

SCIENTIFIC NOTE

IS THE AMERICAN BURYING BEETLE THE FOX TERRIER OF NOVA SCOTIA?

The American burying beetle, *Nicrophorus americanus* Olivier, is the largest species in the genus *Nicrophorus* Fabricius in North America. It formerly occurred throughout most of eastern North America. There are historical records from 35 states ranging from Texas and Florida, north through Nebraska and South Dakota to Minnesota, and east to western Maine (Raithel 1991; Sikes and Raithel 2002). There is a single record from Montana (Raithel 1991). In Canada there are records from southern Ontario and Québec (Anderson and Peck 1985; Sikes and Raithel 2002). Federally endangered in the United States since 1989, it has now disappeared from most of its historic range. Remaining populations are confined to Block Island in Rhode Island in the east (Raithel *et al.* 2006), and along the western periphery of its former range in western Arkansas, eastern Oklahoma, central and southern Nebraska, southeastern Kansas, south-central South Dakota, and northeastern Texas (Sikes and Raithel 2002; Godwin and Minich 2005). The beetle has also been re-introduced to Penikese and Nantucket islands in Massachusetts (Amaral *et al.* 1997; Mckenna-Foster *et al.* 2009) and to eastern Ohio (Keeney and Horn 1998).

Wells *et al.* (1983) asserted that its decline “must represent one of the most disastrous declines of an insect’s range ever to be recorded”. The reasons for this dramatic reduction remain unclear, particularly given that eight other sympatric species of *Nicrophorus* in North America appear not to have been affected (Sikes and Raithel 2002). Sikes and Raithel (2002) discussed a number of hypotheses for this decline, including pesticide use, increases in artificial lighting, pathogens, loss of old-growth habitat, vegetative changes, vertebrate competition for food resources, loss of “ideal” carrion, and competition with congeners. They concluded that even the most well supported hypotheses required further research before an explanation for the decline of the species could be determined.

At the northeastern limit of its range in Maine, there are historical records of *N. americanus* from Oxford and Penobscot counties (Davis 1980; Raithel 1991), and Sikes and Raithel (2002) indicated five locations where it had been found in the western and central portions of the state. Anderson and Peck (1985) indicated one locality in southern Québec in the Sherbrooke region, and Raithel (1991) indicated a second site near Montreal. There are also sporadic references to the occurrence of *N. americanus* in Nova Scotia. Davis (1980), Peck

and Anderson (1985), Raithel (1991), Ratcliffe (1997), and Bedick *et al.* (2004) listed Nova Scotia as being part of the species’ range, and Amaral *et al.* (1997), Bedick *et al.* (1999), Szalanski *et al.* (2000), and Backlund *et al.* (2008) all made reference to the species occurring in “three” Canadian provinces (*i.e.*, Nova Scotia, Ontario, and Québec). Madge (1956) listed “Nova Scotia” in the distribution of the species, although he failed to include a point from the province on the corresponding distribution map (p. 32).

Despite these references to the species in Nova Scotia (which would represent a significant range extension) for over a period of over a half century, it is unclear what the source of this information is, since none of the aforementioned studies provided a reference to an actual collection record, referring only, if at all, to previous publications.

Further investigation revealed that Blackwelder (1939) (one of the series of supplements to the Leng (1920) Catalogue of the Coleoptera of America north of Mexico) listed the range of *N. americanus* as “N.S. - Minn. - Tex. - Fla.”. Only two papers are cited in reference to this entry: Semenov-Tian-Shanskij (1932) and Hatch (1928). Semenov-Tian-Shanskij (1932) said only that *N. americanus* “is distributed through the considerable part of the United States of America, except the western part”. Hatch (1928), however, gives the distribution of the species as “Nova Scotia and Minnesota through Iowa and Kansas to Texas and Florida; ?Guadeloupe, ?Martinique”. Hatch’s (1928) entry cites 17 papers, most of them taxonomic in nature.

In most of these citations, the range of *N. americanus* is given in only very general terms: “l’Amérique septentrionale” (Olivier 1790: 6); “America boreali” (Fabricius 1792: 242); “Virginien” (Frölich 1792: 124); “Nordamerika” (Herbst 1793: 152); “America boreali” (Fabricius 1801: 334); “Amérique du Nord” (Laporte 1840: 2); “Middle and southern states” (LeConte 1853: 276); “Nord-America” (Osten-Sacken 1862: 408); “Widely distributed in the Atlantic region from the Middle States to Texas” (Horn 1880: 230); “den atlantischen Staaten bis Texas” (Barkowski 1910: 79); “Toute l’Amérique du Nord” (Portevin 1923: 305; Portevin 1926: 204); or else not at all. There are no references to Nova Scotia in any of these papers. Portevin (1903), however, wrote “1 exemplaire typique (coll. Bosc) vient de New Jersey. Existe également à la Guadeloupe (Beaupertuis) et à la Martinique (Plée)”. This is evidently the source of Hatch’s

(1928) references to Guadeloupe and Martinique, clearly erroneous since there is no evidence that this species was ever found in the Leeward Islands or Lesser Antilles. Could Portevin's (1903) reference to "New Jersey" have been abbreviated in Hatch's notes to "N.J." which was subsequently confused with "N.S."? One can only conjecture. In any event, the historical trail ends with Hatch (1928) and no source for his inclusion of Nova Scotia within the range of the species.

Furthermore, ongoing research on the Silphidae in Nova Scotia provides no evidence that *N. americanus* is or ever was a part of the Nova Scotia fauna. I have examined 1,310 voucher specimens of *Nicrophorus* species, collected in every county of Nova Scotia between 1922 and 2009; this includes virtually every specimen of *Nicrophorus* in every research collection in the province. These include specimens of *Nicrophorus defodiens* Mannerheim, *Nicrophorus investigator* (Zetterstedt), *Nicrophorus orbicollis* Say, *Nicrophorus pustulatus* Herschel, *Nicrophorus sayi* Laporte, *Nicrophorus tomentosus* Weber, and *Nicrophorus vespilliodes* Herbst. Not a single specimen of *N. americanus* has been found in any of these collections, lending further support to the contention that this species has never occurred in the province.

What lessons can be taken from this account? In an essay titled "The case of the creeping fox terrier clone," Gould (1991) highlighted how, in accounts of the evolution of the horse, the preponderance of paleontological literature compares the size of *Eohippus* Marsh to that of a "fox terrier". Employing some bibliographic research, Gould (1991) discovered a steadily increasing percentage (66% since 1975) of texts employed this particular simile. Gould (1991) traced the origin to Osborn (1904) and credits academic copying to its proliferation. His larger point addresses the consequences of uncritical copying of information. The case of Nova Scotia and *N. americanus* provides an illustration of how errors, or unsupported assertions, can proliferate in the scientific literature. All research must, of course, rely in large measure on earlier studies, and it would be impracticable for investigators to verify all the information on which their conclusions depend. This example does, however, provide an illustration of why periodic scientific reviews are an invaluable service to all researchers, verifying (or rejecting) previous findings, and making explicit the pathway of this knowledge.

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- Christopher G. Majka, Nova Scotia Museum, 1747 Summer Street, Halifax, Nova Scotia, CANADA B3H 3A6, c.majka@ns.sympatico.ca**

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