J. Acad. Entomol. Soc. 21: 1-3 (2024)

NOTE

On the occurrence of the daylily gall midge *Contarinia quinquenotata* (Diptera: Cecidomyiidae) in New Brunswick

Donald F. McAlpine

A native of Asia, and a documented garden pest in the United Kingdom since 1989 (Halstead and Harris 1990), the daylily gall midge, *Contarinia quinquenotata*, Loew, 1888 (Diptera: Cecidomyiidae) is widespread in Europe (Gagné and Jaschhof 2021, p. 277). The species was first reported in North America from British Columbia in 2001 (Gillespie 2001), but has also been reported from Washington, Oregon and New Zealand (Gagné and Jaschhof 2021). *Contarinia quinquenotata* appears to be spreading rapidly, as it has apparently been present in Nova Scotia since at least 2018, and perhaps as early as 2012 (Cattiaux et al. 2021). Nonetheless, the distribution and bionomics of the species in Canada remains largely unknown. *Contarinia quinquenotata* lays eggs in the developing flower buds of *Hemerocallis* spp. L. (Asphodelaceae) and its many hybrid cultivars. Larvae feed within the daylily flowers, producing deformed buds that fail to open and often begin to decompose while still on the stem or fall off. Larvae pupate in the soil, where they overwinter, before emerging as adults the following spring. Although infestations do not lead to the death of plants, they do damage the ornamental blooms for which *Hemerocallis* cultivars are propagated. Pesticide trials have shown only limited success in controlling the infestations (Halstead 2012), although *Hemerocallis* flowering period (early, midseason, late) and bloom colour (yellow being most susceptible) have been reported to influence *C. quinquenotata* infestation frequency (Cattiaux *et al.* 2021, Washington State University 2022). Here I report the presence of *C. quinquenotata* in New Brunswick for the first time.

Deformed flower buds were observed on various *Hemerocallis* cultivars in a residential garden in Grand Bay-Westfield, Kings County, New Brunswick (45.32281° -66.18887°) on 23 July 2022. About 60 different *Hemerocalis* cultivars were growing at the Grand Bay-Westfield site, with many of these in flower at the time. Dissection of deformed buds revealed larvae, samples of which were preserved in 95% ethyl alcohol and deposited in the collections of the New Brunswick Museum (NBM-IN-11578). A sub-sample was drawn and sent to the Canadian Centre for DNA Barcoding, University of Guelph, Guelph, Ontario, Canada.

Larvae, believed to be *C. quinquenotata,* were found to be abundant in many of the deformed blooms dissected (Figure 1). Subsequently, a full-length DNA barcode of 658 base-pairs (bp) was generated from the larval subsamples, with the recovered sequence a 100% match to the Barcode of Life Database System (BOLD) reference records representing *C. quinquenotata*. Although flower buds of various developmental stages exhibited deformities, and more developed blooms showed wilting (Figure 2a), signs of infestation were uneven across cultivars. The cultivar Cherry Frills (cerise red, midseason) showed relatively heavy incidence of deformed buds (4.2 %, N= 190 buds, Figure 2b), while adjacent cultivars that included Catherine Woodbery (light orchid, midseason-late) and Frans Hals (rust-orange bicolor, midseason-late) were only lightly infected. Cultivars Bridgetown Bastion (mustard yellow, early-midseason) and Black-eyed Stella (yellow/rose eye, early) showed no late July infestations.

Cattiaux et al. (2021) surveyed 232 gardeners across the Maritimes for signs of infected daylily buds. Although Cattiaux et al. (2021) demonstrated the presence of *C. quinquenotata* in Nova Scotia, they found no evidence of the midge across the limited number of sites sampled in southern, central and northwestern New Brunswick. Among respondents, 59.6% reported signs of daylily gall midge (all in Nova Scotia) with high certainty (larvae observed

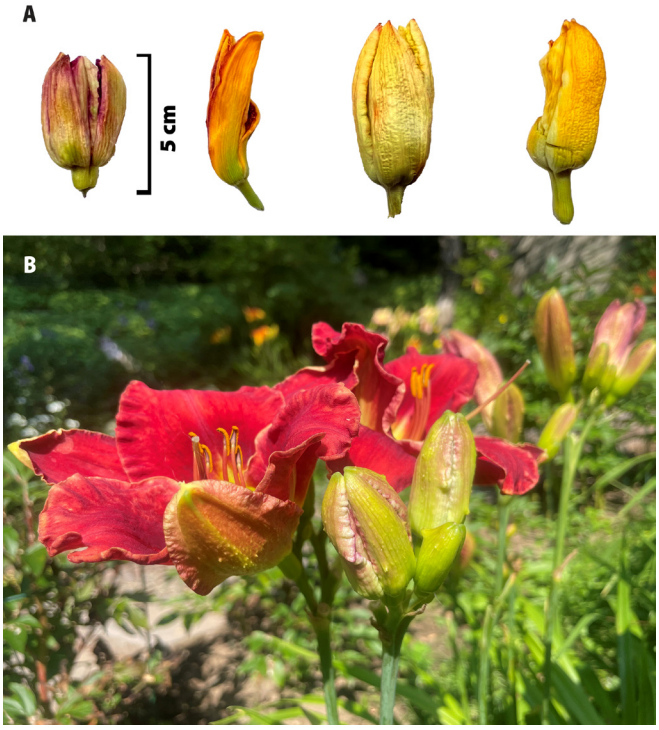
Received 14 August 2023. Accepted for publication 26 November 2023. Published on the Acadian Entomological Society website at www.acadianes.ca/journal.php on 29 February 2024.

Donald F. McAlpine: Department of Natural History, New Brunswick Museum, 277 Douglas Avenue, Saint John, New Brunswick, E2K 1E5, Canada

Corresponding author (email donald.mcalpine@nbm-mnb.ca).

Figure 1. Larvae of the daylily gall midge, *Contarinia quinquenotata*, in the dissected bud of the *Hermerocallis* cultivar 'Sky Hooks' (orchid-lavender, midseason), 23 July 2022, Grand Bay-Westfield, New Brunswick. Larvae are contained within the ellipse.

Figure 2. *Contarinia quinquenotata* deformed buds of various *Hemerocallis* cultivars, 24 July 2022, Grand Bay-Westfield, New Brunswick. A). A series of infected buds, left to right; 'Cherry Frills' (cerise red, midseason), 'Olive's Odd One' (paprika-red, midseason), 'Sky Hooks' (orchid-lavender, midseason), 'Miss Jessie' (orchid mauve-light yellow bicolor, midseason). B). Infected buds on stems of 'Cherry Frills'.



within flower buds), with DNA barcoding confirming *C. quinquenotata* at ten sites across the province. Cattiaux et al. (2021) acknowledge the insufficiency of New Brunswick (and Prince Edward Island) samples to determine presence or absence of *C. quinquenotata,* but also suggested their Nova Scotia data underrepresented establishment in the region. The report here supports this contention.

There are vast numbers of registered *Hemerocallis* cultivars (~40,000), many of which are popular with gardeners (see Petit and Peat 2008) and are used widely in municipal landscaping in the Maritimes. *Hemerocallis fulva* and *Hemerocallis lilioasphodelus* are reported to be naturalized in New Brunswick, but rarely spreading beyond old homesteads and waste ground (Hinds 2000). Both species have been identified as locally invasive in the mid-Atlantic of the United States (Swearingen et al. 2014, Coombs et al. 2020). However, since *H. fulva* is a sterile triploid, and *H. liliasphodelus* rarely sets seed (Hinds 2000), any suggestion that *C. quinquenotata* might serve a significant role in biocontrol is probably overstated. Further surveys should be undertaken in the region to determine how widespread this emerging and invasive horticultural pest may prove to be, and to confirm the contention that early-blooming and yellow-flowered cultivars in the Maritimes are those most susceptible to infection with *C. quinquenotata* (Cattiaux *et al.* 2021, Washington State University 2022).

ACKNOWLEDGEMENTS

The Canadian Centre for DNA Barcoding (CCDB), Guelph, Ontario, provided efficient and professional DNA sequencing services. Thanks to Nguyen Nguyen, Suresh Naik, and Evgeny V. Zakharov of the CCDB.

REFERENCES

Cattiaux, A.S.M.A., Caseley, H.J., Rutherford K.L., and Manning P. 2021. Using community science to explore the spatial distribution of the daylily gall midge (Cecidomyiidae) in Canada's Maritimes region. The Canadian Entomologist **153**: 556-565.

Coombs, G., Gilchrist, D., and Watson, P. 2020. An assessment of the native and invasive horticultural plants sold in the mid-Atlantic region. Native Plants **21**: 74-82.

Gagné, R.J. and Jaschhof, M. 2021. A Catalog of the Cecidomyiidae (Diptera) of the World. Fifth Edition. Available from https://www.ars.usda.gov/ARSUserFiles/80420580/Gagne_Jaschhof_2021_World_Cat_5th_Ed.pdf [accessed 28 January 2023].

Gillespie, D.R. 2001. Arthropod introductions into British Columbia-the past 50 years. Journal of the Entomological Society of British Columbia **98**: 91-97.

Halstead, A.J. 2012. *Hemerocallis* gall midge study. Daylily Journal **67**: 18-20.

Halstead, A.J. and Harris, K.M. 1990. First British record of the gall midge pest of daylily (*Hemerocallis fulva* L.). British Journal of Entomology and Natural History **3**: 1-2.

Hinds, H.R. 2000. Flora of New Brunswick (2nd ed.). Fredericton, New Brunswick: Department of Biology, University of New Brunswick.

Swearingen, J., Slattery, B., Reshetiloff, K., and Zwicker, S. 2014. Plant invaders of mid-Atlantic natural areas (5th ed.). National Park Service and US Fish and Wildlife Service, Washington, DC.

Petit, T.L. and Peat, J.P. 2008. The new encyclopedia of daylilies. Portland, Oregon: Timber Press.

Washington State University. 2022. Daylily: daylily gall midge. Available from https://hortsense.cahnrs.wsu.edu/fact-sheet/daylily-daylily-gall-midge/ [accessed 28 January 2023].