# JAPANESE *LARICOBIUS* SP. N., A PROMISING BIOLOGICAL CONTROL CANDIDATE FOR HEMLOCK WOOLLY ADELGID

**Ashley Lamb[1], Shigehiko Shiyake[2], Scott Salom[1], Nathan Havill[3], Michael Montgomery[4], and Loke Kok[1]**

[1]Virginia Tech, Department of Entomology, Blacksburg, VA 24061

[2]Osaka Museum of Natural History, Nagai Park, Osaka, Japan

[3]Yale University, Department of Ecology & Evolutionary Biology, New Haven, CT 06520

[4]USDA Forest Service, Northern Research Station, Hamden, CT 06514

## ABSTRACT

The U.S. Forest Service foreign exploration effort targeting HWA predators in Asia produced a new *Laricobius* species from Japan. The purpose of this project is to evaluate the newly imported biological control agent, *Laricobius* sp. n., in quarantine and in its native range in Japan. Preliminary host range and basic biology studies show this species has a preference for adelgids and can perhaps inhabit a wide geographic range. Phenological studies of *Laricobius* sp. n., other predators, and their host, *Adelges tsugae* (HWA), are underway in Japan. The presence of each life stage of HWA and its predators have been recorded over a full year. Results indicate the phenology of HWA in Japan is similar to that observed in the southern range of HWA in the eastern US. *Laricobius* sp. n. is present from November to early May, whereas *Sasajiscymus tsuga* and generalist predators are present from late April to early July. Weekly observations of foliage samples indicate the overall impact of natural enemies, on the sistentes and progredientes generations, is significant.

A predator exclusion experiment was conducted from December to the end of April. *Laricobius* sp. n. was the only predator observed during this period. Samples from 20 caged and 20 uncaged branches were removed and the number of HWA counted. The number of HWA surviving within the cages was 42 percent compared to only 5 percent on branches without cages, indicating that *Laricobius* sp. n. is important in the regulation of the sistentes generation.

Results from these studies support the effort to receive permission for *Laricobius* sp. n. to be removed from quarantine in the United States. Furthermore, these results indicate that predators play an important role in HWA regulation in their native range of Japan.