

Losses while rearing lepidoptera

As we move into our fifteenth season rearing caterpillars, (lepidoptera) I felt a need to identify quantifiable reasons for lepidoptera loss. I found some comfort, in reading *The Wild Silk Moths of North America*, Paul M. Tuskes, James P. Tuttle, and Michael M. Collins (1996, pg. 9), "species that lay an average of 200 ova (eggs), the survival rate is less than 1%." Our survival rate for silk moths last year was 88% successfully spun cocoons; monarchs: 97% emerged from chrysalis.

Lepidoptera are vulnerable to many bacterial, viral, fungal, and protozoan infections; most are spread when overcrowding occurs, and in the air. Temperature, humidity levels, and moisture within the environment may affect these causative agents. Deficiency of sunlight may be the key factor in creating an optimal environment for these pathogens.

It is important to try to create conditions endemic to a particular species. Replicating distribution methods of ova and larvae, and offering select host plants greatly influence success in rearing.

Sometimes the behavior of infected larvae themselves contributes to the dispersal of disease: climbing to the top of a rearing chamber enhances the chance of spreading wind-borne diseases.

I list here typical symptoms for each of the four types of infection (bacterial, viral, fungal, and protozoan):

- 1) Bacterial: loss of appetite, diarrhea, and regurgitation. The larvae become sluggish and uncoordinated, and may change color. Death occurs within a few days of infection. The infected larvae are often found hanging from its anal claspers. Bacterial infections are common in *Actias luna*, *Antheraea polyphemus*, and *Hyalophora cecropia*.
- 2) Fungal: most often occurs during periods of hibernation and molting. Ground-pupating species such as sphinx moths are susceptible if soil or holding container's moisture is too high. You will often see fine mycelia (mold) on the pupae. If seen on larvae it will attack the breathing holes (spiracles) and quickly suffocate it. Often dark spots occur on the larvae. Most often seen on *Hyalophora cecropia*.
- 3) Viral: these tend to have the greatest impact on caterpillar populations. Viruses can be dormant for long periods, and occur when conditions are right. Infected larvae become inactive, feed sporadically, and often skin color changes. Most larvae have been shown resist early infection if kept warm enough. Grow lights are very helpful in maintaining warmth and good lighting conditions. Death usually takes several weeks, and dead larvae are often found hanging from anal claspers as in bacterial infections. Granulosis virus (GV), and Nuclear polyhedrosis virus (NPV) are common in silk moths.
- 4) Protozoan: seldom reported in North American species but still a threat, microsporidiosis, (*Bombyx mori*) may be present in larval, pupae, or adult stages. General lethargy, loss of appetite, and difficulty molting are symptoms, and are always fatal.

Diseases in lepidoptera are cyclical, and only when populations and environmental conditions are favorable will disease symptoms appear at epidemic levels. Even with careful rearing, disease may occur. We should not feel responsible as sometimes there is nothing we can do except detect disease early and dispose of the specimen quickly so as not to infect the whole colony. Your purchase of livestock is not guaranteed as there are no guarantees it will not become infected or susceptible to factors affecting its overall health. We do not have a refund or replacement policy for lepidoptera. The costs are low; the educational experience priceless no matter the outcome. All livestock offered are deemed healthy at time of purchase.

For further information on proper rearing techniques ask for the specific J.J.Cardinal pamphlet on the species you are caring for, or ask a J.J.Cardinal Naturalist for our book list of suggested reading.