

New hosts for the Andaman Baron butterfly, *Euthalia aconthea acontius* (Hewitson, 1874) (Lepidoptera: Nymphalidae) in an Island Ecosystem

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Abstract

Euthalia aconthea acontius (Hewitson, 1874) (Lepidoptera: Nymphalidae) has been reported as a pest of mango (*Mangifera* spp.) in the Andaman and Nicobar Islands, India for the first time. In the present communication, the impact of pest on host species is assessed. Larvae damage all above-ground plant parts especially the leaves, *Mangifera andamanica* King, *Mangifera griffithii* Hook. f. are recorded here for the first time as new host plants. *Mangifera andamanica* is endemic to the Andaman and Nicobar Islands and population of *M. griffithii* is very few and confined in distribution.

Key words: Anacardiaceae, *Euthalia*, *Lepidoptera*, *Mangifera*, *Nymphalidae*

Introduction

The study of life history traits (egg, larva and pupa stage) and fecundity is of fundamental importance for understanding on the biological and ecological parameters which are linked to extinction risk. Moreover, when a plant species becomes endangered due to damage by an invasive phytophagous insect, more knowledge about life history traits of all trophic levels may be important in sustainable conservation management. *Euthalia aconthea* (Lepidoptera: Nymphalidae) is a butterfly that has been reported as a pest of *Mangifera* species of the family Anacardiaceae.

Arthropod herbivores comprise one of threats to the native flora worldwide and in particular reveal a strong fecundity response to food choice. *E. aconthea* is recorded as a minor pest infesting *Mangifera* plants and is a serious threat to the mango populations (Tara & Gupta 2016). But nothing is known about Nymphalidae herbivory among the *Mangifera* species of Andaman and Nicobar Islands (ANI's). Recently Perti et al. (2022 & 2023) recorded cycads of the ANI's which Offered as larval food for Lycaenid species, *Luthrodes pandava* Horsfield. The present study report here for the first time that the *Mangifera* species of the ANI's are used as larval host plants. Impact

of butterfly herbivory on *Mango* host species native to the ANI's was also assessed at natural population and *ex-situ* conservation site, Dhanikhari Experimental Garden-cum-Arboretum (DEGCA), Botanical Survey of India, Andaman and Nicobar Regional Centre. DEGCA is an excellent centre for collection of plant species and *ex-situ* as well as *in-situ* conservation. (Singh & Murugan 2014; Singh et al. 2014, 2021a, b)

Mango produces fruits with significant socioeconomic value. The first botanical description of *Mangifera* had been given by Linnaeus (Sp. Pl. 1: 200. 1753). Thereafter, it has been studied from time to time by various workers (Hooker 1886; Mukherjee 1953, 1985; Kostermans & Bompard 1993; Bompard & Schnell 1997; Dinesh et al. 2011, 2015; Kumar & Chakrabarty 2021). It is taxonomically complex genus and one of the most economically and culturally significant tropical fruits, particularly in Asia. Approximate 123 taxa have been recorded under the genus from the tropical and subtropical world (The Plant List 2013), however it is taxonomically complex at species level. It is very diverse in Southeast Asia, Indo-Malaysia, and the Solomon Islands. The genus *Mangifera* occurs throughout India including the ANI's. Biogeographically the ANI's lie in the proximity of Eastern coast of South Asia, Madagascar, Sri Lanka,

Thailand, Peninsular Malaysia, Myanmar, Sumatra and Java and widely recognized as one of the centers or hot spots of biodiversity. It is a rich and unique region in terms of plant diversity with a high number of endemics in India (Singh et al. 2014, 2020 a, b & 2021 a, b; Singh & Misra 2020; Singh & Ranjan 2021). In India, the species diversity confined to the ANI's and the genus is represented by five wild taxa viz., *Mangifera andamanica* King, *M. campto-sperma* Pierre, *M. griffithii* Hook., *M. indica* L., *M. nicobarica* Kostern. & *M. sylvatica* Roxb. and an introduced species, *M. indica* L. The distribution of *M. nicobarica* is confined to the Nicobar group of Islands whereas the *M. indica* is spread in all parts of the Islands due to its domestication and large consumption of fruits. *M. griffithii* has a small population that is restricted to Manipur Parvat National Park (previously known as Mount Harriet National Park). *M. andamanica*, *M. camptosperma*, and *M. sylvatica* populations are also sparsely distributed and can be found in the tropical evergreen forests of these Islands.

Mangifera species naturally occurring the ANI's are sparsely scattered and confined to a few localities, which face many significant threats such as anthropogenic pressures such as land transformation and shifting cultivation etc., leading to habitat loss. Furthermore, anthropogenic pressure and parasitization of Mistletoes, as well as invasive arthropod herbivores also threaten local mango population. However, the ANI's rich and unique in terms of plant diversity in India with higher number of endemism (Singh et al. 2014; Singh et al. 2020a, b; Singh et al. 2021a, b; Singh & Misra 2020; Singh & Ranjan 2021) and constitute one of the hotspots of biodiversity with 572 Islands and islets, (N 6°45' to 13°41' E 92°12' to 93°57'). These Islands are situated in the tropical belt and frequently battered by tropical rains during both South-West monsoons (May to September) and North-East monsoon (October to December). The majority of the rainfall (76%) is received during South-West Monsoon, 22% during the North-East monsoon and the rest during summer season.

Except for few notable exceptions like *M. indica* (Young 1907; Bell 1909; Sevastopulo 1938; Pant & Chatterjee 1950; Wynter-Blyth 1957; Kunte 2000; Kalesh

& Prakash 2007; Veenakumari et al. 2008; Robinson et al. 2010, 2023; Jayasinghe et al. 2014, 2021; Nitin et al. 2018; Nayanathara & Narayana 2020) to date, no lepidopteran has been identified as a pest of mango species other than *M. indica* from India. So far, this investigation aimed to record the mango host plants, detail the life history traits (morphology of the egg, larva and pupa stage) of an endemic lepidopteran, *Euthalia aconthea acontius* (Hewitson 1874) and assess its impact on *Mango* host species native to the ANI's. Although, more recently Purti et al. (2022, 2023) recorded cycads of the ANI's as larval host plants for one of the Lepidopteran butterfly, *Luthrodes pandava* Horsfield.

Materials and methods

The live plant and butterfly specimens were observed through ten field trips to localities where natural populations occur (Baratang, Chidiyatapu, Chouldhari, Karmatang, Khudirampur, Humpfrygunj, Jirkatang, Manipur Parvat National Park, Manjery, Rutland, Shoalbay, Wandoor) as well as *ex-situ* *Mangifera* conservation site, DEGCA throughout 2017–2022. Eggs of *E. a. acontius* were collected from the infested mango leaf, *M. andamanica* and *M. griffithii*. Field surveys were conducted to quantify the impact of *E. a. acontius* herbivory on field-planted *Mangifera* species at the DEGCA and naturally occurring plants (Fig. 1). GPS (Garmin Montana 680) coordinates of the localities of wild population were recorded. *E. a. acontius* eggs along with the host plants were placed in a separate sterile labeled plastic container. The droppings of the larva were cleaned periodically and fresh leaves of the host plants were replaced on daily basis. The larval stages of *E. a. acontius* were monitored daily, documented and photographed. The eggs of *E. a. acontius* laid on the leaves of the plant were observed and photographed under a stereomicroscope (Olympus SZ 61) at the ANRC, BSI.

Observations and Result (Fig. 1-3)

Based on field exploration conducted during the period 2016 to 2019, critical analysis of morphological characters and scrutiny of relevant literature and examination of the herbarium specimens kept in Indian herbaria (PBL) and digital herbaria (e-Floras 2008; WCSP 2012; The Plant

List 2013; GBIF 2020; JSTOR 2020 & The Herbarium Catalogue 2021), five wild and one cultivated species recorded in the islands as mentioned below.

Taxonomic Notes on host plants

Mangifera L. (Anacardiaceae) Sp. Pl.: 200 (1753)

Mangifera andamanica King. J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 470 (1896)

Distinguishing features

Evergreen tree, rough bark. Leaves simple, alternate, obovate to oblanceolate, acuminate caudate base cuneate,

entire, coriaceous, glabrous, shiny clustered at the tip of branchlets, petioles long. Flowers in terminal panicles, small yellowish green. Fruit a drupe, elliptic, yellowish orange on ripening. Mesocarp fleshy to fibrous. Seed ellipsoid reniform.

Distribution / Locality selected for *in-situ*

Observations

Throughout Andaman Islands particularly South Andaman Islands, some Islands of Middle and North Andaman, (Fig. 1).

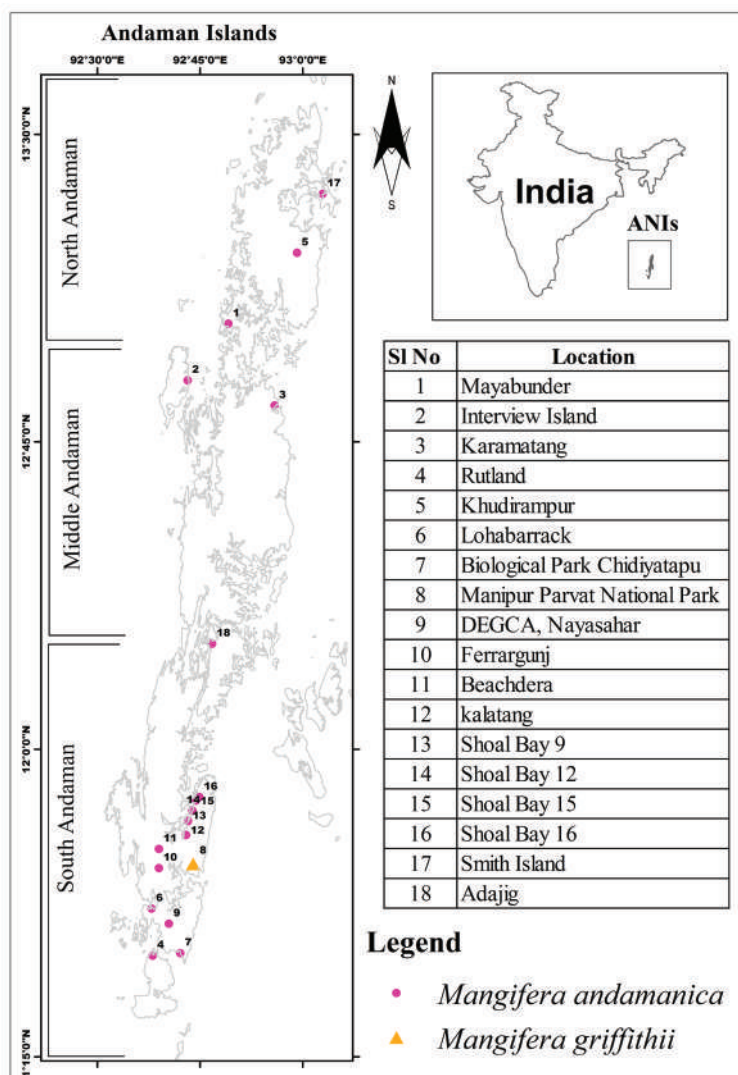


Fig. 1. Distribution and study localities of *Mangifera* species used as food by *Euthalia aconthea acontius*

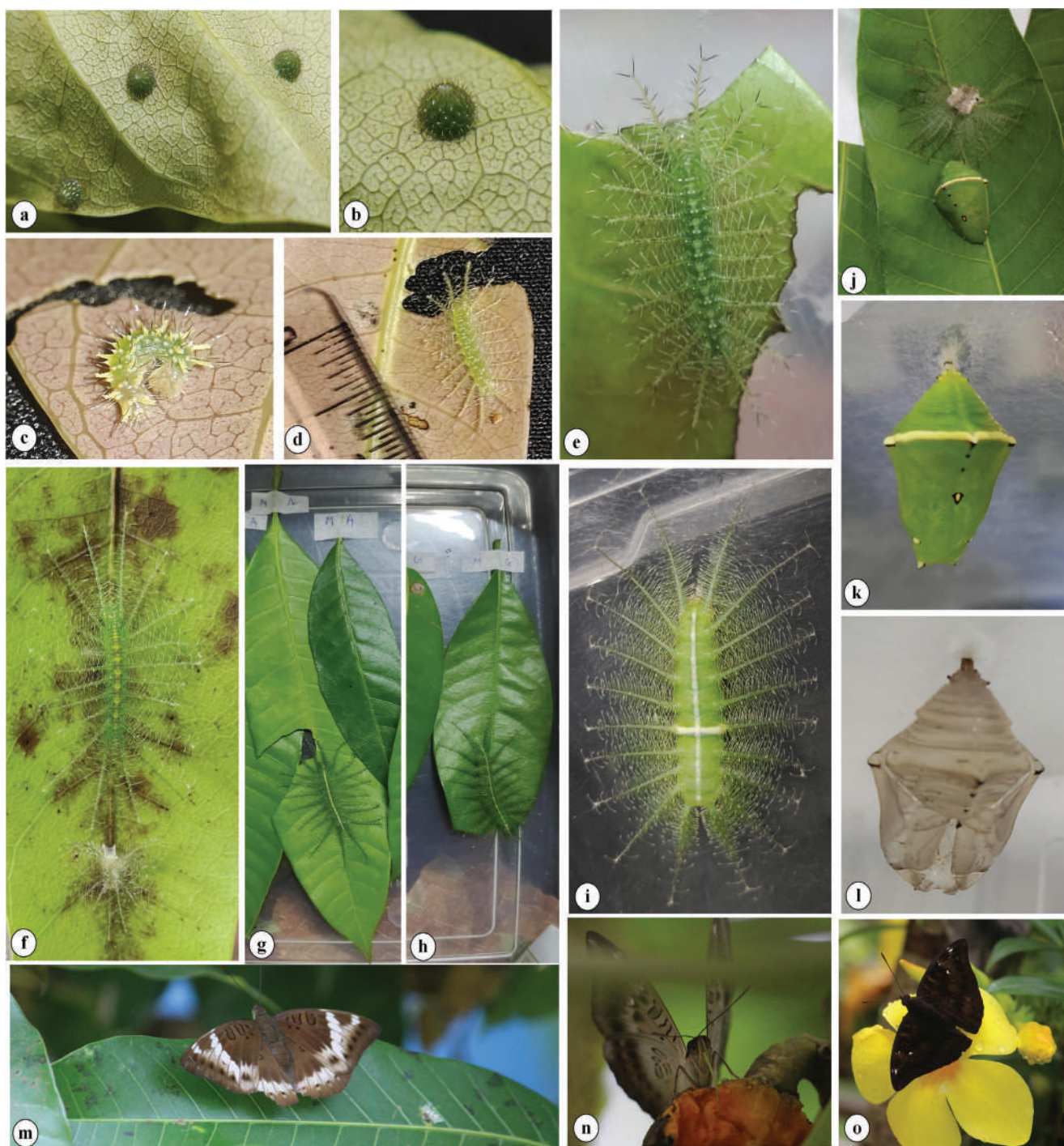


Fig. 2. Damage to *Mangifera* leaves caused by *Euthalia aconthea acontius*: a: Eggs on *Mangifera andamanica*; b: Close up view of egg; c: First Instar feeding on *M. andamanica*; d: Second Instar on *M. andamanica*; e: Third Instar feeding on *M. andamanica*; f: Fourth Instar feeding on *M. griffithi*; g: Fifth Instar feeding on *Mangifera andamanica*; h: Fifth Instar on *M. griffithi*; i: Pre pupa; j: Pupa on *M. andamanica*; k: Pupa; l: Empty pupa; m: Female butterfly; n: Female butterfly feeding fruit juice of *Carica papaya*; o: Male butterfly seeking nectar on the flower of *Allamanda cathartica*

Habitat: Evergreen forests, Semi Evergreen forests

Conservation status

Near threatened. The populations of *M. andamanica* are sparsely scattered and confined to a few localities, which face many significant threats such as anthropogenic pressures such as land transformation and shifting cultivation etc., leading to habitat loss. Therefore, the species is assessed here as “Near threatened” based on the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN, 2019).

Mangifera griffithii Hook. f. Linn. Soc. London 23: 168 (1860)

Distinguishing features

Evergreen tree. Leaves broadly elliptical to elliptical-oblong or obovate-oblong smooth leathery inflorescence in axillary or terminal panicles flowers small creamy white. Fruit yellowish to pink or rose-red, sometimes becoming purplish-black when ripe.

Distribution: India: Andaman & Nicobar Islands, Assam, Peninsula Thailand to W. Malesia.

Locality selected for *in-situ* Observations: Manipur Parvat National Park, South Andaman (Fig.1),

Habitat: Evergreen forests

Conservation status: Data deficient. It is recorded only in the Manipur Parvat National Park South Andaman. Apart from this locality, there are no data on the population of the species available in other islands. Therefore, the new species is assessed here as “Data Deficient” (DD) based on the International Union for Conservation of Nature (IUCN) categories and criteria (IUCN 2019).

Note: In the ANI’s geographical distribution recorded only from Mount Manipur Parvat National Park, South Andaman.

Except for preliminary account regarding host of *E. a. aconitus* there is no detailed information available in literature. The present investigation recorded here detailed

account on host plant species along with the life history traits (egg, larva and pupa stage). The study began during a visit to the Forest nursery Chouldhari in the evening hours. Couples of Andaman baron butterflies were spotted involved in mating ritual. After the copulation the female was found to oviposit eggs on the *Mangifera andamanica* leaves. The eggs along with the leaf were collected and placed in a sterile plastic container.

The young leaves laden with the eggs were carefully dislodged from the tree and placed in an aseptic plastic labelled container to document the life cycle. Because, the literature suggests that the life cycle of this endemic butterfly of Andaman Islands were not reported till date. The leaves laden with the eggs were thoroughly examined and extruded for potential predators like spiders, fungus, etc.

The first instar was fed with young and mature leaves of *M. andamanica* and *M. griffithii* brought from Mt Harriet (Manipur Parvat National Park). It was observed that the first instar did not feed on the mature leaves of the aforementioned new larval host plants. This may be due to the inability of the larva to devour the mature leaves. However, the young leaves which were raised as seedlings in the park area were readily consumed by the larva.

As the larva progressed into further instar stages it was seen that that it consumed mature leaves too. The larvae consumed the mature leaves of the *M. andamanica* plant. Whereas in case of *M. griffithii* when the leaves were fed the larva did not consume the leaves may due to hard and leathery nature of the leaves. Whereas when the mature leaves of nursery raised plants of the same were fed, they were easily consumed by the larvae. Also, it was noticed that there was a complete change in the morphology and texture of the sole standing tree of *M. griffithii* and the nursery raised plants in the Manipur Parvat National Park.

Also it has been observed that the larvae feed on the young and mature leaves leaving behind the hard costa of the leaves. In some leaves where the costa is soft, the whole leaf has been consumed by the butterfly larvae.

Notes on pest of *Mangifera* spp.

Euthalia aconthea acontius (Hewitson, 1874)

(Lepidoptera: Nymphalidae)

Euthalia aconthea acontius (Lepidoptera: Nymphalidae) is an endemic sub species and commonly called as Andaman Baron which was described by Hewitson (1874) from group of Andaman Islands. Although, Holloway (1989) stated that it remains considerably requires intensive field surveys that will contribute to the knowledge of the host plants of the butterflies naturally occurring in these islands. Andaman Baron, *E. a. acontius* has been reported as pest of common mango species *M. indica* (Veenakumari et al. 2008; Varshney & Smetacek 2015). The present study first time observed it's herbivory on native species of mango. It was also observed that the adult butterfly visited many other plants viz.; *Allamanda cathartica* L. (Apocynaceae), *Carica papaya* L. (Caricaceae), *Cycas zeylanica* (J. Schust.) A. Lindstrom & K.D. Hill (Cycadaceae), *Polyalthia longifolia* (Sonn.) Thwaites (Annonaceae) for various purposes like protection from fatal attacks by predators, feeding of nectars, fruit juices, mating etc. (Fig.2 n, o, Fig. 3 c, d)

Morphology and Description: Male and female butterfly (Fig.2-4).

E. a. acontius, unlike other members of the order Lepidoptera, goes through four stages of development: egg, larva, pupa, and adult. The larval stage lasts the longest, followed by the pupa and incubation stages.

It glides and flies with stiff wings beats. The male has a dark brown upper side with a broad obscure post-discal band on both wings. Several small whitish spots can be found along the inner edge of this band on the forewing. When viewed in sidelight, the wings typically have a dark purplish tinge. The female is larger and pale bluff

brown, with larger and more defined white spots on its forewing. The wings are paler on the underside and have a submarginal series of black spots on both the fore- and hindwings. Lime green is the colour of the proboscis.

Mating behavior and Oviposition behavior

Andaman Baron, *E. a. acontius* couples were found copulating during the dusk (around 1745 hrs) under *M. indica* at Manglutan forest range office dated 5th May 2022. The copulating act lasted for 60-70 minutes. During the course of mating these couples flew towards a wall and resting in the same compromised position. At this point these mating couples were captured in a sterile plastic contained without disturbing them and released into the cage with few leaves of *M. indica*.

Three single eggs were laid singly on the underside of the *M. indica*. Due to the oviposting pressure the female generally not biased to lay her eggs on the *M. indica* leaf. Under captive observation leaves of *M. indica* of different ages including the dry leaf as well was kept in the cage. The gravid female chooses to oviposit over a mature leaf (fig 2a). On 6th May 2022 leaves of *M. andamanica* and *M. griffithii* brought from Manipur Parvat national Park (Mt. Harriet) and placed in the contained after labelling it.

Egg stage (Plate 1)

Gravid females lay eggs singly on the surface (under or upper side) of mango leaves. Each egg is hemispherical in shape and has a base diameter of 1.5-1.8 mm. The egg's surface is covered in large hexagonal depressions with hair-like projections emerging from adjoining corners. When the egg is freshly laid, it is light green in colour, and as it matures, it becomes darker in colour. The egg is 1.6-2.0mm long with an average length of 4.86 ± 0.78 mm and 2 - 2.5 mm wide with an average width of 2.75 ± 0.25 mm. Mature eggs turn a dark green colour, and the incubation period lasts 4 to 5 days on average. Young larvae begin hatching from incubated eggs on its host plant. First instar larvae wander around after hatching and begin feeding on the upper surfaces of leaves, forming small perforations.

Larval Stages

Five larval stages were recorded during the observation.

First Instar (Plate 1)

After 4-5 days, the first instar emerges and consumes the eggshell as its first meal. The caterpillar has a pale yellowish-brown head capsule and is dark greenish in colour. The body is made up of ten pairs of long, yellowish, fleshy dorsolatero protuberances. The body produces green setae. The first instar measured 4.5 - 7 mm in length with an average of 5.75 ± 0.93 mm and 1.5-2 mm in width with an average of 1.75 ± 0.25 mm (Table 1). The first instar lasted 2.5-5 days on average, with a maximum of 3.60.96 days. Larvae that have just hatched feed on the upper surfaces of leaves, causing small perforations.

Second instar (Plate 1)

The second instar larva is greenish in color. All the ten pairs of short protuberances have lengthened considerably. As the larva grows, white patches appear between all ten pairs of protuberances. Later on these patches become conjoined, forming a continuous dorsal band (which helps the larvae to blend in the surrounding when it rests on the midrib of a leaf). The second instar measured 10.5 - 14.5 mm in length with an average of 12.6 ± 1.67 mm and width of 2.5 - 3 mm with an average of 2.75 ± 0.25 mm (Table 1). Second instar lasted for 2.5-4 days with an average of 3.2 ± 0.570 days. Larvae feed by defoliating the leaves along their margins.

Third instar (Plate 1)

The larva of the second instar is greenish in colour. All ten pairs of short protuberances have grown significantly longer. White patches appear between all ten pairs of protuberances as the larva grows. Later on, these patches fuse to form a continuous dorsal band (which helps the larvae to blend in the surrounding when it rests on the midrib of a leaf). The second instar was 10.5 - 14.5 mm long with an average of 12.6 ± 1.67 mm and 2.5- 3.0 mm wide with an average of 2.75 ± 0.25 mm (Table 1). The third instar lasted 2.5-4 days on average, with a maximum

of 3.2 ± 0.570 days. Larvae feed by defoliating the leaves' margins.

Fourth instar (Plate 1)

The fourth instar caterpillar looks similar to the third instar. The embedded purplish spots in the dorsal band are now easier to spot. The fourth instar was 2.3- 25 mm long, with an average of 23.8 ± 0.85 mm, and 3.5 - 4 mm wide, with an average of 4.75 ± 0.25 mm (Table 1). The fourth instar lasted 6 - 7 days on average, with a total of 6.56 ± 0.42 days.

Fifth instar (Plate 1)

The general appearance of the final instar larvae was similar to that of the fourth instar, with the exception of differences in body length and width, which measured 29-33 mm with an average of 31 ± 1.5 mm and width of 4.5 - 5 mm with an average of 5.75 ± 0.25 mm (Table 1). The duration of the fifth instar ranged from 10.0 days to 12.0 days, with an average of 11.0 ± 0.79 days. Aside from its larger size, another noticeable change is the embedded purplish spots in the dorsal band. In this final instar, the spots have grown larger and more noticeable. The average larval duration ranged between 24.0 - 32.0 days, with an average of 27.8 ± 3.34 days.

Pupa (Plate 1)

Fully fed and matured larvae stopped feeding, and their bodies began to shrink and thicken in size. It then spins silken threads around its body and remains in this pre-pupal stage for approximately 1.25 ± 0.25 days. It then looks for a location on the underside of a leaf. There, it spins a large number of silk threads into a silk mound, to which its posterior claspers are attached. Later on, the pre-pupa hangs from this anchor point with its head down. The dorsal band has completely whitened by this point. A short transverse pale yellowish band appears on the dorsum around mid-body after some time. Pupae are almost naked, reddish brown, with only a few strands of silken threads loosely attached to their bodies. The pupa measured 18 - 20 mm in length with an average of 19.0 ± 0.79 mm and 8-9 mm in width with an average of 8.43

± 0.42 mm. The pupal period ranged between 7.5 and 8 days, with an average of 7.75 ± 0.25 days.

Adult (Plate 1)

The adult has a brownish colour with hints of olive. Dark brown is found on the antennae, head, thorax, and abdomen. Lime green is the colour of the proboscis. The tip of the antenna is ochraceous. The forewing has two transverse black lines at the base, a black loop in the middle and one beyond the apex of the cell with dark brown centres, followed by an angulated discal dark brown band bordered outwardly by a series of five white spots; two preapical white spots beyond and a broad, somewhat diffuse, subterminal black band broadening over the apex and angulated inwards in interspace. The hind wing is also dark brown, with two crescent-shaped dark brown loop-like marks in cell, as well as a discal series of dark brown, elongate, outwardly acute, inwardly diffuse, somewhat hastate spots, followed by a sub-terminal series of small spots of the same colour. The underside is an ochraceous brown colour. The wings are paler on the underside and have a submarginal series of black spots on both the fore- and hindwings. The underside of the forewing has five transverse slender black lines that run across the cell. The wing span ranges from 68 to 79 mm.

E. a. acontius is an important leaf destructive pest of *Mangifera* spp. Naturally occurring in the ANI's. Besides its earlier recorded host species, *M. indica* two endemic host species, *M. andamanica* and *M. griffithii* are added as a first record from these islands. It was also observed most of the times that by the end of 5th instar before entering into pupa stage the larvae leaves the mother host plants (Mango species) and pupates in the adjacent plants. In the present investigation it was observed that *Polyalthia longifolia* (Sonn.) Thwaites and *Cycas zeylanica* (J. Schust.) A. Lindstrom & K.D. Hill served to prevent fatal attacks by red ants other predators. Among these two adjacent plants *C. zeylanica* was better for the larvae for providing protection.

The *E. a. acontius* is has also variety of predatory birds like Common Myna, Hill Myna, Magpie Robin, Red whiskered Bulbul. It has also been observed that the host plant is mostly affected before the onset of phonological events (flowering, fruiting and leaf fall). As during this time the larvae would be safer from pollinators. *E. a. acontius* larvae feeds on the leaves of the plant. It has been observed that the larvae choose the leaf for its consumption according to its size. At the initial stage it feeds on young leaves later on its further growth it feeds on the semi mature and mature leaves too. The larvae start feeding the leaves from tip of the leaf and gradually to the petiole base and thus at last defoliates the leaf. The larvae choose the leaf according to its body size so that its complete body rest on the leaf and no bristles are hanging out of the leaf lamina. The larvae well blend with the colour of the leaf with its camouflaging property to hide from its predators. The larvae mostly rest and align itself with the mid rib of its body with that of the leaf. The larvae mostly align and camouflage on the upper surface of the leaf.

It has also been observed that the eggs are laid by the butterfly before the flowering and fruiting season. Since during the flowering season the inflorescence are being visited by many pollinators such as birds, wasps, bees etc.

During the study it was also observed that, adult butterfly *E. a. aconitus* visited on the other host plants such as papaya species for dietary and other essential events like feeding of nectars, fruit juices and mating. *E. a. acontius* fed on the various fruits like mango and papaya.

Various Herbivorous butterfly larvae have been recorded as pest of *Mangifera* spp. Worldwide (Table 1). Although, present study revealed that nothing is known about the larval food of Andaman Baron, *E. a. acontius* in great details. The following are the list of butterflies recorded which utilizes the *M. indica* plant as their larval host.

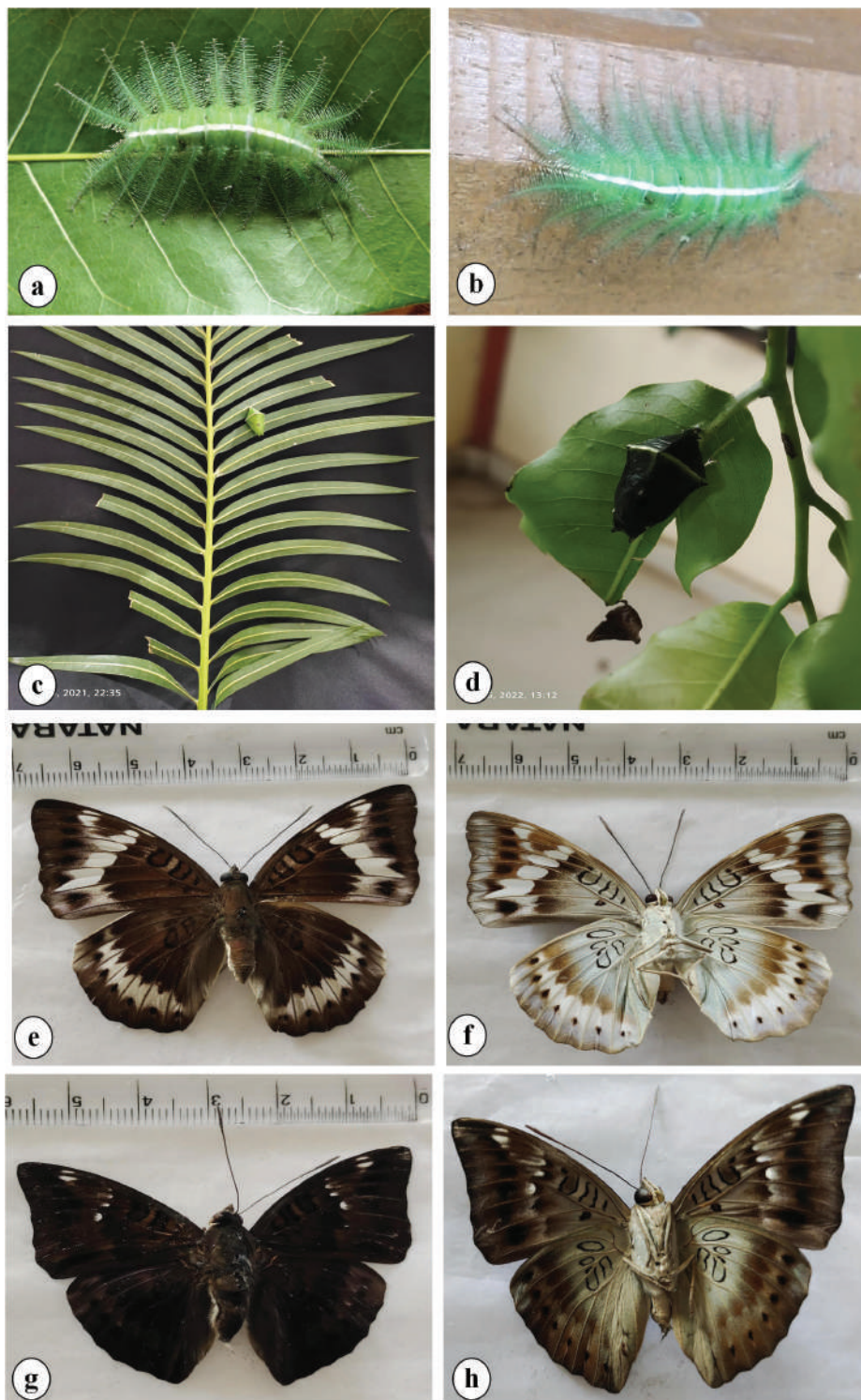


Fig. 3: *Mangifera* and other plant species used by *Euthalia aconthea acontius* for fulfill of various biological needs a: Pre pupa stage on *M. andamanica* leaf; b: Pre pupa stage on the door away from the host plant; c: Pupa on *Cycas zelanica* leaves; d: Parasitised pupa on *Polyalthia longifolia*; e: Female upper side; f: Female underside; g: Male upper side; h: Male under side;

Table 1: *Mangifera* spp. that were recorded as larval host plant for butterflies

S. No.	<i>Mangifera</i> species	Butterfly	Family	Location where reported	Record of references
1	<i>Mangifera andamanica</i> King	<i>Euthalia aconthea acontius</i> (Hewitson, 1874)	Nymphalidae	Andaman Islands	Present Study
2	<i>Mangifera griffithii</i> Hook. f.	<i>Euthalia aconthea acontius</i> (Hewitson, 1874)	Nymphalidae	Andaman Islands	Present Study
3	<i>Mangifera indica</i> L.	<i>Anthene emolus</i> (Godart, 1823)	Lycaenidae	India, Thailand	Robinson et al. 2023
4	<i>Mangifera indica</i> L.	<i>Anthene liodes</i> (Hewitson, 1874)	Lycaenidae	Southern Africa	Robinson et al. 2023
5	<i>Mangifera indica</i> L.	<i>Arhopala pseudocentaurus</i> (Doubleday, 1847)	Lycaenidae	Thailand	Robinson et al. 2023
6	<i>Mangifera indica</i> L.	<i>Callophrys herodotus</i> (Fabricius, 1793)	Lycaenidae	Neotropical	Robinson et al. 2023
7	<i>Mangifera indica</i> L.	<i>Calycopis cecrops</i> (Fabricius, 1793)	Lycaenidae	USA	Robinson et al. 2023
8	<i>Mangifera indica</i> L.	<i>Cheritra freja</i> (Fabricius 1793)	Lycaenidae	Laos	Robinson et al. 2023
9	<i>Mangifera indica</i> L.	<i>Chilades lajus</i> (Stoll, 1780)	Lycaenidae	India	Robinson et al. 2023
10	<i>Mangifera indica</i> L.	<i>Cyanophrys herodotus</i> (Fabricius, 1793)	Lycaenidae	Brazil	Robinson et al. 2023
11	<i>Mangifera indica</i> L.	<i>Euthalia aconthea</i> (Cramer, 1777)	Nymphalidae	Brunei India Sabah Thailand West Malaysia	Robinson et al. 2023; Kunte 2000
12	<i>Mangifera indica</i> L.	<i>Euthalia aconthea acontius</i> (Hewitson, 1874)	Nymphalidae	Andaman Islands	Robinson et al. 2023 & Veenakumari et al. 2008
13	<i>Mangifera indica</i> L.	<i>Euthalia aconthea garuda</i> (Moore, 1858)	Nymphalidae	India West Malaysia	Robinson et al. 2023
14	<i>Mangifera indica</i> L.	<i>Euthalia aconthea gurma</i> (Fruhstorfer 1906)	Nymphalidae	West Malaysia Sabah	Robinson et al. 2023
15	<i>Mangifera indica</i> L.	<i>Euthalia adonia</i> (Cramer, 1780)	Nymphalidae	West Malaysia	Robinson et al. 2023
16	<i>Mangifera indica</i> L.	<i>Euthalia alpheda</i> (Godart, 1824)	Nymphalidae	Philippines West Malaysia	Robinson et al. 2023
17	<i>Mangifera indica</i> L.	<i>Euthalia anosia</i> (Moore, 1857)	Nymphalidae	India West Malaysia	Robinson et al. 2023
18	<i>Mangifera indica</i> L.	<i>Euthalia phemius</i> (Doubleday, 1848)	Nymphalidae	Hong Kong Oriental	Robinson et al. 2023
19	<i>Mangifera indica</i> L.	<i>Euthalia vasanta</i> (Moore, 1859)	Nymphalidae	India	Robinson et al. 2023
20	<i>Mangifera indica</i> L.	<i>Historis acheronta cadmus</i> (Cramer, 1775)	Nymphalidae	Puerto Rico	Robinson et al. 2023
21	<i>Mangifera indica</i> L.	<i>Horaga albimacula</i> (Wood-Mason & de Nicéville, 1881)	Lycaenidae	Laos	Robinson et al. 2023
22	<i>Mangifera indica</i> L.	<i>Phalanta phalantha</i> (Drury, 1773)	Nymphalidae	Thailand	Robinson et al. 2023

23	<i>Mangifera indica</i> L.	<i>Pseudo lycaena marsyas</i> (Linnaeus, 1758)	Lycaenidae	Brazil	Robinson et al. 2023
24	<i>Mangifera indica</i> L.	<i>Rapala iabus</i> (Fabricius, 1787)	Lycaenidae	Pakistan	Robinson et al. 2023
25	<i>Mangifera indica</i> L.	<i>Rapala manea</i> (Hewitson, 1863)	Lycaenidae	India	Robinson et al. 2023
26	<i>Mangifera indica</i> L.	<i>Rapala pheretima</i> (Hewitson, 1863)	Lycaenidae	West Malaysia Thailand	Robinson et al. 2023
27	<i>Mangifera indica</i> L.	<i>Rathinda amor</i> (Fabricius, 1775)	Lycaenidae	India	Robinson et al. 2023
28	<i>Mangifera indica</i> L.	<i>Spalgis epeus</i> (Westwood, 1851).	Lycaenidae	India	Robinson et al. 2023
29	<i>Mangifera indica</i> L.	<i>Spalgis epius epius</i> (Westwood, 1851)	Lycaenidae	India	Nitin et al. 2018
30	<i>Mangifera indica</i> L.	<i>Tmolusechion echiolus</i> (Draudt, 1920)	Lycaenidae	Brazil	Robinson et al. 2023
31	<i>Mangifera indica</i> L.	<i>Euthalia aconthea vasanta</i> (Moore, 1858)	Nymphalidae	Sri Lanka	Jayasinghe et al. 2014
32	<i>Mangifera indica</i> L.	<i>Anthene emolus emolus</i> (Godart, 1824)	Lycaenidae	India	Nitin et al. 2018
33	<i>Mangifera indica</i> L.	<i>Rapala manea schistacea</i> (Moore, 1879)	Lycaenidae	India	Nitin et al. 2018
34	<i>Mangifera indica</i> L.	<i>Horaga onyx cingalensis</i> (Moore, 1884)	Lycaenidae	India	Nitin et al. 2018
35	<i>Mangifera indica</i> L.	<i>Horaga viola</i> (Moore, 1882)	Lycaenidae	India	Nitin et al. 2018
36	<i>Mangifera indica</i> L.	<i>Rathinda amor</i> (Fabricius, 1775)	Lycaenidae	Sri Lanka	Jayasinghe et al. 2021
37	<i>Mangifera indica</i> L.	<i>Rathinda amor</i> (Fabricius, 1775)	Lycaenidae	India	Kalesh & Prakash 2007
38	<i>Mangifera indica</i> L.	<i>Euthalia aconthea meridionalis</i> (Fruhstorfer, 1913)	Nymphalidae	India	Young 1907 Bell 1909a Sevastopulo 1938 Pant & Chatterjee 1950 Wynter-Blyth 1957 Kunte 2000 Nitin et al. 2018 Young, 1907
39	<i>Mangifera indica</i> L.	<i>Symphaedra nais</i> (Forster, 1771)	Nymphalidae	India	
40	<i>Mangifera pentandra</i> Hook.f.	<i>Euthalia alpheda</i> (Godart, 1824)	Nymphalidae	Thailand	Robinson et al. 2023
41	<i>Mangifera</i> (Species name not available in literature)	<i>Anthene lycaenina lycaenina</i> (R. Felder, 1868)	Lycaenidae	India	Nayanathara & Narayana, 2020
42	<i>Mangifera</i> (Species name not available in literature)	<i>Anthene liodes</i> (Hewitson, 1874)	Lycaenidae	East Africa	Robinson et al. 2023
43	<i>Mangifera</i> (Species name not available in literature)	<i>Euthalia alpheda</i> (Godart, 1824)	Nymphalidae	Indonesia	Robinson et al. 2023

Discussion

E. a. aconitus is an endemic sub species recorded here as pest of *Mangifera* species naturally occurring in ANI along with its impact on host plants and fruit feeding behavior. On the basis of observations made during present study, the choice of the host individuals corresponds with the natural habitat of the butterfly. The larva of *E. a. aconitus* feeds on the leaves of preferred host however the adult butterfly visited many other plants viz.; *Allamanda cathartica*, *Carica papaya*, *Cycas zeylanica*, *Polyalthia longifolia* for fulfill of various biological needs of the life. Among these plants, the genus *Cycas* also appeared as most susceptible larval host plant for butterflies in ANI. Numerous cycad species (*Cycas dharmrajii* L.J. Singh, *C. pschannae* R.C. Srivast. & L.J. Singh, *C. revoluta* Thunb. and *C. zeylanica* (J. Schust.) A. Lindstr. & K.D. Hill) offered as larval food influences fecundity of *Luthrodes pandava* Horsfield (Lepidoptera: Lycaenidae) in the islands ecosystem (Purti et al 2022, 2023). *L. pandava* also acts as a pest for endemic as well as introduced *Cycad* species in other parts of the world (Marler & Muniappan 2006; Marler et al 2012a,b, 2017; Purti et al 2022, 2023).

Except for few notable exceptions very little information has been recorded on the fruit feeding behavior of adult butterflies, it is also recorded here in *E. a. aconitus* for the first time from ANI's India. Fruit feeding behavior of adult butterflies evolved several times in nymphalid butterflies probably as an escape route from periods of low flower abundance (Hall & Willmott 2000; Shiha 2016; Krenn et al. 2001).

Under *ex-situ* observation it is found that the caterpillars of this pest their feeding preference with common *Mangifera* species, *M. indica*, and followed by *M. andamanica* and *M. griffithii*. *M. indica* is distributed throughout the islands, however, two host species *M. andamanica* and *M. griffithii* recorded here as a new hosts which are sparsely distributed and confined only in few localities. The IUCN status of *M. andamanica* and *M. griffithii* are near threatened and data deficient respectively. The host plant, *M. andamanica* is encountered only in reserve forest and protected areas of ANIs that are

undisturbed habitat. While another host plant *M. griffithii* is found in Manipur Parvat National Park (Mt. Harriet).

Conclusions

The present study has revealed that the *Mangifera* spp. served as preferred host for both larva and adult form of the Andaman Baron butterfly, *Euthalia aconthea acontius* (Hewitson 1874) (Lepidoptera: Nymphalidae). Two endemic *Mangifera* spp. viz. *M. andamanica* and *M. griffithii* have been reports here for the first time as larval host plants from the ANI's, India. In the ANI's, it observed that only a single lepidopteran sub species, *E. a. acontius* larvae feeds on Mango host plants. It observed that *E. a. acontius* larvae acts as pests of both endemic and common *Mangifera* species in the ANI's. Due to natural calamities and anthropogenic pressures *Mangifera* species are under threatened condition. Besides distribution of endemic *Mangifera* species is sparsely confined only in few localities. In terms of declining populations, the present study revealed that in the near future this pest may assume more serious and destructive position specifically the endemic taxa. Although presently it is not reported as a serious pest of *Mangifera*.

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