

The Great Lakes Entomologist

Volume 56
Numbers 1 & 2 - Spring/Summer 2023 *Numbers*
1 & 2 - Spring/Summer 2023

Article 17

June 2023

First records of three Carpophilinae (Coleoptera: Nitidulidae) in Quebec

Ludovic Leclerc
Laval University, ludovic.leclerc.1@ulaval.ca

Pierrick Bloin
Natural Resources Canada, pierrick.bloin@nrcan-rncan.gc.ca

Françoise Pelletier
Natural Resources Canada, francoise.pelletier@nrcan-rncan.gc.ca

Christian Hébert
Natural Resources Canada, christian.hebert@nrcan-rncan.gc.ca

Kishan Sambaraju
Natural Resources Canada, kishan.sambaraju@nrcan-rncan.gc.ca

Follow this and additional works at: <https://scholar.valpo.edu/tgle>



Part of the [Entomology Commons](#)

Recommended Citation

Leclerc, Ludovic; Bloin, Pierrick; Pelletier, Françoise; Hébert, Christian; and Sambaraju, Kishan 2023. "First records of three Carpophilinae (Coleoptera: Nitidulidae) in Quebec," *The Great Lakes Entomologist*, vol 56 (1)

DOI: <https://doi.org/10.22543/0090-0222.2447>

Available at: <https://scholar.valpo.edu/tgle/vol56/iss1/17>

This Entomological Note is brought to you for free and open access by the Department of Biology at ValpoScholar. It has been accepted for inclusion in *The Great Lakes Entomologist* by an authorized administrator of ValpoScholar. For more information, please contact a ValpoScholar staff member at scholar@valpo.edu.

First records of three Carpophilinae (Coleoptera: Nitidulidae) in Quebec

Cover Page Footnote

We thank Anthony Davies (CNC) for confirming the identification of *Caplothorax lugubris*, Gareth Powell (Florida State Collection of Arthropods) for providing supporting information on both species. We also thank field technicians from Natural Resources Canada for their assistance on population assessments of oak wilt vectors and funding for the project.

First Records of Three Carpophilinae (Coleoptera: Nitidulidae) in Quebec

Ludovic Leclerc^{1,*}, Pierrick Bloin², Françoise Pelletier², Christian Hébert², and Kishan Sambaraju²

¹Université Laval, 12325, rue de l'Université, Québec, QC G1V 0A6, Canada.

²Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, 1055, rue du P.E.P.S., P.O. Box 10380, Québec, QC G1V 4C7, Canada.

*Corresponding author: (e-mail: ludovic.leclerc.1@ulaval.ca)

Abstract

We report first records for three species of Carpophilinae (Coleoptera: Nitidulidae), two for the province of Quebec (*Caplothorax lugubris* and *Carpophilus corticinus*), a third species (*Carpophilus marginatus*) being a first report for Canada. These beetles were trapped while conducting population assessments of oak wilt vectors and in amateur collections. Biological information and a brief description of the records including distribution data in Quebec for the three species are presented.

Keywords: Carpophilinae, Lindgren funnel trap, oak wilt, sap-feeding beetles, survey

Sap-feeding beetles (Coleoptera: Nitidulidae) can be found in diverse habitats where they feed on flowers, fruits, fungi, and fermenting matter (Parsons 1943, Lee et al. 2020). Although most species are not considered economically significant pests, some may cause serious damage directly or indirectly to fruits, vegetables, and stored grains (Campbell et al. 1989, Arbogast and Throne 1997). Several Nitidulidae are known to be associated with tree diseases in North America (Hinds 1972, Juzwik and French 1986). For instance, *Colopterus truncatus* (Randall) and *Caplothorax sayi* (Parsons) are considered important vectors of oak wilt (*Bretziella fagacearum* (Bretz) Z.W. de Beer, Marincowitz, T.A. Duong & M.J. Wingfield), which causes serious mortality of oak trees (*Quercus* spp.) in the United States (Currie et al. 1996, Cease and Juzwik 2001). Expansion of this nitidulid-vectored disease into Canada is imminent (Invasive Species Centre 2018) and was detected as close as 600 meters from the Canadian border, near Detroit, Michigan, in 2016 (CFIA 2019). In this context, surveys were conducted in and around the Quebec City area to assess Nitidulidae abundances and community composition. The first records of *Caplothorax lugubris*

(Murray), *Carpophilus corticinus* Erichson and *Carpophilus marginatus* Erichson (Coleoptera, Nitidulidae) presented here mainly come from these surveys (Fig. 1).

Nitidulid beetles were collected using wind-oriented pipe traps and 12-unit Lindgren funnel traps baited with *C. sayi* and *C. truncatus* pheromone lures (Trécé Inc., Adair, Oklahoma, USA) and wheat dough bait (DiGirolomo et al. 2020; Fig. 2). These traps were installed in 12 different sites of varying land cover characteristics around Quebec City. The traps were set up between 10 May and 5 November, 2021, and between 27 April and 11 November, 2022. Other specimens were collected by amateur entomologists using fermenting bait traps. Vouchers have been deposited in the Laurentian Forestry Centre's René Martineau Insectarium collection. Acronyms of collections referred in the above-mentioned specimens are as follows:

CNC Canadian National Collection of Insects, Arachnids and Arthropods, Ottawa, Ontario, Canada

LLC Ludovic Leclerc Insect Collection (private collection), Québec, Québec, Canada

LFC Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, René Martineau Insectarium, Québec, Québec, Canada

PBC Pierrick Bloin Insect Collection (private collection), Québec, Québec, Canada

Oak wilt was discovered in June 2023 in Niagara Falls, Ontario. It has been recently found at two other locations in Ontario (<https://www.pestalerts.org/nappo/official-pest-reports/1053/>; <https://inspection.canada.ca/plant-health/invasive-species/plant-diseases/oak-wilt/eng/1325624048625/1325624535106>).

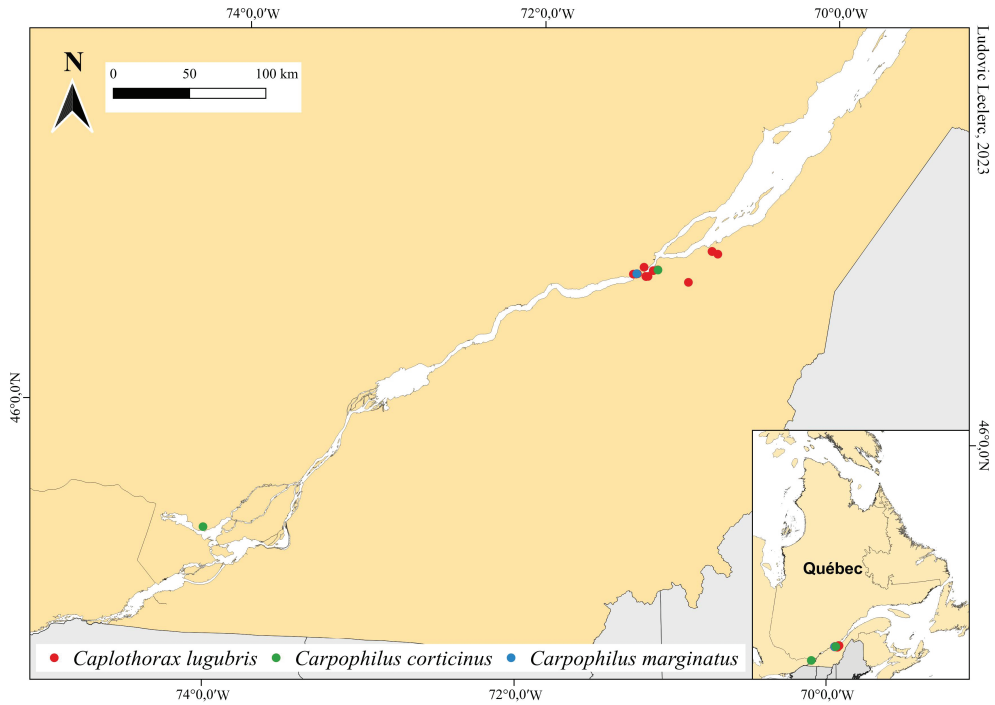


Figure 1. Occurrences of three new Carpophilinae species in the province of Quebec, Canada.



Figure 2. Two trap types used in the oak wilt vector surveys in Quebec. A) Lindgren funnel trap, B) Wind-oriented pipe trap.

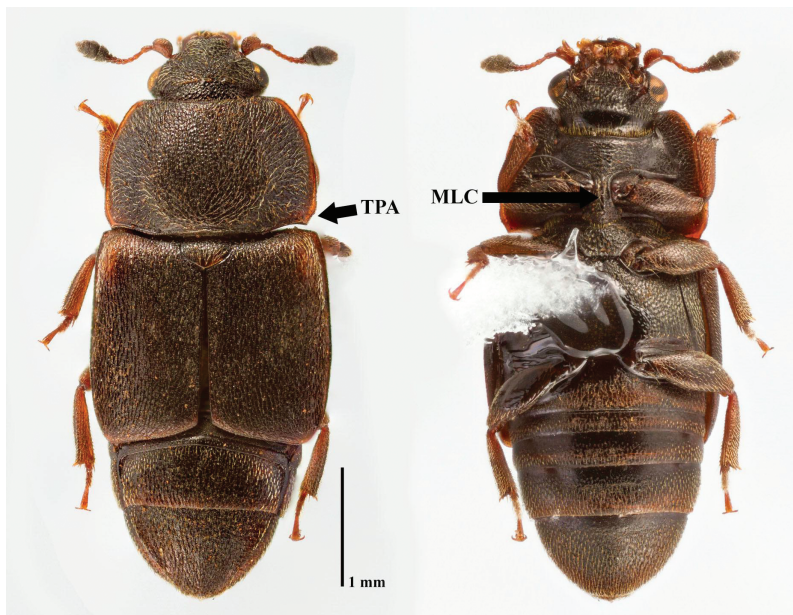


Figure 3. Dorsal and ventral habitus of *Caplothorax lugubris* captured in Quebec City. The discriminant criteria are: TPA: Truncated Posterior Angles; MLC: Median Longitudinal Carina.

PdTC Pierre de Tonnancour Insect Collection (private collection), Terrasse-Vaudreuil, Quebec, Canada

RVC Robert Vigneault Insect Collection (private collection), Oka, Quebec, Canada

***Caplothorax lugubris* (Murray, 1864)**

The adults (3.0–4.5 mm in length) can be distinguished from all other North American Carpophilinae by the presence of a median longitudinal carina on the prosternal process and truncated posterior angles at the pronotum’s base (Parsons 1943, DiLorenzo et al. 2021; Fig. 3). *Caplothorax lugubris* is widely distributed in North, Central and South America (Sanford and Luckmann 1963). It has been reported from four Canadian provinces: British Columbia, Alberta, Saskatchewan, and Ontario (Bousquet et al. 2013). It is known to infest a wide variety of vegetables and fruits, and historically, corn fields (Connell 1956). This species is also considered one of the vectors of oak wilt in North America. The transmission of the pathogen to healthy oak trees usually occurs through wounds (Dorsey et al. 1953, Appel et al. 1986). Information presented here is based on trappings done between 10 May and 5 November, 2021. Most *C. lugubris* were observed in August, while no captures

were made in May and November (Fig. 4). Material examined (67 specimens):

CANADA, QUEBEC, City of Lévis, Saint-Romuald area, 46.7410, -71.2403, 9 May 2021, on freshly cut stump of *Acer saccharum* (1, LLC); 46.7407, -71.2544, 1 June 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 28 June 2021 (1, LFC); 27 July 2021 (2, LFC); 6 August 2021 (6, LFC); 24 August 2021 (2, LFC); 7 September 2021 (1, LFC); 27 July

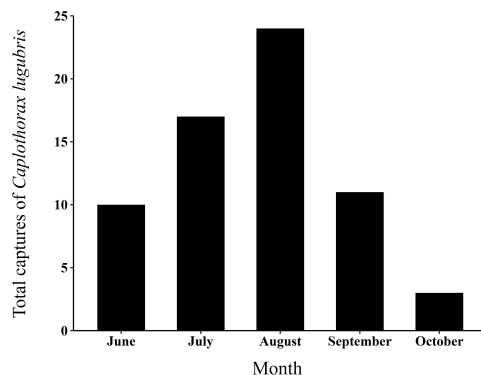


Figure 4. Cumulative monthly captures of *Caplothorax lugubris* from twelve sites in the Quebec City area from June to October 2021.

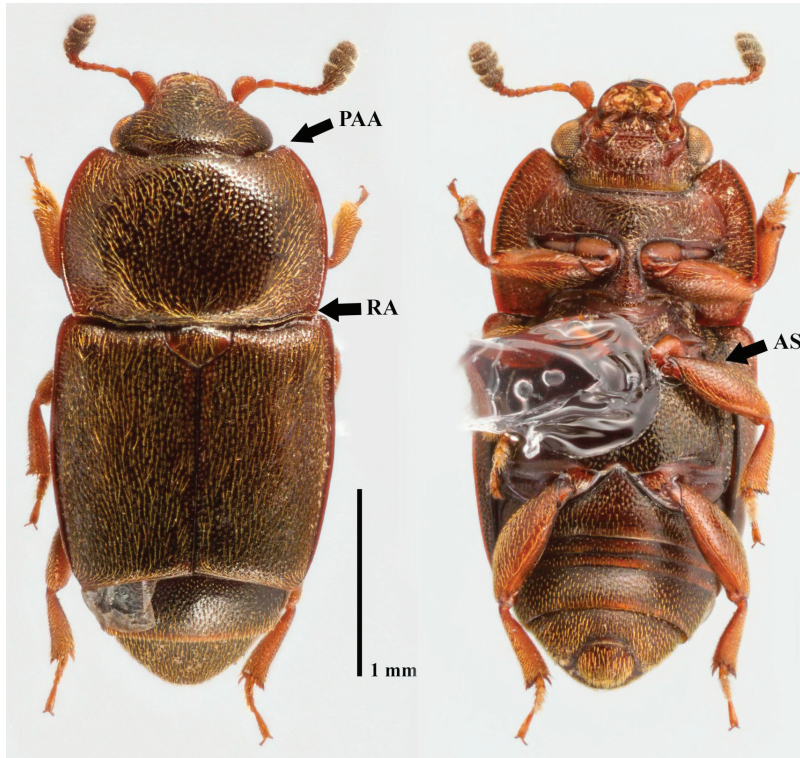


Figure 5. Dorsal and ventral habitus of *Carpophilus corticinus* captured in Quebec City. The discriminant criteria are: PAA: Projected Anterior Angles; RA: Right Angle (90 degrees); AS: Axillary Space.

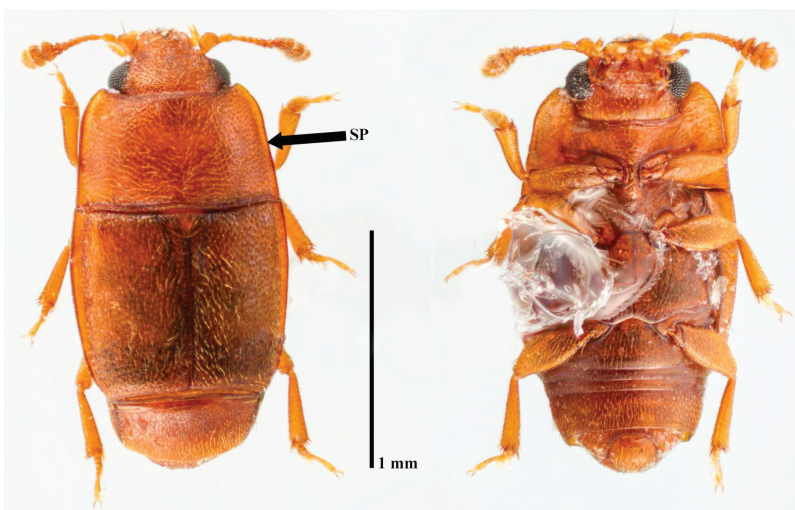


Figure 6. Dorsal and ventral habitus of *Carpophilus marginatus* captured in Quebec City. The discriminant criteria are: SP: Subparallel Pronotum.

2021, wind-oriented pipe trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (2, LFC); 46.7728, -71.1759, 24 August 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 46.7684, -71.2067, 7 September 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC). Saint-Charles-de-Bellechasse, 46.7206, -70.9701, 1 June 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 27 July 2021, wind-oriented pipe trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC). Saint-Valier, 46.8658, -70.8196, 14 June 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 2 July 2021 (1, LFC); 7 September 2021 (1, LFC); 20 September 2021 (1, LFC); 2 July 2021, wind-oriented pipe trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC). City of Quebec, Cap-Rouge area, 46.7509, -71.3112, 5 August 2021, fermenting bait trap (red wine, beer and sugar) (1, PBC); 46.7502, -71.3185, 15 June 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (5, LFC); 27 July 2021 (4, LFC); 27 July 2021, wind-oriented pipe trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (5, LFC); 11 August 2021 (13, LFC); 24 August 2021 (2, LFC); 7 September 2021 (2, LFC); 20 September 2021 (1, LFC); 5 October 2021 (5, LFC); 19 October 2021 (2, LFC); 46.748753, -71.338233, 15 June 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 46.782433, -71.268978, 27 July 2021, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC).

***Carpophilus corticinus* Erichson, 1843**

Adults of *C. corticinus* (2.8–3.4 mm in length) have abruptly darkening coloration on antennal segments, 90-degree angles at the pronotum's base, the absence of an axillary space, and projected anterior angles (DiLorenzo et al. 2021; Fig. 5). This species was reported from southern Ontario in 2008 and its geographic range covers a large portion in the United States (Paiero et al. 2010). Very little is known about the biology of this sap-feeding beetle although it has been collected from sap flows of various hardwoods (*Acer* spp., *Quercus* spp.) and

fermenting vegetal debris (Connell 1956, Price and Young 2006). Material examined (7 specimens):

CANADA, QUEBEC, City of Lévis, Saint-Romuald area, 46.7720, -71.1757, 25 May 2022, Lindgren funnel trap baited with *C. sayi*, *C. truncatus* pheromones and bread dough (1, LFC); 19 July 2022 (2, LFC); Deux-Montagnes, Oka, 45.4793, -74.0647, 5 June 2020, under dehiscent bark of freshly fallen *Acer saccharum* (1, PdTC); 19 June 2020, white tulle fabric interception trap (1, PdTC); 24 June 2016, by beating underbush vegetation (1, RVC); 2022-09-05, white tulle fabric interception trap (1, RVC).

***Carpophilus marginatus* Erichson, 1843**

This species is one of the smallest *Carpophilus* in North America (1.6–2.8 mm in length), with 90-degree posterior angles of pronotum, the presence of an axillary space, and pronotum with subparallel sides (DiLorenzo et al. 2021; Fig. 6). It ranges south to Guatemala and north to New York State. In the literature, it is associated mainly with wounded oaks (Williams et al. 1997). Material examined (1 specimen):

CANADA, QUEBEC, City of Quebec, Cap-Rouge area, 46.7513, -71.3158, 12 August 2022, fermenting bait trap (wine + brown sugar + dry yeast) (1, LLC).

Surveys conducted by amateur entomologists, added to those of the government of Canada, allowed detection of these three Carpophilinae species. Several pheromone-based monitoring tools including fermenting bait traps have been developed recently and the present records attest to the efficiency of such methods in attracting nitidulid species (DiGirolomo et al. 2020). The detection of these three new Carpophilinae species brings the total number of known species in this subfamily to 10 in the province of Quebec and to 13 for Canada (Bousquet et al. 2013).

Acknowledgments

We thank Anthony Davies (CNC) for confirming the identification of *Caplothorax lugubris*, Gareth Powell (Florida State Collection of Arthropods) for providing supporting information on both species. We also thank field technicians from Natural Resources Canada for their assistance on population assessments of oak wilt vectors and funding for the project.

Literature Cited

- Appel, D. N., K. Andersen, and Jr. R. Lewis. 1986.** Occurrence of nitidulid beetles (Coleoptera: Nitidulidae) in Texas oak wilt centers. *Journal of Economic Entomology* 79: 1276–1279.
- Arbogast, R. T., and J. E. Throne. 1997.** Insect infestation of farm-stored maize in South Carolina: towards characterization of a habitat. *Journal of Stored Products Research* 33: 187–198.
- Bousquet, Y., P. Bouchard, A. E. Davies, and D. S. Sikes. 2013.** Checklist of beetles (Coleoptera) of Canada and Alaska. Second edition. Pensoft Series Faunistica No. 109. Pensoft Publishers, Sofia, Bulgaria. 402 pp.
- Campbell, J. M., M. Sarazin, and D. B. Lyons. 1989.** Canadian beetles (Coleoptera) injurious to crops, ornamentals, stored products, and buildings. Agriculture Canada, Ottawa, Ontario, Canada. 491 pp.
- Cease, K. R., and J. Juzwik. 2001.** Predominant nitidulid species (Coleoptera: Nitidulidae) associated with spring oak wilt mats in Minnesota. *Canadian Journal of Forest Research* 31: 635–643.
- CFIA [Canadian Food Inspection Agency]. 2019.** Oak wilt response framework for Canada. Available from <https://inspection.canada.ca/plant-health/invasive-species/plant-diseases/oak-wilt/response-framework/eng/1563898431188/1563898479048>. Accessed March 2023.
- Connell, W. A. 1956.** Nitidulidae of Delaware. *Delaware Agricultural Experiment Station Bulletin* 318: 1–67.
- Currie, C. R., J. R. Spence, and W. J. A. Volney. 1996.** Biology and life history of *Epuraea obliquus* Hatch (Coleoptera: Nitidulidae) on western gall rust. *The Canadian Entomologist* 128: 177–186.
- DiGirolomo, M. F., I. A. Munck, K. J. Dodds, and J. Cancelliere. 2020.** Sap beetles (Coleoptera: Nitidulidae) in oak forests of two northeastern states: A comparison of trapping methods and monitoring for phoretic fungi. *Journal of Economic Entomology* 113: 2758–2771.
- DiLorenzo, C. L., G. S. Powell, A. R. Cline, and J. V. McHugh. 2021.** Carpophiline-ID, a taxonomic web resource for the identification of Carpophilinae (Nitidulidae) of eastern North America. Available from <https://site.caes.uga.edu/carpophiline-id/>. Accessed March 2023.
- Dorsey, C. K., F. F. Jewell, J. G. Leach, and R. P. True. 1953.** Experimental transmission of oak wilt by four species of Nitidulidae. *The Plant Disease Reporter* 37: 419–420.
- Hinds, T. E. 1972.** Insect transmission of *Ceratocystis* species associated with aspen cankers. *Phytopathology* 62: 221–225.
- Invasive Species Centre. 2018.** Oak Wilt: An Invasive Pathogen on Canada's Doorstep. Available from https://www.invasivespeciescentre.ca/wp-content/uploads/2020/03/oak_wilt_factsheet_2018.pdf. Accessed March 2023.
- Juzwik, J., and D. W. French. 1986.** Relationship between nitidulids and *Ceratocystis fagacearum* during late summer and autumn in Minnesota. *Plant disease* 70: 424–426.
- Lee, M. H., S. Lee, R. A. Leschen, and S. Lee. 2020.** Evolution of feeding habits of sap beetles (Coleoptera: Nitidulidae) and placement of Calonecrinae. *Systematic Entomology* 45: 911–923.
- Paiero, S. M., S. A. Marshall, P. D. Pratt, and M. Buck. 2010.** Insects of Ojibway Prairie, a southern Ontario tallgrass prairie. *Arthropods of Canadian Grasslands* 1: 199–225.
- Parsons, C. T. 1943.** A revision of Nearctic Nitidulidae (Coleoptera). *Bulletin of the Museum of Comparative Zoology* 92: 121–273.
- Price, M. B., and D. K. Young. 2006.** An annotated checklist of Wisconsin sap and short-winged flower beetles (Coleoptera: Nitidulidae, Kateretidae). *Insecta Mundi* 109: 69–84.
- Sanford, J. W., and W. H. Luckman. 1963.** Observations on the biology and control of the dusky sap beetle in Illinois. *Proceedings North Central Branch Entomological Society of America* 18: 39–43.
- Williams, R. N., M. S. Ellis, and S. Teraguchi. 1997.** Nitidulidae (Coleoptera) survey in northeast Ohio. *Journal of Entomological Science* 32: 204–211.