with rosy outer margin; the primaries with silver-centred rosy discocellular spot, and three or four obliquely-placed strioles between the median and discoidal branches; secondaries with two connected silver-centred rosy spots at the end of the cell, and six to seven discal lunules forming an arc round them; expanse of wings, 3 inches 1 line.

Female.—Above typically bright sulphur-yellow, sometimes (and generally in the Australian region) pale sulphur-yellow, almost white; the primaries with a broad dentated, sometimes interrupted, marginal border; a more or less defined waved striolate discal band and discocellular spot, all blackish; secondaries usually with orange-tinted external border, the veins terminating in blackish dots; below golden-yellow, the outer border slightly deeper coloured, a rusty irregular patch (sometimes obsolete) terminating the cells of both wings and enclosing two connected silver-centred ocelloid spots; primaries with a rust-reddish discal interrupted angulated band; secondaries with three black-centred orange lunules on the median and interno-median interspaces; expanse of wings, 3 inches 2 lines.

Although this species ranges from Silhet to Queensland, but little is known of its habits. Captain Lang states that it frequents *Cathartocarpus fistula.*

Doubtful Species.

Subfamily Danainæ.

Hamadryas, *Boisduval.*

15. *Hamadryas zoilus.*

Papilio zoilus, Fabricius, Syst. Ent., p. 480, n. 163 (1775).

"Alis integerrimis, atris; anticis maculis tribus, porticis disco, albis; habitat in Novâ Hollandiâ."—*Fabricius.*

The wings are black, becoming brown towards the base; the primaries have three sordid whitish spots, and the secondaries have the whole central area of the wings white.

We have never seen an example of this species from New Zealand, but in Dieffenbach it is noted as belonging to the Lepidopterous fauna: as the species seems to frequent gloomy brushwood, it may have been overlooked by recent explorers.

Art. XXXVI.—*Notes on the Metamorphosis and Development of one of our large Butterflies* (Danais berenice), *or a closely-allied Species.*

By W. Colenso, F.L.S.

[*Read before the Hawke Bay Philosophical Institute, 13th August*, 1877.]

On the 25th January, 1875, Mr. Huntley, of Meeanee (a member of this society), sent me some insect larvæ, apparently of a butterfly, in a box. In

the letter which accompanied them, Mr. Huntley says:—"I send you some caterpillars gathered from 'cotton plants' in a neighbouring garden, grown from seed sown about two years ago. My attention was first drawn to them yesterday by a lady in the garden, she having gathered at least forty of them on her cherished row of 'cotton plants.' The most extraordinary thing seems to be that, although they made a large quantity of vegetable *débris* (more than a silk-worm), the leaves of the 'cotton plants' show no signs of having been eaten; and, further, there is nothing in the neighbourhood of the said plants upon which the caterpillars could possibly feed. These I send you I gathered myself from the plants—breaking off the twigs on which the caterpillars were clinging without disturbing them. I send also with them the important parts of the plant from which they were gathered. I shall be glad to know whether the caterpillars will eat what is in the box."

Unfortunately, when I received the box on the following day, the 26th, there was scarcely a vestige of vegetable matter remaining in it, save the woody fibrous parts of the small branches or twigs, and the ends (petioles) of a few hard leaf stalks, with a very small bit of a green capsule having the remains of soft spines, somewhat resembling that of a young one of *Datura stramonium;* and also a large amount of "vegetable *débris*" (fæces). Of the four larvæ, however, three were alive and very active, apparently ravenously hungry. I immediately procured them leaves of various plants, both indigenous and exotic—*viz.*, sow thistle *(Sonchus oleraceus)*, ngaio *(Myoporum lætum)*, Cape gooseberry *(Physalis)*, *Arthropodium cirrhatum*, *Dodonæa viscosa*, *Entelea arborescens*, *Coprosma lucida*, *Veronica* (species), *Acacia* (species), *Geranium*, roses, laurustinus, laburnum, flowering currant, *Cordyline*, and of clovers and grasses; but nothing I offered suited them—they would not eat.

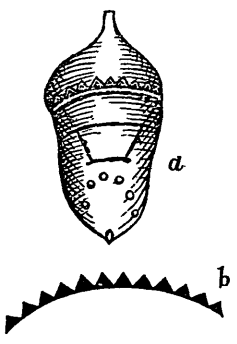
These larvæ appeared to be of gregarious habit; two of them were much larger than their companion, the third, being about two inches long, and of pretty uniform thickness throughout, each having six fore-legs (veræ) and eight hind ones; the body smooth, transversely and alternately striped or banded with bright yellow lilac and white, each having in all eleven yellow stripes, while on each side of the yellow stripe was (1) white, (2) narrow lilac line, (3) white, (4) broad lilac band nearly a line in width, (5) white, (6) narrow lilac line, (7) white, (8) yellow; so that between each of the eleven yellow transverse bands, were seven other bands and lines of lilac and white, which were clearly distinguishable when the animal stretched itself out in crawling; the feet and belly of the larvæ were of a dark-blue almost a blue-blackish colour; the head was regularly striped across with lilac and white; it had two antennæ or horns near its anterior end, which were also bluish-black and nine lines long, cylindrical, soft and flexible; it

had also two spinous processes near its tail, which were three lines long and soft. The larvæ were all very active, and kept incessantly moving their long flexible antennæ, or feelers, in all directions; in this respect more resembling those of a wasp or hornet, or some irascible perfect insect.

On the 27th January, the biggest larva (No. 1) commenced spinning a kind of fine web, by which it suspended itself by the tail only, and with no silky band around its body, in a box with a glass top, in which I kept them. The second large one (No. 2) did the same on the following day, January 28th, while the small one (No. 3), which I saw was not fully matured (and was apparently passing an uncomfortable kind of life, through its not having any proper food), did not enter into its pupa state until the 31st of January, or early on the 1st of February.

No. 1 emerged from its pupa state on the 15th of February; No. 2 on February 16th; and No. 3 on February 18th, being also imperfectly developed and of smaller size; so that 19–20 days is the time taken for its transformation, from its entering into the pupa state and its emerging a perfect insect.

The pupa was an elegant object, being 10–11 lines long and 6 lines wide (at its widest part), smooth, and of a pale pea-green colour, somewhat resembling in outline a small acorn in its cup, the stem of the cup (or calyx) being the produced point and the web by which it was suspended. Around the lower part of the pupa (as hanging) was a row of small circular dots, of a pale gold colour, having a metallic glistening appearance; while around the pupa in its widest part, and standing out a little from it, was a ridged crest or band, porcated towards the edge, which was crenulated; this, above, had also that metallic glistening appearance, while underneath, and seen from below, it was intensely black.



The accompanying wood-cut represents *(a)* the pupa, natural size, and *(b)* the ridged band, seen from below, magnified.

I have not unfrequently seen an ear-ring of greenstone worn by the Maoris of exactly the same hue of green as these pupæ.

But, if I was pleased with the elegant and unique appearance of the chrysalis, I was much more so with what I unexpectedly saw afterwards. I had watched them pretty narrowly, and when I found that No. 1 had quitted its pupa state on the 15th February, I watched No. 2 closely, and on the day after (the 16th) I was rewarded and gratified in seeing the perfect insect break forth into active life! I gazed with astonishment, and was almost spell-bound—rivetted, as it were, for half-an-hour; and never have I seen a more interesting living gorgeous spectacle—one which I can never forget.

It broke through its pupa case at the top part, near the head and back of the imago, the case (in every instance) splitting longitudinally for two-thirds of its length into three segments, and then the insect moved its legs a little and got out of its prison, and held fast. At this time it appeared almost wingless, or with two tiny transversely-folded, squeezed-up plaits (like pigmy epaulettes) on its shoulders. These soon began to move, to descend, growing larger, and progressing downwards in an astonishing manner—soft, damp, limp, and wavy, their colours prismatically glistening like silk velvet, and at first falling in graceful folds, plaits, and rumples, without the least approach to stiffness. As its wings were mysteriously and silently evolved and produced, and grew and descended, they also widened to their natural size, but not at first.

It seemed a truly mysterious sight to see these large wings growing so fast—evolving from nothing! by some occult hidden power. It was not, for instance, like water (a spring) welling forth from a mountain's side over green moss, for there was the hidden quantity or mass—here there was nothing behind, and yet it evolved and grew!

It took forty-five minutes, or very nearly an hour, before its wings attained to their full size, after which they very soon stiffened, and became rigid. Beautiful they still were in their symmetry, colours, and markings; but, *sic transit!* the surpassing glory—that gorgeous pristine excellence which had so spell-bound me, was, as an object, gone for ever—never, however, to be forgotten while memory remains.

I have seen, at various times, many plants and flowers unfolding, opening, bursting forth into bloom and beauty—have watched the evolution of some of our elegant tiny ferns, the rapid growth and change of some fungi, and the wonderful and beautiful birth of the ephemeral day-lily, when it unrolls its gorgeous petals to the morning sun; but all that I have seen of that description pales and fades before this—the birth, the amazingly rapid growth, and the beautiful and mysterious development of this butterfly. Words fail to describe it, in its splendid and wonderful living reality—

"A thing of beauty is a joy for ever."

About four years ago, I heard from one of our members (Mr. Meinertzhagen) that he had captured at Waimarama a butterfly of this species. On his communicating with me concerning it, I identified it as one I had more than once seen in my travels in New Zealand many years before. Shortly after that I saw a pair of them flying here on the hill-side, at Napier; other specimens were also caught much about the same time, one, or more, of which are now in the Museum of the Athenæum in this town. And Mr. Meinertzhagen, and subsequently Mr. Huntley, found from the Maoris that they knew the insect well.

Mr. R. W. Fereday, of Canterbury, has a paper on the Waimarama butterfly, in Vol. VI. of the "Transactions of the N.Z. Institute." In that paper Mr. Fereday mentions two species (or varieties) *D. erippus* and *D. archippus*, specimens of both being in the Canterbury Museum. The former, *D. erippus*, having been sent from Melbourne; the latter, *D. archippus*, from San Francisco. Mr. Fereday doubts our New Zealand butterfly being distinct from *D. erippus*; at the same time he prefers giving it the specific name of *berenice*—which has superseded that of *erippus* in some published catalogues.

Mr. Fereday further says, that Mr. Nairn, of Poureerere, had found some larvæ of this insect on plants of *Gomphocarpus ovata* growing in his garden. It is not at all unlikely that the "cotton plants," whence Mr. Huntley obtained his specimens, were a species of *Gomphocarpus*, from the scrap of a spinous capsule, or follicle, I found remaining in the box; but the leaves were long and lanceolate, as I subsequently found from Mr. Huntley. I know several species of *Gomphocarpus*, but none bearing the specific name of *ovata*.

From a portion of a newspaper lately received from a friend, I find that our butterfly, or a species very nearly allied to it, was represented, in two very fair characteristic cuts, in the "Australian Sketcher," of July 12, 1873, under the name of *Danais archippus*, on the authority of Professor McCoy of Melbourne, where it had been lately captured, who says it is found very commonly in America from Canada to Brazil; but only of late years observed in North Australia, Queensland, and the northern parts of New South Wales, and more recently in Melbourne.

I venture, however, to doubt our insect being identical with the Australian one, as therein represented and described; there seems a slight difference in its markings, and a still greater one in its colour. Those differences, however, may be only sexual ones. Should it hereafter prove, on full examination and comparison of specimens of both sexes, to be distinct from both the Australian and American insects, I trust it will have, and retain, the name of *Danais novæ-zealandiæ*.