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Entomological & Natural History Society.

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MEETINGS HELD AT

THE LONDON INSTITUTION,

FINSBURY CIRCUS, E.C.,

On the 1st and 3rd Tuesdays in each Month.

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AND

A. BACOT, H. H. MAY, A. F. BAYNE, E. HEASLER, H. HEASLER.

TRANSACTIONS

OF THE

City of London Entomological

AND

Natural History Society,

1896-97.

REPORTS OF MEETINGS.

THE SOCIETY'S ROOMS, LONDON INSTITUTION,
FINSBURY CIRCUS, E.C.

REPORTS OF MEETINGS.

Dec. 15th, 1896.—This, the first meeting after the annual, was devoted to a pocket-box exhibition, which was remarkably well attended by members, and a number of interesting exhibits made. Some of these were as follows:—Specimens bred during 1896.—Mr. Bacot exhibited numerous species which he had bred during 1896, including two broods of *Orgyia gonostigma*, from Tonbridge; *Taeniocampa miniosa*, from the New Forest; *Choerocampa elpenor*, from Ponder's End; *Endromis versicolor*, from bought pupæ; *Catocala sponsa*, from the New Forest; *Leiocampa dictaea*, from ova received from Mr. Goymour; *Clisiocampa castrensis*, from ova received from Mr. Whittle; *Smerinthus ocellatus-populi* hybrid; *Notodonta carmelita*, from ova received from Mr. J. A. Clark; *Dianthoecia capsincola* and *Acronicta leporina*, from the New Forest, etc., etc. Mr. May exhibited *Acherontia atropos*, bred from larva, from Bampton, in Oxfordshire; *Orthosia suspecta*, taken at sugar at New Park, near Brockenhurst, in June of this year; *Grammesia trigrammica* ab. *bilinea*, from the New Forest, in June of this year; besides many other interesting species, captured or bred during 1896. Local forms of Cœnonympha tiphon, etc.—Mr. Routledge exhibited *Coenonympha tiphon*, from Carlisle, Morpeth, Rannoch, Orkney, Liverpool and Bantry Bay. Hepialides.—Mr. Routledge also exhibited *Hepialus humuli*, from Carlisle, Orkney and Shetland; *H. sylvinus*, from Carlisle; *H. velleda*, from Carlisle and Shetland; and abs. *gallicus* and *carnus*, from Carlisle. British Coleoptera.—Mr. Sauzé exhibited thirty-three species of British Longicorn beetles. Aberrations of Aglais urticæ.—Mr. Nicholson exhibited a series of *Aglais urticae*, all, except 5 from Scotland, having been bred or caught by himself. One of the specimens was nearly identical with var. *ichnusa*. Also a malformed specimen of *Pyrameis cardui*, with a sketch of hind-wings, showing a disarrangement of the wing-rays on the left hind-wing; and a specimen having an extra white spot on the tawny part of the fore-wing, just below the series of white apical spots. The position of this spot is identical with that of the white spot frequently found in the red band of *P. atalanta*. The genus Hypsipetes.—Mr. Tutt exhibited his two cabinet drawers containing his series of the three British species—*Hypsipetes sordidata*, *trifasciata* and *rubcrata*. These insects have been collected from widely different localities, and exhibit considerable extremes of variation.

Jan. 5th, 1897.—Dwarf Calymnia trapezina.—Mr. Oldham: 8 dwarf *Calymnia trapezina*, taken in Epping Forest in 1895-96, to show that the species is getting small by degrees in the locality; also *Cosmia affinis*, and 1 dwarf *Scopelosoma satellitia*, from Woodford; and 1 *Scotosia certata*, from Cambridgeshire. Breeding Acherontia atropos.—Mr. Burrows: a number of bred *Acherontia atropos*, including one from Rainham, in 1893, which had the inner band distinctly paler on the left hind-wing. He also read the following notes on his rearing

of this species : "I commenced forcing the pupæ at the end of August, when the bulk had been brought in, but 5 or 6 were brought to me later in the year. My forcing arrangement is simply a deep box, half filled with earth, upon which the pupæ were placed, and covered with moss. The box, covered with muslin, was placed upon a couple of bricks standing upon the kitchen oven, and was copiously watered with warm water morning and evening. The temperature remained pretty constantly at from 80° F. to 90° F., only rarely being observed to fall below this. The imagines began to appear in a fortnight, and continued to do so for about six weeks; but the later specimens bred belonged to pupæ found later, and these also appeared after a fortnight to three weeks' treatment. The whole number dealt with was 42. Of these 15 died under the process, 5 came out hopelessly deformed, and 22 are set out, and appear to be more or less perfect. The two dark specimens at the top of the first row were the last to appear, and belonged to the latest pupæ captured. The deformed specimens appeared to me to owe their misfortunes to insufficient moisture, when, being absent from home, I was unable to give the water required." Larvæ of Acidalia dilutaria (holosericata).—Mr. Riches exhibited larvæ of *Acidalia dilutaria* (*holosericata*), from ova laid on Oct. 12th, and hatched on Nov. 13th. Bohemian bat.—Mr. Sauzé: *Rhinolophus hipposideros* (the Lesser Horseshoe Bat), from Johannisbad, Bohemia. Variation of Acherontia atropos.—Mr. Tutt made the following remarks on the series of *A. atropos*, bred by Mr. Burrows:—"The specimens vary in the *shape* of the wing, the costa being much more hollowed in some specimens, and more convex in others, than is normally the case. The apices of the fore-wings are rounded in the least pigmented specimens. Sometimes the outer margin is more angular. In others, again, the wings are distinctly narrower. The hind-wings, in some specimens, are quite hollow. The *skull mark* on the thorax varies. In some the colour of this is whitish-grey, in others dark, in others, again, ochreous; in the more extreme it becomes deep brown, until in one or two the mark is only faintly traceable, having blended, as it were, into the ground-colour. The anterior edge of this mark is very variable; in some specimens it forms a simple convex curve; in others a series of three small curves; in others, again, it is angulated or pointed. The *abdomen* varies from pale yellowish to darker orange, which in some inclines to brownish. The black longitudinal streak down the centre of the dorsum of the abdomen is much broader in some specimens than others. On the *fore-wings* the basal marking is distinctly double, and traceable to the inner margin; in others, only the inner line is shown, and this does not reach the inner margin of the wing. In some the marking is concolorous with the rest of the wing. The angulated line, which extends occasionally from the costa to the inner margin, is pale; usually it is not to be traced on the inner half of its course. The subterminal is less distinct, but very variable in intensity. The brown colouring, extending from the costa along the upper half of the wing to the centre, is very much developed in some specimens, almost absent in others. In three or four specimens the wings are badly scaled at the tips, the rest of the wings being unicolorous, blackish. The central spot is much larger in some specimens than others. In the *hind-wings* the nervures between the two bands are very variable

in intensity, sometimes rather closely uniting the two bands. The basal half of the inner band may be strong, or weak, or obsolete. The outer band is sometimes weak apically, the black inclining to greyish. In one specimen, forced in 1893, from a Rainham (Essex) pupa, the left hind-wing has a pale, almost obsolete, inner band."

January 19th, 1897.—Captures at Brockenhurst and Loughton in 1896.—Mr. E. Heasler: a series of *Aplecta prasina* (*herbida*) taken at sugar, in June last, at Brockenhurst; series of *Hylophila bicolorana*, bred from larvæ taken at Loughton, and *H. prasinana* captured at sugar in the New Forest. Dark aberration of Acherontia atropos.—Mr. J. A. Clark: a dark specimen of *A. atropos*, the larva being taken at Walthamstow, in August, and imago emerging Nov. 25th. Aberrations of Angerona prunaria.—Mr. Clark: also picked variable forms of *A. prunaria* var. *sordiata*, 6 males, 4 females, bred from ova laid by a female, the last of three impregnated by the same male. The brood consisted of 82 larvæ, of which about 65 successfully passed through all stages. Amongst the males, variation occurred in the size of the orange marking near the apical angle of fore-wings, which marking coalesced with the central orange area in one specimen; in another, the orange area was streaked with black lines. A female was asymmetrically marked, the left hind-wing being without the broad dark border present on the right. Aberrations of Aglais urticæ and Pieris rapæ.—Also *A.* (*Vanessa*) *urticae*, caught in August last, at Ponder's End, with the black spots at costal margin much suffused, and the two outer confluent. Also two abs. of *P. rapae* from the same locality, the upper wings of one, a male, being almost perfectly white, with no darkening at tip of fore-wings, and the black spot in the middle showing dimly; the second, a female, having the hinder of the two spots on the upper wing in duplicate. Larvæ of Trochilium crabroniforme.—Mr. G. R. Garland: larvæ of *T. crabroniforme* (*bembeciformis*) from Manchester, feeding on wood of willow. Nyssia zonaria.—Mr. Garland also exhibited a series of *N. zonaria* taken at Blundellsands, near Liverpool; and a sample of cotton made by a new patent process to imitate silk. Dasychira pudibunda emerging in november.—Mr. D. C. Bate: Five well-marked male and one female *Dasychira pudibunda*, bred from larvæ *with black hairs*; all emerged in November, having been kept indoors. Pœcilocampa populi.—He also exhibited *P. populi*, the larva having been beaten at Dorking. Dwarf Hybernia defoliaria.—In endeavouring to breed *H. defoliaria*, Mr. Bate said his imagines emerged dwarfs, three being exhibited. The larvæ were obtained at Dulwich, and wild moths shown from the same locality were of normal size. Mr. Clark suggested that the dwarfing was, perhaps, caused by keeping the larvæ too dry. History of silk.—Mr. L. J. Tremayne read a paper entitled "The History of Silk," and a vote of thanks was heartily accorded him.

Feb. 2nd, 1897.—Larvæ of Bombyx (Lasiocampa) quercûs and B. spartii.—Mr. Bacot exhibited larvæ of *Bombyx spartii* and *B. quercûs* from ova laid by parents (received from Mr. Warburg) from S. France, and larvæ of English *quercûs* (received from Mr. Goymour). Also blown larvæ of *Bombyx rubi*, *B. trifolii*, *Clisiocampa castrensis*, for comparison. He said that the difference between *spartii* and the French *quercûs* was quite apparent after the 2nd moult, but was more marked after the

3rd. It consisted in the different colour of the dorsal coat of short hairs or fur. This, in *spartii*, was light red-brown, while in the *quercûs* it was white. The larvæ of the English *quercûs* differed markedly from both S. of France forms in the 4th or 5th skins. They seemed to be quite a moult behind the French races in getting their adult skins. The head was dark blue or blue-black, while in the French species it was usually reddish-brown, with a white marking on the face that was generally absent in the English form, although a few of these larvæ had a dirty white marking on the face, which, however, differed in shape from that on the French larvæ. The hairs were also much more scanty in the English form, and the long hairs, which in the French races were white, were brown in the English larvæ. The white sub-dorsal line, and the remnants of the oblique stripes, were also stronger in the English forms, and there were traces in some larvæ, strongly developed, of a blue line or band just above the sub-dorsal line, probably a remnant of the blue stripes that are well developed in *B. trifolii* and *Clisiocampa neustria*, and slightly less so in *C. castrensis*. The English *quercûs* Mr. Bacot took to be the older form, the French *quercûs* occasionally having faint traces of the blue, coming between it and *spartii*, which was more constant, and tended to approach *B. rubi* in the loss of these markings. Mr. Warburg had also very kindly given Mr. Bacot a few larvæ, the result of a pairing between a ♂ *quercûs* (French) and a ♀ *spartii*. The larvæ were now in about the 4th stage; 4 of them had the white *quercûs* coat, 6 the red coloured fur of *spartii*. On a fixed hybernating stage in larvæ of Orgyia gonostigma.—Mr. Bacot said that he had placed some larvæ of *Orgyia gonostigma*, which had passed the usual hybernating stage before the food supply failed, in a cold room, to see if they would hybernate. They attempted to do so, fastening themselves in one position, which they occupied through October, November, and most of December. But they had subsequently died, being unable apparently to stand the recent cold, which had had no ill effects on larvæ hybernating in their normal stage. European and American Catocalids.—Mr. Dadd exhibited *Catocala fraxini* from Germany, *C. nupta* from Wood Green, *C. sponsa* and *C. promissa* from the New Forest, and *C. pacta*, *C. luciana* and *C. concumbens* from Dakota, U.S.A. Hybrid Zygænidæ.—Mr. Tutt then exhibited some hybrid Zygænids, and read the following notes:—"It is in the memory of you all that Mr. W. H. B. Fletcher has bred hybrids between *Z. lonicerae* and *Z. filipendulae*, and between *Z. lonicerae* and *Z. trifolii* (the progeny of the latter proving fertile for four generations). In my pamphlet, 'Notes on the Zygænidæ,' I described fully two very distinct Zygænids, which had been united by Staudinger under the name of *Z. trifolii* var. *dubia*. These were *Zygaena medicaginis* and *Z. ochsenheimeri*, Zell., the former a five-spotted species, closely related to, but larger than, *Z. lonicerae*, the latter a six-spotted species, closely allied to *Z. filipendulae*, aberrations of which have been erroneously referred to this species. Whilst we were at Courmayeur (Piedmont), in 1894, Dr. Chapman sent eggs of *Z. ochsenheimeri* to Mr. W. H. B. Fletcher. These duly hatched, and when the imagines emerged a ♀ *ochsenheimeri* was paired with a ♂ *filipendulae* from the Sussex Downs (Lewes or Shoreham). Eggs were obtained, and a part of the moths resulting by the cross I now exhibit. Mr. Fletcher adds that the hybrids (or

mongrels) paired *inter se*, and the larvæ duly hatched. You will observe that the true ♂. *ochsenheimeri* shows considerable sexual dimorphism, the male being smaller than the female, the sixth spot (or lower of the outer pair of spots) being almost obsolete, with a distinct concavity on the outer margin of the hind-wing, which is largely accentuated by the widening of the rather broad black margin at this area. The females show the same peculiarities, but less markedly than the males. You will also notice that the males of the cross exhibit very markedly the characters of the male of *ochsenheimeri*, the sixth spot, in all but two of the male specimens, being much reduced, and in a majority of the specimens the hind-wing is like that of *ochsenheimeri*. On the other hand, the females, with two exceptions, are strikingly *filipendulae*, and the hind-wing character is almost entirely lost." INSECTS FROM THE CHESHIRE COAST, BIDSTON, ETC.—Mr. Tutt exhibited some Lepidoptera from the Cheshire coast, Bidston, etc., and said :—"The insects, which I exhibit for Mr. H. B. Prince, were captured on Wallasey sand-hills. The following particulars about the specimens may be interesting : NYSSIA ZONARIA.—These insects are remarkably uniform at first sight, and yet, when carefully examined, exhibit considerable variation. In some specimens the darker areas of the wings are but faintly developed, and the specimens have a very pallid and unicolorous appearance. At the opposite extreme, the transverse basal line is continued up to the costa, and the space between this and the next transverse line is filled in with dark grey shading, forming a more or less distinct transverse band. In other specimens the basal transverse line is almost, or quite, obsolete, and leaves the whole area, from the discoidal lunule to the base of the wing, with only the two dark longitudinal neurational markings. On the hind-wings there is an equal range of variation, the paler having scarcely any trace of the three transverse bands, which are very distinctly marked in the darkest specimens. The apterous females show no marked variation. *Triphaena orbona* (*comes*).—A moderately variable series, with nothing approaching the range of variation found among the Scotch specimens. Of the colour aberrations, you will observe the ab. *adsequa*, Tr. (pale grey), ab. *grisea*, Tutt (dark grey), ab. *ochrea*, Tutt (pale ochreous), and ab. *rufo-ochrea* (pale ochreous, tinted with red). For descriptions of these forms *vide*, *Brit. Noctuae and their Varieties*, vol. ii., pp. 96-99. At the same time it will be observed that two or three specimens closely approach the ab. *connuba*, Hb., and the ab. *subsequa*, Haw. This is probably the usual range reached in our Southern and Midland English counties. *Noctua xanthographa*.—Among these we get the usual range of variation, extending from the pale grey ab. *cohaesa* of Herrich-Schäffer, the typical *xanthographa*, Fab., the pale reddish-grey ab. *rufescens*, and an approach to ab. *obscura*, without reaching the range to which the Scotch specimens often reach. *Triphaena pronuba*.—The range in this series comprises some of the more usual forms. There is the pale grey type, the ab. *ochrea*, Tutt (greyish-ochreous form), the ab. *brunnea*, Tutt, and the ab. *ochrea-brunnea*, Tutt. Altogether the series tends to the darker aberrations. *Mellinia circellaris*.—The series of this species is composed of about half each of the greyish-ochreous type (*circellaris*), and the redder ab. *ferruginea* of Esper. The suffused ab. *macilenta*, Hb., is not represented. *Orthosia lota*.—These are a

most uniform series of the insect. Of the thirteen insects 11 are quite of the typical coloration, whilst one shows a tendency to approach the ab. *rufa*, Tutt. *Apamea basilinea*.—The four specimens sent are very fairly typical. *Ematurga atomaria*.—These specimens were captured on Thurstaton Common, by the river Dee, in May, 1896. They are rather smaller than our southern form, and more nearly approach in size, and in their dark fuscous coloration, those from the northern moors. *Hypsipetes ruberata*. — Captured at Flaybruck Hill, near Bidston, in May, 1896. These are an interesting series, somewhat smaller than the Wisbech specimens. Most of the individuals show the transverse markings fairly well, whilst only two examples exhibit the pale central band so conspicuous in the two allied species—*trifasciata* and *furcata* (*sordidata*).

Feb. 16th, 1897.—Heredity notes relating to Tæniocampa stabilis, Demas coryli, and Ennomos quercinaria.—Mr. Bacot exhibited two broods of *Taeniocampa stabilis* with their ♀ parents. No. 1, of 19 specimens, contained 9 ♂ s (47·37 %) and 10 ♀ s (52·63 %). No. 2 contained 10 specimens, the sexes being equally divided. All the specimens were much smaller than their ♀ parents (hardly larger than *T. pulverulenta*). This was probably due to their having been largely fed on sycamore (a food to which they were not very partial), and perhaps also to their having been occasionally allowed to run very short of food. Neither brood seemed to closely follow the ♀ parents, either in tone of ground colour or shading. Considerable variability existed in both broods as to the distance separating the orbicular and reniform stigmata. Mr. Bacot also exhibited 22 specimens of *Demas coryli*, bred during August, 1896, from a ♀ taken in Epping Forest, by Mr. A. F. Bayne, last April. These contained 12 ♀ s (or 54·5 %) and 10 ♂ s (or 45·5 %). He said: "The ♀ parent I carelessly lost; but, so far as my memory serves me, she was a strongly marked form, the dark and light areas of the fore-wings being sharply contrasted. A tendency in the same direction is noticeable in many of her offspring. The ♀ s seem to vary much more than do the ♂ s, both as regards size, and also as to the depth of colour and sharpness of outline of the dark band of the fore-wings." Mr. Bacot also exhibited 23 specimens of *Ennomos quercinaria*, containing 13 ♂ s and 10 ♀ s, bred in 1896, from a ♂ and ♀ of his '95 brood. The parents of both broods were also exhibited. A comparison with the far larger brood of 106 specimens, reared in 1895, showed that the proportion of ♂ s to ♀ s was almost exactly reversed; the figures for the '95 brood were 56·6 % ♀ s and 43·4 % ♂ s; while for the '96 brood they were 43·5 % ♀ s and 56·5 % ♂. The moths bred during 1896 exhibited but slight variation, the ground-colour being of almost exactly the same tone in all the specimens, only 1 ♀ being noticeably lighter in this respect. They also showed far greater stability as regards the strength of the dark suffusion in the fore-wings. In every case, with possibly one exception (the ♀ previously alluded to), the '96 brood was as dark as, or darker than, their parents, and also than their grandparents, if the sexes were taken separately and compared with the grandparent of the same sex. At least one ♀ and many of the males were darker than either ♂ parent or grandparents. In the '95 brood 23 % had hardly a trace of suffusion; 33·66 % were suffused, but to a less extent

than their parents; while the remaining 43·34 % were as dark as the ♂ parent, and considerably darker than the ♀ parent, only one ♂ specimen, however, being darker than the ♂ parent. The second crossing (possibly through the action of intra-selection) had apparently tended to eliminate or suppress the pale (?) ancestral strain (determinants). In any case, the difference between the '95 and '96 broods of the same race seemed worth attention. Lastly, Mr. Bacot exhibited 3 ♂ and 4 ♀ specimens of *Ennomos quercinaria*, bred in July, 1896, from ova given him by Dr. Buckell. One had no trace of suffusion, the remaining 6 all being strongly marked in this direction, and one ♂ in particular having the whole ground-colour of both wings of a smoky hue, instead of the usual bright yellow. Living Endromis versicolor.—Mr. Garland exhibited a living female specimen of *Endromis versicolor*, which emerged from pupa Feb. 14th, 1897; also four imagines of *Zygaena lonicerae*, from Enniskillen, 1896, *Plusia pulchrina*, from Enniskillen, 1896, and *Cucullia lychnitis*, bred May, 1896, from Hampshire pupæ of 1894. Remarkable aberration of Dromius 4-notatus.—Mr. Heasler exhibited a remarkable aberration of *Dromius 4-notatus*, taken under bark at Richmond in Jan., 1897. The head was shorter, flatter, and broader; the eyes being closer to the anterior margin of the thorax than was usual, owing to the short neck. The head was also strongly alutaceous and striated at the sides, making it appear very dull, whereas in the type form it is shiny, owing to the striæ being obsolete and the surface very finely alutaceous. The thorax was depressed on the disc, and the central channel fine and sharply defined. The upper surface was very dull and rugulose with scattered transverse striæ. In the type form the disc of the thorax was convex, with a broad central channel, and was very shiny. The elytra had the striæ rather deeper than in the type form. On the underside, the head and thoracic segments all exhibited the coarse striation and dull appearance, so different from the type, but the abdominal segments were typical. In fact, the whole of these remarkable variations were confined to the head and thorax and their appendages. Perhaps the most remarkable difference occurred in the femora, of which Mr. Heasler had drawn and exhibited a rough illustration, showing in what a marked manner they differed from typical femora, which were not only typical for the genus, but also, so far as he knew, for the whole of the British Geodephaga. The femora were also flattened on both the upper and undersides, and both surfaces were striated transversely. Mr. Heasler read the following notes on the species:—"This species, in common with other members of the genus, has carnivorous habits, feeding on small insects, found on the trees which the *Dromius* frequents. It is a nocturnal species, hiding in crevices of the bark by day, and feeding during the night. It hybernates under bark during the winter, in company with many other insects, which are always found in similar situations. Bearing in mind that the species is under bark quite six months of the year (Oct. to March), and also that there is in company with it a large number of insects which might become its natural food, and that nowhere else would it find food so readily during this time of year, it is quite possible that under these conditions the habits of the species might gradually become changed, so that the species became exclusively a sub-cortical feeder. The ten-

dency to a change of habit like this would, I think, be accelerated in England by the mild winters that we usually experience, and which would tend to shorten the hybernating period of a species, especially with food so close at hand. Under these conditions, it is evident that if a flatter variety occurred with more powerful legs, it would have a good chance of obtaining food that was beyond the reach of its less specialised neighbours, and it is precisely these variations which are shown in the specimen exhibited, so that, in spite of the abnormal shape of the femora, I cannot think that it should be classed as a monstrosity, but rather as an important variation, which in time may become a permanent and distinct species. The great difficulty is, that at present the specimen stands quite alone, and all the other specimens I have seen, show no tendency to vary in any one of the points in which this specimen shows so striking a divergence from the type."

March 2nd, 1897.—European and American lepidoptera.—Mr. Dadd exhibited *Nemeophila plantaginis* (♀ with red hind-wings); *Zygaena pilosellae*, *Z. trifolii*, *Z. filipendulae*, from Saxony; *Anosia archippus* and *Limenitis disippus*, to show mimicry; *Agrotis campestris*, *A. quadridentata*, *A. messoria*, *A. venerabilis*, *A. introferus*, *A. agrestis*, *A. insignata*, *A. subgothica*, *A. clandestina*, from Dakota, U.S.A. Cœnonympha tiphon *var.* inornata.—Dr. Buckell, exhibiting as a visitor, showed specimens of *Coenonympha inornata*, on which he read the following notes:—" In the paper on *Coenonympha tiphon*, which I read here in Oct., 1895 (*Ent. Rec.*, vol. vii., pp. 100–107), I alluded to the American butterfly, described by W. H. Edwards, under the name of *C. inornata*, which he and Scudder considered to be a distinct species, but which the late Jenner Weir looked upon only as a variety of *C. tiphon*. My paper was read by Mr. James Fletcher, of Ottawa, the entomologist to the Dominion of Canada, and he very kindly sent me the five specimens of what, as he writes, 'we here call *C. inornata*,' which had been taken in the North West during the summer of 1895, and which I exhibit this evening. In the right-hand column, I have placed some specimens of the Scotch form of *C. tiphon* var. *laidion*, and may just remind you that the characteristic mark of this form is the obsolescent condition of the ocellated spots on the underside of the hind-wing. Comparing the two insects, the American specimens have a brighter coloration on the upper surface, and the hind-wings are very little, if at all, darker than the fore-wings, whilst in the Scotch specimens they are distinctly darker. On the under surface of the fore-wings it is noticeable that the apical ocellated spot is much more developed in the American than in the Scotch specimens. The marked feature of the under surface of the hind-wings is the entire absence of ocellated spots in the four upper specimens; on the lowest there is just a trace of one. In four of the Scotch specimens there is likewise an entire absence of ocellated spots. On the whole, I am disposed to adhere to the opinion, that I expressed provisionally in 1895, that *C. inornata* is not sufficiently different from *C. tiphon* var. *laidion* to be worthy of a varietal name." Heredity notes on Amphidasys strataria.—Mr. Bacot exhibited 122 specimens of *Amphidasys strataria*, bred during 1896 from the ova of a ♂ and ♀ of one of his '95 broods. He also exhibited the '95 brood, together with its parents,

which were bred from larvæ beaten in the New Forest in 1893. The '96 brood consisted of 58 ♂s and 64 ♀s, or 47·54% ♂s and 52·46% ♀s. Mr. Bacot read the following notes on his exhibit:—"The variation of the specimens is not very marked, and can, I think, in every instance be traced to one of the parents or grandparents. It consists chiefly of minor details of marking, and the amount of dusky suffusion on the white ground of the fore-wings. Only one point is perhaps worthy of special mention. I refer to a tendency in some of the ♀s, for the dark bands on the fore-wings to close together at the base. The larvæ of both '95 and '96 broods were fed on cherry, and those of the grandparents on oak." Larvæ of Orgyia gonostigma.—Mr. Burrows exhibited (*a*) larvæ of *O. gonostigma*, hatched July, 1896, hybernated in bag out of doors on oak; (*b*) ditto, a full generation ahead, hatched Sept. 1st, 1896, hybernated indoors. The winter home of Apamea ophiogramma.—A single larva, believed to be that of *A. ophiogramma*, was also exhibited by Mr. Burrows. It was embedded in the root-stem of striped grass. Double-broods of O. gonostigma.—With regard to the double-broods of *O. gonostigma*, Mr. Burrows said, in 1887 the imagines emerged on June 28th, the ova hatched on July 18th, and the larvæ pupated on Aug. 30th. In 1893, the imagines emerged on June 14th, the ova hatched on June 27th, the larvæ pupated on Aug. 13th, the imagines again emerged on Aug. 25th and the ova again hatched on Sept. 15th. In 1896, the imagines emerged on June 22nd, the ova hatched on July 2nd, the larvæ pupated on Aug. 3rd, the imagines again emerged on Aug. 15th, and the ova again hatched on Sept. 1st. Living specimen of Aglais urticæ.—Mr. Garland exhibited *A. urticae*, taken at rest upon a brick wall at Harrow Green, Leytonstone, about 10 o'clock in the morning of Feb. 19th. Aberrations of Hybernia defoliaria.—Mr. Garland also exhibited bred male aberrations of *H. defoliaria*, being larger than captured specimens. Bruchus lentis.—Mr. Newbery exhibited *Bruchus lentis*, from Egyptian lentils. He read the following notes: "This species is erroneously stated to be without a thoracic tooth, by both 'Cox' and 'Fowler,' although the contrary is stated in the original description." Field observations.—Mr. May said that he had found *Asphalia flavicornis*, *Taeniocampa stabilis*, *T. pulverulenta*, *T. incerta*, *T. munda* and *T. gothica*, on Feb. 27th.

March 16th, 1897.—T. crepuscularia (biundularia) not in Morayshire.—Mr. Tutt said that it had been stated, on the strength of a specimen in Mr. Adkin's possession, and another in Mr. Horne's, that *T. crepuscularia* (*biundularia*) was found in the Altyre Woods in Morayshire. He had examined Mr. Adkin's specimen, and so also had Mr. South, and Mr. Adkin, Mr. South and himself were all inclined to refer it to *T. bistortata*. He now exhibited Mr. Horne's specimen, captured on April 16th, 1892, on the trunk of a pine tree in Altyre Wood. This, a male in fine condition, is identical with the Perthshire race, which, as has been pointed out, is more nearly allied to the Central European typical form of *T. bistortata* than any other form occurring in Britain. Mr. Tutt further said that, although he had not yet seen specimens of *T. crepuscularia* (*biundularia*) from Scotland, he suspected that the southern counties, at least, would produce the species. Mr. Adkin stated that Mr. Horne's specimen

was a very fine one, and dark. His (Mr. A.) specimen had been sent to him alive, and, having spent some hours in a chip box, had injured itself considerably, but he had been fortunate in obtaining a few eggs, which produced larvæ in due course, and he expected the imagines shortly now. On the larval nest of a gregarious Europterid moth. —Mr. Tutt exhibited a nest of an Europterid, which he had received from Dr. Chapman, who had cut it from a pine tree in the neighbourhood of Cannes the previous week. He did not know which species it was—one member suggested *pityocampa*—as he was quite ignorant of the larvæ of the members of the genus to which they belonged. The larvæ were busy feeding, some being outside the web at the time the exhibition was being made. Mr. Tutt said that, when not feeding, the larvæ retired within the web, and came out again to feed. He also referred to the urticating properties the hairs of these creatures were said to possess, but stated that, although he had handled these larvæ, he had felt no ill effects. The eggs of T. bistortata and T. crepuscularia (biundularia). — Mr. Tutt made some remarks on eggs of *T. bistortata*, eggs of *T. crepuscularia* (*biundularia*) and eggs of ♀ *T. bistortata*, that had been fertilised by a ♂ *T. biundularia*. The first two sets showed considerable differences, which were exhibited by drawings made under the microscope by Messrs. Rowe and Baty. The eggs of *T. bistortata*, as exemplified by the batch that had been examined, were long and cylindrical, with rounded ends. Those of *T. crepuscularia* (*biundularia*) were of only about two-thirds to half the cubical contents of those of *T. bistortata*, and, although exhibiting considerable variation, were of a somewhat oval form, or inclining to the shape of a hen's egg. To the naked eye, there did not appear to be much difference in colour, both being of a pea-green, but those of *T. crepuscularia* (*biundularia*) were of a somewhat yellower tint. Under the microscope, however, the difference of colour became more marked, that of *T. bistortata* appearing of a pearly-green hue, that of *T. crepuscularia* being yellow, and whilst the shell of the former was iridescent and slightly transparent, that of the latter was somewhat opaque. There were also faint traces of longitudinal ribbing, just round the shoulder of the micropylar end, in the egg of *T. bistortata*, such traces not being discernible in the egg of *T. crepuscularia*. The egg of *T. bistortata*, too, was also noticeable for small irregular depressions, which occurred on the surface, and which appeared to be due to pressure or the contraction of the protoplasmic contents of the egg. These were not to be seen in the egg of *T. crepuscularia*, the shell of which appeared, under a high power, to be minutely pitted. Another character of differentiation in the two sets of eggs observed, was in the position of the lateral depression, which is so characteristic of many Geometrid eggs. In the egg of *T. bistortata*, the depression was placed well toward the micropylar end, whilst in the egg of *T. crepuscularia* it is placed much nearer to the centre. In the set of *T. bistortata* eggs examined, which had been fertilised by a male *T. biundularia*, the general shape, colour and appearance were very similar to those of the first set of *T. bistortata*. The eggs were, however, slightly smaller, and tended to be a little more rounded at one end than the other, showing some trifling variation between the two sets, and one or two of the eggs out of a considerable number examined, exhibited a most complete oval shape. They were, however, still very distinctly *T.*

bistortata eggs, as apart from those of *T. crepuscularia*. In colour, the cross fertilisation seems to have had some effect, for the eggs were, under a good power, certainly yellower than the other batch of *T. bistortata* eggs. This may, however, have been due to a slight difference in age. The lateral depression of this batch of eggs was puzzling, but, after a number of eggs had been repeatedly examined, it was found that it was placed well up towards the micropylar area, but was somewhat obscured by the depressions described as being characteristic of *T. bistortata*, being often placed in close proximity therewith. These eggs, like those of many other species that are laid in crannies, etc., *e.g.*, *Orrhodia*, etc., appear to be capable of much modification in shape by pressure, the moth pushing the egg into a cranny, and the soft egg being affected, more or less, by the pressure, and becoming somewhat similar in shape to the cranny into which it is pushed. It is very probable that the eggs of these two species have never before been examined side by side under the microscope, owing to the different dates at which the insects usually appear. The chance of doing so now is due to Mr. A. Bacot, who, by forcing the pupæ of *T. crepuscularia*, brought out the imagines at the same time that those of *T. bistortata* were appearing in the breeding cages. By this means also he obtained pairings between ♀ *T. bistortata* and ♂ *T. crepuscularia*, although it appeared that they would not cross the other way. This is, of course, exactly parallel with Dr. T. A. Chapman's experiment, when he forced *A. betularia* to appear in March, obtained pairings between that species and *A. strataria*, and not only obtained fertile ova, but bred the hybrid imagines. Rare species.—Mr. Tutt exhibited a series of *Cedestis gysselinella*, Dup., captured by Lord Walsingham and Mr. Durrant at Merton on July 4th, 1896; specimens of *Steganoptycha pygmaeana*, Hb., captured by Mr. Durrant, also at Merton, on April 19th, 1896. Also a specimen of *Cœratemma terebrella*, Zk., bred by Mr. Durrant on July 18th, 1896, from *Cephalonica*, at Merton. Local Coleoptera.—Mr. Heasler exhibited his collection of Club-horned Coleoptera, the latest additions being *Myrmestis piceus*, taken in a nest of *Formica rufa*, in the New Forest, and *Rhizophagus ferrugineus*, captured in Richmond Park, under bark. European Lycænidæ.—Mr. Dadd: Lycænidæ from Europe, including *Chrysophanus virgaurea*, *hippothoe*, and *dorilis*, *Ereres argiades*, *Polyommatus damon*, *Lycaena arion*, *jolas*, *Nomiades cyllarus*, and *N. semiargus*. Experiment in breeding Arctia caia.—Mr. Bate detailed an "Experiment in breeding *Arctia caia*." He had begged some larvæ off Mr. Geo. Shields last August, the imagines of which he exhibited. They had been fed on lettuce, and all had more or less yellow hind-wings. The continuing generation, which formed the subject of the paper, was fed on deadnettle. Mr. Bate proceeded: "As my insects emerged, one after another, throughout the first three weeks of September, I made desperate attempts to get them to pair, which they are none too ready to do in captivity. The Fates at first seemed to be against me. There were several days difference between the dates of emergence of the sexes, and I continually had to try and pair a three or four days' old male with a fresh female, or *vice versa*. I kept them all till they died, but either they laid no eggs at all, or infertile ones, until, on September 20th, a pair emerged within a few hours of one another, and, although in this case, as in all the others, I was unsuccessful in observing the act of pairing, on the 22nd I

found a batch of ova, next day another, and for two more days a further deposit—in all about 800 eggs. Having taken Dr. Chapman's papers as my text-book, I was naturally interested in confirming or modifying his various observations, and that concerning the opacity of the ovum came first under review. I was surprised at it, but not having bred *caia* from the egg for some time, was willing to believe that my own observation was at fault. It is possible that Dr. Chapman's record of what he saw is quite correct, but I saw something different on this occasion. The eggs which, when freshly laid, have a slightly greenish hue, become more distinctly cream-coloured during the following three or four days; on the 15th day, a dark spot, slightly out of the centre, became visible. One small batch of eggs had been laid in the glass cover of the box, and examination of this spot with a pocket lens under transmitted light showed that it was the larval head. Each day the larval form became more and more distinctly visible, and on the 14th day the jaws could be seen moving. Although, of course, more distinctly visible under transmitted light, the same phenomena could be observed in those eggs which had been laid on the cardboard sides of the box. On the 15th day, the first larvæ emerged from the egg, biting their way through near the edge, and not eating more of the shell than would enable them to get out. For nine days, larvæ continued to come out, but whether owing to the abnormal time of year, the dryness of the box, or some other undetected cause, only a small proportion ultimately emerged, the larger portion dying in the egg. On first appearance, the larvæ were nearly white, the hairs and tubercles slightly darker, but, in a few minutes, it could be seen that they were darkening rapidly, and passing through dark brown, they, in a few hours, became almost uniformly black. They were supplied with deadnettle, but for two days the closest scrutiny failed to detect any signs of feeding; the larvæ, if left to themselves, remaining close to the shells they had come out of, and if removed to the food-plant promptly leaving it, and congregating on the white cardboard side or glass cover of the box. I have usually found the first few days of the life of all larvæ a critical time, as many do not seem to be able to make up their minds to feed at all, and deaths are numerous until the first change of skin has taken place. From the 15th to the 20th of October, I noted that some 60 larvæ had ceased to feed, and, having spun a slight silk pad as a holdfast for their prolegs, had apparently laid up for the purpose of undergoing their first ecdysis. The period of quiescence was a prolonged one, and it was not until the 22nd that I observed the first larva in its fresh coat, and the last had effected the change by the 1st of November. Reversing Dr. Chapman's procedure, I had removed each larva into a fresh glass jar as fast as I found it had changed, the consequence being that the last second-skin larva did not reach bottle No. 2 until the first was laying up for its second change. Bottle No. 3 was commenced on November 5th, and bottle No. 4 on the 19th. On December 1st appeared the first of the fifth-skin larvæ, dressed in his full parade uniform, and by the 16th, ten larvæ had reached this stage. On December 30th, the sixth change was commenced, and by January 6th, five larvæ had reached this stage, the remaining five lagging behind, and, as it ultimately turned out, never underwent this moult at all, but after wandering about in an aimless manner,

occasionally nibbling at their food, but more often remaining without feeding at all, one by one died off, and this in spite of my utmost endeavours to tempt their appetites, by supplying them with stinging-nettle, dock, and other plants, in addition to the deadnettle, of which I had a plentiful supply. One larva died after moulting into the sixth skin, and the remaining four commenced spinning on the 9th, 12th and 15th (2) of February. The spinner of the 9th pupated on 22nd, 13 days after the commencement of its cocoon; that of the 12th on the 24th, or 12 days afterwards; and one of the 15th got through on March 6th, a delay of 19 days. The second of the 15th February spinners had not changed on the 7th, but when it ultimately succeeded in effecting this operation I do not know, as I have been absent from London. Thus far, my ten "forwards" have produced four pupæ, and had formed 16·6 % of those which had effected their first change of skin. Returning now to the contents of bottles 2, 3 and 4, all those which occupied bottle No. 4 appeared to be hybernating, and these I regarded as Dr. Chapman's so-called "normals." They had undergone three changes, and were in their 4th skin. The "laggards" in bottles Nos. 2 and 3, however, went on feeding, and ultimately, by February 14th, all had reached the same stage, and on the following day the first 5th skin laggard appeared, but not in *caia* plumage. Indeed, I saw little difference in its appearance, except that it was considerably larger. Eleven larvæ reached this 5th skin state by March 1st, and on March 6th, one of them moulted for the fifth time, and in this, its 6th skin, took on the *caia* plumage. And now a second disaster awaited me, for whilst the normal hybernators had not yet woke up, the laggards suddenly refused to eat, and one by one died off, until, at the present moment, I possess only five laggards, all in their 6th skin, four of which are laying up for another ecdysis, and one which, although the largest, is certainly the liveliest, and is here in the small glass-topped box, whilst the large jam-bottle contains the normal hybernators, which still sleep the sleep of the just caterpillar, waiting to be made perfect. Now let us note first that the winter has been exceptionally mild, and, in addition to this, my *caia* have occupied a position of warmth in my sitting room, where the temperature is somewhere about 60°-65° F., and yet a certain number of larvæ have hybernated right through. Next as to the laggards, they have all passed the normal by one skin. One, indeed, got two skins in advance before it died. I see distinctly that the continual handling of the larvæ in shifting them from bottle to bottle as fast as they moulted, has apparently been the cause of great mortality, and yet I fancy my procedure was perferable to that of Dr. Chapman's, who on certain of his larvæ laying up to moult, removed the *remainder* into a new bottle. On my plan, one bottle always contained all the larvæ in a certain state, and as each one assumed a new state it was removed. With his plan, several bottles gradually accumulated, each containing larvæ in the same stage of development, and I cannot help thinking that, owing to the fact that the various stages overlapped each other in point of time, the most careful and acute observer, and I am quite ready to hail Dr. Chapman as such, would be liable to become mixed up as to the number of moults which had taken place in any particular instance, and this difficulty would be vastly increased as the number of specimens under observation increased. Whilst not for

a moment denying that it is quite possible that a larva might undergo a great number of changes of skin when being fed up in an abnormal temperature at an unnatural time of the year, the fact remains that of 50 larvæ kept under observation, none except the forwards had undergone more than three moults, that is to say, reached their 4th skin by February 14th. Again, Dr. Chapman notes that it is in the 5th skin that the larva hybernates, whilst all mine did so in the 4th. I do not lay much stress on the results I obtained as differing from those obtained by Dr. Chapman, because I believe that the exceptionally mild winter and the indoor position of feeding would probably have a large influence on the number of moults. I failed to detect any *fuliginosa*-plumaged larvæ, all mine passing direct from *Spilosoma* to *caia* plumage. As to whether forwards exist in a state of nature, I have in bygone days seen larvæ in adult clothing in the autumn, when that has been mild through the prolongation of the summer, but as I invariably left them out of doors for the winter, they always died, and I got the idea that they could not hybernate in *caia* dress. This, Dr. Chapman appears to confirm, as he says that some aberrant normals prepared to hybernate in distinctly *caia* plumage, but does not say that they actually succeeded in doing so. Even if they did so hybernate, that would be no proof that wild ones could do so also, as Dr. Chapman was apparently breeding indoors." Mr. Clark said that this species should be hybernated out of doors, and kept exposed to all weathers. They were usually kept too dry. Mr. Fenn remarked that all hairy larvæ are apt to die of mould. He described an excellent method of hybernating the larvæ out of doors, by placing a sloping piece of glass over the top of the tub or other vessel in which they were confined, to keep the rain off. Mr. Heasler queried the action of food on the coloration of the wings. Mr. Nicholson said that several bred specimens had a tendency to yellow hind-wings, although perfectly healthy. A vote of thanks to Mr. Bate terminated the proceedings.

April 6th, 1897.—Cidaria immanata from Raindene Wood.—Dr. Sequeira: a series of *Cidaria immanata* from Raindene Wood, near Folkestone. Xyleborus saxeseni from Richmond Park.—Mr. Heasler: a series of *Xyleborus saxeseni* from an oak stump in Richmond Park last November. He said: "This species belongs to the group which bore into the solid wood, and are usually difficult to obtain, especially when they take to oak. The whole of my specimens, however, were taken in the bark in company with *Dryocœtes villosus*, *Placusa pumilio*, *Rhizophagus ferrugineus*, etc." Tæniocampa populeti.—Mr. Taylor: a series of *Taeniocampa populeti* from Wimbledon, illustrating the entire range of variation of the species in this district, and including specimens of ab. *obsoleta*, Tutt, and ab. *intermedia*, Tutt. The Lepidoptera of the Isle of Dogs.—Mr. Woolley read some "Notes from the Isle of Dogs." He gave a list of the Lepidoptera to be taken on the island, and exhibited many of the species and some plants. The particular piece of ground from which all these were taken was about a mile square, and was constantly used by the Millwall Dock Company as a receptacle for the mud which is dredged from the bottom of the dock. The land was divided into three parts, and each division was flooded with mud every third year. The following is a list of the

Lepidoptera taken on the island. RHOPALOCERA :— *Pieris brassicae* (common), *P. rapae* (common), *P. napi* (common), *Aglais urticae* (common), *Pyrameis atalanta* (fairly common), *P. cardui* (not common), *Chrysophanus phlaeas* (not common). SPHINGIDES :— *Smerinthus ocellatus* (not common—3 imagines, 4 larvæ), *S. populi* (not common). CHELONIIDES :—*Spilosoma lubricipeda* (common), *S. menthastri* (common), *S. urticae* (single specimen), *Arctia caja* (common as a larva), *Deiopeia pulchella* (single specimen), *Liparis salicis* (single specimen), *Orgyia antiqua* (common). NOTODONTIDES :—*Dicranura vinula* (single specimen). GEOMETRIDES :—*Rumia crataegata* (common), *Abraxas grossulariata* (not common), *Hemerophila abruptaria* (not common), *Camptogramma bilineata* (single specimen), *Boarmia repandata* (not common), *B. gemmaria* (fairly common), *Melanippe sociata* (common), *M. fluctuata* (common), *Cidaria corylata* (not common), *Eupithecia centaureata* (not common), *E. subnotata* (common), *Pelurga comitata* (common). NOCTUIDES :—*Acronycta megacephala* (larvæ only, and not common), *Leucania conigera* (fairly common), *L. pallens* (common), *L. impura* (common), *L. comma* (not common), *Hydroecia micacea* (not common), *Xylophasia lithoxylea* (common), *X. polyodon* (very common), *Gortyna flavago* (took 15 in 1892—never before or since), *Mamestra brassicae* (very common), *Luperina testacea* (fairly common), *Apamea basilinea* (not common), *A. didyma* (common), *Caradrina cubicularis* (not common), *Peridroma suffusa* (common), *Agrotis exclamationis* (very common), *A. nigricans* (very common), *Tryphaena pronuba* (common), *T. fimbria* (single specimen), *Noctua xanthographa* (common), *Cosmia trapezina* (not common), *Phlogophora meticulosa* (not common), *Plusia gamma* (very common), *Hadena trifolii* (very common), *H. oleracea* (very common), *Hecatera serena* (single specimen). HEPIALIDES :— *Hepialus humuli* (common), *H. lupulinus* (common), *H. sylvinus* (not common). Mr. Tutt wondered what *Cidaria corylata* fed upon in the Isle of Dogs, but said that *Camptogramma bilineata* generally occurs wherever there is any garden herbage. ARCTIA CAIA AB. FLAVESCENS.—Mr. Clark exhibited bred specimens of *Arctia caia* ab. *flavescens*, from larvæ taken near Hackney Marsh. ASTYNOMUS ÆDILIS AT LEA BRIDGE.—Mr. Clark also exhibited two specimens of *Astynomus aedilis*, taken at Lea Bridge. BISTON HIRTARIA IN MARCH. — Dr. Sequeira reported *B. hirtaria* as abundant in North London. He had taken seven specimens in less than half-an-hour on the 21st March.

April 20th, 1897.—SPRING MOTHS.—Mr. Dadd exhibited representatives of the genus *Taeniocampa*, which had been captured at Oxshott at the end of March and on April 1st. The exhibits included a very fine series of *Taeniocampa miniosa*. CIDARIA PSITTACATA.—Dr. Sequeira exhibited some very fine specimens of *C. psittacata*, including many banded individuals from the New Forest. LARVA-BEATING. — Mr. Dadd reported that he had beaten for larvæ at Oxshott, on April 19th. The pines gave four species, including *Thera variata* and *Ellopia fasciaria*. He had also found imagines of *Tephrosia bistortata*, on fences, and beaten imagines of *Panolis piniperda* from a pine-tree.

April 27th, 1897.—The Society held on this date a Conversazione and Exhibition at the London Institution, Finsbury Circus. There was a good attendance, and visitors seemed much pleased with the

efforts of the committee to provide for their entertainment. Although the proximity of the date to the Easter Holidays prevented some friends exhibiting, who would have done so had they been in town, yet the committee acknowledge with great satisfaction that they were well supported by the members of their own society, and met with much kindness on the part of well-known entomologists, who brought selected portions of their collections to add to the attractiveness of the exhibits. Lepidoptera predominated, and care had been exercised to procure the representation of most of the groups. British Lepidoptera.—Mr. J. A. Clark (vice-president) brought his drawers of British butterflies, supplying a complete representation of all our known species, special attention being directed to a long series of ♂ and ♀ *Chrysophanus dispar*, now extinct as a British insect, and to hermaphrodite specimens of *Dryas* (*Argynnis*) *paphia*, *Plebeius* (*Lycaena*) *aegon*, and *Polyommatus icarus* (*Lycaena alexis*), etc., and black varieties of *Limenitis sibylla*. Mr. C. Nicholson exhibited Rhodocerid, Vanessid and Argynnid Butterflies, and a case of forms of aberration from type, including a *Pyrameis atalanta*, with partial bleaching of red band on right hind-wing; *Pyrameis cardui*, with an additional white spot on fore-wings in one specimen, and curious neuration of left-hind wing in another; and *Aglais urticae* approaching var. *ichnusa*. Mr. A. W. Dennis showed a case of picked varieties of Lepidoptera, of which the principal were a xanthic *Epinephele janira*; *Pararge egeria*, a ♀ with eight markings enlarged, and a ♀ with ♂ coloration; *Pyrameis cardui*, much suffused with black; *Argynnis adippe*, with median black band on all wings; *Brenthis selene*, with pale ground colour, and a second specimen with black band on fore-wings; *Cupido minima*, short series of undersides, showing variation from normal markings to all spots obsolete; *Polyommatus bellargus*, a ♂ with ground colour light ash, and all basal spots and spots within lunules absent; *P. icarus*, a ♀ with ocelli obsolete; *Spilosoma lubricipeda*, with central fascia on all wings, extreme London form; *S. menthastri*, with all usual spots very much enlarged, taken in London district; *Callimorpha dominula*, with all spots on fore-wings buff. Mr. Dennis followed the plan of placing for comparison a typical specimen by the side of each insect divergent from the type. Mr. Robert Adkin lent his "clear-wings," including series of the whole of the known British species; a drawer of Bombycid moths, with long series of *Endromis versicolor*, *Lasiocampa quercifolia* and *L. ilicifolia*, amongst the latter being one of the original Cannock Chase specimens; and a box of choice varieties, *viz.*, *Camptogramma bilineata*, black forms from Kerry and banded forms from Shetland; *Thera juniperata*, banded forms from Orkney; *Amphidasys betularia*, black forms from Yorkshire, and others; *Boarmia cinctaria*, banded and plain forms from S. Ireland; *B. repandata*, black, brown and grey forms from various localities in Britain. The variable species, *Abraxas grossulariata*, was represented in a second box by some numbers, specimens having the black markings and spots reduced to a vanishing point, and leading through more darkly marked forms to a black specimen, in which the yellow spots were absent, and white merely represented obsoletely by three faint spots on each fore-wing. Mr. J. W. Tutt (president) undertook to exhibit some of the Zygænids, and gave workers at this group an opportunity of studying *Zygaena hippocre-*

pidis, St., a species usually confounded with *Z. filipendulae*, of which typical specimens were also shown. In drawers of Geometers, also contributed, were to be seen melanic forms of *Amphidasys betularia*, a series of aberrations of *Cidaria immanata* from Lochgoilhead, and a specially interesting insect, a hybrid between *Amphidasys strataria* and *A. betularia*, bred by Dr. T. Chapman. Mr. W. M. Christy showed *Zygaena filipendulae* and *Z. trifolii*, with variation occurring in the matter of colour and spots; and *Macroglossa bombyliformis* (the narrow-bordered bee hawk-moth), with scales all over the wings, which are only found prior to the use of their wings. Acceding to a special request, this gentleman very courteously placed in his drawer *Nyssia lapponaria*, with *N. zonaria* and some of its nearest Continental relatives, for comparison. Considerable interest was excited by the contributions of Mr. C. G. Barrett, which consisted of Psychids, the genera *Psyche*, *Epichnoptery.r* and *Fumea* being accompanied with their curious larval cases, and a box of European Psychids was added for comparison with the British species. In sub-family *Noctuina*, a most interesting drawer of *Agrotis cursoria* and *A. tritici* was shown, containing extensive series of each, and exhibiting remarkable variation, and in a drawer of *Leucaniidae* Mr. Barrett had specially inserted specimens of *Leucania faricolor*, the new species recently determined by himself, the shape of whose fore-wings could be compared with those of *L. pallens*. Mr. G. F. Mathew had entrusted to Mr. Barrett a box containing vars. of *L. faricolor*, ♀, which were marked with spots, and also two vars. of *L. straminea*. *Senta maritima* (*ulvae*) displayed in Mr. Barrett's series rich possibilities in variation, the fore-wings, in some specimens, being simply ochreous, and in others conspicuously marked with a row of black spots. From Unst, Shetland, he had received a moth which agrees with *Hadena maillardi* (St. Cat.), which, if satisfactorily determined, would add another species to our British list, but at present it was placed on the table as a form of *Crymodes exulis*, nine typical specimens of which, from Perthshire, Shetland and Ireland, were in the same box, and one intermediate form, belonging to Mr. Percy M. Bright. Mr. F. J. Hanbury (vice-president) brought up several drawers of Noctuids, extending from *Agrotis* to *Catocala*. *Noctua festiva* var. *conflua* was largely represented, and the *Xanthiae* were much admired. Mr. L. B. Prout, who has been paying attention to the genus *Coremia*, exhibited bred series of *C. ferrugata* and *C. unidentaria*, with the parents, to illustrate the influence of heredity. In the case of *unidentaria*, he supplied the following notes as to pedigree of the latest brood: "The specimens are somewhat small and weakly coloured through in-breeding, but 87 % are red (27 specimens out of 31). ♂ parent (red) is from a brood of which 71·2 % were red. ♀ parent (red) is from a brood of which 45·8 % were red. The parents of ♂ parent were a captured red ♂ and a ♀ from a brood of which 80 % were red. The parents of ♀ are from a brood of which 41·6 % were red." Mr. J. Riches showed some dark vars. of *Hemerophila abruptaria*, all captured at Hornsey Rise, and all being ♂; and a series of dark *Ennomia quercinaria* (*angularia*), bred 1896. Mr. G. Elisha's table was occupied by no less than 20 drawers of *Micro-Lepidoptera*, all of the greatest beauty as to freshness of moths and regularity of setting, a monument of labour. This group comprises the leaf-rolling (Tortrices)

and leaf-mining (classed under the *Tineae*) caterpillars, but the habits of the larvæ and their mode of feeding are very diverse, and not restricted to these two methods, some living in flower-heads, seed-vessels, and in galls, others in rotten wood, fungi, etc. Living larvæ were exhibited by Mr. D. C. Bate, laggards from a second brood, in 1896, of *Orgyia gonostigma*: and Mr. J. Riches brought up a clump of variegated ribbon grass, in the stems of which nearly full-fed larvæ of *Apamea ophiogramma* were feeding. Mr. C. Nicholson had a preserved larva (young) of *Lasiocampa quercifolia*, which showed the "lappets," which give its popular name. Exotic Lepidoptera.—Exotic Lepidoptera were nearly as numerously represented as British, the principal exhibitors being Mr. Stanley Edwards, who favoured the society by showing his valuable and immense collection of foreign *Papilioninae*, etc., from all regions; Mr. J. A. Clark, several drawers of tropical butterflies (genus *Morpho*, etc.), and the large silk-producing moths (*Atlas*, *Cecropia*, etc.), and fine examples of *Thysania agrippina*, usually said to be the largest known moth, occurring in Brazil and British Guiana; Dr. J. S. Sequeira, many cases of butterflies, principally Indian; Mr. A. Bacot, a large collection of Lepidoptera from the Johannesburg and Pretoria districts of S. Africa; Mr. E. M. Dadd, butterflies from Dakota, U.S.A., a special point of interest being the "mimicry" of *Anosia archippus* and *Limenitis disippus*, and the extent of variation of *Colias eurytheme*. The subject of "mimicry," or the assumption by persecuted species of similar or nearly similar coloration to that of species protected by scents, colours or presumed nauseousness of flavor, from their bird and animal foes, was well illustrated by Messrs. Watkins and Doncaster, of the Strand, who sent up three large cases of tropical butterflies, whose habits and colours bore on this point. Mr. O. E. Janson also exhibited a case with a similar object. Coleoptera.—Turning to other orders, Mr. H. Heasler furnished six cases of British Beetles, including Ground, Water, Rove, Club-horn, Leaf-horn, Skip-jack, Weevil, and Long-horn Beetles, a large proportion of which were collected in the 10 mile radius of London, and form the material for his "London List of Coleoptera." In this district may be found such "good things" as *Notiophilus rufipes*, *Oodes helopioides*, *Hydrophilus piceus*, *Hydraena testacea*, *Quedius scitus*, *Philonthus atratus*, *Epurea diffusa*, *Atomaria fimetarii*, *Aphodius lividus*, *Rhinonchus bruchoides*, *Molorchus minor* and *Tritoma bipustulata*. Orthoptera.—Mr. O. E. Janson exhibited, in addition to that previously mentioned, a case of the extraordinary "Stick insects." They were set out for study, with legs and antennæ extended; but in their natural habitat, lying along branches or twigs of trees and stems of plants with their legs, side by side, stretching out before and behind in a straight line with their body, which is not much thicker than the legs thus held together, they can with difficulty be discerned by the entomologist, and escape the notice of the unobservant, and it is presumable this is a further development of the "protective mimicry" principle. Pseudo-Neuroptera.—Mr. W. J. Ashdown obliged with a selected type collection of British Odonata, the following deserving notice: *Anax imperator* (*formosus*), *Orthetrum cancellatum*, *Leptetrum quadrimaculata* with the beautiful var. *praenubila*, all from Surrey; *Cordulegaster annulatus*, clear-winged specimens of *Calopteryx splendens*

and *C. virgo* ♂ var. approaching var. *anceps* (Steph.), and a ♀ of same species with apex of hind-wings darkened, and *Brachytrum pratense*, from Wicken Fen. Hymenoptera.—Hymenoptera were only represented by Mr. J. A. Clark's case of large nests of *Vespa britannica*, from Forres, 1893, on fir, birch and heather, and two smaller, from the New Forest, on ivy and yew. Miscellaneous.—Dr. J. S. Sequeira sent some cases of insects (silk moths, bees, blister beetles, gall insects, lac and cochineal insects), and their products (silk, honey, wax, dyes, shellac, etc.), useful to man in the arts, manufactures and medicine, illustrated by wall-diagrams, one of which, picturing 18th century medicines (pill-woodlice, etc.), created sympathy for our suffering forefathers, who must have had every inducement to say they were cured. Mr. R. M. Wattson's illustration of "Life in a Pond" was attractive. Large elegant glass jars, half-filled with water, on which floated pond weed, etc., well lighted artificially, contained *Hydrophilus piceus*, the large water-beetle; *Nepa cinerea*, the water-scorpion; dragon-fly nymphs of *Micronympha elegans*, *Libellula depressa*, *Æschna cyanea*, besides smaller water-beetles and other inhabitants of our ponds and pools. Apparatus.—For catching and setting insects, which, unfortunately, can only be satisfactorily studied by these means, Messrs. Watkins and Doncaster introduced to the notice of members several sorts of nets, which conveniently folded up, for catching winged insects and for "sweeping" beetles; boxes for larvæ, "travelling boxes," for use at the end of a holiday, when the country must be left and our captures are not dry enough to take off the boards without slipping. Mr. Bate showed a brilliant "cat's-eye" electric lamp, for use when sugaring, very small, of light weight, and with no oil to ooze out. Mollusca.—Shells were exhibited by Messrs. J. A. Clark, R. A. Adkin, and G. K. Gude. Mr. R. Adkin's carefully mounted land and freshwater shells included *Helix pomatia*, vars. of *H. nemoralis* and *H. virgata*, brown forms of *H. ericetorum*, and the exceedingly local species of *H. elegans*, from Dover, and a large shell of *Limnæa peregra* had the body whorl raised abnormally into a decided hump. Mr. G. K. Gude's boxes contained a beautiful collection of *Helix aspersa*, from many localities in Britain, also from Gibraltar, Algeria and New Zealand; and about 100 varieties of *H. nemoralis* and *H. hortensis*, with and without bands. Geology.—Mr. C. Oldham, who has collected pebbles from S. Devon and other coasts, and had them cut and polished, was able to show many sorts of Madrepores, marbles, and agates, all deserving examination and admiration. Botany.—Mr. Oldham also lent for the occasion his collection of lichens and mosses from Merioneth. Mr. F. J. Hanbury brought up to the meeting enough material from his splendid herbarium to keep botanists happy all the evening. In his selections he exhibited a set of Italian Alpine plants, and with great liberality put out for inspection some of the rarest and, in some cases, extinct dried British plants, all of which could be handled and examined by those interested. A copy of his Monograph of the British Hieracia (Hawk-weeds), so far as published, was laid on the table, the delicate illustrations of which are from the brush of Miss Lister and Mrs. F. J. Hanbury. Comm. Thos. Hanbury, whom many were hoping would attend the gathering, most kindly made the journey from

La Mortola, Vintimiglia, Italy, bringing with him a rich exhibit of fresh fruits and curious seed-pods, etc., from his own gardens. He himself gave information about these charming sub-tropical fruits, and at the end of the evening many ladies and gentlemen had reason to thank him for distributing the pods, citrons, etc., as mementos. Sprays with flower and leaf, or leaf and fruit, were justly admired. The following list will help the botanist to understand the beauty and, to English eyes, the rarity of the spectacle: *Citrus bergamia*, the Bergamot orange; *C. myrtifolia*, the myrtle-leaved orange; *C. lumia* and *C. medica* v. *cedrato*, citrons; *C. decumana* v. *pompelmos*, the forbidden fruit; *C. decumana* v. *santa-sabina*, the historical orange, described in the *Pharmacographia*, p. 112; *Solanum betaceum* (eatable); *S. ciliatum*; *Ficus repens*, the climbing fig; *Encephalartos altensteini*, a Cycad from the Cape; *Eucalyptus globulus*, the blue gum; six varieties of *Cucurbito pepo*, gourds; *Banksia grandis* and *B. marcescens*, the "bottle brush," from Australia; *Gossypium herbaceum*, cotton; flower-buds and seeds of *Eucalyptus lehmanni*; and seed-pods only of *Martynia proboscidea*, the "Wait-a-bit" thorn; of *Pithecactenium muricatum* (fam. *Bignoniaceae*) a double-valved husk, covered with blunt spines, holding innumerable, closely packed, winged seeds, with a curious hinged "septum" lying between the valves; and of *Canaralia ensiformis*; and fibre of *Agave rigida*, the sissal hemp of commerce. Ornithology and Zoology.—Messrs. A. F. and W. M. Bayne and F. S. Cottell exhibited eggs of hawks, owls, nightjar and kingfisher, and a collection of those of the Corvidæ (crow family), showing striking colour variation. Around the library had been arranged several large cases of birds and mammals. Mr. F. J. Hanbury's cases contained, besides others, terns, corncrake, sheldrake, black rat, shrews, and pole cats, shot in Norfolk, a species now nearly extinct in Britain; Mr. J. A. Clark: cinnamon blackbirds, little auks, ringed guillemot, turnstone, kingfisher, ringed dotterel, smew (♂ and ♀), great crested grebe, and long-eared bat, etc.; Dr. J. S. Sequeira: ruff and reeve, knot, redshank, dunlin, great northern diver, laughing jackass or great Australian kingfisher, sirral cat from Java (a musteline mammal), and porcupine ant-eater, *Echidna hystrix* (caught by himself in 1856, at Bendigo, Australia), an egg-laying mammal; Messrs. Watkins and Doncaster: bramblings; and Mr. J. Riches: *Picus minor*, the lesser-spotted woodpecker. Microscopical.—Two tables were set apart for the display of the infinitely minute, and the microscopists were besieged, this phase of natural history being always popular, and the manipulators having provided a most beautiful assortment of living or mounted objects. Special thanks are due to the energy and assiduous attention of Mr. Wm. Burton, M.Q.C., and the society are also indebted to the following gentlemen, who made this department so successful: Messrs. A. Bacot, A. W. Dennis, G. K. Dunstall, S. Edwards, F. J. Hanbury, W. H. Jackson, P. S. King, H. H. May, C. Nicholson, J. A. Simes, H. J. Turner, C. and W. West, and Dr. J. S. Sequeira. There could be seen under the best conditions of help from experts:—*Pseudo-neuroptera*: larva of *Ephemera*, or day-fly; Lepidoptera: hairs of larvæ of *Phorodesma smaragdaria* and *Porthesia chrysorrhoea*: Entomostraca: *Diaptomus castor* and *Daphnia pulex*, the water-flea; freshwater polypes: *Hydra viridis*; Rotifers: *Melicerta ringens*, *M. conifera*, and *Stephanoceros*

eichornii, tube-builders, a colony of a social rotifer, *Conochilus volvox*, and various free-swimmers; freshwater Polyzoa: *Lophopus crystallina*, *Fredericella sultana* and *Plumatella repens*: Infusoria: *Amœba* and *Epistylis*; Algæ: *Volvox globator*, to be found over submerged grass; Plantæ: seed of *Nemesia compacta* (expansion of testa). Dr. W. A. Kibbler arranged a stand with a brilliant light which illuminated a set of photo-micrographs, among which could be identified: Oyster Spat, scales of Podura, spine of Echinus (section), etc., etc. Electricity.—Gerard Smith, Esq., M.R.C.S., etc.. at great trouble brought the necessary apparatus for giving a demonstration (which was repeated later in the evening) of X rays phenomena. A separate room was required, as darkness was obligatory for the experiments. Dr. Smith began by showing two of Prof. Crooke's original experiments, demonstrating the movement, under the influence of high tension electric impulses, of the residual air molecules in high vacua; and the fluorescence resulting from the collision of the molecules amongst themselves against other materials placed in the course of the cathode stream (the molecular shadow experiment, and the fluorescence of Iceland spar). He then spoke of the fluorescence of certain salts under the impact of the X rays, produced outside the vacuum tube as the result of the bombardment of the cathode stream within the tube, and showed by various means the peculiar standard of "transparency" possessed by the X rays, wood, vulcanite, coke, aluminium, etc., being "transparent;" glass, metals, other than aluminium, etc., "opaque." He brought the interesting experiments to a close by showing the skeleton, heart, and movements of respiration in a living person. The Theatre.—At 8.45 a move was made to the theatre, when the president stated that as soon as the committee had decided to hold this exhibition, he could not resist the temptation of asking their learned and respected hon. member, Lord Walsingham, to be present, and to say a few words of encouragement to the members and their friends. Without the slightest hesitation Lord Walsingham kindly promised to be present, and, knowing how much his time was occupied with various pursuits, he was sure the members would all agree with him in thanking Lord Walsingham very heartily for this practical expression of his sympathy with their work. He (the president) considered that it was absolutely unnecessary for him to formally introduce Lord Walsingham to the members and their friends present. To many he was personally well-known, to all he was known by repute. His position as the leading micro-lepidopterist of the world had brought him into touch with those members of the City of London Entomological Society, who were lepidopterists, but his wider sympathies and work in other branches of natural history were such, that he had long been looked upon as one of the best informed naturalists of the day, and his name was a household word among all workers in the various branches of natural science. He would, therefore, simply ask Lord Walsingham to address the meeting.

LORD WALSINGHAM'S ADDRESS.

Lord Walsingham then addressed the members and their friends. He said:—"Will you permit one, who has devoted a great many years to the study of various branches of natural history, both at

home and in the field, to congratulate you, as members of this society, upon the facilities it affords you for exchanging views and comparing notes and specimens, and thus advancing not only the personal knowledge of each and all who take an interest in such studies, but very frequently also the general knowledge of the subject by means of discoveries, which, however small in themselves, may be, as it were, the missing links in some line of thought, by which important conclusions are ultimately verified. That such societies as these should exist in our large towns, and in the heart of the City of London, is in itself sufficient to prove the great interest taken by a large section of the population in acquiring some knowledge of the common things of the country, which they are likely to meet with when they can devote their leisure to field rambles. I think none of us would hesitate to prefer the opportunity of collecting a fair cabinet series of some of our commonest insects, to devoting our vacation, for instance, to a search for larvæ of *Boletobia fuliginaria* within the metropolitan district. I sat next to the great traveller, Mr. Stanley, one night at a big dinner, and the conversation having turned upon collecting objects of natural history, I mentioned the very refining and civilising effect of entomological societies and field clubs upon a section of the population of our large manufacturing towns. He had to make a speech soon afterwards, in which he emphasised the fact that he had that evening heard for the first time that bug-hunting had a civilising effect upon human nature. It certainly occurred to me that a very elementary study of ichthyology would have saved him and his followers from much unnecessary starving upon rotten bananas on the banks of the Aruwhimi river! We do not all have Mr. Stanley's opportunities of field study, but most of us are able occasionally to extend our knowledge of natural history somewhat beyond that which may be acquired through the medium of printer's ink, and such societies as this undoubtedly go far to defend us from the too popular fallacy that anything one sees in print must be true. Had I not arrived from the country only yesterday, and been far too busy to hunt up recruits, I should certainly have liked to send a card of invitation to this meeting in a friendly spirit to the publisher of the following charming and instructive description of the habits of *Cossus*: 'A talk about trees.* The elm tree. Dear children, now we must tell you a little about the elm. . . . . I am sorry to have to tell you that these beautiful elm trees are often much injured by the ravages of insects. One of these insects is called the Goat Moth. This tiny little creature bores holes in the bark of the tree, and lays her eggs there. A small beetle comes out of each egg, and these little beetles eat the soft parts of the wood, and so the poor tree begins to wither. As many as 80,000 beetles have been found in one tree.' This passage was discovered, and severely criticised, by the daughter of my assistant, Mr. Durrant, who was evidently preparing to review the work at the mature age of six. It is certainly remarkable that no one in this room should yet have discovered that caterpillars of any kind lay eggs from which beetles subsequently come into existence. The little boy who, when told by his mother that God made every-

* D.B.M. The Prize for Girls and Boys, 1896. [Published for the Proprietors by Wells, Gardner, Darton & Co., 3, Paternoster Buildings.] No. VI. (New Series), pp. 75-76, June, 1896.

thing, remarked that it must be niggling work making flies, expressed a very wide-spread opinion upon the subject of entomology, but the truly human desire to discover something unknown has fortunately enlarged the field of study, since the more conspicuous forms of life have become so well recognised that novelty is more than ever rare among them. Yet it is not only in the search for something new that the true worshipper of nature finds his greatest enjoyment: to watch the habits of birds and animals, to follow out the life-histories of even our commonest insects, is a source of pleasure to many, and gives us much to look back to in every country place that we have ever visited. For my own part, even here in town, I would rather smoke my pipe on the house-top, and listen to the flight and call-notes of birds in their migrations, than dance till 4 o'clock in the morning at any ball that ever was given at the West End. Against all arguments, I am prepared to maintain the advantages of a study of nature, and to encourage in all possible ways those societies which advocate and facilitate such studies against all scepticism. I must insist upon the civilising social effect of exchanging views and observations between kindred spirits, who meet upon common ground in search for the truth, and against all ridicule I am prepared to defend the niggling work involved in finding out the difference between one fly and another, no less than between beetles and caterpillars, or tigers and elephants, or Prime Ministers and Popes. Such work must be done before any definite knowledge of structure and of evolutionary development can be attained. Those who allow themselves to be seduced into the more attractive branches of biological study, which at present involve a good deal of theoretical speculation, are perhaps becoming a little too prone to disparage the efforts of systematic workers, which, after all, must form the primary basis of all theories and of all deductions, if they are to be made useful and intelligible to the public."

Mr. Fred Enock then delivered a lecture on the "British Trap-door Spider," magnificently illustrated by his own photographs and photographed drawings passed through the lantern, which, at its termination, was pronounced one of the greatest successes of the evening.

A programme of music, most kindly arranged by Mr. W. J. Petty, was performed during the evening, and the songs of Miss Kingsford and Miss Lola Pavlina, the brilliant pianoforte solo of Mr. F. Shaw, the songs of Messrs. Theo. Swinburne and Victor Maerker, and the trombone solos of Mr. H. Pearse, were much appreciated. Light refreshments were served during the evening, the whole of the arrangements being undertaken by Mrs. F. J. Hanbury.

May 18th, 1897.—Heterogynis penella.—Dr. Chapman: *Heterogynis penella*, a moth sometimes spoken of as half-way between *Psyche* and *Zygaena*, from the flimsy delicate structure of the black male. He said: "Really it is related to *Zygaena*, in so far that it appears to belong to the same stirps, but is far lower in the scale of evolution. The ♀ is rotund like the larva, but is even less supplied with appendages, having no trace of wings, whilst the true legs are organically connected with the pupa-case, retain it in its position outside the cocoon, and enable it to return, after fertilisation, to the interior of the chrysalis-case within which it lays its eggs."

Larvæ of different species.—Mr. Bacot: Larvæ of *Lasiocampa trifolii*, sent by Mr Simes, from Cornwall; larvæ of two species of *Arctia*, one of which was *Arctia purpurea*, sent by Dr. Chapman; larvæ of *Angerona prunaria*; larvæ of *Tephrosia bistortata* and *T. crepuscularia* for comparison; also larvæ of the cross between *T. bistortata* and *T. crepuscularia*. Mr. Bacot read the following notes on his exhibits:—"The Λ-mark on the dorsum of the segments in *T. bistortata* is well marked, and usually joined at apex, or only has a narrow opening, while in *T. crepuscularia* (*biundularia*) the corresponding mark is always widely open at apex, and often the Λ-mark is very faint or altogether absent. One box contains the larvæ of the cross between ♀ *T. bistortata* and ♂ *T. crepuscularia*, and the other two boxes the larvæ of pairings between ♀s of *T. crepuscularia* and ♂s of *T. bistortata*. One of the latter broods was from my own pairing, and the other from Dr. Riding's. The hybrid larvæ of both crossings show more tendency to follow *T. bistortata* than *T. crepuscularia*, though a few larvæ can be found with the open bar, and I think this is more frequent among the larvæ, the ♀ parent of which was *T. crepuscularia* (*biundularia*). I should just like to state that I was mistaken in my remarks at a previous meeting to the effect that the ♂s of *T. bistortata* would not pair with the ♀s of *T. crepuscularia*; it is evident that they must have done so, as all the ova laid by ♀s of *T. crepuscularia*, which had been shut up with ♂s of *T. bistortata*, hatched. I was misled by the fact that I never found them together, although with the reverse pairing I always found the moths *in cop.*, and they often remained together for several hours. This seems to point to a difference in the habits of the two species." Industries and politics of the ant.—Mr. Sauzé read a paper, entitled "Industries and Politics of the ant." He said that, at the name 'ant' there is, perhaps, conjured up in the mind an ideal insect, which leads to disappointment on watching an ordinary working ant out of doors. A casual glance at a few ants is misleading. It was to the varied forms of the ant tribe he wished to call attention. How the efforts of individuals, little in themselves, tell up in the aggregate can be seen by examining a common object in our woods, the nest of *Formica rufa*. The marvel in ant-life is the multiplicity of resources, habits, and industries, occurring in the many species. Of the inhabitants of a nest, the males and females were spoken of with their natural duties, and the workers, major and minor, the former appearing to act as sentinels or 'soldiers,' the latter attending to the duties of feeding the grubs, carrying pupæ into warmth, removing them from danger, and helping to force the imago from the pupal pellicle. It is these workers who build, forage, keep and distribute the common stores. Attention was next drawn to the connection between ants and aphides, to the migrating and hunting habits of species of *Eciton*, of S. America, to the so-called slave-making habits of *Formica sanguinea*, of this country, *F. fusca* being the ant enslaved, to the harvesting instincts of species of *Atta*, etc., in India, S. France and Palestine, to the operations of the extraordinary Agricultural Ant of Texas, and of the Umbrella Ant found in tropical America. As regards intelligence, ants were thus seen by these varied practical developments to deserve a high place, and, in the opinion of the reader, to rank before bees, and any other invertebrates. The nearest analogy amongst mankind

to the mode of life and government in an ants' nest was thought to be a commune. All the inhabitants of a nest work harmoniously for the general good, the queens (though waited on) and the males (though cared for) seem to have no voice in the good government of the nest, which is, as far as is known, an instinctive attitude of all, only possible in a community where in the case of the bulk of the race sexlessness prevents jealousies, and weakness begets interdependence. Mr. Tremayne asked whether no instances were presented of ants performing their marvellous operations under distinct leaders. He thought such instances might easily be overlooked. With regard to the place which Mr. Sauzé assigned to ants among Invertebrates, Mr. Tremayne suggested that possible rivals to them might be found in Termites, which were less known, but appeared to possess many of the socialistic abilities of the ants, and to be very similar to them in many of their habits. Mr. Dadd had known an ant carry away a full-grown larva of *Miselia oxyacanthae*. A vote of thanks to Mr. Sauzé was carried unanimously, and, in reply, Mr. Sauzé said that ants on the march certainly had officers at their sides. He thought that, according to our present knowledge, ants were possessed of more intelligence and ideas than Termites.

May 4th, 1897.—Lepidoptera from Digne.—Mr. Tutt exhibited a box of insects of various orders, collected during March by Dr. T. A. Chapman. These, he said, were interesting, and the presence of freshly emerged specimens of *Colias edusa* and *C. hyale* supported the now practically proved view that they hybernated as larvæ, and pupated and emerged in early spring. Among other species captured were *Spilothyrus alceae*, *Thais polyxena*, *T. medesicaste*, *Pieris daplidice*, *Anthocharis belia*, *Euchloë cardamines*, *E. euphenoides* (very fine examples of both sexes), *Leucophasia sinapis*, *Gonepteryx rhamni*, *G. cleopatra*, *Nomiades melanops*, *Polyommatus baton*, *Polygonia egea*, *Melitaea cinxia*, *Brenthis dia*, *Pararge egeria* (the southern fulvous form), *P. megaera*, and a magnificent series of *Erebia epistygne*, from Grasse. Among insects of other orders were many Hemiptera, Hymenoptera, Coleoptera, etc. Also several specimens of *Ascalaphus coccajus*, W. V. Larvæ and pupæ of Charaxes jasius.—Mr. Tutt (for Mr. Stanley Edwards) exhibited a number of larvæ of *Charaxes jasius* on the food-plant (*Arbutus*), which had been captured by Dr. Chapman at Cannes. He drew attention to the hood of the larva, and to the remarkable structure of the pupa. Porthesia chrysorrhœa on oak.—Mr. Tutt also exhibited larvæ of *Porthesia chrysorrhoea*, two nests of which Mr. Edwards had cut from oak in the neighbourhood of Digne. Tephrosia crepuscularia and T. bistortata.—Mr. Bacot exhibited three broods of *T. crepuscularia (bimaculata)*: Nos. 1 and 2 bred from ova of the York form, and No. 3 from ova of the ab. *delamerensis*, the eggs of all three broods being sent him by Mr. Hewett. Three broods of *T. bistortata* (*crepuscularia*): No. 1 from ova sent him by Mr. Hewett, who had received them from Major Robertson, No. 2 from ova which Mr. Hewett had received from Mr. Mason, No. 3 reared from eggs laid by moths of brood 2, that emerged last June. Larva of Anchocelis pistacina.—Mr. May: a larva of *Anchocelis pistacina*, one of a brood bred from ova laid by a ♀ taken on Tooting Bec Common, September, 1896. Exotic Coleoptera.—

Mr. Clark: a very fine exhibit of foreign Coleoptera, including the following: ♂ and ♀ *Chalcosoma atlas* (India), ♂ and ♀ *Odontolabis cuvera* (India), ♂ and ♀ *Ceratorrhina polyphemus* (W. Africa), ♂ and ♀ *Xylotrupes dichotomus* (Japan), ♂ and ♀ *Eurytrachelus titan* (Java), *Goliathus druryi* (W. Africa), *Batocera wallacei* (var.), *Chiasognathus granti* (Chili). Oporabia nebulata and Oporabia filigrammaria. —Mr. Prout: a representative series of named forms of *Oporabia nebulata* (*dilutata*); a variable series of *O. filigrammaria* from Ireland, Yorkshire, Bolton and Isle of Lewis; examples of the different forms which have by various authors been named *autumnata* (*-aria*), namely: *autumnata*, Bkh., from Germany, a North Finland specimen agreeing with the figure of *autumnata*, Gn.; a large specimen from Scheeberg, received as *dilutata*, but agreeing in the genitalia with *filigrammaria* or *autumnaria*, and a short series of *addendaria*, B.-White = *autumnaria*, Weav.; also a bred specimen of *approximaria*, Gregson, lent by Mr. F. N. Pierce, of Liverpool; also larvæ of *nebulata* (*dilutata*) in the second, third, fourth, and fifth stages, and those of *filigrammaria* in the fourth and fifth stages. Mr. Prout read an exhaustive paper "On the genus *Oporabia*." Mr. Tremayne said he had once come across a specimen of this genus, presumably *O. filigrammaria*, in the Fairy Glen, Penmaenmawr. It was resting on a trunk about 6 ft. from the ground, with the fore-wings slightly raised inwardly over the back, so as to leave the hind-wings slightly protruding at the sides, after the manner of *Gastropacha quercifolia*, when at rest. The month was September, and the specimen was a perfect wreck, but had evidently belonged to a strongly banded form. Early appearance of Melanippe fluctuata.—Mr. Riches said that he had taken a specimen of *Melanippe fluctuata* on May 1st.

June 1st, 1897.—Tiresias serra bred.—Mr. Heasler exhibited *Tiresias serra*, bred from larva obtained under bark at Richmond, last January. This species appeared to pupate in the last larval skin. Notes on breeding Arctia caia.—Mr. Bate exhibited four female *Arctia caia*, the offspring of a pair exhibited with them, which were the second brood of 1896, emerging in September last. He said: "These four 'forwards' fed through the winter indoors, pupated in February, 1897, and emerged after exactly 50 days in the pupal state. They were generally dark, and had more or less black fringe to hind-wings." Variation of larva of Saturnia carpini.—Mr. Bate also exhibited two larvæ of *Saturnia pavonia-minor*, one in the 2nd, and one in the 3rd skin. The first was black, with orange tubercles; the second was green, with interesting club-shaped hairs on the thoracic and last two abdominal segments. Notes on Melanippe montanata. —Mr. Prout exhibited a short bred series of *Melanippe montanata*, from a ♀ captured in Epping Forest. Eight of these fed up and emerged in the autumn; two hybernated in their final skin; also two bred specimens of the var. *shetlandica*, Weir, the larvæ of which hybernated in the last skin but one; also a specimen of the var. *lapponica*, Stgr., from North Finland. Mr. Tutt, in his *British Moths*, p. 274, appears to unite these two varieties, but they seem to differ considerably (as Herr August Hoffmann has remarked), in that the former is darker and more ochreous, the latter much paler than the type form. Living larvæ.—Mr. Bacot: Larvæ of *Acidalia margine-*

punctata and *A. inornata*, *Porthesia chrysorrhoea* and *P. similis*, *Polia xanthomista* var. *nigrocincta*, *Catocala fraxini* and *C. nupta*; also newly-hatched larvæ of *Eurranthis plumistraria* and *Hemerophila abruptaria*; also larvæ of *Tephrosia crepuscularia (biundularia)* in 1st stage. Mr. Bacot read the following notes: "Although the eggs of *E. plumistraria* and *H. abruptaria* are very similar, with respect to certain strongly-marked characters, the larvæ are entirely different. The young larvæ of *E. plumistraria* are superficially similar to those of *T. crepuscularia*. Differences of detail are, however, apparent with the microscope. The coloration and characters of newly-hatched larvæ of *Selenia* and *Nyssia* are also similar to those of *Tephrosia*, and it seems probable that *Selenia* is really much nearer to *Tephrosia* than to *Eugonia*, with which it is usually placed."

June 15th, 1897.—Boarmia consortaria in the New Forest.—Mr. Nicholson exhibited a specimen of *Boarmia consortaria*, taken in the New Forest on Whit Monday last, and some of the eggs laid by it. Malformation of Pieris brassicæ.—Mr. Bate: One ♂ and five ♀ *Pieris brassicae*, bred from larvæ found last autumn. Two females showed slight malformation, due to the tightness of the silk sling which the larvæ spun, and which caused a deep indentation in the pupæ. With reference to this exhibit, Mr. Nicholson said that he had always bred *Gonepteryx rhamni* with the mark of the silken girth across its wings, though not so badly as in these specimens. Aberrations of Coremia ferrugata, etc.—Mr. Bayne: *Coremia ferrugata* (1) with the twin spot obsolete, from Epping; (2) with the twin spot strongly developed, from the New Forest; (3) with the red lighter than usual, from Aylesbury; (4) with the band very dark, from Aylesbury. He also exhibited red-banded *C. unidentaria*, from Epping; *Melanippe galiata*, one with black solid band, from Aylesbury; *Cidaria corylata*, from Epping, one suffused with olive; *Aylais urticae*, approaching var. *polaris*, from Hoddesdon, 1897; *Nola cucullatella*, with the melanic var.; *Thyatira batis*, one from Epping, without the pink colour in the spots, though very fresh. Oxshott in June.—Mr. Bate had been at Oxshott on Monday last, and had found *Bupalus piniaria*, a few *Brenthis selene*, *Polyommatus icarus*, and many *Adela degeerella*. He had also found a swarm of bees hanging to one of the lower boughs of a pine tree. The bough being cut in half, the bees vanished, but they presently returned, and Mr. Bate then captured them, bough and all. Hydrilla palustris at Wicken.—Mr. Clark reported that *Hydrilla palustris* was taken at Wicken Fen on June 5th.

Oxshott in June.—Some of our members went, on June 26th, to Oxshott. Messrs. Prout and Garland proceeded to Esher, where they arrived at 11 a.m., walking from thence to Oxshott. On the way they worked the fences, which, however, produced only *Triaena psi* and *Acidalia aversata*, until they reached the Oxshott district, when *Hadena genistae* and other Noctuids turned up. *Eubolia plumbaria* was common on one part of the heath, and in a favoured spot among the pines *Plebeius aegon*, *Euthemonia russula*, *Ellopia prosapiaria*, *Macaria liturata*, *Bupalus piniaria* (abundant), *Aspilates strigillaria* and *Dianthoecia carpophaga* (one) were observed. The rest of

the party arrived at 3 p.m., after which the above-named species were taken more or less commonly during the afternoon, the only notable addition being *Acidalia straminata*. After tea, dusking in Steer Lane resulted in swarms of *Cidaria fulvata*, a few *Angerona prunaria*, one *Asthena luteata*, *Cidaria suffumata* (very worn) and *Hypsipetes sordidata*.

July 6th, 1897.—Silk of Bombyx mori.—Dr. Sequeira exhibited two cocoons of *Bombyx mori*, the silk of which differed from the normal colour, being white instead of yellow. Acidalia aversata in Hackney.—Dr. Sequeira also exhibited a ♀ specimen of *A. aversata*, taken in his garden at Hackney. Living larvæ of Cerura vinula.—Mr. Woolley exhibited living larvæ of *C. vinula* in the 3rd and 4th skins. New Forest insects.—Mr .Tremayne exhibited insects taken in the New Forest at Whitsuntide, including *Hypsipetes trifaseiata*, *Eupisteria obliterata*, *Aspilates strigillaria*, *Hydrelia uncula*, etc. Eggs of Leucoma salicis.—Mr. Dadd exhibited eggs of *L. salicis*, and remarked that "the eggs are laid in batches, a fresh batch being made every day. The laying takes place during the hottest parts of the day. They are bright green, and covered with a satiny silk." Coleoptera from the New Forest.—Mr. Heasler exhibited some Coleoptera from the New Forest, including *Carabus nitens* and *Dasytes niger*. Dicycla oo and Cymatophora ocularis.—Mr. Clark recorded the capture of *D. oo* and *C. ocularis* in Epping Forest. Notes from Oxshott.—Mr. Tremayne had been to Oxshott the previous Sunday, and had found *Plebeius aegon* swarming all over the heath. *Bupalus piniaria* was as abundant as ever, but only one female seen. Five *Macaria liturata* were taken, but practically nothing else worth noting, except, perhaps, a single specimen of *Epinephele hyperanthus*. Mr. Prout had been to the same locality yesterday (Monday), and had had much the same experience, but had taken rather more variety, his captures including *Eupisteria obliterata*, *Melanippe unangulata*, *Erastria fasciana* and *Euthemonia russula*.

July 20th, 1897.—Aberrations of Zeuzera æsculi.—Mr. Clark exhibited two beautiful aberrations of *Zeuzera æsculi* ♀, with many confluent spots, taken near Lea Bridge, on July 1st, 1897. Ichneumons.—Mr. Tremayne: pupæ of the Ichneumons of *Hybernia rupicapraria* and *Trachea piniperda*. Dr. Sequeira also exhibited two species of Ichneumons that infest *Chrysoclysta linnecella*. Aberration of Aglais urticæ.—Dr. Sequeira: an aberration of *Aglais urticae*, taken in the beginning of July, in Newport Park, Monmouthshire, differing from the type in the hinder wings being black, and the orange band, and two black spots usually found on the upper wing, being wanting. It was figured as var. No. 3 in Newman. Batrachedra præangusta in London.—Dr. Sequeira also exhibited specimens of *Batrachedra praeangusta*, occurring annually on a lime tree in a garden at Hackney.

August 3rd, 1897.—Larvæ of Chœrocampa elpenor and Arctia caia.—Mr. Dadd exhibited larvæ of *Choerocampa elpenor*, three being in their last skin, and two in the last but one, taken on Lea Marshes, near Ponder's End, on bed-straw, and now feeding on willow herb. He also showed larvæ of *Arctia caia* in second and third skins, bred from

dark ♀ with yellow-suffused hind-wings. New Forest Insects.—Mr. E. Heasler: the results of 14 days' work in the New Forest, 46 species in all, including two *Diphthera orion*; one *Arctia villica* from Lymington salt marshes, also larvæ of the same in 4th and 5th skins. He drew attention to a dark ab. of *Aplecta prasina* (*herbida*), and, as good captures, *Acidalia straminata*, *A. trigeminata* and *A. subsericeata*. He also showed the results of breeding *Selenia illunaria* var. *juliaria*, from eggs of spring brood. Larvæ of Platysamia cecropia.—Mr. Bate: larvæ of *Platysamia cecropia*, given him when in their 2nd skin, by Mr. O. Lindermann. In this skin they are yellow, with black tubercles, each surmounted by five short hairs. In the 3rd skin they have four red tubercles on the first two thoracic segments, the remainder black, with blue tips and black hairs. In the 4th skin the four red tubercles remain, and the two rows of seven next the dorsal line, and one single tubercle on the 8th abdominal segment, are yellow, the remainder being blue. In the 5th skin there are six red tubercles, the remainder as before, except that the yellow ones have only one bristle each, instead of five or six, as in the earlier skins.

September 7th, 1897.—Aberrations of Abraxas ulmata.—Mr. Tutt exhibited many striking aberrations of *Abraxas ulmata* from Mr. Dutton, of York, where this year the suffused form had not been uncommon. Mr. Dutton supposed, as most of the aberrations were more or less crippled, that the aberration was due to mal-nutrition. Nests of bees and wasps attacked by larvæ of Aphomia sociella.—Mr. Tutt also exhibited, on behalf of Mr. Tuck: nests of *Bombus lapidarius*, taken on August 18th, *Bombus latreillellus*, taken on August 23rd, and *Vespa rufa*, taken on August 13th, all from Tostock, near Bury St. Edmunds. These were all attacked by the larvæ of *Aphomia sociella* (*colonella*). He also exhibited representatives of the two *Bombi* and the *Vespa*, whose nests were exhibited. Aberration of Melanippe fluctuata.—Also an aberration of *Melanippe fluctuata* without markings, except a very small basal patch, and the central discoidal spot. This was taken three or four days ago at Boxhill. Aberrations of Odonestis potatoria, etc.—Mr. Oldham exhibited a pink variety of *Scabiosa succisa* from Epping Forest; 7 ♂ specimens of *Odonestis potatoria*, three being dark and four light yellow varieties; the latter included a very bright specimen. Another with a black patch at the base of the fore-wing, whilst a third had a narrow left fore-wing; also a ♀ *O. potatoria*, with distinct bars on the upper, and much suffused ones on the hind, wings. These were all bred this year, from Cambridgeshire larvæ. Pale aberration of Sphinx ligustri, and aberrations of other species.—Mr. Garland: A bred specimen of *Sphinx ligustri* of a very pale colour; four *Smerinthus tiliae*—one typical, the three others showing the band-like mark much reduced; these were bred from S. Tottenham pupæ, this season; aberrations of ♂ and ♀ *Angerona prunaria*, bred from larvæ from Chepstow, Monmouthshire; specimens of *Anaitis plagiata* from Boxhill, and an aberration of the same. An ant-lion from Piedmont.—Mr. Sauzé: specimens of *Myrmeleon formicarius* and *Tipula gigantea*, collected by Mr. Tutt, at Susa.

October 19th, 1897.—Aberrations of Dianthœcia conspersa.—Mr. Clark exhibited dark aberrations of *Dianthoecia conspersa* from Main-

land, one of the Shetland Islands. SUPPOSED ABERRATION OF POLYOMMATUS ICARUS.—Dr. Sequeira exhibited *Polyommatus icarus* with white spot on each fore-wing, taken at Boxhill, last month. Mr. Nicholson, having examined this exhibit through a pocket lens, said that the white spot was clearly something deposited on the wing. ABERRATIONS OF ANCHOCELIS PISTACINA, ARCTIA VILLICA, AND OTHER SPECIES.—Mr. Garland exhibited *Anchocelis pistacina*, from Woodford and Oxshott, with aberrations, all taken this year; also *Arctia villica*, bred this year, from Riddlesdown larvæ, and one aberration, on the fore-wings of which the cream markings formed a V. Mr. May exhibited the underside of a ♀ *Polyommatus corydon*, with long confluent spots on upper wings, taken near Guildford; also a pair of *Heliothis peltigera*, bred from larvæ; two pairs of *Nonagria geminipuncta*, bred from pupæ, and an *Agrotis exclamationis* with confluent stigmata, all from Sandown, this year. HYBRID TEPHROSIAS.—Mr. Tutt exhibited a very large number of hybrids: (1) *Tephrosia crepuscularia* (*biundularia*) ♂ crossed with *T. bistortata* ♀. (2) *T. bistortata* ♂ with *T. crepuscularia* ♀. (3) *T. crepuscularia* ab. *delamerensis* ♂ with *T. bistortata* ♀. (4). *T. bistortata* ♂ with *T. crepuscularia* ab. *delamerensis* ♀. (5) Cross of ♂ of the 4th set with a ♀ of the 3rd. These were all bred by Dr. Riding. Mr. Bacot exhibited a number of similar hybrids bred by himself. NEMEOPHILA PLANTAGINIS.—Mr. Tutt exhibited an aberration of *N. plantaginis* from Aberdeen, in which all the wings were black, the black markings having spread over all the wings. This was not a mere suffusion, as sometimes occurs in this species. INSECTS FROM SANDOWN.—Mr. Prout exhibited *Tapinostola hellmanni* from the Isle of Wight, quite a new locality for the species, also *Heliothis peltigera* from the same locality.

Mr. Bate read a paper entitled, "The Ideal Local Natural History Society." In the discussion which followed, Mr. Clark strongly advocated improvement in the Society's cabinet, which ought, he said, to be made so complete as to render assistance to all members in naming their specimens. The proceedings terminated with a vote of thanks.

Nov. 2nd, 1897.—CALAMIA PHRAGMITIDIS AB. RUFA.—Mr. May exhibited a series of *Calamia phragmitidis* with ab. *rufa*, from Sandown, captured in July, 1897. LEPIDOPTERA FROM WOODFORD.—Mr. Oldham: six bred specimens of *Botys urticalis*, *Endotricha flammealis*, from Epping Forest, *Apamea ophiogramma*, from Woodford, and one bright and distinct ab. of *Noctua xanthographa*, from Woodford. MELITÆAS BRED.—Mr. Garland: *Melitæa aurinia*, bred from larvæ taken at Carlisle, and *M. cinxia*, bred from Isle of Wight larvæ this year. POLYOMMATUS ICARUS BRED FROM LARVÆ.—Mr. Prout: A series of *Polyommatus icarus* bred from larvæ taken from *Ononis*; a specimen of *Laphygma exigua*, taken at sugar, at Sandown, September 2nd, 1897. HYBRID TEPHROSIAS.—Mr. Prout also exhibited two series of hybrid Tephrosias, bred between June and September, 1897. Those produced by the crossing of ♂ *T. bistortata* with ♀ *T. crepuscularia*, yielded both sexes in equal proportions, and no pupæ went over. Those reared from crossing ♂ *T. crepuscularia* with ♀ *T. bistortata* gave only one male, which emerged on the earliest date at which the brood commenced to appear. About ten or twelve pupæ of this latter brood, but no ♂s,

are going over the winter. Aberrations from Navestock, Essex.—Mr. Tutt, on behalf of the Rev. W. Claxton: *Anchocelis pistacina* ab. *serina*, and ab. *venosa*; *Agrotis exclamationis* ab. *picea*; *Xylophasia hepatica* ab. *characterea*; *Miselia oxyacanthae* ab. *capucina*. Aberration of Arctia caia.—Mr. Clark: A curiously suffused aberration of *Arctia caia*, bred from a larva captured at Walthamstow. The Microscope.—Mr. Nicholson read a paper on "The Microscope," for which a hearty vote of thanks was accorded him.

Nov. 16th, 1897.—Larvæ of Lasiocampids.—Mr. Bacot exhibited living larvæ of S. French *Lasiocampa quercûs*, S. French *L. spartii*, *L. callunae* from Aberdeen, cross between ♂ English and ♀ French *quercûs*, cross between ♂ *L. spartii* and ♀ *L. callunae*, cross between ♂ French *L. quercûs* and ♀ *L. callunae*. He also exhibited preserved larvæ of *L. rubi*, *L. quercûs* from the S. of England, *L. trifolii*, cross between ♂ *L. spartii* and ♀ English *L. quercûs*, cross between ♂ French *L. quercûs* and ♀ *L. callunae*, S. French *L. quercûs*. Mr. Bacot read the following notes on his exhibits:—"I exhibit to-night larvæ of *L. quercûs*, with its different varieties or sub-species *callunae*, *spartii*, and French *quercûs*, together with larvæ of crosses between these different races. I will briefly call attention to the principal differences between the adult larvæ of the several stocks, and afterwards of the crosses. These differences consist chiefly in the colour of the hairs, and these may be, for convenience, divided into two classes: firstly, the long hairs more or less evenly distributed all over the body; and, secondly, the fine short hairs, closely massed together on the dorsal and sub-dorsal area (of the larvæ) forming a thick fur, most probably of a protective nature, as these hairs are easily detached, and produce great irritation in the skin. In French *quercûs* both kinds of hairs are pure white. This I take to be the most specialised form in one direction. With *spartii* the short fur is bright red-brown. the long hairs being white. My *sicula* are, as yet, too small to be compared, but a larva Mr. Warburg showed me was very similar to *spartii* as regards colour, though possibly a little paler; *callunae* has both long and short hairs of a dark brown, approaching the hairs of *L. rubi* in colour. This I take to be the most specialised form in the opposite direction to French *L. quercûs*. I would call the members' special attention to the difference between *callunae* and English *quercûs*, which, in the southern counties at any rate, has the short fur of dirty white, or dusky colour, with the long hairs brown. No doubt a perfect series of transitional forms, from French *quercûs* to *callunae*, might be obtained, but there seems no doubt that the larvæ of the races inhabiting the extremes of latitude are distinct. In their early stages, the two French forms are alike, but very different from the English races, *quercûs* and *callunae*, which are also almost, if not exactly, similar in their early stages. The larva of *sicula* follows the other Continental races rather than the English form, but it differs in several points as to coloration and pattern. Now, as to the crosses, the larva of ♂ *spartii* with ♀ *callunae* has the hairs of a rich red-brown, with a few scattered long white hairs. *Spartii* ♂ with English *quercûs* ♀ is similar to above, but rather lighter coloured. French *quercûs* ♂ with *callunae* ♀ have the fur of a pale pinkish-brown. English *quercûs* ♂ with

♀ French *quercûs*, differ very slightly, if at all, from typical English *quercûs*. My ♂ *sicula* with ♀ French *quercûs* have adult coloration and fur, but are not fully grown. They are very similar to *spartii*. Last year, Mr. Warburg crossed French *quercûs* with *spartii*, and the larvæ of this cross, instead of showing transitional forms, divided into two batches, one being exactly similar to typical larvæ of *spartii* and the other to typical French *quercûs*. I am quite unable to give any explanation of this fact. None of the other crosses have shown the slightest tendency in this direction. The pupæ resulting from these different forms of hybrid *spartii-quercûs* larvæ were kept separate, and I crossed and paired the moths in all possible ways. Unfortunately, there is a large amount of disease among the larvæ this year, and I have lost most of the larvæ of these pairings, but the tendency of the few larvæ which reached adult coloration, was to follow the parental form, where the parents had the same coloured larvæ. When crossed again with the species the results were different. A moth bred from the white-haired hybrid larvæ, crossed with *spartii*, produced larvæ of *spartii* form; but I only have four or five larvæ living of this cross, the bulk dying before obtaining adult colours. On the other hand, a moth from brown-haired hybrid larvæ, crossed with French *quercûs*, produced part brown-haired and part white-haired larvæ. I have six living larvæ of this cross, three of each colour. The only living larva that I have of a pairing between the brown-haired hybrid larvæ with the white-haired hybrid larvæ, is white-haired. These last results are based on far too meagre data to be of any scientific importance; but they are, I think, not without interest, as showing what uncertain results attend the crossing of varieties or sub-species. ENODIA HYPERANTHUS, WITH PALE UNDERSIDES.—Mr. Prout: A long series of undersides of *Enodia hyperanthus*, sent by Mr. G. B. Routledge, from the Carlisle district, considerably paler than the southern form, and a few specimens approaching the extreme ab. *arctc*. RARE DIPTERA AND COLEOPTERA.—Mr. Claude Morley, exhibiting as a visitor, *Nemoraea quadraticornis*, Meade, unique, taken at Ipswich in 1893, described in *Ent. Mo. Mag.*, July, 1894; two *Phorocera incerta*, Meade, new to science, taken not uncommonly on oak trunks near Ipswich in 1897, described in *Ent. Mo. Mag.*, Oct., 1897; two *Xysta* (*Phasia*) *cana*, Mgr., new to Britain—a doubtful specimen taken in 1893, and an authentic one in May, 1896, both at Ipswich; two *Microdon mutabilis*, L., very rare indeed—two specimens in the New Forest in May, 1895; these are described in Mr. Verrall's forthcoming work on the *British Syrphidae*; one *Nomada guttulata*, Schk., the second British specimen (the first in Mr. Saunders' collection having no locality attached), taken at Ipswich, May, 1897; one *Gerris rufoscutellata*, Latr., very rare, on a tiny puddle in the woods at Ipswich, March, 1895; two *Anthaxia nitidula*, L., on hawthorn blossom, New Forest, May, 1895—only found in New Forest; two *Anobium denticolle*, Pz., very rare, under bark, New Forest, May, 1895, Richmond Park, Jan., 1896; one *Ilyobates forticornis*, Lac., very rare, flood refuse, Ipswich, Feb., 1897; one *Lionychus quadrillum*, Duft., rare, on banks of brackish stream, Felixstowe, April, 1897. ABERRATIONS FROM WOODFORD.—Mr. Oldham: a long and variable series of *Anchocelis pistacina*, and a specimen of *Calocampa*

exoleta from Woodford. LEPIDOPTERA EXHIBITED.—Mr. Bayne exhibited single specimens of *Lasiocampa quercûs* from Norfolk, the New Forest and Epping Forest, for comparison. *Eubolia cervinaria* from Broxbourne; a small indistinctly marked aberration of *Luperina testaeea* from Broxbourne; *Melanippe fluctuata* and *Rumia luteolata*, taken on Sept. 15th. He suggested that these might be 3rd broods. PAPILIO POLYTES AND ITS VARIETIES.—Mr. Edwards exhibited specimens of *Papilio polytes* and its varieties, and closely allied species, to illustrate his paper. HEMIPTERA AND DIPTERA.—Mr. Jennings, on behalf of Mr. Clark: a box of insects of various orders, the most interesting of which, perhaps, were *Acanthosoma tristriatum* (Heteroptera) and *Spilomyia speciosa* (Diptera), upon the former of which Mr. Jennings made some remarks. Other interesting insects in the box were, *Ledra aurita* (Homoptera) and *Hippobosca equina*, the "New Forest fly." COLEOPTERA FROM W. WICKHAM.— Mr. H. Heasler exhibited *Amphicyllius globus*, *Acalles ptinioides* and *A. turbatus*, all taken in dead leaves at West Wickham, last September.

PAPILIO POLYTES: ITS VARIETIES AND ALLIES.—Mr. Edwards read a most interesting paper on the facts connected with the polymorphic species, *Papilio pammon*, L. ♂ = *polytes*, L., ♀; its variation, subspecies, races and geographical distribution. He said it is more or less distributed over the four divisions of the Oriental region and the Austro-Malay division of the Australian region. In each part of its range we find a different form of the ♀ predominating, and resembling in flight, habit, and general colouring, some very common species of *Papilio*, which is protected from the attack of lizards, birds, etc.., by its acrid juices. This variation is confined to the ♀s. Each particular ♀ produces not only ♀s like herself, but the other ♀ types as well, and the types are remarkably definite and constant. He then gave a classified list of the various forms as follows:—

I. CONTINENTAL.—1. Tailed ♂ and tailed ♀.—*P. pammon* ♂, India, Malacca; *P. pammon* ♀, India, China, Ceylon; *P. polytes* ♀, India (mimics, *P. aristolochiae*); *P. romulus* ♀, India (mimics *P. hector*); *P. borealis* ♀, Ningpo; *P. eyrus* ♀; *P. ceylanicus* ♀; *P. javanus*; *P. nicobarus* ♀; *P. astyanax*.

II. ISLAND.—2. Toothed ♂, tailed ♀.—*P. theseus* ♂, Malayana; *P. theseus* ♀ (toothed), Timor (mimics, *P. aristolochiae* var. *diphilus*); *P. timorensis* ♀, Borneo, Java, Timor (mimics *P. polyphontes*); *P. theseus* var. *antiphus* ♀ (?), Sumatra, Lombock (mimics *P. antiphus*); *P. melanides* ♀, (Borneo) Banjarmassing, isolated form; *P. numa*.

3. Tailless ♂, toothed ♀.—*P. alphenor* ♂, *P. alphenor* ♀, Molucca, Celebes and Philippines, Bouru, Ceram; *P. ledebouria* ♀, Philippines (mimics *P. polydorus* (?)); *P. elyros* ♀, isolated form.

4. Tailless ♂, tailless ♀.—*P. nicanor* ♂, Gilolo, Batchian; *P. nicanor* ♀, very local.

5. New Guinea group: *P. ambrax*, *P. ambracia*, *P. epirus*, *P. dunali*.

Mr. Edwards proceeded to give the history of the discovery of these relationships. He said: "The species was first described by Linné, in the year 1758. His description was undoubtedly made from a female specimen, and was separated from what is now known to be the male form, but which Linné called *P. pammon*. Some time afterwards, Westerman bred both *P. pammon* and *P. polytes* from similar larvæ, and he was the first to surmise that the two very

distinct looking insects were in reality only the sexes of the same species. This view soon became generally accepted, and they were treated as the sexes of one species, by Edward Doubleday, in his *Genera of Lepidoptera*, 1846. Later, however, specimens were sent from India, which closely resembled the male insect, *P. pammon*. This was supposed to overthrow the authority of Westerman's observation, and to re-establish *P. polytes* as distinct from *P. pammon*. This view of the matter was generally accepted, and the two appear as distinct species in the *Catalogue of the East India Museum*, 1857, P. The notion of the male *P. pammon* having two distinct females, one somewhat similar in appearance to itself, the other so distinct as Linné's *P. polytes*, did not appear to strike entomologists, until Wallace, in his paper on 'The Papilionidæ of the Malayan region' (*Trans. Linn. Soc.*, 1865), stated that he felt convinced that this was so, because in every place where the male *P. pammon* was found, a female resembling *P. polytes* was also found, and, further, although very much less frequently than on the Asiatic continent, a female closely resembling the male was also found. He further points out that not only has no male specimen of *P. polytes* yet been found, but that *P. polytes* itself has only been found in those localities in which *P. pammon* occurs. He concludes that, in this instance, varieties have been accepted as distinct species, and that the male *P. pammon* has two females, one similar to the male, the other, the insect described as distinct by Linné, and known as *P. polytes*. It may not be out of place here to note that Meldola [*Studies in the theory of descent* (translation), Weismann] has already suggested that the dimorphism and trimorphism exhibited by certain butterflies has originated through polymorphism from the ordinary variability of these species. Collections, however, brought from various parts of the East Indies, soon made us conversant with the fact, that, besides these two forms of the female, there were several others that might probably be referable to the same species, of which *P. pammon* represented the male form. These had been hitherto considered as distinct species under the names of *theseus*, *polyphontes*, *antiphus*, *melanides*, *alphenor*, *clyras*, *romulus*, and *ledebourius*. Considerable variation exists in the length of the caudate appendages to the posterior wings, and, as Mr. Wallace pointed out, 'Continental specimens have all considerably developed tails in both sexes.' The insular specimens, on the other hand, which I treat as a separate species, have only a prominent tooth, or very short tooth in the male. Messrs. Godman and Salvin also describe the same character in Billiton specimens, in which the caudal appendage is slightly developed, and, in this respect, they agree best with Javan examples. I cannot, however, separate the continental and insular specimens as distinct species. My own collection contains examples from Banjarmassing, in which the males have these appendages well developed, whilst in other males from North Borneo they are almost extinct. We can, however, accept Wallace's axiom in a general sense, and certify that insular specimens do, as a rule, vary from Continental ones more or less in this respect." Dealing with the various forms, varieties, subspecies, etc., more in detail, Mr. Edwards said: "The typical male *P. pammon* has broad and rather short fore-wings, with ample hind-wings, which are dentated, and furnished with a spatulate tail. The wings are black, the fore-wings having a row of small white spots on

the hind margin, diminishing in size towards the apex and the hind-wings, with a transverse and slightly curved white band, divided into spots by the nervures. Sometimes the anal angle is marked with orange above, but always on the underside, where, in addition, there is always a sub-marginal row of orange lunules. These markings are very constant in the male. The first form of the female, a by no means common form, exactly resembles the male, except that it has a distinct ocellus at the anal angle, on the upper surface. Varieties occur with a few sub-marginal red lunules, thus indicating a slight approximation to the second form of the female. The first form may conveniently be termed the *P. pammon* form. This second form of the female, by far the most common, is that originally described as *P. polytes*. It differs from the first form in having the white band of the hind-wing reduced to a large central blotch, divided into spots by the nervures. The anal angle possesses a large red blotch, and there is a strongly marked sub-marginal row of red lunules. The nervures of the fore-wings on the disc are bordered with whitish scales. A rare variety of this form approaches the first form, in having the white blotch laterally extended, and in the absence of the red patch at the anal angle. This *P. polytes* form bears a very strong likeness to an abundant Indian and Malay peninsula species, *P. aristolochiae*, a member of another group of the Papilionidæ, which is protected by the pungent emanation from its scent glands. The third form of the female, in place of the white markings on the hind-wings, has them wholly replaced by red, both on the upper and undersides. This form was described by Cramer as a distinct species, under the name of *P. romulus*. It mimics another species of the *polydorus* group, *viz.*, *P. hector*, so faithfully, that it has frequently been sent home for this species, and De Haan even figured it as the female of *P. hector*. It will be seen from the table previously given, that the distribution of these forms is Continental, although occasionally a tailed male is sent to Europe from one or other of the Malayan Islands. In Malayana, that is, Java, Sumatra, Borneo, Limbock, Timor, etc., a male form is found exactly like the typical male *P. pammon* in markings, but somewhat smaller in size, and having the tale reduced to a projecting tooth. This has been described as a distinct species under the name of *P. theseus*, but Dr. Wallace, in his "Papilionidæ of the Malay Region," does not consider it more than a sub-species of the well-known *P. pammon*. The females accompanying this form are not precisely like those of the typical *P. pammon*, but bear a striking likeness to them, and correspond in gradation of variation. Wallace took one specimen only of a tailless female, on the Island of Timor, *in copulâ* with a male *P. theseus*, which it exactly resembled, except that it had a very slightly marked red and blue ocellus at the anal angle. This may be termed the *P. theseus* form of the female. The second form of the female of *P. theseus* has the fore-wings much paler alongside each nervure, and in the hind-wing the white blotch always covers more of the discoidal cell, and is externally bordered by red. It so closely resembles the female of *P. polyphontes*, one of the protected *polydorus* group, that a specimen was figured by De Haan for that species. This form only exists in Borneo, Java, and Timor, and is somewhat local. It has received the name of *P. timorensis*. It is a tailed form. The third form, like the third form of *P. pammon*, is characterised by the entire absence of the white

blotch from the hind-wing, the red spots and lunules being left, and in no way extended, but in some specimens restricted in area. This form in turn bears a striking likeness to another of the *polydorus* group, *viz.*, *P. antiphus*. This form also has fully developed spatulate tails. There is another very local form from Banjarmassing, Borneo, which Wallace considered to be an isolated modification. It is characterised by, and has been described under, the name *P. melanides*. It is a tailed form. In the Celebes, Moluccas, and Philippines, there occur male specimens, scarcely to be distinguished from *P. theseus*, except by their larger size, by the fact that the caudal tooth of the hind-wing is hardly perceptible, and by the marginal lunules on the underside being white instead of red. This form of the male has been named *P. alphenor*. In the different parts of the range of this variation of the male, there are found no less than three forms of the female. The first form, which has the same distribution as the male, differs from it in having the white blotch and red marking of the hind-wings considerably blended and more prominent. It is termed the *alphenor* form. A second form of the female is only to be found in the Philippine Islands. It has a brown tinge, and the anal lunule is very obscure. The name *P. ledebouria* has been applied to it. While these two forms are very constant, there is a third form to which the name of *P. elyros* has been given, by no means so constant, in which the white patch of the lower wings is either reduced to a spot or altogether absent. This form, like the last, is confined to the Philippines, and all the three forms have much shorter tails than any which have been previously referred to; in fact, they are toothed. We now come to a form described as *P. nicanor*, taken in Batchian, Gilolo, and Morty Island, in which both the males and females are without tails. In the former, the band of white spots on the hind-wings is broader and more regular, and there is a row of white submarginal lunules, while on the underside, the white spots and lunules are larger and more distinct. In the female, the ocellus is scarcely distinguishable as such, and is separate from the central patch, both on the upper- and under-sides. Several other varieties, races, subspecies, or closely allied species, have been given in the table of species, but I have, so far, been unable to find sufficiently reliable material to include in this paper."

A hearty vote of thanks to Mr. Edwards terminated the proceedings.

December 7th, 1897.—Exhibits.—Mr. E. M. Dadd: specimens of *Catocala nupta*, *C. elocata* and *C. fraxini*, on which he read some interesting notes. Mr. May: three *Plusia moneta*, bred this year, from Weybridge larvæ, and a short variable series of *Bryophila muralis*, taken at Sandown last July. Rare Coleoptera.—Mr. H. Heasler: *Aleochara succicola*, from Highgate and Richmond Park, and *Homalota pruinosa*, taken by Mr. Elliman at Chesham, the latter species new to the British list.

One of the Secretaries, Mr. Tremayne, then read the following:—

SECRETARIES' REPORT.

The Secretaries' Report for 1897 may be a short one, but it can hardly be described as a sweet one. If the Society has not executed any very

decided retrograde movement this year, it has, at least, been equally careful that very little of the sin of forwardness shall be laid at its door, and that its progress towards the ideal shall be slow, if not altogether stately.

There was one item in last year's report which was a perfect disgrace. Even after a substantial donation from Mr. J. A. Clark, the Society was still in debt to its Treasurer to the extent of £9 14s. 6d., solely due, we believe, to the non-payment of subscriptions; and the Secretaries spoke so strongly in their report for last year, that they believed that the members would make some effort to put this matter on a better footing.

Will it be credited that this balance now stands £12 6s. 1d? The reason of this is not that the executive have been plunging the Society into any rash or unusual expenditure. Far from it. The reason is practically the same as it was last year. Further comment would be unnecessary, and futile. The Treasurer will give you details of this unsatisfactory financial condition presently. Meanwhile, we will content ourselves with saying that a circular is being issued by the direction of the Council to every member of the Society, asking for assistance to clear off this obnoxious balance. This would give us a fresh start, and it is satisfactory to know that the Council has decided that in future the expenditure must be kept within the income at all costs. We only hope this appeal will meet with sufficient response to enable us to get rid of this really great evil.

The Society's membership now stands at 63, having decreased from 76 last year. This is due to the Council's having resolutely struck off several members who persistently declined to pay. On the other hand, the average attendance has only decreased to just under, instead of just over, 19, the best meeting being on February 16th, on which, curiously enough, no paper was read. That attendance comprised 26 members and one visitor. Against this we have to record that on August 17th only three members attended, and no meeting was constituted. (Surely, even at that time of the year, there was no excuse for this). Besides this, it is much to be regretted that two recent meetings had to be abandoned, owing to our room at the London Institution not being available.

The Library and Cabinet still need great attention. Neither is yet quite perfect, nor does the Society seem to mind. How very rarely we hear of any donations in either branch! Even the magazines are not presented by members!

The following is a list of the papers read before the Society this year:—

Jan. 5th	...	"Stars, Star Clusters, and Nebulæ," C. Nicholson, F.E.S.
Jan. 19th	..	"The History of Silk" ... L. J. Tremayne.
Feb. 2nd	...	"Notes from Bures" ... ... W. Bloomfield.
March 2nd	...	"The Origin of Lepidoptera" J. W. Tutt, F.E.S.
March 16th	..	"An experiment in breeding *Arctia caia*" .. ... D. C. Bate.
April 6th	...	"Notes from the Isle of Dogs" ... H. S. Woolley.
May 4th	...	"The Genus *Oporabia*" ... L. B. Prout, F.E.S.
May 10th	...	"Industries and Politics of the Ant," H. A. Sauzé.

Oct. 19th ... "The Ideal Local Natural History Society," D. C. Bate.
Nov. 2nd ... "The Microscope" ... C. Nicholson, F.E.S.
Nov. 16th ... "*Papilio polytes* and its Varieties" S. Edwards, F.Z.S., F.E.S.

The Secretaries take this occasion to complain, however, of the extreme difficulty they have in procuring papers for the Society, which is quite unwarrantable. Among the older members, we fear, exhortations and entreaties are alike useless. If a man has reached the age of 40 without reading a paper, it is pretty certain he will never read one at all. But we cannot too strongly impress upon our younger members the necesssity of beginning, and that at once. If we may say so, we perfectly understand their feelings in holding back. We have been through them ourselves. To a certain extent they are commendable, but they are chiefly selfish. Our young men are afraid of not doing well enough, afraid that they cannot write anything to which it would be worth the Society's while to listen. But, surely, they cannot know until they have tried, and surely the Society should be the best judge. We strongly exhort our young members to do their very utmost to overcome this diffidence, to present the Society with their best, and then to rest on the assurance that it is far more meritorious, unselfish, and patriotic, to deliver an indifferent paper under such circumstances for the Society's sake, than to withhold one for fear it might not be good enough. We cannot all be Tutts, Prouts, or Bacots, but we doubt if there be a single one amongst us who cannot occasionally contribute some item, slight it may be, but still valuable, to the Society's printed programmes; and we venture to lay down this general rule: that the Secretaries, on applying for a paper for the Society, ought never to meet with a refusal, except when circumstances render the giving of such paper an absolute impossibility. We have laid great stress upon this here, because we feel it is one of the most vital questions affecting the welfare of the Society. And we hope all the members, but especially the young members, will take it to heart. To turn to a more cheerful subject, the Society held a very enjoyable excursion to Oxshott, on the 26th of June, which was attended by 9 members and 9 visitors. This outing was a decided improvement on the one held the previous year, and a development of the Society's usual work, which, we trust, will be still further extended, and lead to happy results. Another item deserves special mention. The Society this year repeated the experiment of 1895, and held an exhibition in the Library of the London Institution, on the 27th of April. Whether this was altogether advisable, having regard to the Society's financial condition, is a matter involving strong difference of opinion, and one on which the two Secretaries themselves are not agreed. But the exhibition was an undoubted success, and will be an event long remembered by all those who participated in it.

In conclusion, we have only to tender our hearty thanks for the support we have received throughout the year. In one instance, indeed, there is room for improvement. We refer to the indifference shown in certain quarters to Rule XIV., which provides for our being supplied with lists of exhibits. It is obviously desirable, in the best interests of everybody, for the Secretaries and the members to co-

operate in the Society's reports as much as possible, and we can only trust that those who have so far seen fit to ignore this rule, will quickly see the error of their ways, and work heartily with us in future. Save for this, and the points mentioned above, we have only to thank you again sincerely for the assistance and encouragement you have given us at our work. We are deeply sensible of the honour you have done us by re-electing us to the important and trustworthy post that we now hold, and we can only assure you that we will do our utmost to continue to merit the Society's confidence.

LAWRENCE J. TREMAYNE,
H. A. SAUZÉ, } *Hon. Secs.*

The Treasurer's Balance Sheet was read. (This is included at the end of the *Transactions*). It was decided that a statement should be incorporated showing the sums due to the Society, and the Balance Sheet further considered at the next meeting.

The following were elected Council for 1898 :—President, Mr. J. W. Tutt, F.E.S.; Vice-Presidents, Mr. J. A. Clark, F.E.S., M.P.S., Mr. Frederick J. Hanbury, F.L.S., F.E.S., Mr. Louis B. Prout, F.E.S.; Treasurer, Mr. C. Nicholson, F.E.S.; Secretaries, Mr. Lawrence J. Tremayne, Mr. H. A. Sauzé; Librarians, Mr. Louis B. Prout, F.E.S., Mr. Douglas C. Bate; Curators, Mr. E. M. Dadd, Mr. W. Ilston Cox; and Mr. A. Bacot, Mr. H. H. May, Mr. A. F. Bayne, Mr. E. Heasler, Mr. H. Heasler.

The President then read the following :

PRESIDENTIAL ADDRESS.

GENTLEMEN,

We have reached the end of another year in the history of our Society, and I have arrived at the termination of another year of office as President. I am afraid that I have not served you as well as you have a right to expect, and I have to thank one of our Vice-Presidents, Mr. Clark, for his willingness to take up my duties when I was unable to be present, and, at the same time, I wish to thank you all for your kindly forbearance. In spite, however, of my shortcomings, you have elected me for another year to the highest office in your gift. There is, I know, much to be said against the re-election of the same member to the Presidential chair, but that is your concern. I can only thank you for the honour you have done me.

OBSERVATION VERSUS COLLECTING.

The general affairs of the Society have already been dealt with at length by your Treasurer and Secretaries. I must congratulate the members on the work of the year, and particularly on that accomplished by your leading members. The actual scientific work accomplished is, however, in the hands of a few, yet this need not be so, for every recorded observation made in the study or in the field, is as truly scientific as the more elaborate work of better trained and better placed students, and such observations may be made by all. To those members who are yet rather collectors than observers, I say, without hesitation, that when you have once learned to observe, you will find more pleasure and satisfaction in your observations, than does the collector in his specimens.

THE VALUE OF THE TRANSACTIONS OF OUR SMALLER SCIENTIFIC SOCIETIES.

Still it must be acknowledged with pleasure that the number of

facts brought to our knowledge in this room is continually on the increase, yet I grieve to think, that, in a Society like ours, so much really scientific information is buried in oblivion. Year by year, I have slowly been coming to the conclusion that the scrappy reports of this and kindred societies, as published in the magazines, are practically useless, and, at least in the case of one of the monthlies, shut out a considerable amount of more solid matter, a surplusage of which is always on hand. The remarks and observations of some twenty field naturalists (a number below our average attendance), should, it seems to me, make at the end of the year a grand total of scientific entomology, that should be useful to every entomologist in the country. That is, we have reached that point, when we should be able to publish a volume of scientific material at the end of each year, and that this could be done, I have no doubt, if a genuine co-operation existed between the speakers and the reporters. One is somewhat astonished to find that, a meeting which has occupied rather more than two hours, can be condensed into a report that may be read in five minutes or less. This is as it should be for the minutes of the Society, but, at the same time, I have, in my own mind, no doubt whatever, that a full and complete report of each speaker's remarks, whether in direct connection with an exhibit or a discussion thereon, should be taken at each meeting. Our Secretaries complain, and very justly, that members do not give them notes; members say that what they say is often not particularly important, and is scarcely worth reporting at length. Surely our Secretaries can be trusted to separate the wheat from the chaff. These two views crop up at all the Societies that I attend, yet, in the long run, one finds that, by hook or by crook, a very fair summary of one's remarks is published in the *Proceedings* of the various Societies.

I do not wish it to be thought that I am trying to reach the unattainable. This is not so. In my position as an official of what I suppose may be called the three leading entomological societies in London, I see a great deal of the work that is done. I have repeatedly stated, and I maintain as a fact, that, in this room, we often cover more ground scientifically than do the members of either of the other Societies. Yet our *Transactions* bear no comparison with either. I say this with regret, because a society like ours is capable of better things. Our Secretaries, I presume, think that longer reports will not be printed, and that, therefore, it is useless to write them. This is true of the magazines, but, on the other hand, I think their line should be to take a good model, and then say—now, we do as much scientific work at one of our ordinary meetings as do the members of that society (whose *Transactions* we have taken as our model); we will show, by our reports at the end of the year, that we have collected a vast amount of scientific matter that ought to be published, and we will go to the Society at our next annual meeting and insist on the Society finding the money to publish the scientific matter in our hands. This is my view of the matter. If the members of this Society know that they are paying for something that they could not get in any other way, and for something for which each one, more or less, was responsible for the authorship, I venture to think that each would cheerfully help towards defraying that portion of the expense, which the funds of the Society could not meet. To carry this out, two things

are necessary: (1) The establishment of a separate Publication Fund. (2) The distinct separation of the work of our two Secretaries, one to act as General Secretary, the other as Reporting and Minuting Secretary. Unless something of this kind be done, and unless we actually obtain, and publish annually, full digests of our remarks and discussions, I say most decidedly that, in my opinion, we are stultifying ourselves as a scientific society.

THE YEAR'S WORK ENTOMOLOGICALLY.

Nothing very startling has been brought before the entomological world this year, yet the year has been one of steady progress. The field workers have added a few new species to the British list. The Hon. N. C. Rothschild has added two new fleas (*Typhlopsylla pentacanthus* and *T. dasycnemus*). Mr. Newstead has added several Coccids—*Aspidiotus cydoniae*, *A. hederae*, *A. succicola*, *Coccus tomentosus*; one Hemipteron has also been added, *viz.*, *Kermes variegatus*. Mr. Meade has added a new fly—*Phorocera incerta*, Mr. Lucas has described and figured the earwig, *Annolabis annulipes*, whilst two others have been added to the list, *viz.*, *Forficula lesnei* and *Pycnoscelus indicus*, the latter certainly an introduced species. The coleopterists, chiefly by the sub-division of previous synonymic mixtures, add *Alcochara succicola*, *Exomias pyrenaeus*, *Homalota pruinosa*, *Platystethus alutaceus* and *Tachys parvulus*. The additions to the Hymenoptera are only one below the dozen, *viz.*, *Acampsis alternipes*, *Allantus distinguendus*, *Cilissa melanura*, *Dolerus aericeps*, *Hedychridium coriaceum*, *Mesochorus tetricus*, *Neonurus halidaii*, *Polyblastus annulicornis*, *Psen concolor*, *Tenthredopsis nassata* and *T. spreta*. Mr. Kane has added a new moth, *Platyptilia tesseradactyla*, and this appears to be all. There may be another species or two that I have overlooked, but still this list makes it quite evident that the collectors of British Lepidoptera have done little except catch already well-known species.

Among the publications, one notices with pleasure that there are fewer stupid things published year by year in the magazines, and the level of the articles that one feels obliged to read is steadily increasing. Among the best papers of the year, important to British entomologists, are Marshall's "Monograph of the Braconidæ," Latter's "Prothoracic gland of *Dicranura vinula*," Dixey's "Mimetic Attraction," all published in the *Transactions of the Entomological Society of London*, where also is the report of an important discussion on "Homæochromatism in Butterflies." Then there is Saunders' "Notes on collecting Aculeate Hymenoptera," a paper which ought to attract many recruits to a little worked order. Lepidopterists will, however, be more pleased with the fact that Porritt has edited, with his usual skill and success, another of the excellent volumes of Buckler's "Larvæ of British Butterflies and Moths." Mayer's two excellent articles, "On the Wing, Wing-scales and Pigments of Butterflies and Moths," and "On the Colour and Colour-patterns of Moths and Butterflies," are both excellent productions, and, as they are in our library, can be read by all, even without purchase. Standfuss, abroad, has published some of his results on Hybridity, in his *Handbuch der Paläarktischen Gross-Schmetterlinge*; and Grote, in "Die Schmetterlingsfauna von Hildesheim," gives us a new classification of the butterflies. Our friends in Ireland and Scotland have been practically dumb. Scientifically, it may be said, that entomology is stagnant in Scotland, whilst

one may go still further, and say, that, but for a little collecting, lepidopterology is defunct, and has been since the death of Dr. Buchanan White. Years pass by and no one rises to take his place, at once an observant field naturalist, a reader, and an intellectual thinker. Mr. Kane, of course, is without a peer, as an authority on Irish Lepidoptera; we can only hope that Scotland will soon give us a man who will have the same authority on Scotch, as has Mr. Kane on Irish, Lepidoptera. In England, the best practical work has been done by Dr. Riding and Mr. Bacot, with their experiments in the hybridisation of *Tephrosia bistortata* and *T. crepuscularia*. I have had the pleasure of studying the insects that they have bred, and summarised the results. The conclusions have been submitted to, and, I trust, will in due course appear in the *Transactions* of, the Entomological Society of London. In many points, the results bear out Standfuss's conclusions; in others, they appear to be somewhat at variance, but I doubt whether the latter has ever had a tithe of the specimens, in a single year, that have gone through our experimenters' hands. There is one paper of great importance to scientific entomologists likely to be overlooked, because of its being mixed up with the life-history of *Charaxes jasius*, the species in which the phenomena were observed. I refer to the observations on the moulting and pupation of this species, published by Dr. Chapman in the *Entomologist's Record* (vol. ix., pp. 218–220). All entomologists can read them at leisure, so that there is no need for me to repeat them.

But if the entomological world has not been much startled this year by any remarkable publication, it has received with pleasure the announcement, by the British Museum authorities, of a stupendous undertaking to be accomplished, we hope, in the near future. This is no less than the compilation of a series of volumes on the "Lepidoptera of the World," by Sir George Hampson. All we can say of the proposed work is, that if it is to be done scientifically, skilfully, and with a minimum of error, no better man could have been selected for this gigantic undertaking. We wish the talented author every success.

One other matter has been brought to head. The committee formed by the Entomological Society of London for the protection of insects in danger of extermination, has had several meetings. At its last meeting each of the affiliated town and provincial societies was asked to elect a representative who should be *de facto* a member of the committee. These members were, I believe, in many cases elected, but, by some oversight, we do not seem to have yet held a meeting to welcome them as helpers in what is, I think, a good cause. It is too early yet to tell how much or what moral effect the committee has had; that it has had some is quite evident. So much for the more important entomological matters of 1897, that occur to me. We may now turn our attention to other matters.

DOUBTFUL SPECIES.

Year by year we are faced, in some form or other, with the question—"What is a species?" Year by year this question is discussed in our magazines without getting any nearer to a definite issue; year by year the discussion will go on so long as there are those who think that every species can be defined with unerring accuracy, so long as there are those who think that every species is distinctly cut off from its nearest allies, that there are no species in the process of making

as it were. We have now for several years discussed the specific identity (and the reverse) of *Tephrosia crepuscularia* and *Tephrosia bistortata*, and have arrived at no very satisfactory results. Everyone seems willing to grant that they are what may be called "doubtful" species, that is, that the characters by which they may be differentiated from each other are not sufficiently decided to leave no doubt, in some cases, as to which species a particular individual specimen should be referred to. In other words, it is stated, that even specialists cannot invariably determine them.

HYBRIDITY OF ALLIED SPECIES.

The practical work which Mr. Bacot and Dr. Riding have successfully carried out in the direction of hybridising these species, appears to me to be of the greatest importance, and the results arrived at may possibly be very far-reaching in their character. That these species are very closely allied, everyone allows; that the distinctive characters are so ill-defined as to make it a matter of difficulty, except for the trained specialist, to discriminate, may also be conceded. They are species in the making, as I have just said, and their specialisation is not yet completed. It is clear that, if the theory of evolution by natural selection be sound, there must be many such cases, and there must be, in nature, every gradation between the polymorphic and unstable species, in which almost every individual varies from almost every other in some slight and unimportant manner, through every gradation of varieties (local races), and sub-species, to clearly defined species.

Each species is separable from its nearest allies by certain characters which will differentiate it from all other species. These we call specific characters. Some naturalists, and I disagree entirely with them, go so far as to include all species that will pair and produce offspring as being one species. Under these conditions we should have to unite *Smerinthus populi* with *S. ocellatus*, *Amphidasys strataria* with *A. betularia*, *Saturnia carpini* with *S. pyri*, and a large number of species well-defined on many characters in all their stages of existence. We should also have to unite *Phasianus colchicus* with *P. torquatus*, the hare [*Lepus europaeus* (*timidus*)] with the rabbit (*L. cuniculus*), and endless other birds and mammals which are abundantly distinct. When the question of hybridity was first studied, it was laid down as an axiom that all hybrids were sterile, and when it was found that fertilisation between two plants or animals was possible, and that fertile progeny resulted, the plants and animals were reduced at once to the rank of varieties. As, however, our data on this subject accumulates, it appears to be certain that a very large number of closely allied, but, in the generally accepted sense of the term, perfectly distinct, species, are not only reciprocally fertile, but their hybrids are also fertile *inter se*. Before, however, we can assert that we really know anything about the subject, a very great number of careful experiments on many different species must be carried out, and the results compared.

VARIATIONS ALWAYS PRESENT IN ORGANIC BEINGS.

The general tendency not only for all organisms to vary, but also, for every constituent structure and part of an organism to vary, is so well-known, that, in re-reading any of Darwin's works, one is struck by the frequency with which he prefaces his remarks with "if the species

vary," or some similar phrase. One has some difficulty to conceive how vastly our facts relating to variation have increased during the last half-century. As entomologists, we know very well, that in every individual brood of any given species, there is an abundance of variations present, upon which natural selection might work in many directions. If this be once thoroughly understood, and, if to this be added the fact, that an inconceivable percentage of the progeny of every living insect (even if only judged by the standard of lack of increase in numbers of common species of Lepidoptera in well-known localities) is annually destroyed by various causes, nature continually weeding out the less fit, so that only a few selected and well-favoured individuals reach maturity, then one can readily conceive that natural selection may have much to do with the process of the formation of a new race under the most favourable conditions. There can be little doubt that, by a slow process of the selection of suitable variations presented by a species, nursed under the most favourable conditions, on lines similar to those already indicated, species have been formed.

UTILITY AND THE ORIGIN OF SPECIFIC CHARACTERS.

It may not be out of place now to say a few words on the evolution of those "specific characters" which every species possesses, and which ultimately result in the differentiation of each individual species from all others. I have attempted to show, in certain articles that I published on "Mimicry" (*Entom. Record*, vol. viii), that utility is the mainspring on which the formation of mimetic patterns depends,and that utility has guided natural selection to act in ways advantageous to the species in their evolution. I would also urge that utility is again the guide by which natural selection is driven into the paths advantageous to the species, when it brings about the development of new forms, which ultimately become new species. On this question, Huxley says: "Every variety which is selected into a species, is favoured and preserved in consequence of being, in some one or more respects, better adapted to its surroundings than its rivals. . . . For, as has been pointed out, it is a necessary consequence of the theory of selection, that every species must have some one or more structural or functional peculiarities, in virtue of the advantage conferred by which it has fought through the crowd of its competitors, and achieved a certain duration. In this sense, it is true, that every species has been originated by selection." Wallace says: "Perhaps no principle has ever been announced, so fertile in results as that which Mr. Darwin so earnestly impresses upon us, and which is, indeed, a necessary deduction from the theory of natural selection, *viz.*, that none of the definite facts of organic nature, no special organ, no characteristic form or marking, no peculiarities of instinct or of habit, no relations between species or between groups of species, can exist, but which must now be, or once have been, useful to the individuals or races which possess them." Here it is quite evident, that two of the greatest thinkers on this subject, accept the principle of the utility of specific characters, at any rate, at the time of their origin as such; and, although it is possible that certain specific characters may exist in certain species which are now of no direct advantage to their possessor, yet there can be but little doubt that at some previous time in the past history of the species, they were either themselves useful, or were correlated with some useful character.

AVERAGE CHARACTERS AS EXHIBITED BY SPECIES.

As I have already pointed out, the amount of variation that occurs in each species, year by year, is much greater than was originally supposed, and yet, the weeding out of the most marked aberrations results in the production of what may be called a general facies, presenting an average of the special characters, for each particular species. In spite, therefore, of the variation that exists between the individuals of a species, a similarity is preserved which enables the species to maintain itself in its given environment.

INDIVIDUALS OF A SPECIES NOT IDENTICAL.

When the materials acted upon are identical, and the conditions under which they are acted upon are identical, we may take it as a general axiom, that the same cause will produce similar results. But in the true sense of the word, the individuals of no species are identical, and hence the same cause acting upon the individuals under the same conditions does not produce the same results, except in a very general manner. Bearing this in mind, we may proceed to the consideraton of a few special phenomena that have proved interesting to me.

ON THE ORIGIN OF VARIETIES OR LOCAL RACES.

We may make the general statement, subject to the above limitation, that uniformity in environment tends to produce a general uniformity in the species; whilst, great differences of environment tend to produce great differences in the species. Many species of Lepidoptera bearing out this general statement will occur to all entomologists, yet it is not difficult to mention species whose appearance suggests antagonism to the general principle here enunciated.

The well-known *Pyrameis cardui* has an almost cosmopolitan range. It exists under a variety of physical and climatic conditions in both the Old and New World, yet it is a species that varies little. As a matter of fact, in spite of the apparent dissimilarity of its habitats, these are comparatively alike. The species inhabits the sub-tropical and warmer temperate regions of the world. Hence the climatic conditions are not unlike. From these areas it is a wanderer, and has no lasting habitation in the colder regions, of which it is reported to be a native. Its habits are similar all over the world. By the swiftness of its flight it escapes from its enemies, and, on a flower-head, at rest, it is sufficiently protected to be difficult of detection. Variation in its colours would be of no service to the species; hence, in spite of its wide range, there is no attempt to set up local colour variation. The Australian form, *kerwatin*, shows a tendency to develop a transverse row of ocellated spots on the hind-wings. Now and again a striking aberration may be bred or captured, but these do not amount, perhaps, to one in a million, and do not affect the general question. Here, then, we have an instance of a species in which variation in hue would be of little or no use to it, and we find as a result that its colour and markings are very rarely modified, whatever may be the conditions of its environment.

Let us now consider for a moment, a species that depends not upon its swiftness of flight, but upon its colour and markings, for its safety. No better example can be selected than *Amphidasys betularia*. Its pale grey-white colour, plentifully peppered with black dots, forms about as useful a pattern as one can well imagine for the protection of this

species. On the tree-trunks on which it rests, its colour and markings are its salvation. Yet its colour would be fatal on the black fences and tree-trunks to be found in all manufacturing districts. In these districts, natural selection has eliminated the pale conspicuous forms, and a melanic form known as the var. *doubledayaria* has been evolved in its place. The process of evolution has been exceedingly simple, just the weeding out of the most conspicuously pale specimens, and the retention of the darker and less conspicuous forms. The same process of selection has taken place in the formation of the melanic aberrations of *Tephrosia crepuscularia*, *T. bistortata*, *Diurnaea fagella*, and numbers of other species. Utility is the mainspring of the formation of all these melanic forms. The physiological factors of variation necessary for the production of this result were (and are) present in all these species. They possess, in their typical forms, black and white scales in varying numbers; utility has seized on the useful character, and has moulded the material at its disposal into its own channels for the advantage of the species.

Again, let us examine a species like *Gnophos obscurata*. This species, all lepidopterists are aware, rests upon the ground, and is entirely dependent for its protection on the resemblance which its colour bears to that of the rocks upon which it rests; and this resemblance is perfect—black on peat and dark slate, grey on limestone, white on chalk, with such a nice gradation in tint, corresponding with that of the different rocks upon which the species is found, that one can almost tell exactly where individual specimens have been captured. Here, again, the part that utility has played in the determination of the various local races of this species is obvious.

I do not here wish to enter into the physiological processes involved in the development of these local forms. I only want to point out that they have been developed, because the points which distinguish them from each other and the type, are severally useful to the species, under those conditions of environment by which each individual form finds itself surrounded.

The modification of many of the species here incidently referred to—*Amphidasys betularia*, etc.—in the direction of melanism is largely connected with certain habits that these species possess in common. The phenomenon, too, is undoubtedly of comparatively recent occurrence, and has largely increased within the last fifty years. That the phenomenon, as exhibited by these species, has been brought about by changes in the environment, must be obvious to all who will only look for them. The modification of other species — *Gnophos obscurata*, *Dasydia obfuscata*, *Agrotis lucernea*, etc.—with a slightly different habit, sometimes, in a somewhat similar direction, is of much greater age, and dates back probably as long as the species have rested on differently coloured rocks in different localities. Still, the hand of utility is just as evident here, as in the previous cases. What is true of the formation of these local races, must be true in a measure of species themselves.

A great change in the environment of a species, locally, produces in that district a local race. It matters not whether the change be one of climate, food-supply, introduction of new enemies, or geological change, so long as it is sufficiently marked to affect the species in-

juriously under the new conditions. Given these conditions, and the injury will result in extermination, unless some structural or functional modification be developed in the species, which will enable it to combat the disabilities under which it now lives, and, in time, to succeed under the new conditions. We have already seen that a recent change in the environment of certain Lepidoptera has resulted in the development of a maximum of black scales, so that the colour of the insect may respond to its new environment. We have also seen that this change of colour is simply a change in the proportion of the black scales (always present in the species) developed. The change then must take place by the modification of the different variable factors that play around, what we may term, the "mean" of any structural part of the insect; and, it must be evident that from these variable factors alone, can utility obtain the materials which it moulds into those lines, which will fit the species to its new environment. Survival of the fittest in the required direction (or directions), goes on year by year, and thus the species is maintained under the new conditions.

Little further insight is needed to see that more than one modification may be necessary, and that under a complex series of change, divergent races might be formed, each specially suited for success in different directions, whilst the original type of the species might become extinct.

In this way we obtain the beginnings, as it were, of new species, which may take a vast period of time before they become thoroughly differentiated from each other. The more rapidly and sharply certain peculiarities separate them, especially peculiarities of the genital organs, the more rapidly would their complete separation as species be brought about.

SPECIALISATION OF GENITAL ORGANS DOES NOT NECESSARILY ACCOMPANY OTHER SPECIALISATIONS.

There appears to me, however, to be no reason whatever why changes of the genital organs should take place under changing conditions of environment, such as those just suggested, nor why changes in the genital organs should accompany other changes, necessary for greater speed, better concealment, or other habit now assumed to be a matter of necessity to the species. It is evident, that the safety of insects depends primarily upon colour (protective or warning), speed, nauseous excretions, development of fascicles of hair in place of simple tubercles, waving flagella, osmateria, discharges of acid and gaseous matters and similar factors, rather than on changes, either in structure or function, of the internal organs. All, or any, of the various changes just enumerated may be effected without the slightest change in the structure of the genital organs, and hence it is possible for new species to be developed with distinct and conspicuous external characters, either in the imaginal, or pupal, or larval, or oval stages, or in all, or any, of these stages, without any very great modification being necessary in the genital organs. These external characters may be most marked, and, in every respect, specific, as we understand the term. Yet the possibility of successful pairing and the production of fertile ova, between the supposed allies may always be present.

VARIATION IN GENITAL ORGANS.

That there is usually some well-marked difference presented by the

male genital organs of closely allied species is well-known. That these same organs, within the limits of a well-marked single species, often offer considerable variation, is also well-known. That species with very distinct looking male genitalia, such as those presented by *Zygaena filipendulae* and *Z. trifolii*, will pair and produce hybrid progeny is a well-ascertained fact. One is uncertain, therefore, how much structural difference is necessary to prevent successful pairing between, and the production of fertile eggs by, two allied species. So little actual experiment in this direction has been performed, that one is inclined to reject the statements laid down as veritable axioms, that one repeatedly finds in the works of even our best naturalists, relating to this point.

STERILITY NOT A NECESSITY OF SPECIFIC DISTINCTION.

No one can read Darwin's remarks on "hybridity," in the *Origin of Species*, without recognising that he was not at all clear how far fertility between allied species was general or the reverse. He was, however, evidently quite clear that the ability of two forms to cross and to produce fertile progeny, did not render them any the less two quite distinct species. Yet he assumed that between first crosses there was a tendency to sterility, and that in the intercrossing of the hybrids there was a still greater tendency in this direction. In spite of this, cases are cited by him in which hybrid plants were as fertile as the parent species ; he also cites the well-known case of *Phasianus colchicus* and *P. torquatus*, also the case of the Indian humped ox, being perfectly fertile with the common ox, in each instance the hybrids also being fertile. When one considers the difficulties of breeding animals artificially, the ill effects of in-breeding, the individual idiosyncrasies of each animal, the thousand and one difficulties that have to be surmounted, in order only to attain a fair amount of success when breeding the same species, it appears evident that we require much more detailed information before any very sweeping generalisations may be formulated.

INCIPIENT SPECIES AND PARTIAL STERILITY.

Even Wallace lays it down as a law that, when two incipient species are in process of formation, one condition of their differentiation as distinct species necessitates "some amount of infertility when crossed with the parent form, or with each other." Now, it appears to me, once the power is granted for certain species to be able to hybridise freely, somewhat illogical to insist on this as a general principle, and, I must confess that, although I can see the advantage to the incipient forms should such a condition arise, yet, I do not at all follow the necessity for it.

Wallace supports his view by asserting that the danger of a species, placed under new and adverse conditions, so that it cannot adapt itself to them with sufficient rapidity, is much increased if crossing with the parent form is not checked and afterwards completely prevented except as a very occasional occurrence. He looks upon the means of preventing inter-crossing as being three in number : (1) Infertility. (2) The presence of "recognition marks" or external distinctions leading to the preferential mating of similar forms. (3) Physical isolation. He believes that the latter is of little importance, because the majority of new species must arise in the midst of the population of existing species. He thinks, further,

that mutual infertility would be usually brought about by natural selection wherever the two forms were in contact; also that the early occurrence of well-marked differences would assist greatly in the rapidity of adaptation.

VALUE OF RECOGNITION MARKS.

The value of these "recognition marks" is probably of some importance in many species, yet the presence of such marks does not prevent the crossing of such species as *Smerinthus ocellatus* and *S. populi*, of *Amphidasys strataria* and *A. betularia*, of *Ennomos quercinaria* (*angularia*) and *E. autumnaria*, when opportunity offers. Still, there can be no doubt that, in Lepidoptera, specialisation of androconial scales, scent tufts, and similar structures may have much to do with the usual natural mating of species, especially in view of our present knowledge of the sight of insects, and the doubt that may naturally arise as to their want of ability to discriminate small and trifling colour marks, such as those which usually exist between two very closely allied species; nor is the colour sense of insects sufficiently defined to prevent the pairing of a perfectly normal specimen of *A. betularia* with a perfectly melanic aberration of the species, nor the correct pairing of the various forms of a polymorphic species like *Cidaria immanata*. It would appear certain, therefore, that the correct pairing of species in nature, among Lepidoptera, is often due to causes other than recognition marks, however important a part they may play in certain cases.

ISOLATION.

Although I do not see that mutual infertility would be, as Wallace asserts, brought about by natural selection, wherever two incipient species were in contact, yet it is quite clear that, in some way, nature must prevent their crossing, if a new form (or forms) is to be differentiated. Now, it is quite clear that, to prevent this, isolation of some kind must occur. After a careful consideration of the matter, it appears to me that, among Lepidoptera at least, the isolation is frequently, more or less perfectly, brought about by a difference in the time of year at which the imago reaches the perfect stage. Among our butterflies the single-brood of *Limenitis sibylla* falls between the two broods of the allied *L. camilla*, and, in this case, there is not even a differentiation of the food-plants of the two species, both being confined to honeysuckle. Similarly, the single-brooded *Polyommatus corydon* falls between the two broods of *P. bellargus*, nor must it be thought that these species are so distinct as the colour of their respective males would suggest, for Buckler and Hellins were both unable to definitely distinguish the larvæ, whilst I have, in my possession, an undoubted wild hybrid of these two species. I need only call attention to the single-brooded *Cidaria immanata*, which occurs in July and August, at a time practically intermediate between the two broods of *Cidaria russata*; to the parallel instance of the single-brood of *Tephrosia crepuscularia*, which appears between the two broods of *Tephrosia bistortata*. True, the emergences may occasionally overlap for a few days, locally, but for all intents and purposes, the species are as perfectly isolated as if their habitats were separated by some of the most marked physical barriers. Isolation, indeed, must be the essential factor of the differentiation of new species, and an isolation that is engendered by the physical inability of two species

to appear in the imaginal state at the same time, is as potent as any physical barrier, that prevents the two incipient species spreading to each other's grounds. It is only isolation of the kind pointed out above that could allow of the formation of a new species, under the same general conditions, and on the same ground. as that occupied by its immediate progenitor. Given this isolation, the close interbreeding of the individuals of the new form and the intensification of its peculiarities are as assured as is the powerlessness of the new to cross with the ancestral form. The formation of peculiar androconia and other characters will also tend to specialise the new form, and, when once the peculiarities of the new form, albeit at first modifications of the old form, have become fixed, the possibility of crossing frequently in nature, even if subsequent changes lead to their appearance at the same time, will be much lessened thereby. How strong a factor this may really be in the differentiation of closely allied species, will be evident to every field entomologist. *Brenthis euphrosyne* and *Brenthis selene* offer an illustration. In dozens of closely allied Noctuid moths its influence is evident, *e.g.*, *Agrotis tritici* and *A. obelisca*, occurring in July–August, and late September respectively, *Caradrina ambigua* and *C. taraxaci*, *Agrotis segetum* and *A. lunigera*, *Triphaena subsequa* and *T. orbona (comes)*, etc. In none of these are there any real "recognition marks" in the true sense of the word.

SPECIALISATION OF LEPIDOPTERA TO FOOD-PLANT.

A difference of habit, which results in the isolation of allied species by causing the appearance of the imagines at separate times of the year, is, however, only one of a large number of habits which result in isolating closely allied species. There is, first of all, the specialisation of two allied species to two different food-plants of restricted range, or restricted to different geological formations. This not only tends to keep species very local, by confining them to the ground on which the food-plant grows, but it also isolates them from each other owing to the necessity of the insects, confined to a local plant for pabulum, giving up any wandering tendency they may have originally possessed. Species that have been or are isolated in this way, are numerous in our fauna. *Thecla w-album* is confined to elm (*Ulmus*), *T. pruni* to blackthorn (*Prunus*), *Cupido minima* is confined to *Anthyllis*, *Lycaena arion* to thyme (*Thymus*), *Nemeobius lucina* to *Primula*, and *Nisoniades tages* to *Lotus; Sphinx pinastri* is confined to *Pinus*, *Macroglossa fuciformis* to honeysuckle, and *M. bombyliformis* to scabious; *Adscita globulariae* is confined to *Centaurea*, *A. statices* to *Rumex*, and *A. geryon* to *Helianthemum*, *Sarrothripa undulana* and *Halias chlorana* are confined to *Salix*, *Hylophila bicolorana* to oak, *Leiocampa dictaea* is confined to *Salix* and *Populus*, *L. dictaeoides* practically to *Betula*. *Lophopteryx cucullа* is confined to *Acer*, *L. carmelita* to *Betula*, *Notodonta trepida* is confined to *Quercus*, so also is *Drymonia chaonia*; *Cerura bifida* affects *Populus*, *C. furcula* prefers *Salix*, and *C. bicuspis* feeds on *Betula* and *Alnus*. It is possible to show that about a third of the British lepidopterous fauna is more or less distinctly specialised, with regard to some particular food-plant, and is, therefore, more or less isolated from its allies equally specialised with regard to some other food-plant (or food-plants).

ISOLATION BY DIFFERENCE OF HABITAT.

Other habits may result in the isolation of closely allied species.

The habit, which, in Britain, confines the polyphagous *Clisiocampa castrensis* to our coast marshes whilst the almost equally polyphagous and closely allied *C. neustria* is generally distributed in gardens and hedgerows, results in their almost complete isolation. The habit that confines *Nudaria senex* to marshy meadows, and *N. mundana* to the neighbourhood of old walls; the habit that confines *Spilosoma urticae* to marshes, and allows *S. menthastri* to abound in gardens and hedgerows everywhere; the habit that makes *Dasychira fascelina* a coast, and *D. pudibunda* a woodland, species, are sufficient to illustrate another means by which isolation between species occupying practically the same tract of country may be brought about.

DIFFERENCE OF HYBERNATING HABIT TENDING TO ISOLATION.

Other habits that result in the isolation of closely allied species occurring in the same districts, and having the same food-plants, are well illustrated in our fauna. *Toxocampa pastinum* hybernates as a larva, its close ally, *T. craccae*, hybernates as an egg, yet both feed on *Vicia*. *Boarmia consortaria* hybernates as a pupa, *B. roboraria* hybernates as a larva, yet both species are still restricted to oak. It is quite evident that, even should hybridisation take place between such species as these, the progeny must die, so different are the conditions, under which the vital processes, connected with the early stages of the two species, are respectively carried on, and every entomologist knows how fixed is the hybernating habit in nature for almost every species.

DOUBTFUL ISOLATION.

Where closely allied species, such as *Leucania impura* and *L. straminea*, occur at the same time, and on the same ground, and only partially, perhaps, specialised as to food-plant, it is possible that, in their early stages of separation, they were much more specialised as to habitat than they are now, for it is usually the case, as is evident in the example here given, that one of the two species (*L. straminea*) is strictly localised as to habitat, whilst the other (*L. impura*) is of more general distribution; for whilst the former is strictly confined to marshes, the latter occurs in meadows, woodlands, in fact, almost everywhere. It is possible, too, that even these two species are strictly specialised as to food-plant, *L. straminea* to reed (*Phragmites*), and *L. impura* to *Carex*. I am not sure whether these two species cannot easily discriminate each other by what may be a true recognition mark, for, in the meadows bordering reed beds, where both sometimes occur in profusion, I can separate them at night as they are flying, with the greatest ease, the white colour of *L. straminea* making that species very conspicuous.

ISOLATION BY DIVERSE HABITS.

In some cases, then, allied species may have been differentiated from a common stock by the development of diverse habits, as well as by a difference of form or colour, and the development of different habit—necessitating, as it may do, specialisation with regard to a particular food-plant, hybernating in a different stage, appearing at a different time of the year, becoming single- instead of double-brooded, or *vice versa*, etc.—is almost sure to be correlated with a difference of colour, form or structure, for it undergoes its metamorphoses under different conditions, and we know now that a difference in the nutritive value of the food given, and the formation of the wing pigments under varying conditions, etc., are accompanied by distinct changes of size

or colour in the imago. In this way species might readily be formed on the ground where they actually occur, and the same general rule would hold as to both insular and continental areas, and, in this way, one can readily understand why, in some districts, large numbers of closely allied species maintain their distinctness. Even such a fixed habit as flying between 8 p.m. and 9 p.m., is sufficient to isolate a species from an ally flying say between 7 p.m. and 8 p.m., and we know that the flight and pairing of certain species takes place regularly at a fixed time. In many species, the regularity of emergence from the pupa and of the hour at which pairing takes place, are so constant as to cause experienced naturalists some surprise.

CONDITIONS NECESSARY FOR SPECIFIC DISTINCTNESS.

I have been insisting on these particulars, because it appears to me that the various conditions laid down by our most eminent naturalists for the formation of new species under the influence of natural selection, are too narrowly kept between certain limits. However important (1) modification of structure or function, (2) the development of recognition marks, and (3) the necessity of some amount of infertility when crossed with allied species may be, there are other factors to be considered. The first of these axioms is a necessity, for if the newly developed form did not differ in structure or function from the parent form, we could not recognise it as a distinct species. There must be some modification of structure or function, and this modification can usually be correlated with a difference of habit, of which indeed it may be the result. The study of habits, then, is a useful addition to the work of the biologist. It appears to me that "recognition marks," and some amount of sterility, when crossed with allied forms," are useful adjuncts to, but not necessities of, specific distinctness.

PHYLOGENETIC AGE OF SPECIES.

We often speak of phylogenetically new and phylogenetically old species, meaning thereby species that have been more recently, or more distantly (in point of time), evolved from a parent stock. If, however, we think for a moment, it must be evident that each species traces back its ancestry to the primeval ancestor of its class, and the ancestry of all species of the same class is, in point of time, and, from this point of view, equal. Some species have, however, been evolved through lines, that have undergone more changes than others, and, hence, some bear in their facies, the traces of a much more complex series of modifications than others. It is these remnants of bygone conditions that are evident in some stage or other of the species that determine the super-family, family, sub-family, tribe or genus, into which we group the various species. It is these that make us assert that the Hepialids and Micropterygids are among the oldest Lepidoptera now in existence, meaning thereby that they are those that have undergone least change from the primitive form of lepidopterous insect, although how much modification they have undergone, we have really no conception. It is these that make us say that the Sphingids and Geometrids are among the most specialised of Lepidoptera.

ORIGIN OF SO-CALLED USELESS SPECIFIC CHARACTERS.

But this long line of ancestry, accompanied as it has been, by endless modifications that have taken place during the aeons of time,

through which the species and their ancestors have existed, has left a very complicated facies, and among the various structures and markings of the Lepidoptera (and the same general facts hold good for other branches of zoology), are many that have persisted and for which now there seems to be no actual use. The fact that every species has, in its long ancestral past, carried at each stage of its evolution, various peculiar structures and markings, that distinguished it from its then allies, and useful to it at the time, and so, back through all time during which insects have existed as such. or even further back to the first dawn of life, does not seem to be appreciated by many naturalists, and that these markings and structures should, in some instances, persist in a modified form, when they have ceased to be directly useful, although not hurtful, to the species in its present form, has raised, in the minds of some naturalists, a suspicion that some apparent specific characters are not useful to their possessors, and from this, some have gone on to assert that certain of these characters never have been useful to the species. If one will carefully consider the development of species in time, if one will consider our absolute ignorance of these early forms, except such as we can gather from analogy by the closest study and comparison of various species, it is surely somewhat unsafe, if not illogical, to make such an assertion.

SPONTANEOUS VARIATIONS ACTED UPON BY NATURAL SELECTION IN THE MODIFICATION OF SPECIES.

It is quite true, as Romanes has pointed out, that Darwin himself believed that every "slight individual difference, as well as more strongly marked variations which occasionally arise," had "an efficient cause," and that "if the cause were to act persistently, it is almost certain that all the individuals of the species would be similarly modified." Romanes took his stand on the principle here enunciated, and attempted to maintain the position of Darwin with regard to this and similar statements. Wallace, however, has shown that this reasoning can only be true when the same cause acts persistently on identical materials, under identical conditions. He has also further pointed out that the very theory of natural selection is based on the fact that the materials, *i.e.*, the individuals or species, are not identical, but that they vary indefinitely, and in many directions even under closely similar conditions, and he asks: "How, then, can any external or internal cause produce an identical result—a definite new variation—in *all* the individuals of a species, born as they are of varying parents, of different ages, and subject to ever fluctuating conditions?" The endless variation of almost every species of insect, in a more or less marked manner, re-echoes Wallace's question, and I can see no other conclusion than that natural selection has chosen and intensified variations that have occurred independently in the species, and modified such into paths that have proved useful to the species when any striking change in the environment has taken place.

SPECIFIC, GENERIC, TRIBAL, ETC., CHARACTERS UTILITARIAN.

I quite agree with Wallace that the selection of all variations, whether now exhibited as class, family, tribal or generic characters, has been brought about by utility to the species, and perfected by natural selection. We differentiate our classes, families, tribes and

genera, on the remnants of previous elements of utilitarianism. The active utilities are more conspicuous to us, are more prominently brought to our notice, by the differences existing between the species and its local race, between species and species, and so on throughout the whole scale, for, if we may so term it, the differences between two families, or classes, are only the accumulated differences which have existed (and in a measure persisted) between the endless specific forms which have been developed and died out since the representatives of the now distinct classes, formed but a single species. The problem of the utility of family, tribal, and generic characters is all included, then, in the consideration of the utility of specific characters, for, in the species, the useful differentiations have been completed, and are not in a state of doubt, as they are between a species and its local races. At the same time the consideration of the utility of specific characters leaves the problem shorn of the secondary and tertiary (and so on, *ad infin.*) considerations as to disuse and subsequent modifications that at once accumulate when one commences to study the same problem when applied to genera, tribes, families, etc.

CLIMATE AS PRODUCING USELESS SPECIFIC CHARACTERS.

Romanes considered that the actual causes which lead to the production of useless specific characters were : Climate, Food, Sexual Selection, and Laws of Growth. It may be well to examine these points from our position as entomologists.

The influence of climate on Lepidoptera (and I have no doubt on other classes of insects) is undoubted. When the same species inhabits central Europe, the Alps at high altitudes, and the Polar regions at high latitudes, the forms from the various localities often exhibit marked differences, and those from high altitudes more or less tend to resemble those from high latitudes. These differences may be produced either by climate directly, or by a difference in the nutritious value of the food brought about by a difference of climate. According to Staudinger, the variety *aegidion* of *Plebeius argus* is confined to Lapland and the Swiss Alps. *Polyommatus eros* inhabits the Alps and Pyrenees; a large form known as var. *eroides* occurs in the plains of south-east Germany. The var. *polaris* of *Aglais urticae* is almost confined to the Polar regions. *Melitaea aurinia* has a small undersized Alpine variety known as *merope*, whilst *M. partheniae* has a similar form known as var. *varia*. *Ossianus* is a small Lapland variety of *Brenthis aphirape*, and *Brenthis selene* and *B. euphrosyne* have parallel Lapland forms known as *hela* and *fingal* respectively; *Coenonympha arcania* has an Alpine form known as *darwiniana*, and so on. We have the bright red form of *Chrysophanus phlaeas* from northern Europe, the almost black form of the same species appearing in the summer, in those countries washed by the Mediterranean. Yet, in neither race, is the character a very fixed one, nor the physiological change accompanying the change of colour one that is hereditary, for the breeding of the species from the dark form in more northern latitudes results at once in the production of specimens scarcely distinguishable from the normal form of the species occurring in our latitude. The difference, then, may be due to the rapidity of feeding up, so that the larvæ do not get sufficient material for use; this, however, is unlikely. It may be due to the rapid metabolism of the

tissues in the pupa, so that the normal pigment (if the brighter coloured pigment be considered normal) has not sufficient time to mature; or it may be that the pupa has not sufficient material at disposal to form the pigment matter. I take it that the second of these possibilities is the correct one. It seems to me that this change of colour being due to physiological causes, does not in any way affect the specific characters of the species, and what is true of this is true of all other Lepidoptera that vary under different climatic conditions.

When we turn to Merrifield's experiments, where, as far as possible, all other factors have been eliminated, we are much struck with the fact that the exposure of the pupa to a difference of temperature, does, in some species, produce a marked difference in the imago. This difference, however, is not by any means identical, even with species of the same brood, yet we may safely say that a general change in the same direction takes place, under given conditions, in the individuals of the same species, some individuals showing much, others comparatively little, change. The more extreme results, however, of these experiments have not been the production of useless specific characters, but have resulted in the production of atavic forms, often quite unlike any species now in existence. That these modifications take place only at the critical point of pigment formation, Mr. Merrifield has, I think, abundantly proved, and that the changes are due to the effect of the high or low temperature on the energy of the pupa at the time of the formation of the pigment is, I think, certain. I am, therefore, inclined to consider that climate does not, except as (1) acting prejudicially (or the reverse) on insects through their food (making it stunted and less nutritious, and *vice versa*), and thus leaving them with an insufficiency (or excess) of energy for the production of an imago of normal size and pigmentation, (2) causing less (or more) rapid metabolism of the pupal tissues during the period at which the imaginal tissues are being perfected, really affect any species of Lepidoptera at all. Certainly it does not do so in the direction of producing real structural modifications.

THE EFFECT OF FOOD IN PRODUCTION OF SPECIFIC CHARACTERS.

When I wrote *Melanism and Melanochroism in British Lepidoptera*, I stated, I believe, that food could not produce changes in the colours of insects. I have long since retired from this untenable position, although I cannot give, off-hand, a single illustration from nature, where food, without doubt, causes a change in a species. Probably the stunted moorland forms of *Hypsipetes sordidata* and *Cidaria russata*, with which Mr. Porritt has made us acquainted, are due to the innutritious nature of their food. I am also aware that ill-fed larvæ produce either dwarfed or ill-pigmented imagines, the larvæ evidently not being strong enough, nor having reserve-material and energy enough, to produce the normal coloration. All variations brought about by food, too, appear to act in this direction, *i.e.*, by increasing or decreasing the amount of material available for wing formation and pigment, and, thus, variations produced by this means are those of size or colour. In no way can these be considered as hereditary, since they change with the substitution of a different food-plant, with each brood, or even part of a brood, if it be separated. Hence these differences can in no way be considered as specific characters.

SEXUAL SELECTION IN LEPIDOPTERA.

I have already (*British Noctuae and their Varieties*, vol. iii., p. xvii) discussed sexual selection in its application to Lepidoptera, and, I must confess, that I am quite unable to subscribe either to the views of Wallace or Darwin, that females exert any real choice, or select the males, with which they pair. There may be some little probability that sexual selection, in a small degree, occurs in butterflies, but I have seen a female *Colias edusa* paired whilst her wings have been limp, and among the Lycænids one must be a poor field naturalist who has not seen wretched little males in copulation with large and well-developed females and *vice versa*, whilst dozens of well-developed specimens are everywhere around. Among the larger moths the males will often pair with the females before their wings have fully expanded, the females most certainly having exerted no choice. Whatever influence sexual selection may have on the formation of specific characters in the higher animals, I do not think such influence exists in the Lepidoptera.

But granted the existence of sexual selection, then I fail to see how it tends to the development of specific characters, useful or useless. To me, sexual selection appears only as another phase of the general principle of natural selection, and, although I can see that the picking and choosing of the females may stamp a character already in existence in the males, more markedly on the race, I fail to see how it can originate any new character for this selective process to act upon. That the females would, as a race, continue to pick males that possessed some mark that had ceased to be of service to the species is hardly conceivable.

ISOLATION FIXES CHARACTERS ALREADY FORMED.

I do not think that isolation can beget specific characters. There can be no doubt that it tends to fix, by natural selection, such characters as are already in process of settlement. The tendency to close interbreeding, the more constant character of the environment to which the species is subjected, and other similar causes tend to define the characters more sharply when a species is strictly isolated from the ancestral form. I have already shown how isolation need not be a physical isolation, like the separation of an island from the adjacent continent; but that the emergence of closely allied species at different times of the year, by flying at different times of the day or night, or by being restricted to different food-plants of local habit, might be just as potent as separation by physical barriers.

LAWS OF GROWTH.

Nor can the laws of growth originate specific characters. The laws of growth, it appears to me, must be applied to actual existent parts of an organism, and, until some nervous or other exciting cause has been stimulated to bring about a modification, I do not see how the laws of growth can influence any structure or organ. It appears to be the case that, only when other causes have brought about changes useful to the species, these laws can have any action at all.

SUMMARY OF EFFECTS PRODUCED BY CLIMATE, FOOD, ETC.

It will be thus seen that I doubt entirely the power of climate, food, sexual selection, isolation and laws of growth, to produce specific characters at all, whether useful or useless. The modification of parts necessary to bring about a new specific character cannot be originated,

I venture to assume, by any of these phenomena. Climate may alter the pigments of lepidoptera, the scale-structure, or the size of a specimen by its injurious (*i.e.*, abnormal) action on the larva or pupa; but none of these alterations are hereditary. Food, according to its nutritious (or innutritious) value, will produce large or small specimens; but size alone is not a specific character. It generates no new modification of an existent organ. Sexual selection is, in Lepidoptera, I believe, practically an unknown quantity, and probably in some other families of organised beings, the supposed action in this direction is much overrated. I fail, entirely, to see how either isolation or the laws of growth can originate a new structure, or modify an existent one *per se*, although both forces are valuable for the development of a modification, once it has taken place.

UTILITY OF SPECIFIC CHARACTERS.

It must be evident to anyone who will logically consider the subject that, if the survival of the fittest be the one test by which species exist, and that all species have been brought about by a gradual and almost imperceptible transition from other species, the change which takes place and becomes fixed in the species—*i.e.*, the specific character—and which separates it from its immediate ancestor, must be a change that will be useful to the species, and that, therefore, the presence of useless specific characters, so-called, is more likely to be due to our failure to understand their use, rather than to any likelihood of their actual uselessness. In no case that occurs to me do any local races of Lepidoptera exist in certain areas to the exclusion of the type, except in the one case of *Polyommatus astrarche* var. *artaxerxes*, which is almost restricted to certain localities in Scotland, without our being able at once to show that they are adaptations to environmental conditions, which make the differentiating features of the utmost use to the races exhibiting it, and as these various local races have assumed their racial characters for purely utilitarian purposes, or are the result of conditions under which the normal type would cease to exist, so we may rest assured the characters retained by various species have been those which have remained useful to the species. These characters which now distinguish them as species most probably originated as racial peculiarities, because they were of use, and enabled them to win in the struggle for existence which they were obliged to wage against the various species by which they were everywhere surrounded, and, so far as an intimate study of our Lepidopterous fauna allows me to judge, I should say that certainly every specific character is, or has been, correlated with a character useful to the species.

PRESENT POSSIBILITIES OF INTELLECTUAL TRAINING AND CONVERSE.

And now, I would urge all those of our members who have recently commenced the study of entomology, to work at our favourite subject, honestly and laboriously, during such leisure as they may be able to devote to it, that, having put their hand to the plough, they turn not back again. I often wonder whether each and every of our younger members have ever thought what a vast field has been opened up of recent years to those who are comparatively poor. Has he ever considered, that until quite recently, intellectual meetings like those of our Society were possible only to men of wealth and leisure, that culture was then the freehold of the rich. Now the good things of

this world, as measured by intellectual enjoyment, are open to almost all who care to taste of them. The daily routine of a man's labour may be closely hedged, and his time of leisure small, yet the stories that nature hides in her bosom need not be strange to him. If he be an archæologist, the vanished cities of the past appear to him in all their grandeur, and the habits and customs of bygone races rise up before him to people the deserted places. If he be a naturalist, he may trace in every plant and insect, the history of a past that is inconceivable in its immensity, to which the time of the archæologist is but as yesterday; or if he be a geologist, then the time of the naturalist sinks into insignificance, and he sees the world peopled with successive races of animals and plants, and travelling ever backward, perceives the origin of life on the earth, or, beyond this, the seething mass from which its solid crust has been formed. Then, having become a partner in these pursuits, he may confer with those who prefer wisdom to ignorance, and who choose to walk in light rather than darkness; he may take part in their counsels when they speak of those hidden facts which it has been the joy and pleasure of their lives to unfold. Or, if these things charm him not, he can sit with the grand old fathers of prose and verse, and can ponder over the literature that shows that the thoughts, the aims, and the aspirations of our race form one continuous whole, the same to-day as thousands of years ago. He can trace how the mites of humble workers have made up the, dare I say, stupendous, whole of our knowledge of to-day. The man, I say, who has joined ours and kindred societies has shown that he has in him the true intellectual thirst which is born in few, and which is independent of wealth and station, and, having become conscious of this greater gift, he knows and lives a grander life than that given by mere worldly wealth and possessions; he worships at an older and more inspiring shrine that those found in temples built with hands; he is richer by far in his own self-reliance, and in the consciousness of the best that is in man, than any "merchant prince or railway monarch."

I am afraid, gentlemen, that I have wearied you, and yet I would make a final appeal to each and every member to do his best to make this Society worthy of its traditions and its name. To you I appeal with confidence to make the next year's work bear more than a satisfactory comparison with the past. I would earnestly beg every member to increase our present membership. This is one means of improving our position. I have already pleaded for the formation of a separate publication fund, so that we may increase the scientific value of the work sent out by our Society. I trust that I shall not plead in vain, and I feel sure that if every member will serve his Society to the best of his ability in these directions, he will be more than satisfied when he sees that we can then bring our work to a fuller fruition, and make it more valuable by leaving it in such a condition that it may be useful to those who come after us.

A vote of thanks to the President terminated the proceedings.

City of London Entomological and Natural History Society.

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City of London
Entomological and Natural History Society.

THIS SOCIETY has for its object the diffusion of the science of Natural History, by means of papers, discussions, exhibitions, and the formation of collections for reference. Since its commencement in 1858, a valuable and useful Library has been formed, which comprises, amongst other works, complete sets of the "Zoologist" (1843–1897), "Entomologist" (Vols. 1–30), "Entomologist's Monthly Magazine" (Vols. 1–33), and the "Entomologist's Record and Journal of Variation" (Vols. 1–9). There is also a collection of British Lepidoptera, and collections of other orders are now in course of formation.

The meetings take place on the first and third Tuesdays in each month, from 7.30 to 10 p.m., at the London Institution, Finsbury Circus, E.C., which is easily accessible from all parts. Exhibits are made at every meeting, and papers read on various Natural History subjects, a special feature being the systematic discussion and exhibition of interesting groups of insects, &c.

The Entrance Fee is Two Shillings and Sixpence, and the Annual Subscription Seven Shillings and Sixpence, payable in advance, both being purposely kept low in order that all may avail themselves of the benefits the Society offers. The Society therefore looks with confidence for the support of all who are interested in the study of Natural History.

The year commences on the first Tuesday in December, but intending members may join at any time, the ballot being taken at the next ordinary meeting after that on which they are proposed.

Further information may be obtained from either of the Hon. Secretaries.