

## On the biology of some species of Papilionidae from the island of Celebes (East-Indonesia)

by

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The island of Celebes is known for its numerous and endemic Lepidoptera. Unfortunately many habitats have been and are being destroyed because of total deforestation. Large areas stretching between Makassar and the Northern and Central Districts are covered with lalang (kunai grass) with only odd trees or small, secondary growth in some gullies. Although the Department of Forestry tries to control reckless cutting of forest and trees, there is little or no progress, mainly because of the indifferent or hostile attitude of the local population.

The author collected in Celebes during the year 1966 and found that Lepidoptera are still abundant in the restricted areas in the South such as Bantimurung (Waterfall of Maros) and locally on the Lompoh-Batang (Peak of Bonthain). The most interesting region stretches from East and South of Palu (Central Celebes) to areas around Lake Posso.

The life-histories of the following species of Papilionidae were recorded:

### *Troides hypolites* Cramer

The early stages were common during the months December to May becoming rarer to nearly absent during the remaining months. Its favorite habitats are areas along rivers and creeks where the hostplant *Aristolochia tagala* Chan grows abundantly.

The egg is pearly gray and slightly flattened at the base. It is deposited singly on young shoots of the foodplant. The incubation period is from 8 to 9 days.

The 1st instar larva has a black ground color without markings. It has long and fleshy tubercles without spines. Tubercles are black with faint red tips with the exception of the dorsal ones of the 4th abdominal segment which are pale orange.

In the 2nd to the 4th instars the ground color remains the same. A yellowish white lateral stripe extends from the base of the dorsal tubercles of the 4th abdominal to the prolegs of the 3rd abdominal segment. The tubercles are long and black and with red tips. In the 2nd and 3rd instars the dorsal tubercles of the 4th and the lateral ones of the 3rd abdominal segments are pinkish white with pink tips becoming white with light red tips in the 4th instar. From the 2nd abdominal segment onward the dorsal tubercles have cephalad inclined tips.

In the 5th instar the ground color is reddish-black. The saddle mark is broad and white. Between the dorsal tubercles of the 3rd abdominal segment is a short white transverse stripe. All the tubercles are long with a broad base, they are black with rounded, red tips, inclined cephalad. The dorsal tubercles of the 4th and the lateral ones of the 3rd abdominal segments are white with light red tips. The head, the neckshield and legs are black, the osmaterium is orange-yellow. Measure-

ments of a large larva, which produced a ♀, were: length 92 mm, greatest width 22 mm, headcapsule: length 7.5 mm and width 6.6 mm.

As is generally the case in *Troides*, pupation takes place on twigs or small branches of a tree or shrub growing in the vicinity of the hostplant. The pupa has a pinkish-gray ground color, strongly mottled with fine, dark irregular markings. The wingcases are very broad as is the orange-yellow dorsal saddle-mark. The abdominal segments 6 to 8 carry two dorsal processes each. Those on the 6th segment are short and pointed. On the 7th segment they are long, blunt and inclined caudad and on the following abdominal segment the processes are also long and blunt but inclined laterally. The pupal stage ranges from 29 to 31 days. No predators have been observed.

The imagos appear to prefer open but shady places. During the warmest hours of the day they were seen resting on leaves of shrubs and trees. The males rest with folded wings while the females keep the wings spread. When the weather is cloudy the butterflies are active throughout the day.

### *Troides helena hephaestes* Fldr.

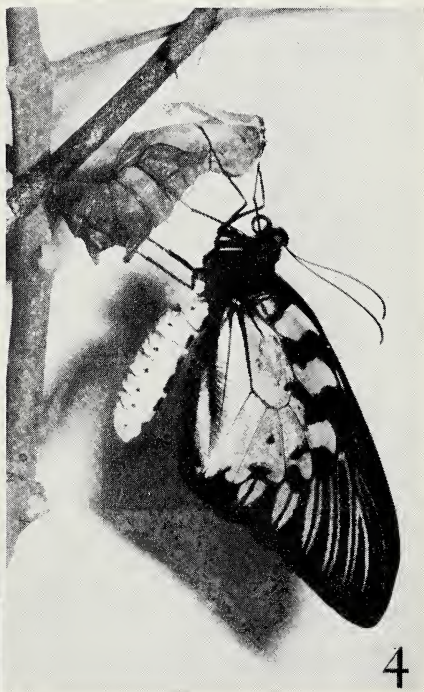
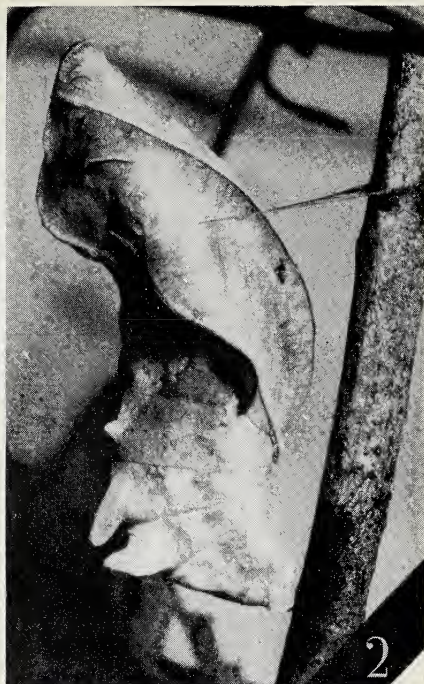
This is the commonest of the *Troides* species which occur in Celebes. It is found in the hot, coastal plains up to elevations of 1700 meters or more. The egg is a yellowish gray, and small in size for this species. It is singly deposited on the hostplant, *Aristolochia tagala*. The number of eggs laid on a single plant depends on its size and location. The incubation period is from 8 to 9 days.

The 1st instar larva has a velvety-black ground color without markings. The 4th abdominal segment has a narrow, faint lateral stripe. The tubercles are fleshy without spines, black with pinkish-yellow tips. The lateral tubercles of the thoracic segments are the longest.

In the 2nd to 4th instars the ground color grows gradually paler. The tubercles of the thoracic segments and those of the 7th to the last abdominal segments are dark pinkish with light red tips, the dorsal tubercles of the 4th and the lateral ones of the 3rd abdominal segments are white with pink tips, the remaining tubercles are as the ground color with yellowish tips. In the 4th instar the white lateral saddle-mark extends from the base of the dorsal tubercles of the 4th down to the spiracles of the 3rd abdominal segment. The pinkish-gray ground color is marked with short, irregular black stripes.

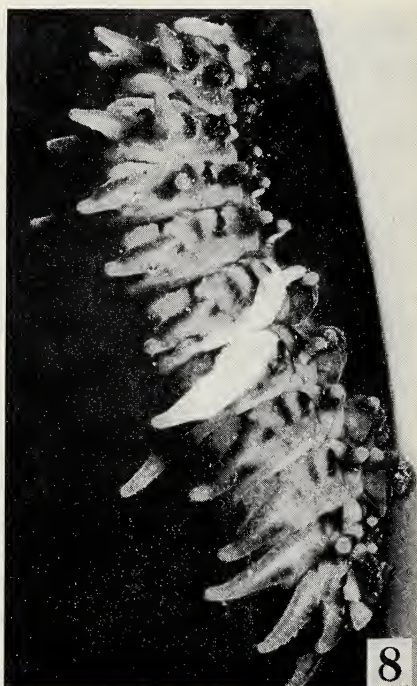
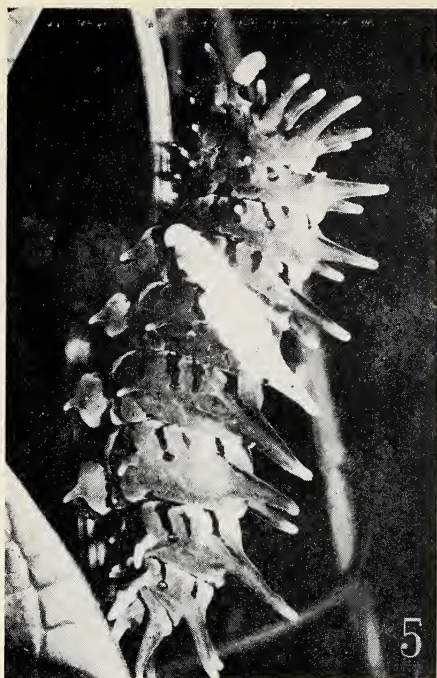
In the 5th instar the ground color is light ochreous brown to pale yellowish grey, and slightly pinkish. Laterally each abdominal segment has 2 long and 2 short narrow, black oblique stripes running cephalad. The longest stripes run from the tip of the dorsal tubercles down to the segmental juncture, the short stripes commence about halfway each segment and stretch as far as its juncture with the following segment. The tubercles are long and straight, the dorsal ones the longest. Their color is pale ochreous with light red tips, the lateral tubercles are darker. The saddle-mark is conspicuous, broad and white. The juncture of the 3rd abdominal segment is white dorsally. The osmaterium is yellow. Measurements of a mature larva were: length 89 mm, greatest width 20 mm, longest dorsal tubercle 12 mm, headcapsule: length 6.8 mm, width 5.9 mm. Pupation occurs on twigs





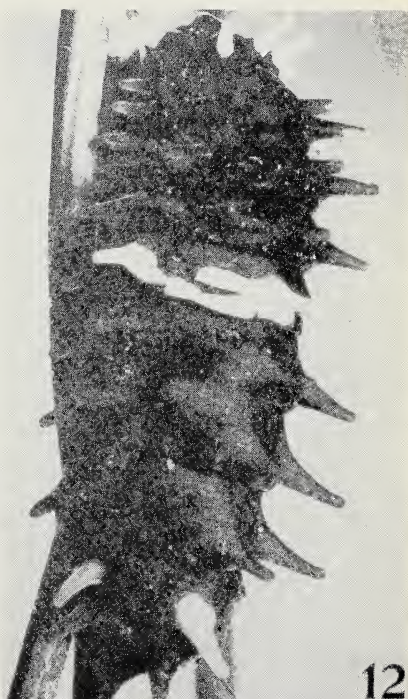
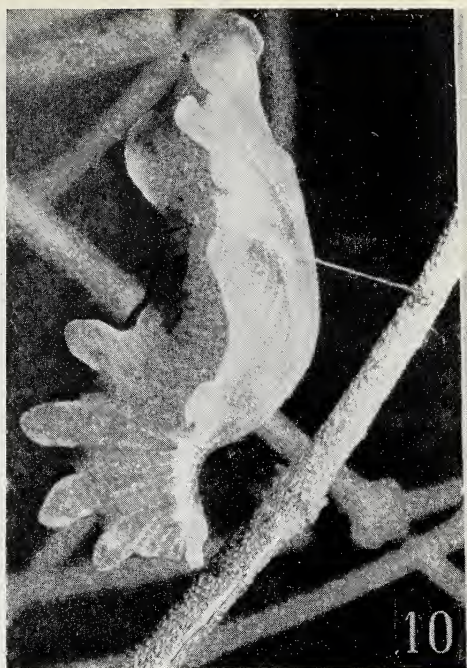
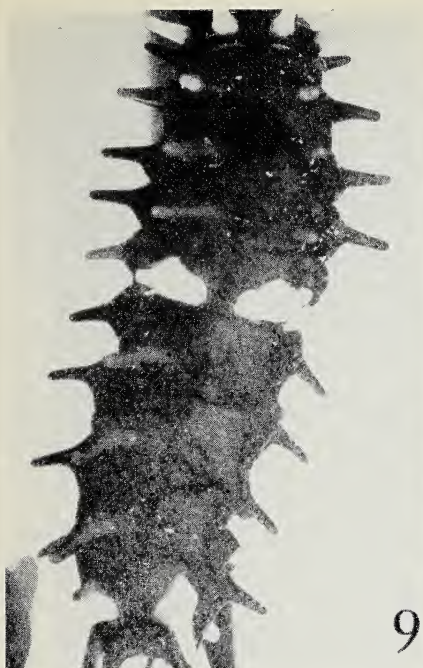
*Troides hypolites* Cramer. 1, larva, lateral; 2, pupa, lateral; 3, pupa, dorsal; 4, imago (male), emerged. Figs. 1—3 about natural size, fig. 4 about  $\frac{1}{2} \times$ .





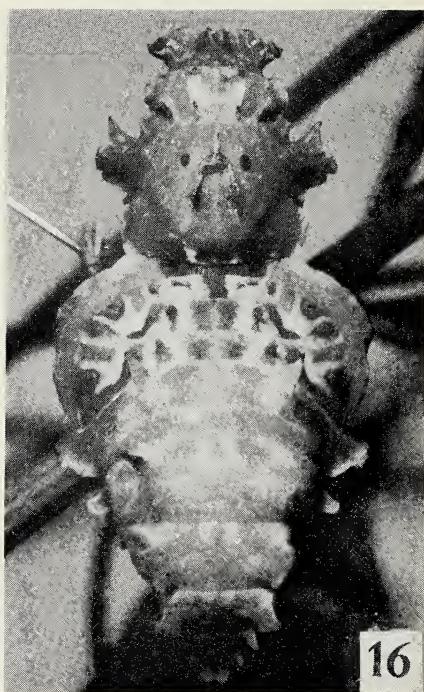
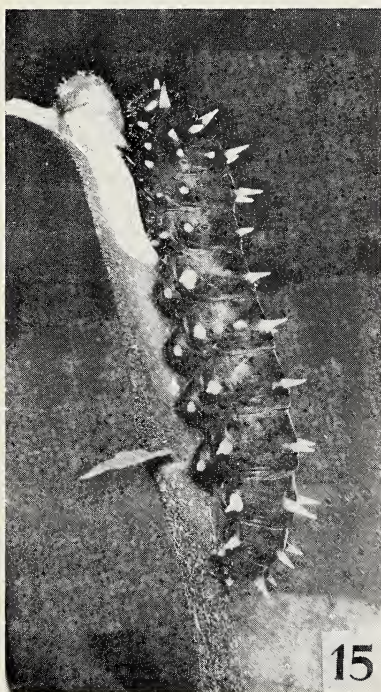
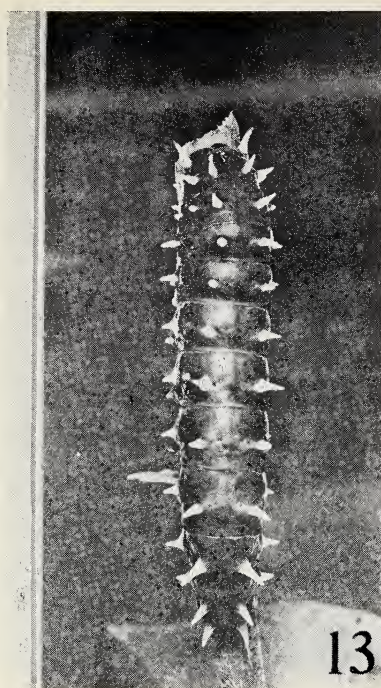
*Troides belena hephaestes* Felder. 5. mature larva; 6. pupa, lateral. *Troides belena papuensis* Wall. 7. pupa; 8. larva, 5th instar, Lae, June 1963. Fig. 5. slightly reduced, 6 about nat. size, figs. 7 and 8 about  $1\frac{1}{2} \times$ .





*Atrophaneura polyphontes* Bsd. 9. larva, dorsal; 10. pupa, lateral; 11. imago, emerged; 12. larva, lateral. Figs. 9, 10 and 12  $2\frac{1}{2}$  X, fig. 11 slightly reduced.





*Parides kuehni* Honrath. 13. larva, dorsal; 14. pupa, lateral; 15. larva, lateral; 16. pupa, dorsal.  
Figs. 13 and 15 about nat. size, figs 14 and 16 about 2  $\times$ .



or stems of plants growing near the hostplant, never under a leaf as in *Ornithoptera*.

The pupa has a pinkish, yellowish-gray ground color, mottled with numerous, fine dark markings. The wing-cases are broad, although comparatively not as broad as in *T. hypolites*. The broad dorsal saddle-mark is lemon yellow. The 5th and the 6th abdominal segments carry 2 long, pointed triangular processes latero-dorsally. The base of these processes is nearly as broad as is the whole segment. The pupal stage is from 24 to 26 days. Predators were not seen.

### *Atrophaneura polyphontes* Bsd.

This species is common in many parts of Celebes and is generally found in areas from sea-level up to about 600 meters, preferably along rivers and creeks where there is light to heavy undergrowth. The butterflies were frequently seen on the wing around flowers, mainly during early morning or late afternoon.

The larva is not easy to detect as it often hides amongst dead leaves or at the base of the foodplant during the day. Neither first nor second instar larvae were found when the present observations were made.

The egg has an orange-yellowish color and is comparatively large for this species. It is generally deposited on the upper surface of the leaves of the hostplant, *Aristolochia tagala*.

The 3rd to the 5th instar larva has a reddish black ground color. A lateral, irregular, white stripe extends from the base of the dorsal tubercles of the 3rd abdominal segment down to the prolegs of the same segment. The 1st thoracic segment carries 2 long tubercles, which are white with red tips. The two following thoracic segments carry 8 tubercles each. The ventrolateral ones of the 2nd segment are reddish-black, the remaining ones white. All the tubercles on the 3rd thoracic segment are reddish black. The abdominal segments 1 to 6 have 6 tubercles and the remaining segments 4 tubercles each. The dorsal and the lateral tubercles of the 3rd, 7th and 9th segments are pinkish white and the remaining tubercles reddish black.

For its pupation the larva leaves its hostplant to pupate on twigs of shrubs growing in the vicinity, generally low to the ground. The pupa has a pale ochreous brown ground color, with lighter markings on the wingcases. Dorsally there are white, irregular markings which do not extend beyond the 3rd abdominal segment. There is no visible residue of the osmaterium. The 4th, 5th, 6th and 7th abdominal segments carry two long, rounded, leaf-like appendages each. Dorsally the thorax has a double, keel-shaped protuberance, running longitudinally, and laterally there are two leaf-like appendages. On the head, above the eyes are 2 keel-shaped ridges, curved upwards. The pupal stage is from 18 to 20 days.

Larvae of *A. polyphontes* were sometimes found in the company of larvae of *Troides hypolites* and *T. hephaestes*, but always on the lower parts of the hostplant or on the ground. No predators were observed.

### *Parides kuehni* Honrath

This Papilionid was found rather localized in some areas in Central and

Northern Celebes. The butterflies avoid sunny and open places and are rarely met on the wing, except around some flowering forest-trees generally during the early morning or late afternoon. During the warmer part of the day they were observed resting in the shade of trees and shrubs, sitting on the upperside of leaves, generally low to the ground with wings spread.

The egg is light yellowish grey, strongly ribbed and flattened at the base. It is deposited singly on the hairy stems and leaves of the host-plant. Incubation is from 7 to 8 days.

The 1st instar larva has a dark wine-red ground color on the 1st and 2nd thoracic and on the 6th to the 9th abdominal segments, the remaining segments having a pale ochreous brown ground color.

The fleshy tubercles are long, they are red on the 1st thoracic and on the 6th to the 8th abdominal segments, and white on the remaining segments. All the tubercles carry 4 to 6 stiff, black hairs each. The head and legs are black and the prolegs fleshy.

In the 2nd and 3rd instars the ground color remains the same. Comparatively the tubercles are shorter and without the stiff hairs. From the 3rd instar on the tubercles have a red color.

In the 4th and 5th instars the ground color is reddish black without markings. The shape of the larva is long and slender. The only difference between these instars is that the 5th instar larva has comparatively shorter tubercles. The 1st thoracic segment carries 4 and the following two thoracic segments 8 tubercles each. The abdominal segments 1 to 6 have 6, the 7th to the 9th segments have 4 and the last segment 2 tubercles respectively. The ventrolateral tubercles are very short. The dorsal ones of the 3rd, 4th and 7th abdominal segments have a white base in most specimens and sometimes they are white tipped. All the other tubercles are bright red. Some individuals have 1 to 3 small white dots on each side of the 4th abdominal segment.

The head, neckshield and legs are black, the prolegs dark fleshy brown. For its pupation the larva chooses small twigs or branches of shrubs growing in the vicinity of the hostplant, generally not more than 30 cm above the ground. The imago emerges comparatively later in the day than is usually the case in Papilionidae, generally between 11 a.m. and noon. This may be caused by the sheltered position of its environment where morning temperatures rise but slowly.

The pupa is short compared to the mature larva. It has a fawny, ochreous brown ground color, mottled with darker areas. Dorsally the thorax shows the residue of the larval osmaterium as 2 bright red dots. Irregular white markings extend dorsally and laterally on the abdominal segments. The wingcases are very broad. Dorsally each abdominal segment carries 2 processes, those on the 4th, 5th, 6th and 7th segment are the longest. They are broad, flattened laterally and inclined slightly cephalad. The 4th to the 8th abdominal segments have 2 small additional processes each, located dorso-ventrally below the spiracles. The thorax carries 2 broad, leaf-like appendages laterally. On the head, above each eye, is a short, keel-shaped ridge, curved upwards.

The larva has peculiar feeding habits. Every afternoon, about an hour before sunset, it leaves its hostplant to spend the night on twigs or branches of other



plants nearby, and returning to their foodplant early the following morning. Shortly before maturity, the larva chews about halfway up through the stem of its hostplant of which the lower half is devoured down to the ground.

If more than one larva is present on the same plant, nothing remains above the surface but a heap of dry leaves after the larvae have left for pupation.

*Parides kuehni* is monophagous and is associated with a species of *Thottea* (Subfam. Apamaceae, Fam. Aristolochiaceae). It is a small shrub, growing rather localized, although often in number in shady but open areas in the forest, preferably where the undergrowth is light. The long, coarse leaves and the large, peculiar flowers closely resemble those of another species of *Thottea*, previously described as the foodplant of *Parides sycorax*, *Atrophaneura neptunus*, *A. aristolochiae* and *Troides amphrysus ruficollis* from Sumatra.

Preserved specimens of the hostplant were taken to the Herbarium of the Botanical Gardens, Bogor, Java, where it is believed that this plant is an undescribed species of *Thottea*.

Predators were not numerous. However it was observed that larger larvae, generally feeding closer to the ground, were attacked by lizards and toads. No parasites were found.

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#### References

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Horion, Ad., Faunistik der mitteleuropäischen Käfer, Band XI, XXIV + 419 p. Ueberlingen, 1967. Prijs DM 30.

Het elfde deel van HORION's levenswerk behandelt het resterende gedeelte van de Staphyliniden (Habrocerinae tot en met Aleocharinae), echter met uitzondering van de subtribus Athetae. In deze laatste groep zijn voor Midden-Europa nog zoveel systematische problemen op te lossen, dat de auteur van een faunistische bewerking moest afzien. Systematiek en faunistiek van het *Atheta*-complex zullen daarom later door enkele specialisten worden uitgewerkt.

Het thans verschenen deel vormt, met bovengenoemde uitzondering, het sluitstuk van de kortschildkeverfaunistiek. Een ontzag afdwingende prestatie voor ieder die zich de omvang van deze mammoet onder de keverfamilies bewust is. Een zeer welkome aanvulling ook van onze ecologische kennis. De auteur beperkt zich niet tot faunistische gegevens, maar belicht talrijke ecologische facetten: gebondenheid aan bepaalde soorten fungi, knaagdieren, vogelnesten e.d. Veertig verspreidingskaartjes geven een duidelijk inzicht in de soms merkwaardige distributie van even zoveel minder gewone of zeldzame soorten.

Moge het de bejaarde auteur gegeven zijn ook nog de Phytophaga, het restant der Coleoptera, op dezelfde uitstekende wijze te bewerken. — P. J. BRAKMAN.