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NOTES ON THE BIOLOGY AND HOSTPLANT ASSOCIATIONS OF *ORNITHOPTERA PRIAMUS URVILLEANUS* AND *O. VICTORIAE* (PAPILIONIDAE)

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In 1964 the biologies of *Ornithoptera priamus urvilleanus* Guérin & Ménéville and *O. victoriae* Gray were studied on various islands of the Solomon Islands Archipelago. On the islands of Guadalcanal and Nggela, the early stages of the two species live together on *Aristolochia tagala* Chan, but on other islands they were found on separate hosts, which they did not seem to share. Reports from Forestry Department, Honiara, tell of the almost complete disappearance of both species from the Honiara region due to extensive cutting of the undergrowth and also because of reckless collecting of adults and their early stages.

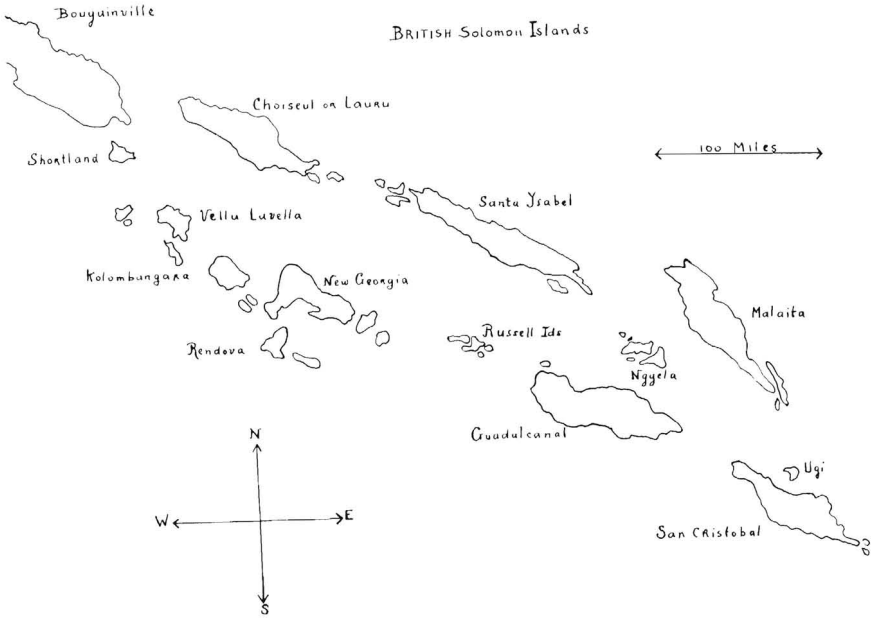
ORNITHOPTERA PRIAMUS URVILLEANUS Guérin–Ménéville

First Instar: Upon hatching, larva wine red, turning dark brown or almost black in a few hours. All segments with long tubercles consisting of two parts: lower part fleshy from base to approximately one-fifth of its length, remaining four-fifths stiff, hard, shiny black, carrying numerous black spines. Fleshy part of dorsal tubercles of fourth abdominal segment red, on other segments dark brown.

Second Instar: Tubercles rather long, pointed, fleshy, without spines. Dorsal tubercles of fourth abdominal segment light red, all remaining tubercles same colour as body.

Third Instar: A faint, short, lateral, light pink to whitish saddle-mark on fourth abdominal segment.

Fourth & Fifth Instars: Ground colour varying from dark ashy grey to almost black. Saddle-mark distinct, white, extending from base of white dorsal tubercles of fourth abdominal segment to base of lateral tubercles of same segment. Sometimes part of a second white mark on fifth abdominal segment. (In the Trobriand Islands many larvae have two or even three distinct saddle-marks.) Larva of *O. priamus urvilleanus* almost identical to that of *O. priamus poseidon* Doubleday, differing in fourth and fifth instars. Dorsal tubercles in the fourth and fifth instars of *urvilleanus* bright red for approximately three-quarters their length as compared to one-fifth or less in *poseidon*. Tips of tubercles black in both forms. Osmaterium dark red. Measurements of one mature larva: total length 94 mm, greatest width 22 mm, longest tubercle 12 mm; headcapsule: length 8.1 mm, width 7.7 mm.



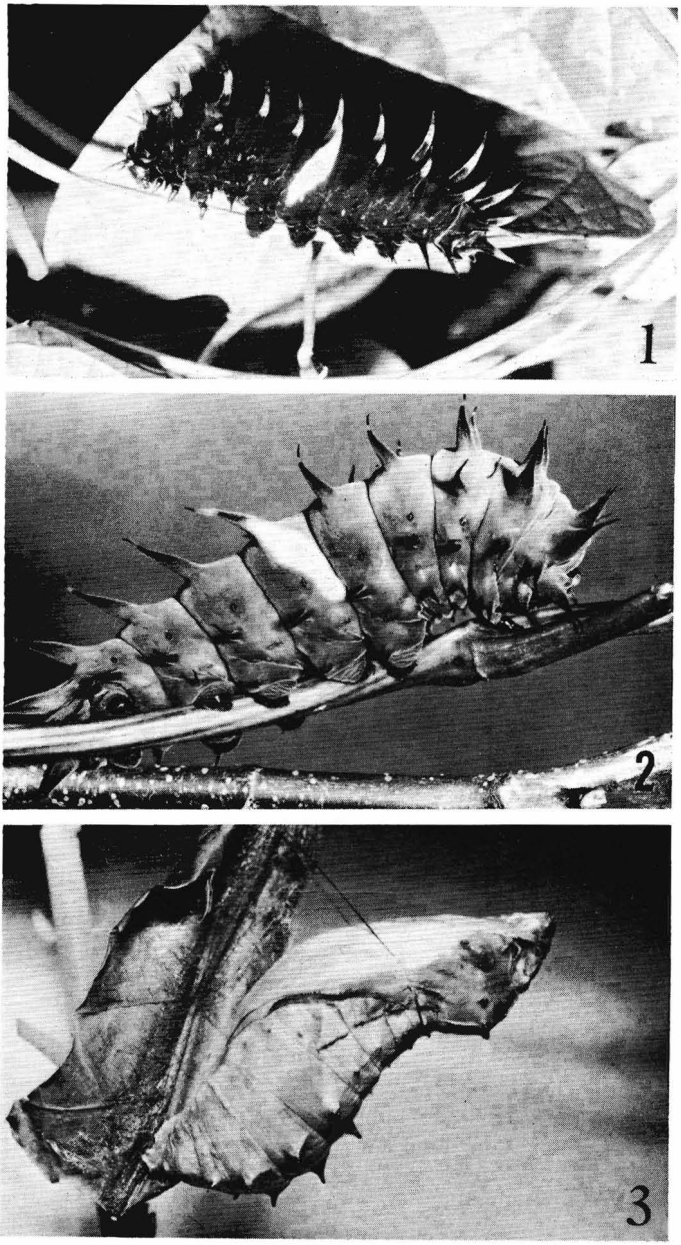
Pupa: Ground colour of *O. urvilleanus* more yellow and markings less distinct than pupa of *O. poseidon*. Abdominal segments with eight sharp, short dorsal processes.

Pupation occurs under a leaf of a tree or shrub growing some distance from the hostplant, seldom on the hostplant itself. The pupal stage ranges from 30 to 33 days.

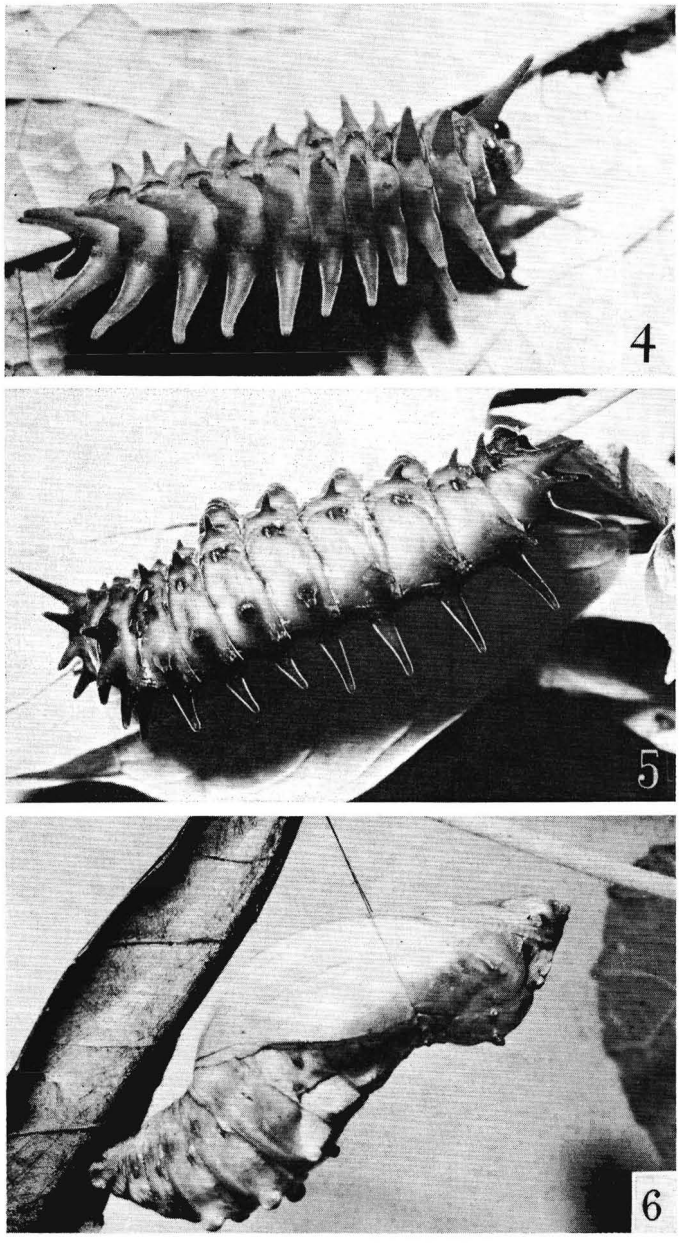
The average sex ratio with specimens emerged was nearly 45% males with minor variations on different islands. On Banika, one of the Russell Islands in the Central Solomons, *O. urvilleanus* was found localized along some stretches of the beach where *Aristolochia tagala* grows mixed with undergrowth of coconut plantations. Average size of the butterflies here is slightly smaller than those of Guadalcanal.

On Malaita *O. urvilleanus* was found rather localized along a sandy beach where *Aristolochia tagala* grows abundantly. Male imagos are slightly smaller and of a darker coloration as compared to those of Guadalcanal and other islands.

On Santa Ysabel, males are larger and of a brighter, paler blue. The host, *A. tagala*, is localized along stretches of sandy beach. On San Cristobal *O. urvilleanus* was not observed.



Figs. 1–3. Early stages of *Ornithoptera*. 1, *O. priamus urvilleanus* Guérin-Ménéville, larva; 2, *O. priamus poseidon* Doubleday, larva; 3, *O. priamus urvilleanus*, pupa.



Figs. 4–6. Early stages of *Ornithoptera victoriae* Gray. 4, penultimate instar larvae; 5, mature larvae; 6, pupa.

Butterflies emerging from pupae brought to San Cristobal from other islands were shown to missionaries and local inhabitants, who were all of the opinion that this species does not occur on this island. Again, *A. tagala* is abundant along the beach, but leaves and stems did not show any trace of damage caused by larvae.

In December, the island of Rendova (opposite New Georgia) was visited and numerous larvae and pupae of *O. urvilleanus* were seen on or near *A. tagala* along the eastern sandy shores. Male adults resemble closely those described from Santa Ysabel, being large and of a bright blue colour. Females are large and clearly marked.

Oviposition and Behaviour.—It was frequently observed that females of *O. priamus* seldom oviposit on the hostplant itself. Eggs were generally laid on twigs and stems of trees and shrubs growing in the vicinity of the hostplant, sometimes on dead sticks or even on stones on the ground. Only on rare occasions were females observed ovipositing on *Aristolochia* plants.

After locating its host which appears to be done by scent, the female butterfly encircles it and frequently touches leaves and stems with her outsteretched legs. Inspection completed, she may then lay from one to several eggs. The number of eggs laid depends on the size of the inspected foodplant. This oviposition behaviour often results in the loss of many newly hatched larvae. Assuming the pungent scent of the *Aristolochia* is carried towards the larva, it may eventually reach its future host. Sometimes it happens that the branch on which the egg is attached is not directly connected to the *Aristolochia*, necessitating the larva to walk down to the ground as happens to those hatched from eggs laid on stones. In doing so, it faces possible drowning in heavy rain or dew, or attack by spiders, ants, wasps, tree frogs, or small lizards.

There is little danger that the young larva would perish from starvation, because after devouring its eggshell no food is needed for at least twenty-four hours. Neither its spiny appearance in the first instar, nor its osmaterium seem to offer much protection, if any at all, from its numerous predators. Contrary to the rarer species of *Ornithoptera*, which generally lay but few eggs, the female of *O. priamus* may lay as many as fifty eggs, which appears more than sufficient to ensure species survival.

In later instars many larvae are killed by the green tree-ant, *Oecophylla smaragdina* Fabricius, or by a small formicid species constructing its nest against branches of trees. Prepupae and soft, fresh pupae are often destroyed by these ants. *Vespa* species, probably *V. tropica* Sulzer and *V. affinis* Fabricius, were seen attacking large larvae, stinging them and then chewing pieces out of the paralized bodies which were then carried

to their nests. Some birds attack large larvae, which apparently are not as distasteful as is generally believed. It was observed several times that a mature larva in wanderings to find a suitable spot for pupation, was swallowed by large toads. This happens when the larva walks low enough to the ground to be reached by the toad with a short jump. No parasites were recorded as attacking *O. urvilleanus*.

ORNITHOPTERA VICTORIAE Gray

First Instar: Ground colour dark fleshy red, tubercles of the same colour, carrying numerous black spines.

Second Instar: Tubercles comparatively longer, fleshy, without spines. Dorsal tubercles of fourth, seventh, and eighth abdominal segments light red.

Third & Fourth Instars: Ground colour darker red; in the penultimate instar, tubercles very long with a broad base.

Fifth Instar: Ground colour and tubercles dark wine red. Tubercles comparatively shorter and narrower than in penultimate instar. Neither saddle-mark nor other markings present. The two tubercles of first thoracic segment longest (up to 17 mm); the following two segments with eight, first abdominal six, the remaining segments four tubercles each. Osmaterium orange-yellow; head, prothoracic shield and legs glossy black, prolegs light fleshy. Measurements of a large larva: length 97 mm, greatest width 22 mm, average length of dorsal tubercles 11 mm; headcapsule: 8.3 mm, width 7.8 mm.

Pupa: Ground-colour dark yellow, slightly mottled with brown, wing cases light yellow, dorsal saddle-mark orange-yellow. Abdominal segments with six short blunt processes dorsally.

In the Malaita form of *O. victoriae reginae* Salvin, the pupa has a dark brown streak extending over lower part of wingcases along the abdominal segments. Pupation occurs under a leaf of a plant other than the host-plant, sometimes a great distance from it. The pupal stage is long, 38 to 42 days. In the specimens observed, the sex ratio in the emerging adults was nearly 40% males on Nggela, but not more than 26% to 28% males on other islands.

The hostplant association differs from that of *O. urvilleanus*. On Guadalcanal larvae of both *Ornithoptera* species were found feeding on the same hostplant, *Aristolochia tagala* Chan. This may be the only *Aristolochia* species found on this island. On Nggela two different *Aristolochia* species were found growing in the same environment. The first species is *A. tagala*. The second has small, yellowish, thick, triangular leaves and its mature stems are covered with thick layers of corky bark. Although larvae of *O. victoriae* were found on both *Aristolochia* species, there was a distinct preference for the plants with the corky stems.

On Malaita the host preference was more pronounced. The plant with corky stems grows in numbers, although localized, and generally in areas along the beach or a little inland on poor, rocky soil with light undergrowth. In this environment the early stages of *O. victoriae reginae* were

present but those of *O. urvilleanus* were absent. The following experiments were carried out:

1. Larvae of *O. v. reginae* in various instars, were taken from their hostplant, the *Aristolochia* with corky stems, and transferred to *A. tagala*. After some hesitation and wandering, the larvae began to feed. After about a week it became apparent however, that they were not growing. A week later they were dead. Only those which were in the fifth instar when transferred, survived. These larvae reached maturity and pupated into small pupae from which no butterfly emerged.

2. From Guadalcanal larvae of *O. victoriae* were brought to Malaita and released on the *Aristolochia* with corky stems. It took these larvae longer before they accepted their new host and began feeding, as compared to those in the first experiment. The younger larvae died within ten days, but some fifth instar larvae continued feeding for several weeks, growing smaller and weaker, and died without reaching maturity.

3. Larvae of *O. urvilleanus* collected from *A. tagala* were transferred to the hostplant of *O. victoriae reginae*. They accepted it more readily than did *O. victoriae* larvae from Guadalcanal, but in spite of continuous feeding they gradually grew smaller and after a period of two to three weeks all were dead.

On the Russell Islands (Central Solomons), no *O. victoriae* were seen and according to the local inhabitants this species appears to be absent here. Although Seitz (1927) mentioned that *O. victoriae* was not known to occur on San Cristobal, adults and larvae of *O. victoriae* were found on this island at some distance from the Government station, Kira-Kira, where they appear to be localized. The larvae were found on *A. tagala* growing in sandy areas not far from the beach. The hostplant with corky stems was not found, and it is likely that it is absent on this island. The female butterfly of the San Cristobal race has the markings on its wings larger and more yellow than in any other form of *O. victoriae*; the male has the bright green and yellow markings on the forewings joined. Both sexes are slightly smaller as compared to those on other islands. On Santa Ysabel females and an occasional male were seen on the wing. A few small plants of the *Aristolochia* with corky stems were found, but no larvae were present. However, it is likely that this plant when growing in a suitable environment, would be the host of *O. victoriae inabellae* Rothschild, as the numerous *A. tagala* plants growing in sandy areas along the beach failed to produce any instars of *O. victoriae*, while those of *O. urvilleanus* were present.

On Rendova Island (opposite New Georgia) the plant with corky stems was located along the rocky western shore and a few larvae of *O. vic-*

toriae rubianus Rothschild were seen. On *A. tagala* plants growing abundantly along the sandy eastern shore, where at the time the early instars of *O. urvilleanus* were numerous, no specimens of *O. victoriae* were found.

Predators.—It was noticed that on those islands where early instars of *O. victoriae* were found together with those of *O. urvilleanus* on *A. tagala*, the number of predators appeared to be higher than was the case in areas where *O. victoriae* is associated with the hostplant having corky stems, generally growing in a more open and drier environment. Parasites have not been observed to attack this species.

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OCCURRENCE OF *THYMELICUS LINEOLA* (HESPERIIDAE) IN VIRGINIA

In recent years there has been a great amount of attention drawn to the rather rapid expansion of the range of the European skipper, *Thymelicus lineola* (Ochsenheimer) in the United States and Canada.

On June 21, 1968 I collected two fresh males of this skipper in Giles County, in the mountains of southwestern Virginia. They were taken in an open grassy meadow just north of Buckeye Mountain, about three miles west of the small town of Eggleston, Virginia. It was about 6:00 P.M. when they were first seen flying slowly near the ground among the tall grass. They were easily caught as they rested on the grass. No more were seen that day or the following day. A rainy period for the remainder of the time that I was in the area, hindered further collecting.

The foodplant, *Phleum pratense* L. was very common in the meadow and surrounding areas.—GERALD B. STRALEY, *Eggleston, Virginia.*