

NOTES ON THE BIOLOGIES OF *PAPILIO LAGLAIZEI* AND  
*P. TOBOROI* (PAPILIONIDAE)

R. STRAATMAN

Sogeri, Papua, New Guinea

*Papilio laglaizei* Depuiset and *P. toboroi* Ribbe are included in a small and closely related species group that is morphologically distinctive from other species in the genus (Munroe, 1958). *P. laglaizei* is found on mainland New Guinea, and *P. toboroi* occurs on Bougainville, Santa Ysabel and Malaita Island. A third species, *P. moeneri* Aurivillius, is known from New Ireland. What some recognise as *P. mayrhoferi* Bang-Haas from New Britain probably is only a geographical race of *P. moeneri* as was originally described by Bang-Haas (1939).

In addition to the two specimens of typical *P. moeneri* mentioned by D'Abbrera (1971), there is one in the Australian National Insect Collection, Canberra, and the author has also seen a few specimens taken on New Ireland in 1968. In view of the foregoing, and the fact that at least some known localities of the species on New Ireland have hardly been disturbed during this century, D'Abbrera's (op. cit.) suggestion that the species is "probably extinct" is considered unlikely to be correct.

The adult of *P. laglaizei* shows a remarkable similarity to the common and presumably distasteful diurnal moth *Alcides agathysus* Kirsch (Uraniidae). The two species also share some of the same habitats. These factors suggest a possible mimicry situation. *Papilio toboroi* and *P. moeneri*, although co-existing in the same habitats with other diurnal *Alcides* species, do not particularly resemble them.

The biology of this *Papilio* species group is remarkable in other aspects, e.g., the laying of eggs in large masses and the highly gregarious behaviour of the larvae (D'Abbrera, 1971). More complete notes for *P. laglaizei* and *P. toboroi* are given below.

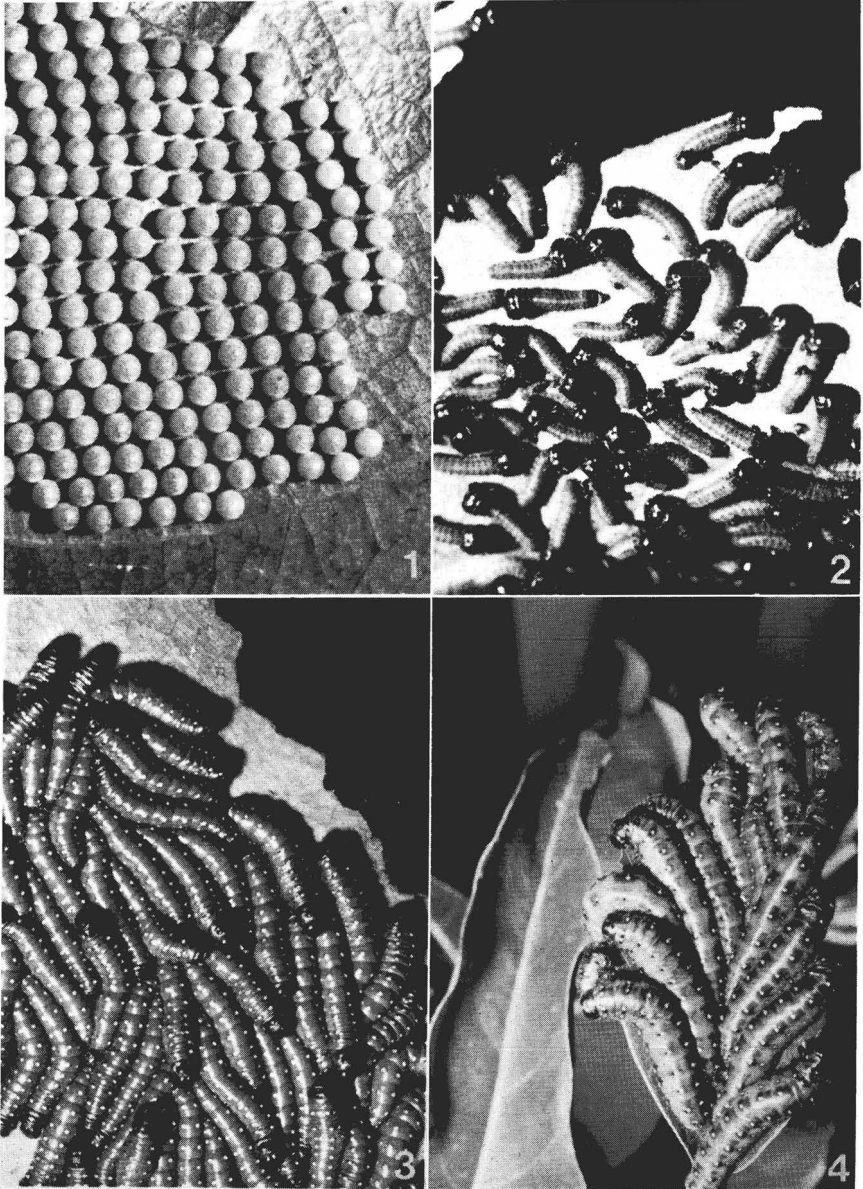
*Papilio laglaizei* Depuiset

Early Stages

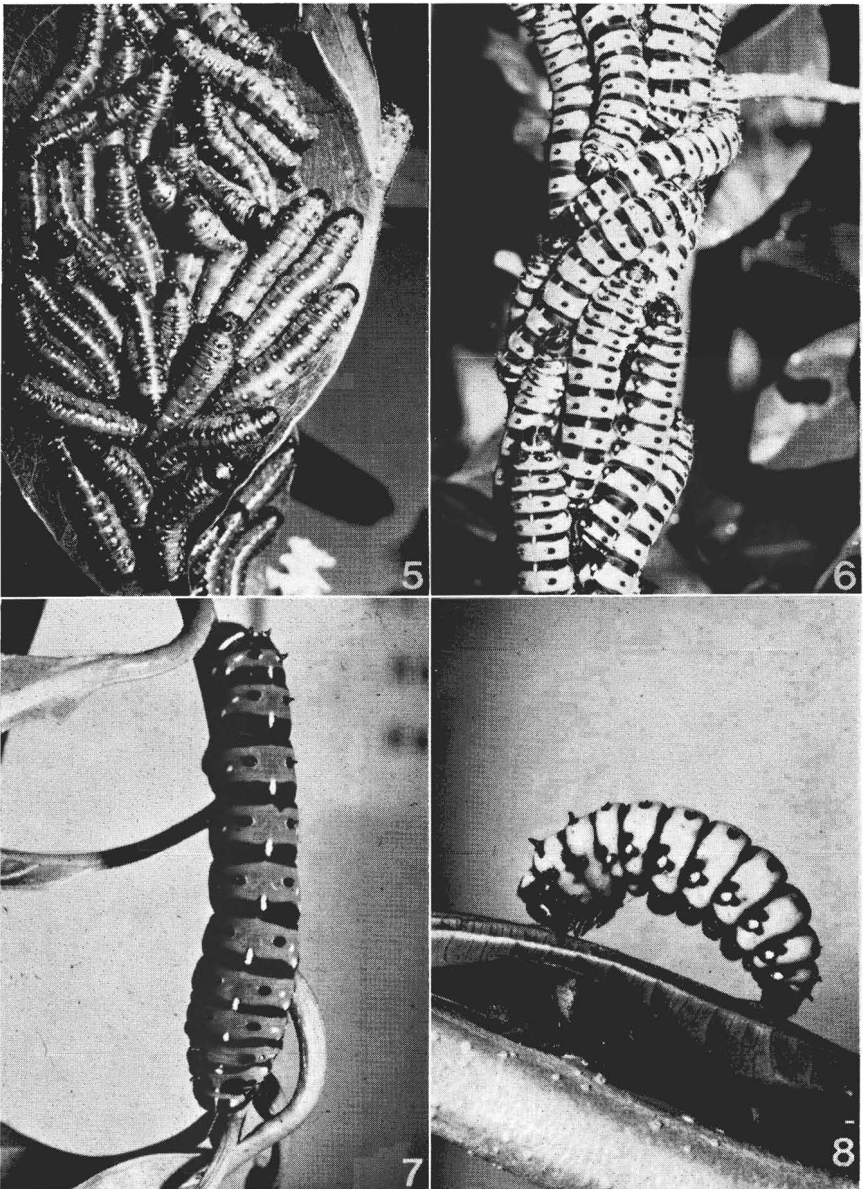
*Egg* (Fig. 1). Small, diameter 0.9 mm. When freshly laid its colour reddish yellow. A few hours later numerous reddish brown lines appear below top of egg and extend towards, but not reaching flattened base. Deposited in parallel rows of up to 500 eggs per batch on undersurface of leaf of foodplant, *Litsia* sp. (Lauraceae).

*First instar larva* (Fig. 2). Head and prothoracic shield comparatively large, shiny black. Body bronze green, laterodorsally with 2 rows of tiny black processes, each carrying a fine, black hair with a small white dot at base.

*Second and third instar larvae* (Fig. 3). Groundcolour light brown. Head, legs and prothoracic shield black. Laterodorsal processes black, average length about 0.33



Figs. 1-4. *Papilio laglaizei*: (1) eggs on hostplant, *Litsia* sp.; (2) first instar larvae; (3) second and third instar larvae; (4) fourth instar larvae.



Figs. 5-8. *Papilio laglaizeii*: (5) fourth instar larvae; (6-7) last instar larvae; (8) prepupa (inverted).

mm. Each segment has 6 white spots, 1 at the base of each dorsal process, 2 laterally and 2 ventrolaterally.

*Fourth instar larva* (Figs. 4, 5). Laterodorsally with a broken and ventrolaterally with a longitudinal, vague, dark, broad stripe. Posterior segments black, with a broken ring formed by white spots and stripes. Dorsal tubercles about 0.5 mm long with broad, round black bases, having large round white central spots. Osmaterium light green.

*Final instar larva* (Figs. 6, 7). Groundcolour varies from dull brown to reddish brown. Prothoracic shield black, middorsally divided by white line. Posterior segments black with 2 white spots middorsally and white stripes laterally, forming a broken ring. Laterodorsal tubercles about 1.0 mm long, with broad, black bases that in some individuals have small white central spots. All segments joined by broad, black ring, widening laterally into large, triangular spot below spiracles. Middorsally each ring has white, elongated spot. Thoracic segments have 4 and abdominal segments 6 white spots laterally and ventrolaterally. Measurements of mature larva: headcapsule length 5.5 mm, width 4.1 mm; total length 74.0 mm.

*Prepupa* (Fig. 8). As soon as the larva has settled for pupation its general colour fades to pale ochreous yellow.

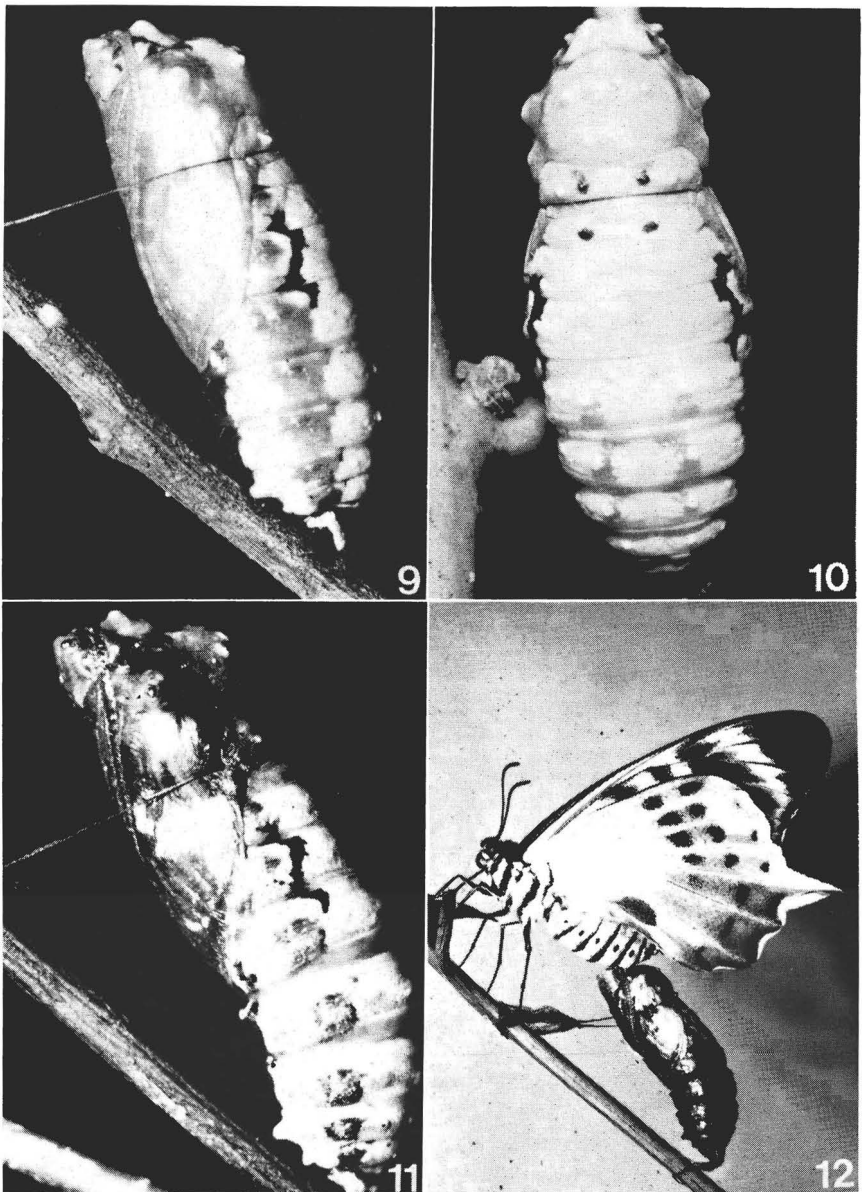
*Pupa* (Figs. 9–11). Groundcolour cadmium yellow. Smooth, roundish and hard in general appearance. Abdominal segment 8 with a long and segment 9 with a shorter, blunt appendage lateroventrally. Cremaster broad, strong. Black ventrally, yellow laterally and dorsally cephalad with a black ring. Dorsally the thoracic and first abdominal segments with 4 blunt humps each. Abdominal segments 1 and 2 dorsally with 2 round, black dots each. Segments 5–9 laterally with broken, broad, brown stripe surrounding the spiracles; segments 6 and 7 each with 2 triangular, light brown spots dorsally, while segments 3, 4 and 5 are laterally joined by a short, W-shaped black line.

*Duration of stages.* First instar, 4–5 days; second instar, 4 days; third instar, 5 days; fourth instar, 4–5 days; final instar, 6–7 days; prepupa, 2 days; and pupa, 14–16 days.

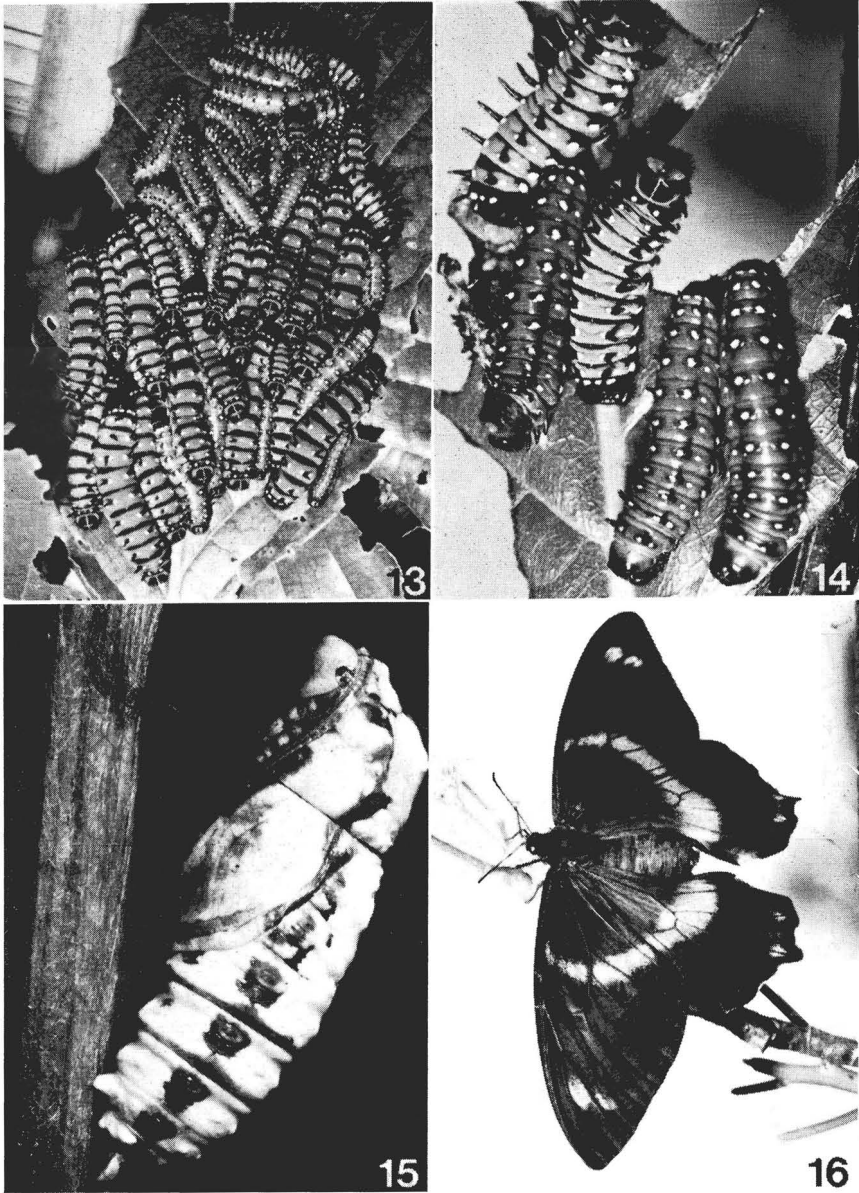
### General Observations

**Behaviour of larvae.** The larvae are strongly gregarious at all stages. Shortly after hatching they group themselves on the underside of a leaf, pressing together around a few individuals as a solid ring, radially orientated with heads outward. All larvae feed simultaneously for about 25 minutes, and then return to their resting position for about four hours after which time feeding is resumed.

During the penultimate and ultimate instars the larvae, being too large to rest on leaves, aggregate on branches or on the main stem of their hostplant. From a distance they closely resemble larvae of sawflies (Perginae) or some saturniids, e.g., *Opodiphthera*. After the final feeding, the mature larvae remain motionless and clustered together for about a day, during which time their groundcolour becomes bright orange brown. At a certain moment, generally towards sunset, all individuals start to move simultaneously and rapidly walk down the main stem of their hostplant. This often happens to be a tree standing near a riverbank with several of its branches overhanging the water. Many



Figs. 9-12. *Papilio laglaizei*: (9) pupa, lateral view; (10) pupa, dorsal view; (11) pupa, lateral view, seconds before adult emerged; (12) adult male.



Figs. 13-16. *Papilio toboroi*: (13-14) fourth instar (moulting) and fifth instar larvae; (15) pupa, lateral view; (16) adult female.

larvae fall into the water in their wandering and may be carried over long distances. Some drown but many keep floating, hanging onto debris, which, if carried by the current to the riverbank, enables them to crawl up and settle on nearby overhanging branches of shrubs and weeds. On several occasions pupae were found on low shrubs growing on small islands in the middle of shallow rivers. However, some individuals pupated on twigs or on the underside of leaves of their hostplant. This applied generally to parasitised larvae which may not have had the strength to move a long distance.

**Predators and parasites.** All stages face many predators. Some egg batches were found parasitised by minute wasps or attacked by small landsnails. Others were eaten by ants although some batches escaped undetected. Mainly fourth instar larvae are heavily parasitised by Braconidae, Ichneumonidae and Tachinidae. Mature larvae face other dangers when ready for pupation as frogs and toads were seen attacking them during their search for a pupation site. It is estimated that in the field no more than 2-3 percent of an egg batch produces adults.

**Behaviour of adults.** Male butterflies fly high in an erratic way. They may establish a territory which often consists of an opening between trees at the edge of the forest. In a space often not larger than a few square meters, they fly up and down chasing any flying creature in sight. Females have a more sluggish flight. The sex ratio of 115 pupae obtained in captivity from the egg was 64 females : 48 males, while three pupae died.

*P. laglaizei* is found from sea level to 1500 meters, its optimal range being 500-1200 m.

### *Papilio toboroi* Ribbe

#### Early Stages

The observations started with third instar larvae because no younger stages were available.

*Third instar larva.* Groundcolour light brown. Thoracic segments with 6, and abdominal segments with 8 white spots each, forming a row starting from base of dorsolateral tubercles down to prolegs. Tubercles black with 1 large and sometimes 2 small white spots near base. Head, legs and prothoracic shield black.

*Fourth instar larva* (Figs. 13-14). Abdominal segments black with broken ring formed by white spots and stripes. Laterodorsal tubercles approximately 5.0 mm long. A longitudinal, broken dark brown stripe appears ventrolaterally covering the prolegs.

*Final instar larva* (Figs. 13-14). Groundcolour brown. Head, legs, prothoracic shield and anal segment black, prolegs black spotted. Prothoracic shield middorsally narrowly divided by white line. Thoracic segments with 6 and abdominal segments with 8 white spots each. Tubercles between 8.0 and 9.0 mm long, stiff, black with broad white spots at their bases. All segments joined by a black ring, which is comparatively narrower than in *P. laglaizei* and misses the middorsal white spot.



*Pupa* (Fig. 15). Very similar to *P. laglaizei*. Main differences are comparatively shorter ventral appendages on abdominal segment 9 and the black, lateral markings on abdominal segments 3, 4, and 5 which do not form a W-shaped line, but are broken into short black stripes. The duration of the pupal stage averaged 16–18 days.

#### General Observations

**Behaviour of larvae.** The larvae are strongly gregarious as in *P. laglaizei*. Two separate batches of larvae were observed in the same area. The largest group consisted of at least 700 larvae. Feeding occurred simultaneously and mostly at night. The average size of the leaves of the hostplant was rather large, allowing the larvae in all instars to rest together on both sides of leaves instead of congregating on stems and branches as is the case with mature larvae of *P. laglaizei*. The position of the hostplant trees, possibly belonging to the Lauraceae, was on high hills, approximately 1300 m above sea level, in secondary growth near village gardens and a considerable distance from water. The larvae remained close together until the time they were ready to disperse in search for suitable pupation sites.

**Predators.** During their nocturnal wanderings, lasting a whole night, the larvae were attacked by toads, frogs, geckos, spiders and ants. Only a fraction of the mature larvae ever reached a suitable spot to settle for pupation. Of these about 20 percent produced parasitic species of the Tachinidae and Braconidae.

**Behaviour of adults.** Male and female butterflies were seen flying around and feeding from flowers in village gardens. No males were seen in "territorial flight" as was the case in *P. laglaizei*. However, in spite of the very large numbers of larvae present in the area, comparatively few adults were seen on the wing.

#### ACKNOWLEDGMENTS

Thanks are due to Mr. Ted Fenner, Entomologist, Department of Agriculture, Konedobu for critically correcting and improving this manuscript and to Mrs. D. Bowden and R. Carr, Sogeri, for typing the manuscript. Dr. D. Frodin, University of Papua New Guinea, kindly identified plant specimens.

#### LITERATURE CITED

- BANG-HAAS, O. 1939. Neubeschreibungen und Berichtigungen der Exotischen Macrolepidopterenfauna II. Entomol. Zeit. 52(39): 301–302.
- D'ARRERA, B. 1971. Butterflies of the Australian Region. Lansdowne, Melbourne. 415 p.
- MUNROE, E. 1960. The classification of the Papilionidae (Lepidoptera). Can. Entomol. 92 (suppl. 17): 1–51.