

THE FIRST NEW WORLD RECORD OF *LYCORMA DELICATULA* (INSECTA: HEMIPTERA: FULGORIDAE)¹

Lawrence E. Barringer,^{2,3} Leo R. Donovan,³ Sven-Erik Spichiger,³
Daniel Lynch,⁴ and David Henry⁴

ABSTRACT: The invasive species *Lycorma delicatula* (White) (Hemiptera: Fulgoridae) is reported from the United States. The first specimens of *Lycorma delicatula* were collected in Berks County, Pennsylvania, USA in September 2014. The species' North American history of distribution, pest implications, and brief observations on their biology in the New World are reviewed.

KEY WORDS: *Lycorma delicatula*, *Ailanthus altissima*, Fulgoridae, New World, First Record, Distribution, Spotted Lanternfly

The initial report of “an unusual pest in large numbers on *Ailanthus altissima*” was submitted to the Pennsylvania Department of Agriculture (PDA) Entomology Division on September 22, 2014, by Wildlife Education Specialist Daniel Lynch, Pennsylvania Game Commission, following consultation with his Area Forest Specialist, David Henry. The first voucher specimens were collected by PDA Entomologists Lawrence Barringer, Sven-Erik Spichiger and Leo Donovan later that same day. The original specimens were tentatively identified as *Lycorma delicatula* (White), also referred to with the given common name Spotted Lanternfly, by Leo Donovan, PDA Entomologist, and submitted for verification by the USDA-APHIS-PPQ Area Identifier. The initial material collected consisted of over one hundred adult specimens of both sexes agreeing with the description of the species (White 1845). Data for the find are as follows: USA: PA: Berks Co., 15 Rolling Rock Road, 40.415240°N, -75.675340°W, 22 September 2014, Host: *Ailanthus alitissima*, Collector: L. E. Barringer.

Lycorma delicatula is in the order Hemiptera, suborder Auchenorrhyncha, infraorder Fulgomorpha, and family Fulgoridae, which can be distinguished from other planthopper families in the United States by its large size, row of apical spines on the second segment of the hind tibia (vs. 2 or none in higher planthoppers) and reticulate wing venation, including the anal area of the hind wing (vs. Dictyopharidae). *Lycorma* Stål contains four species from Southeast Asia, with records from Bangladesh, India, Vietnam, Taiwan, China, and introductions to Japan and South Korea (Kim 2013, Bourgoin 2014). The species was originally described (White 1845) in the genus *Aphaena* from Nankin, China, in 1844, though reports of its use in medicine date back to the 1100s CE. (Han et al., 2008). Though sporadically reported from Japan since the 1930s, this species had been minimally studied until its discovery in South Korea in 2004 and subse-

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² Corresponding Author (email: lbarringer@pa.gov)

³ Pennsylvania Department of Agriculture, Bureau of Plant Industry, Division of Entomology, 2301 Cameron Street, Harrisburg, PA 17110

⁴ Pennsylvania Game Commission, 2001 Elmerton Avenue, Harrisburg, PA 17110

quent impact as an outbreak pest of grapes, fruit trees, and ornamental trees and shrubs in both Japan and South Korea since 2006 (Kim 2013).

L. delicatula is 17-25 mm long (Females 20-25 mm, males 17-20 mm) with grey forewings adorned with black spots and reticulated tips. The hindwings have strikingly contrasting blocks of red and black with a white stripe partially dividing them. The head and body are black with a yellow abdomen incompletely divided by black bands.

In North America the distribution of *L. delicatula* is restricted to Berks County, in eastern Pennsylvania to date. Survey efforts by the Pennsylvania Department of Agriculture have confirmed its presence to the original discovery in Pike Township and in five adjacent townships within Berks County: Rockland, District, Earl, Washington, and Hereford. Ongoing delimitation surveys to identify the edge of the infested region were established immediately following confirmation of *L. delicatula* as a potential pest of concern. The infestation is believed to be at least 2-3 years old based on observed population levels and presence of only a relatively few number of old, overwintered egg masses near the putative original site of introduction.

The agricultural impacts of *L. delicatula* appear to threaten primarily the grape and tree fruit industries in North America. In South Korea there is an established history of damage and control in the grape industry (Park et al., 2009, Shin et al., 2010, Lee et al., 2011). Feeding damage was recorded on 67 plant species in South Korea, 34 of which occur in the United States (25 in Pennsylvania). *Lycorma delicatula* induced damage on an additional 26 species that do not occur in North America; however, congeneric species of these plants do occur in Pennsylvania. (Han et al., 2008, Park et al., 2009, Lee et al., 2011, Kim et al., 2011, USDA, NRCS 2015). Field observations in Pennsylvania have confirmed *L. delicatula* feeding on wild *Vitis* spp. Although feeding damage has not yet been observed in cultivated grape in Pennsylvania, monitoring will continue at vineyards and fruit orchards within the known current distribution and surrounding region.

The life cycle of *L. delicatula* in North America is presently unclear. Our observations are consistent with those of Park et al. (2009). Adults and active mating are confirmed as early as September 22 and unconfirmed reports have adults present in August. The first confirmed egg mass laid in the current season was found October 13. Adult activity persisted through November 18. The dates for Pennsylvania, when compared to South Korea (Park et al., 2009), were delayed by 1 to 2 weeks in 2014. Spring phenology in the USA is still unknown since there has not yet been opportunity for monitoring.

Lycorma delicatula's preferred host in North America, as it is in South Korea, is the introduced tree *Ailanthus altissima* (Mill.) Swingle (Simaroubaceae), also known as the Tree-of-heaven (Dix and Cassel, 2011) and locally as "Paradise Tree." It is considered invasive and readily escapes cultivation into disturbed woods, roadsides, vacant areas, and railroad banks. This planthopper utilizes this

tree for feeding, mating, possible chemical sequestration, and egg depositing, where it overwinters in cryptic wax colored masses of 30 to 50 eggs (Kim et al., 2011).

In Pennsylvania it has been observed utilizing an additional 12 unrelated species so far: Resting/aggregating on *Acer rubrum* L. (Sapindaceae), *Cornus* sp. (Cornaceae), *Prunus serotina* Ehrh. (Rosaceae); egg laying on *Acer rubrum*, *Fagus grandifolia* Ehrh. (Fagaceae), *Liriodendron tulipifera* L. (Magnoliaceae), *Platanus occidentalis* L. (Platanaceae), *Prunus serotina*, *Quercus montana* Willd. (Fagaceae); and feeding on *Phellodendron amurense* Rupr. (Rutaceae), *Salix matsudana* Koidz. (Salicaceae), *S. udensis* Trautv. & C. A. Mey., *Salix* sp., *Acer saccharum*, *Styrax japonicas* Siebold & Zucc (Styracaceae), *Vitis* spp. (USDA, NRCS 2015). Inanimate smooth surfaces such as stones, fence posts, and other outdoor equipment have been used for egg laying in Pennsylvania, as well.

Voucher specimens have been deposited with the following collections (with abbreviations following Arnett et al., 1993): Pennsylvania Department of Agriculture (PADA), National Museum of Natural History (USNM), Academy of Natural Sciences (ANSP), Carnegie Museum of Natural History (CMNH), Cornell University (CUIC), American Museum of Natural History (AMNH), University of Delaware (UDCC), University of Georgia (UGCA), Frost Entomological Museum (PSUC), Purdue University (West Lafayette, Indiana, USA), Field Museum of Natural History (FMNH), Oregon Department of Agriculture (ODAC), and Tom Ridge Environmental Center (Erie, Pennsylvania, USA).

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