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## RESEARCH ARTICLE

# COLEOPTERA CAPTURED IN PRIONIC ACID BAITED CROSS-VANED PANEL TRAPS AT THE SMITHSONIAN ENVIRONMENTAL RESEARCH CENTER, MARYLAND

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## ABSTRACT

Two black cross-vaned panel traps baited with commercial prionic acid were deployed at four locations on the Smithsonian Environmental Research Center. In addition to capturing all three Maryland *Prionus* species (Coleoptera: Cerambycidae), the traps captured an additional 33 species in 16 families.

**Keywords:** Beetles, Maryland, non-target insects, pheromone trap.

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## INTRODUCTION

Members of the subfamily Prioninae (Coleoptera: Cerambycidae) are relatively large beetles (some species are >5 cm in length) which are nocturnal or crepuscular, are short lived, and do not feed as adults. Larvae feed on the roots of trees, shrubs or grasses and some species can be of economic importance (Solomon, 1995; Schiefer, 2022).

The largest prionine genus in North America is *Prionus* Geoffroy with 15 described species (Schiefer, 2022). Despite their large size, adult *Prionus* have been infrequently collected due to their nocturnal habits and short life span. Synthetic prionic acid (3,5-dimethyldodecanoic acid) has proven to be an effective attractant for many male *Prionus* and some other prionine genera (Barbour et al., 2011; Wickham et al., 2016; Greene, 2024).

The use of baited traps for the detection, monitoring, and management of insects has become common. However, there is little published information on non-target species captured (Pernek et al., 2003; Weber et al., 2005; Skvarla & Holland, 2011).

This is a continuation of the Coleoptera inventory work at the Smithsonian Environmental Research Center (SERC), located in Edgewater, Anne Arundel County, Maryland (Staines & Staines, 2019, 2020a-d, 2021a-f, 2022, 2023b, 2024; Staines & Bennett, 2024). For a detailed description of SERC habitats see Staines & Staines (2020a).

## MATERIALS AND METHODS

Two black cross-vented panel traps baited with commercial prionic acid (Alpha Scents, Inc.) were deployed from 19 June to 16 August 2025. These dates corresponded to the adult *Prionus* activity in the Maryland Biodiversity Project (MBP, 2025). The killing agent used was propylene glycol. The lures used were effective for approximately 30 days and were changed on 15 July 2025. Traps were hung in trees with the base of the collecting pan approximately 1 m above the ground. Selected sites were at the wet mid-successional forest at the intersection of Back Road and dirt road 11-6 (38.532648, -76.334303) and in the *Pinus taeda* L. (Pinaceae) plantation opposite the drive to the Java House ruins (38.533025, -76.330394) from 19 June to 15 July. They were moved to the dry mid-successional forest along Fox Point Road (38.530308, -76.330097) and the *P. taeda* plantation northwest of the Sellman House (38.535423, -76.330838) on 15 July and ran until 16 August.

Traps were checked weekly unless we had rain (6 mm or more flooded the traps). Beetles were extracted and placed in 70% ethanol and taken to the laboratory for identification. Identifications were made by the author using published resources (see references). Voucher specimens are deposited in the SERC collection. Duplicate specimens are deposited at Towson University.

## RESULTS

### Family Anthribidae

*Ischnocerus infuscatus* Fåhraeus is a generalist in dead branches (Valentine, 1998). A single specimen was taken in the pines opposite the drive to the Java House ruins from 10-15 July 2025.

### Family Carabidae

*Clivina pallida* Say is a lowland species found in moist soil near forests and sawmills. It is nocturnal; sheltering during the day under *Pinus* bark, in tree hollows, fermenting pieces of wood and saw dust, and burrows dug in the soil under stones (Larochelle & Larivière, 2003). A single specimen was taken in the pines opposite the drive to the Java House ruins from 17-19 June 2025.

*Coptodera aerata* Dejean is a nocturnal species found in deciduous forests and has been collected by beating or sweeping vegetation, under bark, on carrion, and at lights (Larochelle & Larivière, 2003). Three specimens were taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025 and in the pines opposite the drive to the Java House ruins from 10-15 July 2025.

## Family Cerambycidae

*Leptostylus transversus* (Gyllenhal) is found in various hardwoods, conifers, and vines (Yanega, 1996) and is attracted to lights (Staines, 1987). A single specimen was taken from 8-16 August along Fox Point Road.

*Liopinus mimetinus* Casey feeds in various hardwoods (Lingafelter, 2007). A single specimen was taken from 1-8 August 2025 in the pines northwest of the Sellman House.

*Liopinus misellus* (LeConte) larvae are borers in various hardwoods (Lingafelter, 2007). A single SERC specimen was taken in the pines northwest of the Sellman House from 8-16 August 2025.

*Orthosoma brunneum* (Forster) larvae feed in hardwood and conifer trees; adults are attracted to lights (Lingafelter, 2007) and ethanol lures (Dunn et al., 2016). Three specimens were taken along Fox Point Road and in the pines northwest of the Sellman House from 17-21 July 2025.

*Prionus imbricornis* (Linnaeus) larvae feed on living roots of *Quercus*, *Castanea* (Fagaceae), *Carya* (Juglandaceae), *Vitis* (Vitaceae), and *Pinus* (Lingafelter, 2007). Three specimens were taken from 17 July to 8 August 2025 along Fox Point Road and in the pines northwest of the Sellman House.

*Prionus laticollis* (Drury) is found in the roots of living hardwoods (Solomon, 1995). 154 specimens were taken from 17 June to 1 August 2025 in the pines opposite the drive to the Java House ruins, at the intersection of Back Road and dirt road 11-6, along Fox Point Road, and in the pines northwest of the Sellman House.

*Prionus pocularis* Dalman larvae feed on dead *Pinus* (Lingafelter, 2007). 62 specimens were taken from 2 July to 8 August 2025 in the pines opposite the drive to the Java House ruins, at the intersection of Back Road and dirt road 11-6, along Fox Point Road, and in the pines northwest the Sellman House.

## Family Curculionidae

*Cossonus corticola* Say has been collected under the bark of *Pinus* (Ciegler, 2010). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

## Family Elateridae

*Alaus oculatus* (L.) is found in deciduous forests where larvae feed on the larvae of woodboring beetles (Evans, 2014). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

*Monocrepidius lividus* (DeGeer) has been beaten from branches of *Juglans*, *Carya* (Juglandaceae), and other trees (Blatchley, 1910); larvae have been found in corn fields in Indiana (Belcher & Tenne, 1987). Two specimens were taken from 21-28 July 2025 and 8-16 August 2025 along Fox Point Road.

*Parallelostethus attenuatus* (Say) has been found beneath bark of decaying *Juglans*, *Morus* (Moraceae), and other logs (Blatchley, 1910); and is commonly found in rotting logs feeding on decaying wood (Kirk, 1922). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 10-15 July 2025.

### Family Eucnemidae

*Isorhipis obliqua* (Say) breeds in decaying soft wood of various deciduous trees (Muona, 2000). Three specimens were taken from 17 June to 7 July 2025 at the intersection of Back Road and dirt road 11-6.

### Family Histeridae

*Hololepta aequalis* Say is mainly found under the tight bark of recently dead trees, in particular *Populus*, *Salix* (Salicaceae), *Ulmus* (Ulmaceae), and *Pinus* (Bousquet & Laplante, 2006). Three specimens were taken from 20-26 June 2025 at the intersection of Back Road and dirt road 11-6 and from 17-21 July 2025 in the pines northwest of the Sellman House.

*Margarinotus egregious* (Casey) has been found in woodchuck burrows (*Marmota monax* (L.), Mammalia: Sciuridae) in early spring; also in carrion, dung, and decaying mushrooms (Bousquet & Laplante, 2006). A single specimen was taken from 20-26 June 2025 at the intersection of Back Road and dirt road 11-6.

### Family Lampyridae

*Photuris pensylvanicus* (DeGeer) larvae are found in subterranean burrows during the day, feeding on soft-bodied insects, earthworms, and snails on the surface at night (Keiper & Solomon, 1972); has been captured in pitfall traps (Levesque & Levesque, 1997); and is found in high quality freshwater emergent, shrub, and floodplain peatlands (Heckscher, 2012). A single specimen was taken from 20-26 June 2025 at the intersection of Back Road and dirt road 11-6.

### Family Lymexylidae

*Melittomma sericeus* Harris has been found under loose bark and is frequent at light (Downie & Arnett, 1996). Two specimens were taken at the intersection of Back Road and dirt road 11-6 from 20 June to 2 July 2025.

### Family Melandryidae

*Dircaea liturata* LeConte has been taken in flight intercept traps (Chandler, 1991); collected on fallen trunks of *Acer rubrum* L., *A. saccharum* Marshall (Aceraceae), *Tilia americana* L. (Malvaceae), *Quercus rubra* L., and *Fagus grandifolia* Ehrh. (Fagaceae) (Laliberté, 1965); collected in both deciduous (*Acer* spp., *Betula* spp. (Betulaceae), and *Q. rubra*) and coniferous (*Picea rubens* Sarg., *P. mariana* (Mill.) Britton, Sterns & Poggenburg, and *Tsuga canadensis* (L.) Carrière, Pinaceae) forests (Bouchard & Pollack, 2006). A single specimen was taken from 20-26 June 2025 at the intersection of Back Road and dirt road 11-6.

### Family Mordellidae

*Mordella marginata* Melsheimer has been collected from flowers of *Amorpha canescens* Pursh, *Trifolium pratense* L. (Fabaceae), *Anemone canadensis* L. (Ranunculaceae), *Berteroa incana* L. (Brassicaceae), *Cornus racemosa* Lamarck (Cornaceae), *Daucus carota* L. (Apiaceae), *Eupatorium maculatum* L., *Parthenium integrifolium* L. (Asteraceae), *Euphorbia corollata* L. (Euphorbiaceae), *Physocarpus opulifolius* L., *Spiraea alba* Du Roi (Rosaceae), *Rhus glabra* L. (Anacardiaceae), *Sambucus canadensis* L., *Viburnum opulus* L. (Caprifoliaceae), *Asclepias* (Apocynaceae), daisy (probably *Leucanthemum vulgare* Lam.), *Erigeron annuus* (L.) Pers. (Asteraceae), wild rose (*Rosa*), and one specimen was found on a *Cirsium altissimum* L. (Asteraceae) stem; sweep nets and flight intercept, Malaise, and yellow pan traps (Lisberg & Young, 2003). A single specimen was taken from 2-7 July 2025 at the intersection of Back Road and dirt road 11-6.

*Paramordellaria triloba* (Say) has an unknown biology. Two specimens were taken from 20 June to 2 July 2025 at the intersection of Back Road and dirt road 11-6 and in the pines opposite the drive to the Java House ruins.

*Yakuhamanonia bidentata* (Say) has been taken in dead *Ulmus*, *Fagus*, and *Quercus* (Frost, 1913). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 26 June to 2 July 2025.

### Family Nitidulidae

*Carpophilus antiquus* Melsheimer has been collected on new tassels of *Zea mays* L. (Poaceae) (Vogt, 1950). Seven specimens were taken from 15-17 July in the pines northwest of the Sellman House.

### Family Ptilodactylidae

*Ptilodactyla angustata* Horn has been collected sweeping vegetation, in sticky traps, and at lights (Ciegler, 2003). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

*Ptilodactyla serricollis* (Say) has been beaten from vegetation along the margins of lakes and marshes (Blatchley, 1910); and has been taken at light (Johnson & Freytag, 1978). Two specimens were taken from 15-17-July 2025 in the pines northwest the Sellman House.

### Family Staphylinidae

*Homaetarsus* sp. a single specimen which I could not place to species was collected from 10-15 July 2025 in the pines opposite the drive to the Java House ruins.

*Necrophila americana* (Linnaeus) may be found on carrion or fungi. Cole (1942) found that this species was equally active on carrion in wooded areas and exposed locations. Shubeck (1971) found this species was active during the day. 286 specimens were collected from 17 June to 16

August 2025 at the intersection of Back Road and dirt road 11-6, in the pines opposite the drive to the Java House ruins, along Fox Point Road, and in the pines northwest of the Sellman House

*Nicrophorus orbicollis* Say is nocturnal and more commonly found on cold-blooded carrion (Shubeck, 1976). Anderson (1982) found this species more commonly in forested areas and is attracted to light. Two specimens were taken along Fox Point Road from 1-8 August 2025.

*Oiceoptoma noveboracensis* (Forster) is usually found on carrion but occasionally can be taken on fungi. Cole (1942) found this species more numerous in wooded areas. Anderson (1982) found that it was the first species active in the spring and was found in all habitats sampled. Shubeck et al. (1981) found this species to be bivoltine in New Jersey and to be a diurnal species. A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

*Philonthus rufulus* Horn has been taken at lights (Peck & Thomas, 1998). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 19-20 June 2025.

*Platydracus caliginosus* (Erichson) has an unknown biology. A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

*Platydreus violaceus* (Gravenhorst) is a common species found in mesic to swampy forests, primarily under the loose bark of dead hardwood trees including *Quercus*, *Acer*, *Tilia*, *Aesculus* (Sapindaceae), *Celtis* (Ulmaceae), *Fagus*, and *Carya*. It occurs less frequently under the bark of *Pinus strobus* L., in rotting wood, and under logs. The few records in rotting fungi, on carrion, or on dung probably do not reflect habitat preferences (Brunke et al., 2011). Two specimens were taken from 17-26 June 2025 at the intersection of Back Road and dirt road 11-6 and in the pines opposite the drive to the Java House ruins.

### **Family Tenebrionidae**

*Hapladrus fulvipes* (Herbst) is found in forested areas, larvae develop in decaying wood (Steiner, 2016). A single specimen was found in the pines northwest of the Sellman House from 21-28 July 2025.

*Isomira sericea* (Say) has been taken diurnally on flowers of *Ceanothus americanus* L. (Rhamnaceae) and *Asclepias* spp., on *Quercus rubra* and *Q. nigra* L., at blacklight, in sweep net, flight intercept trap, Lindgren funnel trap, and Malaise trap (Blatchley, 1910; Majka et al., 2008). Adults have also been taken in oak savanna and deciduous forest (Marshall, 1970). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

### **Family Trogossitidae**

*Tenebroides laticollis* Horn has been collected under the bark of various trees (Barron, 1971). A single specimen was taken at the intersection of Back Road and dirt road 11-6 from 20-26 June 2025.

## DISCUSSION

The crossed-vaaned panel traps baited with prionic acid were highly effective in capturing *Prionus* species. During the two-month trapping season 219 males of the three *Prionus* known from Maryland were captured (Table 1). This starkly contrasts with the single *Prionus* female captured at light in the previous six years of the inventory using black lighting, head-lamping, and visual survey (Staines & Staines, 2022). It contrasts with the annual capture reported by Greene's (2024) three-year study of 69, 160, and 160 total *Prionus*. Both studies had a predominance of *P. laticollis* (70.3% versus 73%). But it differs in the number of *P. pocularis* (28% versus 5%) and *P. imbricornis* (1.3% versus 28%).

**Table 1.** Number of *Prionus* specimens captured.

	<i>Prionus imbricornis</i>	<i>Prionus laticollis</i>	<i>Prionus pocularis</i>	Total for site
Back Road	0	91	7	98
Java pines	0	35	15	40
Fox Point	2	16	27	46
Sellman pines	1	12	13	26
<b>Totals</b>	<b>3</b>	<b>154</b>	<b>62</b>	<b>219</b>

There are two possible explanations for the different species predominance. The first is the different trapping methods. Greene (2024) used baited pitfall traps with plain water as a killing agent. This study used cross-vaaned panel traps hung in trees with propylene glycol as a killing agent. Trap height (Weber et al., 2005) and trap design (Miller & Crowe, 2011) affect the effectiveness of traps. The killing agent used is another confounding factor. Some insects are more attracted to specific killing agents (Pekár, 1996; Weeks & McIntyre, 1997, Skvarala et al., 2014).

The second possible difference is the sites surveyed. Greene's (2024) sites contained mid-successional forest dominated by *Quercus alba* L., *Q. rubra*, *Q. falcata* Michx., *Liriodendron tulipifera* L. (Magnoliaceae), and *Nyssa sylvatica* Marshall (Nyssaceae). The Fox Point site in this study contained the same dry woods species while the Back Road site was a mid-successional wet forest containing seasonal woodland pools, a small stream and dominated by *Q. rubra*, *Acer rubrum* L. (Sapindaceae), *L. tulipifera*, *Lindera benzoin* L. (Lauraceae), and *Asimina triloba* (L.) Dunal (Annonaceae). From the photographs in Greene (2024) all of his sites were dry forests. The Java House and Sellman House sites were *P. taeda* plantations. Greene (2024) worked at a site on the western edge of the coastal plain while this work was done 32 km further east and at lower elevations (2-20 m versus 50-177 m). This may explain the higher numbers of *P. pocularis* found here since it is a coastal plain species and the larval host plant is *Pinus*.

Back Road, the wet lowland forest, was the most productive site capturing 98 specimens of two species. Fox Point, the dry upland forest was the second most productive site capturing 46 specimens in three species. The *P. taeda* plantation opposite the drive to the Java House ruins was third in the number of specimens with 40 representing two species. While the *P. taeda* plantation northwest of the Sellman House was the least productive with 26 specimens of three species (Table 1).

Barbour et al. (2011) found that prionic acid attracted numerous species of *Prionus* in the United States and England. The Asian prionine *Dorysthenes granulosus* (Thomson) has also been captured using prionic acid (Wickham et al., 2016). We collected three specimens of the prionine

*Orthosoma brunneum* (Forster). This genus has not been mentioned as captured in prionic acid baited traps in previous literature.

Assessing bycatch is even more problematic. Many factors influence the attractiveness of a particular trap, even with the same lure. Trap type (Miller & Crowe, 2011), color (Clare et al., 2000), placement (Dodds et al., 2024), lure blends (Greene, 2024), trap surface coating (Graham et al., 2010), and killing agent (Sweeney et al., 2006) all affect the catch of traps. The only comparable paper I can find is Pernek et al. (2003) which reported 53 Coleoptera species from 25 families in traps baited with pheromone blends for *Tomicus piniperda* (L.) (Coleoptera: Curculionidae) in Croatia. Other papers only report insects to Order and Family (Skavarla & Holland, 2011).

Of the 33 species captured in this study, 14 are wood or twig borers and four are predators on wood boring species. The remaining 15 species have either an unknown biology or are incidental captures. This is not surprising since the cross-vented panel design also functions as a flight intercept trap (Allison et al., 2014). The one exception is *Necrophila americana* with 286 specimens. This species is very common at SERC and has been captured in carrion traps, Malaise traps, flight intercept traps, Lindgren funnel traps, pitfall traps, and by visual survey (Staines, unpubl.). Except for the carrion trap, *N. americana* is captured in low numbers (1-3). Numbers are higher in both the panel trap and Lindgren funnel trap when time between trap emptying is longer than one to three days. This may indicate that *N. americana* may find concentrations of dead insects an acceptable food source.

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