

## CONTINUING YOUR PROJECT

### *Getting eggs and rearing a second generation*

People often ask us for how to carry their project forward by obtaining eggs from their adults. This can be a very rewarding and exciting way to study even more about these amazing animals! In appropriate conditions, the butterflies are naturally eager to pair (breed) if they are in proximity to one another. However, we would like to emphasize that the process of caring for the resulting offspring requires a level of dedication a bit beyond casual. Butterflies are highly prolific breeders, and a single female can lay up to 500 eggs in just a matter of days. Be prepared for the responsibility of caring for potentially hundreds of voracious offspring! It can be a lot of preparing, and a lot of responsibility, but if you're up for the project it's a great way to do some hands-on learning.

This guide is by no means comprehensive: there is a lot of dedicated expertise involved in the successful rearing of any animal. The goal of this info sheet is just to provide a starter framework for the curious and enthusiastic.

## PREPARATION: BEFORE YOU BEGIN.

### *Plants*

Your adults will not lay on the nutrient diet they ate as caterpillars (plus, the shelf life of the food you originally received with your kit is too short to still be using it). So you will need to have access to one of the host plant species for *V cardui*, the painted lady: and you'll need a lot of it to feed the resultant caterpillars.

We use Hollyhock (see image), but a couple other commonly found choices would be nettles, mallow, sunflower, Canada thistle, or other plants in related families such as malvacea. Growing from seed is ideal, but not accessible to everyone:

- Outdoor plants: It is an advantage to have access to an established patch of clean plants. Be mindful of neighbourhood spraying: still a sadly common practice. There are no safe insecticides or herbicides. Use plants **only** from locations you trust.
- Plants from greenhouses: Many greenhouses treat their plants against insects. There is no safe insecticide. Unless you can trust the history and origin of the plants, we recommend waiting for new growth and feeding only that new growth to caterpillars, as commercial pesticides are impossible to mechanically remove. Many plants are traded between nurseries and greenhouses, making plant history difficult to determine.

### *Housing*

You will need somewhere for the caterpillars to live. Mesh flight cages work well for holding living plants and groups of caterpillars. Plastic containers such as yogurt containers or small storage containers work well for individuals being raised on leaf.

## BREEDING

### *Mating*

When male and female butterflies are housed together in good conditions, you will notice them beginning to mate about 4 days after they have hatched from their chrysalis.

The males chase the females around and will attempt to grab her with the "clasper;" a pincerlike organ at the end of a male butterfly's abdomen. A successful male will remain attached to a female for hours: it will look like the ends of their abdomens are stuck together. This is called "pairing."

- Butterflies want to breed on hot, sunny days, and will congregate on the sunny side of their enclosure.
- Ensure the conditions for your adults are warm, with plenty of full-spectrum and ideally natural light, and that there are plenty of fresh food sources available.



*A mature hollyhock in bloom.*

- Nutrition is important. When breeding, add a drop of soya sauce to your nectar mix: it adds sodium to their diet, which the female can metabolize directly, and which the male can pass along to her in mating. Sodium aids in the survival rate of the eggs.



*Thousands of eggs on the underside of a hollyhock leaf. The other side is similarly loaded: a half day's work for some 10 females.*

### *Egg laying*

Eggs are tiny (1 mm), bright blue, vertically lined, and laid singly.

Painted ladies are prolific layers, laying continuously once they begin: they will deposit eggs all over any available host plants, sometimes on food sources, and indeed sometimes seemingly at random on nearby surfaces. Be prepared for lots of eggs!

If you have more than one female, you will have many hundreds of eggs in a very brief matter of time. If you do not have capacity to care for that many caterpillars, monitor the females carefully as they lay, and remove them from the host plant once you have obtained the number you want.

Be warned that once she starts laying she will not be able to stop, even if no host plants are available. A butterfly's adult phase is short, and they are driven by the need to reproduce. A gravid female's needs should be met by you.

### *Egg hatching*

Begins 3 days after they are laid.

The first thing the larvae do is eat their egg case: then they will move to eating the available host plant (or nutrient diet, if you are raising them on diet).

### *Feeding the larvae*

Larvae will eat many hundreds of times their own weight in food; there is a reason many moth and butterfly larvae are considered crop pests. Be prepared with lots of food, or to move the larvae as needed to locations with more food (such as releasing larvae onto safe outdoor patches of host plants).

- ***Feeding outdoors.*** You need a reliable crop of host plants for this, such as thistle patch, or an ornamental hollyhock/sunflower patch. Providing you do, this is the most low maintenance method: you just have to decide how much you want to interfere. There is a technique called "sleeving" that is interesting to utilize if you want a higher survival rate than what nature would provide; it involves placing a protective sleeve of parasite mesh around a section of plants with caterpillars on. Monitoring is still required, and potentially moving them, to ensure they do not eat themselves into starvation inside the sleeve.
- ***Feeding in a flight cage.*** Raising larvae on potted plants or cut leaf inside flight cages is a very popular method.
- If you are using cut leaf, and not potted pants, make sure that you replace the leaves every 1-2 days as needed. Be careful not to have any open water inside the habitat: caterpillars are very prone to drowning.



*Cute baby*

- **Feeding in a tub/container.** If you want to raise just one caterpillar in a container, deli cups or mason jars with fabric/paper towel lids are a popular choice. These get humid easily, so ensure it is ventilated. You'll have to replace the cut leaves they are eating every day.
- **Feeding on diet.** Nutrient diet can be expensive: we sell it, or it can be ordered in bulk from laboratories in the USA. Prices are market value and can fluctuate, so contact us if you are interested in purchasing some. It is typically available as a somewhat shelf-stable powder that is mixed with boiling water to create the familiar agar-like gel caterpillars eat. As a powder, it has a shelf life of about 4 months. As a prepared gel, the shelf life is only 2-3 weeks.

### Cleaning

You'll notice that the frass (poops) produced from a caterpillar fed on leaf are black or dark green, unlike that which is produced when feeding on the nutrient diet.

It is a good idea to remove the frass as it accumulates every day or so, to discourage mold and bacteria growth, which is easy to introduce when feeding on leaf.

#### NOTES.

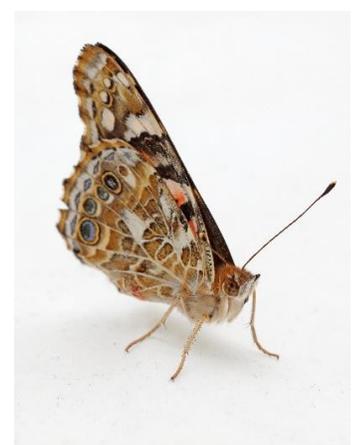
Natural survival rates are low in most insects: 1-5%. Many small organisms like butterflies are naturally selected as resources for other consumers. If you are not interfering much with outdoor larvae, you can expect a survival rate somewhat like this.

The more you protect them, the more you interrupt this: and survival rates may increase, which is why our kits produce so many adult butterflies: you aren't eating them, like nature would (or at least, we hope you are not).

If you do raise on leaf, it is very interesting to note the differences between caterpillars raised on leaf and those raised on the diet you initially may have observed.

Leaf-reared caterpillars grow slower, and given the chance will make very beautiful little messy nests (pictured here, on thistle) to protect themselves by bundling leaves up into little tents and covering them with webs and poop. If you're using cut leaf this behaviour may not be available to them, as you will be swapping the leaves out frequently.

Try a few different methods or locations out as you raise your next generation, and observe the variety of behaviours you witness!



As always, enjoy your time with the bugs!



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