NEW RECORD OF THE ASIATIC GARDEN BEETLE, *MALADERA CASTANEA* (ARROW), IN ATLANTIC CANADA

G. C. Cutler[1], R. E. L. Rogers[2]
Department of Environmental Sciences, Nova Scotia Agricultural College
Truro, NS, Canada B2N 5E3
email: ccutler@nsac.ca

Scientific Note *J. ent. Soc. Ont.* 140: 40-45

The Asiatic garden beetle, *Maladera castanea* (Arrow) (Coleoptera: Scarabaeidae), was first named by Arrow in the genus *Autoserica* in 1913, moved to the genus *Aserica* in 1927 by Arrow, and then moved by Pope to genus *Maladera* in 1961 (Evans and Smith 2005). *Maladera castanea* is endemic to the Russian Far East, Japan, North Korea, and South Korea (Ahrens 2006). It was first collected in North America near Rutherford, New Jersey in 1921 (Hallock 1929, 1930, 1936) but has been studied sporadically since 1927. It is known to have established along the eastern seaboard from Massachusetts to South Carolina, west to Pennsylvania and Ohio (Hallock 1936; Potter 1998). In those regions it is generally a minor pest of turfgrass, ornamentals and some vegetables. However, *M. castanea* may cause serious economic damage, is known to feed on more than 100 host plants, and may be locally abundant, particularly in weedy or abandoned areas (Hallock 1936; Koppenhofer and Fuzy 2003; Tashiro 1987).

Maladera castanea appears to have been first collected in Canada in Saint-Armand, Québec, in 1996 (Chantal 2003). Specimens were subsequently found in multiple locations of southern Québec (Bostanian et al. 2003; Chantal 2003). Here, we document the collection of *M. castanea* from Cumberland County, Nova Scotia, which we believe is the first record of this insect in Atlantic Canada.

Collections occurred in a commercial, wild (syn. "lowbush") blueberry (*Vaccinium angustifolium* Ait.) growing area near Fox River, Cumberland Co., Nova Scotia (N45o 40.83', W64o 53.43'). One particular field was described by the producer as a "flag-ship" field, historically producing high numbers of berries. For reasons that were unknown to the grower, production in the field had decreased and attempts to rejuvenate the field through conventional fertilizer, pesticide and irrigation practices were unsuccessful. Soil samples (approximately 20 x 20 x 20 cm) were collected with a spade shovel on 21 May 2003, 17 July 2007, and in early June 2008, from areas in fields with poor plant growth, near the farm road and along a hedgerow of trees that separated fields. Samples were sifted through in the field or later in the laboratory and collected larvae were stored in 70% ethanol.

Published November 2009

[1] Author to whom all correspondence should be addressed.
[2] Wildwood Labs Inc. 53 Blossom Drive, Kentville, NS, Canada B4N 3Z1

An unexpectedly large number of Scarabaeidae larvae were present in several of the soil samples, particularly those adjacent to patches of grass and sedge, common weeds in wild blueberry fields. Formal counts of larvae from each sample were not conducted, but several grubs were collected in 2003, around 40 in 2007, and several in 2008. We also observed that many blueberry plant roots from samples containing these Scarabaeidae larvae had suffered feeding damage, with extensive girdling and destruction of fibrous roots and root hairs, as well as root necrosis as a result of this feeding (Fig. 1).

FIGURE 1. Damage to wild (lowbush) blueberry roots where *M. castanea* larvae were found in Fox River, Nova Scotia, 2003. Photo: R.E.L. Rogers, Wildwood Labs Inc.

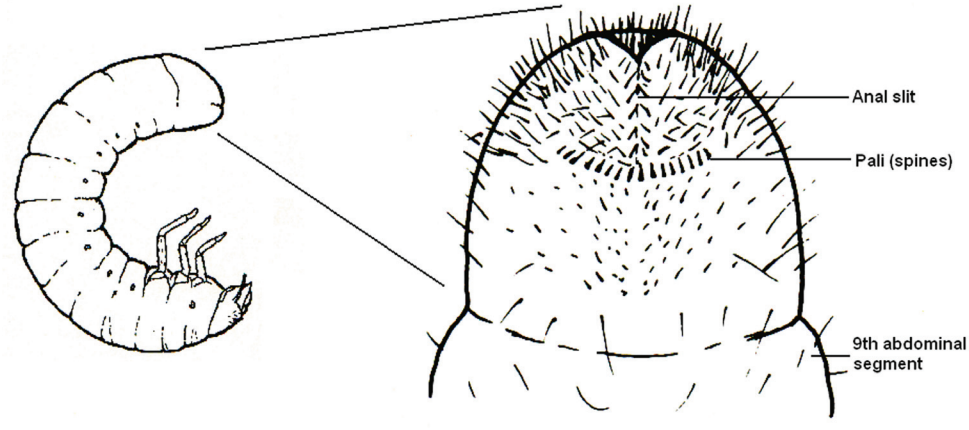

FIGURE 2. Rastral pattern on the 10th abdominal segment of a *M. castanea* larva, illustrating the characteristic longitudinal anal slit and crescent-shaped transverse row of spines (adapted from Tashiro 1987; with permission, NY State Agricultural Experiment Station).

Larval specimens were confirmed as *M. castanea* by R.E.L.R and G.C.C. Voucher specimens have been deposited in the A. D. Pickett Entomology Museum at the Nova Scotia Agricultural College and the Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON. *Maladera castanea* larvae can be most easily distinguished from other scarabaeid turfgrass feeders such as the Japanese beetle, *Popillia japonica* Newman, the oriental beetle, *Exomala (*syn. *Anomala) orientalis* Waterhouse, masked chafers, *Cyclocephala* spp., and European chafer, *Rhizotrogus majalis* (Rhazoumowsky), by the characteristic positioning of the anal slit and arrangement of spines, hairs and bare spaces on the raster of the terminal (tenth) abdominal segment. A single, transverse row of spines in a crescent shape is the most noticeable character (Fig. 2, 3a), and whereas the anal slit may be transverse or Y-shaped in related species, it is essentially longitudinal in *M. castanea* (Reding and Klein 2006; Tashiro 1987). Other distinguishing larval characters include very small claws of the metathoracic legs, as compared to the pro- and mesothoracic legs, and a light-coloured, enlarged bulbous stipe of the maxilla (Fig. 3b). *Maladera castanea* larvae are smaller than those of *P. japonica, E. orientalis,* and *R. majalis,* with full-grown third instars being approximately 19 mm long. *Maladera castanea* adults were not collected, but they are 8-11 mm long, dull chestnut-brown, with a velvety, slight iridescent sheen (Tashiro 1987). Adult beetles generally conceal themselves in moist soil at the base of food plants and grasses during the day. They fly only at night, but are highly attracted to lights, a behaviour that has proved useful in collecting or monitoring for *M. castanea* (Tashiro 1987).

Soil samples were not collected throughout the blueberry fields in question, and therefore it is not possible to correlate *M. castanea* with the progressively poorer berry yields generated. However, white grubs, including *M. castanea*, are increasingly important pests of highbush blueberries (Alm et al. 1999; Cowles 2005; Wise et al. 2007), other *Vaccinium* spp. (Koppenhofer et al. 2008; Wenninger and Averill 2006), strawberries (LaMondia et

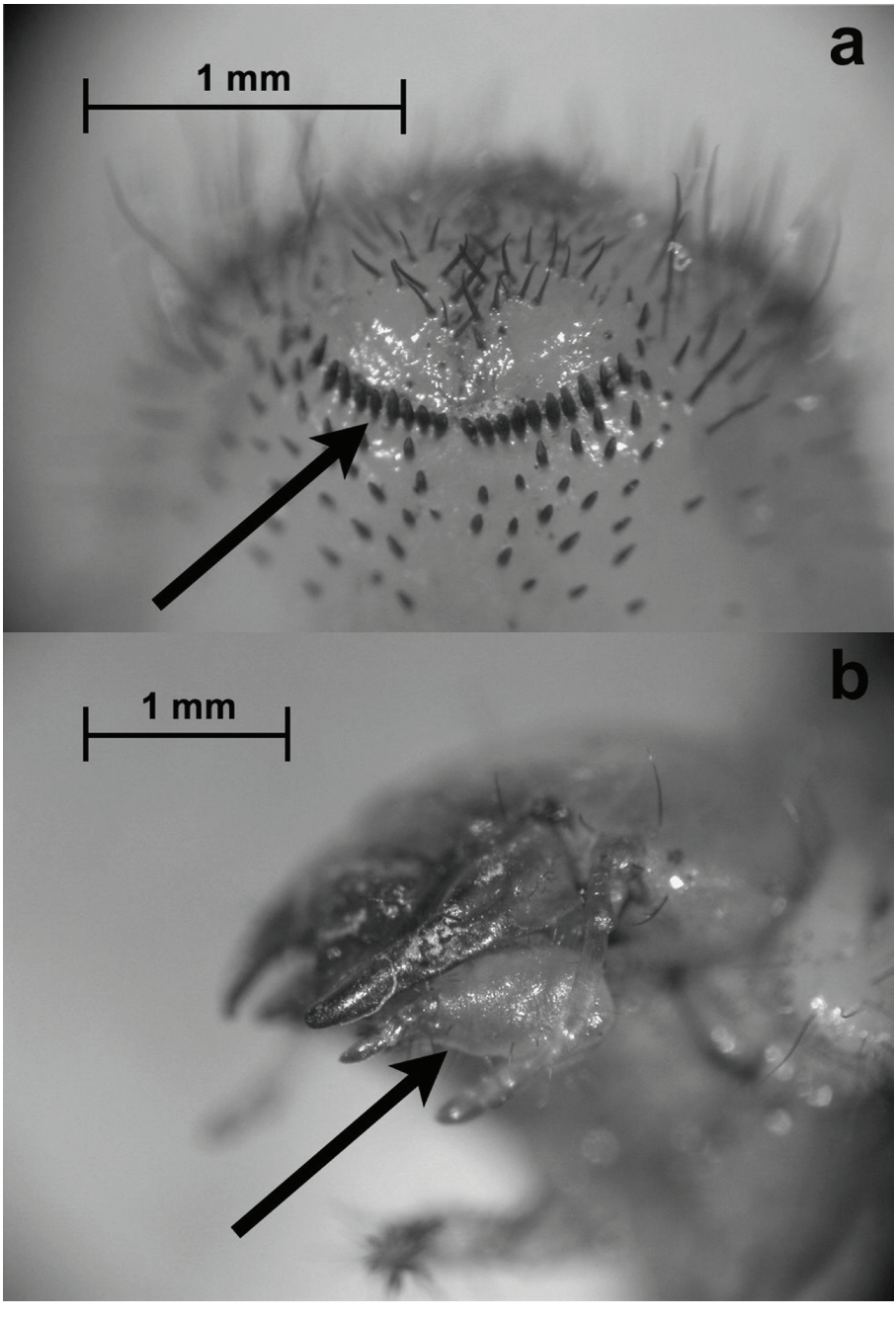

FIGURE 3. *Maladera castanea* larva from Fox River, Nova Scotia, 2008, (a) rastral pattern on the 10th abdominal segment and (b) head illustrating the enlarged bulbous stipe of the maxilla. Photos: R.E.L. Rogers, Wildwood Labs Inc.

al. 2002), turf (Koppenhofer and Fuzy 2003), and other crops, ornamentals and perennials (Tashiro 1987). Hallock (1936) reported that adults and/or larvae may cause considerable injury to many vegetables, including beets, carrots, corn, parsnips, peppers, and turnips, but that larvae were almost always more numerous in grassy areas overgrown with weeds, particularly in the presence of hawkweed (the preferred oviposition site), goldenrod, wild asters and, to a lesser extent, sorrel. Indeed, we found *M. castanea* feeding on *V. angustifolium* in patches next to a high density of grasses and other weeds. Further, being an unfamiliar, subterranean root feeder with few natural enemies (Tashiro 1987), there is potential for undetected population growth.

Although it is unknown how *M. castanea* became established in the Fox River area, the producer revealed that there is occasional back-and-forth transport of farm machinery (e.g. tractors, harvesters) from operations in the state of Maine where the beetle is known to exist, suggesting cross-border transport. Alternatively, this *M. castanea* record could simply be the product of natural expansion throughout North America. With recent intensive efforts of C.G. Majka and colleagues to document Coleoptera occurrence in the Maritimes (http://www.chebucto.ns.ca/Environment/NHR/PDF/index.html), it is somewhat surprising that *M. castanea* has not been found earlier or elsewhere. Whether the geographic range of *M. castanea* in this region is poorly understood or if the beetle is of sporadic occurrence is unclear. Future work will attempt to map the distribution of *M. castanea* throughout Nova Scotia.

Acknowledgements

We thank L. Babineau, K. Ramanaidu and D. McIsaac for their help during collection of *M. castanea* larvae, R. Delbridge, G. Brown and K. MacKenzie for their assistance, and G. Williams for reviewing an early version of the manuscript. Partial funding for this work was provided by the Wild Blueberry Producers Association of Nova Scotia, Agriculture and Agri-Food Canada through Agri-Futures Nova Scotia, Conseil pour le développement de l'agriculture du Québec, the New Brunswick Agricultural Council/Counseil Agricole due Nouveau-Brunswick, the PEI Adapt Council, Agri-Adapt Council Inc. and the Nova Scotia Department of Agriculture Technology Development Program.

References

Ahrens, D. 2006. Subfamily Sericinae Kirby, 1837, p. 229–248, *In* I. Löbl and A. Smetana, eds. Catalogue of Palaearctic Coleoptera. Apollo Books, Stenstrup, Denmark.

Alm, S.R., M.G. Villani and W. Roelofs. 1999. Oriental beetles (Coleoptera: Scarabaeidae): Current distribution in the United States and optimization of monitoring traps. Journal of Economic Entomology 92: 931-935.

Bostanian, N.J., C. Vincent, H. Goulet, L. Lesage, J. Lasnier, J. Bellemare and Y. Mauffette. 2003. The arthropod fauna of Québec vineyards with particular reference to phytophagous arthropods. Journal of Economic Entomology 96: 1221-1229.

Chantal, C. 2003. Six nouvelles mentions québécoises de coléoptères. Fabreries 28: 25-30.

Cowles, R.S. 2005. White grub management in blueberries. Proceedings of the New England Vegetable & Fruit Conference. Manchester, New Hampshire.

Evans, A.V. and A.B.T. Smith. 2005. An electronic checklist of the New World chafers (Coleoptera: Scarabaeidae: Melolonthinae). DigitalCommons@University of Nebraska - Lincoln. http://digitalcommons.unl.edu/entomologypapers/2.

Hallock, H.C. 1929. Known distribution and abundance of *Anomala orientalis* Waterhouse, *Aserica castanea* Arrow, and *Serica similis* Lewis in New York. Journal of Economic Entomology 22: 293-299.

Hallock, H.C. 1930. Some observations upon the biology and control of *Aserica castanea* Arrow. Journal of Economic Entomology 23: 281-286.

Hallock, H.C. 1936. Notes on biology and control of the Asiatic garden beetle. Journal of Economic Entomology 29: 348-356.

Koppenhofer, A.M. and E.M. Fuzy. 2003. Biological and chemical control of the Asiatic garden beetle, *Maladera castanea* (Coleoptera: Scarabaeidae). Journal of Economic Entomology 96: 1076-1082.

Koppenhofer, A.M., C.R. Rodriguez-Saona, S. Polavarapu and R.J. Holdcraft. 2008. Entomopathogenic nematodes for control of *Phyllophaga georgiana* (Coleoptera: Scarabaeidae) in cranberries. Biocontrol Science and Technology 18: 21-31.

LaMondia, J.A., W.H. Elmer, T.L. Mervosh and R.S. Cowles. 2002. Integrated management of strawberry pests by rotation and intercropping. Crop Protection 21: 837-846.

Potter, D.A. 1998. Destructive turfgrass insects: Biology, diagnosis, and control. Ann Arbor Press, Chelsea, MI.

Reding, M.E. and M.G. Klein. 2006. Common white grubs of northeast Ohio nurseries. Government Publication/Report. www.ars.usda.gov/sp2UserFiles/Place/36071000/Publications/Reding192314_2006_CommonWhiteGrubs.pdf.

Tashiro, H. 1987. Turfgrass insects of the United States and Canada. Cornell University Press, Ithaca, NY.

Wenninger, E.J. and A.L. Averill. 2006. Mating disruption of oriental beetle (Coleoptera: Scarabaeidae) in cranberry using retrievable, point-source dispensers of sex pheromone. Environmental Entomology 35: 458-464.

Wise, J.C., C. Vandervoort and R. Isaacs. 2007. Lethal and sublethal activities of imidacloprid contribute to control of adult Japanese beetle in blueberries. Journal of Economic Entomology 100: 1596-1603.