in 2019) and as late as 9/27 (in 2016).

Euphyes vestris metacomet – Surprisingly scarce in the observation area, only observed in 2020. A small irruption occurred from 8/6/2020 to 8/22/2020 with several observed on garden *Buddleia* flowers.

Hylephila phyleus phyleus – Only seen in my garden. Might be considered a seasonal migrant in this area, with adults seen sporadically in late-summer from 8/14 (in 2019) to 10/24 (in 2019). Adults observed nectaring on *Buddleia*, less frequently on *Zinnia*.

Polites themistocles themistocles – Surprisingly scarce in the observation area. Only single individuals were seen on garden *Buddleia* flowers on 8/17/2008, 10/7/2015, 5/23/2019, and 8/22/2020, indicating at least two broods: MAY and AUG-OCT.

Polites peckius peckius – Most common in open areas and forest edge habitat, nectaring primarily on *Rosa multiflora* and *Rubus fruticosus*, also on *Buddleia* in my garden. Three broods evident: MAY, JUL to early-AUG, late-AUG to early-OCT. Earliest observed on 5/7 (in 2019), latest on 10/9 (in 2020). Females observed ovipositing on *Poa pratensis* (Kentucky Bluegrass) in my lawn.

Polites (Wallengrenia) egeremet – Fairly common in the surrounding region but surprisingly scarce within the study area, only recorded once in my garden on *Buddleia* flowers on 8/6/2010.

Polites (Wallengrenia) otho otho – Rare stray to the area. One individual netted on my *Buddleia* shrubs on 8/17/2012 and three on 8/21/2013, during regional irruptions.

Vernia verna – Surprisingly scarce in the study area. Single individuals were observed on garden *Buddleia* flowers on 8/22/2020, 8/29/2018, and 9/12/2019. Three males were observed imbibing moisture from a woodland road on 5/18/2021, indicating at least two broods.

Atalopedes campestris huron – Mainly a resident of open grassy areas and suburban lawns, never seen in woodlands. Three broods: MAY (scarce), JUL, late-AUG through early-OCT, with individuals continuing to emerge in declining numbers until hard freeze. Flying as late as 11/10 (in 2020) and 11/22 (in 2012). Heavy regional irruptions in AUG-SEP 2011, JUL 2017, OCT 2019, and AUG 2020, each time with hundreds swarming in my garden especially on *Buddleia*, and frequently seen along forest edge habitat. Most abundant during excessively hot, dry summers, becoming the most common butterfly by far. Females observed ovipositing on a variety of lawn grasses. Larvae reared on *Poa pratensis* (Kentucky Bluegrass), *Schedonorus arundinaceus* (Tall Fescue) and *Digitaria sanguinalis* (Large Crabgrass). Males of the summer brood are mostly clear yellow on the hindwing beneath (resembling *Anatrytone logan*), while males of the fall brood have a more darkened pattern beneath.

Lon zabulon – Primarily a forest dweller. Males are frequently observed along sunny woodland pathways, and coming to the forest edge and my garden to nectar. Females remain elusive, mostly keeping to the forest floor but occasionally coming to the forest edge to nectar. Two broods: MAY, AUG. Earliest observed on 5/15 (in 2019), latest on 9/5 (in 2018).

Lerodea eufala – Infrequent vagrant. One individual on the roadway in Veterans Park along the forest edge on 8/9/2019.

Lerema accius – Late season vagrant to forest edge habitat and my garden: 9/5/2018, 9/22/2012, 10/23/2012. Two males were observed displaying territorial behavior along a forest edge pathway.

Panoquina ocola ocola – An infrequent vagrant only seen in my garden on *Buddleia* and *Zinnia* flowers. Generally, only seen SEP and OCT, flying as late as 11/6 (in 2020). Ten were counted in my garden during a brief irruption on 10/1/2018, then 20 on 10/11/2018.

Calpodus ethlius – Rare vagrant observed only once in my garden, on *Buddleia*, on 9/6/2018 (Fig. 6). The hosts are various cultivars of *Canna* (Canna Lily) which are frequently grown in neighborhood gardens.

Ancyloxypha numitor – Seen frequently in small open areas in woodlands or forest edge habitat where *Microstegium vimineum* grows thick, though no host association has been observed. Three broods: MAY through early-JUN, JUL, late-AUG to early-SEP.



Fig. 6. *Calpodus ethlius*, 9/6/2018, Leesburg, VA on *Buddleia*.

PAPILIONIDAE

Eurytides marcellus – Common in woodlands, but mostly in spring. Three broods: MAR to mid-MAY, JUN through JUL, mid-AUG to early-SEP. Emerging as early as 3/11 (in 2016). An irruption beginning 4/13/2016 brought hundreds out of the forest into the adjacent residential neighborhood with adults frequently observed flying over streets and lawns. Larvae were found on the host *Asimina triloba* (Fig. 2). An egg was found on 10/12/2020, as some host trees were starting to turn yellow and dropping leaves shortly thereafter. The resultant larva was raised on a supply of refrigerated leaves until pupation in early DEC. While rearing larvae of *marcellus* in May of 2015, I was

astounded to observe several caged larvae tie a folded leaf or two together, forming a loose shelter in which they pipated. The edges of the folded leaves were held together in several places with a silk button. Insect predators would likely not be deterred from entering the shelters, however this structure might shield them from birds.

Battus philenor philenor – Due to the absence of naturally-occurring host *Aristolochia* vines in the study area, this is an infrequent stray into this area. One observed in my garden on 5/17/2021. A very small transplanted *Aristolochia macrophylla* (Pipevine) attracted a female on 9/26/2010, who persisted on finding the vine – unsuccessfully. The females are apparently able to detect the smallest host vines at great distances by sense of smell.

Papilio polyxenes asterius – Generally only observed as larvae or as infrequent adult females ovipositing on *Foeniculum vulgare* (Bronze Fennel) in my garden. Brood sequence is unclear, but adults, eggs and larvae found generally MAY through SEP. Twenty fully-grown larvae found on Fennel on 9/5/2018.

Heraclides cresphontes – Forest dweller. Two broods annually and a partial third most years: MAY, JUL, and a third brood flying in late-AUG to early-SEP. Third brood earliest seen on 8/23 (in 2017), latest seen on 9/20 (in 2019). Larvae were found on *Ptelea trifoliata* in the forest. Several larvae were found on potted *Ruta graveolens* on my front porch (8/10/2010).

Pterourus troilus troilus – Dwells in the forest understory. Two broods: first emerging in mid-APR and flying through MAY, second brood emerging in JUL and flying through AUG. Larvae frequently found on *Lindera benzoin*.

Pterourus glaucus glaucus – Though a forest canopy species, *glaucus* travels into all open habitats in search of nectar sources, most abundantly at forest edge. Three full broods: APR to early-MAY, late-MAY to early-JUL, and mid-JUL to AUG. Scarce in spring but progressively more common through summer. A partial fourth brood in early-SEP. Emerged as early as 3/25 (in 2017) and flew as late as 9/20 (in 2019). Hosts include *Prunus serotina* and *Ptelea trifoliata*.

PIERIDAE

Abaeis nicippe – A frequent visitor to my garden and occasionally seen along wide woodland paths. Found most years, generally JUL through OCT, latest seen on 11/10 (in 2010), indicating at least two very prolonged broods, with those emerging in fall overwintering in the adult stage in this region. However, winter mortality must be high, as it is rarely seen regionally in spring. One winter form “*rosa*” adult was observed in my garden as early as 3/23 (in 2012), and another on 4/26/2021 ovipositing. An active colony of up to 30 adults established itself in my garden for several continuous months during 2019. Larvae were found on a *Senna marilandica* patch at the forest edge throughout late summer, with some larvae feeding as late as 10/31 (in 2010), when the host leaves start yellowing. A curious observation was made over the course of the afternoon of 4/26/2021, when a female was observed searching for *Senna* plants in my forest edge garden, which had just broken through the soil and none over 1 inch tall. She coursed back and forth, peppering the tiny shoots with eggs. How they are able to locate hostplants that have just broken soil, literally miles from the nearest natural patch of *Senna*, is remarkable.

Colias philodice – Infrequently seen in this area. Found in the grass monoculture field in Veterans Park, but one seen along the forest dirt road, and rarely in my garden on *Buddleia* flowers. A female was observed ovipositing on *Trifolium repens* in my lawn. Only the spring and fall broods were recorded in the study area, with individuals observed on 3/30/2012, 4/16/2019, and 11/6/2020.

Colias eurytheme – Lives in open habitats, mainly on lawns in the adjacent neighborhood, rarely seen along the forest dirt road in Veterans Park, and infrequently in my garden. Records span 3/1 (in 2012) through 12/27 (in 2019). Broods overlap, making the species continuously-brooded by summer. Generally scarce but more frequently seen on my *Buddleia* in late summer and fall. Females observed ovipositing on *Trifolium pratense*. The species overwinters here in the larval stage as indicated by an outdoor rearing experiment.

Phoebis sennae eubule – Seasonal migrant, found in almost all situations. Mostly observed in late summer, 8/17 (in 2012) to 11/6 (in 2020), but arriving as early as 4/30 (in 2019), with another observed on 5/16/2020. Larvae found on host *Senna marilandica* in my garden at forest edge.

Phoebis agarithe maxima – Rare vagrant. One observed at close range (<1 meter), nectaring very briefly on *Tithonia rotundifolia* in my garden on 7/30/2020. This sighting was corroborated by four additional potential sightings in this region within days.

Anthocharis midea annickae – Forest dweller. One brood: mid-MAR to mid-APR. Earliest seen on 3/17 (in 2020), latest seen on 4/20 (in 2016). Generally uncommon, but an irruption at Veterans Park on 3/28/2016 produced over 100 observed adults. *Dentaria diphylla* (Broad-leaved Toothwort) is the hostplant.

Pieris rapae rapae – Generally common in all forested and open habitats due to spread of host *Alliaria petiolata* (Garlic Mustard) in all wooded situations. Among the earliest species to emerge from the chrysalis. Records span 3/1 (in 2012) through 12/3 (in 2017), being continuously brooded. Infrequently emerges during warm spells in mid-winter: 2/23/2017 in the adjacent residential neighborhood. Oviposition primarily on *Alliaria petiolata* in the forest, and on *Raphanus sativus* (Radish) in my garden.

LYCAENIDAE

Parrhasius m-album – Two broods have been recorded: APR to mid-MAY and JUN. Mostly observed along wide woodland paths or edge habitat: 4/3/2019, 4/12/2018, 4/14/2018, 4/4/2019, 4/16/2019, 5/15/2019, 6/8/2019, 6/12/2019, and 7/6/2020. The species is usually seen as single individuals, but local irruptions occur in some years, when multiples are seen.

Calycopis cecrops – A woodland species, also found at edge habitat and frequently seen in my garden on *Mentha spicata* (Spearmint) and *Foeniculum vulgare* (Fennel) flowers. Females frequently seen on the forest floor, ovipositing on leaf litter. A female was observed ovipositing on garden mulch beneath my *Buddleia* shrubs. Spring brood (MAY-JUN) is scarce, otherwise recorded in late-summer and fall: AUG-OCT. Earliest observed on 5/10 (in 2021), latest on 10/9 (in 2020). [Despite textbook assertions, this butterfly is not associated with *Rhus* (Sumac species) in this region.]

Strymon melinus humuli – Infrequent visitor to my garden, never seen elsewhere in the study area. A single larva was found feeding on *Viburnum prunifolium* fruits. Single individuals observed on 9/5/2016, 10/7/2015, 8/30/2016, 11/18/2016.

Callophrys (Mitoura) gryneus gryneus – Freshly-emerged third brood individuals in rare late summer emergences on 8/20/2010, 9/3/2011 and 9/5/2018 in association with *Juniperus virginiana* (Eastern Red Cedar) in the forest clearing behind my garden. Oddly none were ever seen during the typical spring and early summer broods.

Callophrys (Incisalia) henrici henrici – Despite presence of its host *Cercis canadensis* (Redbud) in some areas, none were observed in association with this host. Perching males observed on various forest shrubs on 4/3/2007, 4/12/2014, 3/24/2016, 4/10/2019.

Satyrrium calanus falacer – A few individuals were observed over several years, generally in late-JUN to early-JUL: earliest observed on 6/5 (in 2018), latest on 7/5 (in 2013).

Everes comyntas comyntas – Found in an open field and in my lawn. Recorded from 4/20 (in 2014) to 11/10 (in 2010). Broods overlap but peaks in MAY, JUL and SEP. A localized irruption observed on 9/5/2018. Host is *Trifolium repens* on a small hillside field and in my lawn.

Celastrina ladon – An inhabitant of the forest only, usually in vicinity of the host *Cornus florida* (Fig. 4). One brood: APR. This species has become very rare in this area, and usually found only as single individuals every few years. Single specimens confirmed on 4/3/2007, 3/18/2011, 4/12/2014, 3/24/2016, 3/25/2017, 4/16/2019 and 3/30/2021. Several mature larvae were found on *Cornus florida* fruits on 5/10/2013; captive larvae will accept and mature on *Viburnum prunifolium* (flower buds, flowers, fruits).

Celastrina neglecta – An inhabitant of the forest understory and forest edge habitats, straying widely into open habitats during irruptions. The earliest species to emerge from the chrysalis. Spring brood observed as early as 2/7 (in 2017) and infrequently observed in late-FEB in other years, but sometimes first emerging as late as 4/11 (in 2015). Flight peaks usually in late-MAR to early-APR, but flying until 5/10 (in 2013). On 3/9/2017, hundreds of males had emerged at once, only to be completely decimated by three weeks of bitter Arctic cold. Second brood (summer form) recorded from 5/15 (first observed in 2019) to 6/10 (last observed in 2013) with adults abundantly attracted to *Ptelea trifoliata* blossoms along the forest edge. First and second brood can be very common to abundant (thousands observed on 6/10/2013 and throughout MAY 2019). Third brood in late-JUN to JUL is scarce due to no available oviposition substrates during the second brood. Rarely seen in summer until fourth brood in late-AUG to early-SEP. Accidental fall emergences were recorded on 10/18/2007, over several days 10/9-10/22 (in 2017), and on 9/20/2020 and 10/22/2020. Local hostplant identified as *Viburnum prunifolium* (flower buds, flowers, fruits) (Fig. 4) for the spring brood and *Verbesina alternifolia* for the late-summer brood. *Cornus florida*, the host of closely-related *C. ladon*, proved to be toxic to *C. neglecta* larvae in rearing experiments. An aberrant ventrally-patched individual was collected on April 5, 2013 (Fig. 7). [It is important to note that the spring flight of *neglecta* is the predominant “Spring Azure” in northern Virginia.]



Fig. 7. Rare patched aberrant of *Celastrina neglecta* spring form, 4/5/2013, Leesburg, VA.

NYMPHALIDAE

Libytheana carinenta bachmanii – Seasonal migrant observed as early as 2/19 (in 2017) and 3/18 (in 2016), suggesting that this species may actually overwinter in the adult stage some years. Scarce in spring but frequently seen along forest paths from JUN-AUG. Females observed ovipositing on *Celtis occidentalis*.

Danaus plexippus plexippus – Mainly observed in my garden. Adults present JUL-OCT. The fall migration occurs mainly mid-OCT when adults were commonly observed on *Buddleia* and *Tithonia rotundifolia* in my garden. In SEP 2011, several adults were seen forming small-scale roosts of 5-10 individuals, over a 1-week period, on two Norway Maple trees above several

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Buddleia shrubs. On 9/24/2011, adults were observed nectaring in a day-long light/moderate rain, seemingly ignoring the rain, indicating that they are reasonably waterproof.

Dione incarnata nigrior – Very rare vagrant. A single individual observed nectaring on *Zinnia* in my garden on 8/25/2017.

Euptoieta claudia – Commonly observed throughout the year in nearby areas of Leesburg, but rarely seen in the study area. Infrequent adults only observed in my garden late in the season on 10/7/2015, 10/22/2015, 11/21/2017.

Argynnis (Speyeria) cybele cybele – An infrequent visitor to my garden. One brood spans late-JUN through early-SEP. Observations were mainly of females on *Buddleia* flowers.

Limenitis arthemis astyanax – Seen mostly as males along wide woodland paths. Females remain elusive in the forest. Three broods: MAY, JUL-AUG, late-AUG through SEP. Summer broods overlap. Infrequent over the course of the season, but many females come out of the forest to seek nectar in forest edge habitat, feeding abundantly on *Buddleia* in late-AUG through SEP. Latest seen on 10/19 (in 2019). Larvae found on *Prunus serotina* and *Gaylussacia* sp. (Huckleberry).

Asterocampa celtis celtis – Seen mostly as males along wide woodland paths. Generally, two broods: late-MAY through JUL, late-AUG. A partial third brood was observed some years as indicated by adults on *Buddleia* flowers in my garden on 9/21-22 (in 2012) and a fresh female on fermenting fruit on 9/27/2016. Host is *Celtis occidentalis*. One of the few butterflies that often lands on humans.

Asterocampa clyton clyton – Seen mostly as males along wide woodland paths. One brood in JUL. Host is *Celtis occidentalis*. Another one of the few butterflies that often lands on humans.

Nymphalis antiopa lintnerii – Rarely seen except along a woodland pathway on warm winter days in FEB through mid-APR. Earliest overwintering adults seen on 2/24 (in 2017). Latest seen on 4/20 (in 2014). Not seen every year and no individuals were ever observed after April, which indicates that overwintering adults likely came from elsewhere (northern haunts). All adults were observed patrolling the exact same spot along a dirt roadway. Nectaring was observed on *Acer rubrum* flowers in late-winter.

Nymphalis (Polygonia) interrogationis – Frequent in woodlands. Late-summer (overwintering) brood first emerges in mid-AUG, flying until hard freeze (10/22 in 2020), then seeking winter shelter. They are occasionally seen on mild winter days in this region, but generally re-emerging in APR and flying until mid-JUN. Earliest observed on 4/5 (in 2015). Short-lived summer brood flies JUN through JUL, though some years emerging as early as May 21 (in 2019). Interestingly, occasional worn individuals of the summer form are found in early spring, possibly indicative of migratory activity from the south. Host is *Ulmus americana*. One female was observed ovipositing on *Celtis occidentalis*.

Nymphalis (Polygonia) comma – Frequent in woodlands. Two broods. Late-summer (overwintering) brood first emerges in late-AUG, flying until hard freeze, then occasionally seen on warm winter days, such as 12/12/2015, 12/13/2020, 1/19/2021, and many dates from 2/19 to 3/1 in 2017. Adults re-emerge in numbers in MAR and fly until mid-MAY. Short-lived summer brood flies in JUL. There is evidence that a fall migration occurs, usually in OCT, as evidenced by small numbers of individuals flying in a southeast direction in open areas over a span of 2-3 days. However, it is not known from where these migrators originated, possibly in regions further north. Hosts are *Urtica dioica* and a patch of escaped/naturalized *Humulus japonicus* (Japanese Hops) growing along the Potomac River shore.

Vanessa virginiensis – Seasonal migrant. Infrequent visitor to my garden, mainly in late-summer, though seen much earlier in the surrounding region. Earliest observed on 5/25 (in 2019); latest on 10/5 (in 2020), mostly on *Buddleia* blossoms.

Vanessa cardui – Seasonal migrant. A frequent visitor to *Calendula*, *Zinnia* and *Buddleia* blossoms in my garden in late-summer, with adults recorded as late as 10/22 (in 2017). A count of 10 on 10/16/2017 seems to indicate a late emergence or migratory movement. Mostly found at forest edge habitat in my garden, but one observed flying north in woodlands on 11/10/2013. Larvae are frequently found on small, dense patches of *Antennaria* (Pussytoes) in woodland habitat, indicating that adults do frequent woodland habitat.

Vanessa atalanta rubria – Seasonal migrants arrive in APR, flying until SEP when they are most common. A major northward migration was observed throughout APR 2012, with hundreds of adults seen daily in all habitats at all times. Multiple overlapping

broods. Flying as late as 12/15 (in 2015). A very worn individual observed on 2/23/2017 suggests that this species may overwinter as adults some years. Host is *Urtica dioica* along the shore of the Potomac River.

Junonia coenia coenia – Found in all open situations, also along forest edge habitat in my garden. Multiple broods. Frequent from JUL through hard freeze but individuals have been observed in the adjacent neighborhood on 12/3/2018, 12/13/2020, 12/19/2017, and another on 12/28/2019. Most common in fall, but irrupting to huge numbers in SEP 2006, SEP 2010 and SEP 2011, each year swarming in all open areas and even present in the forest itself. No fall migratory movement was ever observed in this area, though localized mass-movements have been observed. On 10/08/2006, a persistent westerly movement of approximately 40-50 individuals was observed through my garden and the adjacent neighborhood for several hours. In my garden, they were especially attracted to *Buddleia* flowers. The only observed larval host was *Plantago lanceolata* (Narrowleaf Plantain) along a dirt pathway. On 9/25/2010, a male was observed to establish a territory on the pavement of my subdivision street, cruising back and forth between two points and landing at each endpoint.

Chlosyne nycteis nycteis – During most years there are two broods, MAY and JUL, some years irrupting in huge numbers (thousands observed in all habitat types and in adjacent neighborhood in mid-JUL 2018 and 2019) (Fig. 8). 1st instar larvae of the second brood have been observed to abandon their communal webs and drop into the forest litter and go into diapause for the winter, but during some seasons a portion of the larvae develop to produce a partial third brood in late-AUG to SEP. Many third brood adults recorded over several years (2010-2019) between 8/20 (in 2019) and last seen 9/15 (in 2012), but exceptionally common on 9/5/2018 and 8/30/2019. Adults preferred nectaring on orange *Zinnia* flowers and *Foeniculum vulgare* in my garden. Hostplants include *Verbesina alternifolia* (which were mass-defoliated in 2019) along forest paths and clearings, and *Helianthus annuus* in my garden.



Fig. 8. *Chlosyne nycteis* irruption, 7/19/2019.

Phyciodes tharos tharos – Three broods: early-MAY, late-JUN, late-AUG to SEP, with continued emergences until hard freeze. Earliest on 5/18 (in 2021); latest on 11/20 (in 2020). Different forms appreciated in spring, summer, and fall.

***Phyciodes* sp. (orange antenna male taxon)** – One individual was netted in my backyard garden on 8/27/2014. The taxon represents a bivoltine population in the *Phyciodes cocyta* group. It is not the univoltine *P. cocyta selenis* that is found to the west in the Appalachian Mountains. Rather, it is intermediate in size and morphology between *P. tharos tharos* and *P. cocyta selenis*. This taxon has been extending its range eastward from the mountains in recent years, now established at several sites. The find in my Leesburg backyard indicates the species is spreading out onto the Piedmont, seeking new sites to colonize.

Lethe (Enodia) anthedon anthedon – Forest dweller, usually found in small, widely-scattered congregations of several individuals. Records indicate three broods: MAY, early-JUL, and AUG to late-SEP. A female was observed ovipositing on invasive Japanese Stiltgrass (*Microstegium vimineum*) in woodlands.

Hermeuptychia sosybius – A single male was collected on 9/9/2015 in Balls Bluff Regional Park.

Megisto viola* (or) *eurytris – Primarily a forest edge species, but also found in immediate adjacent overgrown field habitat or just inside woodland. One brood: MAY to early-JUN. Earliest observed on 5/12 (in 2012), latest on 6/12 (in 2019). Taxonomic status of the early flight of *Megisto* in this region is currently unresolved due to technicalities surrounding its naming and lack of adequate study. To date, no individuals of the summer taxon, *Megisto cymela* have been observed in the study area.

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Limenitis a. arthemis (White Admiral) in coastal southeastern Virginia.

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ABSTRACT. *Limenitis a. arthemis* is reported from coastal southeastern Virginia for the first time.

Additional key words: Kiptopeke, Northampton County, Jamestown, James City County.

INTRODUCTION

Limenitis a. arthemis (White Admiral) resides in boreal and transition zone forests of Canada and northern United States (Cech & Tudor, 2005). It rarely occurs within the range of southern subspecies, *L. a. astyanax* (Red-spotted Purple). Prior to 2019, only eight records of the White Admiral were known from Virginia: Albemarle, Bath, Fluvanna, Frederick, Henrico, Nelson, Rockingham Counties, and Charlottesville City. Clark & Clark (1951), Pl. 6g, illustrate an odd intergrade with white *arthemis* bands on the forewings only.

OBSERVATIONS

On 27 Jul 2019, a White Admiral butterfly was spotted by staff at Kiptopeke SP, Northampton County, VA. The reporting individual was also a seasonal biologist at the Coastal Virginia Wildlife Observatory. No photo was obtained, but the reporting individual was familiar with the species from living in Massachusetts. The following day, the Observatory conducted its annual NABA 4th of July Butterfly Count in the area and searched unsuccessfully for the butterfly. The habitat at Kiptopeke is a *Pinus taeda* (Coastal Plain Loblolly Pine) and *Quercus* sp. (Oak) forest with an understory of *Ilex opaca* (American Holly), *Prunus serotina* (Black Cherry), *Celtis occidentalis* (Hackberry), and *Toxicodendron radicans* (Poison Ivy). *Solidago* sp. (Goldenrods) are the primary nectar sources.



On 6 Aug 2019, the Observatory's Pearly-eye Survey Team found and photographed a White Admiral near Jamestown in James City County, VA. (Fig. 1). This discovery occurred across the Chesapeake Bay approximately 30 miles from the Kiptopeke observation. The Jamestown habitat is similar and consists of a Coastal Plain Loblolly Pine & Oak forest, with an understory of American Holly, *Arundinaria tecta* (Switch Cane) and the invasive *Microstegium vimineum* (Japanese Stiltgrass).

I am not aware of other records of White Admirals in coastal Virginia.

Fig. 1. White Admiral, Jamestown, VA, 6 Aug 2019.

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Three species of the Pearly-eye genus *Enodia* (Hübner, 1819) observed together in Colonial National Historical Park, Virginia

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ABSTRACT. Butterflies of the Pearly-eye group of satyrs (genus *Enodia*) are rarely observed together at the same site at the same time. This report documents an occurrence of *Enodia anthedon*, *E. portlandia* and *E. creola* together at a location near Jamestown, VA.

Editor's Note: *Enodia* is now recognized as a subgenus of *Lethe*.

INTRODUCTION

Three sibling Pearly-eye species of the genus *Enodia* are found on the East coast of the United States: *Enodia anthedon* (Northern Pearly-eye), *E. portlandia* (Southern Pearly-eye), and *E. creola* (Creole Pearly-eye). These woodland satyrs prefer shady interiors of dense forests and tend to remain close to the ground. Wetlands are often present where they are observed. Native cane (*Arundinaria sp.*) is typically present where Southern and Creole Pearly-eyes occur. Northern Pearly-eyes frequent stands of woodland grasses. Adults do not nectar on flowers, instead obtain nutrients from sap, dung, carrion, and decaying organic matter.

OBSERVATIONS

A butterfly survey (15 Aug 2016) conducted in the Neck of Land (NOL) area of Colonial National Historical Park, VA, recorded twelve Northern Pearly-eyes and a single Creole Pearly-eye. This was the first known sighting of a Creole Pearly-eye in James City County. A second butterfly survey conducted one year later in the general area recorded three Northern and two Creole Pearly-eyes. Subsequently a group of volunteers from the Historic Rivers Chapter of Virginia Master Naturalists and the Coastal Virginia Wildlife Observatory submitted a proposal to the National Park Service (NPS) to conduct a citizen science study of Pearly-eye butterflies in the NOL area. The NPS proposal was approved and a two-year study began in April 2018. All three Pearly-eye species were observed and documented. A Southern Pearly-eye was observed on 4 Sep 2018, representing the first known sighting of this species in James City County. A total of three Southern Pearly-eyes were documented during the study (Lorenzen 2020). On three separate occasions, all three Pearly-eye species were observed on the same day: 4 Sept 2018, 18 May 2019, and 10 July 2019. All three species were photographed side-by-side on 18 May 2019, at a sap seep near the base of a Chestnut Oak (*Quercus montana*) (**Fig. 1**).

Observing all three Pearly-eye species together in the same location is a rare event according to Porter (2016). During a speech he presented at the University of Georgia, he reported finding all three Pearly-eye species in the Tallassee Forest in Athens-Clarke County, Georgia and commented: "The presence of three virtually indistinguishable, but genetically distinct species, at the same time and in the same place is almost unheard of outside the tropics." Pyle (2010) described finding all three Pearly-eye species on a farm in southern Illinois, and Cech & Tudor (2005) stated that all three Pearly-eye species can be found together in parts of Arkansas. Using the Regional Species Checklist generator on BAMONA (Lotts & Naberhaus, 2021) and selecting counties within states where the ranges of all three Pearly-eyes overlap, 28 counties in 10 states were identified where sightings of all three species have been reported. However, this is not confirmation that all three species were observed at the same place and at the same time within those counties.



Fig. 1. Three Pearly-eye species at sap seep on Chestnut Oak, near Jamestown, VA, 18 May 2019. Left to Right: *Enodia anthedon*, *E. portlandia*, *E. creola*.

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***Atlides halesus* (Cramer, 1777) (Lycaenidae: Theclinae) and American Mistletoe in northern Virginia.**

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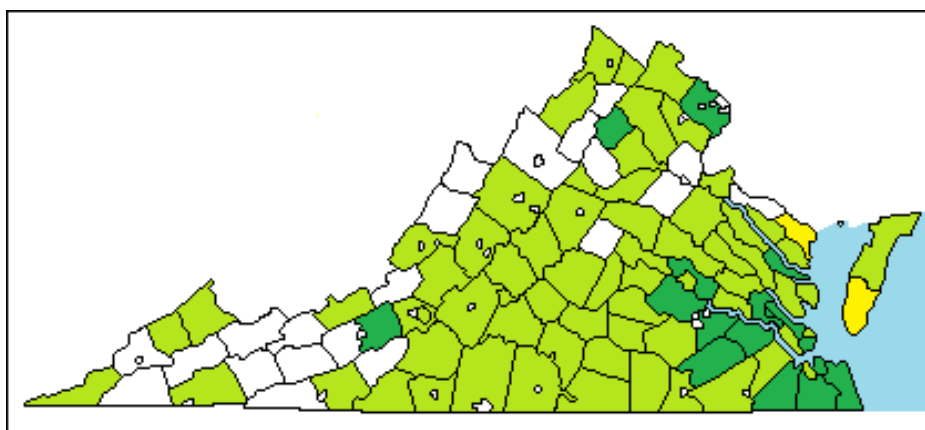
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ABSTRACT. *Atlides halesus halesus* (Great Purple Hairstreak) is documented from three sites in western Fairfax County, VA. The host American Mistletoe (*Phoradendron leucarpum*) is widespread in this area, forming dense infestations on trees which certainly supports a resident population of the butterfly as evidenced by several records over a 13-year span.

INTRODUCTION

Atlides halesus (Great Purple Hairstreak) is a familiar species of the southern United States, ranging north to southern Maryland and Delaware, with historic records as far north as New Jersey (Gochfeld & Burger, 1997) and Long Island, New York (Shapiro, 1974). The butterfly is most common on the southeastern Atlantic Coastal Plain and Gulf Coast region, where the host *Phoradendron leucarpum* Mistletoe) is widespread. Note there are several synonyms of *P. leucarpum* in the literature (USDA, 2021): *P. eatonii*, *P. flavescens*, *P. macrotomum*, *P. serotinum*.] *A. halesus* is most frequently seen as far north as southeastern Virginia, where is it common in the Great Dismal Swamp, and occurs as isolated reports inland to around Richmond City. In the northeastern United States, isolated inland records were reported from Montgomery County, VA. (Wood & Gottschalk, 1942) and Cumberland County, PA. (Monroe & Wright, 2017). The present case study reveals strong evidence for an undocumented resident population in northern Virginia, associated with the widespread presence of the host Mistletoe in western Fairfax County, VA. Mistletoe is found throughout Virginia (**Fig. 1**), which is indicative that additional records could be documented well beyond the current known range of *A. halesus*.



Light green: Records of Mistletoe (*P. leucarpum*).

Dark green: Records of Mistletoe with records of *A. halesus*.

Yellow: Records of *A. halesus* without records of Mistletoe.

Fig. 1. Distribution of *Phoradendron leucarpum* and *Atlides halesus* in VA.

OBSERVATIONS

The senior author has documented Mistletoe in Fairfax County, in northern Virginia since 1995 (**Fig. 2**). Mistletoe was generally found on *Acer rubrum* (Red Maple) (**Fig. 3**), located along forest edges, in tree rows, in isolated trees, and in suburban neighborhoods when leafless trees were identifiable in winter. Mistletoe was rarely found deep within forests. It was also found on *Acer platanoides* (Norway Maple) and has been reported growing on *Quercus* sp. (Oaks) in the county.

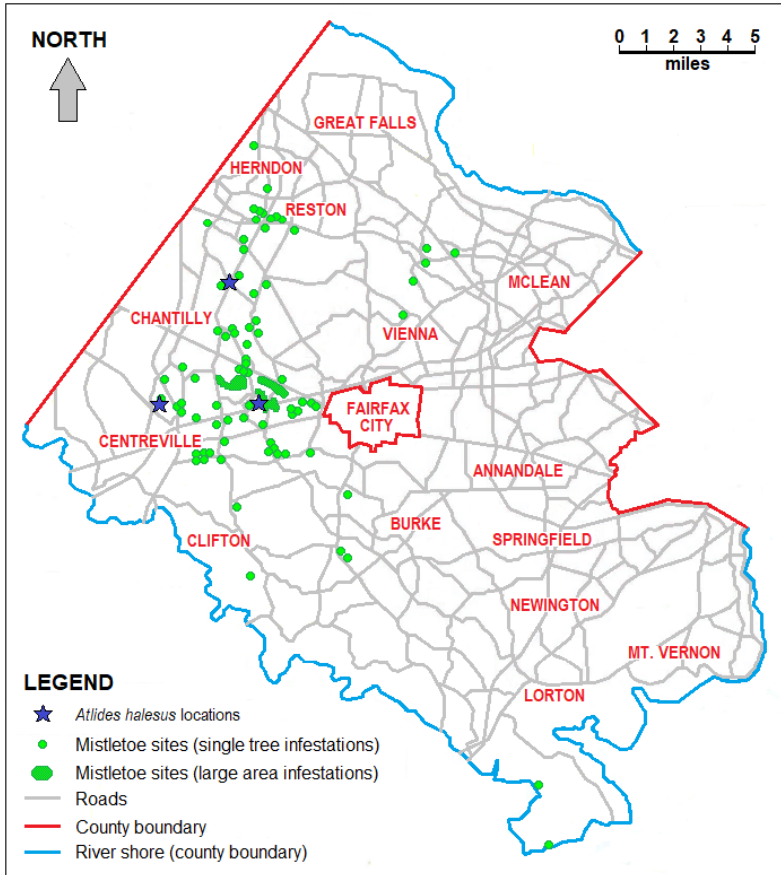


Fig. 2. Distribution of *P. leucarpum* in Fairfax County, VA.



Fig. 3. *P. leucarpum* on *Acer rubrum*, Reston, VA.

The junior author observed and collected several specimens of *halesus* (**Figs. 4 & 5**). All sites were near Mistletoe-infested trees. Dates of capture: 6 Aug 1998 (1 female), Centerville, on *Hylotelephium telephium* (Sedum); 5 Sep 1998 (1 female), Centerville; 15-24 Aug 2004 (2 males, 4 females), Fair Lakes, on *Aralia spinosa* (Hercules Club). Mona Miller observed *A. halesus* individual resting on a *Dipsacus* sp. (Teasel) flowerhead, which had gone to seed, in Herndon on 14 Sep 2010. A tree infested with Mistletoe was nearby.



Fig. 4. *Atlides halesus*, male, 15 Aug 2004, Fair Lakes, VA.

Fig. 5. *Atlides halesus*, female, 6 Aug 1998, Centerville, VA.

DISCUSSION

The present study area lies at the northern periphery of the range of *Atlides halesus* on the outer Piedmont region of Virginia. Observations of the butterfly indicate a resident population in northern Virginia amidst a relatively large regional presence of the host plant *Phoradendron leucarpum*. This suggests the butterfly is likely more widely-distributed in Virginia than currently documented. Other inland areas having a presence of the *P. leucarpum* may yet yield additional records. Though records of the butterfly recorded in the study are from August to September, a resident population should follow the species emergence pattern in neighboring states. Clark & Clark (1951) described three broods in Virginia: “The mistletoe hairstreak first appears at the end of March or early in April; the second brood is on the wing in July; and the third brood flies from the latter part of August until the end of the season late in October.” This was corroborated by LeGrand & Howard (2021) with flight phenograms from three physiographic provinces of the Carolinas, showing three distinct flight peaks in March-April, a weak flight in May-June, and a strong prolonged flight from July through October which may actually consist of two overlapping broods.

In Fairfax County, several of the documented sites of Mistletoe have been converted to commercial development, including the collection site at Fair Lakes. Other individual trees hosting Mistletoes have been lost over time due to a variety of factors. However, there remains a sufficient presence of Mistletoe at the time of this writing (2021) to maintain its survival, along with the butterfly, in a rapidly-developing suburban region. The presence of Mistletoe in this region is dependent on the presence of birds which consume and spread the seeds to new host trees.

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