

Historical Records of *Nicrophorus americanus* (American Burying Beetle) from Virginia and Vicinity, and Confirmation of the Occurrence of *N. carolinus* in Virginia (Coleoptera: Silphidae)

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ABSTRACT

Nicrophorus americanus is a federally endangered beetle that was last collected in Virginia in 1955. All known historical records of this species from Virginia, North Carolina, Maryland, and the District of Columbia are reviewed. The alleged existence of *Nicrophorus carolinus* in Virginia is substantiated for the first time. Historical records of this species from North Carolina, West Virginia, and Maryland are reviewed.

Key words: beetle, distribution, endangered species, Coleoptera, *Nicrophorus*, Silphidae, Maryland, North Carolina, Virginia, West Virginia, District of Columbia.

INTRODUCTION

Although at least three volumes (Linzey, 1979; Terwilliger, 1991; Terwilliger et al., 1995) have treated the rare, threatened, and endangered flora and fauna (including selected insects) of Virginia in great detail in recent decades, none of them includes mention of *Nicrophorus americanus* Olivier, the American burying beetle. Davis (1980) and Anderson (1982) first noted apparent scarcity or population declines of this large, wide-ranging carrion beetle, and Kozol et al. (1988) conducted the first detailed ecological study of this species. Like all *Nicrophorus*, this species, the largest North American member of the genus, exhibits extended biparental care of its young, and both adults and larvae feed on carrion. In 1989, *N. americanus* was listed as a federally endangered species due to widespread population declines during the previous century (U.S. Fish and Wildlife Service, 1991). Once found throughout eastern United States (it was

historically documented from at least 150 counties in 35 states) as well as extreme southeastern Canada, the range of *N. americanus* has been reduced by more than 90% from its historical extent (Anderson & Peck, 1985; Peck & Kaulbaurs, 1987; U.S. Fish and Wildlife Service, 1991). At the time of its official listing as endangered, this species was thought to persist only on one island off the coast of Rhode Island (i.e., Block Island) and in four counties in eastern Oklahoma (U.S. Fish and Wildlife Service, 1991). Its new legal status brought increased attention to this species in the form of inventory and research studies (e.g., Ratcliffe & Jameson, 1992; Creighton et al., 1993; Lomolino & Creighton, 1996; Amaral et al., 1997; Backlund & Marrone, 1997; Guarisco, 1997; Holloway & Schnell, 1997; Lomolino et al., 1997; Miller & McDonald, 1997; Carlton & Rothwein, 1998; Creighton & Schnell, 1998; Bedick, et al. 1999; Walker & Hoback, 2007; Backlund et al., 2008). Some of these inventory efforts resulted in the documentation of additional extant

populations of *N. americanus* at the western periphery of its historical range, including sites in six states (Arkansas, Oklahoma, Texas, Kansas, Nebraska, and South Dakota), but the species has not been rediscovered anywhere in the East.

The Block Island population remains the only known, naturally-occurring extant population east of the Mississippi River. Raithel et al. (2006) summarized the results of a long-term monitoring study on this population, and reported that supplemental provisioning of carrion resulted in an increase in the population size, perhaps suggesting that availability of carcasses is a limiting factor. Captive rearing and reintroduction methods (in southeastern Ohio and two islands off the coast of Massachusetts) have also been employed in an effort to re-establish additional populations in the East (Amaral et al., 1997; Dikeman, 2009; Selbo, 2009).

More recently, Szalanski et al. (2000) analyzed the population genetic structure of *N. americanus* and Bedick et al. (2004) evaluated a number of sampling methods for *N. americanus* that involved the use of baited pitfall traps of various sizes and designs, and suggested changes to the official standard protocol approved by the U.S. Fish and Wildlife Service. Sikes & Raithel (2002) reviewed eight hypotheses that might account for the rather sudden decline of this species. These hypotheses include the possibility that an unknown pathogen could have caused widespread declines of *N. americanus* or that reduced availability of large vertebrate carrion within the past century, perhaps as a result of factors such as habitat degradation or fragmentation, increased competition from vertebrate scavengers, or even the extinction of the once extremely abundant Passenger Pigeon (*Ectopistes migratorius*), might account for the observed decline. Since *N. americanus* seems to be a habitat generalist (e.g., Lomolino et al., 1995; Backlund & Marrone, 1997; Creighton & Schnell, 1998), the loss of any particular type of habitat does not appear to be a satisfactory explanation. Sikes & Raithel (2002) concluded that more research is needed to evaluate the various hypotheses before a better understanding of the precipitous decline of *N. americanus* can be obtained.

REGIONAL DISTRIBUTION OF *NICROPHORUS AMERICANUS*

In the virtual absence of inventory surveys for most groups of insects in Virginia, the disappearance of *N. americanus* from the Commonwealth essentially went unnoticed. We are aware of a total of 15 historical adult specimens that were collected in the state and take this

opportunity to document these records. Twelve of the specimens are deposited in the National Museum of Natural History (NMNH), Smithsonian Institution, Washington, D.C., and one each resides in the insect collections of Harvard University (MCZ, Cambridge, Massachusetts), Virginia Polytechnic Institute and State University (= Virginia Tech; VPISU, Blacksburg, Virginia), and the Virginia Museum of Natural History (VMNH, Martinsville, Virginia). These specimens came from the following five or six localities:

1. Nelson County, June 1896 (MCZ, 1; specimen not examined). Perkins (1983) and U.S. Fish and Wildlife Service (1991) do not provide a specific locality (or collector), but we suspect the specimen was obtained by Col. Wirt Robinson, a naturalist/collector who resided at Wingina along the James River during that period.

2. Fredericksburg [Spotsylvania Co.] - three old specimens, including two collected on 25 May 1900 and the other one lacking a date (probably ca. 1900); collector's name lacking from all labels (NMNH, 3♂) but we suspect it may have been W. D. Richardson, a local naturalist/collector during that period.

3. Richmond (city) - six specimens, including a male and female collected on 24 July 1927 and 5 August 1927, respectively, and four others lacking dates (probably ca. 1920-30); all specimens collected by George W. Barber (NMNH, 3♂, 3♀). According to the pin labels, the four specimens lacking dates were taken on turtle carcasses during a scavenger study and were part of the S. W. Bromley insect collection that was donated to NMNH in 1955.

4. Essex County, [unspecified locality], 22 May 1932, C. L. Pace, "On dead snake" (VMNH, 1♀, ex UR collection).

5. Montgomery County, [unspecified locality and collector but likely Ellison A. Smyth, Jr.], 26 June 1900, 20 May 1910, and 20 May 1911 (NMNH, 3♀). Smyth was head of the biology department at Virginia Tech during this time period (Mitchell & Kosztarab, 1998) and collected insects locally in Blacksburg as well as nearby Poverty Hollow (ca. 8 km north of Blacksburg). SMR has seen many of Smyth's Lepidoptera specimens at NMNH (mostly) and VPISU, most of which do not bear his name as the collector and often only list the county name (Montgomery) rather than also include Blacksburg on the label (very few

labels specify Poverty Hollow as the collection site).

6. Montgomery Co., Blacksburg, August 1955, [no collector specified] (VPISU, 1♀). This is the last known specimen of *N. americanus* documented in Virginia.

The United States range maps for *N. americanus* prepared by Perkins (1983) and Peck & Kaulbars (1987) (as well as those published in U.S. Fish and Wildlife Service, 1991, Lomolino et al., 1995, Holloway & Schnell, 1997, and Sikes & Raitzel, 2002) show four localities in Virginia, which correspond to records 1-3 and 5 above. During the past two decades, staff of our respective agencies (as well as several other researchers, most notably Joseph C. Mitchell and Arthur V. Evans) have conducted extensive pitfall and/or blacklight trapping throughout Virginia and captured thousands of *Nicrophorus* specimens, but *N. americanus* was not among these, suggesting that this species is likely extirpated from the state.

Other historical localities nearest to Virginia include the District of Columbia, one site on the Eastern Shore of Maryland (Dorchester Co., Cambridge, [collector unknown], 25 June 1947, Florida State Collection of Arthropods (FSCA), 1; same but August 1939, Natural History Society of Maryland, 1; specimen not examined) and two sites each in western North Carolina and eastern Tennessee (the most recent collections from these states were made in 1940 and 1955, respectively, fide U.S. Fish and Wildlife Service [1991]; see also Walker [1957] and Anderson [1982]). Historical specimens of *N. americanus* from the District of Columbia include those housed in the American Museum of Natural History (1895, n = 1; AMNH), Carnegie Museum of Natural History (no dates, n = 2; CMNH), MCZ (1931, n = 1), and NMNH (1890-1902, n = 5) (SMR, pers. obs. and data in Perkins [1983]). At least seven other Maryland specimens exist (MCZ, 3; University of Maryland, 4 [four other specimens in this collection lack locality data but they apparently were presumed to be of Maryland origin by Staines (1987), who reported 8 specimens]), but they only contain state labels and lack collection data (Perkins, 1983; Staines, 1987; Roble, pers. obs.). No records of *N. americanus* were plotted for West Virginia by Perkins (1983) or Peck & Kaulbars (1987), and we are not aware of any subsequent reports from that state. This species was last documented in Kentucky (Land Between the Lakes region in southwestern corner) much later than in each of the states discussed above (Trigg Co., Hematite Lake, T. Jeffards, 18 July 1974, FSCA, 1).

Brimley (1938) recorded *N. americanus* from five localities in North Carolina: Beaver Creek (Ashe Co.), Morganton (Burke Co.), New Bern (Craven Co.), Raleigh (Wake Co.), and Southern Pines (Moore Co.). None of these records was included in the summaries prepared by Perkins (1983) or Peck & Kaulbars (1987). Apparently, the most recent specimen (in Field Museum of Natural History) of *N. americanus* from North Carolina was taken at Black Mountain (Buncombe Co.) in 1940 (Perkins, 1983; U.S. Fish and Wildlife Service, 1991). Perkins (1983) and Peck & Kaulbars (1987) did not examine the North Carolina State University collection, which contains five specimens of *N. americanus* from North Carolina, including two obtained at localities not mentioned by Brimley (1938): Erwin (Harnett Co.), 1938; Asheville (Buncombe Co.), 1935; New Bern, 1935; Beaver Creek, 1915; and Raleigh, 1901. Five additional specimens (AMNH) of this species were collected in 1904 in the Black Mountains of western North Carolina (Perkins, 1983). It is likely that these specimens were collected on or near Mount Mitchell (Yancey Co.) by E. C. Van Dyke or William Beutenmuller, both of whom were active beetle collectors in this region at that time. Collectively, the above sources account for a minimum of nine known historical sites for *N. americanus* in North Carolina (Fig. 1).

REGIONAL DISTRIBUTION OF *NICROPHORUS CAROLINUS*

A related species of potential conservation concern in Virginia is *Nicrophorus carolinus* (Linnaeus). Anderson & Peck (1985) stated that the range of this species extends “from the central states south to Texas and Arizona, east along the Gulf Coastal Plain to Florida, then north along the Atlantic Coastal Plain to Virginia.” They also cited a specimen record from southeastern Alberta, the only documentation of this species from Canada. Peck & Miller’s (1993) catalog listed Virginia, Maryland, and New York as the northernmost extent of the range of this species in the East. However, Peck & Kaulbars (1987) did not plot locality records in any of these states (or West Virginia) on their map for *N. carolinus*, their northernmost records east of the Mississippi River being four localities in southeastern North Carolina. When queried for data on Virginia specimens of *N. carolinus*, Peck responded (*in litt.*, 1994) that he had no actual records of this species from Virginia (or Maryland and New York), but he did confirm the existence of an unpublished record for West Virginia (Hardy Co.,

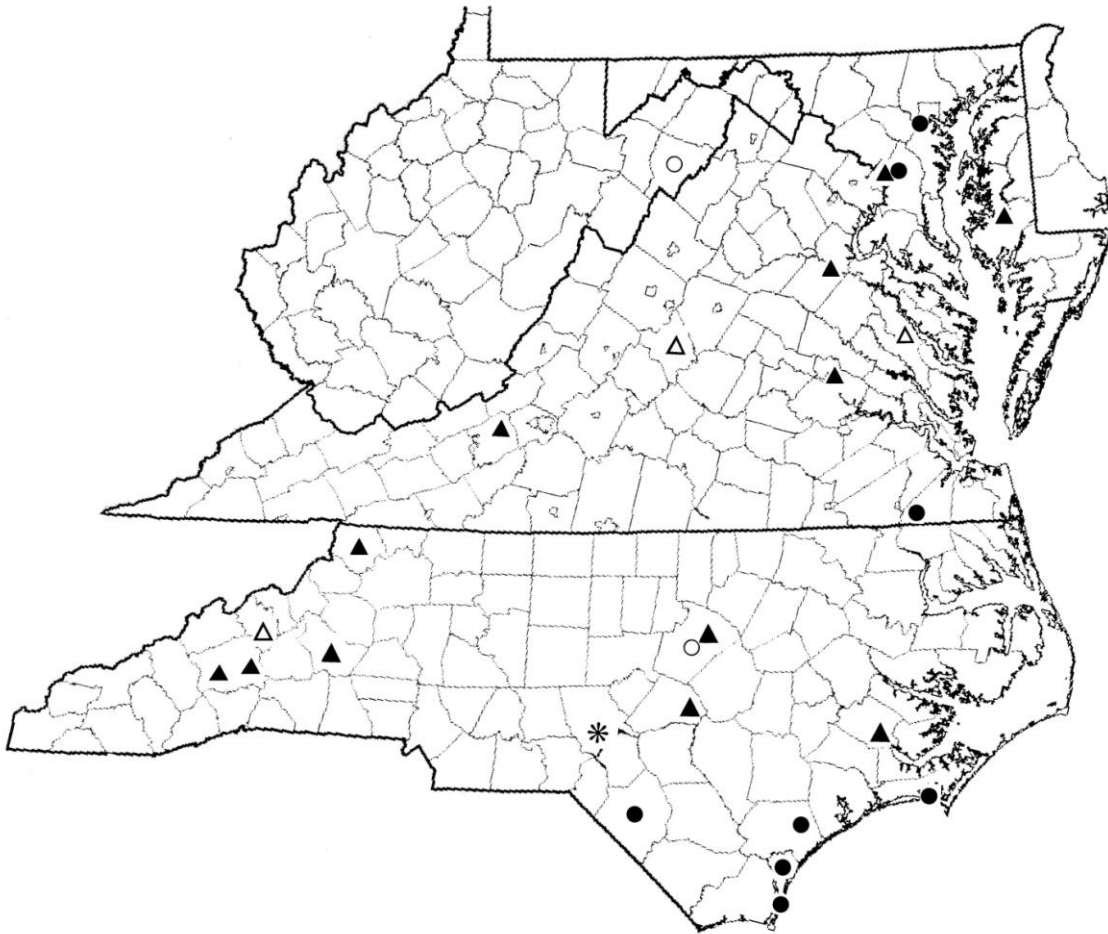


Fig. 1. Known distribution of *Nicrophorus americanus* (triangles; all records 1955 or older) and *Nicrophorus carolinus* (circles; all records 1968 or older except for Suffolk, Virginia) in Virginia and adjacent states. Closed symbols indicate specific localities and open symbols denote county or other general records. The asterisk marks the only documented sympatric locality (Southern Pines, North Carolina); Aberdeen is proximate to Southern Pines and not indicated by a separate symbol. College Park and Greenbelt, Maryland are represented by the same dot. "Dundee" North Carolina appears to no longer exist; the symbol for that locality is therefore centered on Robeson County.

3 August 1966, R. Martin, West Virginia Department of Agriculture collection, 1). Staines (1987) reported *N. carolinus* from Frederick (Ijamsville, 18 May 1898) and Prince Georges (College Park, 20 June 1941; Greenbelt, 8 May 1961) counties in Maryland, but we believe the first record is in error and represents a misreading of the handwritten collection label that actually contains the following data: Lansdowne [Baltimore Co.], Maryland, 28 May 1898 (University of Maryland, 1). In addition to the 1941 specimen from College Park, the University of Maryland collection contains a second specimen from the same locality ("College, Md.") taken in September 1893.

The following specimens conclusively document the

occurrence of *N. carolinus* in southeastern Virginia: "S. of Franklin, Va. / 8 IX 1937 / Carroll Williams, Coll." (VMNH, 1♀, ex UR collection); City of Suffolk, South Quay pine barrens, ca. 6 mi SSE Franklin, xeric pine woods 100 m N of canal, 2 July-6 August 2003, pitfall trap, S. M. Roble (VMNH, 1♂). **NEW STATE RECORD.**

The South Quay site is within 0.5 km of the North Carolina border and is one of the most xeric, sandy habitats known in Virginia. We suspect that the 1937 specimen, the existence of which went undetected until May 2010 when RLH discovered it amongst a series of unidentified beetles in the former University of Richmond (UR) collection, was collected in the same

general area. Carroll Williams, the collector of this specimen, was an entomologist and junior faculty member in the biology department at the University of Richmond in the mid-1930s. He often accompanied (and served as the driver for) renowned Harvard University botanist Merritt Fernald during the latter's collecting trips to southeastern Virginia, which included several excursions to the South Quay pine barrens (Fernald, 1937, 1938). Williams later joined the faculty at Harvard for the duration of his career.

Brimley (1938) recorded *N. carolinus* from four localities in North Carolina: Aberdeen (Moore Co.), Dundee (Robeson Co.), Southern Pines (Moore Co.), and Wilmington (New Hanover Co.). The NCSU collection has six specimens of this species from that state, confirming Brimley's reported localities and adding two later records: Wake County [no further details], 19 August 1968, W. M. Kulash (1); Holly Shelter [State Game Lands, Pender Co.], 6 October 1965, D. Weisman (1); Dundee, 9 November 1926, T. B. Mitchell (1); Aberdeen, 7 July 1922, E. W. Leiby (1); Southern Pines, 24 November 1909, [presumably A. H. Manee] (1); and Wilmington, 11 November (no year on label), M. Kisciuk (1). All of these records are from the Coastal Plain. The North Carolina specimens (n = 15; data sheets provided by S. Peck) of *N. carolinus* examined during the study by Peck & Kaulbars (1987) reside in one private (H. F. Howden) and four museum collections and were taken in Beaufort (Carteret Co., [no further details], MCZ, 2), Carolina Beach (New Hanover Co., 15 August 1935, S. W. Bromley, NMNH, 1), Holly Shelter (5 June 1951, H. F. Howden, 1), Southern Pines (24 June 1920, A. N. Manee, Canadian National Collection (CNC), 2; 11 July 1920, A. N. Manee, CNC, 1; November [no further details], INHS, 1), and Wilmington (1 August [no year], [G. P.] Englehardt, NMNH, 1). Six additional specimens (MCZ, 5; NMNH, 1) only have state labels and lack dates, but the latter specimen was obtained by Henry G. Hubbard and Eugene A. Schwarz who were active beetle collectors in the late 19th century. The Illinois Natural History Survey (INHS) collection actually contains eight (not one) historical specimens of *N. carolinus* from North Carolina (C. Dietrich, pers. comm.), all but one taken at Southern Pines (16 July 1911, 20 September 1911, 1 November 1911, 17 September 1913, and 23 April 1914, all A. N. Manee; two additional specimens from Southern Pines lack dates and collector names). The other INHS specimen, collected on 5 October 1917, only has a state label and no collector is indicated. We do not know if *N. carolinus* has been collected in North Carolina in the

past four decades. The regional distribution of this species is shown in Figure 1.

Anderson & Peck (1985) stated that "*N. carolinus* appears restricted to sandy soil in open or sparsely forested areas" and remarked that little else was known about its natural history other than Arnett's (1946) observations of adults burying a dead snake. Peck & Kaulbars (1987) noted that this species has been found in open forests, grasslands, shrub steppe, and creosote bush desert habitats, with adult collection dates ranging from March to October. Perhaps future sampling in southeastern Virginia will reveal the presence of additional populations of *N. carolinus*.

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