XVI. *Notes on Eastern Butterflies* (*continued*). By Alfred R. Wallace, F.Z.S., V.-P. Ent. Soc., &c.

[Read 3rd May, 1869.]

Genus Diadema.

In Doubleday, Westwood, and Hewitson's Genera of Diurnal *Lepidoptera* this genus included six or seven others, which were most of them characterized and named as subgenera, or sections. These are now generally considered as distinct genera, since they offer remarkable structural differences, and mostly inhabit distinct geographical regions. The genus thus restricted will contain eighteen species, only two of which do not inhabit the Malay Archipelago. One of these, *Diadema Salmacis*, is found in Africa, and a beautiful new one, apparently allied to it (*Diadema Dexithea*) has been described by Mr. Hewitson, from Madagascar. Two of the commonest species, *Diadema Bolina*, L. (*Auge*, Cr.) and *D. Misippus*, L. (*Bolina*, Cr.), have an immense range, from Australia and the Pacific to India and Africa, but no other species of the restricted genus is found in continental India, and all but two are inhabitants of the Austro-Malayan region, which we may therefore look upon as the probable birth-place of the group, as indicated by the following table :—

Diadema.	Africa.	India.	Indo-Malay Region.	Austro-Malay Region.
2 Species . .	2	-	-	-
2 Species .	2	2	2	2
1 Species . .	-	-	1	-
13 Species .	-	-	-	13
Total 18 Species . .	4	2	3	15

It is remarkable that the African *D. Salmacis* should most resemble in its colouration and general appearance a species inhabiting Celebes, *D. Diomea;* one of the little group of facts which point to some unknown mode of connection in former times between these remote portions of the earth.

This genus, and those which have been separated from it, furnish us with examples of almost all the anomalies of variation. Some species present an amount of variation perhaps greater than any to be found among butterflies; others scarcely vary at all. The sexes are, in some species, absolutely without a feature of their colouration in common; in others they are hardly distinguishable. In a large number of species there is the most wonderful mimicry of other groups, so that they have been mistaken for *Danaidæ* and *Acræidæ*, and there is, perhaps, nothing more striking than the accurate manner in which some African species imitate the striped and spotted *Acrææ*, which inhabit the very same districts. In the Eastern islands the protective mimicry has sometimes caused the usual sexual characters to be completely reversed, which has led to confusion in the determination of the species.

Papilio Vitellia, figured by Cramer, has been usually placed in this genus, but specimens collected by myself in the original locality, Amboyna, show it to be a species of *Elymnias*.

DIADEMA, Boisduval.

1. Diadema Bolina.

♂. *Papilio Bolina*, Linn. Mus. Lud. Ulr. Reg. p. 295; Syst. Nat. ii. 781. Clerck, Icon. t. 21.

♂. *Papilio Auge*, Cram. 190, A. B.

♂. *Papilio Lasinassa*, Cram. 205, A. B.; Fabr. Ent. Syst. iii. pt. i. p. 127.

♀. *Papilio Iphigenia*, Cram. 67, D. E.

Cramer figures as distinct species eight varieties of the female, and many others exist in collections. I do not repeat the references to all these, which are to be found in the "Genera of Diurnal Lepidoptera," Moore's "Catalogue of the East Indian Museum," and other works. I would remark, however, that *Porphyria* and *Velleda* of Cramer, usually placed with this species, seem to me to be females of *Diadema Alimena*.

Hab.—Every island in the Archipelago, as well as India, Australia, and the Pacific Islands. (S. Africa?).

Mr. Butler has pointed out to me, that Clerck's figure, the only one quoted by Linnæus, undoubtedly represents

the same insect as that which has hitherto been termed *Auge* or *Lasinassa*, with which the detailed description in Mus. Ludovicæ Ulricæ perfectly agrees, while it will not at all apply to the *Bolina* of Cramer. This error originated with Cramer, who quotes Linnæus and Clerck for his *Papilio Bolina*, which is a different insect, to which it will now be necessary to apply the name of *Misippus*, given to the female by Linnæus. Cramer's mistake has been unfortunately adopted by all succeeding authors, who seem never to have compared the two insects with the original description and figure. The alteration at this late period will, therefore, cause much confusion, but unless the law of priority is abandoned, no other course is open to me.

This is an exceedingly wide-spread and variable species. The male is tolerably constant, but presents three decided modifications. That which extends over the whole continent of India, is generally distinguished by a row of white points behind the blue and white spot on the hind-wing, and the white bands across the wings on the underside are well marked. Those of the Malayan and Polynesian countries never have the white dots, and seldom have the bands beneath so distinctly marked. Clerck's figure closely resembles an Indian specimen without the white dots. Cramer's figures represent the two most common Malayan forms of the male insect. *Papilio Auge* is the most abundant, and with it are associated females of the type of his *P. Iphigenia*. *Papilio Lasinassa* is a larger insect, in which the blue gloss completely covers the white spots, the margins are less deeply scallopped and less distinctly spotted with white, while on the underside the white transverse bands are nearly or quite absent, and the submarginal lunules are larger, deeper, and placed closer to the submarginal line. The large dusky and yellow-banded females, such as *P. Manlia*, *P. Eriphile*, &c., seem to belong to this form, which is most commonly met with in the Moluccas and the Pacific Islands. The most common females of the Indian form (*P. Perimele*, Cram. 67, B.) are also very distinct looking insects. In the British Museum are some remarkable specimens from the Philippine Islands, in which the male has the spot on the hind-wings reduced to a mere blue gloss without any paler centre, so that in most lights it is invisible; but without a large series

from this locality, it would be impossible to determine how far this is linked to the more ordinary forms by intermediate types. We seem, therefore, to have here a species partly separated into several tolerably distinct forms or races, which only require to be isolated by changes of land and sea to become well-marked species. It may also be remarked, that although the sexes are generally strikingly different, there are individuals whose sex it is impossible to determine without an examination of their structural characters, and which form a complete gradation from one to the other. If any Entomologist would devote himself to the study of this species, by collecting every possible variety of form from every locality in which it is found, it would alone furnish materials for a most instructive essay, which might go far towards elucidating the process of the formation of species.

2. Diadema Misippus.

♀. *Papilio Misippus*, Linn. Syst. Nat. ii. 767.
♀. *Papilio Diocippus*, Cram. 28, B. C.; Fabr. Ent. Syst. iii. pt. i. p. 51.
♀. *Papilio Inaria*, Cram. 214, A. B.
♂. *Papilio Bolina*, Cram. 65, E. F. (*nec* Linn.).

Hab.—Java, Borneo, Lombock, Timor, Celebes, India, China, Formosa, Australia, Africa.

This species is remarkable for the striking contrast of the sexes: the female resembles *Danais Chrysippus*, in company with which I have often taken it flying, when the two were indistinguishable. Specimens occasionally show a slight approach of the sexes to each other, and in the British Museum is a hermaphrodite, one side of which is male, and the other female. The form *Inaria*, which seems common in Africa, is rare in the East, where there is no *Danais* it resembles.

3. Diadema Alimena.

♂. *Papilio Alimena*, Linn. Syst. Nat. ii. 780; Clerck, Ic. pl. 32, f. 1; Cramer, 221, A. B. C.
♀. *Papilio Porphyria*, Cramer, 255, E. F.
♀. *Papilio Velleda*, Cramer, 349, C. D.

Hab.—Bouru, Amboyna, Ceram, Goram, Ké Islands, Waigiou, New Guinea. (Wallace).

This species varies much, and the sexes generally differ greatly, but there are intermediate forms which connect the whole into an unbroken series. *P. Porphyria* and *P. Velleda* of Cramer, have usually been placed with *Diadema Lasinassa*, but they agree very closely with some of my specimens of this species.

4. Diadema Polymena.

Diadema Polymena, Felder, Novara Voyage, Lepidop. p. 414, pl. lv. figs. 5, 6.

Hab.—Aru Islands (Felder).

This is an extreme form of *Diadema Alimena*, the female assuming the white colour which characterizes many butterflies of different genera in the islands south-east of Ceram.

5. Diadema Pandarus.

♂. *Papilio Pandarus*, Linn. Syst. Nat. ii. 767; Esper, Ausl. Schmett. pl. 40, f. 1.

Papilio Callisto, Cramer, 24, A. B.

♀. *Papilio Pipleis*, Linn. Syst. Nat. ii. 775; Cramer, 60, A. B.

Hab.—Amboyna, Ceram (Wallace).

The female has the band across the upper wings either creamy white or pale rufous; the former appearing to be characteristic of Amboyna, the latter of Ceram.

6. Diadema Pandora, n. s.

Female. Wings rather more elongate than in *D. Pandarus*, the posterior margin more deeply scallopped.

Above; the band on the anterior wings replaced by four spots, the lower and upper of which are small, the two middle larger, white, tinged with ashy violet; the row of white spots parallel to the margin smaller and of a subquadrate form; the submarginal lunules nearly half-square instead of triangular. Posterior wings with the black spots almost circular, the pupils almost obsolete.

Beneath; the upper part of the transverse band almost obsolete, the costal margin from its extremity to the apex, whitish; the third and fourth spots from the outer angle of the anterior wings much smaller than the rest; other differences as above. Rather smaller than the females of *D. Pandarus*.

Hab.—Bouru (Wallace).

If we are to discriminate local forms with a view to the investigation of their true place in nature, such slight but definite modifications as this insect presents must be recognized by giving it a distinct specific name.

7. Diadema Saundersi, n. s.

Male. Form and size of *D. Pandarus*.

Above; black, richly glossed with blue in some places; anterior wings with a transverse white band, as in *D. Hewitsoni*, but broader, edged with violet and with a faint violet gloss, the lower spot of this band small and detached; the rufous-orange band as in *D. Hewitsoni*, but broader, more richly coloured, and continued on to the anterior wings so as almost to meet the white band; the row of black spots larger and more regular, but not pupillate; the submarginal row of blue marks wanting.

Beneath; differs from *D. Hewitsoni* by the shorter and whiter transverse band, and the rufous patch with two black pupillate spots at the outer angle of the anterior wings; on the posterior wings there is a whitish patch near the base, and the row of pupillate spots are only edged with rufous, and are placed on a dusky ground, bounded above and below by a wavy white line.

Hab.—Timor (Coll. Wallace, B. M.).

This fine species is intermediate between *D. Pandarus* and *D. Hewitsoni*.

8. Diadema Hewitsoni.

Diadema Pandarus, var., Hewitson, Proc. Zool. Soc. 1858, p. 464, pl. liv. f. 1, 2. (♂. ♀).

The underside of these insects corresponds closely with the upper side, as figured by Mr. Hewitson.

Hab.—Ké Islands (Wallace).

This beautiful species is strikingly distinct. Mr. Hewitson seems to have been led to class it as a variety of *Pandarus* from the analogy of *D. Lasinassa*, which is known to vary enormously; but there are these important differences between the two cases, that many of the most striking modifications of *D. Lasinassa* occur together on the same spot, that they are connected by innumerable intermediate forms, and that almost all these variations occur in the female, while the male hardly varies at all. *D. Pandarus*, on the contrary, is strikingly constant in Amboyna and Ceram, where alone it is found, each of the allied forms seems to be equally constant in its own locality, there are no intermediate connecting links, and the males vary quite as much as the females. I have, therefore, no hesitation in naming this as a very distinct species.

9. Diadema octocula.

Diadema octocula, Butler, Ann. and Mag. Nat. Hist. 1869 (Jan.), pl. ix. f. 1, ♂.

Hab.—Tologa Island (?, perhaps Gilolo). (Coll. Druce).

10. Diadema Tydea.

Diadema Tydea, Felder, Novara Voyage, Lepidop. p. 415, pl. lv. f. 1, 2 (♂), 3, 4 (♀).

Hab.—New Guinea, Waigiou, Batchian (Wallace), Gilolo (Lorquin).

My specimen from New Guinea has the small blue spot on the hind-wings expanded into an oval white patch, almost as in *D. Deois*, and the orange-rufous band broader; the female has the white bands more distinct, and the ocellate spots on the hind-wings smaller. The specimens from Waigiou are intermediate, and as there are other islands between Waigiou and Gilolo, I am inclined to think that a complete gradation of forms will be found.

11. Diadema Deois.

Diadema Deois, Hewitson, Proc. Zool. Soc. 1868, p. 464, pl. liv. f. 3, 4, 5.

Hab.—Aru Islands.

This must be considered as an extreme form of the New Guinea type of *D. Tydea*, from which, however, it differs in the shape of the anterior wing, as well as in markings. The females of this species and of *D. Hewitsoni* have a great resemblance to some of the forms of *Melanitis Melane*, Hewits., which inhabits the same islands.

12. Diadema Diomea.

Diadema Diomea, Hewitson, Proc. Zool. Soc. 1861, p. 51, pl. viii. f. 2 (♂).

Hab.—Menado, Celebes (Wallace).

The female differs only in having the bands broader and whiter, and the submarginal spots on the hind-wings more distinct.

13. Diadema fraterna, n. s.

Male: very near *D. Diomea*, rather smaller; upper-wings less elongate, and the outer margin straighter.

Above; the bands are smaller, and completely covered with a violet blue gloss, costal margin entirely black, band of hind-wings of four spots only.

Beneath; has a large oval white spot above the origin of the first branch of the subcostal vein, which is entirely absent from both sexes of *D. Diomea*.

Hab.—Macassar, Celebes (Wallace).

This insect is certainly very close to *D. Diomea*, but it differs decidedly in the form of the wings, as well as in several characteristic markings. Many species, both of birds and insects, are found exclusively in the North or South of Celebes, but very rarely do they possess representative species. One such case, however, occurs in birds, and with that now noticed, would seem to indicate that the extreme points of this strangely shaped island, have formed two or more distinct islands, at a not very remote epoch.

14. Diadema antilope.

♀. *Papilio antilope*, Cramer, 183, E. F.; *Nymphalis antilope*, Godart, Enc. Méth. ix. 397.

Male: smaller. *Above;* light olive-brown, with a large

apical patch on the anterior wings, a little paler, and a broad submarginal band on the hind-wings nearly white. *Beneath;* as in the female, but paler.

Hab.—Amboyna, Ceram, Bouru. (Wallace).

Prof. Westwood supposed a glossy-blue insect from Java, of exactly the same form as the above, to be the male of Cramer's *Antilope,* and he is followed by Mr. Moore in the Catalogue of the *Lepidoptera* of the East India Company. I have ascertained, however, that these are females, and constitute one or more distinct species, peculiar to the western part of the Archipelago.

15. Diadema anomala.

Diadema Perimele, ♂, Felder, Wien. Ent. Monats. iv. 102 (*nec* Cram.).

♀. *Diadema antilope,* ♂, Westw. Gen. Diurn. Lep. p. 281 (note); Moore, Cat. Lep. Mus. E. I. Comp. p. 160.

Male. Form of *D. Antilope,* rather smaller.

Above; bronzy or olive-brown, with a blue gloss on the costal and outer margins of the anterior wings, and the outer part of the hind-wings paler. A row of white round spots parallel to the outer margin as in *D. Antilope,* but larger and more distinct; a band of three white or bluish-white marks, sometimes very indistinct, across the anterior wings beyond the middle; marginal and submarginal spots as in *D. Antilope. Beneath;* olive-brown, spots and markings as above, with one additional white spot on the costal margin.

Female. Above; rich purple-brown, the whole surface of the upper-wings, except the basal third, richly glossed with satiny blue, a transverse band of three blueish elongate spots beyond the cell, and a fourth much smaller; the two white spots of the intra-marginal band nearest the costa large and confluent, while those nearest the anal angle are small and indistinct. *Beneath;* as in the male.

Hab.—Malacca (♂); Java (♀) (Wallace).

Local form.

Male. Like *D. anomala,* but the two apical white spots are larger, and there is a broad submarginal whitish band on the hind wings, not reaching the outer angle.

Female. Rather larger than *D. anomala*, the transverse band of blue spots wanting, the intra-marginal spots smaller near the apex, and more incurved towards the end of the cell; on the hind-wings a broad brownish band behind, and the marginal and submarginal spots much more distinct. *Beneath;* there is in both sexes a whitish submarginal band on the hind-wings, of which there is hardly any trace in *D. anomala*.

Hab.—Macassar ♂, Menado ♀ (Celebes).

Two females in the British Museum, said to be from Java, differ from mine in having the apex of the wings rather more angular, and in the upperside being nearly uniformly glossed, as in my Bornean form. A male, without locality, agrees closely with my Malacca specimen, but has the white spots and lines more developed on the disc and apex of the upper-wings. A male from Borneo in the British Museum approaches the colouring of the female, being darker than my Malacca male, and having a brighter blue gloss on the outer margin, and apical third of the anterior wings. Two other males, marked "India," closely resemble my Bornean male, but have the apical white spots much less distinctly marked. One of these has much more blue gloss on the outer margin of the anterior wings than the other. We thus find, that there is a great amount of variation in this species, but have not sufficient materials to determine whether there are any fixed local forms.

Felder has described this insect as *Papilio Perimele*, Cramer, and I was for some time disposed to agree with him, but a more careful comparison of the figure with my specimens has convinced me that Cramer's figure represents a female form of his *Papilio Lasinassa*, and that the present insect must have another name bestowed upon it. Cramer's figure differs from *D. anomala* in the following particulars:—1. The wings are shorter and broader, and the upper-wings less falcate. 2. The blue gloss on the anterior wings is not represented in the figure, and the blue spots there shown are not found in *D. anomala*. 3. The submarginal spots on the anterior wings are entirely absent from the figure. 4. The spots on the hind-wings do not decrease towards the anal angle, but are of equal size in the figure. 5. On the under-surface *D. anomala* has two white spots below the costal vein, the figure has only one. 6. There are two spots, one

above the other, at the anal angle in Cramer's figure, but only one in all the specimens of *D. anomala*. Now in all these points in which the figure differs from *D. anomala*, it agrees pretty closely with some of the female forms of *D. Lasinassa*, to which I have little doubt it belongs.

Diadema anomala offers the most remarkable case known among butterflies of a reversal of the usual sexual colouring, the males being always dull brown, the females glossed with rich blue. The reason for this exception to the ordinary rule is, I believe, to be found in the fact that the brilliant blue gloss causes the female to resemble or mimic the *Euplœa Midamus*, one of the very commonest butterflies of the East, and one that belongs to the pre-eminently protected group of the *Danaidæ*. The two insects frequent the same places, and the resemblance on the wing was such as to deceive myself, and it is perhaps owing to this cause that I captured so few specimens of this interesting butterfly. That protection which female insects usually obtain by being less brilliant and conspicuous than the males, is here given by exactly opposite means; a remarkable proof, as it appears to me, that female butterflies would be more generally brilliant than they are, were not their variations in this direction checked, and eliminated by the danger they incur through it. It may be observed, that in the allied species *Diadema Antilope*, the female resembles *Euplœa Climena* (a common species in the countries it inhabits) much more than the male does. It also closely resembles *Elymnias Vitellia*, a species which has long figured in our lists as a *Diadema;* and there is reason to believe that the *Eurytelidæ*, to which *Elymnias* belongs, are themselves a protected group, though perhaps not so perfectly so as the *Danaidæ*.

I exhibited this species at the British Association in 1866, as a remarkable illustration of "mimicry," and afterwards at a meeting of this Society; and I should have described the species before, had I not for a long time considered with Felder, that it was a form of *Perimele*.

16. Diadema albula, n. s.

Form of *D. anomala*, rather smaller.

Male. Above; rusty brown, the markings as in *D.*

anomala, but whiter and more diffused, the spots at the apex confluent, and forming a white spot; a broad white band covering the outer part of the hind-wings. *Beneath;* nearly as above; four whitish linear spots forming a transverse band across the upper-wings, the white band on the hind-wings broader than above, the costal spot larger than in *D. anomala*.

Female. Darker than the male, and of a richer purplish rusty brown. *Above;* spots and bands as in the male, but the transverse band of longitudinal spots bluish, and produced almost to the white intra-marginal spots.

Beneath; as in the male, but rather paler.

Hab.—Timor.

This is an extreme form of *D. anomala;* the female is the most richly coloured, and seems to mimic *Euplœa Bandinii*, and an undescribed species allied to *E. Eurypon*, both of which inhabit the same island.