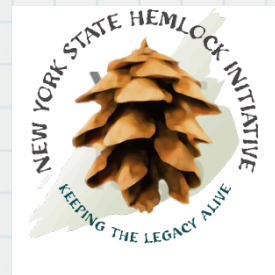


# Nature's Notebook

## Phenophase Photo Guide



### *Adelges tsugae* hemlock woolly adelgid

**NYS Hemlock Initiative**  
**Cornell University**

#### Why Observe?

Hemlock Woolly Adelgid (HWA) is a non native, invasive forest pest that was introduced to the East Coast from southern Japan in the early 1900's. HWA feeds on tree species in the *Tsuga* or hemlock genus. This encompasses Eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*Tsuga caroliniana*) on the East Coast. Monitoring HWA phenology is important for effective and coordinated management in the introduced range. There is currently an extensive biological control program being implemented to manage HWA. Understanding and tracking HWA phenophases from year to year and site to site provides valuable information for researchers to release and evaluate biological controls on the East Coast. Knowing what phenophase HWA is in allows managers to effectively target areas for survey of biological control establishment, and release bio-control predators at the proper time of year.

#### Tips for Identification

From late October through June HWA is easy to see with the naked eye and forms a characteristic white "woolly" ovisac at the base of the needles (Photo 1). From July through August, HWA is in aestivation and can be difficult to detect with the naked eye. The small insects can be found at the base of the needles and look like black sesame seeds (Photo 2).

Be aware that there is variation from individual to individual within a species, so your plant may not look exactly like the one pictured. If you are uncertain whether or not a phenophase is occurring, report a "?" for its status until it becomes clear what you are observing after subsequent visits.



Photo 1:  
Mark Whitmore,  
NYSHI, Cornell University



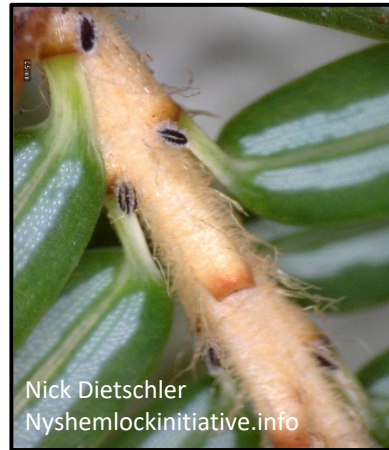
Photo 2:  
Nick Dietschler  
[Nyshemlockinitiative.info](http://Nyshemlockinitiative.info)



**Crawlers**  
**(first-instar nymphs)**

One or more nymphs are seen moving about or at rest. For *Adelges tsugae*, these first-instar nymphs are reddish-brown in color and move around before settling in one spot on a plant.

**Note:** This is the only mobile dispersal stage of HWA in the introduced range (eastern US).



**Dormant nymphs**  
**(aestivating nymphs)**

One or more nymphs are seen in a dormant state. For *Adelges tsugae*, nymphs settle in one spot, usually at the base of a needle, turn black in color with a small halo of white "wool", and enter dormancy (aestivation) between midsummer and fall.



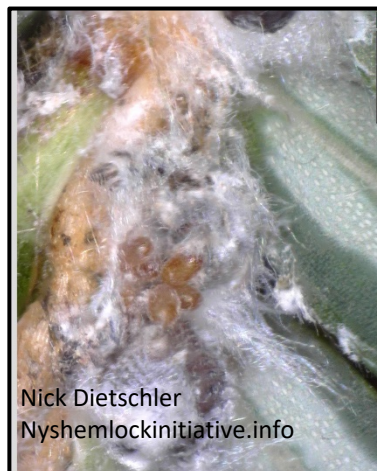
**Post-dormant nymphs**  
**(nymphs breaking aestivation)**

One or more nymphs have come out of their dormant state. For *Adelges tsugae*, the post-dormant nymphs are still settled in one spot, but are increasing in size and wooliness, and changing color from black to grey. Do not include individuals that have molted and shed their exoskeleton, often appearing as if another adelgid is riding on top of them. These individuals are "wool"-covered instars that can be considered "Active adults".



**Adults**  
**(including instars 2-4)**

One or more adults are seen moving about or at rest. For *Adelges tsugae*, the wingless, "wool"-covered, adult females are settled in one spot on a plant, usually at the base of a needle on the most recent twig growth, and do not move. Also include "wool"-covered instars as they are difficult to distinguish from adults.



**Eggs**  
**(egg laying adults)**

One or more eggs are seen. For *Adelges tsugae*, the small, brownish-orange eggs are present when the white, woolly sac around an adult female appears puffy, generally starting in early spring, and can be seen by gently scraping the "wool" aside.

**Phenophases not pictured:** Feeding, Dead adults, Individuals in a trap