

NEW COUNTY AND STATE RECORDS FOR TENNESSEE OF AN EXOTIC PEST, *HALYOMORPHA HALYS* (HEMIPTERA: PENTATOMIDAE), WITH POTENTIAL ECONOMIC AND ECOLOGICAL IMPLICATIONS

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Halyomorpha halys (Hemiptera: Pentatomidae), the brown marmorated stinkbug, is an exotic polyphagous species from Asia that was first collected in North America from Allentown, Pennsylvania in 1996 (Hamilton & Shearer 2003). In 2002, *H. halys* was reported from 6 counties in Pennsylvania (Hoebeke 2002), and by 2003, the species was reported from 2 neighboring counties in New Jersey (Bernon et al. 2004). In 2005, this species was reported from Vallejo, Solano County, California, with over a dozen individuals recovered from a storage unit rented by a new resident that had relocated from Pennsylvania. Within 10 years from the original record from Allentown, Pennsylvania, *H. halys* had been reported from 26 counties in Pennsylvania (Jacobs & Bernhard

2008). This pest continues to increase its range and has since been reported around Portland and Salem, Oregon (CDFA 2005), as well as in Delaware, Maryland, Virginia, and West Virginia (Khrimian et al. 2008).

On 30 Oct. 2008, a single adult female was captured in the home of the first author in Knoxville, Knox County, Tennessee. The specimen, approximately 16.2 mm in length, displayed the characteristic light bands on the terminal 2 antennal segments, as well as alternating light and dark banding along the exposed lateral abdominal margins (Fig. 1). Closer examination also revealed the absence of teeth on the juga, as well as a smooth anterior pronotal margin, both of which distinguish this species

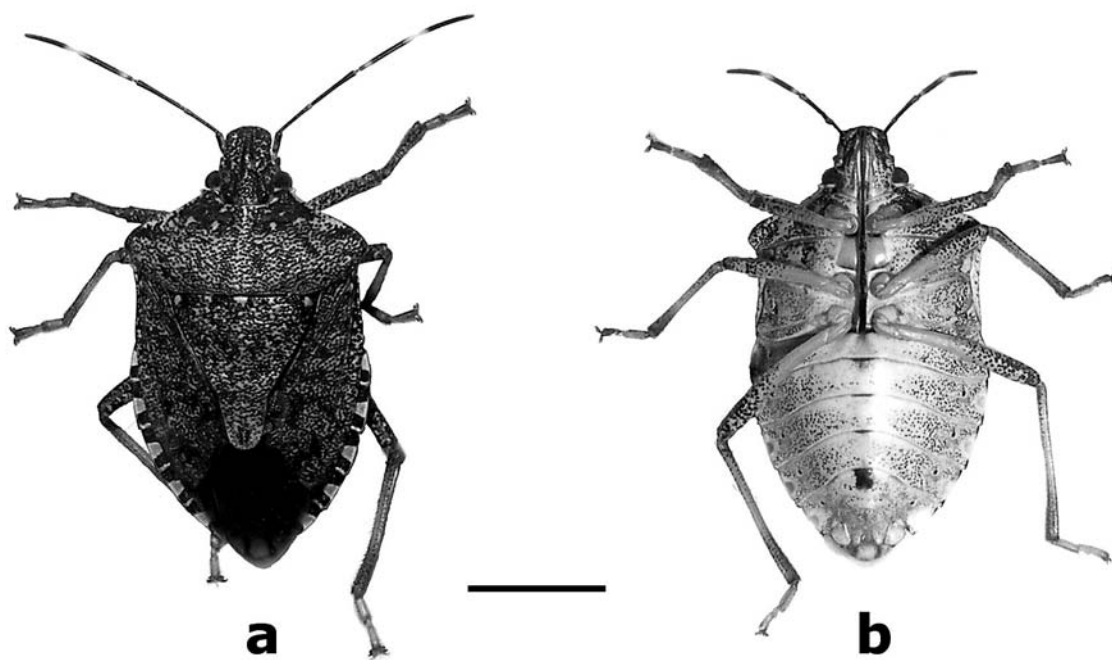


Fig. 1a, b. *Halyomorpha halys*: (a) dorsal view showing humeral angle of the pronotum rounded and abdominal margins with alternating light and dark banding, (b) ventral aspect showing legs with 3-segmented tarsi, abdominal sterna, and the genital capsule. Note the characteristic light bands on the terminal 2 antennal segments. Scale = 5 mm.

from those assigned to a similar genus, *Brochymena* (Hoebeke 2002; CDFA 2005).

In its native northeastern Asia, *H. halys* represents a nuisance pest indoors, where it seeks winter retreats, as well as a significant agricultural pest, attacking a broad range of ornamental, shade and fruit trees, several woody plants, and numerous vegetables and legumes, including soybeans (Kobayashi 1967; Jacobs & Bernhard 2008; Bernon et al. 2004; Khrimian et al. 2008). In 2007, soybeans represented a total production value of \$183 million in Tennessee, a conservative estimate of annual production value, considering the average of nearly \$209 million per year between 1998 and 2007 (USDA 2007).

In addition to physical damage caused by feeding of nymphs and adults in its native Japan, *H. halys* is also a vector of a phytoplasma disease (witches' broom) of the Princess tree, *Paulownia tomentosa* (Thunb.) (Hoebeke 2002; Bernon et al. 2004). *Paulownia tomentosa* is widely distributed throughout the eastern United States, having escaped cultivation after its original importation for its ornamental blooms. Although Lee et al. (1998) stated that *Paulownia* witches' broom exhibits host specificity, Gao et al. (2008) show that the phytoplasma causing rose witches' broom in China is the same phytoplasma causing witches' broom in *Paulownia*. In addition, Lee et al. (1998) highlight the fact that insect vectors may transmit multiple types of phytoplasma. Although the status of *H. halys* as a vector of other phytoplasmas is unknown, there exists the possibility it could transmit other phytoplasmas that could infect a broader range of host plants given its polyphagous nature. As of 2004, the presence of phytoplasma in Pennsylvania populations had not been detected with universal phytoplasma primers (Bernon et al. 2004). However, this does not preclude the potential acquisition of phytoplasmas from other infected plants, and the subsequent transmission to new hosts by *H. halys*.

Given the extremely generalist degree of host plants used by *H. halys*, as well as its potential as a vector of phytoplasma diseases, the presence of this species in Tennessee has the capacity for some degree of economic and ecological impact. Further studies, such as monitoring efforts to determine the geographic extent of its presence in Tennessee, as well as control measures to prevent further spread within the state, as well as to adjacent states, may be warranted. This specimen has been deposited in the University of Tennessee Insect Museum.

SUMMARY

Here we report a new county and state locality record for *Halyomorpha halys* in Knox County, Tennessee. The degree of establishment of local populations and effects on local agricultural and

ornamental crops is currently unknown. However, occurrence of this species in this state is of economic and ecological interest, and the implementation of monitoring and control programs may prove valuable in the assessment of current impact, as well as prevention of further damage by this introduced pest.

REFERENCES CITED

- BERNON, G., K., BERNHARD, M., HOEBEKE, E. R., CARTER, M. E., AND BEANLAND, L. 2004. *Halyomorpha halys*, (Heteroptera: Pentatomidae), the Brown Marmorated Stink Bug; Are trees the primary host for this new invasive pest? GTR-NE-332. Proc. XV USDA Interagency Res. Forum on Gypsy Moth and Other Invasive Species 2004. http://www.fs.fed.us/newtown_square/publications/technical_reports/pdfs/2005/332%20papers/bernon332.pdf (30 Oct 2008).
- CDFA. 2005. Report covering period from July 2002 through July 2005. California Plant Pest & Disease Report. California Dept. Food and Agriculture, Plant Pest Diagnostics Branch, Sacramento, CA. 22(1): 1-78.
- GAO, R., ZHANG, G.-M., LAN, Y.-F., ZHU, T.-S., YU, X.-O., ZHU, X.-P., AND LI, X.-D. 2008. Molecular characterization of phytoplasma associated with rose witches' broom in China. Plant Disease. 156: 93-98.
- HAMILTON, G. C., AND SHEARER, P. W. 2003. Brown Marmorated Stink Bug—A New Exotic Insect in New Jersey. FS002. Rutgers Cooperative Extension, New Jersey Agricultural Experiment Station, Rutgers, NJ. http://www.usapple.org/industry/treetac/stinkbug_factsheet121903.pdf (30 October 2008).
- HOEBEKE, E. R. 2002. Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) Heteroptera: Pentatomidae. Regulatory Horticulture Entomol. Circular No. 204, 28:35-37. Pennsylvania Department of Agriculture, Bureau of Plant Industry. http://www.agriculture.state.pa.us/plantindustry/lib/plantindustry/vol28_11.pdf (30 Oct 2008).
- HOEBEKE, E. R., AND CARTER, M. E. 2003. *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae): A polyphagous plant pest from Asia newly detected in North America. Proc. Entomol. Soc. Washington. 105: 225-237.
- JACOBS, S. B., AND BERNHARD, K. M. 2008. Brown marmorated stink bug *Halyomorpha halys*. NP-15. The Pennsylvania State University Entomology Notes. <http://www.ento.psu.edu/extension/factsheets/pdfs/brMarmoratedStinkBug.pdf> (30 Oct 2008).
- KHRIMIYAN, A., SHEARER, P. W., ZHANG, A., HAMILTON, G. C., AND ALDRICH, J. R. 2008. Field Trapping of the Invasive Brown Marmorated Stink Bug, *Halyomorpha halys*, with Geometric Isomers of Methyl 2,4,6-Decatrienoate. J. Agricultural and Food Chem. 56:197-203.
- LEE, I.-M., GUNDERSEN-RINDAL, D. E., AND BERTACCINI, A. 1998. Phytoplasma: ecology and genomic diversity. Phytopath. 88:1359-1366
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATIONAL AGRICULTURAL STATISTICS SERVICE (USDA/NASS). 2007. Tennessee Reports and Statistics. http://www.nass.usda.gov/Statistics_by_State/Tennessee/index.asp (30 Oct 2008).