

Beetles (Coleoptera) Associated with Flowers of Lizard's Tail (*Saururus cernuus* L.) in Calvert County, Maryland

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ABSTRACT

Beetles associated with flowers of *Saururus cernuus* L. (Saururaceae) are documented from a freshwater swamp in southern Maryland. Six hundred forty-six beetles of 29 species in 14 families were documented on flowers of *S. cernuus* during eight hours of collection effort over four days in June. Mating was observed in three species of Cerambycidae indicating a possible connection between pollen consumption and copulation. Both pollen and other flower parts may be food sources for some beetles. The most common beetle on flowers of *S. cernuus* at Cove Point Marsh was *Isomira sericea* Say (Tenebrionidae). The most species rich family was Mordellidae. Other arthropods observed on flowers of *S. cernuus* included: arachnids, collembolans, dipterans, hemipterans, hymenopterans, lepidopterans, and orthopterans.

INTRODUCTION

Saururus cernuus L. is a perennial, rhizomatous, herbaceous plant common on hydric soils, typically in shady habitats. It is common throughout the Coastal Plain and Piedmont of Maryland and Virginia (Brown and Brown, 1984; Virginia Botanical Associates, 2018) and occurs from Canada to Florida, westward to Texas (Buddell & Thieret, 1997). It is in the Lizard's tail family (Saururaceae), a small, primitive, plant family containing only six species in the order Piperales (Raju 1961). Only *S. cernuus* and *Anemopsis californica* (Nutt.) Hook. & Arn. are native to North America; the others are Asian (Buddell and Thieret 1997). *Saururus cernuus* reaches heights of just over 1 m and has entire, cordate leaves, the lower ones the largest, generally 15 cm long and 10 cm wide. Each plant produces one, or two, terminal, crook-shaped racemes on each branch. The showy, bright white, aromatic inflorescences may be over 20 cm long and 1 cm wide, and contain up to 350 small, tightly aggregated, flowers with 6 or 8 protruding stamens in two whorls, or 3 in a single whorl (Raju 1961). Anthesis proceeds from the base of the racemes to the tip revealing a gradient of flowering and fruit maturation and a straightening of the inflorescence. In the southern United States anthesis proceeds at approximately 1.52 cm per day (Thien et al., 1994). Thien et al. (1994) concluded pollination was primarily insect-mediated or wind dependent. *Saururus cernuus* propagates both vegetatively and by seed, however, vegetative reproduction may be more important to population persistence since seedlings have not been reported from field studies (Hall 1940, Penfound et al. 1945). Thien et al. (1994) attempted to discern the pollination mode for *S. cernuus* in Louisiana based on observations of potential pollinators and observed Diptera and Coleoptera eating pollen. This study documents

the Coleoptera species and other arthropod orders associated with flowers of a large population of *S. cernuus* in Maryland.

STUDY SITE

The study site at Cove Point, in Calvert County, Maryland, is located at 38°23'30.6" north latitude, 76°24'02.2" west longitude in a forested swamp with a canopy of *Acer rubrum* L. (red maple) and *Nyssa sylvatica* Marshall (black gum). The herb layer is strongly dominated by a crescent shaped patch of *S. cernuus* (Fig. 1) with a maximum length and width of approximately 70 m x 20 m. The site is situated near the Chesapeake Bay and is bordered by a non-tidal, freshwater marsh known for its high number of state rare plant species (Steury, 1999).

Figure 1: The study site at Cove Point, Calvert County, Maryland on 25 June 2018, showing *Saururus cernuus* L. in foreground, under canopy of *Acer rubrum* L. and *Nyssa sylvatica* Marshall.



MATERIALS AND METHODS

The top was cut from a plastic, one gallon milk jug and a thin film of water was added. The jug was held under an *S. cernuus* inflorescence as it was bent into the jug and shaken. The process was conducted for the first 30 minutes of each hour, from 9:00 am to 12:30 pm on 21-23 June and on 25 June from 11:00 am to 2:15 pm, 2018. The process did not damage the inflorescences other than the abscission of some dehisced anthers from the flowers. Beetles fell to the bottom of the jug and were held by the surface tension of the water. They were removed from the jug by hand and placed in a glass vial containing 95% ethanol. Beetles were sorted, identified, and tallied by date of capture. A male and female (when available) of each species was pinned, labeled, and deposited in the entomology collection at the United States National Museum in Washington, DC. No observed beetle species alluded capture, and inflorescences, which on close inspection appeared to contain no beetles, often yielded Coleoptera in the bottom of the jug. Individuals of other arthropod orders captured during the survey were released after being recorded in a field notebook. During each day of the survey, all *S. cernuus* flowers were at various stages of anthesis. No leaves of *S. cernuus* were inserted in the jug and arthropods observed on leaves were not included in the tally. The total number of individual beetles of each species captured is shown for each sampling day in Table 1. Weather was recorded on 21 June as partly cloudy with a high temperature of 28.9° C (84° F) during the survey; 22 June as intermittent light rain and a high of 23.9° C (75° F); 23 June as overcast and humid with a high temperature of 27.8° C (82° F); and 25 June as mostly sunny with a high temperature of 28.3° C (83° F).

RESULTS and DISCUSSION

A total of 646 beetles of 29 species in 14 families were captured from flowers of *S. cernuus* during eight hours of sampling over four days. The most common beetle on flowers of *S. cernuus* at Cove Point Marsh was *Isomira sericea* Say (347 captures). Other common species were *Mordellistena masoni* (146 captures), *Glipostenoda ambusta* (21), *Mordella marginata* (20) and *Falsomordellistena pubescens* and *Mordellistena literata* (18 each). The families with the highest species richness were Mordellidae (10 species), Cerambycidae (4), and Curculionidae (3). Families with the highest number of individuals were Tenebrionidae (346), Mordellidae (233), and Cerambycidae (27). Three of four species of Cerambycidae were observed in copula on inflorescences of *S. cernuus*, with the female apparently feeding on pollen during copulation, indicating a possible connection between pollen consumption and mating. One mordellid closely observed through a 10 x hand lens appeared to be feeding on the base of a *S. cernuus* flower ovary, creating a dark scar when finished. Larger beetles (Cerambycidae, Cantharidae) were observed clinging to the stamens on the exterior edge of the racemes while smaller beetles (Mordellidae and *Isomira sericea*) were primarily observed inside the inflorescence along the rachis. The largest beetle captured on flowers of *S. cernuus* was *Typocerus velutinus* (17 mm) and the smallest was *Orthoperus glaber* (0.6 mm). The record of *Lebia ornata* is the first for Cove Point, increasing the known carabid fauna from the site to 70 species (Steury & Messer, 2017). The number of individuals of each beetle species captured is shown for each sampling day in Table 1. Based on findings of this study, *S. cernuus* is an important food source for many species of beetles in at least 14 families that may feed upon its pollen and other flower parts. Further study will undoubtedly reveal additional beetle families associated with *S. cernuus*. Other arthropods observed on flowers of *S. cernuus* included: arachnids (one spider with a captured wasp, one with captured syrphid fly; mites were observed

on some beetles), collembolans, dipterans, hemipterans, hymenopterans (only wasps and ants), lepidopteran larvae (and one adult, dark phase, tiger swallowtail [*Papilio glaucus* L.]), and orthopterans. The importance of the large, showy, aromatic inflorescences, to a plant that almost exclusively reproduces vegetatively, remains unknown.

Table 1: Number of beetles captured on flowers of *Saururus cernuus* L. at Cove Point, Calvert County, Maryland, during two hours of daily search effort on June 21-23 and June 25, 2018. Taxa are listed alphabetically by family, genus, and species.

Family, Genus, Species, & Author	21 June	22 June	23 June	25 June	Total # captured
Anthicidae (antlike flower beetles)					
<i>Macratria murina</i> (Fabricius)	7			3	10
Cantharidae (soldier beetles)					
<i>Chauliognathus marginatus</i> (Fabricius)	4				4
<i>Rhagonycha angulata</i> (Say)	1				1
Carabidae (ground beetles)					
<i>Lebia ornata</i> Say		1			1
Cerambycidae (long-horned beetles)					
<i>Obrium rufulum</i> Gahan	1				1
<i>Strangalia luteicornis</i> (Fabricius)	2	1	3	2	8
<i>Typocerus lugubris</i> (Say)	3				3
<i>Typocerus velutinus velutinus</i> (Olivier)	3		6	6	15
Chrysomelidae (leaf beetles)					
<i>Diabrotica undecimpunctata howardi</i> Barber	3	4	2	2	11
Corylophidae (minute hooded beetles)					
<i>Orthoperus glaber</i> LeConte	1			1	2
Curculionidae (true weevils)					
<i>Anthonomus signatus</i> Say			1		1
<i>Geraeus picumnus</i> (Herbst.)			1		1
<i>Tyloderma variegatum</i> (Horn)				1	1
Elaterinae (click beetles)					
<i>Glyphonyx nanus</i> Smith and Balsbaugh				1	1

Latridiidae (Minute Brown Scavenger Beetles)					
<i>Melanophthalma</i> sp.				1	1
Melyridae (soft-winged flower beetles)					
<i>Hypebaeus oblitus</i> (LeConte)	1				1
Mordellidea (tumbling flower beetles)					
<i>Falsomordellistena hebraica</i> (LeConte)	1				1
<i>Falsomordellistena pubescens</i> (Fabricius)	9	1	2	6	18
<i>Glipostenoda ambusta</i> (LeConte)	6	5	4	6	21
<i>Mordella obliqua</i> LeConte	1				1
<i>Mordella marginata</i> Melsheimer	5	9	3	3	20
<i>Mordellistena literata</i> Melsheimer	3	3	5	7	18
<i>Mordellistena masoni</i> Liljeblad	54	19	46	27	146
<i>Mordellistena</i> sp. (near <i>smithi</i> Dury)			1	1	2
<i>Mordellistena vapida</i> LeConte	1			1	2
<i>Mordellistena vera</i> Liljeblad	2	1		1	4
Scarabaeidae (scarab beetles)					
<i>Valgus canaliculatus</i> (Fabricius)	1				1
Scraphiidae (false flower beetles)					
<i>Allopoda lutea</i> (Halderman)	2			1	3
Tenebrionidae (darkling beetles)					
<i>Isomira sericea</i> Say	106	64	82	95	347

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