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Development of *Idea leuconoe* Erichson 1834 (Lepidoptera: Nymphalidae) reared on *Parsonia sp.* leaves

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ABSTRACT

Lepidopterans are among the most ecologically and economically important insect taxon in the biosphere. However, due to habitat loss majority of these species are now threatened. Rearing and studying the life development of this insect is important in conservation especially ex-situ conservation. *Idea leuconoe* Erichson, 1834 which is commonly known as mangrove tree nymph, paper kite and rice paper is one of the common attractions displayed in butterfly sanctuaries and whose population in the wild is threatened due to habitat loss. This paper investigates the complete developmental life cycle (42 days) of *Idea leuconoe* reared on the leaves of *Parsonia sp.* mimicking natural environmental conditions.

***Keywords*:** *Development, Idea leuconoe, Parsonia sp.*

INTRODUCTION

The order Lepidoptera (butterflies and moths) is one of the most ecologically and economically important insects in the world. They are pollinators of various types of wild crops and economically important plants; without them the sustained balance in the ecosystem may collapse. Reported as a good bio indicator, they represent the presence or absence of other organisms indicating ecosystems overall health (Mohagan and Treadway, 2010; Barua, 2009). The greatest diversity of butterflies is in the tropics with 90% of all butterfly species (Munyuli, 2010). The Philippine butterfly represented by approximately 1030

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species is one of the highest concentrations in the world with an astounding level of diversity (Aguilar, 2007; Treadway, 1995).

Moreover, Lepidopterans are also coveted by insect collectors due to their beautiful and striking wing coloration pattern. Their popularity to people from all walks of life makes them a charismatic species which gives an advantage for their conservation. Despite the popularity of this insect a lot remains understudied including their life development (Nacua*et al*. 2015). Only few species have well studied life development. Studying their ontogenic development is important in understanding their biology and vulnerability.

I. leuconoe, a member of the family Nymphalidae, a popular butterfly found mostly in mangrove, lowland forests, and butterfly sanctuaries. Its common names include giant mangrove tree nymph from its typical habitat and paper kite or rice paper due to its light weight and floating like paper flight style. It feeds on various host plants including *Parsonsia helicandra, P. laevigata, P. spiralis, Tylophora hispida, and Cynanchum formosanum*. Currently, the species is not considered as threatened in the International Union for the Conservation of Nature however due to fast degradation of our lowland and mangrove forests this species is facing an inevitable threat of population decline in the wild. Understanding their biology including their life cycle is important on their conservation initiatives. This paper presents the development of *I. Leuconoe* from egg to imago reared on *Parsonia sp*. mimicking natural environmental conditions.

MATERIALS AND METHODS

For this study, eggs were collected from the underside of the leaves of *Parsonia sp.*at the butterfly santuary of Davao Crocodile Park, Davao City. The underside of the leaves were checked daily for the presence of eggs. Available eggs were then collected and transferred to a transparent plastic box where they are allowed to hatch. The newly hatched larvae were fed with fresh leaves of *Parsonia sp.*, then transferred to an insect cage after 5 days. The insect cage measures 12 by 15 inches sorrounded by mesh net with cuttings of the host plant placed inside . The larvae fed on the tender leaves of *Parsonia sp.*until they formed into chrysalis. The larvae were checked daily for their molting to the next stage and mortality was recorded. When the larvae change into chrysallis, they are removed and hanged in a separate insect cage where they were allowed to emerge. The cages were kept in room temperature (27-32° Celcius) and exposed to 11 hours photoperiod.

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Figure 1. a) map of the Philippines, b) map of Davao City,
c) map of Davao Crocodile Park [Source: www.googlemap.com]

RESULTS AND DISCUSSION

The development of *I. Leuconoe* reared on *Parsonia sp*. from egg to imago took place in a 6 week (42 days) period. Like most of Lepidoptera species *I.leuconoe* experiences a holometabolous life cycle consisting of four stages: egg, larvae, pupa and imago. The larvae were reared mimicking its natural habitat by using fresh *Parsonia sp.* leaves for its diet kept in a room temperature. The larvae were protected from their predators by putting them in an insect cage with mesh nets. *I. leuconoe* were reared successfully without requiring high maintenance and any artificial laboratory conditions. *I. leuconoe* was reared in a normal tropical temperature of around 27 to 32°Celsius.

Eggs

The eggs of *I. leuconoe*Erichson, 1834 are oval shaped, cream-colored and smooth with no distinct markings (Figure 2-a). The cream-colored eggs turns pinkish on the 4^{th} and 5^{th} day when they are about to hatch. They are oviposited by the female *I. Leuconoe* underside the leaves of *Parsonia sp.* in random order.

Larvae

The full grown larvae has a black head, stout and smooth with striking alternating black and white stripes with red spot on its lateral side, and has long black spikes protruding on the dorsal side. The spikes are lined in rows of two dorsally. Longer spike are found near the head (Figure 2-d) while the shorter

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spikes towards the body. These spikes are used by the larvae to protect them from predators. When attacked by predators, the larvae curl and mimic a spiky ball which wards the predators off.The young larvae feed on the tender leaves of *Parsonia sp.* and undergo five moltings (instars). The newly hatched larvae are only around 3mm long while the fifth instar can be as long as 50mm. It takes 3 weeks of munching on the leaves of *Parsonia sp.* before the larvae wraps itself in a chrysalis.

Chrysalis

The chrysalis of *I. leuconoe* striking golden sheen J-shaped ornamented with black spots spread randomly over its surface (Figure 2-e). It measures 27mm. However, the golden chrysalis turns black over time until the imago's emergence. Figure 2 (e-j) shows the remarkable change of the chrysalis from gold to black with the corresponding days. On the 6^{th}day a noticeable pale brown color is observed near the lower portion of the chrysalis while on the 8^{th} day the increase of black pigmentation on the chrysalis is already visible. The black pigmentation increase over the days until the chrysalis turned completely black on 14^{th} day, a day before the imago emerged. After 15 days the imago emerged from its chrysalis slowly making its way out for several hours. The chrysalis tip can be glued to another surface with no harm on the imago. However, as observed when damage is inflicted on the chrysalis body, the imago has trouble emerging and usually leads to mortality.

Imago

Just like the other species under the genus *Idea, I.leuconoe* is characterized by ornamentation of black veins and random oval spots which contrast its translucent white wings. A diagnostic character for this species is the marginal and submarginal spots that are conjoined to form an irregular black band. Their wings span is about 100-150mm. The imago has a distinct way of graceful flight style which gives it its common names paper kites and rice paper. The imago of *I.leuconoe* main predators are lizards as they are unpalatable for most birds due to the toxins in their body that they have acquired from their food source (Hoskins, 2015).

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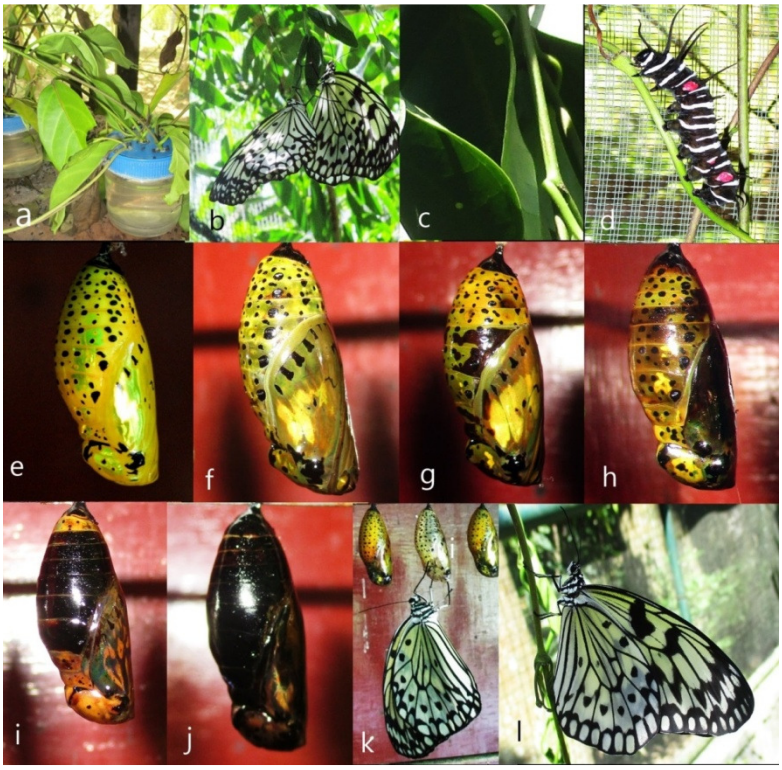

Figure 2. a) *Parsonia sp.* (host plant) , b) *Idea leucunoe* mating , c) eggs underside the leaves of host plant, d) larvae of *I. leuconoe*, e) chrysalis (1st day), f) chrysalis (6th day) , g) chrysalis (8thday), h) chrysalis (10th day), i) chrysalis (12th day, j)chrysalis (14th day), k) emerging imago, l) adult *I. leuconoe.*

CONCLUSION

Studying the developmental stages of different species of Lepidoptera including *I. leuconoe* is important in conservation efforts especially for ex-situ conservation. *I. leuconoe* is easy and fast to rear taking only 6 weeks (42 days) from eggs to imago. Continues ample supply of fresh leaves of its host plant *Parsonia sp*. in the insect cage is important in keeping the larvae fit to develop to pupal stage. More developmental studies of other species especially the threatened and endemic ones should be conducted.

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