HISTORY AND ECOLOGY IN NORTH AMERICA

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NATIVE SPECIES

Euhrychiopsis lecontei
(Coleoptera: Curculionidae)

DESCRIPTION AND LIFE CYCLE

Euhrychiopsis lecontei is fully aquatic and spends the growing season submersed on watermilfoil plants. Adult weevils are 3 mm long and dark with black and yellowish mottled stripes (**Fig. 1a**). Adults feed on the leaves and stems of target plants (**Fig. 1a,c**). Females lay their yellow eggs singly on plant tips throughout the growing season. Larvae are whitish-tan turning purplish-gray as they mature (**Fig. 1b**). They feed on stem tips and mine plant stems before pupating in chambers within stems. Up to five generations can occur per year, though three is more common in the field. In late summer, adults move to shore to overwinter in leaf litter.

HISTORY AND CURRENT STATUS

The original host of this weevil is the native northern watermilfoil (*Myriophyllum sibiricum*). After it was observed feeding on and suppressing Eurasian watermilfoil, the weevil was redistributed to Eurasian watermilfoil in multiple states in the USA and was, at one point, commercially available. Although *E. lecontei* occurs naturally in Canada on northern watermilfoil, it has not been redistributed there for Eurasian watermilfoil control.

The weevil is widely distributed throughout North America and is reportedly associated with declines in Eurasian watermilfoil populations in some lakes in the Northeast, Midwest, and Washington State. High weevil densities can suppress Eurasian watermilfoil populations; however, most weevil populations are too low to provide measurable and consistent control. Factors such as predation, water depth and temperature, plant quality, a lack of competitive native species, and the availability of suitable overwintering habitat can all influence weevil populations and their impact. Augmentation with larvae and/or eggs has proven ineffective, but augmentation with adults may sometimes result in increases of weevil densities the year following release.

Although this weevil does best on Eurasian watermilfoil, its native host is *M. sibiricum*, on which it can be found

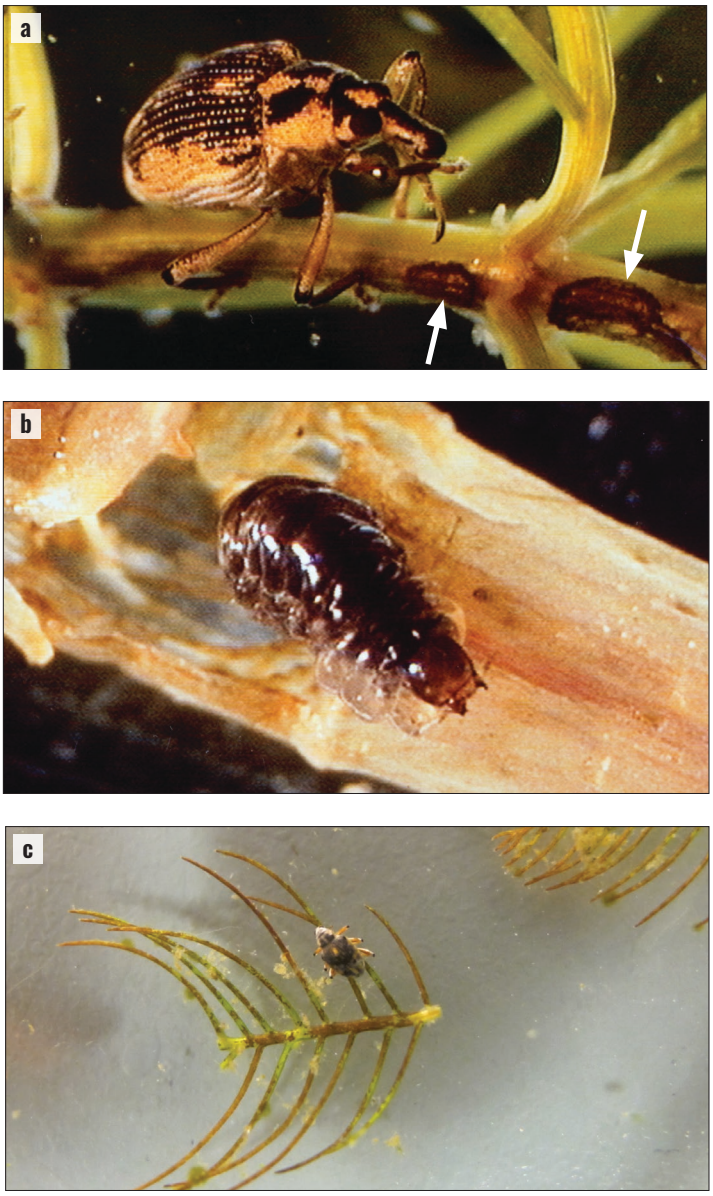

Figure 1. *Euhrychiopsis lecontei* (a) adult near feeding scars (white arrows), (b) late-instar larva, (c) adult feeding on a milfoil leaflet (a,b: Robert L. Johnson, Cornell University, Bugwood.org, CC BY-3.0 US; c: Jenifer Parsons, Washington State Department of Ecology)

throughout northern North America. The weevil may also feed on other native *Myriophyllum* spp. when densities are very high. **Consequently, redistributions are not recommended for water bodies where native milfoil species are present. When redistributions are deemed necessary, an APHIS 526 permit is required for transporting *E. lecontei* interstate. Extreme caution should be exercised during the collection process to ensure other organisms such as snails, mussels, insects, etc. are not inadvertently collected and transported as well.**

UNAPPROVED BIOCONTROL AGENTS

Acentria ephemerella (Lepidoptera: Crambidae)

DESCRIPTION AND LIFE CYCLE

Acentria ephemerella adults are 5–9 mm long and range in color from white to tan, with darker bands on the body. Males and some females (**Fig. 2a**) have creamy-white, feathered wings, though most females are wingless (**Fig. 2b**). Females lay 100–300 eggs on host plants in early summer. Larvae grow up to 12 mm long and are greenish-transparent (**Fig. 2c**). Larvae mine plant leaflets until large enough to build shelters out of plant material. Fourth- and fifth-instar larvae feed on stem tips before pupating within cocoons attached to plant stems (**Fig. 2d**). There are up to two generations per year; new adults emerge in late summer, and larvae overwinter on lower plant stems.

HISTORY AND CURRENT STATUS

This aquatic moth, native to Europe, was first documented in Quebec, Canada in 1927 and Massachusetts, USA in 1949. It was intentionally redistributed in New York, USA 1999–2002. Though now widely distributed, its abundance varies. High population densities have been shown to control Eurasian watermilfoil in some lakes by preventing weed canopy growth; however, no control has been observed in other similar settings, even after augmentative releases. Although host-specificity testing indicated preference and better performance on Eurasian watermilfoil, **it also feeds on other aquatic species, including many natives, and is not approved for redistribution in the USA. In Canada, this species has not been formally evaluated and is not recommended for redistribution prior to consultation with local authorities.**

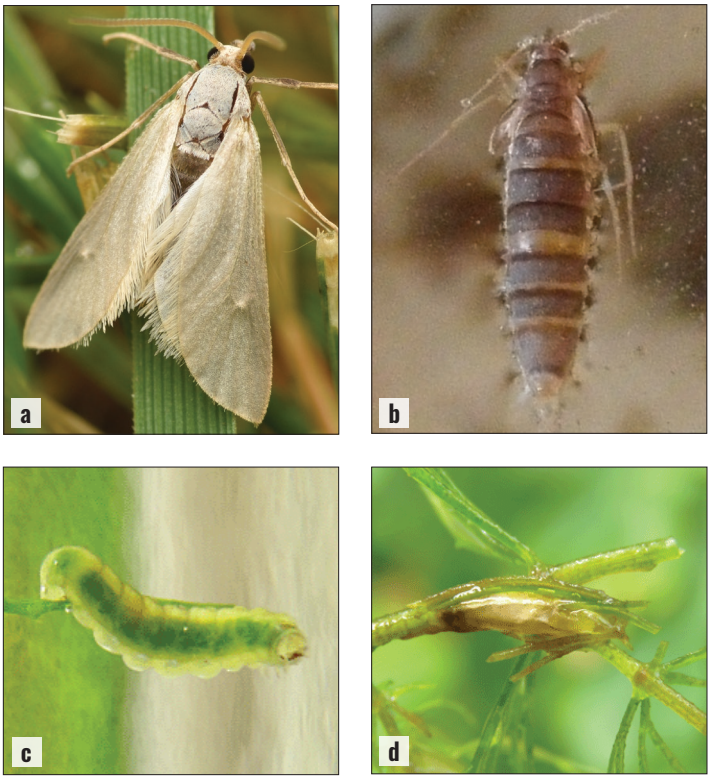

Figure 2. *Acentria ephemerella* winged female (a), wingless female (b), larva (c), pupa within a cocoon (a: Rasmus Allesoee, iNaturalist.org CC BY-NC 4.0; b: Michal Maňas, Wikipedia.org CC BY-3.0; c,d: W.N. Ellis CC BY-NC-SA 4.0)

REFERENCES

Buckingham, G.R. 1994. Biological control of aquatic weeds. *In*: D. Rosen, F.D. Bennett, and J.L. Capinera, Eds. Pest Management in the Subtropics: Biological Control - the Florida Experience. Intercept Ltd, Andover, U.K. pp. 413–480.

Buckingham, G.R. and B.M. Ross. 1981. Notes on the biology and host specificity of *Acentria nivea* (=*Acentropus niveus*). Journal of Aquatic Plant Management 19: 336.

Buckingham, G.R. 2004. Eurasian watermilfoil, *Myriophyllum spicatum*. *In*: E.M. Coombs, J.K. Clark, G.L. Piper, and A.F. Cofrancesco Jr., Eds. Biological Control of Invasive Plants in the United States. Oregon State University Press, Corvallis, Oregon. pp. 169–173.

Cock, M.J.W., H.L. Hinz, G. Grosskopf, and P. Hafliger. 2008. Development of a Biological Control Program for Eurasian Watermilfoil (*Myriophyllum spicatum*). CABI Europe – Switzerland ERDC/EL TR-08-22.

Creed, R.P.J. and S.P. Sheldon. 1994. The effect of two herbivorous insect larvae on Eurasian watermilfoil. Journal of Aquatic Plant Management 32: 21–26.

Creed, R.P. and S.P. Sheldon. 1995. Weevils and watermilfoil: did a North American herbivore cause the decline of an exotic plant? Ecological Applications 5: 1113–1121.

Havel, J.E., S.E. Knight, and K.A. Maxson. 2017. A field test on the effectiveness of milfoil weevil for controlling Eurasian watermilfoil in Wisconsin lakes. Hydrobiologia 800: 81–97.

Johnson, R.L. and B. Blossey. 2002. Eurasian Watermilfoil. *In*: R. Van Driesche, S. Lyon, B. Blossey, M. Hoddle, and

R. Reardon, Eds. Biological Control of Invasive Plants in the Eastern United States. FHTET-2002-04. USDA Forest Service, Forest Health Technology Enterprise Team, Morgantown, West Virginia. pp. 79–90.

Menninger, H. 2011. A review of the science and management of Eurasian watermilfoil: recommendations for future action in New York state. New York Invasive Species Research Institute, Cornell University, Ithaca, New York. 46 pp.

Newman, R.M. 2004. Invited review. Biological control of Eurasian watermilfoil by aquatic insects: basic insights from an applied problem. Archiv Fur Hydrobiologie 159(2): 145–184.

Sheldon, S.P. and R.P.J. Creed. 1995. Use of a native insect as a biological control for an introduced weed. Ecological Applications 5: 1122–1132.

Sheldon, S.P. and R.P. Creed Jr. 2003. The effect of a native biological control agent for Eurasian watermilfoil on six North American watermilfoils. Aquatic Botany 76: 259–265.

Winston, R.L., C.B. Randall, B. Blossey, P.W. Tipping, E.C. Lake, and J. Hough-Goldstein. 2017. Field Guide for the Biological Control of Weeds in Eastern North America. USDA Forest Service, Forest Health Technology Enterprise Team, Morgantown, West Virginia. FHTET-2016-04.

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SUGGESTED CITATION

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