

# THE MARYLAND ENTOMOLOGIST



Volume 5, Number 1

September 2009

### MARYLAND ENTOMOLOGICAL SOCIETY

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The Maryland Entomological Society (MES) was founded in November 1971, to promote the science of entomology in all its sub-disciplines; to provide a common meeting venue for professional and amateur entomologists residing in Maryland, the District of Columbia, and nearby areas; to issue a periodical and other publications dealing with entomology; and to facilitate the exchange of ideas and information through its meetings and publications.

The MES logo features a drawing of a specimen of *Euphydryas phaëton* (Drury), the Baltimore Checkerspot, with its generic name above and its specific epithet below (both in capital letters), all on a pale green field; all these are within a yellow ring double-bordered by red, bearing the message “\* Maryland Entomological Society \* 1971 \*”. All of this is positioned above the Shield of the State of Maryland. In 1973, the Baltimore Checkerspot was named the official insect of the State of Maryland through the efforts of many MES members.

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The MES is a non-profit, scientific organization. Meetings are held on the third Friday of October, November, February, March, April and May, at 8:00 p.m., in Room 4, of the Biological Sciences Building, University of Maryland Baltimore County (UMBC), or another announced site.

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### Editor's Note

This issue of *The Maryland Entomologist* contains five articles submitted by members of the Maryland Entomological Society. Two of the authors are former residents of Maryland who have returned to the Mid-Atlantic region in print.

**Frank G. Guarnieri** presents his observations of *Cicindela unipunctata* (Coleoptera: Cicindelidae), One-spotted Tiger Beetle, at Pocomoke River State Park, Worcester County, Maryland.

**Ted C. MacRae** describes the three species of *Purpuricenus* longhorned beetles (Coleoptera: Cerambycidae) that occur in Maryland. Ted MacRae is the species author of *P. paraxillaris* MacRae 2000.

**Frank G. Guarnieri** documents twenty years of surveying longhorned beetles (Coleoptera: Cerambycidae) near Paw Paw, Morgan County, West Virginia.

**Daniel J. Schamberger** offers an annotated list of the mosquito species (Diptera: Culicidae) that occur, or have occurred, in Maryland since 1902.

**Timothy Foard** presents his 2008 survey of the ants (Hymenoptera: Formicidae) of Assateague Island National Seashore, Worcester County, Maryland.

I thank the authors for their informative contributions that further our knowledge of the insects of Maryland. I also thank the peer reviewers for their insightful comments which strengthened and enhanced each article.

Eugene J. Scarpulla  
Editor

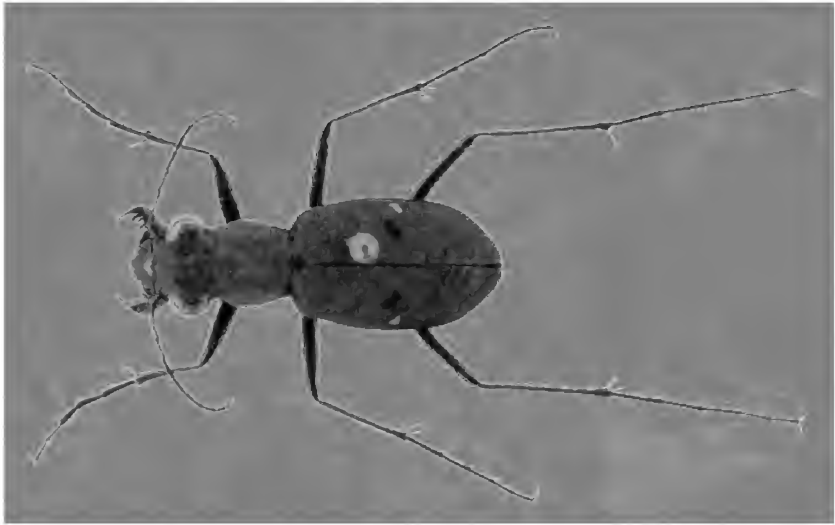
**Observations of *Cicindela unipunctata* Fabricius, 1775  
(One-spotted Tiger Beetle) at Pocomoke River State Park,  
Worcester County, Maryland**

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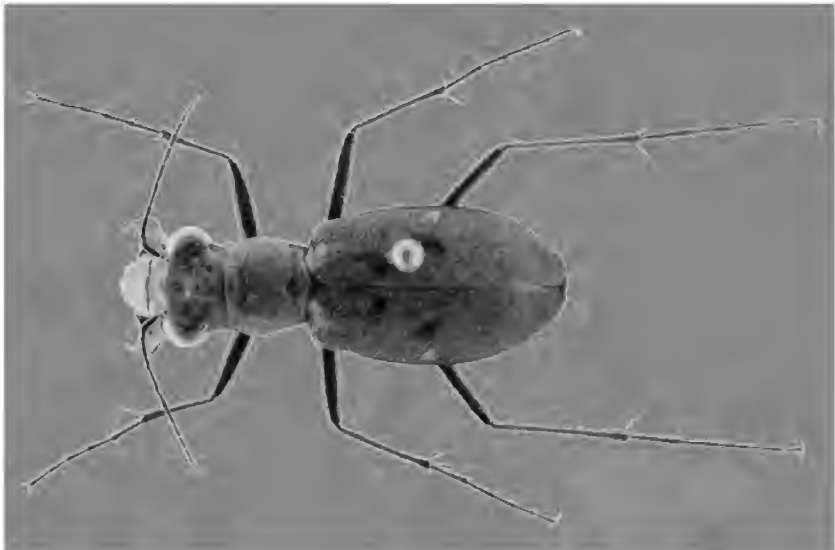
In Maryland, the general habitat and range of *Cicindela unipunctata* Fabricius, 1775 (One-spotted Tiger Beetle) is similar to that of *C. sexguttata* Fabricius, 1775 (Six-spotted Tiger Beetle). *Cicindela sexguttata* is probably the best known and easiest to observe tiger beetle in our area. Both occur throughout Maryland in deciduous and mixed forests in mountain, piedmont, and coastal plain habitats. Yet, unlike the brilliant metallic green *C. sexguttata*, which is abundant and conspicuous as it runs and flies along sunlit paths in late spring and early summer, *C. unipunctata* is olive gray (Figures 1 and 2), rarely flies, and typically stays within the leaf litter. *Cicindela unipunctata*'s avoidance of bright open sunny habitats such as beaches, sand bars, gravel pits, and forest clearings that are typically favored by most other diurnal tiger beetles makes it one of the hardest *Cicindela* species to find in the state.

Because *C. unipunctata* is infrequently encountered, there is controversy as to its status in Maryland. Occasionally large numbers are found in pitfalls traps as described by John D. Glaser in his publication, "The Cicindelidae (Coleoptera) of Maryland" (1984), suggesting that "the scarcity of *C. unipunctata* is more apparent than real." I have come to agree with his assertion based on my own experience with this species around my parents' vacation home near Paw Paw, West Virginia. In more than ten years, I have found only two specimens running along the forest floor. Yet, I would consistently find three or four in the house's basement window wells each year. So, although I agree with the idea that *C. unipunctata* is not as rare as generally thought, I was still amazed by my encounter with these beetles at Pocomoke River State Park in 2006.

In 2006, I was granted a research permit from the Maryland Department of Natural Resources to survey beetles at Tuckahoe and Pocomoke River State Parks. On 27 May 2006, while camping at Pocomoke River State Park, I noticed five individuals of *C. unipunctata* that had been trapped inside a campsite bathroom at Milburn Landing. I assume they had crawled in under the door and were unable to find their way out. They were dead or damaged specimens although still clearly recognizable. Looking more closely in the vicinity, I noticed several squashed beetles along the camp road loops but was encouraged to see a few live ones as well running across the asphalt.



**Figure 1. *Cicindela unipunctata* Fabricius. Male, 16 mm (0.63 in.) length. Milburn Landing, Pocomoke River State Park, Worcester County, Maryland, 27 May 2006.**



**Figure 2. *Cicindela unipunctata* Fabricius. Female, 17 mm (0.67 in.) length. Milburn Landing, Pocomoke River State Park, Worcester County, Maryland, 27 May 2006.**

Going into the nearby woods I was amazed to see literally hundreds of the beetles scurrying along the forest floor. Many mating pairs were observed but I did not see any egg laying or feeding activity. The beetles were so abundant in certain spots that it was difficult to avoid trampling them. Large numbers were also seen in the woods at Shad Landing that same weekend although they were not nearly as common as on the other side of the river. The beetles were present in declining numbers during the next two weekends, then became much harder to find with no specimens observed after 4 July 2006 despite intensive searching.

I have seen similar population surges of related ground beetles in the genus *Calosoma* during gypsy moth caterpillar outbreaks. However, I did not observe any predatory behavior by the *Cicindela unipunctata* so it is hard to speculate what exactly fueled the population surge of this very interesting and seldom observed tiger beetle. It may be that there was an abundant food supply for the larva the year before but I do not know if the larval habitat, behavior, and diet have been well studied. I presume that like other tiger beetle larva, they are ambush predators that attack their prey from deep burrows in the ground.

I suppose it is also possible that the beetles have always been present at Pocomoke but that no one so far has noticed them. Because they are so expertly camouflaged (you really need to get down on your hands and knees and crawl around over the leaf litter to best see these beetles), it would not be hard for even the large numbers that I saw to go unnoticed. In fact, I think that I might have missed them as well if I had just been hiking along the trail rather than specifically searching for them (after being tipped off to their presence by the dead beetles inside the campsite bathroom). It would be interesting to see if similar numbers are present in the coming seasons. It is hoped that my observations might spark further research at other locations around Maryland.

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Choate, P. M. 2003. *A Field Guide and Identification Manual for Florida and Eastern U.S. Tiger Beetles*. University Press of Florida, Gainesville, FL. 224 pp.

## The Species of *Purpuricenus* Dejean (Coleoptera: Cerambycidae) Occurring in Maryland

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**ABSTRACT:** Three species of the genus *Purpuricenus* Dejean (Coleoptera: Cerambycidae) are known to occur in Maryland: *P. axillaris* Haldeman 1847, *P. humeralis* (Fabricius 1798), and *P. paraxillaris* MacRae 2000. Comparisons, color photographs and a key to species are provided to aid in their identification, and comments are made on their distribution, host plants, and seasonal occurrence in Maryland.

### INTRODUCTION

Cerambycid beetles of the genus *Purpuricenus* are among the more attractive members of the family in North America. Their large size and vivid red or orange elytral markings make them favorites among collectors. Three species in the genus are found in the eastern United States: *P. axillaris* Haldeman 1847, *P. humeralis* (Fabricius 1798), and *P. paraxillaris* MacRae 2000. Adults of all three species are strongly attracted to fermenting baits (e.g. Champlain and Knull 1932), the use of which has resulted in the accumulation of large series of specimens from several states. It was this accumulation of material that eventually allowed the recognition of two species among material to which the name *P. axillaris* had previously been assigned (MacRae 2000). Examination of type material was needed in order to clarify which of the two species the existing name should be applied to and which should be described as a new species, named *P. paraxillaris*. All three of the species occurring in eastern North America have been recorded from Maryland, with most of the Maryland records representing specimens collected by John D. Glaser with the use of fermenting bait traps. This paper summarizes the recorded occurrence of *Purpuricenus* species in Maryland and provides comments on their diagnosis, a key to the adults, and color photographs of the adults and key characters of each species to aid in their identification.

## Key to Adults of *Purpuricenus* Species Known to Occur in Maryland (Adapted from MacRae 2000)

1. Posterior margin of basal elytral markings distinctly oblique; apical dark area extending forward along suture and reaching scutellum ..... *P. humeralis* (Fabricius)
- 1'. Posterior margin of basal elytral markings more or less transverse; apical dark area not extending forward along suture to scutellum.....2
- 2 (1'). Discal calluses of pronotum weak, median callus without polished apical line; lateral pronotal tubercles small, angles obtuse; basal elytral punctation relatively finer and sparser; elytral apices subtruncate, angles not distinctly dentate; basal elytral markings yellow to orange..... *P. axillaris* Haldeman
- 2'. Discal calluses of pronotum distinct, median callus prominent and with polished apical line; lateral pronotal tubercles well developed, angles acute; basal punctation of elytra relatively coarser and denser; elytral apices emarginate, angles distinctly dentate; basal elytral markings orange to red-orange. .... *P. paraxillaris* MacRae

### *Purpuricenus humeralis* (Fabricius)

**Diagnosis:** *Purpuricenus humeralis* (Figure 1) may be immediately recognized by the triangular red markings covering the humeral region of the elytra. The markings may extend inwards along the elytral base to reach the scutellum, but they do not surround the scutellum as is the case with *P. axillaris* and *P. paraxillaris*. The basal elytral markings are usually dark red but may be red-orange. The punctation of the pronotum is coarsely, contiguously punctate, much coarser than in *P. axillaris* and *P. paraxillaris*, and that of the basal areas of the elytra is also coarser with the punctures bearing fine, suberect hairs. Adult size is variable, ranging from 11-20 mm (0.43-0.79 in.) in length and averaging around 15-16 mm (0.60-0.63 in.), with females being slightly larger than males.

**Distribution:** The most broadly distributed of the three species, *P. humeralis* has been recorded in the northeastern United States and southeastern Canada west to Manitoba and in the southeastern United States from South Carolina west to Oklahoma (MacRae 2000). I have examined a total of 20 specimens from Maryland collected at Green Ridge State Forest (Allegany Co.), Fort Detrick (Frederick Co.), Mineral Spring (Garrett Co.), Beltsville, Berwyn, and College Park (Prince Georges Co.), and "Ocean Beach" (presumably Ocean City, Worcester Co.).

**Biology:** This species is the most polyphagous of the three, and indeed of all North American *Purpuricenus*. I have examined specimens reared from dead branches of a variety of plants, including maple (*Acer* L.), alder (*Alnus* P. Mill.), hickory (*Carya* Nutt.), redbud (*Cercis* L.), mulberry (*Morus* L.), oak (*Quercus*



L.), and black locust (*Robinia pseudoacacia* L.). In Missouri, I have reared adults from a dead branch of sugar maple (*Acer saccharum* Marsh.) and collected them on dead logs of red maple (*Acer rubrum* L.) and several species of oak and hickory (MacRae 2000). Host plant information is lacking for the Maryland specimens that I have examined, but Lugger (1884) reported rearing the species in Maryland from sugar maple. Although this species has been collected commonly in fermenting bait traps in Missouri and Pennsylvania (MacRae 2000), I have not examined any Maryland specimens collected in such traps. Specimens from Maryland have been collected from mid-May to mid-July.

### ***Purpuricenus axillaris* Haldeman**

**Diagnosis:** *Purpuricenus axillaris* (Figure 2) is immediately distinguished from *P. humeralis* by its transversely-shaped elytral markings, which cover the basal half of the elytra. *Purpuricenus paraxillaris* has similarly shaped basal elytral markings; however, *P. axillaris* is distinguished from that species by its weak discal pronotal calluses, of which the median callus lacks a polished apex. It may be further distinguished by the small and obtusely angled lateral pronotal tubercles, the finer and sparser basal punctation of the elytra, the weakly dentate, obtuse sutural angles of the elytral apices, and its smaller size (average length 3 mm [0.12 in.] less than *P. paraxillaris*). The basal elytral markings vary from yellow to red-orange, but in most specimens they are orange as compared to red-orange for *P. paraxillaris*. Adult size is variable, with specimens from the northeastern United States ranging from 11-17 mm (0.43-0.67 in.) in length and averaging about 14 mm (0.55 in.), with no appreciable difference in size between males and females in the material I have examined.

**Distribution:** *Purpuricenus axillaris* has been recorded from scattered locations across the eastern United States from New York south to Florida and west to Oklahoma (MacRae 2000). I have examined a total of 39 specimens collected in Maryland, nearly all of which were collected during the 1980s and 1990s by John D. Glaser with the use of fermenting bait traps. Most of these were collected at Green Ridge State Forest and Polish Mountain (Allegany Co.), Bear Pond Mountains and Sideling Hill (Washington Co.), and Prettyboy Reservoir (Baltimore Co.). One additional specimen from Glen Echo (Montgomery Co.) has also been examined.

**Biology:** This species is apparently associated with hickory, and all of the reared material I have examined has emerged from dead branches of plants in that genus. Literature references to this species utilizing oak refer to *P. paraxillaris*, which was confused with *P. axillaris* until its description a few years ago (MacRae 2000). According to Craighead (1923) and Blackman and Stage (1924), the larvae are twig girdlers, with habits similar to those of *Anelaphus villosus* (Fabricius). No biological information has been gleaned from the

Maryland material I examined other than an attraction to fermenting bait traps. Dates on Maryland specimens range from mid-June to early-August, but the majority of individuals have been captured from late June to late July.

### ***Purpuricenus paraxillaris* MacRae**

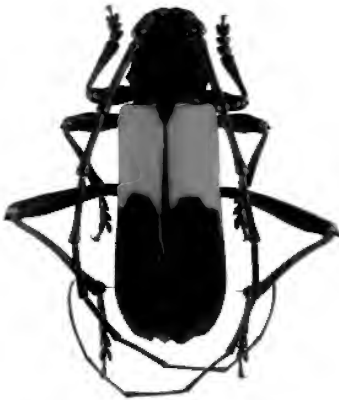
**Diagnosis:** Like *P. axillaris*, *Purpuricenus paraxillaris* (Figure 3) is immediately distinguished from *P. humeralis* by its transversely-shaped elytral markings, which cover the basal half of the elytra. In this regard it resembles *P. axillaris*, from which it differs by its well-developed discal pronotal calluses and polished apical line on the median callus, the distinct, acutely angled lateral pronotal tubercles, the moderately dense basal punctation of the elytra, the distinctly dentate apical angles of the elytral apices, and its robust, larger size (average length 3 mm [0.12 in.] greater than *P. axillaris*). The basal elytral markings are generally red-orange and cover the basal half of the elytra; however, in some specimens they may be orange rather than the more typical red-orange. As in the other species, adult size is variable, with specimens from the northeastern United States ranging from 12-21 mm (0.47-0.83 in.) in length and averaging close to 18 mm (0.71 in.). There was no appreciable difference in size between males and females in the material I have examined.

**Distribution:** *Purpuricenus paraxillaris* is known from scattered localities across the eastern United States from New York south to Florida and west to Oklahoma and Texas (MacRae 2000). A total of 213 specimens have been examined from Maryland, the vast majority of these collected by John D. Glaser during the 1980s and 1990s with the use of fermenting bait traps. Most (n = 187) of the specimens were collected at Green Ridge State Forest and Polish Mountain (Allegany Co.), and additional specimens seen from Rocky Gap State Park and Sideling Hill (Allegany Co.), Prettyboy Reservoir and Sparrows Point (Baltimore Co.), Mt. Etna (Garrett Co.), and Bear Pond Mountains and Sideling Hill (Washington Co.). All of the Maryland specimens I examined were included in the paratype series when this species was described.

**Biology:** This species is apparently associated with oak and the closely related chestnut (*Castanea* P. Mill), as determined by examination of material collected by Josef N. Knull and Harry B. Kirk in Pennsylvania. This species was unrecognized until recently, and it is likely that all literature references to *P. axillaris* on oak actually refer to this species (MacRae 2000). This includes Luger (1884), who reported rearing it from scarlet oak (*Quercus coccinea* Muenchh.) in Maryland. A great majority of specimens for this species have been collected in fermenting bait traps. The largest series comes from Maryland in traps placed in oak/hickory forest (Glaser, personal communication). Dates on Maryland specimens range from mid-June to mid-August, with most specimens collected from early to late July.



**Figure 1.** *Purpuricenus humeralis* (Fabricius). Dorsal habitus, male.



**Figure 2.** *Purpuricenus axillaris* Haldeman. Dorsal habitus, male.



**Figure 3.** *Purpuricenus paraxillaris* MacRae. Dorsal habitus, male

## ACKNOWLEDGEMENTS

I wish to thank Eugene J. Scarpulla (Millers Island, MD), Editor of *The Maryland Entomologist*, for inviting me to write this article. My appreciation also goes to John D. Glaser (Baltimore, MD) for making his extensive collection of Maryland *Purpuricen* available to me when I was revising this genus. Additional Maryland material was loaned to me by the following individuals: Robert A. Androw (Pittsburg, PA), Larry G. Bezark (Sacramento, CA), Joseph A. Green (Lima, OH), Daniel J. Heffern (Houston, TX), and the late Gayle H. Nelson; and institutions: American Museum of Natural History (New York, NY), Florida State Collection of Arthropods (Gainesville, FL), Illinois Natural History Survey (Champaign, IL), Mississippi State University (Mississippi State, MS), Rutgers, the State University of New Jersey (New Brunswick, NJ), University of Michigan Museum of Zoology (Ann Arbor, MI), and University of Minnesota (St. Paul, MN).

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## A Survey of Longhorned Beetles (Coleoptera: Cerambycidae) From Paw Paw, Morgan County, West Virginia

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**ABSTRACT:** For nearly twenty years I have been collecting, with intermittent intensity, longhorned beetles (Coleoptera: Cerambycidae) from a single location near the Potomac River in Morgan County, West Virginia. This paper documents every longhorned beetle that I have collected from the site from 1988 through 2007. The collection is presented in the form of an annotated checklist of 100 species. This information could be potentially useful for assessing the biodiversity of this ecologically and economically important family of beetles in the nearby Green Ridge State Forest in Allegany County, Maryland.

### STUDY SITE

The study site is a 2.4-hectare (6-acre) property located 7 kilometers (4.3 miles) east of Paw Paw, West Virginia (39° 31.30' north, 78° 21.74' west). Anyone familiar with Maryland's Green Ridge State Forest would immediately recognize the ecological and geographical similarities between Green Ridge and the study area, which are separated by only 10 kilometers (6.2 miles). The collecting site consists of dry and shaley uplands that are intersected by steep and slightly more humid ravines.

Common upland trees include *Quercus alba* L. (white oak), *Q. prinus* L. (chestnut oak), *Q. rubra* L. (northern red oak), *Q. coccinea* Muenchh. (scarlet oak), and *Carya glabra* (Mill.) Sweet (pignut hickory). Common lowland trees include *Quercus alba*, *Liriodendron tulipifera* L. (tuliptree), *Acer rubrum* L. (red maple), *A. saccharum* Marsh. (sugar maple), *Carya ovata* (Mill.) K. Koch (shagbark hickory), *Fraxinus pennsylvanica* Marsh. (green ash), *Betula lenta* L. (sweet birch), *Tilia americana* L. (American basswood), and *Juglans nigra* L. (black walnut). *Pinus strobus* L. (eastern white pine), *P. pungens* Lamb. (table mountain pine), and *P. virginiana* Mill. (Virginia pine) occur sporadically on the property, although *P. virginiana* occasionally forms small pure stands in both upland and lowland sites in the vicinity of the study area. Common understory trees include *Cornus florida* L. (flowering dogwood), *Amelanchier arborea* (Michx. f.) Fern. (common serviceberry), *Ostrya virginiana* (Mill.) K. Koch (hophornbeam), *Carpinus caroliniana* Walt. (American hornbeam), and *Hamamelis virginiana* L. (American witchhazel).

## MATERIALS AND METHODS

Specimens listed in the checklist are accompanied by a brief description of the collecting method. Most specimens were hand picked or swept from individual host plants or taken “at UV light” or “at light.” Specimens collected at “UV light” were hand picked from a white sheet illuminated by three 15-watt fluorescent black light tubes (BioQuip #2807A) and a 100-watt incandescent spotlight. Specimens collected at “light” were found around porch lights or on windowpanes at night. This article contains several references to specimens being attracted to “fermenting molasses”. This bait was prepared by mixing 946.1 milliliters (32 ounces) of molasses with an equal volume of tap water and a 7.1-gram (0.25-ounce) packet of activated bread yeast together in an 18.9-liter (5-gallon) bucket. After placement in a warm sunny spot, the fermenting molasses began attracting various insects within a few hours and continued to do so for several days. No other specialized collecting techniques were used.

Specimens were identified using the *Field Guide to Northeastern Longhorned Beetles (Coleoptera: Cerambycidae)* (Yanega 1996). Nomenclature was adjusted to follow the “Checklist of the Cerambycidae, or Longhorned Beetles (Coleoptera) of the Western Hemisphere” (Monné et al. 2007). More difficult determinations were confirmed by examining labeled specimens in the insect collections of the University of Maryland in College Park, Maryland and the National Museum of Natural History in Washington, District of Columbia.

## RESULTS AND DISCUSSION

One hundred species of longhorned beetles were collected in the study area. With the exception of *Tetropium schwarzianum* Casey (Figure 1), all specimens listed below were included in a previous checklist of Maryland Cerambycidae (Staines 1987) or in the addenda to that checklist (Glaser 1992). This study compliments those prior works by providing additional substantiating records for a number of uncommon species. Furthermore, collecting records for *Gairotes thoracica* (Haldeman) (Figure 2) are given. This species was included by Staines (1987) based on historical references in the literature although no actual specimens from Maryland were reported.

Each entry in the following list represents a single specimen in my collection. If more than one beetle of the same species was collected at the same time, the number of duplicate specimens is indicated in parentheses. Only a small percentage of the observed beetles were collected and the sampling methods were variable. Since the choice of which specimens to collect was somewhat arbitrary, the number of entries per species should not be considered a representation of relative abundance. Common names, if provided, follow Yanega (1996).



**Figure 1.** *Tetropium schwarzianum* Casey. 14 mm (0.55 in.) length. Paw Paw, Morgan County, West Virginia, 12 June 1988.



**Figure 2.** *Gaurotes thoracica* (Haldeman). 12 mm (0.47 in.) length. Paw Paw, Morgan County, West Virginia, 5 May 2000.

**ANNOTATED CHECKLIST OF FAMILY CERAMBYCIDAE  
COLLECTED FROM THE STUDY SITE**

**Subfamily Disteniinae**

*Elytrimitatrix undata* (Fabricius). 5 August 1988: light; 4 July 1999: light; 24 July 2007: UV light.

**Subfamily Parandrinae**

*Neandra brunnea* (Fabricius). Pole Borer. 25 July 1999: UV light; 25 July 1999: rotten landscape timber at night.

**Subfamily Prioninae**

*Orthosoma brunneum* (Forster). Brown Prionid. 16 July 1988: UV light (2).

*Prionus laticollis* (Drury). Broad-necked Root Borer. 9 July 1988: UV light; 6 July 1991: crawling on ground in woods at night; 16 July 1988: female laying eggs at base of *Quercus prinus* (chestnut oak); 8 July 2006: rotten *Quercus* sp. (oak) logs at night.

**Subfamily Lepturinae**

*Analeptura lineola* (Say). 26 June 1999: UV light.

*Anoplodera pubera* (Say). 22 May 1989: *Viburnum* sp. (viburnum) flowers.

*Bellamira scalaris* (Say). 5 July 2000: fermenting molasses; 23 June 2000: under bark of rotten *Acer saccharum* (sugar maple); 19 June 2005: collected indoors.

*Brachyleptura circumdata* (Olivier). 4 July 2000: flying through wooded ravine.

*Brachyleptura rubrica* (Say). 5 July 2003: spider web under eave of house.

*Brachysomida bivittata* (Say). 22 May 1989: *Viburnum* sp. (viburnum) flowers.

*Centrodera sublineata* LeConte. 6 May 2000: UV light; 4 May 2001: UV light.

*Desmocerus palliatus* (Forster). Elderberry Borer. 6 July 1991: *Sambucus* sp. (elderberry) leaves (2); 23 June 2000: *Sambucus* sp. leaves (2).



- Encyclops caerulea* (Say). Oak Bark Scaler. 21 May 1989: *Hydrangea arborescens* L. (wild hydrangea) flowers.
- Gaurotes cyanipennis* (Say). 12 June 1988: *Quercus* sp. (oak) log.
- Gaurotes thoracica* (Haldeman). 6 May 2000: UV light (3).
- Grammoptera exigua* (Newman). 4 July 2000: flying through wooded ravine.
- Judolia cordifera* (Olivier). 16 July 1999: *Apocynum* sp. (dogbane) flowers.
- Leptorhabdium pictum* (Haldeman). 25 May 1989: UV light; 11 May 2001: UV light.
- Leptura subhamata* Randall. 2 July 1989: swept from understory foliage.
- Metacmaeops vittata* (Swederus). 5 July 2000: on ground in wooded ravine.
- Necydalis mellita* (Say). 9 July 1989: on trunk of dead *Carya glabra* (pignut hickory).
- Neolosterna capitata* (Newman). 1 June 1999: UV light; 6 May 2000: UV light.
- Rhagium inquisitor* (Linnaeus). Ribbed Pine Borer. 22 May 1989: telephone pole (2).
- Stenelytrana emarginata* Fabricius. 6 July 1991: rotten *Quercus alba* (white oak) log; 23 July 1989: flying through open woods; 4 July 2000: fermenting molasses (2). (Figure 3)
- Stenocorus cinnamopterus* (Randall). 29 May 1989: UV light; 1 June 1999: UV light; 16 May 2000: UV light.
- Stenocorus cylindricollis* (Say). 9 July 1988: on trunk of rotten standing *Quercus alba* (white oak).
- Strangalia acuminata* (Olivier). 22 May 1989: *Viburnum* sp. (viburnum) flowers.
- Strangalia bicolor* (Swederus). 2 July 1988: *Hydrangea arborescens* (wild hydrangea) flowers; 19 June 2005: *Acer saccharum* (sugar maple) leaves.
- Strangalia famelica* Newman. 2 July 1988: *Verbascum* sp. (mullein) flowers (2).

*Strophiona nitens* (Forster). Chestnut Bark Borer. 9 July 1988: UV light; July 2 1989: crawling on *Quercus* sp. (oak) log.

*Trigonarthris proxima* (Say). 22 May 1989: *Viburnum* sp. (viburnum) flowers.

*Typocerus lugubris* (Say). 16 July 1999: UV light.

*Typocerus v. velutinus* (Olivier). 2 July 1988: *Verbascum* sp. (mullein) flowers.

*Xestoleptura octonotata* (Say). 22 May 1989: *Viburnum* sp. (viburnum) flowers (2).

### Subfamily Aseminae

*Asemum striatum* (Linnaeus). 21 May 1989: freshly cut *Pinus strobus* (eastern white pine) trunk; 4 May 2001: UV light.

*Tetropium schwarzianum* Casey. 12 June 1988: freshly cut *Pinus strobus* (eastern white pine) stump.

### Subfamily Cerambycinae

*Aneflomorpha subpubescens* (LeConte). Oak Stem Borer. 9 July 1989: UV light; 4 July 1999: UV light.

*Anelaphus parallelus* (Newman). Oak Twig Pruner. 1 June 1999: UV light; 4 May 2001: UV light (7).

*Anelaphus villosus* (Fabricius). Twig Pruner. 9 July 1988: UV light; 5 July 2003: UV light.

*Cyrtophorus verrucosus* (Olivier). 12 June 1988: *Quercus* sp. (oak) logs; 6 May 2000: UV light.

*Eburia quadrigeminata* (Say). Ivory-marked Beetle. 5 August 1988: UV light (2); 22 July 1989: UV light. (Figure 4)

*Elaphidion mucronatum* (Say). Spined Bark Borer. 23 June 2000: UV light.

*Enaphalodes atomarius* (Drury). 9 July 1988: UV light; 16 July 1999: UV light.

*Enaphalodes cortiphagus* (Craighead). Oak-bark Scarrer. 5 August 1988: UV light; 25 July 1999: UV light.

*Enaphalodes rufulus* (Haldeman). Red Oak Borer. 16 July 1988: UV light; 6 July 1991: UV light; 16 July 1999: UV light (2).

*Euderces picipes* (Fabricius). 2 July 1988: flying over woodpile; 26 June 1999: flying along wood margin in bright sunlight.

*Hesperophanes pubescens* (Haldeman). 5 August 1989: UV light; 4 July 1989: UV light.

*Heterachthes quadrimaculatus* Haldeman. 5 August 1989: UV light; 5 July 2003: UV light (2).

*Knulliana c. cincta* (Drury). Banded Hickory Borer. 6 May 2000: UV light (2).

*Megacyllene robiniae* (Forster). Locust Borer. 26 August 2000: *Solidago* sp. (goldenrod) flowers.

*Micranoplum unicolor* (Haldeman). 23 June 2000: UV light; 4 May 2001: UV light.

*Molorchus b. bimaculatus* Say. 22 May 1989: *Viburnum* sp. (viburnum) flowers (3); 4 May 2001: flying along wood margin in bright sunlight.

*Neoclytus a. acuminatus* (Fabricius). Red-headed Ash Borer. 16 May 2000: newly fallen *Acer rubrum* (red maple) tree (2).

*Neoclytus m. mucronatus* (Fabricius). 2 July 1988: *Pinus* sp. (pine) log; 25 July 1999: newly fallen *Carya glabra* (pignut hickory) tree in bright sunlight (2); 25 July 1999: UV light.

*Neoclytus scutellaris* (Olivier). 29 July 1988: UV light.

*Obrium rufulum* Gahan. 5 July 2003: UV light.

*Phymatodes aereus* (Newman). 25 May 1989: no data; 4 May 2001: UV light (2); 2 May 2006: UV light.

*Phymatodes testaceus* (Linnaeus). Tanbark Borer. 30 May 1988: *Quercus* sp. (oak) logs; 6 May 2000: UV light; 4 May 2001: UV light.

*Phymatodes varius* (Fabricius). 17 June 1989: *Quercus* sp. (oak) logs (2).

*Physocnemum violaceipenne* Hamilton. 17 June 1989: flying over mixed wood pile.

*Psyrassa unicolor* (Randall). Branch Pruner. 13 August 1988: UV light.

*Purpuricenus humeralis* (Fabricius). 9 June 1991: flying along wood margin in bright sunlight.

*Purpuricenus paraxillaris* MacRae. 16 July 1999: fermenting molasses (3); July 25 1999: fermenting molasses; 5 July 2000: fermenting molasses (2); 10 July 2006: fermenting molasses. (Figure 5)

*Sarosesthes fulminans* (Fabricius). 30 May 1988: *Quercus* sp. (oak) logs.

*Smodicum cucujiforme* (Say). Flat Powder-post Beetle. 4 July 1999: UV light; 24 June 2000: UV light.

*Stenosphenus notatus* (Olivier). 6 May 2000: newly fallen *Carya glabra* (pignut hickory) tree in bright sunlight (5).

*Xylotrechus colonus* (Fabricius). Rustic Borer. 5 July 2000: on ground in wooded ravine.

*Xylotrechus s. sagittatus* (Germar). 9 July 1988: UV light.

### Subfamily Lamiinae

*Acanthocinus obsoletus* (Olivier). 2 July 2000: mating on trunk of newly fallen *Pinus virginiana* (Virginia pine) at night (2); 31 May 2006: UV light; 8 July 2006: light.

*Acanthoderes quadrigibba* (Say). 13 August 1988: crawling through leaf litter on ground in woods; 9 July 1989: on trunk of dead *Quercus alba* (white oak); 16 July 1999: UV light; 2 July 2000: mating and ovipositing on trunk of dead *Tilia americana* (American basswood) (3 pairs observed but did not collect).

*Aegomorphus modestus* (Gyllenhal). 5 August 1988: light; 9 July 1988: UV light; 15 August 1996: crawling on outside of cabin; 5 July 2003: UV light.

*Astyleiopus variegatus* (Haldeman). 24 June 2000: UV light.

*Astylopsis macula* (Say). 24 June 2000: UV light; 26 August 2000: UV light.

*Astylopsis sexguttata* (Say). 9 July 1988: light; 23 June 2000: freshly cut *Pinus virginiana* (Virginia pine) logs.

*Dorcaschema cinereum* (Olivier). 2 July 1989: light; 9 July 1999: UV light.

- Dorcaschema nigrum* (Say). 2 July 1989: *Quercus* sp. (oak) log at night.
- Ecyrus d. dasycerus* (Say). 26 June 1999: UV light; 5 July 2003: UV light.
- Goes debilis* LeConte. Oak Branch Borer. 22 June 1999: UV light.
- Goes pulcher* (Haldeman). Living-hickory Borer. 24 July 2007: UV light.
- Goes pulverulentus* (Haldeman). Living-beech Borer. 16 July 1988: UV light; 16 July 1999: light; 16 July 2004: UV light.
- Goes tigrinus* (DeGeer). White Oak Borer. 5 August 1988: light; 6 July 1991: UV light; 25 July 1999: UV light; 4 July 2000: UV light.
- Graphisurus fasciatus* (DeGreer). 18 June 1988: *Quercus* sp. (oak) logs at night; 2 July 2000: dead *Tilia americana* (American basswood); 1 August 2000: UV light; 5 July 2003: UV light.
- Leptostylus transversus* (Gyllenhal). 16 July 1999: UV light; 8 March 2000: UV light (3); 1 September 2005: on trunk of living *Carya glabra* (pignut hickory) tree.
- Lepturges confluens* (Haldeman). 4 July 1999: UV light; 24 June 2000: UV light (2); 26 August 2000: UV light.
- Monochamus carolinensis* (Olivier). 2 July 1989: newly fallen *Pinus virginiana* (Virginia pine) (2); 25 July 1999: UV light; 8 June 2000: newly fallen *P. virginiana* (2); 20 July 2000: UV light.
- Monochamus notatus* (Drury). Northeastern Sawyer. 13 August 1988: UV light (2); 23 July 1989: newly fallen *Pinus strobus* (eastern white pine) (2); 2 July 2000: UV light; 9 August 2000: UV light (3); 8 July 2006: UV light.
- Monochamus s. scutellatus* (Say). White-spotted Sawyer. 16 May 2000: newly fallen *Pinus virginiana* (Virginia pine) (4); 8 June 2000: UV light; 2 July 2000: fresh cut *P. virginiana* logs.
- Monochamus titillator* (Fabricius). Southern Pine Sawyer. 23 June 2000: newly fallen *Pinus virginiana* (Virginia pine) at night (2); 2 July 2000: freshly cut *P. virginiana* at night.
- Oberea myops* Haldeman. Rhododendron Stem Borer. 12 June 1988: *Carya* sp. (hickory) leaves.

*Oberea perspicillata* Haldeman. Raspberry Cane Borer. 9 July 1988: swept at wood margin.

*Oberea praelonga* Casey. 19 May 1989: swept at wood margin (2).

*Oncideres c. cingulata* (Say). Twig Girdler. 26 August 2000: UV light (4); 23 September 2000: light.

*Psenocerus supernotatus* (Say). Currant-tip Borer. 6 May 2000: UV light.

*Saperda candida* Fabricius. Round-headed Apple Tree Borer. 17 June 1989: light; 22 July 1989: UV light; 25 July 1999: UV light; 8 July 2006: UV light. (Figure 6)

*Saperda discoidea* Fabricius. Hickory Saperda. 25 May 1991: UV light (2); 15 July 2003: UV light.

*Saperda imitans* Felt and Joutel. 9 July 1988: UV light; 24 June 2000: UV light.

*Saperda lateralis* Fabricius. Red-edged Saperda. 9 July 1988: light.

*Saperda vestita* Say. Linden Borer. 5 August 1989: UV light.

*Sternidius alpha* (Say). 5 July 2000: UV light.

*Tetraopes tetrophthalmus* (Forster). Red Milkweed Beetle. 12 June 1988: *Asclepias* sp. (milkweed).



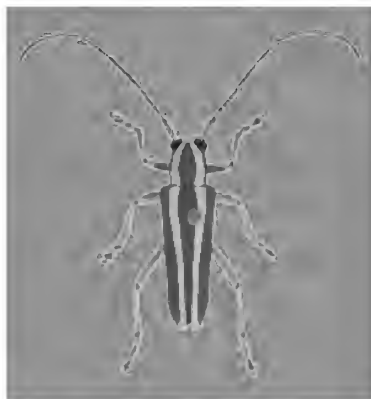
**Figure 3. *Stenelytrana emarginata* Fabricius. 32 mm (1.26 in.) length. Paw Paw, Morgan County, West Virginia, 6 July 1991.**



**Figure 4. *Eburia quadrigeminata* (Say). 23 mm (0.91 in.) length. Paw Paw, Morgan County, West Virginia, 5 August 1988.**



**Figure 5. *Purpuricenus paraxillaris* MacRae. Male, 20 mm (0.79 in.) length. Paw Paw, Morgan County, West Virginia, 5 July 2000.**



**Figure 6. *Saperda candida* Fabricius. 17mm (0.67 in.) length. Paw Paw, Morgan County, West Virginia, 25 July 1999.**

### ACKNOWLEDGMENTS

I would like to thank my parents, Susan and Michael Guarnieri, who are the owners of the study site. Dr. Charles Mitter and Dr. Steven W. Lingafelter were generous in giving me access to the collections at the University of Maryland and the National Museum of Natural History respectively. Dr. Lingafelter helped me with several determinations among the Tribe Elaphidiini, particularly in distinguishing between *Enaphalodes cortiphagus* and *E. atomarius* and also between *Anelaphus villosus* and *A. parallelus*. Dr. James K. Liebherr of Cornell University confirmed the identification of *Gaurotus thoracica*. Ted C. MacRae of Monsanto Company, Chesterfield, Missouri, identified *Purpuricenus paraxillaris*. Philip Kean, Robert Gardner, Susan Holmes, and Lucy Guarnieri were tireless collecting partners on numerous late night blacklighting excursions.

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## An Annotated List of the Mosquito Species (Diptera: Culicidae) Of Maryland

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**ABSTRACT:** Records at the Maryland Department of Agriculture document 60 species of mosquitoes (Diptera: Culicidae) that occur, or have occurred, in Maryland since 1902. The annotated list presented here provides information on the habitat, time of year, daily flight period, status, Maryland distribution, and Maryland abundance for each species. Additional information is provided for the six Maryland species that have been added to the list compiled by William E. Bickley (1971).

### INTRODUCTION

To date, there are 60 species of mosquitoes known to occur, or to have occurred, in Maryland. This list has been compiled from collections made throughout Maryland for over a century. The records used for this current list date back to the summer of 1902 and continue through the summer of 2000 when the latest species, *Ochlerotatus japonicus japonicus* (Theobald), was added (Sardelis and Turell 2001). This list also includes the European species *Culiseta annulata* (Schrank) (Faran and Bailey 1980).

The information associated with each species describes the typical habitat, flight/activity period, status, Maryland distribution and Maryland abundance of the adult mosquito. Since mosquito populations are markedly affected by general weather patterns, local climatic conditions and population dynamics may cause some species to occupy different habitats and delay or extend their presence in relationship to the time of year activity. Overall abundance was assessed based on the likelihood of collecting that species during its historical peak time of year activity period.

The mosquito systematics in this article are based on *Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico* (Darsie and Ward 2005). Habitat and bionomic characteristics of many species were referenced from *Mosquitoes of North America (North of Mexico)* (Carpenter and LaCasse 1955) and "An Annotated List of the Mosquitoes of Maryland" (Bickley et al. 1971). Synonym and variant information for anopheline species was based on *Handbook of the Mosquitoes of the Southeastern United States* (King et al. 1960). Additional species information was found in "Notes on the Distribution of Mosquitoes in Maryland and Virginia" (Bickley 1957).

**SUMMARY OF FAMILY CULICIDAE****Genus *Anopheles* Meigen****Subgenus *Anopheles* Meigan***Anopheles atropos* Dyar & Knab

Habitat: coastal salt marshes

Time of Year: late spring through fall

Flight Period: day, night

Status: non-pest

Maryland Distribution: southern, eastern

Maryland Abundance: uncommon

*Anopheles barberi* Coquillett

Habitat: woodlands

Time of Year: late spring, summer

Flight Period: daytime in shade, night

Status: non-pest

Maryland Distribution: statewide

Maryland Abundance: uncommon

*Anopheles bradleyi* King

Habitat: coastal marshes

Time Period: late spring through fall

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: central, southern, eastern

Maryland Abundance: abundant

*Anopheles crucians* Wiedemann

Habitat: coastal marshes

Time of Year: late spring through fall

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: central, southern, eastern

Maryland Abundance: abundant

*Anopheles punctipennis* (Say)

Habitat: woodlands, fields, yards

Time of Year: late spring through fall

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: statewide

Maryland Abundance: common

*Anopheles quadrimaculatus* Say

Habitat: woodlands, fields, yards  
Time of Year: late spring through fall  
Flight Period: night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: common

*Anopheles walkeri* Theobald

Habitat: freshwater marshes, swamps  
Time of Year: late spring through fall  
Flight Period: night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

**Genus *Aedes* Meigen****Subgenus *Aedes* Meigen***Aedes cinereus* Meigen

Habitat: woodlands  
Time of year: late spring, early summer  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

**Subgenus *Aedimorphus* Theobald***Aedes vexans* (Meigen)

Habitat: woodlands, fields, yards  
Time of Year: spring through fall  
Flight Period: daytime in shade, night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: abundant

**Subgenus *Stegomyia* Theobald***Aedes aegypti* (Linnaeus)

Habitat: yards, inside houses

Time of Year: late spring, summer

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: central, southern, eastern

Maryland Abundance: rare

*Aedes albopictus* (Skuse)

Habitat: yards, inside houses

Time of Year: late spring, summer

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: central, southern, eastern

Maryland Abundance: common

**Genus *Ochlerotatus* Lynch Arribalzaga****Subgenus *Finlaya* Theobald***Ochlerotatus japonicus japonicus* (Theobald)

Habitat: yards

Time of Year: late spring, summer

Flight Period: daytime

Status: pest, disease vector

Maryland Distribution: eastern

Maryland Abundance: uncommon

**Subgenus *Ochlerotatus* Lynch Arribalzaga***Ochlerotatus abserratus* (Felt & Young).

Habitat: cold water swamps

Time of Year: spring

Flight Period: night

Status: non-pest

Maryland Distribution: western

Maryland Abundance: rare

*Ochlerotatus atlanticus* (Dyar & Knab)

Habitat: woodlands  
Time of Year: late spring through fall  
Flight Period: daytime in shade, night  
Status: pest, disease vector  
Maryland Distribution: southern, eastern  
Maryland Abundance: abundant

*Ochlerotatus atropalpus* (Coquillett)

Habitat: woodlands  
Time of Year: summer  
Flight Period: daytime in shade, night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: common

*Ochlerotatus aurifer* (Coquillett)

Habitat: woodlands  
Time of Year: spring  
Flight Period: daytime in shade, night  
Status: non-pest  
Maryland Distribution: western, central, southern, northeastern  
Maryland Abundance: uncommon

*Ochlerotatus canadensis canadensis* (Theobald)

Habitat: woodlands  
Time of Year: spring and fall  
Flight Period: daytime in shade, night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: abundant

*Ochlerotatus cantator* (Coquillett)

Habitat: coastal marshes  
Time of Year: spring, summer  
Flight Period: day, night  
Status: pest, disease vector  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: common

*Ochlerotatus dorsalis* (Meigen)

Habitat: brackish and freshwater marshes  
Time of Year: spring, summer  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: eastern, north-central  
Maryland Abundance: common

*Ochlerotatus excrucians* (Walker)

Habitat: woodlands  
Time of Year: spring  
Flight Period: daytime in shade, night  
Status: pest  
Maryland Distribution: northeastern, north-central  
Maryland Abundance: uncommon

*Ochlerotatus fitchii* (Felt & Young)

Habitat: woodlands  
Time of Year: spring  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: northeastern  
Maryland Abundance: rare

*Ochlerotatus fulvus pallens* (Ross)

Habitat: freshwater swamps  
Time of Year: summer, fall  
Flight Period: night  
Status: non-pest  
Maryland Distribution: southeastern  
Maryland Abundance: accidental

*Ochlerotatus grossbecki* (Dyar & Knab)

Habitat: woodlands  
Time of Year: spring  
Flight Period: daytime in shade, night  
Status: non-pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: common

*Ochlerotatus infirmatus* (Dyar & Knab)

Habitat: woodlands  
Time of Year: spring through fall  
Flight Period: daytime  
Status: non-pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: uncommon

*Ochlerotatus mitchellae* (Dyar)

Habitat: coastal marshes  
Time of Year: spring through fall  
Flight Period: night  
Status: non-pest  
Maryland Distribution: collection location unknown  
Maryland Abundance: accidental

*Ochlerotatus sollicitans* (Walker)

Habitat: coastal marshes  
Time of Year: late spring through fall  
Flight Period: day, night  
Status: pest, disease vector  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: abundant

*Ochlerotatus sticticus* (Meigen)

Habitat: woodlands, thickets  
Time of Year: late spring, summer  
Flight Period: day, night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

*Ochlerotatus stimulans* (Walker)

Habitat: woodlands  
Time of Year: spring, summer  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: common

*Ochlerotatus taeniorhynchus* (Wiedemann)

Habitat: coastal marshes  
Time of Year: summer through fall  
Flight Period: day, night  
Status: pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: abundant

*Ochlerotatus thibaulti* (Dyar & Knab)

Habitat: dense swamps, bogs  
Time of Year: spring  
Flight Period: daytime  
Status: non-pest  
Maryland Distribution: eastern  
Maryland Abundance: rare

*Ochlerotatus tormentor* (Dyar & Knab)

Habitat: woodlands  
Time of Year: summer through fall  
Flight Period: daytime in shade, night  
Status: non-pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: uncommon

*Ochlerotatus trivittatus* (Coquillett)

Habitat: Open woodlands, fields  
Time of Year: summer through fall  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

**Subgenus *Protomacleaya* Theobald***Ochlerotatus hendersoni* (Cockerell)

Habitat: tree canopy of woodlands  
Time of Year: unknown  
Flight Period: unknown  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: accidental



*Ochlerotatus triseriatus* (Say)

Habitat: woodlands  
Time of Year: late spring through fall  
Flight Period: crepuscular  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: common

**Genus *Psorophora* Robineau-Desvoidy****Subgenus *Grabhamia* Theobald***Psorophora columbiae* (Dyar & Knab)

Habitat: woodland edges, open fields, yards  
Time of Year: summer through fall  
Flight Period: day, night  
Status: pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: abundant

*Psorophora discolor* (Coquillett)

Habitat: woodland edges, open fields  
Time of Year: summer through fall  
Flight Period: night  
Status: non-pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: uncommon

**Subgenus *Janthinosoma* Lynch Arribalzaga***Psorophora cyanesceus* (Coquillett)

Habitat: woodlands, thickets  
Time of Year: summer through fall  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: southern, eastern  
Maryland Abundance: uncommon

*Psorophora ferox* (von Humboldt)

Habitat: woodlands, thickets  
Time of Year: late spring through fall  
Flight Period: day, night  
Status: pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: abundant

*Psorophora horrida* (Dyar & Knab)

Habitat: woodlands, thickets  
Time of Year: summer through fall  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: southern, southeastern  
Maryland Abundance: uncommon

*Psorophora mathesoni* Belkin & Heinemann

Habitat: woodlands, thickets  
Time of Year: summer through fall  
Flight Period: unknown  
Status: non-pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: rare

**Subgenus *Psorophora* Robineau-Desvoidy***Psorophora ciliata* (Fabricius)

Habitat: woodland edges, open fields  
Time of Year: summer through fall  
Flight Period: day, night  
Status: pest  
Maryland Distribution: statewide  
Maryland Abundance: common

*Psorophora howardii* (Coquillett)

Habitat: woodland edges, open fields  
Time of Year: summer through fall  
Flight Period: day, night  
Status: non-pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: common

**Genus *Culex* Linnaeus****Subgenus *Culex* Linnaeus***Culex pipiens* Linnaeus

Habitat: yards, inside houses  
Time of Year: late spring through fall  
Flight Period: night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: abundant

*Culex quinquefasciatus* Say

Habitat: yards, inside houses  
Time of Year: late summer, early fall  
Flight Period: night  
Status: pest, disease vector  
Maryland Distribution: southern, southeastern  
Maryland Abundance: rare

*Culex restuans* Theobald

Habitat: woodlands, fields, yards  
Time of Year: spring, early summer  
Flight Period: night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: abundant

*Culex salinarius* Coquillett

Habitat: Open woodlands, marshes, fields  
Time of Year: spring through fall  
Flight Period: crepuscular  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: abundant

**Subgenus *Melanoconium* Theobald***Culex erraticus* (Dyar & Knab)

Habitat: woodlands, fields  
Time of Year: spring through fall  
Flight Period: night  
Status: non-pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: common

**Subgenus *Neoculex* Dyar***Culex territans* Walker

Habitat: swamps, marshes  
Time of Year: spring through fall  
Flight Period: daytime in shade, night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: common

## Genus *Culiseta* Felt

### Subgenus *Climacura* Howard, Dyar & Knab

#### *Culiseta melanura* (Coquillett)

Habitat: freshwater swamps

Time of Year: late spring through fall

Flight Period: daytime in shade, night

Status: pest, disease vector

Maryland Distribution: central, southern, eastern

Maryland Abundance: common

### Subgenus *Culicella* Felt

#### *Culiseta minnesotae* Barr

Habitat: freshwater marshes

Time of Year: late spring, summer

Flight Period: unknown

Status: non-pest

Maryland Distribution: collection location unknown

Maryland Abundance: accidental

#### *Culiseta morsitans* (Theobald)

Habitat: dense swamps, bogs

Time of Year: late spring through fall

Flight Period: daytime in shade, night

Status: non-pest

Maryland Distribution: western

Maryland Abundance: rare

### Subgenus *Culiseta* Felt

#### *Culiseta annulata* (Schrank)

Habitat: unknown in Maryland

Time of Year: unknown in Maryland

Flight Period: unknown in Maryland

Status: unknown in Maryland

Maryland Distribution: 1 overwintering adult female collected 8 March 1978 at Fort McHenry National Monument and Historic Shrine, Baltimore (Faran and Bailey 1980)

Maryland Abundance: accidental (European)

*Culiseta impatiens* (Walker)

Habitat: woodlands  
Time of Year: spring through fall  
Flight Period: crepuscular  
Status: non-pest  
Maryland Distribution: central  
Maryland Abundance: rare

*Culiseta inornata* (Williston)

Habitat: Open woodlands, marshes, fields  
Time of Year: spring through fall  
Flight Period: night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

**Genus *Coquillettidia* Dyar****Subgenus *Coquillettidia* Dyar***Coquillettidia perturbans* (Walker)

Habitat: areas around shallow ponds and lakes  
Time of Year: spring, summer  
Flight Period: daytime in shade, night  
Status: pest, disease vector  
Maryland Distribution: statewide  
Maryland Abundance: common

**Genus *Orthopodomyia* Theobald***Orthopodomyia alba* Baker

Habitat: woodlands  
Time of Year: spring, summer  
Flight Period: night  
Status: non-pest  
Maryland Distribution: central, southern, eastern  
Maryland Abundance: rare

*Orthopodomyia signifera* (Coquillett)

Habitat: woodlands  
Time of Year: spring, summer  
Flight Period: night  
Status: non-pest  
Maryland Distribution: statewide  
Maryland Abundance: uncommon

## Genus *Wyeomyia* Theobald

### Subgenus *Wyeomyia* Theobald

#### *Wyeomyia smithii* (Coquillett)

Habitat: in the vicinity of pitcher plants

Time of Year: summer through fall

Flight Period: unknown

Status: non-pest

Maryland Distribution: statewide

Maryland Abundance: rare

## Genus *Uranotaenia* Lynch Arribalzaga

### Subgenus *Uranotaenia* Lynch Arribalzaga

#### *Uranotaenia sapphirina* (Osten Sacken)

Habitat: swamps

Time of Year: summer through fall

Flight Period: daytime in shade; night

Status: non-pest

Maryland Distribution: statewide

Maryland Abundance: common

## Genus *Toxorhynchites* Theobald

### Subgenus *Lynchiella* Lahille

#### *Toxorhynchites rutilus septentrionalis* Dyar & Knab

Habitat: woodlands, thickets

Time of Year: summer

Flight Period: daytime

Status: non-pest

Maryland Distribution: statewide

Maryland Abundance: rare

## SUMMARY

“An Annotated List of the Mosquitoes of Maryland” (Bickley et al. 1971) documented the occurrence of 53 species of mosquitoes. Since then, two of the listed subspecies, *Culex pipiens pipiens* Linnaeus and *Culex pipiens quinquefasciatus* Say, have been elevated to species rank, *Cx. pipiens* Linnaeus and *Cx. quinquefasciatus* Say, thereby increasing the Bickley et al. total to 54 species.

The Maryland mosquito fauna has increased by six additional species since the annotated list of Bickley et al. The first record for each additional species is presented in Table 1.

Species	First Record	Citation
<i>Aedes albopictus</i> (Skuse)	Baltimore 8 August 1987	CDC 1987 & Sweeny et al. 1988
<i>Ochlerotatus japonicus japonicus</i> (Theobald)	Frederick Frederick County 8 June 2000	Sardelis and Turell 2001
<i>Ochlerotatus dorsalis</i> (Meigen)	Cumberland Allegheny County 21 May 1975	Mallack 1975
<i>Ochlerotatus hendersoni</i> (Cockerell)	River View (sic) Prince George's County T. Pergande August 1905	Zavortink 1972 & Zavortink, in litt.
<i>Culiseta annulata</i> (Schrank)	Fort McHenry Baltimore 8 March 1978	Faran and Bailey 1980
<i>Culiseta impatiens</i> (Walker)	Fort George G. Meade Anne Arundel County 1 June 1987	Pagac et al. 1992

**Table 1. Additional Maryland mosquito species since Bickley et al. (1971).**

The breakdown by genus of the 60 Maryland species is as follows: *Anopheles* (7), *Aedes* (4), *Ochlerotatus* (23), *Psorophora* (8), *Culex* (6), *Culiseta* (6), *Coquillettidia* (1), *Orthopodomyia* (2), *Wyeomyia* (1), *Uranotaenia* (1), and *Toxorhynchites* (1).

In addition to the list of 60 Maryland species, *Anopheles earlei* Vargas and *Anopheles perplexens* Ludlow have been reported in United States Army Environmental Hygiene Agency mosquito surveillance reports as having occurred in Maryland (Table 2).

Species	First Report	Citation
<i>Anopheles earlei</i> Vargas	1 adult female Fort George G. Meade Anne Arundel County June 1987	USAEHA 1988
<i>Anopheles perplexens</i> Ludlow	1 adult female Chesapeake City Cecil County August 1983	USAEHA 1984
<i>Anopheles perplexens</i> Ludlow (additional reports)	2 adult females Aberdeen Proving Ground Harford County September 1983	USAEHA 1984
	29 adult females Fort George G. Meade Anne Arundel County June – August, October 1987	USAEHA 1988
	130 adult females Fort George G. Meade Anne Arundel County June – September 1988	USAEHA 1989
	240 adult females Fort George G. Meade Anne Arundel County June – November 1989	USAEHA 1990
	5 adult females Fort George G. Meade Anne Arundel County June – July 1990	USAEHA 1991

**Table 2. Additional mosquito species reported in United States Army Environmental Hygiene Agency mosquito surveillance reports. (These are not being added to the Maryland species list at this time.)**

Attempts were unsuccessful trying to determine if voucher specimens or details existed of these two reported anopheline species. It is unknown what keys or characters were used to identify the two species in the 1980s and 1990.

The identification of *Anopheles earlei* was based on a single adult female specimen. The condition of the specimen would be of interest, since a rubbed



*An. crucians* Complex specimen could possibly be confused with *An. earlei* (Harrison, in litt.).

In the genus *Anopheles*, cryptic species are common (Fritz et al. 1991). Fritz et al. studied the usefulness of the “presence and relative size of the subcostal pale spot to the preapical dark spot (SCP ratio)” for separating *An. perplexens* and *An. punctipennis* (Say). They found that the SCP ratio was highly variable in *An. punctipennis* and determined that it should not be used exclusively for separating *An. perplexens* and *An. punctipennis*. *Anopheles punctipennis* is common in Maryland and occurs throughout the state.

Although *An. earlei* and *An. perplexens* are reported here, they are not being added to the Maryland list at this time. It is hoped that in the future, voucher specimens might be located that were housed at Fort George G. Meade, Maryland during the 1980s and 1990s (Harlan, personal communication). If the specimens still exist, they should be reexamined for species confirmation.

It should be noted that this list of 60 Maryland species is a dynamic list. As global transport becomes more expeditious, the expectation is that this list will grow as exotic species are transported into the United States. This is an area of concern for mosquito control managers and health professionals in that many mosquito species exhibit a high potential to colonize Maryland and vector exotic arboviral diseases. A comprehensive surveillance program is essential for maintaining an updated species list for entomological purposes as well as for the protection of public health.

### ACKNOWLEDGEMENTS

I wish to thank Robert A. Berry, Assistant Chief (retired), and Dr. Stanley R. Joseph, Chief (retired), of MDA’s Mosquito Control Program, for their expertise in collecting and identifying many of these species. Without their hard work and dedication to mosquito control, the information in this publication would not have been as accurate and complete.

I thank Jeannine M. Dorothy, Entomologist Supervisor (MDA), for maintaining and updating this current list.

I wish to thank Dr. Thomas J. Zavortink, Research Associate at the Bohart Museum of Entomology and Affiliate in the Department of Entomology, University of California, Davis, for providing historical records of *Ochlerotatus hendersoni* (Cockerell).

I also thank Dr. Richard C. Wilkerson, Manager and Research Entomologist at the Walter Reed Biosystematics Unit, Museum Support Center, Smithsonian Institution; Dr. Bruce A. Harrison, Medical Entomologist/Taxonomist at the

North Carolina Department of Environment and Natural Resources; and Dr. Harold J. Harlan, former Chief of the Entomological Sciences Division of the United States Army Environmental Hygiene Agency – North at Fort George G. Meade, Maryland and current Senior Scientific Associate at the Armed Forces Pest Management Board for their assistance and advice regarding *Anopheles earlei* and *An. perplexens*.

Thanks are also due to Eugene J. Scarpulla, Editor of *The Maryland Entomologist*, for his persistence tracking down historical publications and records.

I dedicate this publication to the late Cyrus R. Lesser, renowned mosquito control entomologist, Chief of Maryland's Mosquito Control Program, and mentor and friend. I thank him for the wealth of knowledge and memories he imparted to me.

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## The Ants (Hymenoptera: Formicidae) of Assateague Island National Seashore, Worcester County, Maryland: A Preliminary Survey

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**ABSTRACT:** A preliminary survey of the ant fauna of Assateague Island National Seashore, Worcester County, Maryland was conducted in 2008 to catalog the species present. Collections were made by hand collecting, sweep net, and very limited leaf litter extraction. Twenty-nine species were collected from walking trails leading through three major areas: the marsh, the dunes, and the forest. Species overlap occurred mostly between the dunes and the forest. It was the absence of certain species from Assateague Island that was more noticeable than the presence of species, except for the presence of dark specimens of *Forelius pruinosus* (Roger), which in Maryland at present seem more or less confined to the island. Large formicines (subfamily Formicinae) were notably absent and it appeared that the Assateague ant fauna is a subset of the adjacent mainland fauna.

### INTRODUCTION

The Maryland ant fauna in recent years has received some attention. While no comprehensive survey for the state presently exists, one was initiated in January 2005 with that goal in mind. By early 2008, specimens were collected from all of Maryland's 23 counties. The same year a preliminary survey of the ant fauna of Assateague Island National Seashore, Worcester County, Maryland was conducted, with a more intensive one planned for the following year. The results of the 2008 survey are reported here.

### METHODS

Periodic visits to Assateague Island National Seashore were made from May to September of 2008. For this survey, collecting was focused primarily in the habitats surrounding the three walking trails: Life of the Forest (Forest Trail); Life of the Marsh (Marsh Trail); and Life of the Dunes (Dunes Trail) Trails. Visual searching, which also included limited overturning and examining decaying logs and stripping bark from dead standing trees, was the most common collection methods used in most of the habitats. In areas with abundant ground cover or in dense shrubby areas, sweeping vegetation was widely used. One additional method used was limited leaf litter sifting for later processing in the laboratory. All specimens were preserved in vials containing 95% ethanol. Identifications were made using Coovert (2005).

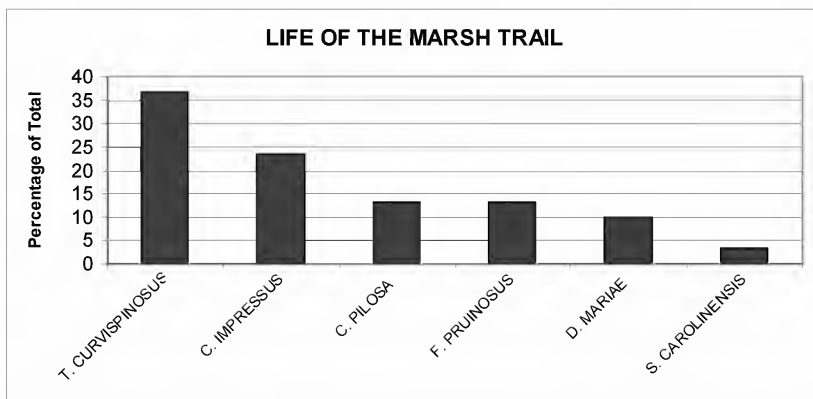
## RESULTS AND DISCUSSION

Twenty-nine ant species were identified from 24 collections during this initial survey (Table 1). The percentages are only relative to the specimens obtained and do not represent actual species composition for Assateague Island. Nevertheless, the four most commonly collected species listed in the table are also among the most common species encountered at sites on Maryland's Eastern Shore where more intensive surveys were carried out. When specimens were broken down by site, the Marsh Trail contained the fewest number of species (Figure 1). This is not surprising, since collections were almost exclusively obtained by sweeping vegetation next to the boardwalk extending out into the open-water marsh. Two of the species, *Crematogaster pilosa* Emery, and *Camponotus impressus* (Roger), are marsh specialists, and five of the six species exhibit arboreal tendencies. The most species, 24, were encountered from the Forest Trail (Figure 2), and 17 species were collected from the Dunes Trail (Figure 3). The relatively higher species richness of the former is due in part to the contribution of species identified from leaf litter samples, which were not collected from the latter area. There is considerable overlap in species occurrence in both habitat trails. This is due to the fact that the Dunes Trail cuts through some pine (*Pinus* L.) forest tracts and the Forest Trail itself created an open, dry area suitable for colonization by sand generalists and specialists, which otherwise would have been confined to the dunes area. Notably absent are the poneromorph (traditional subfamily Ponerinae) genera such as *Amblyopone* Erichson and *Proceratium* Roger, but this can be easily explained by the limited amount of leaf litter collections. Furthermore, both genera occur on the adjacent mainland.

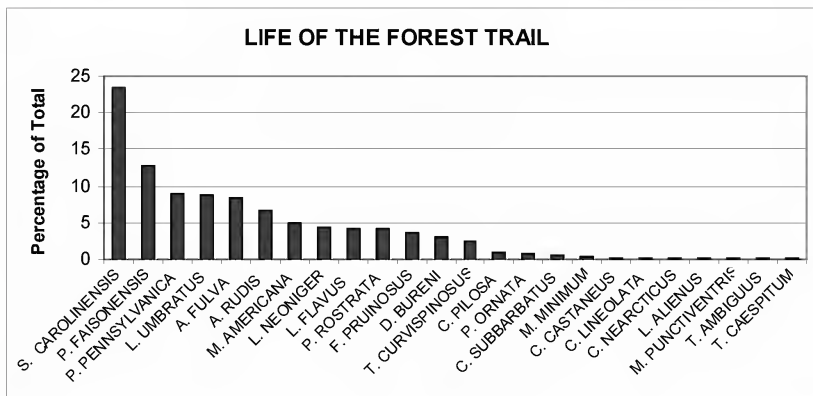
It appears that the absence of certain ant taxa is more notable at this time than what is actually present. One exception, however, is the widespread dolichoderine (subfamily Dolichoderinae) *Forelius pruinosus* (Roger). This ant is variable in color, from light brown to nearly black (Figure 4). So far in Maryland, I have found the black morph only on Assateague Island; other collections made throughout the state have produced the light colored specimens. Some inland dune populations may also include the dark colored ants, but I have not encountered them at present. Since the genus contains some undescribed species (Fisher and Cover 2007) and is in need of revision, it is possible that these color morphs could represent separate sibling species. Other examples of such color variations in ants are known: bicolored individuals of the normally black *Camponotus nearcticus* Emery, (especially in the western half of Maryland); and light and dark morphs of *Temnothorax schaumii* Roger within the same nest (Foard pers. obs.).

Species	Percent of Total
<i>Solenopsis carolinensis</i> Forel	26.2
<i>Aphaenogaster rudis complex</i> Enzmann	9.2
<i>Paratrechina faisonensis</i> (Forel)	7.8
<i>Ponera pennsylvanica</i> Buckley	5.3
<i>Lasius umbratus</i> (Nylander)	5.2
<i>Aphaenogaster fulva</i> Roger	5.0
<i>Monomorium minimum</i> (Buckley)	4.8
<i>Crematogaster pilosa</i> Emery	4.5
<i>Lasius neoniger</i> Emory	4.3
<i>Pheidole dentata</i> Mayr	3.9
<i>Forelius pruinosus</i> (Roger)	3.7
<i>Lasius flavus</i> (Fabricius)	3.0
<i>Temnothorax curvispinosus</i> Mayr	2.6
<i>Lasius alienus</i> (Foerster)	2.5
<i>Myrmecina americana</i> Emery	2.5
<i>Pyramica rostrata</i> (Emery)	2.5
<i>Dorymyrmex bureni</i> (Trager)	2.4
<i>Pheidole bicarinata</i> Mayr	0.9
<i>Camponotus impressus</i> (Roger)	0.7
<i>Dolichoderus mariae</i> Forel	0.4
<i>Pyramica ornata</i> (Mayr)	0.4
<i>Camponotus subbarbatus</i> Emery	0.3
<i>Camponotus castaneus</i> (Latreille)	0.2
<i>Crematogaster lineolata</i> (Say)	0.2
<i>Camponotus nearcticus</i> Emery	0.2
<i>Hypoponera opacior</i> (Forel)	0.1
<i>Myrmica punctiventris</i> Roger	0.1
<i>Temnothorax ambiguus</i> Emery	0.1
<i>Tetramorium caespitum</i> (Linnaeus)	0.1

**Table 1. Ant species recorded during an initial survey at Assateague Island National Seashore, Worcester County, Maryland, 2008.**

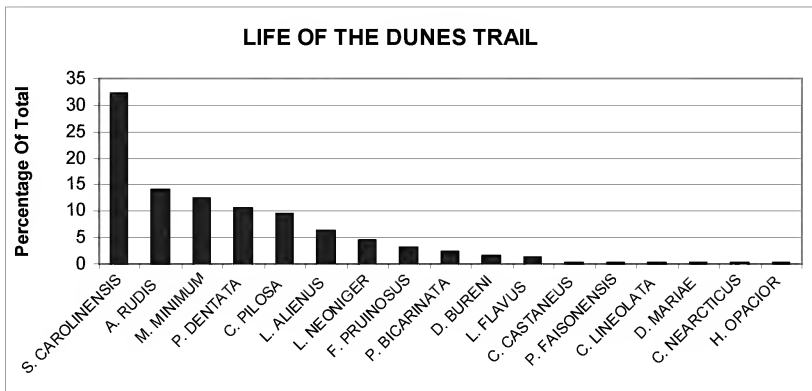


**Figure 1. Species composition of ants from the Life of the Marsh Trail, Assateague Island National Seashore, Worcester County, Maryland.**



**Figure 2. Species composition of ants from the Life of the Forest Trail, Assateague Island National Seashore, Worcester County, Maryland.**





**Figure 3. Species composition of ants from the Life of the Dunes Trail, Assateague Island National Seashore, Worcester County, Maryland.**



**Figure 4. Specimens of *Forelius pruinosus* (Roger) from Maryland: Above, light morph specimens from Hart-Miller Island, Baltimore County; and below, dark morph specimens from Assateague Island, Worcester County.**

Another element of the Maryland ant fauna notably absent from Assateague Island is the larger members of the genus *Camponotus* Mayr and the genus *Formica* Linnaeus. The ground dwelling *Camponotus castaneus* (Latreille) had been collected on two occasions at Assateague; it was the only large *Camponotus* found on this survey. The other *Camponotus* species present are small, arboreal species. Two other large species, *C. pennsylvanicus* (DeGeer) and *C. chromaiodes* Bolton, are common on the Eastern Shore, particularly in mixed moist forests but were not found on Assateague. *Formica* species, while present on the Eastern Shore, are generally not as conspicuous and common as what are observed on the western half of the Maryland coastal plain. The species most often encountered are members of the *F. pallidefulva* Latreille species group, which occurs in open areas and *F. subsericea* Say, more common near forest margins. Assateague Island is a relatively stable barrier island, but does not have a diverse variety of habitats. The absence of these two formicine elements suggests that the island is not particularly suitable for these ants to inhabit. A more intensive survey should determine whether they are rare on the island or absent altogether, as well as possibly increase the species inventory. The Assateague ant fauna appears to be a subset of the Maryland Eastern Shore fauna.

The initial survey was made possible with United States Department of the Interior National Park Service Permit No. ASIS-2008-SCI-003.

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## THE MARYLAND ENTOMOLOGIST

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**Tables:** Tables, graphs and line drawings should be done electronically

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*The Maryland Entomologist* is published annually by the MES. There are four numbers per volume. Original articles or reports on geographic or temporal distribution, particularly pertaining to Maryland or nearby localities; ecology, biology, morphology, genetics, systematics, behavior, etc., are welcome. Book notices or reviews, requests for information, notes on distribution, behavior, occurrence, migration, life history and other biologic topics will be published. All articles are subject to editorial review and acceptance. Articles will be peer-reviewed. Send submissions to the Editor: Eugene J. Scarpulla, 9015 Millers Island Boulevard, Millers Island, MD 21219-1645, ejscarp@comcast.net .

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### COVER PHOTOGRAPH

Engorged female *Ochlerotatus sollicitans* (Walker), 1856, Salt Marsh Mosquito, feeding on blood from the arm of the photographer on Hart-Miller Island, 21 September 2008.

Photographed by Mikey Lutmerding