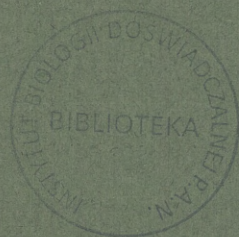


INTRODUCTORY ADDRESS
FAREWELL ADDRESS
SPEECH AT BANQUET

BY

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PRESIDENT'S INTRODUCTORY ADDRESS.

WITH PLATES I AND II.

It is my pleasure and privilege to bid a hearty welcome to all who are now visiting Oxford for the second International Entomological Congress. Two years ago we met in Brussels for the first, and in every way successful opening meeting of the long series of International Congresses to which we all look forward with confidence. Then the language of our hosts was the beautiful and classic language of France, and at that meeting Frenchmen stood in a special relation to our Belgian hosts. Speaking the same language, they were in a sense, though present as guests, acting as hosts. On this occasion, meeting in Oxford, you are welcomed not only by the entomologists of the British Isles, but also of the British Colonies and of India, and I venture to invite the American members, who speak our language, to act with us as hosts, and to endeavour to make the visit of our continental visitors and colleagues as bright and successful as possible. I know well, from many a happy experience, how gracefully and graciously our American friends play the part of hosts in their own country, and in inviting them to act with us on this occasion

I am sure that I carry with me the feelings and wishes of every British member of the Congress.

I imagine that in the choice of Oxford for the second meeting of the Congress a determining factor was the existence of the Hope Department—the great collection of insects given to the University more than sixty years ago by one of her own sons, and immensely increased by the great name and fame of my distinguished predecessor, Professor J. O. WESTWOOD.

The choice of Oxford gives me the opportunity of expressing gratitude to all those who made the Hope Department—above all to the founders, the Rev. F. W. HOPE and his widow ELLEN HOPE, and to the first Hope Professor, JOHN OBADIAH WESTWOOD. It enables me to acknowledge for him the obligation he had no such great opportunity as this of expressing.

I have brought with me the Visitors' Book of the Hope Department, and in it we see that members of the University first came, on June 12th, 1850, to look at the fine collections, which had just arrived in Oxford. The long list of names shows the immediate interest and attention which were excited in Oxford by the gift of the Rev. F. W. HOPE. The book has received many hundreds of signatures since that date, and preserves a record of the distinguished entomologists who have visited the Hope Collection during sixty-two years; but it is not quite full even now, and I propose to devote the few unoccupied pages to the preservation of the signatures of the members of this Congress. The visitors' book will be placed on a table in the adjoining writing-room, and I hope that every member of the Congress will do me the favour of inscribing his or her name, and thus complete the volume that was begun in 1850.

The Hope Collection was not at first a very large one. In the year 1857 Professor WESTWOOD drew up a detailed inventory in which the contents of 903 cabinet drawers are briefly described: but Mr. Hope was an ideal benefactor, who, for the remainder of his life, never ceased to augment his original gift, buying and adding to it everything of interest to entomological science which he had the chance of acquiring. For about ten years the Hope Collection remained in the Taylorian Building, where it was first accommodated, but it was moved, on the completion of the new University Museum, to a part of the space which it now

occupies. The Hope Professorship of Zoology was established in 1861, and I believe there is little doubt that Mr. HOPE founded it in connection with the migration to the University Museum, a migration contemplated in the original deed drawn up in 1849.

I look back over many years of kindness and most pleasant friendship with my master in Entomology, Professor WESTWOOD—going back to the year 1873, before I became an undergraduate. At that time, as a boy of seventeen, working in the Museum for a scholarship, I often stole an hour from my regular studies in order to visit the Professor and to learn something of the great entomological collection and library. Professor WESTWOOD treated the young beginner with great kindness and sympathy, and I was permitted to learn much of the intimate thoughts of this eminent leader in the science. Thus, I gathered that of all the long list of classical works which WESTWOOD produced, the one to which he looked back with the deepest interest and affection was his wonderful *Introduction to the Modern Classification of Insects*. I remember his telling me with a touch of pride that the book was known in America as “The Entomologist’s Bible.”

Another interesting feature which makes it appropriate that the Congress should meet in this Museum is the relation which the building bears to the history of Darwinian teaching. Just fifty-two years ago, on June 30th, 1860, between seven hundred and a thousand people gathered in the room which lies a few yards away to the west of the lecture-theatre in which you are sitting, in order to listen to a discussion on evolution, with DARWIN’S old teacher, Professor HENSLOW of Cambridge, in the chair. That room, where we shall peacefully write our letters and indulge in quiet talk in the intervals of the more strenuous work in the sections, was the scene of the celebrated duel between the Bishop of Oxford and Professor HUXLEY. Hardly any episode in the history of Darwinism has been more discussed, and probably no other produced so much excitement; yet, as oftentimes when feelings run high, it is very difficult to know what actually happened. Many versions have been published,¹ but I believe that the most accurate account is that given by my

¹ See *Life and Letters of Charles Darwin*, Lond., 1887, vol. ii., pp. 320–323; *Life and Letters of Thomas Henry Huxley*, Lond., 1900, vol. i., pp. 179–189.

friend Dr. A. G. VERNON HARCOURT. It will be remembered that the Bishop of Oxford at the climax of his speech turned to HUXLEY and asked him if he was descended from a monkey on his grandfather's or his grandmother's side. Some of those who were present have said that HUXLEY was so angry that he was really ineffective, while others maintain that he was perfectly calm, and rebuked the Bishop with dignity and complete success. His reply, as it is remembered by Mr. HARCOURT, is precisely the sort of answer we should have expected from Professor HUXLEY.

“ . . . if I am asked whether I would choose to be descended from the poor animal of low intelligence and stooping gait, who grins and chatters as we pass, or from a man, endowed with great ability and a splendid position, who should use these gifts ” [here, as the point became clear, there was a great outburst of applause, which mostly drowned the end of the sentence] “ to discredit and crush humble seekers after truth, I hesitate what answer to make.”¹

My eminent predecessor was well over fifty when Natural Selection came before the world in 1858, and *The Origin of Species* in 1859, and it is always exceedingly difficult, generally indeed well-nigh impossible, for a man of that age to mould his ideas afresh. The conspicuous exception was Sir CHARLES LYELL, who, having published his opinions against the new views, finally came late in life to accept them. Such examples must always be very rare, and certainly Professor WESTWOOD was no exception. He remained for the whole of his life strongly opposed to evolutionary teachings; in fact, he proposed to the last Commission that the University should permanently establish a lectureship for the unceasing refutation of the errors of Darwinism. I well remember being asked by Professor WESTWOOD what I had been reading, and how serious he looked when I told him *The Origin of Species*. He seemed to think that it was an unsuitable book for one so young, and that the authorities of the University and my College had been guilty of some indiscretion in allowing it to come into my hands. Nevertheless, WESTWOOD's relations with CHARLES DARWIN were of the most pleasant description, and he was always proud of the fact that one of the Royal Medals was conferred on him, on the nomination of the Council of the Royal

¹ *Life and Letters of Thomas Henry Huxley*, 1900, vol. i., p. 185.

Society, as the result of the representations of Charles Darwin, who had carefully studied the *Introduction to the Modern Classification of Insects*. More than one letter in Darwin's correspondence deals with this very episode.

Oxford is also specially appropriate for the first meeting of the Congress in this country, because it is the seat of the most ancient University in the British Empire, and because much that is interesting and historic may be learnt in the intervals of the varied and voluminous programme which has been arranged. The Colleges have hospitably opened their doors to members of the Congress, and those who are staying at Wadham, founded in 1612, may remember that they are residing in a College of special interest in relation to the history of science in this country ; for it was at Wadham that the Royal Society may be said to have begun. A party of friends who met in the rooms of Warden WILKINS—rooms still existing unchanged in the house of the present Warden—afterwards continued their meetings in London, thus creating the " Invisible College," which became the Royal Society. Members of the Congress who have rooms in Merton will be living in the earliest of all Collegiate buildings, and one which, founded in 1264 and established in Oxford ten years later, served as the type followed in both our ancient Universities. Members staying at New College may like to remember that the foundation was established as a kind of " new model " by WILLIAM OF WYKEHAM in 1379.

We have especially to thank the Warden of Wadham for his great generosity in lending his private garden to the members for the whole of the week, so that there, close at hand, we can refresh ourselves in the intervals between the meetings, and can sit and talk in the evenings. We may indeed almost fancy ourselves on the Continent, where beautiful surroundings are more commonly put to such uses than in this country, while some of our friends, though still in Oxford, may now and then imagine that they are at home.

It will be our duty at the conclusion of the Congress to thank the many friends who have helped us to prepare for the meeting, but I must even now, at the very beginning, express our thanks to one or two who have taken a special part in the work of organisation. My friend, Dr. F. A. DIXEY, F.R.S., being Bursar of

Wadham, has settled all the details in the arrangements of which I was just now speaking. The General Secretary, Dr. MALCOLM BURR, who has been himself far from well, is unable to be present in consequence of the very serious illness of his wife. We all extend to him our warmest sympathy, and the hope that Mrs. BURR will rapidly recover, and that he himself will soon be restored to full health and strength. In the meantime Mr. H. ELTRINGHAM, although he has only just brought out a long and exhaustive monograph on the *Acræinæ*, occupying the whole of Part I of the *Transactions of the Entomological Society of London* for this year, has thrown himself into the breach, and, with the assistance of Mr. G. H. GROSVENOR, has enabled us to overcome all the difficulties which threatened to overwhelm our preparations for the meeting.

I must also refer to the friendly and cordial relationship between the University Museum and the two great Museums established near Oxford, the British Museum of Natural History and the great Zoological Museum at Tring. From these two Museums the Hope Department has always received the kindest help, and I am glad to think that we in turn have been able to render them some assistance. We shall have the opportunity on Saturday of visiting the Tring Museum, and I am sure that we all look forward with very great pleasure to that day as a most agreeable and appropriate close to the Congress of 1912.

I propose to devote the remainder of this address to the exhibition and description of the series of the African Swallow-tail butterfly, *Papilio dardanus*, and the related island forms in the University collection. By this single great example I hope to make clear one chief aim of the Hope Department—the study of specific change in relation to geographical distribution and to the organic environment. Members of the Congress who desire to study in detail the work which has been done will have ample opportunity of seeing two great collections—the *Pierinæ* worked out and arranged by Dr. F. A. Dixey, the *Acræinæ* by Mr. H. ELTRINGHAM—as well as the special series, illustrating mimicry and other bionomic principles, in which both the *Pierinæ* and *Acræinæ* play an important part.

The complexity of the problem presented by *Papilio dardanus*

is sufficiently indicated in the accompanying Plate I, which represents the male (Fig. 1) and four mimetic female forms (Figs. 7 to 10), together with their respective Danaine models (Figs. 2 to 5) from the same geographical area—Natal. Before 1869, when ROLAND TRIMEN'S classical memoir¹ appeared, three of these mimetic females were held to be three different species, and the male a fourth. Figs. 1, 7, 8, 9, and 10 on Plate I are of special interest in that they represent individuals from one of the families bred from a known female parent (Fig. 6), which have put the final coping-stone on the proof brought forward by the great African naturalist and ably defended by him against the fierce attacks of the older systematists.²

I think that you will best see what we have been able to do in working out the wonderful history of *Papilio dardanus*, if I arrange in the frame behind the lecture-table the twenty-seven drawers that are now piled before you, giving them such relative positions as will approximately indicate the geographical distribution.

We begin with the ancestral non-mimetic island form confined to Madagascar, *Papilio meriones* (Plate II, Figs. 1, 2). It will be observed that the non-mimetic female differs from the male in the presence of a black mark curving into the forewing cell from the basal half of the costa. This mark is of the greatest importance, for it serves as the starting-point for the mimetic patterns of the continental females (cf. Fig. 2 with 6, 7, and 8 of Plate II). A somewhat similar non-mimetic form, which we do not possess, *P. humbloti*, is found in the Comoro Islands.

We now enter the Ethiopian region—Africa south of the Sahara—at its north-east corner, and here in Abyssinia and Somaliland we find another non-mimetic subspecies, and the only continental one, namely *P. antinorii*, which I next place upon the frame. I have called this subspecies non-mimetic, but as a matter of fact two single mimetic females of different forms have been obtained in Abyssinia. Neither of them has appeared a second time, and they are in themselves so very remarkable, combining the fully formed "tails" of the male butterfly with two highly developed mimetic female patterns,

¹ *Trans. Linn. Soc., Lond.*, vol. xxvi., 1870; Pt. III., 1869, p. 497.

² See especially *Trans. Ent. Soc., Lond.*, 1874, pp. 139-141.

that until further evidence is forthcoming one is tempted to regard them as hybrids between a wandering male from further south, carrying tendencies of the mimetic females, and the ordinary female of *antinorii*. Omitting these from consideration until further specimens have been obtained, the *antinorii* male and female are closely similar to the Madagascar *meriones*, except for a considerable reduction of black on both the wings of both sexes. The female still presents the black mark on the costa which is the beginning of the mimetic pattern.

I next place upon the frame the most interesting of all the subspecies, namely *polytrophus*, from the lofty eastern edge of the great Rift Valley, near Nairobi in British East Africa (Plate II, Figs. 3 to 9). Here, on the Kikuyu Escarpment, at an elevation of 6,500 to 9,000 ft., we meet with all the mimetic forms of the female *dardanus*, together with innumerable intermediates and an abundant ancestral form, *trimeni*, which has not entirely lost the yellow ground-colour of the male and non-mimetic female, and shows a prolongation of the costal mark towards the posterior angle of the forewing, giving in different individuals every transition between a marking well-nigh as rudimentary as that of the *meriones* female itself, and the fully formed bar of *hippocoön* (cf. Figs. 2, 6, 7, and 8 on Plate II). It is characteristic of the ancestral *trimeni* females that they are exceedingly variable, and especially so in the degree of development of the bar crossing the forewing. They further commonly exhibit a vestigial trace of the "tail" to the hindwing (Figs. 6 and 9). Comparison between Figs. 6, 7, and 8 shows that the fully formed mimetic female *hippocoön*, resembling in East Africa the Danaine model *Amauris niavius dominicanus* (Plate I, Fig. 2), has been derived from *trimeni* by the transformation of the yellowish ground-colour into white, and the sharpening of the outlines of the most fully developed black pattern. Comparison with Fig. 9 shows that the *trophonius* form, mimetic of *Danaida chrysippus* (Plate I, Fig. 3) over the whole Ethiopian region, is derived directly from *trimeni* by a fulvous flush overspreading the principal pale area extending over a large part of both wings. In the interesting example represented in Fig. 9 the flush does not cover the whole of this area, and the uncovered part, as well as all the other pale markings, are of the yellowish

tint of *trimeni*. A slight trace of the "tail" is also to be seen in the same specimen. The most specialised of all the mimetic females, *cenea*, mimetic of *Amauris echeria* (Plate I, Fig. 5) and *Am. albimaculata* (Plate I, Fig. 4) in East Africa, and westward as far as the Eastern borders of the Congo State, also appears to have been directly derived from *trimeni*. Thus Fig. 4 on Plate II shows us an example with the fully developed *cenea* pattern, but with all the pale markings retaining the yellowish tint of *trimeni*. Comparison between Figs. 4 and 6 shows that the hindwing of *cenea* is easily derived from *trimeni* by an increase in the breadth of the black border, while the forewing also originated by an increase of black, together with the splitting up of the pale markings into a series of separate spots. The traces of such a process can, in fact, be seen in an initial stage in the outer half of the forewing of the *trimeni* represented in Fig. 6. Comparison between Figs. 4 and 5 shows how the ordinary colours of *cenea* are obtained by a darkening into ochreous of the basal part of the hindwing, while all the other markings become white or sometimes ochreous, according as the form mimics varieties of *Amauris* with white spots or with yellow spots in the forewing. The wonderful mimetic form *planemoides*, resembling the male of *Planema macarista* and both sexes of *Pl. poggei*, is also found among the remarkable assemblage of female forms on the Escarpment, although, if either of its models occurs at all in this locality, it must be extremely rare. The *planemoides* female almost certainly arose in connection with the origin of the *cenea* form: the hindwing, in fact, is almost precisely *cenea*'s, except that the basal patch becomes white like *hippocoon* instead of ochreous like *cenea*. In the forewing the pale markings of *trimeni* are not so completely broken up into separate spots as in the origin of *cenea*, but form larger areas which gain a rich fulvous tint and fuse together into a band crossing the wing from the costa to the posterior angle. It is exceedingly interesting to find that an ancestral stage in the development of this pattern is to be found, not only in association with the fully formed *planemoides*, but also in Natal, far south of the range of the *Planema* models. This ancestral stage of *planemoides*—the *leighi* form—indicates very clearly the way in which the forewing band of *planemoides* arose

from *trimeni*. We find, in fact, a forewing pattern which is in part that of *cenea* and in part that of *hippocoon*, but with all the markings transformed into fulvous orange. Intermediate stages between *leighi* and *planemoides* are also found both within the range of *planemoides* itself and also some hundreds of miles eastward of it and its models (see p. 33).

The *polytrophus* females have occupied a good deal of our time and attention, but they are of extraordinary interest as showing us the origin of all the mimetic forms of the species. The pattern of the male *polytrophus* (Plate II, Fig. 3) bears considerable resemblance to the western subspecies *dardanus dardanus*, but there is, I think, little doubt that *polytrophus* is in interbreeding connection not only with *dardanus dardanus* on the west, but with *dardanus tibullus* on the east. In the forest at a lower elevation (about 5,500 ft.), near Nairobi itself, we meet with a larger form of male bearing heavier markings. At this elevation *trimeni* is still to be seen—a fine example, captured by the Rev. K. ST. AUBYN ROGERS, is in the drawer I have just placed upon the frame, with another remarkable form, apparently a mimic of *Danaïda chrysiippus* f. *doriippus*, captured in 1903 by the late Mr. C. F. ELLIOTT.¹ There can be no reasonable doubt that these larger specimens of the lower slopes form one interbreeding community with those of the higher, and that *tibullus* on the east is syngamic with *polytrophus* of the lofty Escarpment near Nairobi.

Before leaving *polytrophus* I ought to mention that the remarkable ancestral form *trimeni* appears to belong chiefly to the East African section of the *dardanus* subspecies; for it is not only common at Nairobi, but the first specimen to reach a European collection was captured in 1884 by Lieutenant TURNER well within the area of *tibullus* at Zanzibar.² Varieties which I think are to be interpreted as forms of the variable *trimeni* have been described by AURIVILLIUS from Kibara, to the west of

¹ *Trans. Ent. Soc., Lond.*, 1908, pp. 554-7. The date of capture is erroneously given as "1893" on p. 556. A coloured figure of the specimen may be seen in ELTRINGHAM'S *African Mimetic Butterflies*, Oxford, 1910, Pl. X, Fig. 11. Excellent coloured representations of nearly every form of *P. dardanus* are given on the same plate.

² *Proc. Ent. Soc., Lond.*, 1897, pp. lxxxviii, lxxxix; *Trans. Ent. Soc.*, 1906, p. 283, Pl. XIX, Fig. 1.

Lake Mweru, and Ukerewe Island in the south of the Victoria Nyanza.¹ On the west coast, *trimeni* appears to be represented by another ancestral form, the relatively rare *dionysus*, which will be considered later.

The next four drawers now placed in the frame represent forms of the subspecies *dardanus dardanus* from Kisumu (Port Florence), the inland terminus of the Uganda Railway on the north-east shore of the Victoria Nyanza, from the northern and north-western shores as far as the Anglo-German boundary. The males of this subspecies, which extends to the west coast, approach, in the relative amount of black marking, those of *polytrophus* on the high Escarpment and the Madagascar *meriones*. The females resemble Danaine and Acræine models of their locality, and here too, in the eastern part of the range of the western subspecies, all the mimetic female forms are represented. The commonest is *hippocoon*, and next *planemoides*, while *trophonius* and *cenea* are both relatively rare.² The white sub-apical bar of *trophonius* is often transformed into fulvous (the *niobe* form) in mimicry of *Planema tellus*, and in a

¹ Arkiv f. Zool., K. Svenska Vetenskapsakad., Stockholm, Bd. 3, No. 23, 1907.

² The corresponding female forms of the various subspecies of *P. dardanus* were called by the same names in the address, notwithstanding the fact that there are slight differences between them. Such differences seem to be sufficiently indicated by prefixing the subspecific name. I wrote upon this point in 1906: "The name *hippocooides* has been given by HAASE to this form [*hippocoon*] in the eastern and southern subspecies *tibullus* and *cenea*. This seems to me a most unnecessarily complex and inconvenient procedure. The *trophonius* of the western subspecies [named *trophonissa* (1907) by AURIVILLIUS] *merope* [*dardanus*] is at least as different from that of the southern *cenea* as are the two forms of *hippocoon* from the same areas. It is pretty certain indeed that each female form of every subspecies has certain peculiarities and is not exactly like the same form of any other subspecies. But this is quite sufficiently indicated by prefixing to the female form name the subspecific name. *Papilio dardanus* subspecies *merope* ♀ f. *hippocoon* of the west coast is naturally different from *P. dardanus* subspecies *cenea* ♀ f. *hippocoon* from Natal, and it is quite unnecessary to express this by turning the last name into *hippocooides*. To do so without making corresponding changes in the other forms is inconsistent; to be consistent in this respect is immensely to increase and to increase uselessly an already tremendous terminology." *Trans. Ent. Soc., Lond.*, 1906, p. 289.

fine variety from Entebbe presented by Mr. H. ELTRINGHAM it will be seen that the bar is fused with the principal fulvous marking. *Papilio dardanus* has not as yet been bred either at Nairobi or in Uganda,¹ and this final proof that *planemoides* belongs to the *dardanus* association is still wanting. Nevertheless, a single specimen now before you constitutes in itself conclusive evidence that *planemoides* has been rightly placed. This specimen was collected by Captain T. T. BEHRENS in Buddu (1902-3), and it is gynandromorphic on the left side, the yellow scales and part of the dark markings of the male *dardanus* being dovetailed into the pattern of the female *planemoides*.² It is quite certain that such an intermixture of characteristics can only occur between the male and female of the same species, and that therefore *planemoides* is one of the female forms of *dardanus*.

It is interesting to consider the probable causes of the relative rarity of the mimetic female forms in Uganda; *hippocoon* mimics *Amauris niavius*, the most conspicuous Danaine, and probably the most conspicuous butterfly of the African forests; *planemoides* mimics the highly conspicuous pattern of the male *Planema macarista* and both male and female *Pl. foggei*; *trophonius* mimics the ubiquitous *Danaida chrysippus*, but this is an open country and woodland butterfly, not a forest species like its mimic, and the two would only be commonly associated along the borders of their respective stations. This relationship almost certainly accounts for the fact that, although *trophonius* occurs in all the subspecies of *dardanus* with mimetic females, it is nevertheless invariably a rare form. *Cenea* mimics *Amauris echeria*, which is excessively abundant in Uganda, the rarer

¹ Since this address was delivered, Dr. G. D. H. CARPENTER has succeeded in obtaining 26 eggs from a *planemoides* female on Bugalla, one of the Sesse Islands, in the north-west of the Victoria Nyanza. He kindly wrote to me early in the course of the breeding experiment, and, as I happened to be publishing an article on *P. dardanus* at that time (*Bedrock*, April 1913, p. 42), I alluded to his investigations in the following words: "We may anticipate that the offspring will be chiefly or entirely *planemoides* and *hippocoon*." On the very day when I was correcting the proofs (March 7th, 1913), I received another letter telling me the results, namely 3 *planemoides*, 7 *hippocoon* and 12 males (l.c., p. 47 n.). The whole family is now in the Hope Department. See *Proc. Ent. Soc., Lond.*, 1913, pp. xxxiii-xxxv, also for June 4th.

² *Trans. Ent. Soc., Lond.*, 1906, p. 297, Pl. XVIII, Fig. 4.

Am. albimaculata, and the relatively very rare *Am. grogani*. These butterflies, however, although as a whole a very important element in the Danaine fauna, have not the conspicuous pattern of *Am. niavius*, and it is to be observed here, as in other parts of Africa, that when these two Danaine patterns exist side by side the more conspicuous one exerts a far more powerful influence upon the mimetic forms of *dardanus*, even when the model which bears it is not nearly so abundant as the others (cf. p. 34).

We pass to the tropical west coast represented in the seven drawers now placed in the frame. The northern section is marked by the excessive predominance of *hippocoön*, corresponding with the fact that, of the series of models mentioned in the preceding paragraph, only *niavius* and *chrysippus* exist in this part of the range. Furthermore, *chrysippus* is represented by the tropical west coast form *alcippus*, with white hindwings, and is therefore even less suitable than in other parts of Africa as a model for *dardanus*. Along the whole of the tropical west coast the strange ancestral form *dionysus* occurs in relatively small numbers. This female possesses a primitive forewing pattern much like that of *trimeni*, but it has entirely lost the yellow ground-colour of the male, being white-marked like *hippocoön*. The hindwing is yellow, resembling, but paler than, that of the western *trophonius*. The forewing pattern exhibits, like *trimeni*, great variation in the development of the black bar which originates the mimetic pattern. In some individuals it is even more rudimentary, and therefore more like the Madagascar female, than in any *trimeni* that I have seen.

We may feel confident that the results of breeding from a female form in any locality may be fairly accurately predicted by looking to the relative proportions of female forms which there exist. For this reason I anticipated that the great majority of families bred in the northern section of the west coast would yield *hippocoön* and nothing else. Owing to the kindness of Mr. W. A. LAMBORN I have fortunately been able to test this conclusion, and the drawers before you contain three families bred by him from *hippocoön* females, in the Lagos district. These families contain respectively 14, 13, and 10 females, and all are of the *hippocoön* form.¹

¹ *Proc. Ent. Soc., Lond.*, 1912, pp. xii-xvii. Since the address was

It is of importance to note that the pattern varies somewhat in the different families, the first showing an evident tendency towards the enlargement of the principal white patch which spreads over part of both wings. The *hippocoon* form of the east coast differs from that of the west in the increased size of this patch, corresponding with the difference between the eastern *Amauris niavius dominicanus* and the western *Amauris niavius niavius*. It is therefore of much interest to find on the west coast a hereditary tendency towards slight changes in the size of the patch. It is reasonable to suppose that by selection operating upon such small hereditary differences the eastern *hippocoon* could be derived from the western, and *vice versa*.

In the southern section of the tropical west coast the female forms become more varied, and we again meet with *planemoides*, doubtless continuous, across the great tropical forest, with the assemblage of the same forms in Uganda, and corresponding with the co-existence of the appropriate *Planema* models over the whole area. The single specimen before you from Angola is of interest as being probably the first example in any European collection. It was collected in 1873 by W. ROGERS.¹ The relatively frequent occurrence of *niobe* also probably corresponds with the presence of its *Planema* model.

We now return to Nairobi, the central point of the great

delivered Mr. LAMBORN has bred three more families, containing respectively 14, 7, and 6 females, all *hippocoon*. He also obtained a few eggs from a *dionysus* form, but unfortunately these failed to hatch. I suggested to Mr. LAMBORN that it would be of great interest to ascertain the effect of artificial cold during the pupal stage of the female forms. In his locality, Oni, seventy miles east of Lagos, it was impossible to keep up a continual supply of ice, but the first of the families mentioned in this footnote was exposed for a few days to a temperature (about 50° F.) which for that part of the world would be unusually low, and it was interesting to observe that 4 out of 14 of the females possessed slight but distinct traces of the "tail" of the male hindwing. Of the other five families only one included females with traces of the "tail"—two similar to the ♀♀ mentioned above and two others with slighter indications. Hence it is not unlikely that an effect was produced by the artificial cold. It is to be hoped that this experiment may be repeated in a locality more favourably placed for the maintenance of a low temperature. See *Proc. Ent. Soc.*, 1912, pp. cxxxii-cxxxiv.

¹ *Proc. Ent. Soc., Lond.*, 1903, pp. xxxix-xli.

series of *dardanus* forms, and place in the frame the drawers representing the subspecies *tibullus*, which extends from the Escarpment to the east coast and spreads southwards till it insensibly passes into the south-eastern and southern subspecies *cenea*. The male *tibullus* is characterised by heavy black markings, especially on the hindwing. It may be interesting to those who look on climatic conditions as the causes of variation to note that the *hippocoon* form of the east coast, with its drier climate, shows a reduction in the black markings as compared with the same mimetic form on the moister west coast, but that the males, on the contrary, are far more heavily marked with black on the east coast than on the west! If therefore climatic conditions are of any avail in the production of these patterns, it is obvious they have wrought opposite effects on the two sexes of *dardanus*.

It is interesting to pause for a moment and compare the development of the black markings of the male subspecies of *dardanus*. These markings are least developed in the north-eastern *antinorii*, moderately developed and to much the same extent in the Madagascar *meriones*, the Nairobi *polytrophus* and the western *dardanus*, by far the heaviest in the Eastern *tibullus*. As we pass southward into *cenea* the markings again become less heavy, in some individuals indeed approaching those of the west-coast males. Nevertheless, as a whole, *cenea* is more heavily marked with black than any other subspecies except *tibullus*.

The first two drawers exhibit *tibullus* from Nairobi to the British East African coast, and southward into German East Africa. *Hippocoon* is still seen to be by far the commonest form. The single *trimeni* from Zanzibar, already referred to (see p. 28), is to be found in one of the drawers. *Trophonius* and *cenea* are both present, in correspondence with their models, while the second drawer contains the single remarkable *planemoides* from the Mombasa district (see p. 28).

The next two drawers now placed in the frame represent an exceedingly fine collection from a little patch of primitive forest on Mount Chirinda (3,800 ft.) in S.E. Rhodesia, close to the Portuguese border, a tract of country formerly known as Gazaland. From this locality, owing to the kindness of my friends

Mr. GUY A. K. MARSHALL and Mr. C. F. M. SWYNNERTON, I am able to show the great series now before you. The whole of the females are seen to be *hippocoon*, but *cenea* and *trophonius* also occur, although they are relatively rare. The Oxford University Collection possesses two of each, but these are kept in the special mimicry series, together with their models from the same patch of forest. It is interesting to notice that the Chirinda Danaine models of *cenea*, namely *Amauris albimaculata* and *Am. lobengula*, are together far commoner than *Am. niavius dominicanus*, the model of *hippocoon*, but that nevertheless the latter Danaine, with its far more conspicuous appearance, has produced a much stronger effect on the mimetic female forms of *dardanus* (see p. 31). Turning to the males, it will be seen that the series from Chirinda is intermediate between the more heavily marked *tibullus* of the north and the less heavily marked *cenea* of the south. There is great individual variation, and some of the males would be placed in one category, some in the other.

We now come to the subspecies *cenea*, from Cape Colony and Natal. The specimens in the first drawer are of historic interest in that they provided the first evidence obtained by breeding, but not from a known female parent, that the Protean forms of *dardanus* belong to a single species. The drawer contains two *trophonius* and two *cenea* females bred in 1873-4, near King William's Town, in the south-east of Cape Colony, by the late J. P. MANSEL WEALE¹; also one *trophonius*, one *hippocoon*, two *cenea*, and one intermediate form collected by the same naturalist in 1870-4. These specimens, purchased for the University Collection in 1878, undoubtedly convinced Professor WESTWOOD that ROLAND TRIMEN'S conclusions were perfectly sound. I well remember being shown these very specimens by WESTWOOD, and the enthusiasm with which he explained that in the Madagascar representative of *P. merope*, as *dardanus* was then called, the female resembled the male, while the continental females appeared with all kinds of patterns widely different from each other and even more widely different from their own male. I am glad to make this fact known, and to be able to show that, a few years after the following passage was published by ROLAND TRIMEN, my

¹ *Trans. Ent. Soc., Lond.*, 1877, p. 269.

great predecessor had not only ceased to be an opponent, but was teaching the very conclusions he had at first disbelieved.

“ 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. . . .”¹

The following drawer contains specimens of *cenea* from Natal, where the same female forms as those of Cape Colony are found, together with the peculiar ancestral form *leighi*.

The last series of drawers I have the pleasure of showing you contains the fine synepigonous groups which I owe to the energy and ability of G. F. LEIGH, F.E.S., of Durban. All these have been bred by Mr. LEIGH from females captured at Durban, or in the Durban district.

The first two families were bred from *hippocoön* females, and they show an extraordinary contrast. The first,² bred in 1906, contains 14 males, and the following females—3 *hippocoön*, 3 *trophonius*, 3 *cenea* with white, 5 with more or less yellow marks on the forewing. The parent of this family, together with one of its male offspring, and each of the four female forms with its Danaine model, is represented in the accompanying Plate I. The second family,³ bred in 1907, contains 16 males, while of the 13 females all are *cenea*, and not a single one like the parent.

We now pass to families bred from *trophonius* parents, of which there are 3. The first,⁴ bred in 1903, contains only 3 males, and 2 *cenea* females. The second,⁵ bred in 1904, from a *trophonius* parent which unfortunately escaped, contains 6 males, 1 *trophonius*, and 5 *cenea*. It is interesting to note that the rich fulvous colouring of the *trophonius* parent has produced a distinct effect upon the hindwing patch of one of the *cenea* offspring. The third family,⁶ bred in 1910, is both large and remarkable,

¹ TRIMEN in *Trans. Ent. Soc., Lond.*, 1874, p. 139.

² *Trans. Ent. Soc., Lond.*, 1908, p. 434, Pl. XXIII.

³ *Ibid.*, p. 442.

⁴ *Ibid.*, 1904, p. 685, Pl. XXXI, Figs. 9-14.

⁵ *Ibid.*, 1906, p. 281, Pl. XVII.

⁶ *Proc. Ent. Soc., Lond.*, 1911, p. xxxiii.

containing 25 males, 2 *hippocoon*, 4 *trophonius*, 2 *leighi*, and 22 *cenea*, of which 5 show strongly the effect of the parental colouring. The collection also contains the *trophonius* parent,¹ but not the offspring, of another family bred in 1912 by G. F. LEIGH. The family contained 11 males, 2 *hippocoon*, 4 *trophonius*, 1 *leighi*, and 9 *cenea*.

The last two synepigonic groups were the offspring of *cenea* females. The first² was bred in 1902 from a *cenea* female captured *in copulâ*, so that of this family—7 males, 2 *hippocoon*, and 6 *cenea*—both parents are present. The second family,³ bred in 1907, contains 15 males, 1 *hippocoon*, and 16 *cenea*. In this last family the forewing spots of the *cenea* offspring are somewhat unusually developed—a feature evidently inherited from the female parent. It is also noteworthy that the depth of the black markings of the male varies greatly in the different families described above, and it seems quite clear that the extent to which this characteristic is developed is also hereditary.⁴

I trust that the series of specimens now before you conveys some idea of the spirit in which we try to carry on our work.

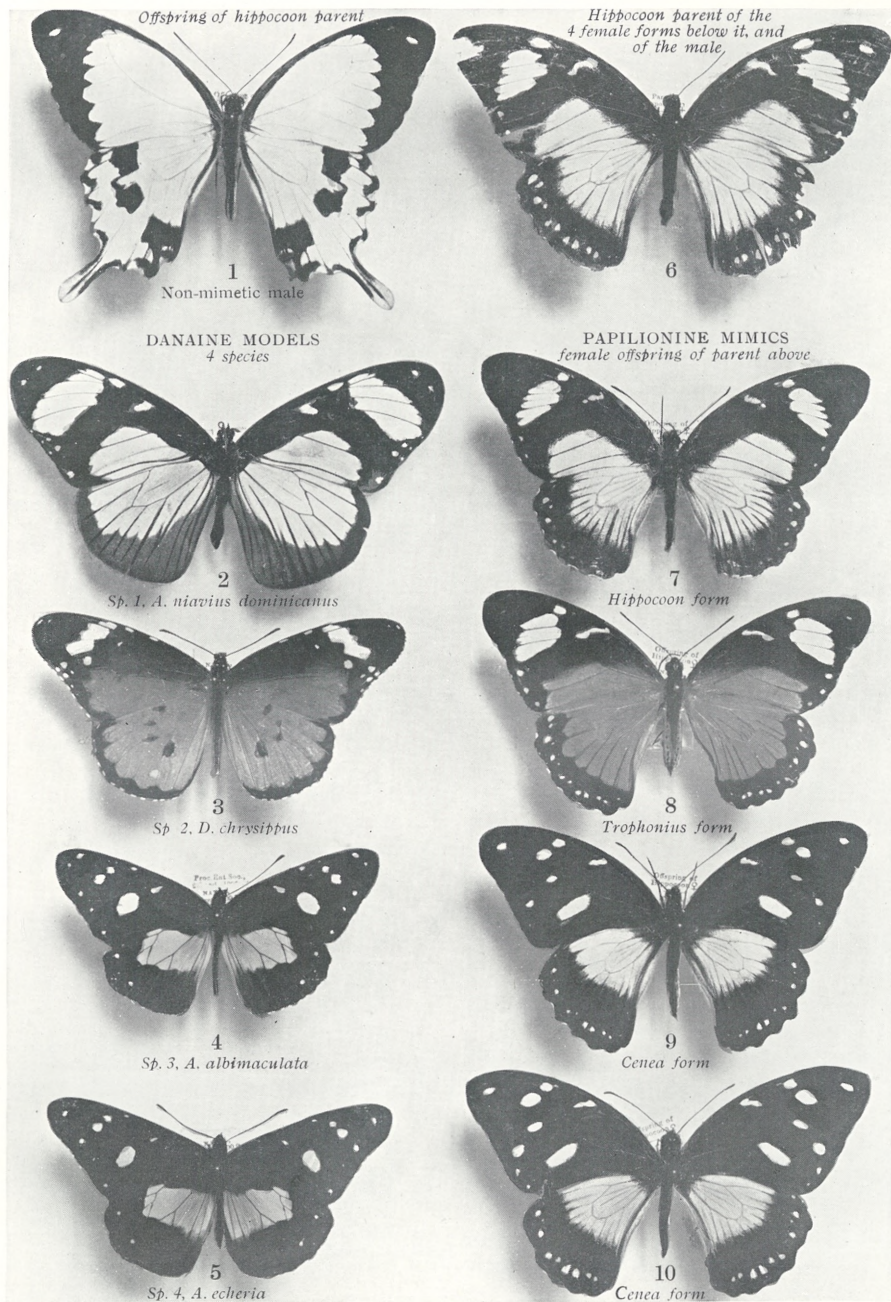
I conclude, as I began, by bidding you a hearty welcome, and by expressing the hope that you will always look back with pleasure upon the week you are about to spend in Oxford.

¹ *Proc. Ent. Soc., Lond.*, 1912, p. cxxxv.

² *Trans. Ent. Soc., Lond.*, 1904, p. 679, Pl. XXXI, Figs. 1-8.

³ *Trans. Ent. Soc., Lond.*, 1908, pp. 337-441, 443-445, Pl. XXIV.

⁴ *Ibid.*, pp. 429 and 443.



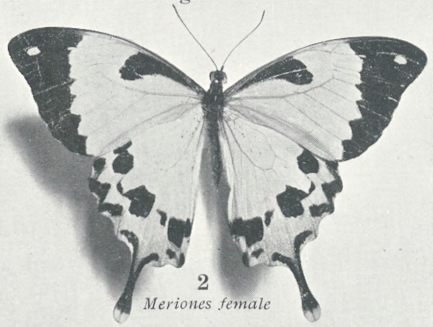
Alfred Robinson, photo.

Nearly $\frac{2}{3}$ of the natural size.

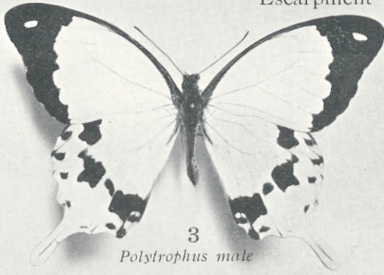
Andre & Steigh, Ltd.

Papilio dardanus cenea, the S. E. African Sub-species of *P. dardanus* with the four Danaïne models of its female forms. The proof by breeding that the mimics are one species. (Near Durban, Natal, 1906, G. F. Leigh.)

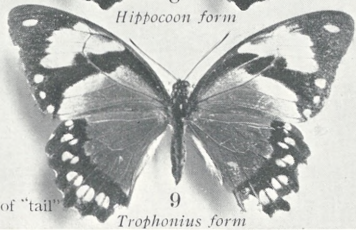
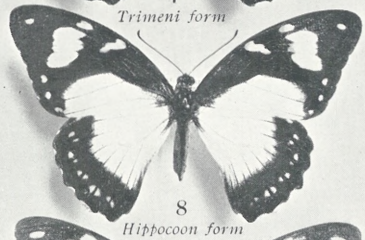
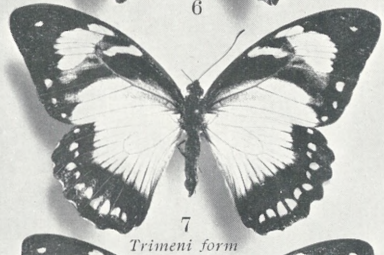
P. meriones, with non-mimetic female : Madagascar.



Escarpment near Nairobi.



6 *Polytraphus* females of 4 forms.



Trace of "tail"

Alfred Robinson, photo.

Rather over half the natural size.

Andre & Sleigh, Ltd.

The non-mimetic ancestor of *Papilio dardanus* (*merope*) from Madagascar, and transitional forms, shewing the origin of mimetic females, from the Kikuyu Escarpment, near Nairobi, British East Africa (6,500—9,000 ft.).

The President then gave his farewell address, as follows :

Ladies and Gentlemen: Our principal and most pleasant duty, on this last formal meeting of the second International Entomological Congress, is to thank those who have so kindly helped us to make the meeting a success.

We have to thank the Delegates of the Oxford University Museum for the use of this lecture-room and the central court of the Museum ; among the Heads of the Museum Departments—Prof. BOWMAN for the use of the writing-room, Prof. BOURNE for rooms in his Department, Prof. SOLLAS for his lecture-room, and Prof. Sir W. OSLER for the Secretary's room.

We also desire to thank the two assistants in the Hope Department, Mr. A. H. HAMM and Mr. J. COLLINS, for helping the members of the Congress to study the collections, and to express our gratitude to many workers in the Department who have also given the kindest assistance—Mr. R. S. BAGNALL, Dr. DIXEY, Mr. ELTRINGHAM, Dr. LONGSTAFF, the Rev. K. ST. AUBYN ROGERS, and Commander WALKER.

That the Congress has passed so successful a week, in spite of the unfortunate weather, is mainly due to two circumstances. The first we owe to the Delegates of the University Museum, namely the fact that all our formal meetings, and the Hope Collections, which have provided interest between the meetings, have been under a single roof. The second fortunate circumstance we owe to the generosity of the Warden of Wadham College—the proximity of the tent in which we have been able to take our meals, and the beautiful garden where we have walked and rested, when the weather permitted, in the intervals between our meetings.

We desire cordially to thank the Warden and Fellows of New College for the use of the College Hall for the opening meeting, the Warden and Fellows of Wadham College for lending the Hall for our banquet, the Warden and Fellows of Merton College, New College, and Wadham College for allowing members to reside in College rooms, and for all the exceedingly efficient arrangements which have been made. With these thanks we desire especially to associate the names of Mr. E. S. GOODRICH, F.R.S., Mr. GEOFFREY SMITH, and Dr. F. A. DIXEY, F.R.S., for acting as hosts in their respective Colleges. I must especially speak of the kindness of Dr. DIXEY in undertaking, at very short notice, to arrange for the banquet at Wadham, and also for all the details, which have been so necessary for our comfort, that have been planned by him in the Warden's garden and in the College.

In speaking of the Colleges we also wish to thank the Principal and Fellows of Jesus College, the Provost and Fellows of Queen's College, and the Rector and Fellows of Lincoln College, who had kindly given the necessary permission for rooms to be occupied if the number of the members had made it necessary ; and here I may say that I am sure that had it been needful other Colleges would have been equally ready with their kind permission.

The success of the meeting has also been greatly assisted by those Oxford residents who have offered hospitality to our visitors, and we desire to give our special thanks to Prof. and Mrs. BOURNE, Prof. and Mrs. PERCY GARDINER, Dr. and Mrs. HOEY, Mr. and Miss NAGEL, and Mr. and Mrs. ARTHUR SIDGWICK. I wish also to thank Mrs. DIXEY and my wife and my daughter for all they have done in helping to entertain members of the Congress.

The two excursions on Wednesday formed an important feature of the meeting, and our thanks are specially due to those who have so kindly received us, as well as to others who have expressed the wish to offer hospitality to the Congress, and would have done so had our numbers been larger. We heartily thank the President and Fellows of St. John's College for entertaining the party in Bagley Wood, and also the Rt. Hon. L. V. HARCOURT, M.P., for his spontaneous suggestion that a party should visit Nuneham. We also warmly thank Sir ARTHUR EVANS, F.R.S., who invited us to Youlbury, and Mr. VERNON and Lady MARGARET WATNEY, who invited us to Cornbury Park, and we express our regret that the numbers of the Congress were not sufficient for us to accept this kind hospitality, as we should have greatly wished to do. I also desire to thank in advance the Hon. WALTER ROTHSCHILD, F.R.S., for the excursion to the Tring Zoological Museum which will take place to-morrow—a fitting and delightful end, to which we are all looking forward with so much pleasure and interest.

For the preliminary preparations, which had to be made long before the opening of the Congress, we have to thank the very efficient local committee with Dr. DIXEY as chairman. At a time when he was especially busy in preparations for the visit to Oxford of Delegates for the 250th Anniversary of the Royal Society, at such a time of stress, and with his many other insistent duties, Dr. DIXEY arranged for all the meetings of this committee, and hospitably entertained its members in Wadham College. We have to thank the secretaries, Mr. H. ELTRINGHAM and Mr. G. H. GROSVENOR and the other members, all of whom rendered most efficient help. Among them I may especially mention Dr. G. B. LONGSTAFF and Prof. SELWYN IMAGE, who came to Oxford on purpose for the meetings, and Commander

WALKER, who edited the guide-book. I may here also express our indebtedness to Prof. SELWYN IMAGE for his very kind help in designing the badge.

We also received the kindest assistance from Mr. WALTER ROTHSCHILD and Dr. KARL JORDAN, who visited Oxford on purpose to give help and advice.

I spoke, at our opening meeting, of the sad cause of Dr. MALCOLM BURR's absence, and we all rejoice with him that Mrs. BURR's health is now so far restored that he has been able to spend the last days of the Congress with us in Oxford. His enforced absence led to much difficulty, and might have led to disaster. On Thursday of last week at this time the manuscript copy of our Programme had not been written, and I really do not know the hour of night or early morning at which Mr. ELTRINGHAM took it to the printers. When we remember that Saturday is only a half-day, it will be realised what this meant; but owing to the way in which Mr. ELTRINGHAM threw himself into the breach, and also to the very efficient help that Mr. GROSVENOR was able to afford him during part of the time, all our difficulties have been overcome. I must here also speak of the great kindness of Mr. H. ROWLAND-BROWN, who, when he heard of our difficulties last week, telegraphed to us, offering to come to Oxford and help.

At this, the last of our most successful meetings, I am sure you would wish to thank all Presidents, Vice-Presidents, and Secretaries of Sections, all readers of papers, and those who have contributed to the discussions. And, for myself, allow me warmly to thank every one of you for the great kindness and consideration shown to me throughout the meeting.

We now adjourn—all of us, I am sure, looking forward to our next meeting in Vienna, under the presidency of my distinguished successor CUSTOS A. HANDLIRSCH.

THE BANQUET.

HELD IN THE HALL OF WADHAM COLLEGE, FRIDAY, AUGUST 9TH.

Early in the week it was found impracticable to hold the banquet in the Hall of Christ Church, as had been intended, but thanks to the efforts of Dr. F. A. DIXEY it was arranged, by kind permission of the Warden and Fellows of Wadham, to hold the dinner at that College.

A very large number of the members of the Congress sat down to an excellent repast served in the fine old Hall.

Following the usual loyal toast, the President said he now had the honour of proposing the toast of the science that they were celebrating at the Oxford Congress, and that they would continue to celebrate in future Congresses—"Success to Entomology." A friend who was in a high position in the British Colonial Office once told him that, whenever he heard of an appointment to be made in the Colonial service, where a young man was wanted for a position of responsibility in a trying climate, he always inquired whether there was a naturalist available for the post. He knew well that in an enthusiastic naturalist he would also secure a better public servant (applause). The contemplation of such beneficial results arising spontaneously from the gratification of certain intellectual interests, led us to inquire why it was that we studied natural history, entomology, or any other science. If they analysed the reasons, he thought they would agree with him that the primary, in fact the only real motive, was that of finding out; they worked because they were interested, and any further object, however laudable in itself, only tended to bias and mar the inquiry. He remembered hearing Sir MICHAEL FOSTER say that it was by curiosity that our first parents lost the Garden of Eden, but that by transmitting to us that same curiosity, they had given us a golden bridge, by which we were able to re-enter Paradise (laughter). There was a correspondence on this very subject between DARWIN and his old Cambridge teacher HENSLow,

who had maintained that science pursued without a practical end was merely building castles in the air.

DARWIN'S reply seemed to him unanswerable :

" I rather demur to one sentence of yours," he said—" viz. ' However delightful any scientific pursuit may be, yet, if it should be wholly unapplied, it is of no more use than building castles in the air.' Would not your hearers infer from this that the practical use of each scientific discovery ought to be immediate and obvious to make it worthy of admiration ? What a beautiful instance chloroform is of a discovery made from purely scientific researches, afterwards coming almost by chance into practical use ! For myself I would, however, take higher ground, for I believe there exists, and I feel within me, an instinct for truth, or knowledge or discovery, of something of the same nature as the instinct of virtue, and that our having such an instinct is reason enough for scientific researches without any practical results ever ensuing from them." ¹

DARWIN here gave the real motive for research, and they would notice that when the followers of the more fundamental sciences, Physics and Chemistry, began to think of practical commercial uses, the science of their investigations dropped to another and a lower level. He expected that they had heard of the terms which had been suggested for the different degrees in the attainment of inaccuracy—how there were liars, liars with an uncomplimentary adjective, and " expert witnesses " (laughter). If that were true—even in the least degree true—it meant of course that the scientific spirit was incompatible with the qualities required in an expert witness. He dwelt on these facts because he thought that Entomology stood out as the one science in which a practical application was, in his experience, without an injurious effect upon investigation. In Entomology, scientific inquiries of all kinds were going on for the purpose of helping mankind, but in spite of the application their researches could still be conducted on purely scientific lines ; and he did not know of any other science for which this could be said so truly as it could for Entomology. If this opinion were sound, it followed that our science occupied a high position in the scale of human

¹ *More Letters of Charles Darwin*, London, 1903, vol. i., p. 61. Letter dated April 1st, 1848.

knowledge. Economic Entomology was a vast field in which practical applications were sought, and sought most successfully, and yet if any one wished for examples of work carried out in the true spirit of science, he could not do better than visit Dr. L. O. HOWARD at Washington, Prof. W. M. WHEELER at Harvard, Dr. R. C. L. PERKINS in Honolulu, or the rooms in our National Museum from which Mr. GUY A. K. MARSHALL inspires and directs the investigations of many a naturalist in Africa.

For this special reason, as well as for its many other unrivalled charms, he invited them to drink the toast of "Success to the Science of Entomology."

He would close in the words of CHARLES DARWIN, who, in a letter to Sir JOHN LUBBOCK, wrote:

"I feel like an old war-horse at the sound of the trumpet, when I read about the capturing of rare beetles—is not this a magnanimous simile for a decayed entomologist?—It really almost makes me long to begin collecting again. Adios.

"'Floreat Entomologia!'—to which toast at Cambridge I have drunk many a glass of wine. So again, 'Floreat Entomologia.' N.B.—I have *not* now been drinking any glasses full of wine."¹

¹ *Life and Letters of Charles Darwin*, 1887, vol. ii., p. 141. Letter written before 1857.



