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ON *ORNITHOPTERA PRIAMUS CAELESTIS* ROTHSCHILD,
DEMOPHANES FRUHSTORFER AND *BOISDUVALI*
MONTROUZIER (PAPILIONIDAE)

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In October and November of 1970 and 1971, the senior author undertook two trips by boat to Trobriand Islands, Louisiades Archipelago and Woodlark Island, to study the life histories of and collect *Ornithoptera priamus caelestis* Rothschild, *O. p. demophanes* Fruhstorfer and *O. p. boisduwali* Montrouzier. This article consists of field notes, descriptions of immature stages and a selection of photographs taken in the field by H. Borch. The young stages are described here for the first time. The taxonomic and phyletic considerations on the imagines are by F. Schmid. The eggs and the first three larval instars are identical in the three forms and likely are very similar to those of other subspecies of *priamus*; therefore, they are not described here.

Ornithoptera priamus caelestis Rothschild

General Observations

Imagines and immatures were seen and collected on Misima Island (Misima, Liag and Larama), Nimoa Island (Nimoa), Sudest Island, Hemenaei Island and Moturina Island. The food-plant is *Aristolochia tagala*. The *ova* are always laid singly on the food-plant or on any nearby object or plant. An ant, *Oecophylla smaragdina* (native name, *Kura Kum*), has been observed preying on the eggs, sometimes sucking dry dozens of them. The newly emerged larvae eat their egg-shells and sometimes turn also to other unhatched eggs and completely devour them.

The *larvae* are always found on the food-plant, but when they are moulting they crawl for shelter into nearby shrubs. We noted a number of cases of cannibalism. This usually occurs just after ecdysis when larvae will attack and devour newly formed pupae. We once observed three larvae completely devour a pupa.

The *pupae* are usually found on the underside of the leaves, or on nearby shrubs, or on grass or even sometimes on trees as high as 20 ft. from the ground. They are usually found in shady situations.

The *imagines* were seen mostly in the hills, as high as 300 ft. elevation, and very rarely at sea-level. Often, early in the morning, males were observed flying directly to female pupae to check if they were emerging. They hovered over the pupae for some minutes and finally flew away. They were observed doing this day after day. When a female finally emerged, it mated before its wings were fully dried.

Taxonomy

Fourth and fifth-instar larvae (Fig. 1). Basic colour intense velvety black. All tubercles partially red, none cream towards the base, except the dorsal tubercles on 4th abdominal segment. Cream saddle-marks small, not extending far laterally. Length at maturity: 67–75 mm.

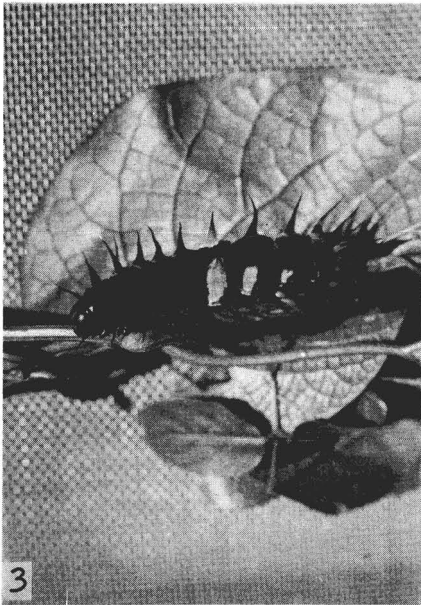
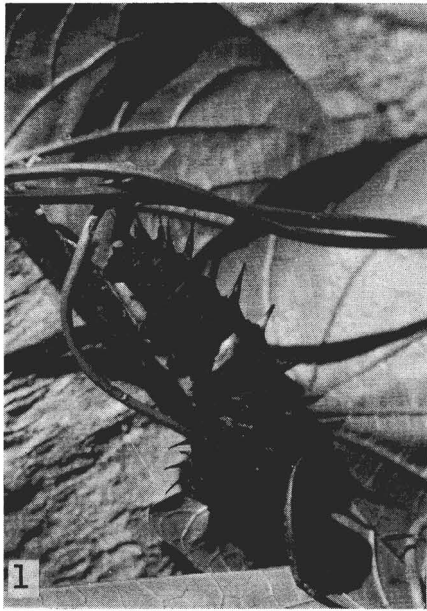
Pupa (Fig. 2). Basic colour rather dark brown. All markings very pale and contrasting. Two bright yellow areas: a small one on the pronotum and a large one on the metanotum and all abdominal segments, limited laterally by the wing-cases and abdominal tubercles. Length 48–50 mm. Pupal period: 22–26 days.

Imagines. This small blue form is well known taxonomically. We shall not describe it again, but simply indicate variations that we observed on 36 ♂♂ and 30 ♀♀ at our disposal. The anal blue band of the anterior wing is always narrower than the radial band and usually regular; in half of our specimens, it is interrupted in the middle of the anal margin. The number of the black discal spots on the posterior wing varies from 5 to 0, the usual number being 3 or 4. Almost all specimens show a black shadow on the discal cell and some have the whole disc powdered with black up to the discal spots. The extension of the black area is proportional to the size of the discal spots. We have seen only two specimens with uniformly blue posterior wings. Three specimens out of four have a yellow translucent spot in the cell Sc + Rl - Rs. Specimens with yellow marginal dots have been reported and named *flavopunctata* Rousseau-Decelle, but only one of our males shows a pair of these dots.

The female is very constant. The basic colour of both wings is deep brown. Both wings are very spotted, with a large oval mark in the discal cell of the anterior wings. The spots are uniformly rather dark.

Phyletic Position

Along with *urvilleana*, *caelestis* is the only known blue subspecies of *priamus*. An interesting point would be to know if it is derived from *urvilleana* (or from a common blue ancestor) or if it evolved from a green form like *poseidon* and acquired the blue colour in a parallel



Figs. 1-2. *O. p. caelestis*: 1, fifth-instar larva; 2, pupa. Figs. 3-4. *O. p. demophanes*: 3, fifth-instar larva; 4, fourth-instar larva (other specimen).

manner to *urvilleana*, as did other subspecies like *hecuba* and *bornemanni* which show a tendency to be partly tinted with blue.

The absence of the coloured cubital band on the anterior wing separates *caelestis* from the complex of *poseidon*, *demophanes*, *boisduvali*, *bornemanni*, *hecuba*, *arruana* and *pronomus* and readily places it in the line of *urvilleana*, *priamus*, *admiralitatis*, *richmundia* and *euphorion*. The regularity of the anal band on the anterior wing and its frequent interruption along the anal margin separates it also from the four last named subspecies and relates it to *urvilleana*. The posterior wing is less rounded than in *priamus*, *admiralitatis*, *richmundia* and *euphorion* and has its anterior apical angle slightly protruding, as in *urvilleana*. Furthermore, the disc of the same wing is always more-or-less clouded with black, again as in *urvilleana*. Below, the posterior wing is blue with a yellowish-green marginal border in both forms. This shows rather convincingly that *caelestis* is the nearest relative of *urvilleana* and that their blue sheen is a monophyletic character inherited from an already blue common ancestor.

O. priamus demophanes Fruhstorfer

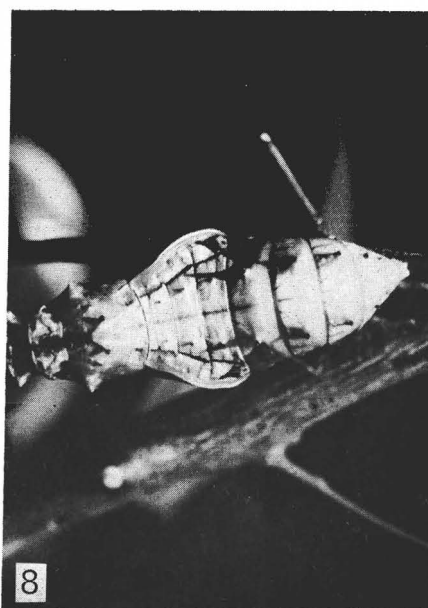
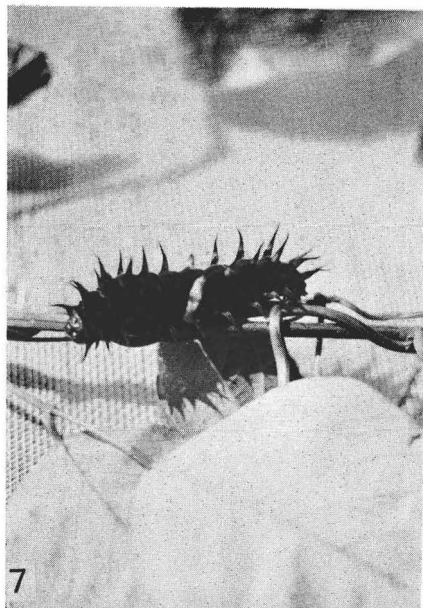
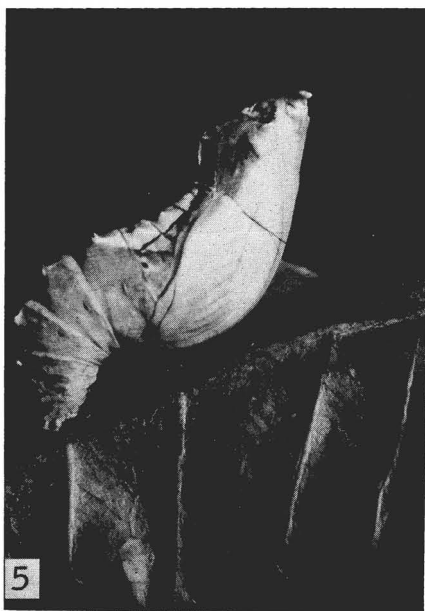
Since the original description by Fruhstorfer in 1913, from the Trobriand Islands, no mention of this form has been recorded in the literature. Its status is universally considered as doubtful. However, specimens are not rare in collections. The question we shall try to resolve here is if this form is a good subspecies or indeed a simple variation of *poseidon*, as are so many of Fruhstorfer's so-called aberrations.

Taxonomy

Fourth and fifth instar larvae (Figs. 3-4). Basic colour velvety black, in some cases grey-black. Tubercles on thoracic segment 1 and all lateral tubercles black. Dorsal and laterodorsal tubercles on thoracic segments 2 and 3 and all abdominal segments partially red, without cream colour. Cream saddle-marks on abdominal segment 4 broad, extending laterally to the spiracles and almost contiguous on the dorsum. Two additional cream saddle-marks usually on segments 5 and 6, decreasing in size (Fig. 3). A few specimens with these three marks on segments 3, 4, 5 (Fig. 4) or only on segments 4 and 5. One large larva measured 90 mm in length. Duration of larval period 25-29 days.

Pupa (Figs. 5-6). Basic colour dull yellowish-brown, in some cases tinted with pinkish. Dorsal saddle-mark bright yellow. A fine brown line middorsally through the saddle-mark to last abdominal segment. A heavy dark brown line laterally below the wing cases. Tenulae yellow. Two short and sharp black-tipped processes on abdominal segments 5 to 8. Average length 60 mm. Pupae period: 24-28 days.

Imagines (Figs. 10-12). From a dozen pairs that we have studied, we illustrate three specimens showing the extremes of variation.



Figs. 5-6. *O. p. demophanes*: pupae. Figs. 7-8. *O. p. boisduwali*: 7, larva; 8, pupa.

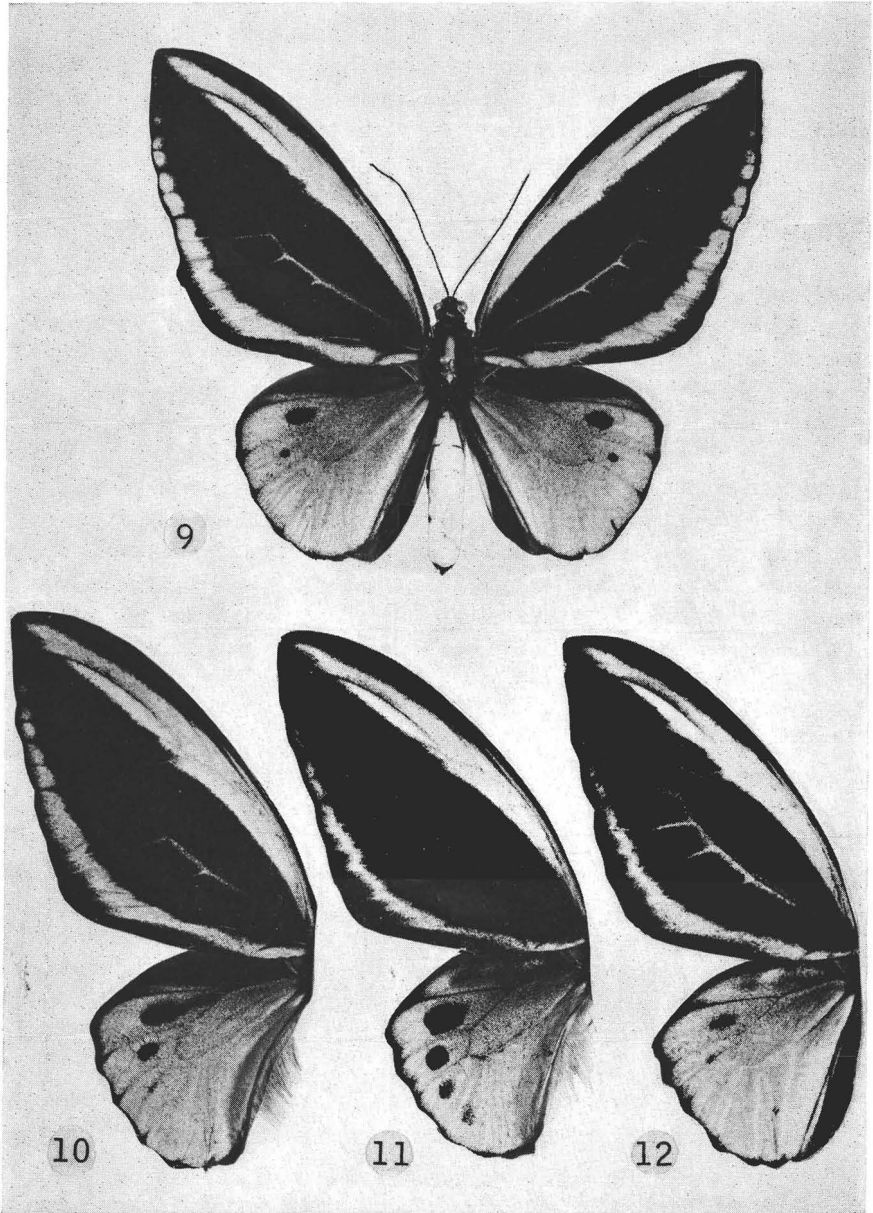


Fig. 9. *O. p. poseidon*, ♂. Figs. 10–12. *O. p. demophanes*, ♂♂, variation of three specimens.

Phyletic Position

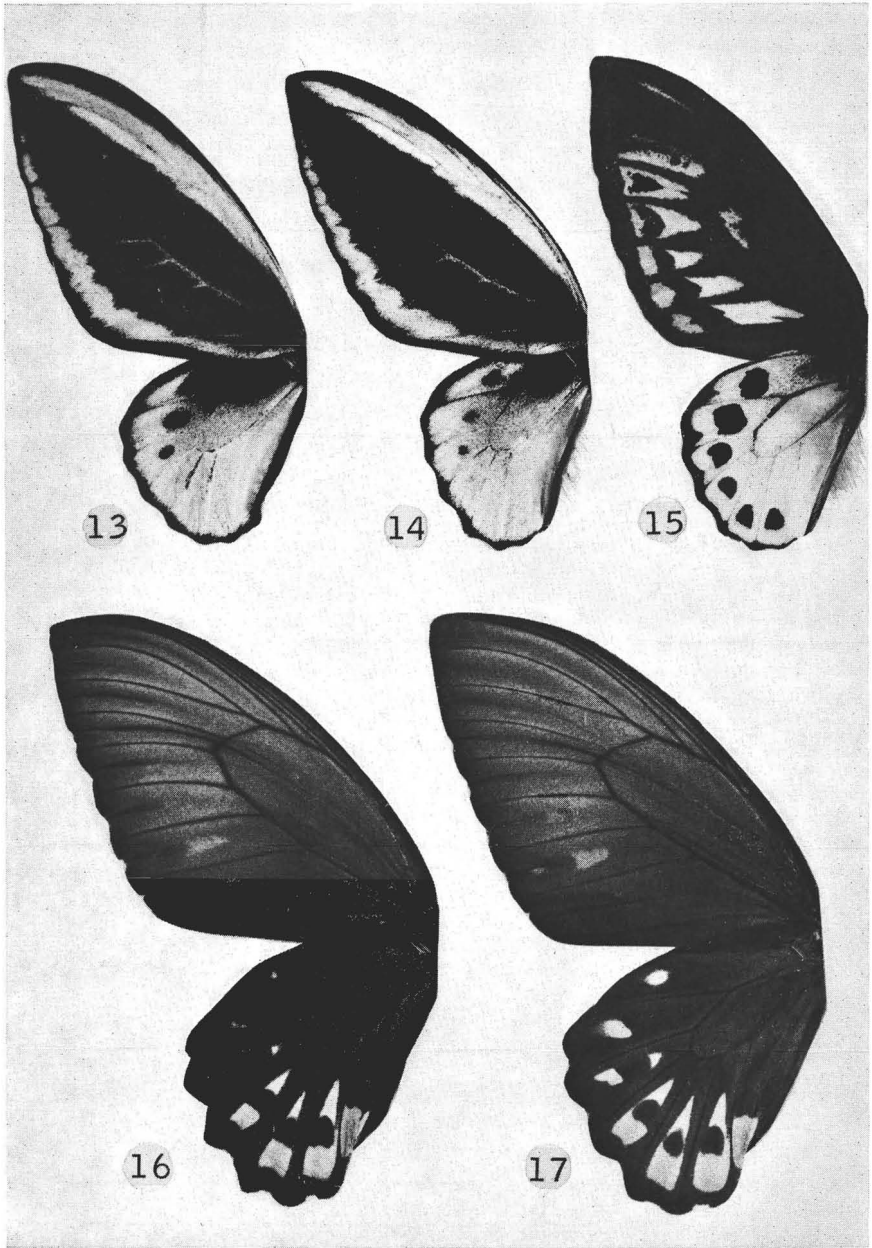
To assess the status of *demophanes*, we shall compare it with *poseidon* to see if the differences are important and constant enough to be considered of subspecific importance. *Poseidon* is a very variable subspecies in size as well as in pattern. One of the patterns rather frequently observed is characterized by the cell Sc + R1 - R2 on the posterior wings being entirely black and with 2 or 3 small black discal spots sharply decreasing in size. A specimen of this form is shown on Fig. 9, but it is clear that many intermediates exist. This type of coloration is not peculiar to *poseidon*, since we know it for *admiralitat* and *bornemanni* also. It is to this form of *poseidon* only that we shall refer below.

The ♂ of *demophanes* is remarkably constant in size as well as in pattern. Likely, it is genetically much more homogenous than *poseidon*, which can be expected in a form geographically restricted to an island. The green colour of *demophanes* is more often tinted with blue than is *poseidon*, though not frequently. In *poseidon*, the radial and anal bands are broad, regular and of equal width. In *demophanes*, the radial band is slightly narrower than in *poseidon*, the anal band is constantly and definitely narrower than the radial one, being sometimes reduced to a simple line (Fig. 11) and somewhat irregular. The reduction occurs from the posterior and outer sides with the result that the black margin is broader than in *poseidon*.

The cell Sc + R1 - R2 of the posterior wing is sometimes entirely black, sometimes green, but always with a certain amount of black. The number of the black discal spots on the wings varies from 1 to 5, the first one often merging with the black area. The second one is the largest and the size of the following ones decreases more rapidly than in *poseidon*. Under the posterior wing, the discal spots are always clearly bigger than in *poseidon* and with frequent black indentations from the black margin in the cells R2 - M1 and M1 - M2. The yellow translucent spot on the cell Sc + R1 - R2 is of course always absent in *demophanes* as well as in the form of *poseidon* considered here, but on one specimen of the latter we have noted two pairs of yellow marginal dots in the cells R2 - R1 and M1 - M2; these dots always seem to be absent in *demophanes*.

The ♀ of *demophanes* is also very stable in size and coloration. We doubt that it can be separated from the highly variable ♀ of *poseidon* but it can be described as follows: basic colour of the anterior wing light brown, except on the three margins that are dark brown. Spots numerous, dark gray, always present in the discal and the marginal cells.

Basic colour of the posterior wing dark brown, with the spots as in *poseidon*.



Figs. 13-17. *O. p. boisduwali*: 13-15, ♂♂, variation of three specimens; 16-17, ♀♀, variation of two specimens.

The typical imaginal characters of *demophanes* are neither numerous nor important. But their constancy plus the remarkable fact that the caterpillar has three saddle-marks where *poseidon* shows only one, plus its insular isolation lead us to think that it is genetically distinct enough from *poseidon* to deserve a full subspecific status. It certainly evolved from specimens of the form of *poseidon* we considered above which populated the Trobriand Islands not long ago and became isolated there.

O. priamus boisduvali Montrouzier

Since its original description by Montrouzier, from Woodlark Island in 1852, only very few references have been made of this subspecies in the literature. They are all brief expressions of doubt on its validity, since Montrouzier's description is insufficient to distinguish it. No specimens seem to be present in collections. We are very glad to have rediscovered this interesting subspecies that was forgotten or ignored for 120 years and to make it known adequately to the lepidopterological world.

Taxonomy

Fourth and fifth-instar larvae (Fig. 7). Basic colour velvety black. All tubercles partially red, those on abdominal segments 5 to 10 red and cream near the bases. Cream saddle-marks on abdominal segment 4 extending from the bases of dorsal tubercles and narrowing to the spiracles. Length 90 mm. Duration of larval period 25–29 days. Feeding on local race of *Aristolochia tagala* with typical flowers and seed-pods but with a slight pink colouring on the stems.

Pupa (Fig. 8). Basic colour dull yellowish-brown as in *demophanes*, but dorsal half sometimes darker than ventral half. Seen dorsally the outer edge of wing cases seeming to protrude more laterally.

Imagines (Figs. 13–17). This subspecies shows a remarkable stability in all of its characters because of the small number of the populations and its isolation on a small island. Since it is closely related to *poseidon* we shall quote here only the characters that distinguish the two subspecies and shall again refer only to the form of *poseidon* we discussed above and illustrated in Fig. 3. Of the 20 pairs we studied, we selected four specimens showing the extremes of variation. Both sexes are small. Expanse of ♂: 8–12 mm; ♀: 13–15 mm.

Phyletic Position

The green colour of the ♂ is distinctly more acid and bluish than in *poseidon* and remarkably constant. The outer margin of the anterior wing is slightly more tilted and the anal angle rounded. The posterior wing is comparatively small, very rounded, even more so than in *euphorion* and the outer margin shows only a very slight crenulation. On the anterior wing, both the radial and anal bands are slightly narrower than in *poseidon*, of equal width and the latter is slightly irregular. The cubital band is always present but never very well developed. On the same wing below, there is always a small coloured spot in the discal cell, the other spots being slightly reduced.

On the posterior wing there is a black area, usually large, extending not only into the cell Sc + R1 - R2 as in *poseidon*, but also into the discal cell and into the anterior angle of the cell M1 - M2, which is never the case in *poseidon*. The apex of the first mentioned cell is always green. The number of the black discal spots varies from 1 to 5, the first one merging often with the black area. The black marginal border is well developed. The underside of the posterior wings is powdered with black at the extreme base. The discal spots are slightly larger than in *poseidon* and there are occasionally short black indentations from the black margin. Yellow spot and dots are always lacking.

The ♀ is the darkest of all the subspecies of *priamus* known to us. The basic colour of the anterior wing is brown-black but generally washed with grey in all the marginal cells from the apex of the discal one. The only constantly present spot is in the cell Cu1 - Cu2 and is divided into two; it is present below only, though it is visible by transparency from above. There might also be two tiny spots in the cells M3 - Cu1 and Cu2 - 2A, but they are not visible from above.

The posterior wing is as shown in Figs. 16-17. Above, the spots are usually very dark, but are lightened to cream yellow in the cell Sc + R1 - R2. Beneath, the spots are distinctly lighter. They can be pure yellow, especially the two anterior ones, but the three posterior ones remain clouded with grey.

Montrouzier's type very likely disappeared long ago, but we do not find it necessary to designate a neotype, since there is no doubt about the identity of the subspecies. *Boisduwali* is obviously derived from the same form of *poseidon* as *demophanes*. It has evolved in the same direction but has gone further, probably because its original population was isolated at an earlier period or because Woodlark Islands are more remotely distant from the New-Guinean mainland than are Trobriand Islands.

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