

IV. *Observations on the Case of Papilio Merope, Auct.; with an account of the various known forms of that Butterfly.* By ROLAND TRIMEN, F.L.S., F.Z.S., &c., Curator of the South-African Museum.

[Read 17th November, 1873.]

IN connection with the foregoing very interesting paper by Mr. Mansel Weale I think it may prove of use if I give a brief *résumé* of the case of *Papilio Merope*, and at the same time add a few remarks by way of supplement to Mr. Weale's observations.

My first introduction to this butterfly in nature took place in 1858, at Knysna, on the south coast of the Cape Colony. The males were numerous in the woods of that district, and from their size and pale colouring were the most conspicuous of all the forest insects. *Papilio Cenea*, Stoll (now proved by Mr. Weale to be one form of the ♀ *Merope*), was scarce, and I did not meet with a specimen of it until I had been familiar with *Merope* for some months. The first *Cenea* that I found, I very nearly passed by as an ordinary *Danais* (*Amauris*) *Echeria*, Stoll, but something peculiar about the size and markings attracted my attention and led me to capture the insect. I well recollect my astonishment on finding that I had taken a *Papilio*! The points in which this specimen resembled *Merope*—viz. the apical spot of the forewings and the colouring and spotting of the whole body—at once struck me, and were noted in writing on the date of capture; but I was not at that time at all aware of the extent to which sexual disparity is carried in nature, and instead of crediting *Cenea* with her proper position as the lawful wife of *Merope*, I inclined to the belief that she was an illegitimate hybrid between the noble *Merope* and the dusky *Danais Echeria*! When I afterwards met with other examples of *Cenea*, and also with two of the form *Trophonius*, Westwood, I had to abandon my idea of a hybrid, and was fairly puzzled.

It was not until the year 1866, that my brooding suspicions of some mysterious connection between *Merope*

and *Cenea* took a definite shape. Mr. H. W. Bates had sent me his admirable paper on the Heliconidæ of the Amazons Valley,* which so ably discusses and explains Mimetism among Lepidoptera and other insects. My friend Mrs. Barber, in June of that year, sending me specimens of *Cenea* from near Grahamstown, requested me to send her a male *Cenea*, in order that she might figure him in her series of drawings of the South-African Butterflies.† I soon discovered that I was not in a position to supply even this modest order; no such creature as a "male *Cenea*" could be found either in the collection of the South-African Museum or in my own. A strict examination of that suspicious character, *P. Merope*, resulting in nothing but males, I felt convinced that it was "a case;" and subsequent close comparison of the two butterflies only strengthened my conviction that they were the sexes of one and the same species. I at once communicated my view of the case to Mrs. Barber, who (as well as her brother, Mr. J. H. Bowker) was somewhat incredulous, though manifestly not unprepared to find it turn out a true one. Mr. Bowker, indeed, had discovered the widely-differing sexes in the not dissimilar case of *Papilio Echerioides*, Trimen,‡ and so could not fail to be in a position to admit the possibility, if not probability, of my view.

During the earlier part of the year 1867, I made a collecting excursion in Natal, and indulged the hope that I might then have the opportunity of taking the sexes together, but in this I was disappointed, though I once saw *Merope* in pursuit of *Cenea*.§

On proceeding to England, later in the same year, I pursued my examination of the sex of all the accessible specimens of *Merope*, *Cenea*, *Trophonius*, *Dionysos*, Doubl., and *Hippocoon*, Fab., and found nothing but males of the first, and females of the rest. In a paper read before the Entomological Society on 2nd December, I mentioned my belief that *Cenea* was the ♀ *Merope*,|| and intimated my intention of treating fully of this and

* Trans. Linn. Soc. vol. xxiii.

† In the same letter Mrs. Barber stated that she had noticed *Cenea* laying her eggs on the underside of the leaves of *Vepris lanceolata*; keeping about the uppermost branches of the tree, so that it would not be easy to secure the larvæ.

‡ See Trans. Ent. Soc., 1868, p. 76.

§ See Entom. Monthly Mag. March, 1868, p. 220.

|| Trans. Ent. Soc., 1868, p. 76, note.

some similar cases in another paper. I carried out this intention in a paper read before the Linnean Society on 5th March, 1868,* which described all the cases of mimicry among African butterflies with which I was then acquainted. With *P. Merope*, I associated all the female forms just mentioned, pointing out how two of them (*Cenea* and *Hippocoon*) accurately imitated *Danaüs Echeria* and *D. Niavius* respectively, and a third, *Trophonius*, fairly copied *D. Chrysippus*. The still prevalent instability of the ♀ *Merope* was indicated by a reference to the various specimens more or less intermediate between the more pronounced forms, which are sometimes met with. Referring to the closely-allied *P. Meriones*, of Madagascar, I noted that the ♀ of that species only differed from the ♂ in the possession of a broad black bar on the costa of the forewings; which marking I suggested as the material upon which—in the case of active persecution and destruction of all the paler females of the allied species on the African continent—"natural selection might gradually work, to the ultimate production of a Danaidiform butterfly like *Hippocoon* or even *Cenea*.

My view of the case naturally met with more acceptance among entomologists who had observed insects in tropical or sub-tropical regions than among those whose experience was limited to Europe, and it received the weighty support of Mr. Bates in his Address to the Society at the Anniversary Meeting on the 25th January, 1869.† Mr. A. G. Butler,‡ and Mr. W. F. Kirby,§ subsequently published their belief in the case by giving *Cenea*, &c., as the females of *Merope*, and of the Western form (*Brutus*, Fab.) respectively.

Among the lepidopterists with whom I have the pleasure to be acquainted, I think the most uncompromising opponent of my view of this matter was my friend Mr. Hewitson;—though I must say that our distinguished President, Professor Westwood, was almost as resolute in his unbelief. I am not aware that the latter published anything on the subject; but Mr. Hewitson, in the letter-press accompanying his excellent figures of *Hippocoon*, and the closely allied forms from Western Africa (*Exot. Butt.*,

* Trans. Linn. Soc. vol. xxvi.

† Proc. Ent. Soc., 1868, pp. lxviii., lxix.

‡ Trans. Ent. Soc., 1869, pp. 275, 276; and Cat. Fabr. D. Lep. in B. M., 1869, p. 252.

§ Synon. Catal. Di. Lep., 1871, p. 563.

pt. 72, Oct. 1869), remarked on the case as follows, viz. "I have figured the species of the plate in confirmation of an opinion expressed by Mr. Trimen, which I have myself long held, that *P. Hippocoön* and *P. Dionysos* are one species, now confirmed beyond a doubt by the very interesting intermediate varieties. . . . I cannot, at present, associate with them either *P. Cenea* of Stoll, or *P. Trophonius* of Westwood, although the latter very much resembles them. . . . That the butterflies now figured are all females there cannot, I think, be a doubt;* but that they are the females of *P. Merope*, as suggested by Mr. Trimen, I do not for one moment believe. *P. Merope*, of Madagascar, has a female the exact image of itself; and it would require a stretch of the imagination, of which I am incapable, to believe that the *P. Merope* of the mainland, having no specific difference, indulges in a whole harem of females, differing as widely from it as any other species in the genus. The fact that *P. Merope*, when received from the Continent, is always of the ♂ sex, and the *Cenea* groups all females, is very slender evidence. We receive constantly a large number of butterflies of which we know but one sex. Nearly all the many species of *Catagramma* are without their females. That the male *Merope* has been seen chasing the female *Cenea* is evidence still more slight, when butterflies of widely differing families, as recorded by Mr. Algernon Chapman in the *Entomological Magazine* for this month, may be discovered in copulation. It is true that we have of late been introduced to some strange anomalies in the sexes, but to none which bear comparison to this. In the orange-banded *Epicalias*, there is no resemblance certainly between the male and female, either in colour or in the arrangement of the spots; but there is no total disagreement in form. In the two species of *Papilio* which have lately been united, *Torquatus* and *Caudius*, and *Argentus* and *Torquatinus*, though much unlike each other, there is quite sufficient resemblance not to shock one's notions of propriety.

"Mr. Trimen, in the paper in the Transactions of the Linnean Society in which he discusses this subject, and details the biography of *P. Merope*, from its first creation in Madagascar to its subsequent wonderful polymorphosis on

* "Mr. Trimen, if I understand him right, gives this (may I call it a dream) as a supposition only. Mr. Bates, in his address as president of the Entomological Society, speaks of it as an established fact." Hewitson, loc. cit., note.

the Continent, says that 'entomologists, no less than naturalists generally, appeared content with a child-like wonder at this and kindred facts, and let them pass as things inscrutable,' until Mr. Darwin gave us a 'rational explanation of these phenomena.' I must say, and I hope that I may do so without giving offence to any one, that I prefer the childlike attitude of former naturalists to the childish guesses of those of the Darwinian school."

It is with reluctance that one contemplates the stretching of Mr. Hewitson's imagination to an extent "of which he is incapable," or the inevitable shock which his "notions of propriety" will receive, but the evidence now adduced by Mr. Weale is such that the profoundest sceptic cannot explain it away, and must allow that the dream had proved to be a true vision. As far as the southern race is concerned, it has now been proved indisputably, that the so-called distinct species, *Papilio Cenea*, Stoll, *P. Trophoni*, Westwood, and *P. Hippocoon*, Fabricius (austral form), are the differing females of *Papilio Merope*, Cramer.

I need not trouble the Society with any account of my various endeavours, since 1868, to get the *Merope-Cenea* case established beyond refutation. It is sufficient to say that I kept the subject prominently before those of my correspondents in South Africa who had opportunities of observing the two butterflies in nature. Mr. Mansel Weale, as mentioned in his paper, has latterly been very favourably situated for the purpose, and merits the thanks of entomologists for the thorough manner in which he has availed himself of his advantages. From time to time he has sent me most tantalizing notes of the very suspicious proceedings of *Merope* and *Cenea* in that delightful wooded glen which is so conveniently situated "at the bottom of his garden," and I gradually became convinced that his clearing-up of the case would be only a question of time. On the 3rd March last, he announced in a letter that he had "six larvæ of *Cenea-Merope*, all in good health,—one just out of egg," and supplemented the welcome news on the 20th, by the intimation that he had by that time no less than twenty-two larvæ. A letter dated the 14th April informed me that two specimens of *Merope*, and a peculiarly-marked *Hippocoon*, had resulted from the three larvæ that first puparised, while a brief postscript on the 15th completed the intelligence by declaring the emergence of a *Cenea* from a fourth pupa. Accompanying this letter were two

pupæ of the butterfly, kindly sent to me by Mr. Weale; and from one of these, on the 6th May, I had the great pleasure of rearing *Merope*. The other pupa up to this time (2nd June) has not produced the imago, and its discoloured surface makes me apprehend that it is dead.

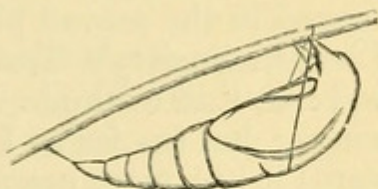
The protective resemblance of exposed lepidopterous pupæ to their surroundings is very general; but it is specially interesting to find that a butterfly protected by mimicry to such an extraordinary extent in its imago condition as *P. Merope*, should be almost as strikingly favoured in the pupa state. Mr. Weale's description and figures show how closely the chrysalis copies the leaflets of *Vepris lanceolata* among which it is suspended, the veriest minutiae of colouring and outline being strictly imitated. Though I have not had the pleasure of seeing it attached to the living plant, I can bear witness to the striking imitation which the chrysalis presents of a lanceolate leaf. Even on the bare twig of a mimosa to which I had attached it, the leaf-like appearance was so great as to deceive several persons to whom I exhibited the finer of the two pupæ sent to me by Mr. Weale. It is most remarkable that the ventral and dorsal aspect of the chrysalis should be of quite different shades of green, corresponding respectively with the colouring of the upper and under surfaces of the leaves. The modifications of shape and outline which combine with the colouring to complete this deceptive resemblance are unusually great, when the pupa is compared with those of other species of *Papilio*. Not only is the whole pupa much flattened, and the convexity of the ventral and pectoral region balanced by an unusual concavity of the dorsal region (with almost a suppression of the dorso-thoracic prominence), but the development and expansion of the lateral longitudinal ridges is very pronounced. The cephalic projections, however, exhibit the most unique form. If these had retained the customary conspicuous divergence into two prominent processes, as in *P. Demoleus*, *P. Nireus*, &c., it is obvious that the general resemblance to a leaf would have been greatly lessened, and the object of concealment to some extent frustrated. These projections are, however, brought closely together, so that their inner edges touch throughout their length to the very extremity,* and their outer edges converge

* Here and there at the meeting-line the contact is not exact, leaving minute crevices between the two projections of the head.

to a common point; and in this manner the tip of the leaf is accurately represented. I do not think that any case of the same modification of a *Papilio* pupa is on record, as regards the cephalic processes; but it appears that, in one section of the genus, those processes are reduced to a mere blunt elevation, while the *dorso-thoracic* prominence is produced to some distance above and beyond the head into an elongated point,—obviously to give the dorsal aspect of the pupa the appearance of a leaf. The chrysalides that I refer to are those of *Papilio Brasidas*, Felder (the southern form of *P. Leonidas*, Fab.), which has been figured by Mr. H. C. Harford from specimens found in Natal, and of the Indian *P. Sarpedon*, Linn., and *P. Eurypylus*, Linn., figured in the Catalogue of Lepidoptera in the Hon. E. I. C. Museum (1857; pl. iii., f. 8 a, and pl. xii., f. 10 a). The pupæ of the three species last referred to are, however,—to judge from the figures—so robust in proportions that their likeness to leaves must (except on the dorsal view) be much less complete than that afforded by the pupa of *Merope*.

Under the heading “change from larva to pupa,” it will be observed that Mr. Weale notes the remarkable circumstance that the cephalic processes are at the outset widely separated in the developing pupa of *Merope*, and the further most singular fact that they, in conjunction with the concaved haustellum or antennæ, are used by the insect to rid itself of the larval skin. These observations were so new to me, that I thought it well to address Mr. Weale on the subject, and his reply is as follows, viz.:—

“With respect to the transformations, you may have noticed I first of all put ‘haustellum’ for ‘antennæ,’ and I am rather disposed to think the first right; and will endeavour to preserve one next year in the process. I never remember noticing anything of the sort in any other butterfly. The following will give you a rough idea of the appearance. Whether it be the haustellum or antennæ, it or they are quite detached along the middle from the body, and afterwards become attached. The line of joining is coincident with the keel-like ridge, and at the time is soft and very viscid, and the junction is completely hidden by the up-arching of the body during the last part of the transformation.”



This temporary functional activity of the cephalic processes for a special object, aided by the freedom for the time of the incipient haustellum (or antennæ?) case, is quite unprecedented in my experience, nor can I recall any record of similar action attending the assumption of the pupal form among the Lepidoptera. And it is certainly a most curious and interesting fact that the very organs actively employed in ensuring the due accomplishment of the chrysalis state are specially those which, when the change is complete, assume a position and appearance essential to the protection of the insect,—the haustellum representing the midrib of the leaf (on the upper side) and the processes the apex.

With reference to the various forms of *Merope* reared by Mr. Weale from the larvæ of the past season taken on his farm, I very much regret to state that my intention of forwarding the whole series to the Society, in illustration of that gentleman's memoir, cannot be carried into effect. Mr. Weale kindly despatched the specimens in a stout corked box, but they sustained such grievous injuries on their 700 miles journey by post, that they arrived in a state which quite precludes their being used for purposes of illustration, as far as the females are concerned,—the males being mostly but little damaged. By dint of some care and trouble, however, I have been able to patch up the females to a sufficient extent for their proper determination, and can testify to their due definition in the list which Mr. Weale has given. The "peculiar *Hippocoön* form" (No. 3), is one of several variations with which I am acquainted, linking that form of the ♀ to the form *Cenea*. In the forewings both the sub-apical white bar and the inner-marginal white patch are considerably smaller and narrower than in the ordinary southern *Hippocoön*, the latter marking being interiorly clouded with blackish. It most nearly resembles the variation figured in the second plate accompanying my paper in the Linnean Society's Transactions (vol. xxvi., tab. 43, f. 2), and like that example wants the apical spot of the forewings; but (as far as I can make out in its very damaged state) it has more resemblance to *Hippocoön* in the wider white space of the hindwings. The *Trophonius* (No. 7) differs both from that figured by Westwood (*Arc. Ent.*, i., pl. 39, ff. 1, 2), and from the example figured to illustrate my paper just referred to (*loc. cit.*, tab. 43, f. 5), in the longer and more obliquely-placed sub-apical bar of the

forewings, and in the total want of the apical spot in those wings.

The seven males present the customary amount of variation in the transverse black markings of the upperside of the hindwings,—from three sub-quadrated discal blotches to a continuous irregular bar,—and in these particular markings no two of them nearly agree. It is the same with the amount of black marking on the tails of the hindwings, which varies from a simple median streak, with an accompanying short suffused stripe bounding the basal half of the tail interiorly, to a black space absorbing almost the whole basal two-thirds of the tail. Four of the seven specimens possess, more or less faintly, the blackish line defining the 2nd disco-cellular nervule of the forewings.

Mr. Weale justly observes that the ochreous colouring of the underside of the wings well serves to protect these butterflies from observation when at rest among withered foliage, and in this respect the males are, perhaps, from their lighter-tinted under-surface, better protected than the females. Mrs. Barber, at the beginning of the year 1871, was fortunate enough to observe this protective resemblance in nature, and sent me the following note on the subject, viz.:—

“I caught a fine *Merope* with my finger and thumb the other day. It was just beginning to rain, and, though it was not late, *Merope* thought proper to seek a resting-place, which he wisely chose upon a shrub which resembled his own underside colouring. It was a splendid match:—when he closed his wings among the yellow and brown seeds and flowers of the shrub, no bird would ever have distinguished him. I had no net with me, and my first attempt was a failure. However, the butterfly took a turn round the neighbourhood, examined several other shrubs (which he found were not so good, I suppose) and eventually returned to the same perch.”*

In relation to the protective mimetism so abundantly exhibited by this remarkable species of *Papilio*, it is most

* “I believe all butterflies act thus, where it is possible to match their colours. *Pyrameis Cardui* will always take a mottled stone or old wall. I have, however, often seen *Danais Chrysippus* perched at the extremity of a tall rush or grass stem, where there was no colour resembling his own, but in this case *he was passing himself off as a flower*, and, I can assure you, looked very like one!” Mrs. Barber, *in litt.*

interesting to find that one at least of the persecuting agencies which have in all probability led to such profound modifications in the colouring and form of the insect is still at work. The fly-catcher, *Tehitrea cristata* (*T. viridis*, Müll.), has been observed by Mr. Weale to capture *Merope* ♂, and he has reason to suspect a bird of a closely allied family, and quite similar habits, *Dicrurus musicus*, Vieill., to be another of the butterfly's enemies. Representatives of these two genera of insectivorous birds are prevalent throughout the African continent, and the activity and rapacity of those whose habits are known to us are very great. But these are only two, prominent by conspicuous plumage and bold pugnacious habits, among a large number of African birds whose food consists of insects; and it may fairly be inferred that, for ages past, the size and colour of *P. Merope* must have rendered it a favourite prey of the *Muscicapidæ* generally.

In concluding these notes, I wish to make a few observations on the synonymy of the very interesting *Papilio* to which they refer. Mr. A. G. Butler, in his paper already referred to (Tr. Ent. Soc., 1869, pp. 275, 276), has given the fullest and latest arrangement of the several forms, as exemplified by specimens in the collection of the British Museum. He groups them as follows, viz.:—

1. *Papilio Merope*.

(a.) *Cenea*.

♂. [Diagnosis.]

♀. *Cenea*, Stoll, Suppl. Cramer, pl. 29, fig. 1 (1791).

♂, ♀. Zoolu Country.

(aa.) *Cenea*, var.

♂. [Diagnosis.]

♀. *Cenea*, var., maculis anticarum albis. Trimen in Trans. Linn. Soc., xxvi. tab. 43, f. 4 (1869).

♂, ♀. Port Natal.

(b.) *Merope* (true).

♂. *Merope*, Cramer, Pap. Exot., ii. pl. 151, figs. A, B (1779).

♀. *Trophonius*, Westwood, Arcana Entom., pl. 39, figs. 1, 2.

♂. Knysna

♂. [No locality recorded.]

2. *Papilio Brutus*.(a.) *Brutus*.♂. *Brutus*, Fabricius, Sp. Ins. p. 13 (1781).♀. *Hippocoon*, Fabricius, Ent. Syst., iii. p. 38 (1793).

♂, ♀. Sierra Leone.

(b.) *Niavius*.

♂. [Diagnosis.]

♀. *Niavius*, Cram., Pap. Exot., iii. pl. 234, fig. A (1782).

♂, ♀. Ashanti.

The ♂s allotted to the several sub-divisions are distinguished in this arrangement, by the differences presented by the *upperside* as regards (in forewings) the size and form of the apical spot, the width of the costal black edging in respect of the discoidal cell, the breadth of the hind-marginal black border, and the "undate" or "dentate-sinuate" hind margin; and (in hindwings) the prevalence of a more or less complete, black, discal fascia, and of black marking on the tails: and, by the *underside*, as regards darker or lighter colouring. The ♂s of (a.) *Brutus* and (b.) *Niavius* are further defined from the southern ♂s by their longer wings and much paler under surface of hindwings; while the latter is distinguished from the former by its greater size and much broader border of forewings.

The possession of fuller means of judging than I possessed, when writing of these butterflies in 1868, enables me to state that I quite concur with Mr. Butler in holding that the prevalent form of *Merope* on the coast of Western Tropical Africa is sufficiently distinct in both sexes from the southern form to take rank as a separate species. In the ♂s, besides the longer wings and paler* underside colouring noticed by Mr. Butler, the western form appears constantly to have longer tails to the hindwings; all the internervular, dark rays on its underside are in both wings, and especially in the basal half of the hindwings, much more fuscous and strongly marked, and the discal bar on the underside of the hindwings is narrower, more broken, and irregular, and more inclining to fuscous than ferruginous-ochreous. In the ♀s, *Hippocoon* differs from the corresponding southern form, not only in its larger size and comparatively longer wings, but in the broader, sub-apical,

* And, I would add, *less rufescent*.

white bar of the forewings, and the much smaller white patch of the hindwings. The type of the form *Trophonius*, figured by Mr. Westwood in *Arcana Entomologica*, is clearly a southern example. The nearest approach to it known from the western coast of Africa is the example figured by Mr. Hewitson (*Exot. Butt.*, iv. pt. 72, Oct. 1869, pl. xii. (*Papilio*), f. 40), which as regards the forewings presents a broader, more oblique, almost wholly brick-red, sub-apical bar, but (unlike the form *Hippocoon* in the same region) has quite as broad a patch in the hindwings as is found in the southern *Trophonius*, and is little, if anything, larger than the latter.* The *Dionysos*-form of ♀ is peculiar to Western Africa, and, in company with the curious allied form figured by Mr. Hewitson (*loc. cit.* f. 39), is of high interest, not only as combining the features of *Hippocoon* and *Trophonius*, but as indicating, in its possession of *merely a trace of black* between the white sub-apical bar and inner-marginal space of the forewings, the mode in which (as suggested by me in the Transactions of the Linnean Society, *loc. cit.*, with reference to the ♀ *Meriones* of Madagascar) the extraordinary modification of the forewing markings of the ♀s was most probably initiated. *Dionysos* is, in fact, of all the continental African ♀s the least profoundly modified form as compared with the ♂. All the western ♀s, like the ♂s (but more so in the outer portion of hindwings), are distinguished from southern examples by the strongly-marked fuscous rays between the nervures.

While, therefore, I follow Mr. Butler in separating as species, in the present lack of intermediate forms, the western and southern races of *Merope*, I wish to observe that I cannot support the nomenclature which he has assigned to the several sections in this arrangement. It will be seen above that under the head of "(b.) *Merope* (true)," Mr. Butler quotes Cramer's earlier figures (tab. 151, A, B) of the ♂, associates with them, as ♀, *Trophonius*, Westwood, and gives the ♂ from Knysna, in South Africa (presented by myself in 1859), as representing Cramer's type. But a reference to Cramer's

* The explanation of this discrepancy seems obvious. The western *Hippocoon* closely mimics the largest of western *Danaides* (*Amauris Niavius*), which has a small white patch in hindwings; while *Trophonius* is modified in imitation of the considerably smaller *Danaïs Chrysippus*, in which nearly the whole field of hindwings is brick-red. In both the western and southern *Trophonius*-form of ♀ the subapical bar of forewings is sometimes almost as red as the other markings. This variation appears to be in imitation of the *Dorippus* variety of *Danaïs Chrysippus*.

figures on the plate quoted will show most clearly that they represent the *western* ♂, the distinctive characters which I have mentioned above being prominently given, especially the strongly marked inter-nervular rays of the underside of the wings, and the colour and narrowness of the discal band on the underside of the hindwings.* A comparison of these figures with Cramer's subsequent ones (pl. 378, ff. D, E), and with specimens of the insect from Western Africa, will convince the lepidopterist that the figures on both plates represent examples of the same western race of the butterfly, although in the later plate the special characters are more decided than in the earlier one. I consequently consider that the *western* race must be held as the typical *Merope*, and that Fabricius's later name of *Brutus* given to the same race must be sunk. The southern race will accordingly have to be distinguished by the oldest name given to any one of its forms; and this happens to be that of Stoll's (date 1791) applied to what is certainly the predominant ♀ form in the south, viz. *Cenea*. The adoption of the name of the ♀ for that of the species, in rectification of erroneous nomenclature, when there is wide disparity between the sexes, is perhaps not altogether desirable, but there is precedent for it in the case of *Diadema Misippus* and some other species, and it is certainly preferable to giving an entirely new name.

As regards Mr. Butler's minute sub-division of the southern race by allotting certain variations of the ♂ to *Cenea* (type), *Cenea*, var., and *Trophonius* respectively, I do not see that it can be borne out by what we know of the distribution of the several forms. The ♂s, not only from the same district, or from the same locality, but even from the same wood, vary indefinitely as to their black markings within certain limits. An instance of this is given by the seven examples above mentioned, reared by Mr. Weale from larvæ of one season found in the same spot. I possess five examples, taken by Mrs. Barber, Mr. F. Barber, jun., and myself, in the same little copse at Highlands, near Grahamstown, which present great variation in the discal upperside band of the hindwings,† and a

* It is singular that the apical spot on upperside of forewings should be divided into two in Cramer's figure A. I have never seen a specimen so marked.

† The most imperfect condition of this band that I am aware of is exhibited by a specimen which I captured at Knysna, Cape Colony, in which the three patches representing the band are reduced to widely-separated, irregular, attenuated spots, smaller (especially that at anal angle) than in the Western race.

noticeable difference in the width of the hind-marginal band of the forewings, as well as in the dentation of its interior edge. A very remarkable specimen, taken by Mrs. Barber at the mouth of the Kleinemonde River, recalls, in the character of the spots which represent the hindwing bands, the ordinary West African ♂, but is also signalized by *a very narrow black border to the forewings*, only slightly denticulated on its inner edge. The other extreme form in the southern ♂ is that described by Mr. Butler under the head of "(aa.) *Cenea*, var.," from Port Natal, in which all the black markings are strongly developed, especially the discal band of the hindwings, which in some examples is quite unbroken. This form is most prevalent in Natal and the adjacent coast country, but also occurs near Grahamstown; it is (except, perhaps, in size) the furthest removed from the ordinary western ♂. I know of no locality in South Africa in which the ♂s are constant to any particular pattern; but, amid all their variation, I have noticed no example that approaches the western ♂ in the strongly-marked inter-nervular rays of the underside, except where (in some of those in which the black markings are most developed) the rays cross the discal band in the hindwings.

Looking to the southern ♀s, it is equally observable that the several well-defined forms are not restricted to particular localities. *Cenea* (typical) and *Trophonius* were taken by me in the same spots at Knysna and Plattenberg Bay respectively, and I have since received the *Hippocoön*-like form from the former locality.* Mr. Weale has bred *Cenea* (variety), *Trophonius*, and a variation closer to *Hippocoön* than to *Cenea*, from larvæ taken in one spot near King William's Town; and Mrs. Barber has sent me the three forms, as well as a variation (very near that delineated on fig. 2 of the second plate accompanying my paper in the Linnean Society's Transactions already referred to), all of which were taken at Highlands, near Grahamstown.

In Kaffraria proper, Commandant Bowker has met with *Cenea* (var.), *Trophonius*, and the *Hippocoön*-like form,

* From a collection brought from Knysna, by Mr. Lee, R.A., I acquired, in 1871, a most singular new variation of this Protean ♀. All the upper-side markings in this specimen are white, and though answering to those of the *Hippocoön*-like form, are so reduced and attenuated as (with the single exception of the very much narrowed and dentated sub-apical bar of the forewings) more to resemble those of the white-spotted variety of *Cenea*.

all the specimens of which are now in the South African Museum; while near D'Urban, Port Natal, I found both *Cenea* var. and the last-named form of ♀.*

These details of distribution seem to me satisfactorily to show that, as far as South Africa is concerned, we have not "representative species or races of *P. Merope* (as Mr. Butler suggests in his *Catalogue of Fabrician Diurnal Lepidoptera*, 1869, p. 252), but one widely-ranging polymorphic species, most unstable in character, yet varying within determinate limits, as regards the females, in the direction of accurate mimicry of the prevalent species of *Danaïs* (*Amauris*).

I have only to add that the following appears to be the accurate synonymy of *Papilio Cenea*, viz. :—

Papilio Cenea.

- ♂. *Papilio Brutus*, Godt. (*pars*), *Encyc. Méth.*, ix. p. 69, n. 122 (1819).
- " " *Donov.*, *Nat. Repos.*, iii. pl. 77 (1825).†
- " " *Boisd.* (*pars*), *Faune Entom. de Madag.*, &c., p. 12 (1833).
- " " *Boisd.*, *Var. A. Spec. Gen. Lep.*, p. 221, n. 39 (1836).‡
- " " *Chenu*, *Encyc. d'Hist. Nat.—Pap.*, pl. 2, f. 1 (? 1852).§
- Papilio Merope*, *Doubl. & Westw.* (*pars*), *Gen. Diurn. Lep.*, i. p. 13, n. 92 (1846).
- " " *G. R. Gray* (*pars*), *Cat. Lep. Brit. Mus.—Pap.*, p. 25 (1852).
- " " *Trimen* (*pars*), *Rhop. Afr. Aust.*, i. p. 11 (1862).
- " " *Trimen*, in *Trans. Linn. Soc.*, xxvi., tab. 43, f. 1 (1869).

* *Trophonius* has not as yet, I believe, been recorded from Natal; but a variation intermediate between that form and the representative of *Hippocoon* was (as I have elsewhere mentioned) taken by the late Colonel Tower, near St. Lucia Bay, on the coast north-east of Natal.

† Donovan delineates the southern extreme form in which the band across the hindwings on the upperside is unbroken. This band is, however, more even and regular on both upper and under surfaces than in any specimen which I have seen. The underside ochreous colouring is given as strongly rufescent. From the letter-press accompanying the plate, Donovan seems to have considered that the unbroken band was the distinctive feature of the Madagascar race (*P. Meriones*, Felder); but in this he was probably mistaken, as in all the Madagascar examples which have come under my notice, the band is represented by 3 or 4 small and widely-separated spots.

‡ Boisduval's "Variété A" is the same southern form as that figured by Donovan, and is noted as inhabiting the Outeniqua district, which is situated in the southern part of the Cape Colony.

§ Chenu gives the locality "Cafrérie," and figures rather a small example, which combines the characters of the two singular specimens above described (p. 150 and note), having the border of the forewings much narrowed, and the broken markings representing the band of the hindwings unusually small.

- ♀. (FORM 1). *Papilio Cenea*, *Stoll, Suppl. Cramer Pap. Exot.*, p. 134, pl. xxix., f. 1, 1A. (1791).*
- Danaïs Rechila*, *Godt. Encyc. Méth.*, ix. p. 183, n. 24 (1819).
- ? *Papilio Trophonius*, *Westw. (pars), Arc. Entom.*, i. p. 153 (1845).
- Papilio Cenea*, *Doubleday and Westw. (pars), Gen. Diurn. Lep.*, i., p. 20, n. 255 (1846).
- " " *G. R. Gray (pars), op. cit.*, p. 70, n. 322 (1852).
- " " *Trimen (♂), Rhop. Afr. Aust.*, i. p. 20 (1862).
- Papilio Merope*, *Trimen (1st Form of ♀), in Trans. Linn. Soc., loc. cit.*, f. 3 (1869).
- " " *Butler (♀, Form a), in Trans. Ent. Soc.*, 1869, p. 275.
- " " *Kirby (♀), Synon. Cat. Diurn. Lep.*, p. 563, n. 305 (1871).
- Variety*.—*Papilio Merope*, *Trimen (1st Form of ♀ var.)*, in *Trans. Linn. Soc., loc. cit.*, f. 4, and p. 521.
- Papilio Merope*, *Butler (♀, Form aa), in Trans. Ent. Soc., loc. cit.*, p. 276.
- ♀. (FORM 2). *Papilio Merope*, *Trimen (2nd Form of ♀ Hippocoon, Fab., var.)*, in *Trans. Linn. Soc., loc. cit.*, f. 6 (1869).
- ♀. (FORM 3). *Papilio Trophonius*, *Westw. "Ann. Nat. Hist.*, ix., p. 38 (1842), "† and *Arcan. Entom.*, i. pl. 39, ff. 1, 2 (1845).
- Papilio Cenea*, *Doubl. & Westw. (♀), Gen. Diurn. Lep.*, i. p. 20, n. 255 (1846).
- " " *G. R. Gray (♀), Cat. Lep. Brit. Mus.—Pap.*, p. 70, n. 322 (1852); and *List Lep. Brit. Mus.—Pap.*, p. 82, n. 339 (1856).
- " " *Trimen (♀), Rhop. Afr. Aust.*, i. p. 20, n. 8 (1862).
- Papilio Merope*, *Trimen (4th Form of ♀), in Trans. Linn. Soc., loc. cit.*, f. 5.
- " " *Butler (♀, Form b = "Merope, true"), in Trans. Ent. Soc., loc. cit.*, p. 276.
- " " *Kirby (♀, Var. b), op. cit.*, p. 563, n. 305.

* Stoll figures a large and finely-coloured example from the "Païs des Caffres," in which the largest spot of the forewings is thicker and more inclining to a quadrate form than in any individual which I have seen, and the sub-marginal spots of the hindwings are mostly larger than usual. The specimen nearest to the type, as far as I am aware, is one in the South African Museum, from either Kaffraria Proper or Natal, but several others in my own collection, from Knysna and Plettenberg Bay, more or less closely approach it. The small example figured to illustrate my paper in the Linnean Society's Transactions above quoted (fig. 3), was selected on account of its peculiarly accurate mimicry of *Amauris Echeria*, as well in size and outline of the wings as in the form of the ochreous patch of the hindwings.

† G. R. Gray, *Cat. Pap. Brit. Mus.*, p. 70 (1852).

♀. (Variations intermediate between the several Forms above enumerated):—*

A. Between Forms 1 (*Cenea*) and 2 (analogue of *Hippocoon*, Fab.)

- a. *P. Merope*, Butler (♀, *P. Cenea*, var.), in *Trans. Ent. Soc.*, *loc. cit.*, p. 275.

[This individual is very close to the typical *Cenea*, but in the shape and position of the very restricted patch in the hindwings resembles the individual (b) immediately following hereunder. *Hab.* Grahamstown, Cape Colony.]

- b. *P. Merope*, Trimen (♀, variation), in *Trans. Linn. Soc.*, *loc. cit.*, f. 2.

[All the markings in this individual are dull white. The forewings have the sub-apical bar of the *Hippocoon*-like form, and an inner-marginal patch strictly intermediate in size and shape between those of the latter form and of the *Cenea* form respectively. The patch of the hindwings is much narrowed by a fuscous basal suffusion. *Hab.* Tsomo River, Kaffraria.]

B. Between Forms 2 (analogue of *Hippocoon*, Fab.) and 3 (*Trophonius*, Westw.)

- c. *P. Merope*, Trimen (♀, variation), in *Trans. Linn. Soc.*, *loc. cit.*, p. 510, *note.*

[This specimen has the ordinary markings of the forms which it links, excepting that the patch of the hindwings, though not obscured at the base, is decidedly narrower. All the markings are tinged with faint, dull, ochreous-yellow. *Hab.* St. Lucia Bay, South Eastern Africa.]

Additional variations to those above recorded are (1), the white-marked specimen from Knysna, described in this paper (*vide supra*, p. 150, *note*), which might stand between a. and b.; and (2), the striking variation of *Trophonius*, which has the sub-apical bar of the forewings considerably broader than usual, and *yellowish brick-red* instead of white. The field of red common to both wings differs from that ordinarily presented in being darker (inclining to ferruginous) and smaller, in the forewings not reaching to the median nervure, and clouded with fuscous between that nervure and the sub-median nervure. A very fine example of the latter was taken in the Division of Bathurst, Cape Colony, by Miss Mary Barber, in March, 1870.

* *P. Cephonius*, Hpffr. (*Stett. Ent. Zeit.*, 1866, pp. 131-2," according to "*Zoolog. Record*, 1866, p. 451), is unknown to me, but may be one of these linking variations. Mr. Kirby gives it under *P. Merope* as "Var. a," in his Catalogue of Diurnal Lepidoptera (1871). Mr. Weale's "peculiar *Hippocoon* form" (see above, p. 144) should be included under "A," and immediately follow "b," in the list of variations here given.



1874. "IV. Observations on the Case of Papilio Merope, Auct.; with an account of the various known forms of that Butterfly." *Transactions of the Entomological Society of London* 22, 137–153.

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