

Three Carabid Beetles New to Maryland and a Preliminary Annotated Checklist for Cove Point, Calvert County, Maryland

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INTRODUCTION

The well-known family Carabidae, whose adult (imago) members are informally called ground beetles, is one of the largest families of beetles in the world. The global systematic list by Lorenz (2005) accounted for 33,920 extant species according to the strict sense of the family which omits both Trachypachidae and Rhysodidae. For North America north of Mexico, one would conclude that Bousquet (2012) listed 2664 carabid species-group taxa (species and subspecies). An ongoing post-2012 registry of new species, new taxonomic placements, and new geographic records affecting the North American Caraboidea is available online at <http://bugguide.net/node/view/744417>.

Ground beetles exhibit wide diversity in body form, coloration, and habitat preferences. Most adults are somber black befitting their mostly nocturnal activity. However, nearly every conceivable color is represented. Some are brightly bicolored or strikingly iridescent. Most are carnivorous, though some add seeds to their diet. Some ground beetles are blind (genus *Anillinus*) while others have eyes that are disproportionately large for their body size (genus *Notiophilus*). Many are strong fliers with well-developed wings, some are flightless with short or rudimentary wings, and still other species display wing polymorphism. Many genera are capable of producing rank defensive odors using chemicals stored in the pygidial glands of their abdomen. The genus *Brachinus* can fire rounds of hot gas (212° Fahrenheit) from their abdominal tips, capable of killing small adversaries. Body lengths of ground beetles range from just over one millimeter in the North American species *Polyderis laeva*, to 100 millimeters in the south Asian genus *Mormolyce*. The largest species in our area at 30 to 36 millimeters include the brilliant green, caterpillar hunting *Calosoma scrutator*; the brightly violaceous, snail-eating *Scaphinotus unicolor*, and the rare *Pasimachus depressus* (possibly extirpated in the Washington, D.C., area) which is a generalist predator of insect larvae.

Ground beetles occupy a wide variety of habitats. *Platypatrobis lacustris* lives only in the walls of active or recently deserted beaver lodges (Bousquet, 2012) and *Elaphropus saturatus* can survive tidal submersion for at least six hours (Steury and Messer, 2014). Some are strong diggers found in subsurface habitats, some are cave specialists, and others are primarily arboreal. They are found in swamps and marshes, upland forests, meadows and deserts, from below sea level to 5,300 meters in elevation (Mani, 1968). It is not uncommon to find ground beetles in human habitations. Many species overwinter as adults. Adults live two to four years and the life cycle is completed within one year. Pupation occurs in the ground. Carabid fossils are common in Quaternary age deposits, many representing extant species and have been found in sediments as old as the late Tertiary Period (Matthews, 1979; Matthews and Telka, 1997).

Despite so much diversity, ground beetles share several anatomic similarities. Carabid antennae are never clubbed and are inserted laterally between the circular eye and mandibular cavity (scrobe). Abdomens consist of six visible segments called sternites, except in *Brachinus* species which have seven to eight. Tarsi always consist of five segments. The front tibiae each exhibit a deep notch containing a comb-like structure used by the beetle for cleaning its antennae. The hind trochanters are enlarged and long legs are adapted for running. The mouthparts project outward (prognathous) with prominent mandibles.

Recent ground beetle surveys of national parks near Washington, D.C., have documented 192 species (Steury & Messer, 2015; Steury et al., 2014; Steury and Messer, 2014). Other recent studies at Quantico Marine Corps Base in Prince William and Stafford counties, Virginia, documented 114 species (Hoffman, 2010), and at Eastern Neck National Wildlife Refuge in Kent County, Maryland, 80 species were recorded (Staines & Staines, 2011). Carabid inventories between 1970 and 1984 on Plummers Island in the Potomac River Gorge of Montgomery County, Maryland, yielded 117 species (Erwin, 1981; Stork, 1984). However, 214 carabid beetle species have been collected on Plummers Island over the last 100 years based on literature reviews and historical collections at the Smithsonian Institution, National Museum of Natural History (Brown, 2008; Erwin, 1981). Bousquet (2012) documented 414 carabid beetles from Maryland and Steury et al. (2014) and this report added a total of five additional species bringing the current Maryland total to 419 species.

STUDY SITE

Cove Point, located at approximately 38°23' north latitude, 76°24' west longitude in Calvert County, Maryland contains 406 ha owned by the Cove Point Liquefied Natural Gas (LNG) Limited Partnership. This area is bordered to the southwest by Cove Point Road, to the east by the Chesapeake Bay, and extends north almost to the main stem of Grays Creek. The site contains brackish and freshwater marshes separated by a barrier dune, the LNG industrial complex (44 ha), and upland areas (285 ha) comprised of young mixed deciduous and coniferous forest, managed meadows and lawns, ponds, creek and seeps. The 77 ha freshwater marsh lies within the truncated cusped foreland of Cove Point Cape. The brackish marsh was created in 2010 by constructing an armor stone breakwater along the beach front to protect the freshwater marsh from breaches of the barrier dune. At least 698 vascular plant species have been documented from this area (Steury, 2002). The freshwater wetlands are dominated by narrow-leaved cattail (*Typha angustifolia*) and the non-native grass, common reed (*Phragmites australis*). The now well-developed brackish marsh is dominated by smooth cordgrass *Spartina alterniflora*. The upland canopy is dominated by rock chestnut oak (*Quercus prinus*), although black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), mockernut hickory (*Carya tomentosa*), and pale hickory (*Carya pallida*) were also common along with the conifers Virginia pine (*Pinus virginiana*) and loblolly pine (*Pinus taeda*). American holly (*Ilex opaca*) occurred in the midstory while the shrub layer was dominated patches of mountain laurel (*Kalmia latifolia*), blueberry (*Vaccinium corymbosum* and *V. pallidum*) and huckleberry (*Gaulthieria baccata*).

CLIMATE

Cove Point lies in the Temperate Continental climate zone. There is no distinct dry season and summers are hot and winters are mild. The mean daily maximum temperature is 19.6° C and the mean daily minimum temperature 6.9° C between 1951 and 1980. Mean annual precipitation is approximately 108 cm. Snowfall measuring 0.25 cm or more occurs on an average of 72 days per year with a mean annual accumulation of 46.7 cm. Average frost penetration is about 12.7 cm along the coast of southern Maryland.

SOILS

Upland soils are primarily composed of Evesboro loamy sand and Sassafras fine sandy loam. Soils are very deep and excessively well drained. They contain low available moisture and are strongly to extremely acidic. Soils of Cove Point wetlands are mixed alluvial and consist of areas of saturated sand, peat, or muck. Elevations at Cove Point range from sea level to 34 m above sea level.

MATERIALS AND METHODS

Incidental collections of carabid beetles were made at Cove Point between 2010 and 2014, usually on two days per year in June and September while conducting vegetation monitoring at the marsh. In 2015, six days of survey effort targeted at land snails provided opportunities to collect carabid beetles as well. In 2016, focused efforts to collect carabid beetles were conducted on May 5, 12, 26, and 30, June 13, and on September 16 and 19. Most specimens were obtained by looking under driftwood on the beach or barrier dune. Other productive sites were beneath loose bark of fallen trees, and under logs or stones in woods and meadows. Areas near vernal pools were especially productive. All collecting was done by hand picking. Splashing (pouring one gallon of water on soil) near vernal pools and along the edge of the salt marsh brought many species to the surface that would have otherwise gone undetected. Specimens are deposited at the Smithsonian Institution, National Museum of Natural History (NMNH).

RESULTS

A total of 69 carabid species in 37 genera and 19 tribes was documented from Cove Point. The most commonly collected genera were *Anisodactylus* (9), *Bembidion* (6), and *Cicindela* (4). Three species, *Anisodactylus haplomus*, *Pterostichus permundus* and *Stenocrepis mexicana* are documented for the first time from Maryland. Fourteen species found at Cove Point were not found at national park sites near Washington, D.C. during recent inventories by Steury & Messer (2015), Steury et al. (2014) or Steury and Messer (2014). Although eight carabid species adventive to North America were found near the District of Columbia by Steury and Messer (2014), only two, *Amara familiaris* (Duftschmid) and *Harpalus affinis* (Schrank), were found at Cove Point. As recently as 1997 the federally threatened *Habroscelimorpha dorsalis dorsalis*

(Say), eastern beach tiger beetle, was found on the beach/dune habitats at Cove Point. This population was as high as 707 individuals in 1990, however by 1997 the population had declined to only 32 individuals (Knisley, 1997). By 2000 no *H. d. dorsalis* were found at Cove Point and despite ample search effort in its habitat in 2015 and 2016 no *H. d. dorsalis* were observed.

LIST OF SPECIES

Taxa are listed by tribe following the nomenclature and taxonomic order used by Bousquet (2012). The number of each species collected or observed is indicated in parentheses after each taxon. The periods of adult activity are given based on dates when taxa were collected or observed at Cove Point. A taxon is noted as “common” if it was routinely encountered during surveys. Dates separated by a hyphen indicate that the taxon was documented on at least one day during each month of the stated interval, whereas dates separated by a comma represent individual observation dates. The habitat associations are described for each taxon along with other bionomic notes. Species marked with an asterisk were not found at national park sites near Washington, D.C. by Steury & Messer (2015), Steury et al. (2014) or Steury and Messer (2014).

NOTIOPHILINI

Notiophilus novemstriatus LeConte—(3); 16 Jun; under deep leaf litter in sandy loam soil at edge of pine woods, associated with *Elaphropus ferrugineus*.

CARABINI

**Calosoma externum* (Say)—(1); 26 Sep; beach drift.

Calosoma wilcoxi LeConte—(5); 23 Apr - 5 May; under log in upland deciduous woods; under driftwood on beach.

CICINDELINI

Cicindela punctulata punctulata Olivier—(6); 15 Jun; sandy beach dune.

Cicindela sexguttata Fabricius—(common); 23 Apr - 16 Jun; roads; boardwalk in marsh; bare ground and open areas of woods and fields.

**Cicindela hirticollis hirticollis* Say—(4); 5 Oct, sandy beach dune.

Cicindela repanda repanda Dejean—(common); 5 May - 2 Aug, sandy beach dune.

OMOPHRONINI

Omophron labiatum (Fabricius)–(1); 30 May; under driftwood at edge of brackish *Spartina alterniflora* marsh.

SCARITINI

Scarites subterraneus Fabricius–(common); 5 May - 10 Jun, 3 Sep; under logs in woods, meadows, and on beach dunes.

CLIVININI

Clivina americana Dejean–(3); 15 Jun; under driftwood on beach; under leaf litter in woods.

Paraclivina bipustulata (Fabricius)–(1); 25 May; under leaf litter at woods/meadow ecotone.

BEMBIDIINI

Bembidion americanum Dejean–(2); 16 Jun; wet sand and algae at edge of salt marsh.

Bembidion affine Say–(8); 2 - 12 May; sandy beach dune under driftwood; muddy edge of vernal pool in meadow in full sun.

Bembidion impotens Casey–(3); 2 May; sandy beach dune under driftwood; muddy edge of vernal pool in meadow in full sun.

**Bembidion constrictum* (LeConte)–(2); 26 May; under detritus at edge of brackish *S. alterniflora* marsh.

**Bembidion contractum* Say–(16); 12 - 30 May; under detritus at edge of brackish *S. alterniflora* marsh.

Bembidion rapidum (LeConte)–(2); 15 Jun; under driftwood on beach.

**Elaphropus ferrugineus* (Dejean)–(1); 16 June; under deep leaf litter in sandy loam soil at edge of pine woods. This tiny beetle is frequently found in the nests of ants (*Lasius* sp.) (Larochelle and Larivière, 2003) and may be an obligatory myrmecophile. This species is not yet recorded from Virginia.

Elaphropus xanthopus (Dejean)–(7); 2 May - 13 Jun; muddy edge of vernal pool in meadow under full sun.

PATROBINI

Patrobus longicornis (Say)–(1); 10 Jun; beach dune/forest ecotone under log.

BRACHININI

**Brachinus alternans* Dejean–(7); 25 May - 13 Jun; dry termite tunneled pine log; under leaf litter at edge of mixed deciduous/coniferous woodland. Specimens possess the diagnostic setal patch on the medial mentum which distinguish it from otherwise similar *B. fumans* (Fabricius).

PTEROSTICHINI

**Poecilus chalcites* (Say)–(2); 12 May - 15 Jun; sandy beach dune under driftwood.

**Pterostichus ebeninus* (Dejean)–(1); 12 May; under plant debris on beach.

Pterostichus permundus (Say)–(2); 10 Jun; under log at beach dune/forest ecotone. NEW STATE RECORD. The known range for *P. permundus* is from southern Ontario and northern Michigan to southeastern South Dakota, northeastern Texas, and northeastern Florida (Bousquet, 2012). It is distinguished from similar *P. sculptus* by possessing a ventrally setose fifth tarsomere and a margined prosternal process.

Pterostichus sculptus LeConte–(1); 30 May; under leaf litter at meadow/forest ecotone.

Cyclotrachelus furtivus (LeConte)–(1); 16 Jun; under shallow leaf litter along fence row between rip-rap roadside and pine woods. The pronounced tapering of the stylomeres on this female specimen separates it from otherwise externally identical *C. sodalist* (LeConte).

ZABRINI

**Amara turbata* Casey–(1); 5 May; under driftwood on beach. This species is not yet recorded from Virginia.

Amara familiaris (Duftschmid)–(3); 5-12 May; under driftwood on beach dune.

OODINI

Oodes amaroides Dejean–(1); 12 May; under plant debris on beach.

**Stenocrepis mexicana* (Chevrolat)–(1); 26 May; under log at edge of vernal pool in meadow. NEW STATE RECORD. This species ranges along the Atlantic Coast from New Jersey to the Florida Keys, west to southern Wisconsin, southeastern Kansas, central Texas, and in Mexico to the Pacific Coast in the state of Colima. It has also been recorded from the Bahamas (Bousquet, 2012). It is distinguished from similar *S. duodecimstriata* (Chevrolat) by its larger size (10.2 - 12.5 mm) and its shorter, truncate mentum tooth. The specimen from Cove Point measured 11.6 mm and possessed the short truncate mentum tooth illustrated in figure 169 by Ciegler (2000).

CHLAENIINI

Chlaenius aestivus Say–(3); 23 Apr - 30 May; under log in swamp; under board in meadow; under pine log in meadow.

Chlaenius tricolor tricolor Dejean-(1); 10 Jun; under log at beach dune forest ecotone.

LICININI

Dicaelus elongatus Bonelli-(2); 23 Apr - 12 May; under log in dry upland woods; under decaying pine log in meadow.

HARPALINI

Anisodactylus nigerrimus (Dejean)-(1); 12 May; under driftwood on beach dune.

Anisodactylus dulcicollis (LaFerté-Sénectère)-(3); 5 May - 13 Jun; under driftwood on beach dune; crossing road at mid-day. The specimen collected on 12 May 2012 at Cove Point was the first Maryland record for this species (Steury et al., 2014).

Anisodactylus ovularis (Casey)-(1); 5 May; under driftwood on beach.

**Anisodactylus haplomus* Chaudoir-(1); 30 May; beach dune under driftwood. NEW STATE RECORD. Along the Atlantic Coast this species ranges from Long Island, New York, to southern Florida. It is found west to northeastern Oklahoma and east-central Texas (Bousquet, 2012). It is distinguished from *A. rusticus* by its larger size (12 - 14.5 mm), deeper subapical sinuation of the elytra, and less pronounced lateral pronotal bead. The specimen from Cove Point measured 13 mm.

**Anisodactylus merula* (Germar)-(2); 10 - 15 Jun; under driftwood on beach; under log at upper edge of beach dune.

Anisodactylus rusticus (Say)-(1); 6 Jun; under driftwood on beach.

Anisodactylus sanctaecrucis (Fabricius)-(1); 2 May - 15 Jun; sandy beach dune; bare open ground under leaf litter.

Anisodactylus verticalis (LeConte)-(1); 12 May; under plant debris on beach.

**Anisodactylus caenus* (Say)-(1); 5 May; under driftwood on beach.

Amphasia sericea (Harris)-(6); 5 May; under driftwood on beach.

Amphasia interstitialis (Say)-(1); 15 Sep; crawling on beach.

Stenolophus ochropezus (Say)-(Common); 5 May - 15 Jun, 3 - 15 Sep; under driftwood on beach, under leaf litter in woods and meadows. This is the most commonly encountered carabid beetle at Cove Point.

Stenolophus lecontei (Chaudoir)-(2); 11 Jun; under driftwood on beach.

Agonoleptus rotundatus (LeConte)-(5); 5 May - 15 Jun; under driftwood on beach.

Bradycellus rupestris (Say)-(1); 10 Jun; under log at edge of freshwater marsh.

Bradycellus tantillus (Dejean)-(3); 25 - 30 May; muddy edge of vernal pool in meadow.

Acupalpus pauperculus Dejean-(1); 25 May; muddy edge of vernal pool in meadow.

Acupalpus testaceus Dejean-(2); 12 - 25 May; muddy edge of vernal pool in meadow; beach dune under drift wood.

Harpalus pensylvanicus (DeGeer)-(15); 25 May - 15 Jun, 3 - 26 Sep; under driftwood on beach; under log in woods; under log in meadow.

Harpalus affinis (Schrank)-(2); 10 Jun; under driftwood on beach.

Harpalus fulgens (Csiki)-(3); 22 Apr - 25 May; under log in dry upland woods; pond edge under stone.

Selenophorus granarius Dejean-(6); 26 May - 15 Jun, 16 Sep; crawling on dry, hot sand in full sun on upper beach dune; edge of brackish marsh.

Trichotichnus autumnalis (Say)-(2); 5 - 12 May; under driftwood on beach.

SPHODRINI

Calathus opaculus LeConte-(5); 10 Jun; beach dune/forest ecotone under log.

PLATYNINI

Agonum excavatum Dejean-(1); 2 May; muddy edge of vernal pool in meadow.

Agonum octopunctatum (Fabricius)-(2); 2 May; muddy edge of vernal pool in meadow.

Agonum punctiforme (Say)-(18); 2 May - 13 Jun; 15 Sep; sandy beach dune under driftwood; in woods under log; under leaf litter in woods.

Platynus decentis (Say)-(1); 2 May; in dry termite riddled pine log in woods.

Platynus cincticollis (Say)-(3); 5 May - 15 Jun; under driftwood on beach.

CYCLOSOMINI

Tetragonoderus fasciatus (Haldeman)-(2); 26 May; beach dune.

LEBIINI

Cymindis limbata Dejean-(1); 13 Jun; under driftwood on beach dune.

Apristus latens (LeConte)-(14); 5 - 26 May, 3 - 16 Sep; under driftwood on beach dune.

Lebia lobulata LeConte-(1); 15 Jun; under leaf litter at edge of shaded vernal pool.

Lebia viridis Say-(3); 5 - 12 May; under drift wood on beach. Associated with chrysomelids of the genus *Altica* forming a union of Batesian mimicry. Adults feed on chrysomelid eggs, larvae, and pupae and the larva is ectoparasitic on chrysomelid pupae (Larochelle and Larivière, 2003).

Plochionus timidus Haldeman-(1); 15 Jun, climbing vegetation on upper beach dune.

**Calleida punctata* LeConte-(1); 5 May; beach drift.

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Notes on other beetle families observed at Cove Point

Anthicidae (Antlike Flower Beetles)

Malporus properus Casey—(1); 15 Jun; under driftwood on beach dune. There is only one other record of this species from east of the Appalachian Mountains in the last 70 years. That record is from Cecil County, Maryland, collected in 1978 (Steury and Messer, 2015).

Cerambycidae (Long-horned Beetles)

Hyperplatys aspersa (Say)—(1); 2 Aug; crawling on vegetation in sandy beach dune.

Purpuricenus humeralis (Fabricius)—(1); 29 May; beach drift.

Sternidius alpha (Say)—(1); 15 Jun; sandy beach dune.

Meloidae (Blister Beetles)

Tricrania sanguinipennis (Say)–(1); 12 May; beach dune under driftwood. The larvae of this beetle are parasites of the eggs and food of ground nesting bees in the genus *Colletes*. Female *Tricrania* imagos, which are not known to feed, can lay over 1000 eggs within a two week period and die a few days after the last oviposit. Eggs hatch in about a month and first instar larvae lay in wait on the ground around the bee burrow entrances. As the *Colletes* crawl past, the meloid parasites use their jaws, which are notched on the inner side, to grab hold of a bee hair and hitch a ride down the burrow. The parasites then move from male to female bees during mating and thus gain entrance to the brood chamber of their host. There they dine on bee eggs and the honey and pollen left for colletid larvae. *Tricrania* larvae have also been documented on andrenid bees but are never successful in reaching the eggs due to a defensive, viscous, watery honey surrounding the egg that entrap the desisted parasite (Parker and Böving, 1924).

Melyridae (Soft-winged Flower Beetles)

Collops quadrimaculatus (Fabricius)–(1); 15 Jun; on flowers of *Opuntia humifusa* (prickly-pear cactus) on beach dune.

Oedemeridae (False Blister Beetles)

Hypasclera doralis (Melsheimer)–(common); 15 Jun; under driftwood on beach. The habitat of this native beetle is the same as for the non-native species below. The two were never observed at the same time of year.

Nacerderdes melanura L.–(common); 25 - 30 May; under driftwood on beach. This species is native to Europe. The larvae develop in damp and decaying driftwood. The adults are short lived and do not feed. At Cove Point the adults of this species are absent from the beach dune before the emergence of *Hypasclera doralis*.

Staphylinidae (Rove Beetles)

Creophilus maxillosus villosus Gravenhorst–(1); 10 June; under log at beach dune forest ecotone. Adults and larvae of this species are found primarily on carrion and are predators of maggots and adult flies and other arthropods attracted to carrion. They are bumblebee mimics and can excrete the same malodorous defensive chemicals used by honeybees when disturbed.

Tenebrionidae (Darkling Beetles)

Phaleria testacea Say–(1); 10 June; under driftwood on beach. This coastal beach specialist is cryptically colored to match the color of beach sand.

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Appreciation is extended to Peter Messer for confirming the identifications of the three new Maryland records (*Anisodactylus haplomis*, *Pterostichus permundus*, and *Stenocrepis Mexicana*).

NOTES ON OTHER TAXA

A survey of mollusks at Cove Point in 2015 documented 27 species (22 snails and 5 slugs). During the 2016 carabid survey one additional species, the Pupillid land snail *Pupoides albilabris* (C.B. Adams) was found under a small dry log on the beach dune near the southern edge of the marsh.