RAISING GIANTS: BREEDING AND SUSTAINING ATTACUS ATLAS

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INTRODUCTION

It isn't hard to imagine why an institution would want to house atlas moths *Attacus atlas* Linnaeus 1758 (Lepidoptera:Saturniidae), they are photogenic, colourful, and absolutely gigantic. Although *A. atlas* has downfalls in terms of its unfortunate adult lifespan, the sight of a plate sized moth with its wings spread wide is a hard image to forget. By breeding these massive Lepidopterans, you not only get to view and display the entire life cycle, but you can rely on yourself for always having moths to display.

About Victoria Butterfly Gardens

The Victoria Butterfly Gardens is a 12,000 square foot indoor garden hosting a wide array of plants, animals, and invertebrates. Located 15 minutes north of Victoria, British Columbia, Canada, V.B.G. typically houses between 3500 and 4000 butterflies primarily from Costa Rica and the Philippines. In addition to butterflies, the gardens is home to flamingos, tortoises, turtles, koi, poison frogs, reptiles, and multiple species of parrots. The information provided below has been compiled after years of successfully breeding *A. atlas* and is meant to serve as a guide to those wishing to rear the species. This paper is in no way meant to be taken as the only way, nor is it a scientific account of the species. It is just a couple of guys' observations on raising giants.

CAPTIVE MANAGEMENT

Where allowed, the breeding of *A. atlas* can be a great addition to any butterfly or invertebrate exhibit. Hailing from widespread Southeast Asia, *A. atlas* is one of the world's largest species of moths. *A. atlas l*arva are general feeders and will host on a wide array of plants common in horticulture trade, making the culture of food plants easier than with Lepidopterans that have a single species host plant.

Enclosures and Adult Management

A wide assortment of enclosures can be used to house all stages of *A. atlas* and they are not picky about their surroundings. Evidence from trials suggests that full screen enclosures are the best for emerging adults. Cocoons can be placed on the bottom of the screen enclosure as the adults will climb up to a suitable position to fully expand their wings. For emerging adults, screen enclosures as small as 12"x12"x12" will work, however, a 12"x12"x24" enclosure provides more room if multiple adults emerge on the same night. Once emerged, adults are moved to a breeding enclosure that is made of aluminum screen which allows for flight. Typical

measurements for such an enclosure are 29”W x 63”L x 38”H. This enclosure allows mates to find each other and, more importantly, allows for easy egg collection as the adults will lay eggs directly on the screen. Adults are left in this enclosure until they are near death and then removed to keep the area clean. Unmated females may live up to 8 days, however 5 days is more typical for females and 7 days for males. The longest living male recorded at V.B.G. was 14 days. No food source is provided as adults do not have functioning mouthparts.

Egg management

Egg incubation is typically 10-12 days and eggs are collected once a week to avoid a hatch occurring in the breeding area. Eggs are collected using a film canister (or similar container) by scraping them off the screen with the inside edge of the canister. The eggs are then dated and put into the triple tray system by using two small trays, one facing up stacked on one facing down, and one large tray facing up, with this system you can prevent hatching larva from escaping. Any that fall off the edge are caught in the larger bottom tray. When eggs first start to hatch, two hibiscus leaves are placed on the edge of the tray. As caterpillars emerge they naturally find the edge of the tray and walk along it. By placing leaves on the edge, the larva will crawl onto the leaves and stay there. The leaves also provide a temporary source of food and hydration. Each day the larva are moved onto host plants by pinning the hibiscus leaf to the leaves of the host plant. To ensure ample time for hatching, eggs are kept for 3 weeks and then discarded.

Host Plants: The Use of Multiple Host Plants

A great aspect of breeding *A. atlas* is the large variety of host plants they can feed on. Half a dozen species are provided within the gardens throughout the year, however, the use of multiple host plants during different instars is the greatest way to achieve large adult *A. atlas.* Three staple host plants are umbrella tree *Schefflera actinophylla* (Endl.) Harms (Apiales: Araliaceae), false kava *Piper auritum* Kunth (Piperales: Piperaceae), and gmelia *Gmelina arborea* Roxb. (Lamiales: Lamiaceae). As a backup and extra food source, privet Ligustrum japonicum Thunb. (Lamiales: Oleaceae) and hibiscus Hibiscus rosa-sinensis L. (Malvales: Malvaceae) can also be used. One caterpillar was found to feed on, pupate, and emerge, solely on ficus Ficus binnendijkii Miq. (Rosales: Moraceae)

Larval Development

First instar larva are placed on *Piper auritum.* The thin leaves are extremely easy for the small larva to consume. In addition the plant’s extremely rapid growth means there is always a supply of food once a patch is established. Each stem must be protected from predators. By using painter’s tape coated with Vaseline around the stem, you can deter predators from reaching the larva. In addition, this method prevents the larva from wandering off. Care must be taken to ensure that the top growth of each stem does not touch surrounding vegetation that has not been protected. In this way second instar larva are kept on the same host and are only moved to *Schefflera actinophylla* once third instar larva begin eating. Once caterpillars reach the third

instar they become voracious eaters and the thin leaves of *P. auritum* are consumed too quickly to sustain. By moving them to the fleshier *S. actinophylla* leaves, larva are able to consume more plant matter with less effort. Larva are then left on *S. actinophylla* for the rest of L3, L4 and L5. When an abundance of caterpillars occurs, *Gmelina arborea* may be used in place of *P. auritum* to preserve plant stock. *Ligustrum japonicum* may be used from L1 to L5, but that species produces much smaller adults than when a combination of host plants is provided.

Pupation

By leaving fifth instar larva on the *S. actinophylla* the larva are provided with the perfect sized leaf for pupation. The leaves are waxy and solid and therefore provide a good base to the cocoon as it is being formed. When L5 larva is left on *P. auritum* and *G. arborea,* the thin leaves seem to affect the development of a sturdy cocoon, with the former being the worst of the two. Once all larva have pupated on a host plant, cocoons are collected and placed in the screen enclosures to prepare for emergence.

Displaying the Life Cycle

The main purpose of many exhibits is to share this amazing species with guests and the public. Luckily *A. atlas* are predisposed to being displayed. At V.B.G. breeding adults are always on display in a screen enclosure and opened during different parts of the day while staff are available. This ensures our breeding stock is not lost, nor is disturbed, while still allowing guests to view and photograph uninterrupted. When extra adults are on hand, they will often be moved to a specific tree to allow for photography. At the end of the day they are moved back into the screen enclosure. Females work best for this, as they are not only large and impressive, but they are less flighty than males, who seem to spook at a slight disturbance. Larva can be displayed in glass or plexiglass enclosures as long as there is adequate ventilation, without the risk that they can escape from the display. Although L1 and L2 can be displayed, L3, L4 and L5 are less sensitive to being housed on cut stems and the more developed instar larva are more impressive to view. Cut *S. actinophylla* leaves last for ages and can support the weight of the larva. Cocoons can be displayed in the bottom of the breeding enclosure and empty cocoons can be attached on a specific tree to show guests how well they blend in with dead leaves.

Other Challenges

One of the largest problems encountered has been predation of the first and sometimes second instar larva. The bite from even the smallest spider can kill third and fourth instar larva, while roaches will sometime eat newly hatched larva. As stated previously, using painters tape on the stem and covering it with Vaseline stops any approaching predators. Letting large fifth instar larva pupate on thin leaves has also been a problem, as they need access to sturdy leaves that can support their weight.

CONCLUSION

Whether raising a couple *A. atlas* for fun or keeping a large breeding colony, the species is great to work with while avoiding some of the heartbreaks and challenges other species can have. By having such a large species the adult size can vary greatly. From tiny runts to bird like giants, the end result is directly linked to larva management and with some experimentation you can find what combination of host plants is best for you.