

Eight Ground Beetles (Coleoptera: Carabidae) New to Virginia, with Additional Records for West Virginia and Maryland

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ABSTRACT

Eight ground beetle species, including *Trechus quadristriatus* (Schrank), *Elaphropus dolosus* (LeConte), *Brachinus americanus* (LeConte), *Pterostichus tenuis* (Casey), *Cyclotrachelus convivus* (LeConte), *Agonum mutatum* (Gemminger & Harold), *Somotrichus unifasciatus* (Dejean), and *Cymindis elegans* LeConte, are reported from Virginia for the first time, and one species, *Clinidium apertum allegheniensis* Bell & Bell, is removed from the state list. Two species are reported as new state records for Maryland (*Harpalus katiae* Battoni) and West Virginia (*Clinidium apertum allegheniensis* Bell & Bell).

Keywords: adventive species, Gaudineer Knob Scenic Area, Laurel Fork Recreation Area, new state records, red spruce, sphagnum.

INTRODUCTION

The ground beetles of Virginia (Carabidae) have been the subject of several papers published in this journal as part of ongoing efforts to document the group's diversity in the Commonwealth. The most recent new state record was reported in Steury & Messer (2015), who cite a total of 544 species and subspecies as occurring in Virginia. The current paper brings the total to 551, satisfying a prediction made by the late Richard L. Hoffman in 2006: "An eventual total of 550 resident Virginia carabids now seems plausible, and another decade of intensive fieldwork may see that figure realized" (Hoffman et al., 2006). Of the eight taxa recorded as new here, four are the result of personal collecting efforts by me and/or Arthur V. Evans, while the other half were obtained through sampling carried out by staff of the Virginia Department of Conservation and Recreation's Division of Natural Heritage (VDNH). The latter records were discovered in the collection of the Virginia Museum of Natural History, which continues to serve as an indispensable resource for documenting Virginia's biodiversity.

The sequence and nomenclature of the taxa listed below follows that of Bousquet (2012), except the tribe Rhysodini, which Bousquet treats as a separate family. The sources used for identification are cited after each species' listing; interested readers are encouraged to

refer to those sources for more information. Images of each species are available online at BugGuide (www.bugguide.net; Accessed 2 April 2018).

Specimens cited are in the collection of the Virginia Museum of Natural History (VMNH, Martinsville, VA) unless otherwise noted. Other collections cited in this paper are the Carnegie Museum of Natural History (CMNH, Pittsburgh, Pennsylvania), National Museum of Natural History, Smithsonian Institution (NMNH, Washington, DC), and the personal collections of myself (CWHC, Front Royal, VA) and Arthur V. Evans (AVEC, Richmond, VA).

SPECIES ACCOUNTS

RHYSODINI

Clinidium apertum allegheniense Bell & Bell
(Identification resource: Bell & Bell, 1985)

This subspecies is known from several old specimens collected in Pennsylvania and Mount Mitchell in the Black Mountains of North Carolina (Bell & Bell, 1985). Roble & Hoffman (2012) reported the subspecies from Virginia for the first time, based on single specimens from Cumberland and Henry counties. While examining *Clinidium* in the VMNH collection in 2017, I realized that these two specimens were misidentified. The

individual from Cumberland County is a female *C. baldufi*, and the one from Henry County is a female *C. sculptile*. These determinations are supported by the presence in the VMNH collection of correctly-identified males of the same species, from the exact same collecting events.

Clinidium species are very similar to one another dorsally. The existing keys to species rely almost entirely on ventral characters. However, *C. apertum* has a unique dorsal character that no other species currently known from Virginia has: the basal impressions of the pronotum are broadly open posteriorly (Fig. 1). Bell & Bell (1985) state that this character alone will separate *C. apertum* from all other eastern U.S. species except *C. valentinei* (not yet known from Virginia) and “some specimens of *rosenbergi*”. They did not elaborate on the latter, and all the individuals of *C. rosenbergi* in the VMNH and CMNH collections have basal impressions that are closed.

As there are currently no specimens of *Clinidium apertum allegheniense* known from Virginia, the species is here **removed** from the state list. However, it can be added to the state list for West Virginia, based on the following specimens:



Fig. 1. Forebody of *Clinidium apertum allegheniense*.

NEW STATE RECORD, WEST VIRGINIA:
Pocahontas Co.: [Monongahela National Forest], Gaudineer Knob Scenic Area. 5 August 1986, M. C. Thomas (11, CMNH); Gaudineer Knob Scenic Area, N 38.624, W -79.844. 1260 m. 29 June 2017. R. E. Acciavatti, R. L. Davidson, and C. W. Harden. Under bark, virgin spruce/hardwoods (6, CWHC; 5, CMNH).

The Gaudineer Knob Scenic Area is a small parcel of virgin red spruce (*Picea rubens*) and northern hardwood forest located in the Monongahela National Forest near Durbin. The 2017 collection cited above was carried out to confirm the continued presence of the species, after the belated discovery (by Davidson) of the specimens collected there 30 years earlier. Our success in finding the species was swift (the third log checked), and the series of 11 individuals was collected in just a couple hours of searching. All of the specimens were under the bark of fallen red spruce trees that had decayed to the point that the bark lifted off easily in large chunks. No other species of *Clinidium* were encountered at the site.

Due to its proximity and ecological similarity to Gaudineer Knob, the best place in Virginia to seek *C. apertum* might be the Laurel Fork Recreation Area in the George Washington National Forest in Highland County (see records for *Pterostichus tenuis* and *Agonum mutatum* below).

TRECHINI

Trechus quadristriatus (Schrank)

NEW STATE RECORD

(Identification resource: Bousquet et al., 1984)

Augusta Co.: [George Washington National Forest], Maple Flats, N 37.9788, W -78.9919. 480 m. 9 June 2017, C. W. Harden. Active at night, margin of sinkhole pond (1). *Botetourt Co.:* [Jefferson National Forest], west of Blackhorse Gap, N 37.4270, W -79.7589. 600 m. 11 June 2017, C. W. Harden. Sifted from litter near small stream (1).

This is a European species that was apparently introduced to the Great Lakes region some time before 1965, and it has gradually been collected from more southern locales since then. Bousquet (2012) lists the species from Maryland and West Virginia, so its occurrence here is not unexpected.

The *Trechus* that are native to Virginia and the southern Appalachians are all incapable of flight and exist only in moist, cool microhabitats. Larochelle & Larivière (2003) report *T. quadristriatus* from anthropogenic habitats such as gardens and field edges, which is typical of an introduced species. However, the habitat

cited above for Botetourt County was a shaded rocky stream in a relatively mature forest, similar to ideal native *Trechus* habitat.

BEMBIDIINI

Elaphropus dolosus (LeConte)

NEW STATE RECORD

(Identification resource: Lindroth, 1966)

Sussex Co.: Swamp, Rte 608, 4 mi SE Sussex, 15 September 1998. UV trap, R. L. Hoffman (1); Chub Sandhill Natural Area Preserve, 11 May 2000, C. S. Hobson, VDNH survey, UV (1).

Elaphropus species are difficult to identify, but *E. dolosus* can be easily distinguished by its markedly narrow body (especially the pronotum), which is also flatter and proportionately more elongate than that of other species in our area. Additionally, the antennae are entirely pale, as is most of the dorsal body surface (the center of the elytra is sometimes darker), and the elytra have only one distinct stria each. The species has not been reported from North Carolina, but its occurrence in Sussex County, not far from the state line, suggests it very likely occurs in that state as well.

BRACHININI

Brachinus americanus (LeConte)

NEW STATE RECORD

(Identification resource: Erwin, 1970)

Appomattox Co.: Holliday Lake State Park, Lakeshore Trail, N 37.34, W -78.63, 14 April 2017, C. W. Harden & L. M. Thompson, headlamp searching at night (1, CWHC). *Cumberland Co.*: 2 km SW of Columbia, clearcut North, 1 May 1990, J. C. Mitchell (1); same location and collector but hardwoods North, 19 October 1989 (1), 16 June 1990 (2), 1 July 1990 (1), 16 July 1990 (1), 1 August 1990 (5), 16 September 1990 (3), 30 September 1990 (3); same collector but 7 km SW of Columbia, hardwoods South, 17 March 1990 (2); same collector but 5.5 km SW of Columbia, clearcut South, 12 March 1990 (1), 17 March 1990 (1); same collector and location but pinewoods, 1 August 1990 (1). *York Co.*: Grafton Ponds, 9 November 1990 (1), 26 November 1990 (1), 21 March 1991 (2), 4 April 1991 (1), 1 May 1991 (1), VDNH survey, K. A. Buhlmann. *Radford City*: 19 May 1960, E. Gooding (1).

This bombardier beetle has obviously been known

from Virginia for many years, and its unreported status until now is likely due only to oversight. *Brachinus* are notoriously difficult to identify, but of the 12 species known from Virginia, *B. americanus* is the only one with strongly-sloped shoulders of the elytra. The species is incapable of flight, and most of the known Virginia specimens were collected during long-term pitfall trap surveys. The specimen from Holliday Lake State Park was found actively running on a dirt trail just after sunset, along with two individuals of the much more common *B. fumans* (Fabricius). The habitat was a forest edge of mostly oak and pine, fronted by a moist grassy lake edge and not far from a developed picnic area. Descriptions of the Cumberland County sites can be found in Hoffman et al. (2012).

PTEROSTICHINI

Pterostichus tenuis (Casey)

NEW STATE RECORD

(Identification resource: Bousquet & Pilon, 1983)

Highland Co.: [George Washington National Forest] Locust Springs Recreation Area [*sic*], wet sphagnum meadow along Buck Run trail, 1000 m, 30 June 2017, C. W. Harden, treading sphagnum (2, VMNH; 12, CWHC).

The accurate title of the area cited above is the Laurel Fork Recreation Area; "Locust Springs" refers more to the maintained picnic area where parking is available. The misnomer is printed on the specimen labels, and repeated here to avoid possible confusion. Laurel Fork is a unique and biologically important area, with extensive red spruce and northern hardwood forests that are home to a more boreal flora and fauna than is typical of Virginia. See Roble (1999) and Roble et al. (2009) for detailed descriptions of the area.

Davidson (1988) discovered the preference of *P. tenuis* for *Sphagnum* mats and reported the species from Maryland and West Virginia. There may not be many other places in Virginia where this species occurs because it seems to favor cold boggy habitats. The very similar species *P. luctuosus* (Dejean) is widespread in Virginia, and found in a variety of wet habitats, usually occurring on silty mud substrates. In addition to the 14 *P. tenuis* collected in *Sphagnum* at Laurel Fork, four *P. luctuosus* were found. These, along with several other interesting beetles and *Agonum mutatum* (see below), were collected by treading the moss mats into the water and waiting for the submerged insects to float to the surface.

Cyclotrachelus convivus (LeConte)

NEW STATE RECORD

(Identification resource: Freitag, 1969)

Wise Co.: Powell Mountain Karst Preserve, Franklin Cave, pitfall traps, 1-30 July 2009, [VDNH survey], A. C. Chazal, C. S. Hobson (4), 20 August-23 September 2009, C. Hobson, W. Orndorff, S. Roble (2, AVEC; 1, CWHC); Solomon's Seal Cave, pitfall traps, 6-28 April 2009, C. S. Hobson, A. V. Evans (1, VMNH; 1, CWHC), 13-27 May 2009, C. S. Hobson, J. F. Townsend (1, AVEC), 10 June-1 July 2009 (3, AVEC), 9 July-20 August 2009, C. Hobson, R. Reynolds, S. Roble (1, CWHC); Cedar Ridge, pitfall traps, 13-29 May 2009, C. S. Hobson, J. F. Townsend (1), 9-11 June 2009, A. C. Chazal, C. S. Hobson (1), 29 June-2 July 2009, C. S. Hobson, J. F. Townsend (2) 29-30 July 2009, A. C. Chazal (1), 29 July-20 August 2009, C. S. Hobson (1, NMNH; 2, AVEC), 20 August-23 September 2009, C. Hobson, W. Orndorff, S. Roble (1, AVEC; 1, CWHC).

This species is nearly indistinguishable externally from *Cyclotrachelus sigillatus*, which is a very common and widespread species in Virginia. *Cyclotrachelus convivus* tends to be duller and with less rounded sides to the pronotum and elytra (notably in males), but both species show much variation, thus examination of the male reproductive organ (aedeagus) is necessary for confident identification. Usually the very tip of the organ is sufficient to confirm the species, and fortunately the tip is often exposed in preserved specimens.

All species of *Cyclotrachelus* are incapable of flight and many have relatively small and localized distributions that are strongly influenced by geographic barriers such as mountain ranges and large rivers. Freitag (1969, fig. 131) illustrates the distributions of *C. convivus* and *C. sigillatus*, showing the two species largely separated by the Appalachian Mountains, with *C. convivus* to the west. He reports eastern Tennessee and southwestern Pennsylvania as the two known areas of range overlap, stating that the species seem to be allopatric otherwise. Another area of overlap has since been observed in and near Morgantown, West Virginia (Davidson, *in litt.*). Davidson has observed that although both species occur at Morgantown and Powdermill Nature Reserve (Westmoreland County, Pennsylvania), the two seem to never share the same microhabitat.

Fine-tuning the distribution of the two species in Virginia through dedicated collecting would be an interesting project to undertake. The occurrence of *C. convivus* in the Cumberland Mountains physiographic province is not surprising given Freitag's map, and it is

probably unlikely that it occurs east of the Tennessee Valley in Virginia. The case is more complicated with *C. sigillatus*. The nearest documented occurrences of *C. sigillatus* to *C. convivus* in Virginia are Washington County (1 km E of Mendota) and Dickenson County (Breaks Interstate Park). The aedeagi of males from both sites were examined and confirmed as *C. sigillatus*. The Breaks record is notably disjunct from the rest of the species' known range and its occurrence there should be verified by further collecting.

HARPALINI

Harpalus katiae Battoni

NEW STATE RECORD, MARYLAND: *Caroline*

Co.: Idylwild Natural Area, 24 June 2017, W. J. Hubick, found dead on trail in sandy area (1, CMNH).

(Identification resource: Will, 1997)

The discovery of *H. katiae* on the Delmarva Peninsula in Maryland extends its known range over 180 km north of the Virginia records in Hoffman & Roble (2000), and beyond the projected range of the species presented in Will (1997, Fig. 1). The specimen is a male and was confirmed by examination of the aedeagus.

PLATYNINI

Agonum mutatum (Gemminger and Harold)

NEW STATE RECORD

(Identification resource: Lindroth, 1966)

Highland Co.: [George Washington National Forest], Locust Springs Recreation Area [*sic*, see under *Pterostichus tenuis* above], wet sphagnum meadow along Buck Run trail, 1000 m, 30 June 2017, C. W. Harden, treading sphagnum (2, VMNH; 20, CWHC).

Like *Pterostichus tenuis* (see above), *A. mutatum* is associated with *Sphagnum* mats, and the two are often found together (Davidson, 1988). *Agonum mutatum* has a much larger range than *P. tenuis*, occurring across the continent in the north and as far south as eastern South Carolina in the east (Bousquet, 2012). It is likely that that the species has been collected before in Virginia and has gone unrecognized due to the difficulty of separating the *melanarium*-group species of *Agonum*. The only other member of this group found at the Laurel Fork area during my visit was *A. fidele* Casey, one specimen of which flew to a blacklight sheet set at the edge of the *Sphagnum* meadow that night. No *A. mutatum* were attracted to the light, and no other *Agonum* were collected in the *Sphagnum*.

LEBIINI

Somotrichus unifasciatus (Dejean)

NEW STATE RECORD

(Identification resource: Ball & Bousquet, 2000)

Powhatan Co.: Powhatan State Park, vicinity of Canoe-in Camp, N 37.6792, W -77.7459, 26-27 June 2014, A. V. Evans, UV light trap (1, AVEC).

Somotrichus unifasciatus is an adventive species in North America, where it is believed to have been introduced several times by human transport. It has been reported from several southeastern states, including North Carolina. The species is distinctive, with dense vestiture and a striking orange-black color pattern. With *Trechus quadristriatus*, it raises the number of non-native carabids known from Virginia to 15.

Cymindis elegans LeConte

NEW STATE RECORD

(Identification resource: Lindroth, 1969)

Sussex Co.: Chub Sandhill Natural Area Preserve, 18 October 2002, S. Erdle, DCR-DNH (1).

Known from most of the mid-Atlantic states including the District of Columbia and North Carolina, this species was to be expected in Virginia. The presence of only a single specimen suggests that the preferred habitat of the species has not been sufficiently searched. Larochelle & Larivière (2003) report the species from sand hills and “dry, sandy, almost bare soil”, of which there is plenty at Chub Sandhill. Label data from collections suggests that the species is most active at colder times of the year, which could also account for the lack of other specimens.

DISCUSSION

The total number of ground beetles known from Virginia has now surpassed 550, and this number will undoubtedly continue to increase. The important regional collection of the Virginia Museum of Natural History will surely continue to supply many of these records, as the extensive backlog of unsorted specimens is explored and identified. However, a thorough understanding of Virginia’s ground beetles will depend on the interest and dedication of individuals, as well as the continued support for programs such as the Virginia Division of Natural Heritage, without which our knowledge of Virginia’s natural history would be far more incomplete.

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