

Todd M. Gilligan<sup>1</sup> and Steven C. Passoa<sup>2</sup>

1) Identification Technology Program (ITP) / Colorado State University, USDA-APHIS-PPQ-Science & Technology (S&T), 2301 Research Boulevard, Suite 108, Fort Collins, Colorado 80526 U.S.A. (Email: [todd.m.gilligan@aphis.usda.gov](mailto:todd.m.gilligan@aphis.usda.gov))

2) USDA-APHIS-PPQ, The Ohio State University and USDA Forest Service Northern Research Station, 1315 Kinnear Road, Columbus, Ohio 43212 U.S.A. (Email: [steven.c.passoa@aphis.usda.gov](mailto:steven.c.passoa@aphis.usda.gov))

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The horse chestnut leaf miner, *Cameraria ohridella* Deschka and Dimić, is a pest of horse chestnut (*Aesculus hippocastanum*) across most of Europe. Larvae form blotch mines in the leaves, causing characteristic brown patches across the leaf (Figs. 1, 3, 7), leaf death (Fig. 6), and early leaf drop. Despite the serious appearance of infected trees (Fig. 3), damage by *C. ohridella* does not usually result in tree mortality. In addition to *A. hippocastanum*, this species is capable of full development on a variety of *Aesculus*, including several North American species (Ohio buckeye, painted buckeye, red buckeye, and yellow buckeye) and it has also been recorded on two species of sycamore (*Acer*). In Europe, three to five overlapping generations per year are possible.

*Cameraria ohridella* is a member of the leaf-miner family Gracillariidae. The genus *Cameraria* consists of 74 described species, with more than 50 species present in North America. Adults are tiny (forewing length 3-4 mm) and many species have very similar brown forewings with white and black bands (Figs. 2, 4-5). Identification to species is difficult and requires a genitalic dissection by a specialist. One North American species, *C. aesculisella*, also creates leaf mines in *Aesculus*, although the individual mines are generally larger than those created by *C. ohridella* and larval damage does not result in complete defoliation of the tree. This species has been recorded from Kentucky, Indiana, Ohio, Pennsylvania, and West Virginia (photos at [Microleps.org](http://Microleps.org)).

Because of their small size and similar appearance, it is difficult or impossible to screen for *Cameraria* adults using traditional pheromone (sticky) traps. This aid is designed to assist in the detection of suspect *C. ohridella* by visual observation of larval damage (leaf mines) on *Aesculus* or *Acer*. If leaf mines are found on these hosts, bring the entire leaf back to the lab. Carefully extract the larvae from the leaf mines and boil the larvae in water for two minutes. Remove the larvae from the water and place them in a vial filled with 80% ethanol. If available, preserve additional larvae directly in 95% ethanol for possible molecular diagnostics. Press the leaf with the mine in a plant press. Collect and press any blotch mines on *Aesculus*, even if they are empty; the leaf-mining fauna of *Acer* is more diverse and identifying empty mines is more complicated.

If many infested leaves are present, place a few infested leaves still attached to a bit of stem in a plastic bag and check periodically for adult emergence. Alternatively, return to the same tree in the autumn to collect infested leaves on the ground that may contain overwintering pupae.

Submit leaf mines and any associated larvae or adults to your regional domestic identifier.

**CAPS Approved Survey Method:** Observation of larval damage



Fig. 1: Typical blotch mines on *Aesculus* created by *C. ohridella* (Photo by William M. Ciesla, Forest Health Management International, Bugwood.org).



Fig. 2: *Cameraria ohridella* resting adult (Photo by Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org).



# Level 1 Screening

## Horse Chestnut Leaf Miner

*Cameraria ohridella* Deschka and Dimić

Visually inspect the following potential hosts for signs of larval damage similar to that shown in Figs. 3, 6-7. Host distribution data for the U.S. was obtained from [plants.usda.gov](http://plants.usda.gov).

### Potential Hosts

***Aesculus hippocastanum*** - Horse chestnut (CT, GA, IA, IL, IN, KY, MA, MD, ME, MI, MN, NC, NJ, NY, OH, OR, PA, RI, SC, VA, WA, WV)

***Aesculus flava*** - yellow buckeye (AL, DC, GA, IL, IN, KY, MD, MS, NC, NJ, NY, OH, PA, SC, TN, VA, WV)

***Aesculus glabra*** - Ohio buckeye (AL, AR, GA, IA, IL, IN, KS, KY, ME, MI, MN, MO, MS, NE, NH, NJ, NY, OH, OK, PA, TN, TX, VA, WI, WV)

***Aesculus sylvatica*** - painted buckeye (AL, GA, NC, SC, TN, VA)

***Aesculus pavia*** - red buckeye (AL, AR, FL, GA, IL, IN, KY, LA, MO, MS, NC, OH, OK, SC, TN, TX, VA, WV)

***Aesculus × bushii*** - Bush's chestnut (AL, AR, LA, MO, MS, OK, TX)

***Acer pseudoplatanus*** - sycamore maple (CT, DC, DE, IL, KY, MA, MD, ME, MI, NC, NJ, NY, PA, RI)

***Acer platanoides*** - Norway maple (CT, DC, DE, ID, IL, IN, KY, MA, MD, ME, MI, MN, MT, NC, NH, NJ, NY, OH, OR, PA, RI, TN, VA, VT, WA, WI, WV)

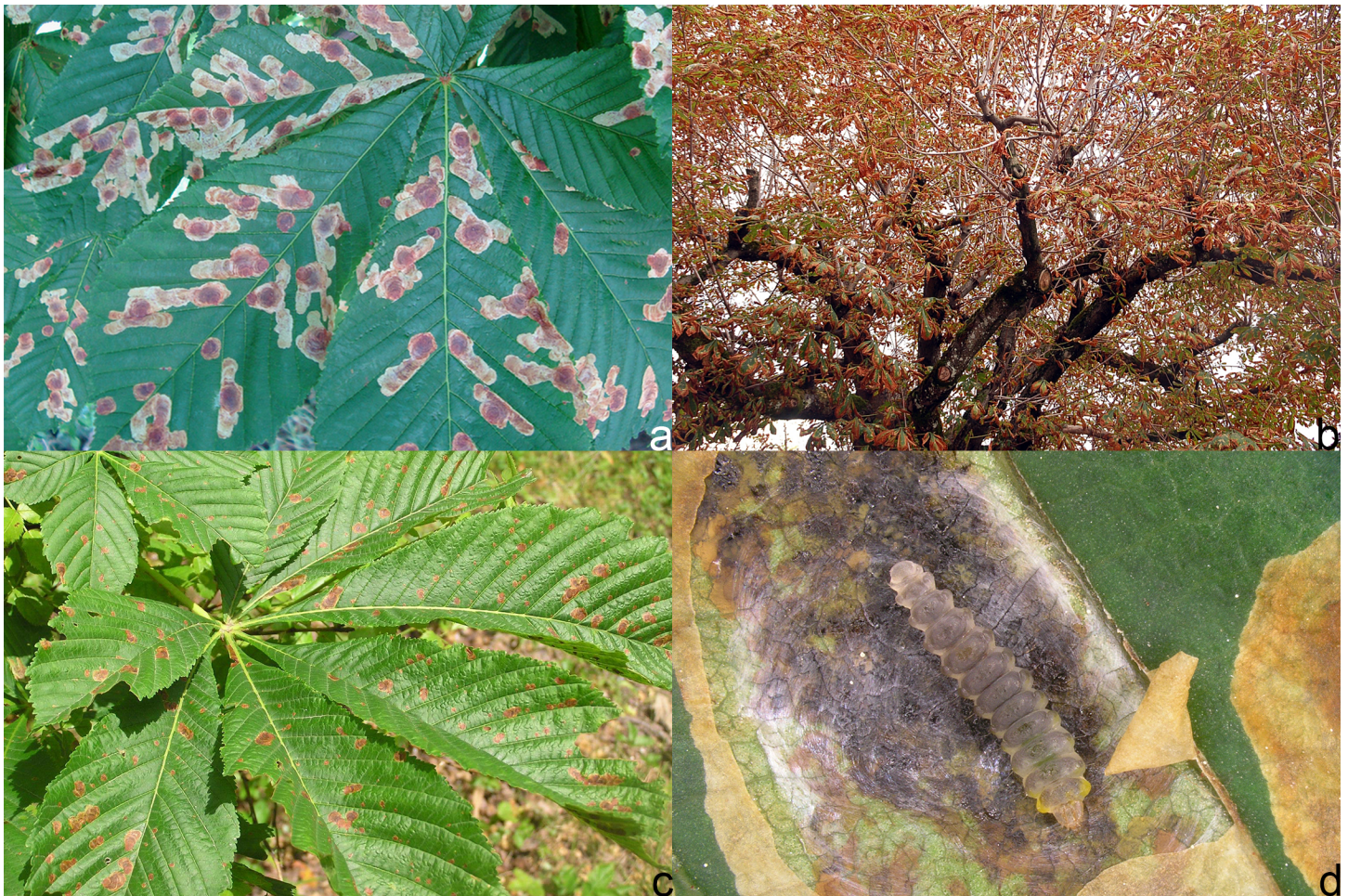


Fig. 3: *Cameraria ohridella* larval damage on *A. hippocastanum*; a: leaf mines in Italy (Photo by Scot Nelson); b: infested tree in France (Photo by Fritz Geller-Grimm); c: leaf mines (Photo by Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org); d: larva on a leaf mine (Photo by Ferenc Lakatos, University of West-Hungary, Bugwood.org).





Fig. 4: *Cameraria ohridella* spread adult. Wingspan is 7-8 mm.

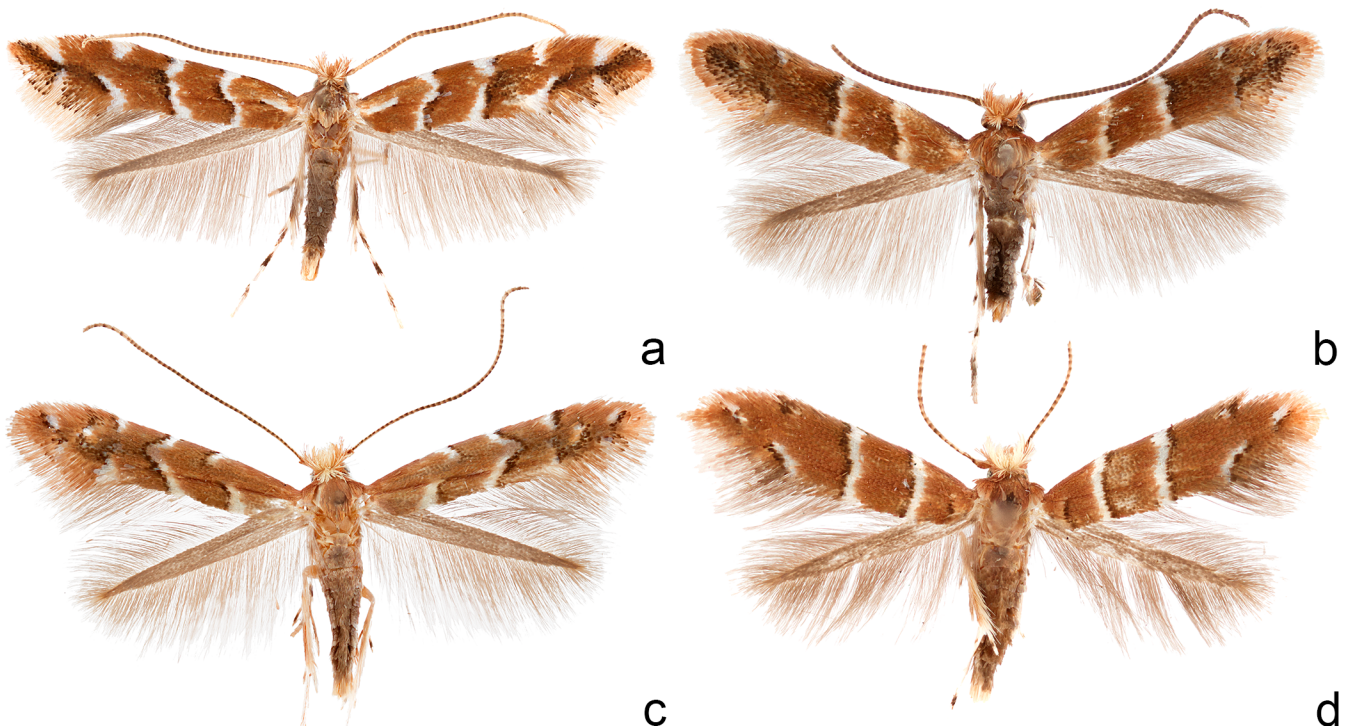


Fig. 5: *Cameraria ohridella* and three North American non-target *Cameraria*; a: *C. ohridella*; b: *C. guttifitella*; c: *C. fitcherella*; d: *C. hamameliella*. Many *Cameraria* share the same forewing pattern and are difficult to separate without a genitalic dissection.



Fig. 6: *Aesculus hippocastanum* leaf killed by *C. ohridella* damage (Photo by Petr Brož).



Fig. 7: *Cameraria ohridella* leaf mines on *A. hippocastanum* (Photo by Georg Slickers).

### Key to Sort and Screen *Cameraria ohridella* Suspects in the United States

#### Larvae

(Note that larvae of *Cameraria* are hypermetamorphic: sap-feeding instars are morphologically different from tissue-feeding instars.)

1. Upperside bloch mines on *Aesculus* or *Acer*; sap-feeding forms with a serrated labrum and no spinneret; tissue feeders with a vestigial claw on reduced thoracic legs, A3-5 with 12-20 crochets in a semicircle but no tubular prolegs; dorsum with rectangular to oval sclerotized patches ..... ***Cameraria* suspect**
- 1'. Not on *Aesculus* or *Acer*; thoracic claws or tubular prolegs present; no rectangular plates on dorsum ..... Not *Cameraria*

#### Adults

1. Adult moth tiny (2-4 mm FWL) with four white transverse bands on the forewing edged in black to brown distally, the third band from the base broken into two parts, the apical (last) one with a black spot in the middle; must be reared from or resting on *Aesculus* or *Acer* ..... ***C. ohridella* suspect**
- 1'. Adult, if tiny, lacks the forewing pattern described above; not reared or resting on *Aesculus* or *Acer* ..... Not *C. ohridella*

#### Citation

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### References for more information on *C. ohridella* and non-targets

*Cameraria* adults and larval damage on Microleps.org (including *C. aesculisella*):

<http://www.microleps.org/Guide/Gracillariidae/Lithocolletinae/Cameraria/index.html>

Freise, J. F., W. Heitland and A. Sturm. 2004. Host plant range of the horse-chestnut leaf miner, *Cameraria ohridella* (Lepidoptera: Gracillariidae), a pest of the white flowering horse-chestnut, *Aesculus hippocastanum*. Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie 14: 351-354.

Kenis, M., R. Tomov, A. Svatoš, P. Schlinsog, C. Lopez-Vaamonde, W. Heitland W., et al. 2005. The horse-chestnut leaf miner in Europe. Prospects and constraints for biological control. Proceedings of the Second International Symposium on Biological Control of Arthropods, Davos, Switzerland, 12-16 September 2000 (ed. M. Hoddle): 77-90.

Lees, D. C., H. W. Lack, R. Rougerie, A. Hernandez-Lopez, T. Raus, N. Avtzis, S. Augustin and C. Lopez-Vaamonde. 2011. Tracking origins of invasive herbivores using herbaria and archival DNA: the case of the horse-chestnut leafminer. Frontiers in Ecology and the Environment 9: 322-328.

Maier, C. T. and D. R. Davis. 1989. Southern New England host and distributional records of Lithocolletine (Gracillariidae), with comparison of host specificity in selected temperate regions. Miscellaneous Publications of the Entomological Society of America 70: 1-23.

Moth Photographers Group. Mississippi State U. (<http://mothphotographersgroup.msstate.edu/Plates.shtml>)

Šefrová, H. and V. Skuhrový. 2000. The larval morphology of *Cameraria ohridella* Deschka & Dimić compared with the genus *Phyllonorycter* Hübner (Lepidoptera, Gracillariidae). Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis 48: 23-30.

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