South London entomological and natural history soc. Proceedings.

1908-1909

Proceedings

OF

THE SOUTH LONDON

ENTOMOLOGICAL & NATURAL HISTORY

SOCIETY

1908–9.

WITH FOUR PLATES.

PUBLISHED AT THE SOCIETY'S ROOMS,
HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.

PRICE TWO SHILLINGS AND SIXPENCE NET.

ce of the

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FIG. 1.

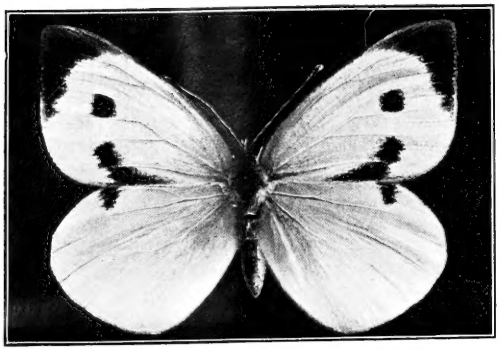


FIG. 3.

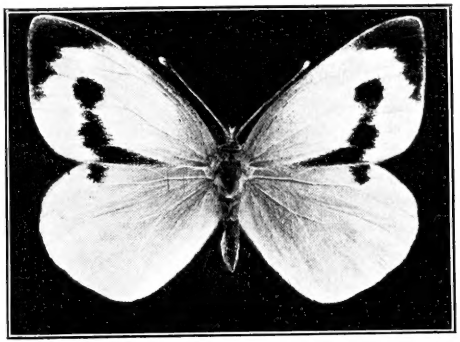


FIG. 2.

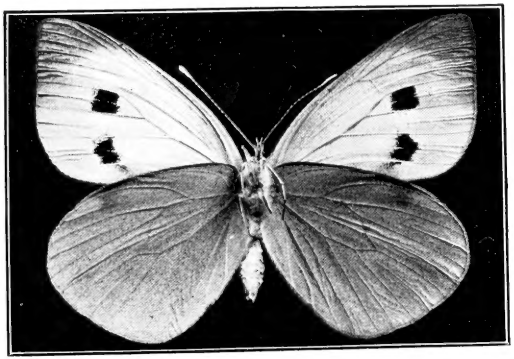
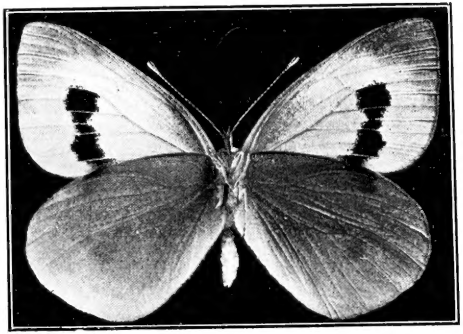


FIG. 4.



Photos. by H. Main.

Pieris brassicæ.

FIGS. 1, 2.—Normal female, upper and under sides.

FIGS. 3, 4.—Female var., upper and under sides.

[See Procs. 1906–7, p. 85

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The Society has for its object the diffusion of Biological Science, by means of Papers and Discussions, and the formation of Typical Collections. There is a Library for the use of Members. Meetings of the Members are held on the 2nd and 4th Thursday evenings in each month, from Eight to Ten p.m., at the above address. The Society's Rooms are easy of access from all parts of London, and the Council cordially invites the co-operation of all Naturalists, especially those who are willing to further the objects of the Society by reading Papers and exhibiting Specimens.

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1885 CROKER, A. J., Hurst Farm, Fleming, Saskatchewan, Canada. *l.*

1898 CROW, E. J., 26, Tindal Street, North Brixton. *l.*

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1889 Dennis, A. W., 56, Romney Buildings, Millbank, S.W. *l, mt, b.*

1906 Dobson, A. A., Ivy House, Acacia Grove, New Malden, Surrey. *l, orn.*

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1907 Fountaine, Miss Margaret E., F.E.S., Orrisdale, Florida Road, Durban, Natal. *l.*

1886 Fremlin, H. S., M.R.C.S., L.R.C.P., F.E.S., Government Lymph Laboratories, Colindale Avenue, The Hyde, N.W. *l, mi.*

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1900 Hewitt, R. L., "Hlabisa" Coalfield, Natal, S. Africa. *l.*

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1886 Kane, W. F. de V., M.A., F.E.S., M.R.I.A., Dadmans, Sittingbourne, Kent. *l, mi, marine invertebrata.*

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1901 Lowe, F., 92, Hurlingham Road, Fulham, S.W. *l.*

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1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham Common, S.W. *orn.*

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1887 WHIFFEN, W. H., Holmwood Lodge, Laton Road, Hastings. *l.*

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1905 WRIGHT, J., 30, Coleman Street, Woolwich, S.E. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors, additions, or alterations in the above Addresses and descriptions.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

BALANCE-SHEET FOR THE YEAR 1908.

GENERAL FUND.

Receipts.	£	s.	d.
By Balance from 1907	32	1	6
,, Subscriptions received, 91 at 7/6	34	2	6
,, ,, ,, 10 ,, 5/–	2	10	0
,, ,, ,, 1 ,, 6/–	0	6	0
,, ,, ,, 15 ,, 2/6	1	17	6
,, Arrears of Subscriptions received	5	2	6
,, Subscriptions received in advance	1	17	6
,, Entrance Fees, 11 at 2/6	1	7	6
	£79	5	0

Expenditure.	£	s.	d.
To Rent for one year	25	0	0
,, Attendance one year	2	10	0
,, Postage, Stationery, and Sundries	5	5	0
,, Insurance	0	8	3
,, Entrance Fees carried to Suspense A/c	1	7	6
,, Subscription to South-East Union	0	10	0
,, Vote to Publication Fund	36	0	0
,, Vote to Library Fund	3	0	0
,, Balance	5	4	3
	£79	5	0

SUSPENSE ACCOUNT.

Receipts.	£	s.	d.
By Balance from 1907	20	10	0
,, Entrance Fees from General Fund...	1	7	6
	£21	17	6

Expenditure.	£	s.	d.
To Balance	21	17	6
	£21	17	6

LIBRARY FUND.

Receipts.	£	s.	d.
By Fines	0	1	6
„ Vote from General Fund	3	0	0
	£3	1	6

Expenditure.	£	s.	d.
To Debit Balance from 1907	0	15	7
„ Postage (Librarian)	0	3	1
„ Subscription to Ray Society	1	1	0
„ Binding (C. J. Andrews)	1	1	0
„ Balance	0	0	10
	£3	1	6

PUBLICATION FUND.

Receipts.	£	s.	d.
By Donations	21	2	6
„ Sales of "Proceedings"	0	5	0
„ Vote from General Fund	36	0	0
	£57	7	6

Expenditure.	£	s.	d.
To Debit Balance, 1907	14	16	11
„ Knight's Account for 1907 "Transactions" ...	41	16	0
„ Balance	0	14	7
	£57	7	6

ASSETS AND LIABILITIES.

Assets.	£	s.	d.
By Balance, General Fund	5	4	3
„ Suspense Account	21	17	6
„ Balance Library Fund	0	0	10
„ „ Publication Fund	0	14	7
„ Arrears of Subscriptions, £25, valued at ...	7	5	0
	£35	2	2

Liabilities.	£	s.	d.
To Balance	35	2	2
	£35	2	2

Audited and found correct this 23*rd* day of *January*, 1909.

A. L. RAYWARD,
FRED. NOAD CLARK, } *Auditors.*

REPORT OF THE COUNCIL, 1908.

IN presenting the Thirty-seventh Annual Report, the Council has pleasure in stating that the affairs of the South London Entomological and Natural History Society still continue in a satisfactory condition.

During the year eight new Members have been elected, while eight names have been taken from the list. Of these five have been removed by death, and there have been three resignations. The Membership thus stands as follows: 2 Honorary, 5 Life, 31 Country, and 130 Ordinary Members, making a total of 168.

As will be evident from the Treasurer's Report and Balance Sheet, our finances continue in the satisfactory position that has marked them throughout the long term of Mr. T. W. Hall's judicious management.

The Meetings have been well attended, and Mr. Dennis, the Recorder, reports that there has been an average attendance of thirty-two Members at the twenty-three meetings held. At the Special Exhibition Meeting in November last seventy-nine Members and friends attended. As in previous years, the Society is much indebted to Mr. F. Noad Clark for his skilful working of the lantern, which has been in use on various occasions.

Mr. WEST, the Hon. Curator, reports as follows: "With regard to the Collections, I have been fortunate in the number of contributions received for the Cabinets. The Macro-Lepidoptera is now fairly represented, but a few species are still required to make the series complete. A list will shortly appear on the notice-board showing our present requirements. As many of them are very rare, it

would be well if, failing British examples, we could have Continental specimens as representatives; they would be very useful to many of our younger Members.

The following gentlemen have contributed a number of fine specimens, which have replaced poor specimens which the Cabinet formerly contained.

Macro-Lepidoptera: Mr. C. G. Brown, Mr. A. Harrison, Mr. L. W. Newman, Mr. A. L. Rayward, Mr. A. E. Tonge, and Mr. West (Ashtead).

Mr. R. Adkin has contributed very largely to the Micros, many species being from the late Mr. C. G. Barrett's collection.

Mr. Ashby, British species of Coleoptera.

Mr. McArthur, a few Scotch Coleoptera.

Mr. West (of Greenwich), several British Hemiptera."

The usual "Abstract of Proceedings" was published in May, and consisted of a volume of 114 pages and five plates.

There have been six Field Meetings held during the year, as follows:

May 30th.—Oxshott. Conductor: Mr. Step.

June 20th.—Box Hill. Conductor: Mr. Turner.

July 11th.—Ranmore Common. Conductor; Mr. Edwards.

July 25th.—Byfleet. Conductors: Messrs. Edwards and Sich.

September 19th.—Claygate. Conductor: Mr. Turner.

October 10th.—Oxshott (Fungus Foray). Conductor: Mr. Step.

In addition to the above, a meeting was held on March 28th at the Natural History Museum, South Kensington, when Dr. A. Smith-Woodward, F.R.S., conducted the Members over the Department of Fossil Reptilia.

Whilst three of the Field Meetings were well attended, the others showed a marked falling off in numbers.

Mr. Dods, the Librarian, reports that the books still continue to be largely used for reference on meeting nights although fewer have been borrowed for home use during the year.

The following is a list of additions which have been made since the last Annual Meeting:

Books.

"The London Catalogue of Plants," Tenth Edition, from Mr. F. J. HANBURY.

"British Lepidoptera," vol. ix, by J. W. TUTT, from Mr. STANLEY EDWARDS.

"British Annelids," Ray Society, by Purchase.

"Forest Entomology," by GILLANDERS, from Mr. R. ADKIN.

"Monograph of British Spongiidæ," Ray Society, from Mr. R. ADKIN.

"British Oak Galls," by CONNOLD, from Mr. A. SICH.

"Injurious Insects, 1879 Report," by ORMEROD, from Mr. ROWLAND-BROWN.

"Wayside and Woodland Ferns," by E. STEP, from Mr. W. F. WARNE.

"Moths of the British Isles," vol. ii, by R. SOUTH, from Mr. W. F. WARNE.

Periodicals.

"Entomologist," from Mr. R. SOUTH.

"Entomologist's Monthly Magazine," from Mr. W. W. WALKER.

"Irish Naturalist," by Exchange.

"Rochester Naturalist," by Exchange.

"Bulletin de la Société Entomologique de France," by Exchange.

"Canadian Entomologist," by Exchange.

"Bolletino Lab. Zool. Portici," by Exchange.

"Philippine Journal of Science," by Exchange.

"La Feuille des Jeunes Naturalistes," two vols., from Mr. ROWLAND-BROWN.

Annual Reports and Transactions.

"Smithsonian Institute," by Exchange.

"Transactions of the Texas Academy of Science," by Exchange.

"The Essex Naturalist," by Exchange.

"The Entomological Society of Ontario," Report of, from Mr. Lachlan Gibb.

"Wisconsin Academy of Science," Report of, by Exchange.

"New Mexico College of Science," Bulletin of the, by Exchange.

"The Norfolk and Norwich Natural Science Society," by Exchange.

"South Eastern Union of Scientific Societies," by Exchange.

"Horniman's Museum," 1907, by Exchange.

Pamphlets and Separata.

"Life of Linné."

"Linné and his Works."

"Address to the Entomological Society of London," 1905 (Poulton).

"Manual of the Agricultural Department of India."

"A Trip to Corsica and the Alpes Maritimes," Rowland-Brown.

"*Lycæna orbitulus*," Rowland-Brown.

"Notes on Scandinavian and Lapland Butterflies," Rowland-Brown.

"Catalogue of the Diptera of Hertfordshire," from Mr. Barrand.

To Mr. Dods, for his unremitting attention to the Library, the best thanks of the Society are due.

The following "Papers" were read during the past Session :

February 13th.—Mr. H. S. Fremlin, M.R.C.S., etc., "The Effects of Physical and Chemical Agencies on Lepidoptera, being the Results of Experiments made in 1906–7."

May 14th.—Mr. A. H. Jones, F.E.S., "Notes on Hungarian Butterflies."

May 28th.—Mr. Gilbert Arrow, F.E.S., "Origin and Use of Horns in Coleoptera."

June 25th.—Mr. R. Adkin, F.E.S., "Report of the

Delegates who represented the Society at the Conference of the South Eastern Union of Scientific Societies held at Hastings in June."

August 27th.—Mr. H. S. FREMLIN, M.R.C.S., etc., "Insects as Carriers of Disease."

October 8th.—Mr. W. J. KAYE, F.E.S., "Orchids."

January 14th.—Professor BATESON, F.R.S., gave a most interesting address with lantern illustrations on "Mendelism."

There were also a number of detailed notes and short papers on exhibits made at most of the Meetings.

The Effects of Physical and Chemical Agencies on Lepidoptera.

(*Being a record of experiments made in* 1906 *and* 1907.)

By H. S. Fremlin, M.R.C.S., F.E.S. *Read February 13th*, 1908.

I wish again to bring before your notice some experiments that I have made on the pupæ of Lepidoptera.

The only species that I have to speak of this evening are *Vanessa urticæ* and *Abraxas grossulariata*.

The total number of pupæ experimented with was 2021, of which 1105 were *urticæ* and 916 were *grossulariata*. The pupæ were not selected from special batches of larvæ, but, as I understand, the larvæ were merely collected from any place in which they happen to have occurred in the wild state.

I received the pupæ as soon as possible after their change from larvæ, and they were placed in the experimental jars on the day they were received.

The following are the conditions in which the pupæ were placed:

Physical.	Chemical.
	Nitric acid.
Water.	Hydrochloric acid.
	Chloride of lime.
98·4° F.	Sulphur.
	Hydrogen sulphide.
	Bisulphide of carbon.

Controls of the above were kept in all cases.

The pupæ were all kept in glass jars on moss litter, into which sticks were placed for the imagines to crawl on when they emerged. The jars were at first covered with tightly-fitting lids, but it was found that these coverings allowed of no evaporation of moisture, and the result was that in some cases moulds grew over both pupæ and moss litter so that it was necessary to admit air, and this was done either by sliding the cover off a little, or by replacing it with a covering of muslin.

The reagents used were kept in an open bottle standing in the moss litter beside the pupæ, save in the cases of water and sulphur. In the case of water the moss litter on which the pupæ were placed was moistened, and further, a bottle or tube of water was kept in the jar, and by these means the atmosphere in the jar was constantly saturated.

The sulphur, in form of powder, was run in a thick layer all over the bottom of the jar and was then covered with the moss litter. To be sure that vapour of SO_2 was given off the jar was from time to time placed in a little hot water, or a little sulphur was burnt in it.

Now, in giving you the results, four important points will be especially noticed: The number of normal imagines; the number of cripples; the colour changes in the wings; the number dead.

The following are the details of the experiments:

Physical Conditions.

Water.

Vanessa urticæ.

Total number.	Hatched.	Cripples.	Died.
123	67	28	56, or 45 per cent.

You will see that several of the butterflies were cripples.

The colour of the wings was, in a few instances, a little less bright than the controls.

A. grossulariata.

Total number.	Hatched.	Crippled.	Died.
147	15	4	132, or 90 per cent.

The pupæ were very much affected by the moisture, as the above figures show, the death-rate being exceedingly high. No special change, however, was observed in the colour of the wings.

98·4° Fahrenheit.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
103	20	7	83, or 80 per cent.

The high death-rate here given is really not sufficiently accurate, as thirteen of the twenty that emerged came out within twenty-four hours of being introduced into the incubator, which probably means that they were so nearly mature that the temperature had but little opportunity to act on them.

Omitting the twenty the figures would have been:

Total number.	Hatched.	Cripples.	Died.
83	7	2	76, or 91·5 per cent.

This shows that the continuous high temperature acts very unfavourably on these pupæ. No colour changes were noted on the butterflies.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
91	0	0	91, or 100 per cent.

In this species the total number died. This result must, I think, be attributed to the temperature only. I was most careful to avoid either excessive humidity, which would have caused decomposition, or excessive dryness, in which they must have perished from extraction of water from their bodies. That temperature alone should be so fatal I was not prepared for. I do not know whether continuous high temperature acts in the same way on other species.

Chemical Conditions.

Nitric Acid.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
166	64	22	102, or 61 per cent.

A large number of *urticæ* died in pupæ, and a third of those that emerged were cripples; those that developed their wings showed little if any change in colour.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
140	82	15	58, or 41 per cent.

The mortality was somewhat above the controls, but not very noticeably. The black colour on the wings has in some instances given place to a deep grey.

Hydrochloric Acid.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
169	83	21	86, or 51 per cent.

Half the pupæ failed to emerge, but no great excess were cripples. The main feature of interest is the change in the colour of the wings, the normal Indian red colour being replaced, in some instances more or less completely, by a dirty grey. This variation occurs more frequently in the upper wings, but is seen also in the lower. I should be interested to know whether varieties of this particular colouring occur naturally, and if so in what neighbourhood, as facts of this sort would possibly give us further knowledge of the cause of variations.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
139	80	10	59, or 42 per cent.

This species shows no noteworthy feature.

Chloride of Lime.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
7	4	0	3, or 43 per cent.

I much regret that I have only tried the effect of this reagent on seven pupæ. Of the four that emerged one shows the same pigmentary changes that occurred in the hydrochloric acid jar.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
101	75	4	26, or 25 per cent.

Nothing worthy of comment occurred among the specimens that emerged.

Sulphur.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
134	52	28	82, or 61 per cent.

The death-rate was high among these pupæ and over half of those that emerged were cripples. No alteration was observed in the colours on the wings.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
72	27	10	45, or 63 per cent.

Sulphur also caused rather a high mortality in this species.

The chief feature, however, is the large number that showed an increase of black pigment on the wings; this occurs rather as a suffusion than as an increase in size of the normal black markings.

Hydrogen Sulphide.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
176	28	5	148, or 84 per cent.

The effect of this gas was disastrous to the pupæ. However, those that emerged showed but few cripples, and the colour of the wings was normal.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
101	28	28	73, or 72 per cent.

Here several pupæ were destroyed; but the remarkable feature in

this experiment is that all those that hatched were cripples. As I mentioned above, only a few *urticæ* were crippled, so that the result is even more remarkable. This shows, I think, pretty clearly, that such experiments as these in a more extensive form, both in reagents and species, may lead to some developments which will teach us more of the causes that lead to variation.

Carbon Bisulphide.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
121	2	1	119, or 98 per cent.

This gas is the most poisonous that I have ever used for *urticæ*. The two that emerged came out in the first twenty-four hours after the pupæ were placed in the jar ; so that one may consider that this sulphur compound is absolutely fatal to this species. No *A. grossulariata* were experimented on with this gas.

Control.

V. urticæ.

Total number.	Hatched.	Cripples.	Died.
106	55	20	51, or 48 per cent.

The large number of this species dying in pupæ and the high percentage of cripples was in part no doubt due to bad packing in forwarding them to me by post. Nothing worthy of note occurred in colours on wings.

A. grossulariata.

Total number.	Hatched.	Cripples.	Died.
125	88	4	37, or 29 per cent.

These gave a fair average of emergences, and you will see in the box that no specially dark forms occur.

This ends the record of the experiments; but before finishing this paper I should like to say that in this record no mention has been made of 600 *Anthrocera filipendulæ* pupæ that I also placed in precisely similar conditions to those given above, the reason for the omission being that only about a dozen hatched, and of these only three were perfect. Out of the nitric acid jar one yellow var. emerged, but this was a cripple.

On looking over these results the two points that strike one are the high death-rate, and the pigmentary changes in the wings.

The death-rate among the *urticæ* is especially noticeable where they were exposed to continuous high temperature, hydrogen sulphide and bi-sulphide of carbon, the latter being particularly deadly.

Now the *grossulariata* were in great measure destroyed in the water-laden atmosphere, and failed entirely to emerge in the continuous high temperature. Hydrogen sulphide, although injurious, was not so destructive to these pupæ as to those of *urticæ*, but it had, apparently, the curious effect of crippling all of those that came out. The effect of the reagents on the colour of the wings is also interesting.

Chlorine would appear to have a marked effect on the red colour of the *urticæ*. Whether this result is due to a want of development of the red pigment, or if it is due to the red colour fading after it had developed, I have yet to learn. The chlorine, however, seems to have little effect on *grossulariata*.

Sulphur, on the other hand, shows no action on *urticæ's* pigments, but the *grossulariata* emerging from that jar were rather markedly suffused with black.

These experiments were all on pupæ but I very much hope, later on, to have the opportunity to try larvæ also.

I trust that these notes have interested you, and knowing, as I do, that many of you are much more conversant with Lepidoptera than I am, I trust that I may be able to gather some ideas this evening that will guide me in any further work I may do in this direction.

House Moths.

By Alfred Sich, F.E.S. *Read April 9th*, 1908.

By "house moths" I mean those species which, though not confined to the interior of our dwellings, very frequently pass the whole of their lives inside our houses. The supposition is that these moths have been inhabitants of human dwellings ever since man became sufficiently luxurious to attract them. Before that time they contented themselves with inhabiting the nests of birds, in which one frequently finds them still. There are several species which occur in houses; among the commoner kinds are: *Endrosis lacteella*, *Borkhausenia pseudospretella*, and some members of the Tineids in the strict sense.

Endrosis lacteella, Schiff. (also called *fenestrella*) is very common, and may be found all the year round in houses, but is more common in summer, when it may also be taken at rest on the trunks of trees. It may be known by its white head and thorax, and dull grey wings with darker spots. In its white head it resembles another house moth, *Trichophaga tapetzella*, but that has the head rough and the basal half of the forewings deep brown, while the posterior half is pale grey. In *E. lacteella* the whole of the forewings has a uniform ground colour. I do not believe that the larvæ of this species attacks any kind of garment, but it will eat various substances. I have bred it myself from stilton cheese, on which the larvæ fed well; they made grooves and tunnels in the rind of the cheese. On another occasion I bred several from an old bird's nest.

Borkhausenia (*Œcophora*) *pseudospretella*, Stt.—This is a brown moth with three large dark brown spots on the forewings. The head is smooth, and the palpi are long and curved upwards. These two last characters will serve to separate it from *Tinea fuscipunctella*, with which it sometimes has a superficial resemblance. Like most house moths this species when disturbed runs with great swiftness into the darkest spot it can find. The larva has no particular taste for clothes, but little else comes amiss to it. I believe I have bred it from decayed oak timber, but have not yet found any note to that effect. I have reared the insect on waste specimens of Noctuæ and Geometræ, and have bred them from a bird's nest. In 1906 Mr. West, of Greenwich, kindly gave me some larvæ feeding on flax seeds. They finally spun silken cocoons, and produced *B. pseudospretella*, which were exhibited here September 26th, 1907.

We now come to the clothes moth group. They vary a good deal among themselves, but all have rough heads, that is to say, the scales clothing the head are long and stand out in various directions. The labial palpi are rather short, but the maxillary palpi are generally long and have five or six joints. The genera, not yet very well arranged, are as follows :

Scardia, Tr., is closely allied to *Tinea*, but has a longer tongue, the labial palpi are large and porrected, the middle joint thickly scaled and the third or terminal joint smooth and rising vertically. Antennæ of the male with bunches of long cilia. The palpus seems to me to give the most marked character in separating this from *Tinea* and the antenna of the male is also distinctly different, but these are only comparative differences, and the species now included in *Tinea* differ in these points among themselves. Nevertheless it may be convenient to retain *Scardia* for the *boleti* group. In Britain we only have one species, *S. boleti*, F. The larva feeds on fungi, and as the species is of large size it is as well that it is not destructive to household goods.

Monopis, Hb. (*Blabophanes*, Z.).—This appears to be a good genus, and may be separated from *Tinea* by the hyaline spot on the forewings and by the nervures three and four of the forewings being stalked. The hyaline spot is very peculiar ; it looks as though the scales had been rubbed off the wing. The scales are there, however, but are very small, thin and pale.

Counting *lombardica*, Hering (*heringi*, Richardson), we have six species, of which *imella* and *rusticella* may be considered destructive.

Trichophaga, Rag., is again close to *Tinea*, but separated on account of the subcostal and the two first radial nervures not reaching the costa, but running into one another below the costa. We only have one species, *tapetzella*, a very destructive moth.

Tinea, L. (restricted by Zeller).—Head rough. No ocelli. Tongue hardly perceptible. Middle joint of labial palpi with long apical bristles. Maxillary palpi several-jointed. Forewings with twelve nervures, three, four and five separate. Hindwings flatly scaled with long fringes. In this genus, as at present constituted, we have at least twenty species, but happily they are not all destructive.

T. granella, though it seems to be a pest in granaries, is scarcely a house moth, but there is no doubt that *pellionella* is very destructive, and probably *fuscipunctella* shares in its depredations.

Tineola, H.S., differs from *Tinea* in the maxillary palpi being very short. We have only one species, *biselliella*, which is perhaps the commonest household lepidopterous pest.

Myrmecozela, Z., differs from *Tinea* in the want of maxillary palpi and in the middle joint of the labial palpi being very roughly scaled. We have only one species—*ochraceella*. It does not come into our houses but dwells in those of the ant, the larva apparently feeding on the refuse of the nest. We will now pass in review the species mentioned.

Monopis imella, Hb.—Head rust-coloured. Forewings brown with a hyaline spot and a very narrow yellowish line along the costa.

This species is rather too uncommon to be called a house moth, but from what Heyden says of it, if it were commoner it would probably be a nuisance. Heyden states ("Stett. Ent. Zeit.," 1860, p. 118) he found numbers of the larvæ in an old felt shoe, lying in a field near Frankfort, in November. The larvæ lived gregariously in crowded tubes. Some of the moths developed in a few days, and the rest in the May following. I have never taken the insect.

M. rusticella, Hb.—Head rust-coloured. Forewings purplish-brown, usually much mottled with dark brown. More variegated than *M. imella*, and wants the pale costal streak. A common species which I have often taken in the house, but I have no personal knowledge of any damage done by the larvæ. There is a notice in the "Entomologist's Annual" for 1857, p. 121, of this species being freely bred from half-rotten carpet.

Trichophaga tapetzella, L.—This is *the* carpet moth, though nothing to do with those elegant Geometers which bear that name. It is easily identified by its rough white head and parti-coloured wings. The basal half of the forewings is deep brown, and the posterior half pale grey with darker mottlings. I have never had the larva of this species, but from various accounts it seems an extra pest. Stainton says ("Insecta Britannica," p. 25, 1854): "Others, like *T. tapetzella*, construct covered galleries of the substance on which they are feeding, thus destroying much more than they actually consume." On p. 28 he further remarks: "Frequently occurring in carriages, the larva feeding on the lining."

Tinea pellionella, L.—Head generally more or less fulvous. Forewings ochreous-brown, fairly uniform in colour, with a conspicuous dark brown spot beyond the middle of the wing. Apical cilia not barred. This species is frequent in rooms and feeds on carpets and feathers, and constructs a portable case in which it finally pupates. I have taken the larva climbing up a drawing-room wall with a case made of the carpet below, and have also bred it from the nest of a blue tit.

Tinea fuscipunctella, Hw.—Like *T. pellionella*, but much darker, and more spotted, and with three or four dark dashes in the cilia at the apex of the forewing. This is very common in houses, where I have frequently taken it on curtains or walls, but I have no indictment against it, though the strongest suspicions.

Tineola biselliella, Hummel.—Head ochreous or rust-coloured, forewings pale ochreous, varying in intensity, unspotted. Very common in the interior of houses, where it breeds abundantly at the expense of the householder. Once, at Sandown, I was asked to sit on a yellow sofa, and as I seated myself sundry bits of the cover fell off towards the floor, but, curiously, instead of reaching it they returned to the sofa. They were the imagines of this species, which were in dozens! In 1906 I had a number of larvæ (and cocoons)

given to me, feeding on hair and moss, which had been used to stuff out a small elephant made of india-rubber. I have also bred it from a bird's nest. Mr. West, of Greenwich, gave me several larvæ feeding on red cloth, from which some very fine specimens were reared last year.

When, some ten years ago, I took a survey of the smaller moths of Britain, my attention was distinctly drawn to what I would call the constellation of the Tineids. I believe the chief attraction in those days to me was the variegated warm browns displayed on the forewings of such species as *Scardia boleti* and *Tinea parasitella*. *Tinea corticella* is even more delightful in that sense as it is more delicate.

When I sought some acquaintance with these gems in the field, naturally the first I came across was *Tinea cloacella*. This is a very beautiful and variable species, and served to whet my appetite and make acquaintance with the other members of this interesting group. But, *Ars longa, vita brevis est*, and consequently I have only made personal acquaintance with some few of the species. I have ventured to give utterance to the above remarks in the hope that the members of this Society will give their personal experience, so that our united efforts may produce a report of some economic value. I say of economic value, because my remarks on this occasion do not apply so much to those species which have still retained the love of their sylvan haunts, but more especially to those species which have found it convenient to share the warmth and comfort with which man has surrounded himself. They are in most cases uninvited guests, and the idea of these remarks is to obtain information as to the actual damage they do, and as to the best means of circumventing their attack.

Notes on Hungarian Butterflies.

By A. H. Jones, F.E.S. *Read May 14th*, 1908.

Hungary may be described as an extensive plain about 350 miles from east to west and 250 miles from north to south. For instance, from Vienna to Buda-Pest and thence to Temesvar, a distance of about 300 miles, the country is one level plain, under a considerable amount of cultivation, principally pasture and arable land, drained by dykes as in our Essex marshes. There are faint indications of hills on the horizon line, but they are of no great elevation until the Carpathian mountains are reached. These extend for a distance of about fifty miles, separating Hungary from Galicia, an Austrian province. We find the loftiest mountains in Hungary in this range—the Höhe Tatra reaching an elevation of 8375 feet. This district is very rich in Lepidoptera, especially in the Apaturidæ, but I was told it is not quite so good as farther south in the Transylvania Alps, which may be considered a continuation of the Carpathians in a southerly direction. The Transylvanian Alps separate Hungary from Roumania, and practically terminate at Orsova on the Danube. Herculesbad, about ten miles distant, may be considered the most westerly point of these mountains. Herculesbad is visited yearly by many entomologists, and may be described as Hungary's "happy hunting ground." It is truly an ideal place in which to collect. On one side of the stream there are open uncultivated tracts of land; there is a beautiful valley along which you can wander for miles, take *Neptis aceris*, find the Apaturidæ resting in the muddy woods, and see the numberless *Argynnis daphne* feasting on the bramble blossoms. When satiated with all these pleasures, you can cross the stream, climb 1000 feet and enter the solitude of the forest. The trees, principally beech, are of great size and grandeur, and sunlight is practically obliterated by their foliage. Only here and there are there any glints of sunshine. The undergrowth with this dearth of sunlight is naturally scanty. Few butterflies are to be seen in this part of the forest except when a small clearing can be found. One I discovered was a place called the "Quelle," and the number of butterflies here congregated was truly a beautiful sight; *Limenitis populi*, *L. camilla*, *L. sibylla* and *Neptis lucilla* were all on the wing together. This spot is on the route to the Domogled, a mountain of an elevation of 3630 feet, on the summit of which are found the beautiful species of *Erebia medusa* var. *psodea* in May, and of *E. melas* in July. *Libythea celtis* is

common in the town of Herculesbad, resting on the hot stones in the sunshine, but is rather difficult to see when at rest. *Melitæa athalia* var. *mehadiensis*, is a remarkably fine form and is fairly common near the town.

In the distant past, no doubt, a vast area bordering on the marshy districts of Hungary was covered with forest, but not of the same character as the one just referred to, poplars, aspen and oak predominating, the beech being practically absent. One of the remnants of this probable forest is to be found at Peszér, about forty miles distant from Buda-Pest. Here we find marshy ground and sandy wastes, both good for their respective species. In the dry places *Melitæa* and *Argynnis* are abundant—*M. cinxia*, *M. didyma*, *M. trivia*, *M. athalia*, *Argynnis hecate*, *A. lathonia* and *A. pandora*; in moist localities *Chrysophanus alciphron* and *Heteropterus morpheus*. This locality appears to be the only one in Hungary, indeed, in Europe, with the exception of Russia, for *Melanargia japygia* var. *suwarovius*, of which I took but two specimens, the last season being a bad one. I found here the larvæ of *Thais polyxena* in the greatest profusion on *Aristolochia clematitis*.

I paid two visits to Peszér from June 12th to 14th, and again on June 27th. There was an abundance of butterfly life on both occasions; many of the species, however, such as the *Melitæa*, had nearly disappeared by June 27th. These were replaced by the second brood of *Lycæna arion* in numbers in the open sandy wastes, and *Heteropterus morpheus* in the damp localities among the undergrowth. *Carcharodus lavatheræ* was now in great abundance in the open spaces, with occasional specimens, both male and female, of *Colias hyale*, and here and there *C. myrmidone*, which, like *C. edusa*, is very quick on the wing, and is more often seen than caught. It is somewhat curious that this district, which is so rich in *Melitæa* and *Argynnis*, should fail to supply a single species of *Apatura*, *Limenitis* or *Neptis*, which are all so well represented at Herculesbad. But, as I said before, the character of the forest is very different.

If one looks across the Danube from Buda-Pest, one sees a range of hills some five to ten miles off. Various tram-lines lead you to an approachable distance from these hills, one of which, Svábhegy, distant about seven or eight miles from Buda-Pest, I visited. The lower part of the hill was covered with dense wood wherein there were some beautiful rides in which to collect. I did not, however, meet with any success here, but on the top of the hill there were some beautiful open spaces which afforded an abundance of lepidopterous life. *Hesperia orbifer* was extremely abundant (but not in fine condition), and so was *Cupido minima*. Here I had a good chase after *Colias myrmidone*, and succeeded in catching it. Privet bushes were scattered about, and being in full bloom attracted numberless specimens of *Thecla acaciæ* and *T. ilicis*. From this

plateau, being at an elevation of about 2000 feet, a good view was obtained of the Danube, the town of Buda-Pest and the surrounding country. In the low-lying marshy land not far distant from this locality a home is afforded for the two beautiful coppers, *Chrysophanus dispar* var. *rutilus* and *C. thersamon*, of which I took some fine examples. *Cœnonympha iphis* was also very common here.

I have roughly estimated the number of butterflies occurring in Hungary as about 170. This number compares very favourably with the adjoining countries, for in Germany we find 122; in Germany and Switzerland together 192, and in Italy and Sardinia 203. Hungary lying considerably to the east of Europe, we naturally find a few eastern species introduced to the list, to which I wish to refer. Among the *Colias* we find two species, *C. chrysotheme* and *C. myrmidone*, which do not occur further west than Austria. The next species is *Neptis aceris*, Hungary being its western limit. Two species of *Vanessa* do not occur further west than Austria, *V. xanthomelas* and *V. l-album*, both of which are not uncommon at Herculesbad.

Among *Melitæa* we find *M. trivia*, which is quite an eastern species. Hungary is very rich in the genus *Argynnis*, for out of the twenty-four species found in Europe sixteen occur there, such local species as *A. hecate*, *A. laodice*, and *A. pandora* being among the number. *Melanargia japygia* var *suwarovius* only occurs in one locality—at Peszér, in Hungary. A whiter form is found, however, in Russia. Among the *Erebias* we find *E. medusa* var. *psodea*, a very interesting form with large eye spots, and *E. melas*, both on the higher mountains, the Domogled being a good locality. Two fine Satyrids, *Pararge climene* and *P. roxelana*, are eastern in their distribution, and Hungary is quite the western limit. Both species are common at Herculesbad and in certain localities in Asia Minor. *Cœnonympha leander* is also an eastern species and does not occur further west; the same remarks may be applied to *Chrysophanus thersamon*. Among the "Blues" there does not appear to be any eastern forms. This is rather singular, for a little farther east, in Russia, we find several distinct species. Although the "Blues" are fairly well represented in Hungary, all occur in the Alps and in central Europe. It appears from the list that there are eleven species of butterflies which do not occur in western or central Europe, but, of course, there is a considerable number of species whose range of distribution does not extend to Hungary, especially among the Erebias, but this may be accounted for in a measure by the lower elevation of the mountains. There are two species to which I must specially refer—*Heteropterus morpheus* and *Cœnonympha, œdippus*, both of which marsh species are common in Hungary, and also occur freely at Biarritz, which points to the wide distribution of nearly 1000 miles.

Insects as Carriers of Disease.

By H. S. Fremlin, M.R.C.S., F.E.S. *Read August 27th*, 1908.

I do not think that I need apologise to you for bringing this subject before your notice.

This Society has always associated itself in all matters of Natural History, and being chiefly an Entomological Society I feel that all that concerns insects will be welcome.

Of course, in a short paper I can only give you the briefest outline of the subject, for it is one that occupies the attention of all medical men in the tropics, and is carefully studied by specially trained men in every part of the world.

Insects may be carriers of disease in one of three ways :

In the first place they may settle on infected substances, and then fly elsewhere and settle again, carrying the germs with them.

Secondly, they may suck blood from an infected case, then, carrying the infection on their proboscis, thrust this into the blood-stream of the next host they bite.

Thirdly, they suck blood as before, but in these cases they draw up in the blood they swallow an immature parasite. This parasite develops in the body of the insect, where the young forms are produced ; these young forms pass into the salivary glands of the insect, and are carried with the saliva into the next host. So that in the first two cases the insects infect immediately, in the third case they only become infective after the parasite has grown up in them and produced a further generation.

Diseases may be carried by the following insects :

Non-biting flies, biting flies, mosquitoes, bed-bugs, fleas and lice.

In the case of the non-biting flies the method of infection is shortly as follows : The fly is attracted by some infected substance containing, let us say, cholera, or typhoid fever germs ; it settles on this, and the infected material adheres to the feet ; from here it flies off, and next settles on some cakes, meat, or fruit, depositing the infection on these. Now, if these are eaten without further cooking, the person taking them will be liable to develop the disease.

Some of the non-biting flies sit at the mouths of sewers, and one such fly was found to have on its feet and in its mouth 100,000 microbes. These flies enter the houses in the neighbourhood and settle on food stuff or fly into the milk. Such flies as these may have adhering to their bodies lice, eggs of tape- and thread-worms, bacilli of dysentery, typhoid fever, plague, cholera, tuberculosis, etc.

Only the other day, whilst I was examining a tuberculous gland, a fly settled on it and then flew off and went into the window!

Not only do flies carry infection in this way, but eggs of worms and pathogenic bacteria have been found in their digestive apparatus and in their fæces.

Biting flies may, of course, carry diseases as in the first group, but they also infect by thrusting the germs into the blood of the person or animal they may bite; both anthrax and septic diseases may be caused in this way. Not only flies, but also fleas, bed-bugs, and lice can infect by biting, thus directly inoculating the blood of the new host. In this way it is thought that bed-bugs may carry tuberculosis, anthrax, cerebro-spinal meningitis, etc., fleas may carry plague, and lice carry skin diseases.

The insects which carry the immature parasite, and which only become infective after this parasite has developed in them, are, however, the most serious carriers of disease. It is in this way probably that the tse-tse fly may carry the germ of sleeping sickness. These flies haunt scrub and bushes at the margin of lakes and rivers in certain localities, and suck the blood of various animals, especially of the crocodile. The tse-tse flies are better known as carriers of a horse and cattle disease, such animals being destroyed if they go into the fly area.

The most deadly scourges in the insect world are the mosquitoes. An *Anopheles* sucks the blood of a person suffering from malaria; the parasite of this disease develops in the mosquito and is then carried to a fresh individual, who is thus infected. The tens of thousands of cases of malaria abroad are due to these insects. Another mosquito, the *Stegomyia*, is the carrier of yellow fever, although in this instance the germ has not yet been found; nevertheless it is proved that killing this insect and poisoning its breeding-places diminishes the fever to the vanishing point; and Panama, formerly one of the most deadly regions of the earth, is now rendered comparatively healthy by the wholesale destruction of these insects.

Although the ticks are only insects in the loose popular sense, it may be legitimately noted here that they certainly carry parasites, and are believed to cause plague, blackwater fever, spotted fever of the Rocky Mountains, and typhus in some cases. These carry also a parasite that causes cattle disease.

You will see from this short summary how very important insects may be as agents in the development of disease, and what an important field for study is opened up for entomologists.

Orchids and their Cultivation.

By W. J. Kaye, F.E.S. *Read October 8th*, 1908.

Orchids are divisible into two large main divisions—those that grow in the ground, or *terrestrial orchids*, and those that grow on trees or rocks, and known as *epiphytal orchids*. To the former class belong all our native orchids, comprising the genera *Malaxis*, *Liparis*, *Corallorhiza*, *Epipactis*, *Cephalanthera*, *Listera*, *Neottia*, *Epipogium*, *Spiranthes*, *Goodyera*, *Orchis*, *Habenaria*, *Aceras*, *Herminium*, *Ophrys*, and *Cypripedium*. These genera contain thirty-six species that we hold as British, the genus *Orchis* claiming eleven out of the number. Several of the species are very abundant, while others are extremely local. *Cypripedium calceolus*, *Spiranthes æstivalis*, *Epipogium aphyllum*, *Cephalanthera rubra*, and *Corallorhiza innata* are all extremely local and scarce in Great Britain, while *Malaxis paludosa*, although widely distributed, is always scarce. All the terrestrial species have roots thickened into tubers or occasionally into a bulb projecting above ground such as in *Malaxis paludosa*.

Bentham, in his handbook to the British flora, defines the British Orchidaceæ thus: "Perennial herbs with the roots or stock often thickened into tubers, entire and parallel nerved leaves and irregular flowers, either solitary or in spikes, racemes, or panicles, each one in the axil of a bract. Perianth superior, irregular, with six usually petal-like segments; the three outer ones, called sepals, and two of the inner ones, called petals, often nearly alike; the third one, called the lip or labellum, differing from the others in shape and direction. Opposite to the lip, in the axis of the flower, is the column, consisting of one, rarely two, stamens, combined with the pistil; the two-celled anther or anthers being variously situated on the style itself. Pollen rarely granular, more frequently cohering into one or two pairs of oblong or globular pollen masses tapering at one end into a point. Ovary inferior celled, with three parietal placentas. Capsule three-valved, with innumerable minute seeds resembling fine sawdust."

This definition is for the British species, which are all terrestrial. but except for the alteration of "roots thickened into tubers" into "growth usually thickened into pseudo-bulbs" in the case of epi phytal orchids, the definition holds for all orchids whether terrestrial or epiphytal.

Terrestrial orchids are found in all parts of the globe, being found in every continent, and from the equator almost to the limits of the arctic regions. They are the only orchids that occur in Europe, and

very few epiphytal orchids occur anywhere within the temperate regions.

The exact reverse is the case with the epiphytal orchids. They are essentially a tropical group of plants. They have doubtless become epiphytal in the struggle for existence. In the dense forests of the tropics there is no light for terrestrial orchids and they have betaken themselves to the trees and bushes, in the forks and angles of whose boughs the seeds germinate and thrive. There are genera which are partly epiphytal and partly terrestrial, such as the genus *Catasetum*, some of whose species "live on the sand reef, others growing on low trees in the swamp, and one which has found a congenial home among the leaf-stalks of the eta palm" (*vide* Rodway, "In the Guiana Forest"). Such a combination of habitats is to be found in the Guianas; while in N.E. Peru, about the headwaters of the Amazonian tributaries, there has recently been discovered the wonderful *Oncidium leopoldi*, which begins by being a terrestrial plant, and when it has grown several feet in length throws out aërial roots and half becomes a creeper, yet the roots do not attach themselves to other plants. Up in the mountains where forest growths have given place to scrub, orchids are found on these low bushes comparatively near the ground, and where large rocks and boulders exist, especially near streams, these also form an anchorage for epiphytes. In the Philippine Islands is to be found that great rock-loving genus of orchids, *Phalænopsis*, and it is questionable if these plants derive any other means of sustenance than light, air, and moisture. It has been proved over and over again by many orchid cultivators that some species of this and other genera will, if hung up by a plain wire in a moist but light and airy glasshouse, grow and thrive for years, and even throw healthy flower spikes without any other attention than watering. It is probable that many terrestrial orchids growing in very poor soil obtain but a very scanty sustenance from the earth and only derive a more or less constant moisture to the roots. There are terrestrial orchids, however, that do require a richer soil, and it is reasonable to suppose that some benefit other than moisture is derived therefrom. The genus *Cypripedium* and its allies is a good example, and *Disa* might also be cited. The terrestrial orchid has the great difference in its root action from the epiphytal, that whereas the former has only to obtain nourishment through its roots the latter has at the same time to use its roots to cling on to the place it has selected to live on, as well as to obtain its necessary nourishment through them. Some orchids throw out a comparatively few large fleshy roots, while others throw out immense numbers of thin fibrous roots.

In the case of some of those that throw out large fleshy roots, Nature has devised a means of protecting them against the attacks of cockroaches and other depredators, by making the orchid mass, or sometimes the hollow bulbs, the home of ants. In Trinidad *Diacrium bicornutum*, an orchid with large yellow bulbs, grows in

great abundance on the seashore on the north side of the island, but collectors experience considerable difficulty in procuring the plants, owing to the immense numbers of ants that these bulbs always contain. I have no means of ascertaining at what period in the life of this species the ants take possession. I do not think the bulbs have any natural opening until they are mature or nearly so. The ants are invariably found to accompany this plant, and a large bulb on being split reveals a regularly constructed nest with galleries, etc. Very many orchids are found to be infested with ants, but usually it is only because an ant's nest is in close proximity to the orchid. Several species of *Oncidium*, *Coryanthes* and *Stanhopea*, however, harbour ant colonies amongst their root masses. Whether the ants in all these cases have anything to do with the wellbeing of the plant other than indirectly protecting its roots has not been recorded, but it is noteworthy that *Diacrium bicornutum* is one of the most difficult of orchids to cultivate. It is, however, not improbable that a uniformly high temperature, such as it enjoys at sea level in Trinidad, combined with sea breezes, are indispensable to success, let alone any physiological benefit the plant may acquire from the presence of the ants.

It has now been freely admitted that, speaking generally, all those orchids that come from a very hot climate are difficult to grow in this country. Doubtless it was with the early orchid growers that the difficulty of orchid cultivation gained a reputation that has taken a century or more of undoing. The reason was doubtless this: that nearly all the original introductions of orchids were from hot countries, quite a number coming from the West Indies. Such were *Epidendrum cochleatum*, introduced in 1786, *Neottia elata* and *N. speciosa*, introduced in 1790, *Epidendrum elongatum*, introduced in 1798, *Vanilla planifolia*, *Neottia picta*, *Epidendrum cuspidatum*, *Ornithidium coccineum*, all introduced before 1811. It is practically impossible, in temperature alone, to give 70–75° F. in this country, such as these plants enjoy in their native habitat, in the winter when our own temperature is anywhere between 20 and 40° F., and occasionally lower still.

Between the years 1820 and 1825 the importations of orchids for commerce may be said to have begun in earnest, at least by this country. The continental countries quickly followed, and to-day, as everybody knows, a huge trade is done in imported orchids. Many must have viewed with a certain feeling of sadness the regular sales of such huge quantities of these interesting and beautiful plants from their native countries. Fortunately, the supply seems to be equal to the demand, and the reason is probably to be found in the prodigious number of seeds a single seed-pod contains in the case of nearly all orchids, though some genera produce more and others less; and it is fortunate that the orchids of commerce, such as *Odontoglossum*, *Oncidium*, etc., produce the largest numbers of seeds. Darwin, in his fascinating book, "The Fertilisation of Orchids" (p. 277), gives some

remarkable figures. In speaking of *Orchis maculata*, our common spotted orchid, he estimated the number of seeds in a capsule at 6,200, and as a plant frequently has thirty capsules, the total number of seeds amounts to 186,300. He gives a graphic picture showing how an acre would hold 174,240 plants, each having a space of six inches square, or in other words one plant could, at the end of one year, completely cover an acre and to spare, if every seed germinated. In tropical orchids the number of seeds is very much greater, even for a single pod, apart from the usually much larger number of flowers borne on a single spike. The notorious case of *Maxillaria* may be cited, in which Fritz Müller found 1,756,440 seeds in a single capsule. *Maxillaria* bears only a single flower however, and it is quite possible that some species of *Cattleya* and *Lælia*, which bear from three to seven flowers, may in the aggregate occasionally bear even more seeds than the astonishing total of *Maxillaria*. The, I believe, invariable minuteness of the seeds is very remarkable. I well remember the first time I saw a large pod of the common *Odontoglossum crispum*, measuring about three inches by one inch, split with a little heap of what looked like sawdust beneath it. The sawdust I was told was the seeds. It is the same with vast numbers of orchids, if not actually with all. Yet, with all the abundance of seeds, orchids are rarely conspicuously abundant. In the case of those species that cannot grow under any but very specialised conditions, it is quite understandable that a large number perish for want of the proper conditions. But in the case of the common British *Orchis maculata*, one frequently finds, perhaps, twenty or thirty plants only in a large meadow, where from the fecundity of the plant one would expect as many thousands. The seeds being so very small and light, probably large numbers are disseminated and carried away from what would have been a suitable nursery for their upbringing. Yet orchids, or many of them, are very local plants, so it is evident there must be an enormous amount of waste continually going on.

Fertilisation of by far the greater number of orchids is by insects; but in some cases, such as with our *Ophrys apifera* or bee orchid, there is self-fertilisation accomplished by the wind. Self-fertilisation is much less common in orchids generally than cross-fertilisation by some agent, such as bees, flies, moths, etc. It is usually also confined to terrestrial orchids, yet many terrestrial orchids are just as beautifully adapted for cross-fertilisation as are tropical epiphytal orchids. It is well known, however, among orchid collectors that notwithstanding the numbers of flowers seed-pods are in comparison quite scarce. Parasitic enemies on the agents of fertilisation—the bees, etc.—keep down any great increase in their numbers, and occasionally, as one knows, especially in the case of moths, a species can all but die out for years at a time. It is easy to imagine what would become of the plant that was perhaps dependent on that moth for its fertilisation. Or again, if one considers the case of a common orchid,

Oncidium varicosum, that grows in S. Brazil. This orchid throws enormous flower spikes, and occasionally bears more than 200 flowers at a time, and the fertilising agent would have to become very abundant indeed if every plant was to have even half its flowers fertilised. Darwin records that *Coryanthes triloba*, a New Zealand orchid with 200 flowers, only yielded five seed-capsules, "and at the Cape of Good Hope only the same number were produced by 78 flowers of *Disa grandiflora*." It is quite possible that the energy of these plants is insufficient to carry more than a relatively very small number of seed pods, even if the amount of fertilisation was on a very extensive scale.

All orchids are bisexual except *Catasetum*, where the seeds are on different plants, and all have a very complicated structure for fertilisation. Most of them are wonderfully adapted for cross-fertilisation, though it is possible to artificially cause self-fertilisation. In the *Vandeæ*, which includes the vast majority of orchids, the structure consists of stigma, rostellum and anther, all united into one. The rostellum bears the pollen masses, which are removable, and when a bee or other insect enters the flower for honey the viscid portion at the end of the pollen pedicil adheres to some portion of the bee's body, or sometimes to the proboscis in the case of butterflies and moths. The insect, flying off to another flower in search of more honey, brings the pollen masses in contact with the externally viscid and sensitive stigma and leaves the pollen behind to fertilise the flower. On emerging from the same flower it removes other pollinia, and the process is repeated. It should here be mentioned that it has been found that if a flower is fertilised with the pollen of another flower, yet has its own pollinia left in position, the flower is incapable of producing a seed-pod, and the reason is probably this, that so long as the pollinia are left in position the plant's energy is divided between bearing a seed-pod and supporting its pollinia. As soon as its own pollinia are removed the plant's whole energy goes to forming a seed-pod.

The fertilising structures in different orchids are so variable that it is impossible here to touch on more than two or three in particular. Those who have studied Darwin's "Fertilisation of Orchids" will have appreciated the extraordinary amount of specialisation the organs of reproduction in the Orchidaceæ have undergone.

Orchids are divided into seven tribes: *Malaxideæ*, *Epidendreæ*, *Vandeæ*, *Ophrydeæ*, *Neottieæ*, *Arethuseæ*, and *Cypripedieæ*. Of these *Malaxideæ*, *Ophrydeæ*, *Neottieæ*, *Arethuseæ* and *Cypripedieæ* are wholly terrestrial or nearly so, and the *Epidendreæ* and *Vandeæ* are epiphytal.

In the *Ophrydeæ* and the *Neottieæ* are to be found the bulk of the British orchids, but we have representatives of the *Arethuseæ*, *Malaxideæ* and *Cypripedieæ*. *Orchis mascula* of the *Ophrydeæ* is well figured in Darwin's work and shows the structure most clearly. The pollinium in this species consists of packets of pollen grains,

each packet containing a large number of these grains. The anther consists of two widely separated cells, and each cell contains a pollen-mass, or, as it is termed, a pollinium.

The *Arethuseæ* have a good representative in Britain in *Cephalanthera grandiflora*. This orchid is self-fertilised and does not possess a rostellum. The pollen is unlike most orchids and is not in masses, but is friable, with the grains held together by small elastic threads. The grains adhere to any object readily, and when the anther opens whilst the flower is in bud it expels the pollen to fall on the stigma. Darwin considered this a degraded orchid, according to its fertilising arrangement.

The *Vandeæ*, which contains a large proportion of both old- and new-world orchids of our glasshouses, and the *Epidendreæ*, which includes the most beautiful new-world genera, have such a diversity of fertilising structure that it would fill many volumes to describe them in detail, but all are adapted for "crossing" by insects.

The *Cypripedieæ* are widely separated from all other orchids, showing that there must have been many connecting links which have in ages past become extinct. The great difference in the fertilising structures of the *Cypripedieæ* is that the single anther, which is present in all other orchids, is here rudimentary (to use Darwin's own words), and is represented by a singular shield-like projecting body, deeply notched and hollowed out in its lower margin. There are two fertile anthers which belong to an inner whorl represented in ordinary orchids by various rudiments.

In the *Vandeæ* there is only one large disc in the stigma, where the pollen is received, but the genus *Angræcum* is an exception and has two. In the *Ophrydeæ* exactly the reverse is the case. The usual structure is two separate glands to the stigma, except in the genus *Orchis*, which has only one gland.

As the orchid family, speaking generally, is so perfectly adapted for cross-fertilisation, experiments were made about forty years ago in hybridising, not only different species in a genus, but by crossing species in different though allied genera. The result was at once successful, though the rearing of the seedlings up to flowering plants was, and is now, a tedious process. The early hybrids were with *Limatodes* (*Calanthe*) *rosea* (seed parent) crossed with *Calanthe vestita* (pollen parent), giving *Calanthe veitchii*, *Lælia crispa* (seed parent) crossed with *Cattleya mossiæ* giving *Lælio-cattleya exoniensis* and several others. Crosses between the genera *Lælia* and *Cattleya*, and between different species within these two genera, have always been, from the first, sought after by orchid fanciers, the brilliant colourings, large size and fine texture of the flowers sufficing to make up a beautiful object for anyone's attention. But with many other genera that have been freely hybridised there has been great demand only for a time, while it was, so to speak, the fashion. Hybrid *Dendrobiums* were, five and twenty years ago, largely grown and found a ready sale, often at very long prices, but to-day they find little favour with

orchid specialists. The taking up of the genus *Odontoglossum* for hybridisation soon diverted people's attention from the *Dendrobium* hybrids, which, however beautiful, could not compete with the more beautiful Odontoglots. At first the greater difficulty of raising *Odontoglossum* hybrids was against their becoming popular, but of late years superior cultivation has made these hybrids quite common, comparatively speaking; and already over thirty different crosses have been raised. Quite recently a cross between the genus *Miltonia* and *Odontoglossum* has been raised, the resultant cross being called *Odontonia.*

By way of parenthesis it may perhaps be here mentioned that botanists give a new generic name to a cross when two different genera are used in the crossing. Entomologists hitherto have retained the generic name of one of the subjects of crossing, very often the female parent. The botanical nomenclature is undoubtedly the more correct.

Although it was at first found so difficult to raise *Odontoglossum* hybrids, natural hybrids are known to be very common in the wild state. It is true many of the supposed natural hybrids have never been proved, but in some cases the same result has been obtained by an artificial crossing, and many of the natural hybrids reveal the characters of two species so clearly that the assumption of what the two parents originally were appears to be fairly clear. Crosses between species of the genus *Oncidium* have, I believe, never yet been obtained, or with species in any allied genus; yet natural hybrids again are suspected. The three species, *Oncidium marshallianum*, *O. forbesii* and *O. dasystyle*, all growing in South Brazil, are strongly suspected of crossing one with another. Although *Oncidiums* are so difficult to raise they will form a seed-pod readily enough in this country. Doubtless many striking new flowers will be revealed when the crossing of *Oncidium* has been successfully accomplished. Many other hybrids have been raised between different genera, as well as within other genera. Such are *Zygopetalum* hybrids; *Zygopetalum* with *Batemannia*; *Zygopetalum* with *Colax*, *Epidendrum* with *Sophronitis*, *Masdevallia* hybrids, *Phalænopsis* hybrids, *Vanda* hybrids, *Sophronitis* with *Cattleya* and many others; but the hybridisation has not been extensive in these instances.

The genus which has received far and away the most attention in recent years is *Cypripedium.* It was found that species in this genus, and the allied *Selenipedium*, could be raised comparatively quickly from seed, and it is doubtless in no small measure the comparative ease of cultivation that has made so many people give this genus such a large share of their attention. The seventy or so species have been so crossed and recrossed that to-day there are close on 1500 different crosses described, and the number is ever increasing, many of the older hybrids being now re-crossed again. *Cypripedium* can be raised from seed to flowering plant under three years, sometimes within two

and a half years, and in this respect they are to be bracketed with *Masdevallia* and *Calanthe* as the quickest of orchids to be raised from seed; but undoubtedly *Cypripedium* is quickest of all, speaking generally. In all seed-pods there are some forward and some backward seedlings. From a pod of a *Cypripedium* one may have flowering plants within two and a half years, and at the same time have minute plants that would, perhaps, take seven or eight years to flower. It frequently happens, however, that the more robust seedlings which flower so rapidly are inferior varieties, while the more delicate and slow-growing seedlings produce extra fine flowers. This is true of all orchids, and, indeed, of plants generally.

While on the subject of seeds it might be well here to say that owing to their extremely small size it is advisable, when a pod is approaching maturity, to place a prepared surface of fine-chopped peat mixed with sphagnum-moss in a shallow pan beneath the pod, so that when it splits open the seeds can fall on the surface where they are to germinate, without any handling. There is a widely spread belief that it is the first few seeds that drop that alone will germinate, but this is not true always, as sometimes out of a single pod one may raise almost as many plants as one wants to, all the seeds, or at least a very large number, germinating and producing plants. All orchids take a long time to ripen their seed-pods, and when one recollects that these plants only thrive in a moist atmosphere the cause is at once apparent. Under cultivation at the present time pods ripen in five or six months at the quickest, some, however, such as *Cattleya*, taking a whole year from the time the seed is set. *Cattleya*, however, germinates very rapidly, as quickly as a fortnight, while some orchids, perhaps the majority, take some months to germinate.

The Distribution of Orchids.

As has already been remarked, terrestrial orchids belong essentially to the temperate regions, but are, nevertheless, spread over the whole world in suitable situations. Epiphytal orchids hardly occur anywhere outside the tropics; none occur in Europe. Europe has only about sixty species of terrestrial orchids, and only one of these, *Cypripedium calceolus*, which is also a scarce inhabitant of Britain, has flowers of any size. Severe climate alone cannot account for the poverty, for in North America and in Siberia there are species of *Cypripedium* that are three times the size, and their colouring much brighter. In North America *Cypripedium spectabile*, *C. montanum*, *C. arietinum*, *C. pubescens*, *C. humile*, and *C. parviflorum* are all handsome species; and in Siberia *C. guttatum* and *C. macranthum* are both far finer than our *C. calceolus*. *Bletia hyacinthina*, from quite cold districts of China and Japan, when well flowered is also an attractive orchid. A very large part of the earth's surface is unsuitable for orchids of any kind. All those districts which have

a high summer temperature with a dry atmosphere, and often a low winter temperature, are quite unsuited. Central Asia, between the great mountain ranges of the Altai and Himalaya, is a vast region, where hot, dry summers and icy winters prevent orchids existing at all. The same is true of the great desert regions of the earth. North America, California, Texas, New Mexico, and the Mississipi basin are too hot and dry in summer, and in South America the pampas of the Argentine and a large part of Chili are eminently unsuitable. A large part of Australia is very arid, but Queensland with its moist climate produces some few orchids. A large part of the African continent besides the deserts is too dry; the elevated plateaus of a large part of South Africa have all a dry climate, but the North African and the Central African forests with their moist climate produce plenty of orchids, though few are of horticultural value.

Of the more isolated regions of the earth producing orchids, Japan and Cape Colony stand, perhaps, first, while Natal and New South Wales are also very interesting. All these countries have a moist, temperate climate without great extremes of heat and cold. The remarkable terrestrial orchid, *Disa grandiflora*, which grows on Table Mountain with *D. racemosa* and *D. tripetaloides*, is found nowhere else, and on account of its remarkable beauty has been ruthlessly collected in years gone by, but fortunately now it and many other orchids in our British possessions are protected, and no one is allowed to collect them.

In the moist countries of the tropics of the old world the genus *Dendrobium* is nearly always represented. It includes a very large number of species, and the genus is very polymorphic. Most of the species have long, narrow bulbs, and the flowers are produced in clusters from the nodes of the pseudo-bulbs. Sometimes the flowers are pendulous, sometimes upright, and occasionally in long, drooping spikes all clustered together. The genus *Dendrobium* affords a large number of species with striking flowers, and *D. nobile*, a species found from India to China, is probably the best known and most cultivated species in existence. In the hilly districts of Northern India and in Burma there are still a large number of species to be found, though in considerably diminished quantity.

In the Philippine Islands are to be found most of the species of *Phalænopsis*, but owing to very special cultivation and the great difficulty of getting plants sent over alive to this country, many people have given up growing these extraordinarily beautiful plants. The orchids of cultivation sent home from the islands of the Malay Archipelago include *Aërides*, *Saccolabium*, and *Vanda*, besides some species of *Dendrobium*. All these require great heat and moisture, especially in the growing season; but even when they are resting a high temperature is necessary, especially for the first three genera.

Most orchids that come from a very hot and moist climate do not thrive for more than a few years in this country under cultivation,

and thousands of plants die after flowering two or three times. Some years ago a wonderful new *Dendrobium*, *D. atro-violaceum*, was discovered in New Guinea. For a few years every orchidist had it in his collection, but to-day they have nearly all disappeared or are in the course of disappearing. Orchids that require this great uniform heat are largely going out of cultivation, doubtless because of the disappointing results obtained after plants have been kept a few years. All epiphytal orchids require a moist atmosphere for their existence, and as a natural result of the moisture enjoy a more or less equable temperature, whether they occur at sea level on the equator or at 5000 feet elevation beyond the tropics.

The greatest orchid-producing country of the world is unquestionably South America. Practically all the orchids that are cultivated at the present day come from the tropical and sub-tropical regions of that continent. The beautiful genera *Cattleya*, *Lælia*, *Odontoglossum*, *Oncidium*, *Masdevallia*, *Zygopetalum*, *Miltonia*, *Maxillaria* and many others, all contain a large number of handsome showy species, and without these our orchid collections would be poor indeed. The districts that produce these plants in the greatest number are widely separated geographically, and the presence of orchids depends on the equability of the climate and the range of temperature. All districts with a moist climate and a mean temperature of between 60 and 70 degrees Fahr., with a range not exceeding 20 to 25 degrees, may be said to be the most productive of epiphytal orchids. The latitudes in which they occur are roughly from 20° north of the Equator to 30° south. Mexico, South of Mexico city, the whole of the Andean region, and the hilly country of South Brazil furnish the greater number of orchids with striking flowers. The orchids obtained in the Guianas, on the Amazon, or indeed anywhere where there is a mean temperature in the neighbourhood of the eighties, are for the most part sombrely coloured, though often they have large and extremely fantastically-shaped flowers. *Catasetum*, *Stanhopea*, *Cycnoches* and other genera are well known for their peculiar flowers. There are some *Cattleya* species, however, that revel in sweltering heat, such as *C. superba* of the Essequibo, *C. rex* of the head-waters of the Amazon, and *C. dowiana* of the lowlands of Costa Rica; but these are exceptional and not the rule. The *Oncidium* of these regions all have flowers that are very inconspicuous and contrast strongly with their lovely congeners of more temperate districts. In South Brazil, in the Organ mountains, *Oncidium varicosum* and *O. crispum*, although abundant, are conspicuously beautiful, and it is so with a large number of species to be found in that favoured part of the earth. The great country for *Odontoglossum* is Colombia. They occur on the slopes of the Andes between 7000–10,000 feet, and besides a large number of species many supposed natural hybrids occur, while some of the species vary to an enormous extent. Such is the case with the famous *O. crispum*, and on the chance of procuring a valuable variety there is always a great demand for im-

ported plants. Unfortunately, this has led to an enormous denudation of the Colombian forests, and the destruction still goes on, and must ultimately lead to a scarcity, for orchid collectors frequently have to cut down the trees to obtain the plants growing on them. A collector who obtains, say, 10,000 *Odontoglossum*, will perhaps destroy from 3000 to 4000 trees to secure them. Whether the demand is slackening somewhat is not stated by those who know best, but it is apparently the case that the supply of *O. crispum* is still equal to all the demands. Occasionally, a collector will come upon a tree that for no obvious reason has an enormous number of plants upon it. An orchid collector told me the other day that once he found a mango tree near Manaos on the Amazon completely covered with a plant of the beautiful *Oncidium lanceanum*. After cutting it up it occupied three large packing cases, and the pieces eventually arrived in London, having come to no harm.

Cypripedium is to be found over a large portion of the earth—India, Malacca, Siam, New Guinea, Borneo, Philippines, Java and Sumatra, of the Old World; Peru, Bolivia, Central America, Guiana, Brazil, and North America, of the New World. The genus *Cypripedium* is here used collectively for all the species, but *Cypripedium* has now been divided into *Cypripedalum* and *Paphiopedalum*, the former embracing all the hardy species, and the latter all the Old World true ladies' slippers. *Selenipedium*, which contains the South American species with strap-like foliage, is now divided into *Selenipedalum* and *Phragmypedalum*, the latter embracing most of the South American slippers of cultivation, including the remarkable tailed species, which have the petals greatly attenuated. The South American species produce a flower spike carrying one or two flowers at a time, and as the flowers die the scape grows and produces another flower, until perhaps a dozen flowers have been produced.

The Growth of an Orchid.

With the hardy terrestrial orchids the growth is very similar to an ordinary low-growing herb, and they are generally pseudo-bulbless, having subterranean tubers only. Some exotic species have the appearance of reeds, such as *Sobralia*, but the hardened central portion of the plant does not act as a reservoir to supply future growths, such as is the case with *Cattleya*, *Odontoglossum*, *Catasetum*, and the like. Many of the exotic terrestrial orchids have large pseudo-bulbs, and some tend to become epiphytal in their habits. The genus *Thunia* is equally epiphytal and terrestrial, but doubtless tends to become epiphytal. The genus *Calanthe*, although wholly terrestrial, has large pseudo-bulbs, some of the species being evergreen and others deciduous: the deciduous species having large bulbs, and the evergreen species very small bulbs. The genus *Pleione* also has pseudo-bulbs, but they are of annual duration only; as the new growth appears and the new bulb matures the old one dies

With the vast majority of epiphytal orchids the old bulbs remain to supply the plant with nourishment long after they have borne their flower spikes. It is no uncommon sight to see imported plants of *Oncidium* and *Cattleya*, particularly of *C. pumila*, showing a large number of back bulbs, the smallest being in all probability the second and third bulb that was made by the plant. In a rough sort of way it is then possible to tell the age of these epiphytes. Bulbous epiphytal orchids only draw on the back bulbs at special periods of stress, such as during the dry season or when it is carrying its flower spikes. Under cultivation and artificial conditions back bulbs cease to be of use to a plant after four years, and generally turn black and die. These must then be removed from the plant or they may affect the other bulbs. Different genera act rather differently with their back bulbs. *Oncidium* will keep several more back bulbs than an *Odontoglossum; Cattleya*, and *Lælia* are more vital in this respect. Although an *Oncidium* may have seven back bulbs, it will not keep leaves on all the seven years' growth. If it retains three years of leaved bulbs it shows skilful cultivation, and more often two years is the rule. In the wild state, while all the back bulbs do not retain their leaves, yet they retain more than what one sees under cultivation. It is a noteworthy fact that in Scotland orchid-growers are able to keep their plants better leaved than in England, and it may be due to the purer air.

Before proceeding to general remarks on the cultivation, it will be as well to state here that the usual cycle of an epiphytal orchid is to start growing slowly with the appearance of the wet season, about the month of March. During this early period the sustenance is derived from the last-made bulb. After the growth has made some headway (at about the end of April or early May in this country), it begins to throw out wax-like green roots from the base of the growth, and from this time onwards, while the roots grow the new growth gradually supports itself. As the roots grow they become hardened and of a whitish colour, but the tip for a varying distance of a quarter to three quarters of an inch always remains green or yellowish-green while the roots are growing. When the root action has developed the new growth forms a bulb, or pseudo-bulb as it is termed, in the centre, the two or three outermost leaves are thrust aside, and the bulb itself carries one, two, or three leaves at its apex. The flower spike is carried either at the side of the bulb (usually the side with the longest leaf, but occasionally, if the plant is vigorous, on both sides), or at the apex of the bulb, and when from the apex frequently at first enveloped in a sheath. When the bulb is completed the plant ceases to be active, or, as it is called, rests, this taking place in the dry season of its native habitats. Under cultivation this resting period has to take place during our wet weather, and the dryness which induces rest has to be created by artificial heat. Some orchids flower *after* this period of rest, and others *before*, that is to say immediately the new growth is

completed. While the plant is flowering it draws principally on its last-made bulb, but also on the back bulbs, each in turn drawing nourishment from the next older bulb. This is easily proved by observing an *Oncidium* carrying a long spike. It is to be seen that all the bulbs show signs of shrivelling, and if the spike is bearing many flowers and the last-made bulb is not of a good size, it may even cause so much shrivelling as to kill the plant, the bulbs being unable to again recoup themselves. It becomes obvious, therefore, to every cultivator that it is far safer, if the plant is not to be injured, to cut away all flower spikes that are not supported by large bulbs. It is also very desirable that the last-made bulb, even if of good size, should have been made by its own plentiful root action, and not have drawn too largely on the back bulbs for its sustenance.

To grow orchids successfully, it is more than half accomplished if the glass-house is a suitable one and is in a suitable position. Speaking generally, a span roof house with the sides facing east and west is the most suitable. In a lean-to house facing south or west it is absolutely impossible to grow the cooler orchids successfully, because it is necessary to heavily shade the house from the burning summer sun and in so doing the light is sacrificed. A lean-to house with a cool aspect, say north or east, is quite suitable for such plants as *Odontoglossum* and cool *Oncidium*. It is quite possible to grow orchids requiring more heat and enjoying more sunlight in a house facing south or west. Shading will, however, be necessary, though not to so great an extent. The four things the orchid cultivator has to remember are, light, air, moisture, and temperature; if any of these is more important than another it is air. If orchids are grown that require great heat it is not possible to give all the air they require, and in fact the steamy forests of Guiana do not suggest air, but rather the want of it; but most of the orchids now cultivated come from hilly districts where the air is constantly in motion. It is not sufficient to have bottom ventilators and top ventilators open; when the outside conditions are suitable it is far better to open the door wide at one end of the house and to shut the ventilators, so as not to cause a draught, for plants are as susceptible as human beings to draughts. With regard to light, give all the light possible without the direct rays of the sun, except from October to the end of February, when the glass should be kept as clear as possible to admit the maximum amount of light. The amount of moisture in the house is an important matter. It is, however, quite a mistake to suppose that the house wants damping three or four times a day. If an understaging is provided of some porous substance, such as brick ballast or broken coke, the former for preference, a large amount of moisture will be retained after thoroughly wetting it. In summer I find that once a day is, as a rule, sufficient, unless the weather is extremely dry and hot. In winter, when the plants are resting and a drier air is required, sometimes once a week is all that is necessary,

particularly if the outside conditions are severe ; but the greater the fire heat used, the more moisture is required to temper it.

There yet remains temperature to be considered. The great desideratum to be aimed at is equability. Different orchids require different temperatures, and it is common practice to speak of a cool, an intermediate, and a stove house to suit their requirements. If one strikes a mean between a cool and an intermediate house it is surprising how many orchids can be grown together and flourish. During the past year I have endeavoured to give an average daily summer temperature of 65°, irrespective of sun heat, and a winter temperature of 55°, falling to 48°, and occasionally to 44° or 45° at night. I have had *Odontoglossum*, *Cattleya*, *Masdevallia*, *Lælia* and *Oncidium* grow and flower vigorously. If the night temperature never falls below 50° it is almost possible to grow anything, provided the air is dry, and even *Odontoglossum*, the coolest of epiphytes, does better if a 50° minimum is aimed at. *Cattleya* and *Lælia* doubtless do better with a slightly higher temperature generally, but it is possible to grow and flower them in the same house with *Odontoglossum*. An ideal *Odontoglossum* temperature is 50° in winter and 60° in summer ; and to anyone starting the growing of orchids I should recommend *Odontoglossum*. Very little need be expended in fire heat, and they are not so impatient of dull winter days as are some others. The ideal method of heating a greenhouse is undoubtedly by hot-water pipes with a gas boiler, as the gas can be regulated with every change in the weather. I have used gas with complete success but it is admittedly expensive. A small coke furnace can be run at a quarter the cost, and a house of twelve feet by nine would not cost more than a couple of sovereigns per annum to heat sufficiently for *Odontoglossum* if coke were used and one always did his own stoking.

There are many other practical sides of the question of growing, but I fear I have detained you already too long.

ANNUAL ADDRESS TO THE MEMBERS

OF THE

South London Entomological and Natural History Society.

Read January 28th, 1909.

By Alfred Sich, F.E.S.

The attendance at our meetings and the number of exhibits during the past year have been fairly up to the average. With regard to the exhibits, I should like to say a word or two. The exhibits of lepidoptera greatly preponderate over all the rest. That is perhaps inevitable, considering the fact that we are nearly all of us students of that order. Next on the list come some exhibits of other orders of the Insecta and then a few of plants; but exhibits of the other divisions of the animal kingdom come, so to say, nowhere at all. Now, I do not for one moment suggest that we should have fewer exhibits of lepidoptera; on the contrary, let us, by all means, have still more exhibits of lepidoptera, but, at the same time, let us not forget that we are a natural history society as well as an entomological one, and, instead of scarcely any, let us have many exhibits of objects illustrating the other divisions.

Among the events of the past year, the Conversazione, held on the 15th May, under the auspices of the Entomological Society of London, and in the organisation of which two of our members took a prominent part, must not be forgotten. Meetings of this nature help greatly to advance our favourite study, as they bring together entomologists who would, possibly, otherwise not meet, besides affording

the opportunity of exhibiting material on a larger scale than is convenient at the ordinary meetings of societies.

I much regret that I have to chronicle the decease of no less than five members of our society, besides other entomologists.

Francis C. Lemann, who joined the Entomological Society in 1883, and this Society in 1898, died last spring. He was a keen collector of European butterflies, though he did not keep his specimens, but gave them away to friends, and his early life fitted him to enjoy this pursuit. He was at school in Russia, where he learnt French and German. It was he who opened up the island of Corsica to British entomologists. He lived at Plymouth, and those who knew him describe him as a man of singularly fine character.

John Adolphus Clark passed somewhat suddenly away on December 16th, 1908, at the age of 66 years. He was well versed in entomological lore, and commenced his favourite study when very young, so that he was as well acquainted with the entomologists of the past generation as with those of the present. He was a Fellow of the Entomological Society, and joined this Society in 1887; but it is undoubtedly in his connection with the City of London Entomological and Natural History Society, which lasted over forty-nine years, that he will be remembered best. The active interest which he took in the affairs of the "City" "was of the greatest possible benefit to that Society." He had other ties, too. In 1893 the members of the Hackney Microscopical and Natural History Society presented him with a valuable microscope as a token of their esteem. He was not a very ready writer, but his paper on the variation of *Peronea cristana* ("Ent. Rec.," vol. xiii) will always be a monument to his acumen and industry.

William H. E. Thornthwaite died suddenly on June 27th last, at the age of 58 years. He joined this Society in 1901, and was with us at our outing on June 20th, just a week before his decease. He was a keen collector of the lepidoptera, studying not only the larger species, but also the micro-lepidoptera. His was a genial nature, and the hopes we had of meeting him on many future occasions are now unhappily disappointed.

Edward Knight, who joined the Society in 1888, passed away during the year. He does not appear to have made any collection of any order, but was interested in general natural history.

Thomas F. Furnival, who joined our Society in 1903,

died January 24th, 1908, at Kroonstadt, Orange River Colony, at the age of 27 years. He collected in almost all orders of insects, and among other of his notable captures was the very scarce lepidopteron *Coleophora tricolor* at Seaford (recorded by Mr. Burrand, "Ent.," xl, p. 36.) One who enjoyed his company during entomological rambles writes: "Had he lived he would, I believe, have developed into that not too common type of entomologist who prefers knowledge obtained from nature by persistent effort rather than that absorbed at second hand by reading books in their armchairs."

John Thomas Carrington, who died March 5th, 1908, was one of those entomologists whose personality impressed itself on all who knew him. Having once known Carrington, no one could ever forget him. From 1876 to 1890 he was editor of the "Entomologist," and afterwards some time editor of "Science Gossip," besides being connected with the "Field." Many of us will remember with pleasure the entertaining entomological evenings over which Carrington presided at the Westminster Aquarium, and also in the same place the finest entomological exhibition ever held. He was for some years a member of this Society, and was President in 1890. To him I owe my first introduction to the entomological world.

The entomological world generally is the poorer by the loss of the following:

Nicholas Frank Dobrée, of Beverley, died at the age of 77, January 8th, 1908. He was greatly interested in the Noctuæ of the European Fauna, and his collection, which is now in the Hull Museum, is perhaps the finest private collection that was ever made. He travelled much, and could speak five languages.

Herbert Goss passed away on February 16th, 1908, at Surbiton Hill. He was known to most of us through his long tenure of the office of Secretary to the Entomological Society, and by the leading part he so successfully took in the agitation against the threatened spoliation of the New Forest in 1892. Among his writings, perhaps the most interesting are those on fossil insects, which were reprinted (from the "E. M. M.") under the title of "The Geological Antiquity of Insects."

Lieut.-Colonel C. T. Bingham was an active field entomologist, besides being a writer of eminence. He spent some years in India and Burma, and contributed four volumes to the "Fauna of British India," two on Hymenop-

tera and two on Lepidoptera. His inclination lay, perhaps, more particularly with the former order. He was elected a Fellow of the Entomological Society in 1895, and died on October 18th, 1908.

Although we have suffered no drastic disturbance of our mother earth in this island, another island has not fared so well. We have all heard of the fearful earthquake at Messina. During this occurrence one of our members, Mr. J. Platt Barrett, underwent a very sad experience. He had gone to Messina to stay the winter with his son, Mr. Arthur Barrett, who was living there with his wife and little son. At the time of the earthquake they had all gone to bed, and when the house fell, Mrs. Arthur Barrett and child perished in the ruins. The two men escaped, as Mr. Barrett, in writing to his daughter in England, says, "by a miracle." We congratulate Mr. Barrett on his escape.

Last October, Part XV of Mr. John W. Taylor's Monograph of the "Land and Freshwater Mollusca of the British Isles" was published. It contains a beautiful coloured plate of the Zonitidæ with very full accounts of some seven species of that group. The accurate and comprehensive way in which this work is written makes it indispensable to British conchologists.

Volume II of Mr. J. W. Tutt's "Natural History of British Butterflies" was completed last spring. It deals with the "Hairstreaks" and some of the "Blues." "There has never been anything published, on any large group of insects, approaching the completeness and thoroughness of this work." It is truly most exhaustive in the treatment of the species considered. The life-like illustrations of the larvæ and of the ova from photographs by Messrs. H. Main and A. E. Tonge, and the structural details from photomicrographs by Mr. F. Noad Clark, form a valuable addition to this work, so necessary to the student of the Rhopalocera, whether he confines his study to British species or takes the lepidoptera of the whole world.

Two more of those companionable volumes of the "Wayside and Woodland" series have also been issued during the year: the second volume of "The Moths of the British Isles," by Mr. South, and "Wayside and Woodland Ferns," by Mr. Step.

These are just the books to pack into one's portmanteau when preparing for the delightful, but alas too rare, holiday in the country.

In the Book of Moths we have the remainder of the

Noctuidæ, including the beautiful "Sallows," the peculiar "Sharks," "Y-moths," and the "Crimsons." Then come the *Hypeninæ*, the *Geometrinæ*, and in conclusion the "Burnets," "Clearwings," and "Swifts." We have accurate notes, written in a pleasing style, with beautifully coloured figures of all of these species.

In the Book of Ferns we have descriptions and haunts of all our Ferns, Horsetails, and Club-Mosses, accompanied by beautifully coloured figures of the fronds of these graceful plants, and reproductions of the author's photographs representing the species in their natural surroundings.

A second and revised edition of Part I of Tutt's "Practical Hints for the Field Lepidopterist" has seen the light. Several chapters have been added, making this edition even still more useful than was the first.

"British Oak Galls," by Mr. E. T. Connold, is a concise handbook, giving information on the various species of British oak galls and the insects which form them. There are directions for collecting and preserving specimens. The book is much enhanced by the reproduction of photographs of the different species.

A new edition, the tenth, of "The London Catalogue of British Plants," by Mr. F. J. Hanbury, was issued early in the year. The merits of this catalogue are well known to botanists, and it should certainly be found in the library of the working entomologist.

We have one Mollusc new to science. On October 3rd, 1908, Mr. John Taylor published, on the cover of Part XV of his Monograph, a description of the anatomy of a species of *Vitrina* under the name of *V. hibernica*. It appears to be a smaller snail than the common *V. pellucida*, Müll. It was discovered by Mr. Grierson in the county of Louth.

Mr. W. L. Distant has been kind enough to inform me that a Woodlouse, new to Britain, *Armadillidium album*, has been recorded from Barnstaple by Mr. R. S. Bagnall.

Aphaniptera.—The Hon. N. Charles Rothschild describes ("E. M. M.," xliv, p. 231) a new and remarkable flea belonging to a new genus. A series of this insect was bred by Dr. Norman H. Joy (after whom it is named) from the nest of a Puffin (*Fratercula arctica*) taken in the Scilly Islands. It is called *Ornithopsylla lætitiæ*. In "The Entomologist" (vol. xli, 281) Mr. Rothschild describes yet another flea new to science, taken in several localities in England. This is named *Nycteridopsylla longiceps*, and appears to be peculiar to bats.

When we consider the additions to some other orders of the British Insect Fauna, chronicled in our periodicals during the past year, the task of mentioning each species by name appears overwhelming, and I therefore propose only to mention such species as I deem are of special interest to ourselves.

Coleoptera.—*Aleochara crassiuscula*, Sahlb. In recording this species Mr. G. C. Champion says, " My old friend, Mr. W. West, of Greenwich, has recently sent me specimens of this important addition to our list." Mr. West captured a number on the Denes at Great Yarmouth in May last. He took the species again last autumn, 200 yards from his own house. Mr. Champion lately detected a specimen, taken at Oxford in 1906, in Commander Walker's Collection (" E. M. M.," xliv, pp. 194 and 271). *Meligethes viduatus*, var. *æstimabilis*, Reitt., recorded by Mr. Newbery. Four examples were taken by Mr. F. H. Day in Cumberland. There are about twenty-seven further species which have been added to our Fauna.

Diptera.—*Zenillia* (*Myxexorista*) *roseanæ*, Brauer and Bergenstamm, is recorded (" Entom.," xlii, p. 1) by Mr. J. E. Collin, as new to Britain. He received several specimens from Mr. Robert Adkin, who reared them from larvæ of *Tortrix pronubana*. It seems a scarce species, as hitherto only the female was known. There have been no less than forty-five other additions to the Diptera, several of which are new to science.

Hemiptera.—This order has not fared so well as some others. It appears that we only have some twenty-two additions, some of which are new to science. Mr. James Edwards is responsible for most of these. He also records (" E. M. M.," xlv, p. 6) the capture by Mr. W. West, of Greenwich, at various times, at Oxshott, one of our favourite hunting grounds, of some fifteen examples of *Idiocerus rutilans*, Kirschbaum, on sallow.

Hymenoptera.—At a meeting of the Entomological Society of London, February 5th, 1908, Mr. H. StJ. K. Donisthorpe exhibited six species of ants, not before captured in Britain. These were taken by himself in Kew Gardens.

While speaking of ants, I think it well to mention the excellent work that Mr. Donisthorpe has done in searching out and recording the various inhabitants of the nests of these intelligent insects, and also our thanks are due to Mr. A. L. Rayward, who has done such good work in studying the relations which exist between ants and some of the

Lycænids. The additions to the Hymenoptera during the last year include a bee, two saw-flies, and sixty-two species of the genus *Antæon*.

Lepidoptera.—*Anthrocera achilleæ*, Esper, was added to the British Fauna by Mr. E. A. Cockayne, who received some Burnets, taken by Mr. W. Renton near Oban, which were afterwards identified as this species (" Ent. Rec.," xx, p. 73).

Nonagria edelsteni, Iutt. This much discussed species has, apparently, in order to show its true identity, appeared in Sussex, where a fine series has been taken by Messrs. Wightman and Sharp.

Hydræcia crinanensis, Burrows, was taken by Messrs. Bacot and Simes on the banks of the Crinan Canal.

Hyponomeuta rorellus, Hb. One taken by Mr. Eustace Bankes on July 25th, 1895, in the Isle of Purbeck, and several seen but only two taken by Mr. A. C. Vine near Brighton. The larva appears to feed on Sallow (" E. M. M.," xliv, p. 250).

Thysanoptera.—Mr. Richard S. Bagnall has described ten species of this much neglected order, new to the British Isles, of which one species, *Uzeliella lubbocki*, Bagnall, is new to science. This is recorded on the strength of a single female, taken among seaweed at Whitley Bay, Northumberland, in October, 1906 (" E. M. M.," xliv, p. 3).

Having been desirous of learning something of the writings of the earliest authors on natural history, I gathered a few notes together on that subject. The ground they cover is really very extensive, and I have not at all explored the region, but simply, as it were, have just taken a motor ride through the territory, and now propose to lay before you a few of the snap-shots taken on the journey.

The study of natural history is probably the oldest of all studies, and the most important of all to the highest animal —man. The most pressing problem in man's earliest days was how, where, and when to obtain food, which consisted of plants and animals. In order to assuage his hunger, man searched for plants and hunted animals, and thus, incidentally, in the course of his labours, though without any intention on his part, became a student of the habits of the animals and plants of this planet, or, in other words, a field naturalist. Again, supposing that man in his very earliest days ate only herbs, and had no need to go hunting or fishing, he must have occupied his time in some way. Would not the animals, the things that had life, the same as he had, the things that

he knew were close to him—would not they interest him as much as the sun, the moon, and the stars? Man, it may be assumed, was a much more simple being in his earliest days than he is now—more childlike; and to this day, even quite modern children will leave their toys to play with a puppy or a kitten. I think, then, we may assume that natural history was the earliest subject that attracted man's attention. As man progressed, his natural history studies led him to discover the healing properties of various herbs, and to attempt the domestication of animals; and he became, as years rolled by, an owner of flocks and herds, and probably at a later date turned his attention particularly to agriculture, and began to grow crops for himself and for his animals. By this time man had, of course, much widened his horizon, and had other interests besides the earlier paramount necessity of getting food. He became ambitious. Perhaps at this period, when man had possessions, his chief interest in life was to keep his own and take his neighbours, and so the study of natural history was left to be carried on by the women of the tribe, or by the captive slaves, whilst the highest intellects of the day turned their attention to fighting. For ages man continued quarrelling and fighting, and thus worked his way onward, till at last better days dawned, and men formed larger societies under a leader or set of leaders, and in such communities the conditions allowed of the existence of the philosopher, the man who was able to give his time to thought and to ponder on the problems of the universe. Up till this time nearly all the natural history known to man was of the economical kind, even as it had been from the beginning. But gradually it began to be studied in other aspects than the economical, and men even began to write on the subject. As the oldest rocks in the world are composed of the remains of still older rocks, so the earliest writings on natural history show the existence of still older writings before them.

The writings of our old friend Aristotle may be taken as the bedrock of natural history literature. The sources of his inspiration appear to have been of two kinds. First, his own wisdom arising from his great mind and his own observations, and, secondly, the facts and the myths which he gathered from the writings of his predecessors, from the hunters (or gamekeepers), the snarers of wildfowl, the fisher folk and sponge divers, and from the soldiers and travellers who brought home the recollections of what they had seen and heard in foreign lands. Aristotle quotes many of these

fabulous tales concerning the habits of animals, but I scarcely believe that he, any more than the great traveller, Herodotus, really believed in them any more, perhaps, than people do to-day. But in those days it was highly dangerous to openly express disbelief in the legends of the times, as Galileo found to his misfortune, even 1900 years later.

After Aristotle, his pupil and friend, Theophrastus, wrote many works, but of these we only know portions, though his two books on plants are more nearly complete. It may be said that what Aristotle did for zoology, Theophrastus did for botany, that is to say, that the works of these two writers held their own for nearly 2000 years.

It is exceedingly difficult for us, who work in these days with so many advantages, to imagine the difficulties, to understand the disadvantages under which the naturalists of 2000 years ago did their work. There were no field-glasses with which to observe the habits of animals in nature, no microscopes for the study of minute structures, there was no chemistry, no means of reducing substances to their ultimate elements. There was only a small and that not an easily accessible literature, and travel was then a much more expensive and serious undertaking than it is now. So much for the introduction.

Perhaps the earliest evidence that we possess of man's studies in natural history is afforded us by the spirited sketches of animals, worked on bone or on the walls of his rock dwelling by Palæolithic man. Rough as these sketches are they show that the artists who executed them knew the habits and haunts of the animals they depicted. Later we have the hieroglyphs of the ancient Egyptians which portray in a conventional manner, well suited to the purpose, various wild and domesticated creatures; and we know from their writings, and from the mummies which still exist that they took a curious interest in natural history. From the writings of the early Greek poets we may gather here and there, odd scraps of natural history details, used generally to illustrate or emphasise the writer's meaning. Thus Homer (about 850 B.C.) says in the "Iliad":

> "And round them thronged the crowd
> As swarms of bees, that pour in ceaseless stream
> From out the crevice of some hollow rock,
> Now clustering, and anon 'mid vernal flowers,
> Some here, some there, in busy numbers fly."

Again—

"Forward he darted, as a swift-winged hawk
That swoops amid the starlings and the daws."

In his delightful "Works and Days," Hesiod (750 B.C.), writes:

"When first the cuckoo from the oak you hear
In welcome sounds."

And further:

"When in the shady boughs, with quivering wings
The grasshopper all day continual sings."

There is also a poem on the grasshopper by Anacreon, who died in 478 B.C. Herodotus, born 484 B.C., also gives us some glimpses of the natural history of Egypt, Mesopotamia, and other countries. Speaking of the Babylonians, he says, "They have palm trees growing all over the plain; most of these bear fruit from which they make bread, wine, and honey. They also tie the fruit of that which the Grecians call the male palm about those trees that bear dates, in order that the fly entering the date may ripen it, lest otherwise the fruit fall before maturity." Now I should like to quote a few sentences from the "Bulletin of the Royal Gardens, Kew," from a report by His Majesty's Consul at Basra, "On the Cultivation of the Date Palm in Mesopotamia." The report is dated March, 1908, at least 2300 years after Herodotus wrote his remarks on the same subject. It shows two things, I think: firstly, that these remarks of Herodotus are wonderfully true, and, secondly, that the cultivation of the date and the use made of its fruit is still much the same as then. The following sentences occur in the report:—"In some cases the juice is extracted. It is collected in jars and used by the natives instead of sugar." "A species of date called *Z*ahdee is used for distilling arak or spirit." "The cultivator climbs the tree, opens the bunch of female blossoms slightly and deposits in it a few sprigs of the male blossom." "When, through neglect or oversight, the female palm is not artificially fertilised, the fruit it bears does not come to perfection."

Before leaving Herodotus I should like to give one more quotation. Speaking of the Gyzantes, a tribe of the Libyans, he says, "Amongst them bees make a great quantity of honey, and it is said that confectioners make much more."

The greatest of the early writers on natural history whose

books have come down to us is, undoubtedly, the Greek philosopher, Aristotle. He was born in 384 B.C., and lived at the time of the Macedonian supremacy. His father was physician to King Philip of Macedon, while he himself became later tutor to Alexander the Great. Thus he was a man of some importance, and enjoyed during most of his life the favour of the Royal House of Macedon, which then practically swayed the balance of affairs at Athens, in which city Aristotle spent the most fruitful years of his life. He studied philosophy for some years under Plato, and subsequently founded a school of his own. Before the days of books, to form a school was the best way for a scholar or philosopher to make his views known to the world. It appears that it was during the time that Aristotle carried on his famous academy that most of his treatises were written. This was towards the end of his life. For after the death of Alexander the Great the Macedonian party lost favour in Athens, and Aristotle was charged with impiety—a charge which the Athenians seem to have been fond of bringing against anyone whom they desired to get rid of. He left Athens and went to Chalcis, where he shortly afterwards died, B.C. 322.

Aristotle left his writings to Theophrastus, his favourite pupil and his successor in his academy. After the death of the latter these treatises met with varied fortune; at one period lying concealed in a vault at Scepsis in Asia Minor, but they subsequently arrived at Rome, where they met with a more deserved fate. The treatises of Aristotle which gave him perhaps the greatest renown, such as the "Rhetoric" or "Metaphysics," do not concern us here, and of his treatises on natural history that entitled "Researches about Animals," in ten books, is perhaps the most interesting. Considering the unsettled times he lived in, and the poor means he had of studying natural history, his works are marvellous, and, as we shall see, they remained the standard works on the subject for centuries afterwards. As I quoted a few words from Homer and Hesiod, so I will give you an ensample of Aristotle in a few sentences:

"Nature passes so gradually from inanimate to animate things, that from their uninterrupted connection their boundary and the mean between them is indistinct. The race of plants succeeds immediately that of inanimate objects. Compared with other bodies plants appear to possess life, though when compared with animals they appear inanimate. For a person might question to which

of these classes some marine objects belong." "There are some animals which at first inhabit the water, but afterwards change into a different form and live out of the water." "There is no animal which has only wings as fish have only fins." "Every living animal is furnished with moisture, and must die if deprived of it." "Almost all insects become torpid except those which dwell in the habitations of men or those that perish or do not survive for a year." "Insects cast their skins." "Ants are both winged and apterous, and so is the glow-worm." "A spinning worm destroys the wax (of bees) and produces a creature like the moth that flies round the lamp." "Kite and swallow migrate to warmer climates." "Small birds do not utter the same notes as their parents if they are brought up away from them, and have only heard other singing birds."

All these facts are now well known, but Aristotle knew them over 2000 years ago. When writing of the kingfisher he relates the beautiful myth of the Halcyon-days, and he also says "that people have met swans in the sea singing a mournful song and afterwards dying." He states that if a poisonous serpent swallows a scorpion it is rendered more deadly. However, he did not believe all the wonderful tales about the enormous speed of the dolphin, and how it leaped over the sails of ships. For he says, "some incredible things are told of the dolphin's swiftness." With him, man, the lord of creation, takes his place among the other animals, for he says "Man and the mule are always tame, leopard and wolf invariably wild, elephant easily tamed."

It may be said without exaggeration that Aristotle's treatises on natural history remained the standard work on that subject for 2000 years. It was not till the invention of the microscope brought a new power to bear on the subject, and until men began to study especial groups of animals that any real advance was made. In the first century A.D. the elder Pliny wrote a large work entitled "Naturalis Historia," which, though not restricted to our meaning of natural history, contained an abundance of observations and statements concerning animals and plants, but nothing of the deep thought of Aristotle. Nevertheless, the work provides us with a mine of information concerning the knowledge and ideas of Pliny's time. In Book I, where Pliny enumerates the authors whose works he consulted, he mentions Aristotle.

It seems evident that by this time the nature and habits of animals had begun to attract man's attention for their

own sake, and not merely on account of their usefulness to mankind. We find that the Greek writer Plutarch, in his less known works, the "Opera Moralia," writes a treatise on the question whether land animals or water animals are the cleverer. After this we seem to enter the dark ages of natural history, in which Aristotle is practically our only guide and writers on this subject are exceedingly scarce. In the thirteenth century, however, Albertus Magnus, a Suabian, described as the most learned man of his time, wrote some books on animals. He appears to have been exceedingly well acquainted with the works of Aristotle, and as his own observations on natural history appear to be of little value, it may be presumed that the better qualities of his works on this subject are in great part due to the Greek philosopher. He died in 1280, but his works were not published till over three hundred years after his death. The very slow production of natural history works continued for many years. In the beginning of the sixteenth century Brunfels, of Bern, published a history of plants with some figures. Some years later Edward Wootton, a native of Oxford, published his "De differentiis Animalium" at Paris in 1552. This work again is described as more or less like a new edition of Aristotle's writings on animals.

But Wootton seems to have made some additions of his own, and to have separated out some of the Aristotelian chaff. We now arrive at Conrad Gesner, another very great scholar who published his "Historia Animalium," in six books, at Zürich between 1551 and 1587. This work appears to be quite an encyclopædia on animals, containing descriptions of all those then known or mentioned by older writers, as well as notices of the writings of previous authors. Cæsalpinus, a professor of Padua, issued a work called "De Plantis," at Florence, in 1583, in which he uses the fruit for purposes of classification of the 1500 plants known to him.

In the last year of the sixteenth century Ulysses Aldrovandus published the first volumes of his work on natural history, the later volumes being issued during the next few years. This is another comprehensive work adorned with many illustrations. Though its publication no doubt aided in the diffusion of the knowledge of natural history, it did not mark any very distinct advance in the progress of that science.

We have now arrived at the seventeenth century, when Aristotle's reign in solitude was drawing to a close. Methods of gaining knowledge with which Aristotle was totally un-

acquainted were fast being discovered, invented, or improved. Men were giving their energies to special subjects, and science generally was making a great advance.

In the seventeenth century Galileo wrote to Kepler that he had seen the moons of Jupiter and the phases of Venus through his telescope. Harvey, our great countryman, discovered the circulation of the blood. Swammerdam studied the metamorphosis of insects. Malpighi and Leuwenhoek, with the aid of the microscope, carried out researches on the anatomy of plants and animals. John Ray, with the assistance of his pupil and benefactor, Francis Willoughby, published numerous works which constituted a very distinct advance, and laid the foundation stones of modern natural history. Newton discovered the law of gravitation. The Royal Society was incorporated, and Greenwich observatory was built. In fact, in this period, which may be considered as the Renaissance period of natural history, the men who, either by taste or accident, took up the study of natural history, were not willing to accept blindly everything that their elders taught them, or that the Church enjoined them to believe. They felt the need of proving or attempting to prove the theories of the ancients, and in so doing came on new facts which stimulated them to fresh researches. The days when the idea prevailed that it was impious to seek for knowledge of the highest heavens or of the most secret wells of life were beginning to pass away. How gradual and lingering the passing is, some ideas held in the present time may show. We may say that the foundations of the modern methods of studying natural history were laid in this period, in and around the seventeenth century. As all naturalists who had written up to that time were more or less influenced by the Greek philosophers, it will not be pressing the case too far to state that these pioneers of modern science, who lived in the seventeenth century, were all directly or indirectly greatly indebted to the writings of Aristotle. Thus we see that the reign of Aristotle lasted nearly two thousand years, and, though no longer reigning in solitary grandeur, he must ever be accounted, not only the father of naturalists, but also one of the great princes in the domain of natural history.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 13th, 1908.

Mr. ALFRED SICH, F.E.S., *President*, in the Chair.

Mr. Robert Adkin exhibited a series of *Anticlea rubidata*, reared from Devonshire parents, and called attention to the colour variation in the individuals comprising the series, some of which were intensely red, while others were pale olive-brown. So far as he was aware, this latter form had been found only in Devonshire.

Mr. R. South exhibited a short series of *Larentia* (*Amœbe*) *olivata*, Schiff. The larvæ were received from Torquay in the spring of 1907, when they were about half-grown. Goose-grass (*Galium aparine*) being more readily obtained, the larvæ were reared upon this plant. Two male moths emerged on June 4th, followed by two females on July 10th, and one example of each sex on July 12th. The specimens are not perhaps below the average size, but the general colour is pale greenish-grey, and the central band is darker greenish-grey. June 4th seems to be an unusually early date for this species, but this was perhaps due to their having been reared indoors.

Mr. A. E. Tonge exhibited a large living spider (*Heteropoda regia*) from Jamaica, found by Mr. Gurney, of Pinner, on a bunch of bananas. It had fed freely on cockroaches and hibernating British spiders. A second exhibit was *Melanippe fluctuata*, taken on a tree trunk in Portsmouth on February 12th. This was an abnormally early appearance. He had never taken it earlier than April in previous years. Mr. Tonge also showed a bred female example of *Hybernia rupicapraria* that had emerged on February 12th, and called attention to the peculiar drooping position of the wings in its resting attitude.

Mr. Step exhibited a *Papilio machaon*, set up between two

pieces of glass fixed at a slight distance apart, for use as an object for students of Art Schools.

Mr. Rayward exhibited the hibernating larva of *Aricia agestis* (*astrarche*).

Mr. Newman exhibited an extremely light specimen of *Mellinia* (*Xanthia*) *gilvago;* two curious *Hylophila prasinana*, with two very indistinct silvery bands, and the third (inner one) missing; a very light var. of *Cidaria prunata*, the light bands being very much whiter than usual, and the hind wings pearly white; a fine form of *Mesotype virgata* (*lineolata*), the dark band being much broadened and margined on both sides with white lines, extending to the lower wings as well; also a curious rayed variety of *Melanippe sociata*.

Mr. Hy. J. Turner exhibited the following species of Pyralid moths kindly given to him by Mr. L. B. Prout, who had taken them during a visit to Canada last summer:

1. *Evergestis straminalis*, from Wellington, British Columbia, and Toronto. This species, well known to us in Britain, has a very wide range over both the Palæarctic and Nearctic regions. Some of the specimens obtained had dark suffusion along the margins and fringes of both upper and under wings. A specimen was exhibited from New York in which the suffusion was much more prominent on all the wings.

2. *Pyrausta fodinalis*, from Wellington, confined to the Northern States and Columbia. The specimen was remarkably bright in colour, exactly agreeing with one in the British Museum collection, which in itself was remarkable as being very aberrant in both size and colour from the rest of the long series there contained.

3. *P. thestinales*, from Wellington. } Both species belong to
4. *P. æglealis*, from Toronto. } the more obscure section of the genus.

5. *Phlyctænodes sticticalis*, from Toronto. This is another species of extended range, being found both in Europe and America.

6. *Pionea profundalis*, from Vancouver and Wellington. A species closely allied to our *P. ferruginalis*, and, in fact, it was at first thought to be a form of that species.

7. *Nymphula badiusalis*, from New Park, Toronto. This Hydrocampid much resembles our *N. stagnalis*. It was taken on trunks of trees; rather an unusual position for this genus, most of whose members settle among herbage. The two specimens exhibited were much brighter in markings than the only two specimens in the Museum.

8. *Crambus turbatellus*, from Toronto. The markings of this species are dots arranged transversely on a pure white ground, a somewhat unusual character for this genus.

In the same box were placed—

1. A pair of *Phlyctænodes sulphuralis*, taken by Mr. A. H. Jones at Herculesbad, at electric light, in June, 1907. The species is a native of Hungary, Asia Minor, and South Russia.

2. *Oligostigma hapilista*, a very beautiful Hydrocampid from the Khasia Hills, North-Eastern India.

3. *Endotricha flammealis*, from Syria.

4. *Pyralis costalis*, from Syria.

5. *Rhodaria sanguinalis*, from Syria.

6. *Nomophila noctuella* (*hybridalis*), from Natal.

All these were specimens of old friends from far away.

Mr. Turner called attention to the exhibit as illustrating the fact that, although one may be thousands of miles away from home, yet it is difficult to get completely away from species either identical or very closely allied to the British species.

Dr. Hodgson exhibited a long series of *Agriades bellargus*. With the exception of three specimens all had been collected from the spring of 1904 to the end of the second week of October, 1907. They were from various localities on the North and South Downs. There were at least five distinct shades of blue shown in both males and females: ordinary bright blue, deep pure blue, green-blue, violet-blue (almost green and violet respectively), and grey-blue. Many females of 1907 had much blue coloration, but principally less orange in the peacock spots. These peacock spots showed considerable gradation of colour, from deep red or brown to pale yellow or primrose white in colour; and also a gradation of development, especially of the blue crescents on the margins of the lower wings. Several specimens had grey apical wedges, approaching *Polyommatus icarus* in this respect. This was especially common in the first brood of 1907, as was indeed some extent of grey on the fore wings. One female had lilac rings around the peacock spots. A few were partially bleached; there was a slight example of ab. *inæqualis*; and one specimen was gynandrous, but with a predominance of the female characters. Some of the females had their nervures paler or darker than the disc. The extreme forms had the wings all blue or all grey. The males showed the spotting and clouding of the margin in various degrees. One male had definite, small, white-

edged spots on the fore wings. Some of the undersides shown were striated forms; some with clustered spots on the disc, others with the median row approximating to the margin; several were incomplete forms of ab. *obsolcta*; in each of three specimens one wing lacked its discoidal spot, and one male exactly resembled the ordinary female on the under side.

Mr. Fremlin read a paper, entitled "The Effect of Physical and Chemical Agencies on Lepidoptera, being the Results of Experiments made in 1906 and 1907" (see p. 1).

In the discussion which ensued the President questioned how much the imagines were affected after they emerged from the pupæ, and suggested that if possible the pupæ should be taken from the jars saturated with the reagent immediately before the emergence of the imago. Mr. Main wished also to know how long the imagines were in the various fumes; and said that no doubt the number of cripples was the direct effect of the fumes on the immature imago. He also asked if the sulphur experiment should not have been termed sulphurous acid. Mr. Kaye wished to know the locality whence all the pupæ experimented on came. Mr. Adkin noted that the two species of pupæ used were such as had no cocoons (naked pupæ), and suggested that there should have been a natural flow of air impregnated with the fumes passing over the pupæ rather than that the jars should be saturated with stagnant fumes of the reagent and closed. Mr. Tutt said that experiments such as these were just what at the present time were required. He pointed out, however, that it was in the early stages of the pupa when it was so impressionable, rather than the later. The results showed that no doubt the reagents were most prejudicial to health. Still there had been no means of checking how far the variation which took place in some of the specimens had been due to the direct action of the reagent on the imagines after emergence.

FEBRUARY 27th, 1908.

Mr. Rayward exhibited ova of *Miselia oxyacanthæ*, found deposited on the twigs of hawthorn. They were laid, apparently, without care as to protection, some being difficult to see on account of being among irregular excrescent growth, others being laid on the bare stem. The general colour was dark, comparable to the colour of the bark. Except in one

instance all were laid singly. Mr. Sich said that, in captivity, this species laid its ova in batches.

Mr. Rayward also exhibited, on behalf of Mr. Pratt, a larva of *Geometra vernaria*, taken on September 29th, 1906, at Leatherhead, and wintered in a sleeve on a garden clematis. It fed slowly in spring, but would not pupate, and ceased feeding when other larvæ of the same species spun up for pupation. It was kept in a cool outhouse through the present winter.

Mr. Step exhibited specimens of the Jew's-ear fungus (*Hirneola auricula-judæ*) from Mickleham Downs; and said the species was a member of the simplest family (Tremellineæ) of the Hymenomycetes, the division which also contained the Mushrooms and Toadstools. In the Tremellineæ, instead of the spores being produced on gills or in tubes, they are borne on the exterior surface of a firm gelatinous sporophore, which is merely thrown into a few folds. In dry weather the substance shrivels and becomes horny, but has the property of revival and expansion with the return of moisture. The Jew's-ear is chiefly parasitic upon dead and decorticated Elder stems, and its shape and position give it a very striking resemblance to an ear, as was well shown by a photograph accompanying the exhibit.

Mr. Sich exhibited a transparent centimetre measure, being an adaptation of the Lincoln Measure for Postage Stamps, and recommended it as a useful arrangement for measuring the expanse of lepidoptera. It was marked in centimetres and millimetres.

Dr. Hodgson exhibited photographs and pencil drawings of some of the results of his hybridisation experiments on the species of Orchidaceæ, *Ophrys aranifera*, *O. arachnites* and *O. apifera* in 1904 and 1905. He also showed specimens of the seeds from the capsules of these hybrids. Lantern slides illustrative of the same experiments were also exhibited.

The remainder of the evening was devoted to an exhibition of lantern slides.

Mr. Tonge showed slides of the ova of *Pyrameis cardui*, *Pachetra leucophæa*, *Nonagria neurica*, etc.; larvæ of *Brenthis selene*, *Argynnis paphia*, var. *valesina*, etc.; cocoons of *Dicranura bicuspis*, *D. bifida*, and *D. vinula;* pupæ of *Nonagria geminipuncta* and *Abraxas grossulariata;* and imagines of *Pyrameis atalanta*, asleep, *Callophrys (Thecla) rubi*, *Ægeria sphegiformis*, *Notodonta trilophus*, *Cucullia umbratica*, *Calocampa exoleta*, etc.

Mr. Main exhibited slides of a sea spider, a member of a family which has been bandied about by various systematists between Crustacea and Arachnida; part of a brood of larvæ of *Pygæra bucephala*, feeding; a dead larva of *Stauropus fagi*, with pupa of a dipterous parasite protruding; cone of silver fir; branches of *Robinia* (false acacia), and read notes on its spines; foot of a spider; batch of ova of *Orgyia antiqua;* a larva of *Papilio machaon*, showing the osmateria; dorsal and ventral views of the larva of *Stratiomys*; and a variety of *Pieris brassicæ*, female, with the spots joined.

Mr. Lucas exhibited slides of blossoms of the butcher's broom (*Ruscus aculeatus*), *Epipactis latifolia*, *Viola palustris*, *Heracleum giganteum*, *Tussilago farfara*, *Orchis latifolia*, etc.

Mr. West (Ashtead) showed sections of wood; sections of stems; a colony of *Hydra viridis*, etc.

Mr. Dennis exhibited slides of Hop, male and female flowers; wych elm, black walnut, common walnut, hazel catkins, sallow catkins, birch catkins, alder catkins, twigs of maidenhair tree, etc.

MARCH 12th, 1908.

Mr. R. Adkin exhibited the following Tortrices: *Hedya aceriana*, *H. ocellana*, *Grapholitha minutana*, and *Semasia wœberiana*. He said they were all common metropolitan species, and the specimens shown were collected at Lewisham from fences that he passed on his way to and from the railway station. He hoped that, by showing how exceedingly easy it was to pick up many species of this interesting group, without even going out of one's daily way, he might induce a more general interest in the Tortrices among the members of the Society than there appeared to be at present.

Mr. Andrews exhibited specimens of the Dipteron *Pipiza lugubris*, F., a scarce Syrphid, and four examples of *Caricea tigrina*, F., with its prey.

Mr. Joy exhibited a collection of Lepidoptera made by him in the near neighbourhood of Calcutta, and contributed the following note:

"The specimens exhibited represent the results of collecting on Sunday mornings only, for I had no other opportunity, during the past two seasons, and they were all taken within ten miles of Calcutta. A few notes regarding my experience may be of interest. I found the cool weather far the better portion of the year for collecting. This extends from

November to February, the midday temperature during this period being about 80°. After February, when the hot weather sets in, until the rains about the middle of June, insect life becomes scarcer as the heat increases. With the advent of the rains, butterflies are more in evidence. The character of the country I worked was anything but propitious. The highest elevation for some miles around Calcutta is only twelve feet above sea-level. Outside the limits of the city it is composed chiefly of rice fields, interspersed with dense jungle of bamboo, cocoa-nut palm, and palmyra. Wild flowers are exceedingly scarce, and small undergrowth is choked out by dense bamboo. *Lycænidæ* and *Hesperiidæ* were almost absent. Roads, cuttings, and the edges of cultivated fields, therefore, were the only accessible collecting grounds, and even in these it was necessary to keep a look out for cobras and the more deadly kreit snake. I observed that during the hotter months, when the midday heat is well over 100° in the shade, butterflies fly quite early in the day, almost disappearing by 11 a.m. Another fact that struck me is that in so many cases the undersides, including those of the species that are most brilliant on the upper wings, closely resemble the coloration of leaves. They generally exhibit a protective resemblance to their surroundings, and certainly in a country where they have a far larger number of enemies than in temperate climes, it is a characteristic that might be expected. As I was entirely without books on the subject, and found no one who collected butterflies—and, judging from the astonishment of stray natives, a kite net was a phenomenon—I could only rely upon my own imperfect observations. I was so much occupied in business that I had no chance to get even a few days in one of the rich hill localities, but I think the insects I secured fairly represent the species obtainable within a few miles of Calcutta."

Mr. Joy's exhibit included the following species:—*Papilio polytes, P. evemon, P. erithonius, Hypolimnas bolina, H. misippus, Danais limniace, D. septentrionis, D. genutia, D. chrysippus, Elymnias undularis, Limenitis procris, Catopsilia fabius, C. crocale, C. florella, Euplœa core, Delias eucharis, Junonia atlites, J. asterie, Nepheronia hippia, Loxura atymnus, Atella phalanta, Euthalia garuda*, etc.

Dr. Hodgson exhibited photographs of species of the Orchid genus *Epipactis* in fruit. *E. latifolia*, with orbicular, horizontally-placed fruit; *E. media*, with pear-shaped, drooping fruit; stems of *E. latifolia*, fully fertilised, from a sunny bank with scattered bushes; stems of *E. latifolia*, scarcely

at all fertilised, from among high trees in dense shade; and a stem of *E. media*, fully fertilised, from dense shade.

Mr. Stanley Edwards exhibited two scorpions, *Heterometrus swammerdami*, from India, and *Tityus insignis*, from the West Indies, and contributed the following note:

"Scorpions, of which there are several hundred species known, are not represented in England at all, and there are only about thirteen species in the south of Europe. Most species of scorpions are viviparous, producing from 20—60 at a time, and the young are carried on the back of the female for about a month. Adult scorpions vary in length from $1\frac{1}{2}$ to 8 inches. The effect of their sting on the system is that the injected poison causes the corpuscles of the blood to coagulate. Remains of scorpions have been found as far back as the carboniferous period."

MARCH 26th, 1908.

Mr. G. B. Browne exhibited a large number of British Lepidoptera, which he was presenting to the Society.

Mr. Tonge exhibited some Lepidoptera recently received from Australia, including the form of *Pyrameis* known as *P. kershawii*, so closely allied to *P. cardui* as to be considered by some as only a geographical race of that species.

Dr. Chapman exhibited a living larva of *Aricia agestis* (*astrarche*), which had been fed under shelter during the winter, and was nearly full grown.

Dr. Hodgson exhibited two rough sketches of an unusual resting (?) attitude of the imago of *Adopæa flava* (*Hesperia thaumas*) (apparently a sunning position). In one female, seen on four occasions (returning after disturbance) about 1 p.m., August 24th, 1907, during a short period of sunshine, the attitude was almost identical (except the antennæ) with the sleeping position of *Nisoniades tages*; but the under surfaces of the wings were, perhaps, a little wider apart than in that species at night. This describes the attitude, but as regards its position on the stem the thorax and abdomen were above the support, instead of below as in *N. tages*. No oviposition or ova were observed.

Mr. Henry J. Turner exhibited more than two dozen species of butterflies from Sierra Leone, West Africa, and contributed the following note:

"The Rhopalocera exhibited are illustrative of the West African fauna. Most of the species belong to the Nympha-

linæ, and are more or less related to species found in our own country. We have a true *Vanessa*, *V. harmonica*, a blue species whose underside closely resembles that of *V. atalanta* or *V. io*. Then there is a form of *Precis octavia*, *P. octavia* var. *natalensis*, which is abundant in many parts of S. Africa, and has been the subject of much discussion in recent years, on account of its seasonal forms. The third species of this section is the lovely mother-of-pearl-like butterfly *Salamis anacardii*, found over an immense area from the Cape to Sierra Leone. One other species should come here, viz. *Junonia orta*, a member of a genus which is much more representative of Asia than of Africa. No less than fourteen species are allied to our *Limenitis sibylla*. Among them are six species of *Euphædra*, a genus characterised by its general robust structure, stout body, broad strong wings, rich deep and velvety colours, with strong, well-defined, bold markings, most of them extremely beautiful. They are *E. xypete*, *E. eupalus*, *E. janetta*, *E. sophrus*, *E. cyparissa* and *E. ceres*. Closely related is the genus *Euryphene*, represented by *E. sophus* and *E. arcadius*. Of the genus *Neptis*, which is so abundant in species, and representative of the tropics of the Old World, I have only one species, the beautiful *Neptis metella*. Somewhat similar in the style of markings is a member of the strictly African genus *Catuna*, *C. cœnobita*. Another genus of this group is *Aterica*, of which I show four species, *A. mirus*, *A. opis*, *A. veronica*, and *A. afer*. They differ considerably in colour and markings, and all have a remarkable underside appearance. Related to the Argynnids, only two species are found in the Ethiopian region and these are only remotely allied. Of these there is shown one species, *Lachnoptera iole*, male, which is at once recognised by the curious dark patches of specialised scales on the costa of the hind wings. Only one of the Nymphalines exhibited is unrelated to our own fauna: that is the curious *Hypolimnas egesta*, a member of the typical genus of one of the most remarkable sections of mimicking species in the *Nymphalinæ*. Three species of *Pierinæ* are shown: *Belenois paulina*, *Mylothris rhodope*, and *Eronia* sp., none closely related to any of our British species, the last belonging to a genus having members of striking appearance in tropical Asia. Of the remaining five species, one, *Amauris niavius*, belongs to the *Danainæ*, a sub-family remarkable for being a highly-protected group of butterflies. This genus *Amauris* is peculiar to tropical and South Africa, and its members have a close general appearance. To another group of protected butter-

flies, the *Acreinæ*, belong the curious long narrow-winged species with reddish bands or markings, *Acræa pseudegina*, *A. euryta*, *A. egina* and *Planema gea*. These are said to be of gregarious habit, of generally weak flight, and often very abundant."

Mr. Alfred Sich exhibited the following eleven species of the genus *Tinea*:

T. fulvimitrella, Sodof.; *T. arcella*, Fb.; *T. corticella*, Curt.; *T. parasitella*, Hb.; *T. picarella*, Clerk; *T. granella*, L.; *T. cloacella*, Haw.; *T. albipunctella*, Haw.; *T. caprimulgella*, H.-S.; *T. nigripunctella*, Haw., and *T. confusella*, H.-S.; and contributed the following note:

"*T. fulvimitrella* occurs locally on the trunks of trees, apparently preferring oak and beech, and the larva probably feeds on fungoid growths. *T. arcella*, a fairly common species, is also probably a fungus feeder. *T. corticella* occurs occasionally on bark of oaks and hornbeams, and probably other trees; one of its strongholds used to be in Epping Forest. It still occurs in Richmond Park. *T. parasitella* is a less beautiful insect than the last, but similar in habits. Last year I took three specimens on the trunk of an old birch tree at Netley Heath, in company with *T. cloacella*. *T. picarella* is a conspicuous black and white species; but little is known of its habits. *T. granella* is said to feed on grains in warehouses. *T. cloacella* is very common on trunks of trees, and it is, undoubtedly, a fungus feeder. These last two species are, I believe, quite separate, but one usually finds them mixed up in collections; and as they both appear to vary along the same lines, it is exceedingly difficult to determine certain specimens. That most careful observer, Zeller, states that the hind-wing in *T. granella* is narrower than in *T. cloacella*. The colour of the head, on which some seem to rely, shows too much variation in tint to be an absolute criterion. I have never been lucky enough to come across *T. granella* in a warehouse, or to get larvæ of it. I should be exceedingly obliged to anyone who could obtain larvæ of this species feeding on grain for me. *T. albipunctella* is a small species, not common, but perhaps overlooked. *T. caprimulgella* is also a rather inconspicuous insect. It seems mostly addicted to Middlesex, having occurred in Hyde Park, Hackney, and Chiswick, at which last place I took one last summer on a decaying tree. *T. nigripunctella* would appear to belong to a different genus, as the appearance of the living moth is so different from most of the others. It sits up like an *Ornix*, and waves round its long antennæ

much in the same way that the species of *Ornix* do when slightly disturbed. It frequents outhouses, and does not seem very common. I have taken it in Chiswick. *T. confusella* appears to be a lichen feeder, and frequents rocks, but possibly it feeds on small fungoid growths, which occur on rocks.

MARCH 28th, 1908.

VISIT TO THE BRITISH MUSEUM (NATURAL HISTORY).

At the instance of Mr. Stanley Edwards, the Keeper of the Geological Department, Dr. Smith-Woodward, F.R.S., very kindly conducted the party, sixteen in number, over those sections of the collections which contain the Fossil Reptilia. In his interesting remarks he brought to the notice of the members the Pterodactyles or winged lizards, the crocodiles, the Dinosaurs or huge lizards, the Ichthyosaurs or fish lizards, the tortoises, etc., and concluded his address with references to the huge and more recently acquired remains of the *Triceratops*, *Diplodocus*, and *Iguanodon*.

APRIL 9th, 1908.

Mr. Kaye exhibited a moth belonging to the Agaristid family, *Scirocastnia præfecta*, from Peru, which appeared superficially to belong to the *Erycinidæ* among the butterflies, and as such he had considered it, until he examined the neuration, which at once revealed his error.

Mr. B. W. Adkin exhibited a cabinet drawer containing series of the various forms of *Angerona prunaria* from various localities; also a drawer of the various forms of *Boarmia repandata*. A discussion arose as to labelling insects geographically. Many members were of opinion that a locality label placed at the side below the section of a series from one locality was the most useful, as by this means the prevailing forms from various places could be compared more easily. It was not intended that the labels on each individual should be superseded. If the object of the collection were merely to show the variation without reference to comparison geographically these additional labels were impossible.

Mr. South exhibited several species of the genus *Cucullia*: *C. verbasci*, *C. lychnitis*, and what was considered by his various correspondents as *C. scrophulariæ*; and initiated a discussion with a view to obtaining an opinion of what is really *C. scrophulariæ*. Messrs. Tutt, Rayward, Hall, Newman, and others took part, but no definite concensus of opinion was reached.

Mr. Sich exhibited several species of house-haunting Tineids, and read a short paper on his exhibit (see p. 7).

A discussion took place on the ravages of this group of moths.

APRIL 23rd, 1908.

Mr. E. D. Green, of Plumstead, was elected a member.

Mr. W. J. Kaye exhibited a curious asymmetrical form of *Anticlea rubidata*, taken at Freshwater, on July 12th, 1907, in which the central band of the right fore-wing was completely broken with a belt of the red ground colour.

Mr. Newman exhibited stems of *Viburnum* containing larvæ of *Sesia andreniformis* from North Kent; also imagines of *Cucullia scrophulariæ* (?), bred from larvæ taken on water-betony in the North Kent marshes.

Mr. B. W. Adkin exhibited specimens of *Cucullia verbasci*, *C. lychnitis*, and *C. scrophulariæ* (?) for comparison.

Mr. Robert Adkin exhibited a Tortrix larva that had a parasitic larva attached to it, and read the following note:

"In the autumn of last year, I put a few ova of *Tortrix pronubana* on a large bush of *Euonymus japonicus* in my garden at Lewisham, and on making a careful search of the bush a few days since I discovered two larvæ which I have little doubt are the result of those eggs. They were, I should judge, in the last larval skin but one, about half grown, and each had attached to it a parasitic larva. The parasite appeared to be hymenopterous,* and was attached to the ventral surface of its host between the second and third pairs of legs, apparently being held in position by one extremity being attached to or buried in the skin of the host, its body fitting round the side of the host between the segments, its other extremity resting upon or being attached to the skin of the back. In both cases the position of the parasite on, and its attachment to, the host were identical, and

* The mature parasites emerged on May 29th and June 9th respectively; and were identified by Mr. Claud Morley as *Œdematopsis scabricula*, Grav.

its presence appeared to cause no inconvenience to the lepidopterous larva, which moved about and performed its usual functions quite in the ordinary manner. The *T. pronubana* larvæ that I have previously found in a wild state at Eastbourne, have been singularly free from parasites of any sort, and the fact that the only two known survivors of an attempt to artificially introduce the species into a new locality should both be fatally attacked, may throw some light upon one of the reasons why similar attempts so often fail."

Mr. Adkin also exhibited a specimen of *Argynnis aglaia*, taken on the wing at Eastbourne some years since, in which the left fore-wing was only about half the size of the right-hand wing. To all appearance this small wing was complete, and the markings of its basal half were but little smaller than those of its fellow, but those of the outer half were reduced in size, and the row of black spots was united with the sub-marginal black lunules, thus forming a row of elongated patches. It therefore appeared that the reduction in size was chiefly due to a contraction of the outer half of the wing. The left hind wing was almost equal in size to the right, and the insect when on flight appeared to suffer little inconvenience from the considerably reduced size of one of its wings.

Mr. E. Step exhibited photographs of the setterwort or stinking hellebore (*Helleborus fœtidus*), and read the following note:

"Among the few Surrey localities for *Helleborus fœtidus*, L., two stations at Mickleham have long been known. Unfortunately, both have been enclosed for some years; but one of these is at least accessible. On March 28th of the present year, I visited the spot and brought away several flowering stems for careful examination. These notes are the result.

"*H. fœtidus* has a permanent stem, in which respect it differs from its only British congener, *H. viridis*, which has only a perennial rootstock, and has to send up a new stem each year. From the summit of the old stem *H. fœtidus*, in February, suddenly produces strong new growth, of so pale a green that it appears almost white in contrast with the dark leathery foliage of the previous year, and this branches above into several corymbs of drooping globose flower-buds, with numerous leafy bracts. The fully-matured buds are about an inch in diameter. At first the sepals open only slightly, revealing two or three curved stigmas—which are already mature—surrounded by the numerous closely-packed anthers, at present immature, in four whorls. The filaments

are curved in order to bring all the anthers close together around the styles. The green petals are few in number, much shorter than the stamens, of a tubular form with erose edges, and half filled with nectar. This arrangement has evident relation to cross-pollination. To reach the nectar an insect must alight on the sepals and thrust its head into the flower; but cannot well do so without bringing its body into contact with the stigmas. After these have been fertilised by pollen brought from an older flower, they are hidden among the anthers owing to the extension of the filaments. Then the sepals part more widely, the anthers separate somewhat and discharge their pollen. Insects probably settle upon them, and so dust their undersides with pollen. At this stage the outer sepals develop a thin line of crimson along their upper edges; after the emptying of the anther-cells this line becomes thicker and more purple, but remains distinctly on the red side of purple.

"The fact that the stations mentioned are on enclosed land precludes one from making observations that one feels to be necessary in order to establish satisfactorily the means by which this plant is fertilised. The purple line is not developed as an attraction to insects, and cannot be intended as an indication to them that, fertilisation having been effected, it is useless to call, for there may still be a considerable quantity of nectar in the petals after all the pollen has disappeared and the purple line is well developed.

"So far as the records go, it appears to be fertilised chiefly by *Apis* and *Bombus*, but it is also visited by *Eristalis* for the sake of its pollen.

"If one were guided solely by coloured illustrations and text-book descriptions, one might suppose that the purple line in conjunction with the fœtid odour of the flowers indicated an attraction for flies; but though the odour may serve this purpose, the colour not being developed until after pollination somewhat weakens the supposition. Possibly, the purple line may be developed to attract Diptera as a last resource. (It may be noted that the text-books are contented with stating that the sepals have a purple border, but do not mention that this is developed after the flowers open.) Lord Avebury supposes that the odour is for the purpose of repelling browsing animals; but for this to be true the unpleasantness should be in the leaves which are present all the year. So far as I can make out, no offensive odour is given off by the foliage. Hooker says, 'Plant fœtid and cathartic.' The cathartic properties would be a sufficient

deterrent, but probably they are accompanied by a scent sufficiently strong to be noticed by quadrupeds, though it could not be detected by my nostrils.

"Soon after the anther-cells have been emptied of their pollen, the stamens are shed and the petals go with them. Not until this stage is reached do the sepals open at all widely. Now they spread fully, and reveal the enlarging carpels, which finally develop into two or three wrinkled follicles, containing numerous shining seeds."

MAY 14th, 1908.

Dr. Chapman exhibited a larva of *Nomiades semiargus* nearly full grown, from the Pyrenees. He also showed a bred *Tanagra atrata* (*chærophyllata*) v. *pyrenaica*, and called attention to the fine brown scaling over all the wings.

Mr. R. Adkin exhibited specimens of the rare fungus *Gyromitra esculenta* sent to him from Aviemore by Mr. McArthur. Mr. McArthur had also forwarded for exhibition nodules of resin caused by the depredations of the larvæ of *Retinia resinella*; a small branch of Scots pine to show the extreme development of lichen in the woods; a curious "mop" of Scots pine twigs which Mr. Step said was a "witch-besom," caused by the fungus *Peridermium elatinum*; and three cocoons of *Dicranura vinula* which appeared to have been opened by birds. With regard to the last exhibit Dr. Chapman suggested the creeper or woodpecker as the culprit, or some bird with a straight powerful beak. Mr. Tonge had found cocoons of *D. bifida* in some numbers slit open in the same way, and suggested that it might have been done by the Nuthatch.

Mr. Newman exhibited living larvæ of *Dryas paphia*, *Argynnis aglaia*, and *A. adippe*, which had been wintered outdoors on living plants, and were extremely small; others which had been kept under glass, unheated, were in their last instar. He also showed ova of *Pyrameis atalanta*, *in sitû* on nettles, which were laid about May 3rd, and were just hatching. This was unusually early.

Mr. Rayward exhibited a considerable number of lepidoptera which he was placing in the Society's collection, including *Toxocampa craccæ*, *Polia nigrocincta*, *Cucullia lychnitis*, *C. asteris*, *Lycæna arion*, etc.

Mr. A. H. Jones read a paper, entitled "Notes on Hungarian Butterflies," and exhibited the more notable

PLATE II.

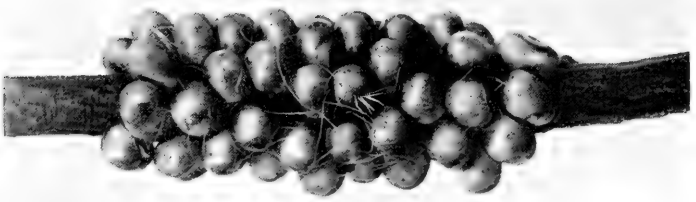

Fig. 4.

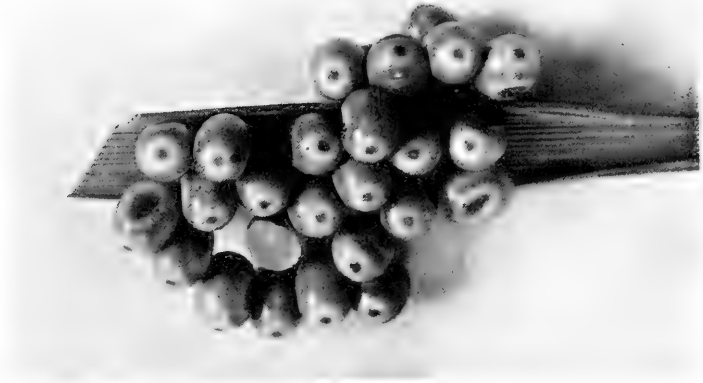

Fig. 3.

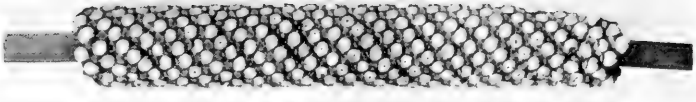

Fig. 2.

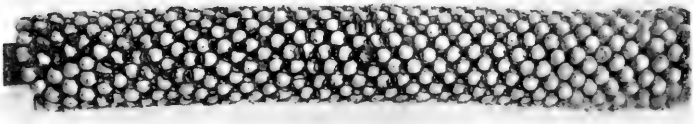

Fig. 1.

Photos. by A. E. Tonge.

Adlard & Son, Impr.

EXPLANATION OF PLATE II.

FIG. 1.—Ova of *Malacosoma castrensis*. × 3½ diameters.

FIG. 2.—Ova of *M. franconica*. × 3½ diameters. (Supplied by M. Gillmer.)

FIG. 3.—Ova of *Macrothylacia rubi*. × 5 diameters. (Continental ova supplied by Dr. T. A. Chapman.)

FIG. 4.—Ova of *Saturnia carpini (pavonia)*. × 5 diameters.

See p. 59.

species he had taken during his holiday last year, including *Neptis lucilla*, *N. aceris*, *Limenitis populi*, *L. sibylla*, *L. camilla*, *Erebia medusa*, var. *psodea*, *Pararge climene*, *P. roxelana*, *Chrysophanus thersamon*, *Heteropterus morpheus*, *Cœnonympha œdippus*, *E. melas*, *C. dispar*, v. *rutilus*, etc. (see p. 11).

MAY 28th, 1908.

Mr. J. St. Aubyn, of Balham, and Mr. N. D. Riley, of Upper Tooting, were elected members.

Mr. Main exhibited living larvæ of a species of "Stick" insect, bred from the ova he had previously exhibited.

Mr. West, of Ashtead, exhibited a series of *Anticlea badiata*, bred from larvæ obtained on his rose trees.

Mr. Tonge exhibited stereographs of the ova of *Saturnia carpini* and *Macrothylacia rubi* for comparison; of the ova of *Malacosoma castrensis* and *M. franconica* for comparison; of the ova of *Panolis piniperda* both fertile and infertile; and of the imago of *Notodonta trepida* at rest.

Mr. Step exhibited for Mr. Tonge, flowers of *Geum rivale*, from Whitchurch in Hampshire, stating that it was a local plant, not occurring anywhere in the London district. He also showed some photographs, including one of a fine group of the fertile fronds of *Equisetum arvense*.

Mr. Rayward exhibited a pupa *in sitû* of *Trochilium crabroniformis*, and pointed out the pad of gnawed wood, with which the lower end of the burrow was stopped, and the silken cap over the hole, which was ruptured at emergence. He stated from his experience that the burrows were generally in the main stems, and that the insect emerged downward, while in *Ægeria culiciformis*, of which he also showed a pupa case *in sitû*, the emergence took place upwards.

Mr. Turner exhibited a long series of the local moth *Pancalia leuwenhoekella*, which he had met with in considerable abundance at Box Hill; a short series of *Swammerdammia grisco-capitella*, bred from larvæ obtained at Oxshott during the Society's Field Meeting in 1907; two specimens of the uncommon Coleopteron, *Cassida murræa*, taken on May 16th at Box Hill on the leaves of *Inula coniza*; and specimens of the extremely beautiful Hydrocampid, *Ambia instrumentalis*, from the Khasia Hills, North India.

Mr. Gilbert Arrow gave an address on the "Origin and Use of Horns in Coleoptera," and illustrated his remarks by

a series of lantern slides and by a number of striking specimens, some of which were kindly lent by Mr. Edwards. Among the instances shown were various stages of the males in *Xylotrupes gideon*, *Archon centaurus*, *Chalcosoma atlas*, *Dynastes hercules*, *Ceratorrhina morgani*, *Enema pan*, *Megaceras philoctetes*, etc.

MAY 30th, 1908.

FIELD MEETING AT OXSHOTT.

Conductor: Mr. E. STEP, F.L.S.

There was a large attendance of members at this, the first field meeting of the year. A good many insects appeared to be taken, especially by the larvæ-beaters, but the only list of captures sent in is by Mr. A. W. Dods, who reports:—*Odontopera bidentata*, *Tephrosia punctularia*, *Acidalia remutaria*, *Cabera pusaria*, *Ematurga atomaria*, *Bupalus piniaria*, and *Thera variata*. Several of these were photographed at rest on tree-trunks.

JUNE 11th, 1908.

Dr. T. A. CHAPMAN, F.E.S., F.Z.S., in the Chair.

Mr. Goulton exhibited living larvæ of *Tethea subtusa*, taken in Surrey.

Mr. Rayward exhibited batches of the ova of *Macrothylacia rubi* on heather; each batch consisted of about 30 ova, and he stated that they were very conspicuous at night.

Mr. Edwards reported the capture of a pair of *Amphidasys betularia*, var. *doubledayaria*, *in cop.*, at Blackheath on June 3rd.

Mr. Goulton reported that a considerable number of pupæ of *Moma orion* were going over, and Mr. Newman stated that in his experience quite 50 per cent. usually did so.

Mr. Tonge reported that the larvæ of *Anticlea nigrofasciaria* (*derivata*), obtained from a female taken at the end of April, were in pupæ now.

Dr. Chapman noted that imagines of *Tanagra atrata*, which he was now breeding from Pyrenean ova, had abundant brown scaling over all the wings, and that he had found

British examples powdered with brown scales, but not so abundantly.

Mr. Rayward had seen plenty of *Pieris rapæ* and *P. napi* in S. Wales a week ago, but no *Euchloë cardamines*.

JUNE 20th, 1908.

Field Meeting at Box Hill.

Conductor: Mr. Henry J. Turner, F.E.S.

About twenty members and friends attended this meeting, and a very pleasant afternoon was spent in the woods and valleys about Juniper Bottom. No captures of any note have been reported, and, on the whole, insects seemed very scarce, in all stages. There was a profusion of the characteristic chalk plants in flower. Tea was obtained on the terrace of the hunting lodge on the crest of the hill.

JUNE 25th, 1908.

Mr. Newman exhibited a variety of *Abraxas grossulariata*, whose fore-wings had the marginal blotches rayed inwards somewhat, and the hind-wings had only the discoidal spot and rayed-out marginal spots.

Mr. West (Greenwich) exhibited a short series of the local species of Coleoptera, *Dytiscus circumcinctus*, male and female, from Great Yarmouth, and called attention to the points of difference from *D. marginalis*, which was also exhibited. He also showed specimens of the rare *Bidessus unistriatus* from the same locality.

Mr. R. Adkin read the following Report of the Delegates (the President and Mr. R. Adkin) appointed to represent the Society at the Congress of the South-Eastern Union of Scientific Societies:

"The Thirteenth Annual Congress of the South-Eastern Union of Scientific Societies was held at Hastings from June 10th to 13th, and was duly attended by your delegates.

"The proceedings were opened by the retiring President, Prof. Silvanus P. Thompson, D.Sc., F.R.S., F.R.A.S., who, in a few well-chosen words, introduced his successor, Sir Archibald Geikie, D.Sc., F.R.S. (Secretary to the Royal Society), who read his inaugural address, taking for his subject 'The Weald.' 'He chose the subject because research

in the problems connected with the Wealden area was eminently suitable for that combined action which local societies and field clubs are well fitted to provide.'

"The papers read before the Congress included 'Some Considerations concerning Dew-ponds,' by Mr. Edward A. Martin, F.G.S.; 'A Contribution to the Spider Fauna of the District around Hastings,' by Messrs. W. Ruskin Butterfield and W. H. Bennett; 'Gilbert White and Sussex,' by Mr. W. H. Mullens, M.A., L.L.M.; 'Local Sponges,' by Mr. Edward Connold, F.Z.S., F.E.S.; 'Mediæval Timbered Houses of Sussex and Kent,' by Mr. John E. Ray; 'Pleistocene Vertebrates of the South-East of England,' by Mr. W. J. Lewis Abbott, F.G.S.; and 'Darwinism as applied to Dress,' by Mr. W. Mark Webb, F.L.S.

"On Friday evening a Reception was held by the Mayor of Hastings (Alderman R. W. Mitchell, M.A., J.P.) in the Town Hall, and was well attended. During the evening, among other attractions, a lecture, illustrated by the lantern, was given by Mr. Wintour F. Gwinnell, F.G.S., on 'The Reptile Monsters of Mesozoic Times, with especial reference to the Iguanodon.'

"The afternoons of the four days during which the Congress lasted were given up to excursions to various places of interest in the neighbourhood, and these included visits to St. Clement's Caves and Hastings Castle, at the latter of which Mr. Harold Sands, F.S.A., read a paper, in which he dealt exhaustively with the history of the castle from its foundation until the present time. To Battle Abbey and Church, when the Very Rev. E. R. Curry, D.D., acted as leader, and pointed out the matters of interest connected with these ancient structures. To Dungeness, under the leadership of Mr. W. C. T. Beasley, M.A., and Dr. H. Stanley; the party were met by Col. H. Finn, who, with his keeper, conducted them over his private grounds, pointing out the breeding places and nests of many of the shore and other birds in the shingle and ponds, the excursion being a particularly interesting one, especially to the zoologist and botanists. To Rye, when Mr. J. Adams conducted the party to the many places of interest which this ancient town contains; the party afterwards being entertained to tea by the Mayor (Councillor Kingsnorth Reeve, J.P.). And, finally, to numerous places of geological interest in the immediate neighbourhood of the town of Hastings, when Mr. Lewis Abbott, F.G.S., F.R.A.I., conducted.

"The Congress Museum, which was arranged at Trinity

Hall by Mr. E. W. Swanton and the Museum Committee, contained, among a large number of interesting natural history specimens, a particularly fine collection of birds' eggs, shown by Mr. Thomas Parkin, J.P., M.A., F.Z.S., and was open for inspection throughout the Congress, as was also the local museum at the Brassey Institute.

"The general arrangements for the Congress were carried out by a strong local committee, and proved entirely satisfactory.

"The business coming before the Delegates' meetings included, among other items, the reading of the reports of—

"The Autumn Meeting by Mr. H. Norman Grey, which gave an account of the visit of the members of the Union to the Apartments of the Royal Society.

"The Photographic Secretary, Mr. E. A. Martin, F.G.S., from which it appeared that, among other sets of lantern slides, available for the use of Societies comprised within the Union, one of 'Some British Orchids,' with explanatory notes, is much in request. Among sets in course of formation are 'English Wild Flowers,' with special reference to forms of capsules and their dehiscence, and 'Photomicrographs,' to which assistance by the members of the Associated Societies is invited.

"The Treasure Trove Committee's report was read by Mr. H. Norman Grey.

"The Report of the Council and the Treasurer's Statement showed the affairs of the Union to be in a satisfactory condition.

"On the motion of Dr. G. Abbott, M.R.C.S., F.G.S., a Cryptogamic Section was formed, and it was proposed to hold a meeting of the Section at Tunbridge Wells in the autumn.

"Mr. W. T. Vincent referred to the perilous condition of the ancient stone circles in the weald of Kent, especially the one at Coldrum, near Wrotham, the preservation of which has, for some time past, occupied the attention of the Union. It was satisfactory to have it stated that the preservation of the Coldrum Circle was now assured, and that it was probable that an equally reassuring report with regard to the others would be forthcoming in the near future.

"Mr. F. Merrifield, F.E.S., called attention to the great necessity for legislation for the prevention of pollution of rivers and streams; and Mr. W. Ruskin Butterfield mentioned Lord Avebury's Plumage Bill, both of which measures received the approval of the Congress.

"The counties of Essex and Herts were added to those coming within the scope of the Union.

"A new bye-law was passed making authors responsible for the cost of any plates they may desire to have published in the 'Transactions.'

"Our President, Mr. Alfred Sich, was elected to a seat on the Council.

"It was unanimously resolved to accept the invitation of the Mayor and Corporation of Winchester to hold the Congress in that city in 1909.

"Dr. Dukinfield H. Scott, F.R.S., and President of the Linnean Society, was unanimously elected to be the new President."

JULY 9th, 1908.

The President, in sympathetic terms, referred to the death of a member, Mr. W. Thornthwaite, of Goff's Tower, Crawley.

A letter was read from the Commons and Footpaths Preservation Society asking the Society to send a resolution in favour of two Bills relating to the objects of the Society, now before Parliament.

The following resolution, proposed by Mr. Step, and seconded by Mr. Adkin, was passed unanimously:

"That the Society is pleased to learn that the 'Public Rights of Way' Bill and the 'Access to Mountains' Bill have been read a second time in the House of Commons, and urges upon the Government the necessity for giving facilities that they may speedily pass into law."

Mr. Henry J. Turner exhibited two undersized females of *Agriades bellargus* from Ranmore, the smaller measuring only 22 mm.; several very blue females of *Polyommatus icarus* from the same place, flying with the former species; and a form of *Hesperia malvæ*, from Eastbourne, with hind wings normal, but with fore-wings having the white blotches coalesced as in ab. *taras*.

Mr. Newman exhibited larvæ of *Xylina semibrunnea*, and for comparison a larva of *X. socia*. He stated that they were terrible cannibals; and pointed out that in the former species the white lateral line was much more distinct, but that the peculiar green tint was not apparent in all specimens of the larvæ.

Mr. R. Adkin exhibited larvæ of *Biston hirtaria*, and called

attention to the light and dark forms, remarking that they kept distinctive at each moult, and seemed in no way to respond to their environment.

Mr. West (Greenwich) exhibited the following species of *Hemiptera*, taken in the New Forest in June of the present year. *Cicadetta montana*, having one fore-wing ill-developed; *Sigara minutissima*, a very small aquatic species; *Eysarcoris æneus*, a very rare species; and *Orthostira cervina*, found in moss, not common.

Mr. Carr exhibited the nymph skin of the large dragon-fly, *Anax imperator*, found on a fir trunk near the Black Pond, Oxshott; and also a batch of ova of *Macrothylacia rubi*, which were producing a large number of Chalcids.

Mr. Sich exhibited the larva and pupa of *Parnassius apollo*, sent from the Engadine, Switzerland, by Mr. Egbert Sich. The larvæ fed well on *Sedum album*. They appear rather sluggish, but very active if irritated, when they sometimes protrude a yellow forked process near the head, the osmaterium.

Mr. Tutt called attention to the fact that the pupa in *P. delius* was covered by a delicate waxy substance over the whole surface, whereby it was probably able to obviate any injury likely to be brought about by excess of water on the marshy ground upon which the frail cocoon was spun.

JULY 11th, 1908.

Field Meeting at Ranmore Common.

Conductor: Mr. Stanley Edwards, F.L.S., F.E.S.

Owing to a change in the arrangements this meeting was unfortunately very poorly attended, only eight members being present. This was much to be regretted, as the well-wooded slopes and valleys, and the rough southern escarpment, offer a considerable variety of collecting ground.

JULY 23rd, 1908.

Mr. Sich exhibited *Cerostoma xylostella*, female, and stated that the text-books describe the larva of this species as pale green with a broad reddish stripe down the back. This is the more usual coloration, but the larva is sometimes quite

without the reddish stripe, having two narrow pale subdorsal lines instead. The specimen exhibited was bred from a larva without the reddish stripe, which may be a sexual distinction, confined to the larvæ of males. He also exhibited three specimens of *Helix* (*Gonyodiscus*) *rotundata* from Folkestone Warren, one of the typical coloration and two of the var. *alba*, M. T., which is very pale and without markings; and two specimens of *Clausilia rolphii*, from near Shepherd's Well, Kent. All taken by Mr. George Sich, 1908.

Mr. Newman exhibited a living larva of *Smerinthus ocellatus* × *Amorpha populi*, and called attention to the facts that the horn was not blue, that the spiracles were not so distinctly pink as in *S. ocellatus*, and that the larvæ were of two shades of green. He then exhibited a bred specimen of *Argynnis paphia*, var. *valesina*, and very fine bred specimens of *Boarmia repandata*, var. *conversaria*, produced in three generations, and also yellow forms of *Callimorpha dominula* also bred of the third generation. The original parents of the last species were a red and a yellow form. The progeny were all red with not a single yellow form, while in the third year only yellow forms had been bred.

Mr. Robert Adkin exhibited series of *Xylina semibrunnea* and *X. socia*. He said that at a recent meeting Mr. South had asked whether a ready means of differentiating the two species could be suggested. The series exhibited were from several localities, and had been sent to him, in several instances certainly, under a wrong identification; but he thought there was no great difficulty in assigning the correct name to any individual specimen. Perhaps the shape of the fore-wings was some guide, but this appeared to him to be unreliable in some cases, and he preferred to rely upon the presence of the black blotch near the anal angle of the fore-wings, and the absence of any distinct band from the underside of the hind-wings as indicating *semibrunnea*; whereas even in the most darkly marked examples of *socia* he failed to find any distinct indication of the black blotch, though the dark band on the underside of the hind-wings appeared always to be present. He thought these two characters, taken in conjunction, might be relied upon as a means of differentiation.

Mr. South exhibited the same two species, and called attention to the following points of difference:—1. The line present on the inner margin of *X. semibrunnea* was never noticed in *X. socia*. 2. The abdominal tufts of the former

were invariably black, while in the latter they were brown. 3. The thorax of the former species was always much darker.

Mr. Turner exhibited living larvæ with their curiously contorted cases of *Coleophora siccifolia*, found by Mr. Sich and himself near Chiswick.

JULY 25th, 1908.

Field Meeting at Byfleet.

Conductor: Mr. Stanley Edwards, F.L.S., F.E.S.

As usual, when the Society goes to Byfleet, the early ones go on to Woking and work along the canal. This generally occupies the time up to three o'clock, when they are joined by their less fortunate companions who can only manage to get away for the afternoon.

Insects, as a whole, were not so plentiful as in former years; but Mr. F. B. Carr was fairly successful with larvæ beating.

The following were the Lepidoptera noticed, according to lists kindly furnished by Messrs. Sich and Ashby:

Aphantopus hyperanthus, *Augiades sylvanus*, *Adopæa flava* (*linea*), *Lithosia griseola*, and v. *stramineola*, *Porthesia similis* (*auriflua*), *P. chrysorrhœa*, *Drepana lacertinaria*, *Calymnia trapezina*, *Epione apiciaria*, *Metrocampa margaritaria*, *Pseudoterpna pruinata* (*cytisaria*), *Melanippe unangulata*, *Gillmeria pallidactyla* (*bertrami*), very common, *Nemotois cupriacellus*, *Aristotelia cricinella*, common on the heather in the marshy part beside the canal, where *Glyphipteryx thrasonella* was common. In a recess among bushes where *Lotus uliginosus* was growing, almost hidden away among the grass, Mr. Sich noticed the mines of *Cemiostoma lotella* and *Nepticula cryptella*, but not commonly. Among the larvæ taken were *Smerinthus ocellatus*, *Dicranura vinula*, *Notodonta ziczac*, *Urapteryx sambucaria*, *Bapta temerata*, etc.

Mr. Ashby communicated the following list of Coleoptera taken:

Coccidula rufa, *Brachypterus gravidus*, *Cercus rufilabris*, *Adrastus limbatus*, *Scirtes hemisphericus*, *Rhagonycha fuscicornis*, *R. limbata*, *Malthodes minimus*, *Donacia simplex*, *D. semicuprea*, *Zeugophora subspinosa*, *Cryptocephalus labiatus*, *Chrysomela polita*, *Phyllodecta cavifrons*, *P. vitellinæ*, *Phyllo-*

brotica quadrimaculata, Luperus rufipes, L. flavipes, Galerucella tenella, G. sagittariæ, Ochrosis salicariæ, Crepidodera transversa, C. aurata, Hippuriphila modeeri, Mordellistena pumila, Anaspis ruficollis, A. flava, Rhynchites nanus, Deporaüs megacephala, D. betulæ, Apion ulicis, A. striatum, A. hæmatodes, A. violaceum, Strophosomus coryli, S. lateralis, Phyllobius pyri, P. argentatus, Sitones lineatus, Orchestes quercus, O. stigma, O. salicis, Thryogenes nereis, Bagous alismatis, Nanophyes lythri, Gymnetron antirrhini, Cæliodes rubicundus, C. quercus, Ceuthorrhynchus melanostictus, Rhinoncus perpendicularis.

The usual waterside and aquatic plants, of which lists have been given on former visits, were all in evidence. *Rhamnus frangula*, though laden with red berries, was also flowering freely on the younger shoots.

AUGUST 13th, 1908.

Mr. C. W. Spurring, of Blackheath, was elected a member.

Mr. Robert Adkin exhibited a short series of *Odontopera bidentata*, reared from melanic Yorkshire parents. He said that, with three exceptions, the whole of the brood were, like the parents, of the black form, many of the specimens also having white outer margins to the fringes. Of the three exceptions two had the central area of the wings semi-transparent, greyish-white, and the borders black; while in the third, the whole of the wings, except the fringes, which were dull brownish-black, were pale and semi-transparent. He had examined these specimens under the microscope, and it appeared that the pale, semi-transparent appearance was due to an absence of pigment from the greater part of the scales; the greyish tone being imparted by scales containing some traces of pigment being sparsely scattered over the wings.

Mr. Edwards exhibited a female *Nemotois cupriacellus* taken at Byfleet during the Society's Field Meeting recently held there, together with a collection of Diptera, Hemiptera, and Hymenoptera taken by him at Fontainebleau, Cannes, and Macugnaga.

Mr. Alfred Sich exhibited the larva of *Aristotelia stipella*, var. *næviferella*, and stated that the larva mines in the leaves of *Chenopodium*, making large pale blotches, and has the power of leaving the mine and entering a fresh leaf. The larvæ were found at Chiswick. He also exhibited the rare

plant *Centaurea solstitialis*, or yellow knapweed, an alien from the Mediterranean region. It was found in a new road in Chiswick. Mr. Step said that some years ago he had received specimens of this plant found by Mr. Adkin at Eastbourne. Its seeds are thought to be introduced with those of lucerne, as it is chiefly found in fields of that plant in the southern and eastern counties.

Mr. W. West (Greenwich) exhibited the following species of *Hemiptera* from Esher: *Salda cocksii*, *Cyrtorrhinus pygmæus*, *C. caricis*, and *Nabis boops*, together with *Bryocoris pteridis* from Carlisle.

Mr. B. H. Smith exhibited ova of *Porthesia chrysorrhœa* in the covering of abdominal hairs of the female found on sea-buckthorn (*Hippophae rhamnoides*) at Deal.

Mr. Step, on behalf of Mr. Carr, exhibited a variegated form of *Senecio jacobæa* from Box Hill.

AUGUST 27th, 1908.

Mr. Robert Adkin exhibited two short series of *Dictyopteryx bergmanniana* reared, the one from pupæ taken on a cultivated rose tree, the other from larvæ feeding on burnet rose. The former, he said, had much distorted the leaves of the cultivated rose, thus forming conspicuous bunches of them; whereas the larvæ in the smaller leaves of the burnet rose had drawn them so neatly together that their presence was not easily discernible, and the puparium was equally inconspicuous. He thought the larvæ in the wild species of food plant followed their natural habit, and that those in the cultivated rose found a difficulty in dealing with the much larger leaves of that plant, and thus rendered their presence unusually conspicuous.

Mr. Hy. J. Turner exhibited a specimen of *Crambus chrysonuchellus* from Eastbourne, in which the lighter markings were all slightly broader than in normal specimens taken in various localities on the North Downs, giving the specimen a whiter appearance. He also showed two forms of *Eurrhypara urticata*, in one of which the usually coalesced spots, forming the marginal band on all four wings, were much diminished in size and well separated, while in the second the same series of spots were enlarged and elongated, forming a complete marginal band and almost obliterating the space between the two dark bands; the rest of the dark

markings were also somewhat extended in this second specimen.

Mr. Brown exhibited a specimen of *Leucania favicolor* taken at Benfleet.

Mr. Newman exhibited six examples of the hybrid *Smerinthus ocellatus-populi*, which had emerged on the same day (August 27th). They were from ova laid in June. The specimens show the markings of *S. ocellatus* well, but the "eyes," although present, are somewhat blurred; six specimens of *Crymodes exulis* taken in Shetland in July, 1908, including two females, which sex is rarely captured; an aberration of *Abraxas grossulariata*, in which the hind-wings have only the discoidal spot, and a spot on the inner margin present besides the marginal band, the spots of which are large and rayed; an aberration of *Melanargia galatea*, having the left hind-wing of the *procida* form, with the black markings coalesced and enlarged, forming a wide marginal band; and a shining red woody fungus, *Fomes lucidus*, taken from a hornbeam in Bexley Woods.

Mr. Joy exhibited the living larva of *Cyclopides palæmon* (*paniscus*).

Mr. Cowham exhibited two specimens of *Amphidasys betularia*, var. *doubledayaria*, in one of which the usual white spot at the base of the fore-wing was absent on one side, and represented by a scale or two only on the other, but there was a white discoidal spot. In the second specimen the fore-wings were normal, but the hind-wings had a large whitish blotch on the costa.

Mr. B. H. Smith exhibited a bred series of *Eugonia polychloros* from the New Forest. One specimen was a dark smoky form, and in another there was a small spot below the two central black spots of the fore-wing.

Mr. Goff exhibited an aberration of *Rumicia phlæas* which showed a complete absence of copper colour on the hind-wings, the submarginal band of black spots being scarcely traceable through the very dark ground colour.

Mr. Alfred Sich exhibited mines of *Nepticula acetosæ* from Surrey. Of the three mines exhibited the two on the right hand side of the leaf are of the normal form, with a red roundish blotch and a broad pale gallery. That on the left hand side is abnormal, being almost throughout its whole length a long, whitish, serpentine gallery. The reason of the difference probably being that the larvæ which made the red mines fed up while the leaf was attached to the plant, and the larva of the whitish gallery mine fed up after the leaf

had been gathered and put into a glass with water, which probably diluted the nourishing qualities of the leaf, so that the larva had to mine a greater distance to obtain its full amount of sustenance.

This species mines indifferently either in *Rumex acetosa* or *R. acetosella*. I have found numerous mines in the leaves of both these species of *Rumex*.

Mr. H. S. Fremlin read a short paper entitled "Insects as Carriers of Disease" (see p. 14).

SEPTEMBER 10th, 1908.

Messrs. Harrison and Main exhibited a series of *Macaria liturata*, bred from ova laid by a female taken in Delamere Forest in 1907. Of the fourteen insects bred thirteen were of the dark form var. *nigrofulvata*, and one of the typical form. In one example the fulvous submarginal band was nearly obsolete. Mr. Harrison remarked that from 25 per cent. to 30 per cent. of the specimens captured were of the dark form.

Mr. L. W. Newman exhibited *Abraxas grossulariata*, a long and varied series, including ab. *varleyata*, ab. *nigrosparsata*, a rayed example particularly well marked on the hind wings, and dark examples from Aberdeen; *Selenia tetralunaria* (*illustraria*), a fine aberration in which the whole surface was very darkly powdered; *Noctua rubi*, a large yellow aberration from York; *Gnophos obscuraria*, a pair of the extremely light form of ab. *mundata*, from Lewes; *Pieris napi*, a rayed form; *Notodonta dictæa*, an extremely dark form bred from Bexley ova; *Argynnis aglaia*, a very long series, mostly bred from ova, and including a good range of variation from very light to melanic forms; also one with a rich brown underside; they were from North Kent.

Mr. Tonge exhibited a large species of Ichneumon (*Protichneumon eryihrogaster*), bred from a larva of *Theretra porcellus*, taken at Sheringham.

Mr. Hy. J. Turner exhibited a very finely marked female underside of *Erebia æthiops* taken at Gersau, L. of Lucerne, on July 27th, having the bands very brilliant in colour and contrasted in depth, there being five well-marked eyespots on that side, and six on the upper side.

Mr. T. W. Hall exhibited an abnormal flower of the sweet pea in which the wing parts were duplicated, and expressed the opinion that such irregularities were some-

what uncommon in the Papilionaceæ. Mr. Step pointed out that there were six parts to the flower instead of five, and that the keel was not formed, all the parts being separate as wings.

Mr. F. Noad Clark exhibited photomicrographs of the ova of *Coleophora virgaureæ* laid on the pappus hairs of *Solidago virgaurea*. Three stages were shown—the ova ten minutes before the emergence of the young larva, at the time of the larval emergence, and ten minutes after emergence.

Mr. Step exhibited on behalf of his daughter a specimen of *Diloba cæruleocephala* in which the "8o" mark was blurred, indistinct, and extended. It was a bred example, but the hind wings were imperfectly developed.

Mr. West, of Greenwich, exhibited specimens of *Aleochara crassiuscula* from Great Yarmouth, a Coleopteron new to the British List, discovered by him in May last. He also showed examples of the Homopteron, *Ideocerus scurra*, taken by him at Blackheath on poplar, and only previously recorded as being found at Crouch End by Mr. Butler.

Mr. H. Moore exhibited a larva of *Acronicta psi*, which had the fleshy horn on the back considerably longer than usual, and not supported.

Mr. Step exhibited photographs of several species of fungi recently obtained by him at Ashtead, Surrey, including *Clavaria cristata*, *Clytopilus orcella*, and *Polyporus acanthoides*.

Mr. A. Sich exhibited the larvæ of *Aristotelia hermanella*, F. One in a mine in a leaf of *Chenopodium album*, nearly full fed, showing the body entirely green; and one after leaving the mine to pupate, showing the change of colour, the body being creamy ochreous, and blotched with crimson spots. These spots appear on the larva about twenty hours before it leaves the mine.

SEPTEMBER 19th, 1908.

Field Meeting in the Claygate Coverts.

Conductor: Mr. Henry J. Turner, F.E.S.

Although the Society had previously visited Claygate Coverts, this was the first occasion on which they had been approached from Claygate itself. The weather was very favourable, and a pleasant afternoon was spent by sixteen members and friends, all of whom finally met at Wigmore's

Rooms in Oxshott Village for the most acceptable meat tea.

Mr. Step writes as follows:—"In the woods a few fungi were found, among them being *Cortinarius papulosus*, *C. purpurascens*, var. *subpurpurascens*, *Laccaria laccata*, and a pale form of it with long stem and small pileus; also *Stropharia æruginosa* and *Lactarius vellereus*. On the footpath from Hook to Claygate was found *Lepiota procera*, and in Rushet Lane (between Ashtead Woods and Chessington) a number of the beautiful var. *puellaris* of the same species. About Prince's Coverts *Angelica sylvestris* was prominent, also *Lycopus europæus*."

Mr. Ashdown notes *Gonepteryx rhamni*, *Amphipyra pyramidea*, and *Emmelina monodactylus*, as the more notable Lepidoptera; and of Coleoptera *Lebia crux-minor*.

Mr. Cowham notes the larvæ of *Drepana lacertinaria*, *Cilix spinula*, *Lophopteryx camelina*, *Selenia illunaria*, *Geometra papilionaria*, *Zonosoma pendularia*, and *Eupisteria obliterata* (*heparata*).

Mr. Lucas writes as follows:—"While passing through Prince's Coverts we found in a clay rut, that was negotiated with difficulty, a fine female of *Chirocephalus diaphanus*, a Crustacean belonging to the *Branchiopoda* of the *Entomostraca*. It was nearly an inch in length, and was carrying an egg-case. The first discovery of this animal in the coverts was on 10th May, 1905. Since that date I have seen it in the same locality on 18th June, 1905 (in company with Mr. D. J. Scourfield); 23rd June, 1906; 6th April, 1907 (a large specimen); and 19th September, 1908 (the present instance).

"The Orthoptera noticed were the common earwig (*Forficula auricularia*), the small earwig (*Labia minor*), and the Locustid, *Meconema varium*, the first and last obtained by beating. A pair of *M. varium* were placed together in a box without food, and the female was afterwards found to have consumed a great part of her 'better half.'

"Some small fluffy galls were sent on to Mr. G. T. Lyle, of Brockenhurst, who says:—'They are made by *Cecidomyia veronicæ*, and I take the plant to be Germander Speedwell. The galls are mature, and all contain full-fed larvæ, many of which are preparing for pupation. The galls are multilarval, and pupation takes place within them, but not, *I think*, until the spring.'

"Mr. J. F. Rayner examined for me the fungi from the London clay, some of whose names follow:—*Amanitopsis vaginata*; *Lactarius torminosus*, top salmon, edge woolly, gills

pale salmon, milky; *Tricholoma rutilans*, bright yellow gills; and *Lactarius serifluus*.

"*Epipactis latifolia*, one of our largest orchids, was seen in fruit by the roadside, as we neared Oxshott."

Dr. Chapman found the grass *Holcus lanatus* with the fruit supporting a crop of one of the Ergots (*Claviceps microcephala*, Tul.). Mr. Lucas reports that on the following day he found *Molinia cærulea* in the neighbourhood of the Black Pond also attacked by the same species of *Claviceps*.

SEPTEMBER 24th, 1908.

Dr. Chapman exhibited a specimen of *Brenthis pales* from Saas-Fée, with much irregular suffusion of the black markings; and a specimen of *Anthrocera exulans*, var. *flava*, from the same place, in which the yellow tinge prevailed over the pink, but by the electric light this was not apparent.

Mr. E. Step exhibited a number of photographs of Fungi, among them the following species taken on the occasion of the Society's meeting at Claygate on September 19th:—*Cortinarius papulosus*, *C. purpurascens*, var. *sub-purpurascens*, *Laccaria laccata*, var., *Polyporus adustus*, *Lepiota procera*, var. *puellaris*, and *Phallus impudicus* in its unexpanded condition.

Mr. Lucas exhibited two species of Fungi and contributed the following notes:

"*Trametes rubescens*. Found on August 7th and August 14th, 1908, on an old sallow by the side of a stream in the New Forest. It is very rare, and not mentioned in Massee's Fungus Flora. Mr. Allen first recorded it from near Willey Hall, Salop, in August, 1906. But I had previously found one in the New Forest on an old sallow on April 25th, 1905.

"*Armillaria mellea*. Found on August 5th, 1908. It consisted of black interlacing strands, forming a tough lace-work two or three yards or more in length, between the bark and the wood of a dead tree (no doubt oak) in Queen's Bower, New Forest. This is the mycelium (the real fungus) with whose sporophores we are better acquainted."

Mr. Lucas also exhibited the specimen of *Chirocephalus diaphanus*, a very beautiful Crustacean, met with in the Claygate Coverts, during the Field Meeting of the Society on September 19th. A question arose as to how so delicate a creature survived the winter and Mr. Clark suggested it was in the egg stage. The specimen exhibited was a female, and was bearing an egg-case.

Mr. Cowham exhibited a specimen of *Ophiodes lunaris*, bred on July 3rd, 1907, from an ovum sent by Dr. Chapman from S. France.

Mr. Newman exhibited two examples of *Dicranura vinula*, one an extremely dark, almost chocolate form, and the other having the submarginal and basal transverse zigzag lines very dark and cleanly cut, with the intervening area unusually light.

Mr. Ashdown exhibited a number of species of Lepidoptera taken by him during a trip in Switzerland in July, 1908, including *Pieris daplidice*, *Thecla w-album*, *T. ilicis* ab. *cerri*, *Chrysophanus dorilis*, *Lycæna arion*, *L. orion*, *L. pheretes*, and *L. damon*, *Melitæa parthenie*, *Brenthis pales*, *Œneis aëllo*, *Satyrus cordula*, *Pararge mæra*, *P. achine*, *Cœnonympha satyrion*, several species of *Erebia*, *Anthrocera*, and *Ino*, *Thyris fenestrella*, *Naclia ancilla*, *Cleogene lutearia*, *Psodos quadrifaria*, *P. coracina*, etc.

Mr. H. Moore exhibited a box of butterflies selected from a collection recently made in Northern Nigeria near Lake Chad, and remarked that in a long series of *Danais chrysippus*, all were of the *alcippus* form, and that of the two females of *Hypolimnas misippus*, one was typical and the other of the *inaria* form, the former being the mimic of typical *chrysippus*, the latter that of the form *dorippus*. A series of the forms of *D. chrysippus* from various localities were also shown for comparison.

Mr. West (Ashtead) exhibited a very fine specimen of the rare and local Hydroid Zoophyte, *Thuiaria thuja*, from Scarborough. From its shape it is popularly known as the bottle-brush zoophyte.

Mr. Coote exhibited living larvæ of *Celastrina argiolus*, and called attention to one example which throughout its instars had been of an obscure red colour, while all the rest of the larvæ had been of the typical green tint. They were fed on ivy.

Mr. Sich exhibited the imago bred from the larva exhibited by him on July 9th last. It was undoubtedly *Parnassius apollo*. It was noted that the larvæ of *P. apollo* and *P. delius* were scarcely to be differentiated except by locality. Possibly the yellow tinge in the young larvæ of *P. delius* persists longer than in the allied species.

OCTOBER 3rd, 1908.

Field Meeting at Oxshott.

The Fungus Foray.

Conductor: Mr. E. Step, F.L.S.

Again a good attendance (twenty-four), but unfortunately there were few species of fungi as yet in evidence. The principal forms noted were *Amanita mappa, A. pantherina, A. muscaria, A. rubescens, Lactarius quietus, L. vellereus, Polyporus schweinitzii, P. adiposus, P. annosus, Russula virescens, R. vesca*, and *Sparassis crispa*. A young beech was found whose every leaf was covered with the furry galls of the dipteron, *Hormomyia piliger*.

OCTOBER 8th, 1908.

Mr. Ashdown exhibited about sixty species of Coleoptera, Hemiptera, etc., taken by him during a tour in Switzerland in July, 1908, including *Trichius fasciatus, Mylabris floralis, Tricodes apricarius, Oxythyrea stictica, Œdemera podagrariæ, Leptura fulva, L. rubra, Strangalia bifasciata, Clytus massiliensis, C. verbasci, Obrium brunneum, Stenopterus rufus, Pissodes picea; Graphosoma lineatum, Harpactor iracundus, Strachia ornata, Therapha hyoscyami; Œdipoda cærulescens, Œ. miniata*; and an immature form of a *Mantis*.

Mr. Tonge exhibited five specimens of *Aphantopus hyperanthus* bred from ova laid by a female caught in Surrey. Two were of the ab. *cæca* form. He also showed a specimen of *Melanargia galathea*, var. *procida*, the common continental form with a large increase in the area covered by black scaling, bred from an ovum laid by a female taken in Hampshire.

Messrs. Harrison and Main exhibited a bred series of *Pseudoterpna pruinata* (*cytisaria*) from Epping Forest larvæ. The series showed considerable variation. In some specimens the submarginal light coloured line was very wide and distinct, in others much less so, and in one or two it was almost obsolete. One or two specimens had this line present in the fore-wings or in the hind-wings only. A few examples had lighter patches of colour, while others were of a much more uniform green.

Mr. L. W. Newman exhibited a bred series of *Malacosoma*

castrensis from Essex larvæ, showing considerable variation in ground colour and width of band, and including the rare yellow unicolorous female and the dark chocolate male; a series of *Ægeria andreniformis* bred from Kent-collected larvæ, with their ichneumons, and stated that in the present year, 1908, over 80 per cent. of the larvæ were stung; a living specimen of *Abraxas grossulariata*, bred on October 8th from second brood larvæ, of which five or six broods were sleeved out of doors on growing trees, and of these over 100 had fed up and pupated. The specimen shown was a very light aberration, suffused with yellow, and with hardly any spots on the hind-wings. It was bred from a pairing of picked light forms from Selkirk, N.B.; a living specimen of *Thera firmata*, second brood, all the larvæ of the brood having pupated; and a living example of *Eumorpha elpenor*, a very unusual second brood specimen.

Mr. T. W. Hall exhibited an immature specimen of the stinkhorn fungus (*Phallus impudicus*) from his garden at Croydon, showing the root-like mycelium or true fungus, and the egg-like body from which the column or sporophore emerges.

Mr. J. P. Barrett made some remarks comparing the lepidopterous fauna of North Kent some thirty years ago with what it was to-day, and stated that, although the two Brenthids, *B. cuphrosyne* and *B. selene* had completely disappeared or were extremely rare in the district, two new species had not only appeared, but were evidently becoming permanently established. He referred to *Aporia cratægi* and to *Nonagria sparganii*. One of the Kentish localities for the former species was well known to him; it was in private grounds, and so far as he knew the insect had come there in a natural manner. It was well known that the young larvæ were gregarious, but on occasions the pupæ also were gregarious; and he showed portions of the branches of a plum tree with a number of pupæ near together. He showed both caught and bred Kentish specimens of the species, the size of the latter being quite equal to that of the captured ones. He had not met with the ova, nor did he find the larvæ on hawthorn.

Dr. Chapman said that on the continent the species differed in its habits; it was certainly not gregarious in its later stages; in fact, the imago could be met with almost anywhere, and the larvæ appeared to attack many trees. Mr. Montgomery had found the ova of this species in N. Kent on hawthorn.

In addition Mr. Barrett exhibited a long and very varied series of *Nonagria sparganii*, showing considerable divergence in the position, size, and presence of the dark striæ; a series of *Acidalia ochrata*, a species which, in spite of collecting and fluctuating seasons still survived in its old locality near Deal; *Agrotera nemoralis*, a species that has increased in numbers in N. Kent; a variety of *Abraxas grossulariata* in which the yellow predominated over the black; the same species ab. *varleyata* from York, and another specimen with the marginal markings of the fore-wings radiated; an example of *Spilosoma menthastri* without spots and with the veins prominent and dark; and some notable captures of the present year, including *Tapinostola bondii*, *Eremobia ochroleuca*, and a pale specimen of *Rumicia phlæas*.

Mr. McArthur exhibited specimens of an *Eupithecia* taken by him at Aviemore in some numbers. It was afterwards ascertained that they were a very finely marked form of *E. sobrinata*.

Mr. South, on behalf of Mr. Waller, exhibited a specimen of *Trichiura cratægi*, a female with one antenna male. He also showed a specimen of *Epinephele jurtina* (*ianira*) from Box Hill having pallid spaces between the nervures, and a short series of *Rhodophæa suavella* bred from a web on stunted sloe found at Eastbourne. These latter were smaller and darker than those usually bred.

Mr. Main exhibited a good sized "stick" insect bred from an ovum exhibited in the spring. It was in its final stage, and fed only at night. It had been kept in a conservatory.

Mr. W. J. Kaye read a paper on "Orchids" (see page 16), and exhibited a large number of flowers illustrating the various genera he dealt with.

OCTOBER 22nd, 1908.

Mr. McArthur exhibited a long series of *Argynnis aglaia*, and some very fine specimens of *Asteroscopus nubeculosa* from Aviemore much lighter in colour than those usually obtained at Rannoch.

Mr. A. E. Tonge exhibited—

(1) A series of *Pieris brassicæ*, consisting of thirty-two examples selected from ninety-one specimens reared from 100 larvæ collected in a cottage garden at Potton, Beds.; of these seven males showed a partial black outer margin to the hind-wings.

(2) *Cerura bifida* bred *ab ovo* from a female taken at Reigate, July 12th, 1907.

(3) A long series of *Agrotis cursoria*; sixty specimens taken near Lowestoft, Suffolk, August 15th—30th, 1908, including most of the recognised varieties, except those with red ground.

(4) A long series of *Hydræcia nictitans*; forty-nine specimens from the same locality, showing great variation.

Mr. Robert Adkin exhibited series of *Rhodophæa suavella* and *R. marmorea*, together with branches of blackthorn showing the larval webs, and some cocoons of the first-named species. The web having the denser tubular structure he believed was that of *R. marmorea*, and that this species pupated in the web. The webs, where the tubular structure was of a less well-defined nature, he thought, were those of *R. suavella*, which species left the web to pupate, and formed its cocoon of rubbish on the surface of the earth. The larvæ were collected near Eastbourne from very stunted and unhealthy-looking blackthorn bushes in June; and the moths appeared—*R. marmorea* in the last week in July, and *R. suavella* in the second and third weeks in August.

He also exhibited a specimen of *Peronea permutana* reared from larvæ taken in *Rosa spinosissima* near Beachy Head. He said that Barrett in "The Natural History of the British Lepidoptera" gives "near Beachy Head" as one of the localities for this species, he believed on the authority of a single example bred by Mr. South some years ago. Since that time both Mr. South and himself had made many attempts to again find the species, but although they had frequently found workings that suggested its presence they had not been successful in getting the insect. In June last several small larvæ were taken in the rose, some of which produced *P. variegana*, but of others that lingered on through July, and of which the majority died, one produced the specimen now exhibited. Both this and Mr. South's specimen appeared to be somewhat paler than the usual Wallasey form. He also exhibited unusually light and dark forms of *Tortrix heparana* from Eastbourne and Lewisham.

Mr. L. W. Newman exhibited a very fine example of *Abraxas grossulariata*, ab. *varleyata*, female, bred from ova October 22nd, 1908, as a second brood. In 1907 ova were obtained from a female *varleyata* paired with a typical male, and the whole brood produced the most ordinary typical form, with no trace of *varleyata*. These were paired, and owing to abnormal weather about twenty-five larvæ fed up

to produce a second brood. The specimen exhibited was the first to emerge out of some twenty which had reached the pupal stage. Three or four larvæ were still feeding. The whole brood was sleeved on currant out of doors, and the full-fed larvæ were collected from the sleeves. Two larvæ in their last skin were also shown.

Mr. Main exhibited some sprays of blackthorn which had been cut from a hedge, and on which were deposited several ova of *Ruralis* (*Thecla*) *betulæ*.

Mr. Smith exhibited a specimen of *Plodia interpunctella*, caught in the Society's rooms just previous to the meeting.

Mr. Rayward exhibited a specimen of *Epinephele jurtina* (*ianira*) with considerable pallid areas, and male and female specimens of *Epinephele tithonus*, with additional spots on the fore-wings.

Mr. Noad Clark exhibited, under the microscope, the early instars of *Nola albulalis* larvæ, and the ova *in sitû* of *Coleophora virgaureæ* on golden rod.

NOVEMBER 12th, 1908.

Mr. P. N. Baker, of Stratford, E., was elected a member.

Mr. W. J. Kaye exhibited a series of *Melitæa aurinia* taken at Wateringbury, Kent, and another series of the same species bred from larvæ obtained from the same place, but reared from the penultimate instar in a humid orchid house having a day temperature averaging 65°, and a night temperature averaging 55°. The facies of the latter was considerably altered from the ordinary Kentish form. The size also was much larger, and the colouring far more red and vivid generally. It was mentioned by Dr. Chapman that it might easily be passed as var. *provincialis*. A series was also shown of the same species from Kerry.

Messrs. Harrison and Main exhibited several specimens of *Epinephele jurtina* (*ianira*), male and female, taken in N. Cornwall, showing extensive, irregular, pallid areas.

Mr. R. Adkin exhibited a series of *Coremia ferrugata* bred from ova obtained at Eastbourne. The larvæ were fed on *Galium mollugo*, and would not touch ground ivy.

Mr. Newman exhibited a series of the hybrid *Smerinthus ocellatus-populi* bred during August and September, 1908, from a pairing obtained in June, 1908. They were not forced. The brood consisted of about 70 larvæ, of which 64 succeeded in pupating. Of these—

PLATE III.

FIG. 1.

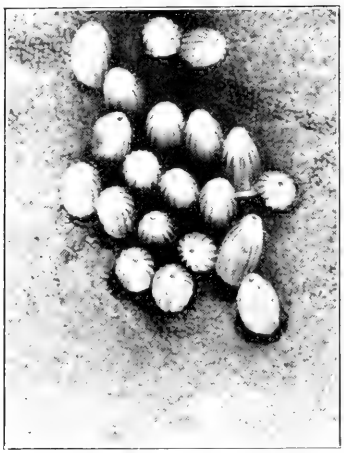

FIG. 9.

FIG. 2.

FIG. 3.

FIG. 8.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7.

Photos. by H. Main.

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EXPLANATION OF PLATE III.

Metamorphoses of *Pieris brassicæ*.

FIG. 1.—Ova *in sitû* (magnified × 10).

FIG. 2.—Young larvæ *in sitû* on Nasturtium leaf (natural size).

FIG. 3.—Full-fed larva suspended for pupation.

FIGS. 4, 5, 6 and 7.—Successive stages in the development of the pupa.

FIG. 8.—Fully-formed pupa.

FIG. 9.—Imago *in sitû* during the development of its wings.

See p. 81.

21 emerged fine perfect males.
1 ,, deformed male.
4 ,, fairly perfect females.
3 ,, badly deformed females.
2 ,, gynandromorphous, perfect.
1 ,, November 8th, fine female.
9 pupæ were crippled and malformed.

The remaining 23 were healthy pupæ awaiting the final change.

Mr. Newman also showed *Abraxas grossulariata*, ab. *varleyata*, male, bred on November 11th, second brood, showing white rays on the hind wings.

Mr. West (Greenwich) exhibited a series of the recently discovered species, *Aleochara crassiuscula*, taken at Lewisham, where it had turned up in some numbers in a manure heap. He noted that at Great Yarmouth, where he had previously taken it, the habitat was in the sand.

Mr. Main exhibited the series of photographs of the life-history of *Pieris brassicæ* recently exhibited by him at the Royal Photographic Society's Exhibition (Plate III).

Dr. Hodgson exhibited, on behalf of Mr. Grosvenor and himself, a long series of *Anthrocera trifolii*, selected from a very large number examined, and from many bred; together with a number of specimens of *A. hippocrepidis*, all from Sussex localities. Included in the series were about a dozen very fine ab. *obscura* (?) of the former species.

Mr. Coote exhibited a third brood specimen of *Celastrina argiolus*, which was bred on October 18th from a larva collected in September at Swanage. Several members noted that they had also occasionally obtained specimens of a third brood of this species.

Mr. Smith exhibited a bred specimen of *Cleora glabraria* from the New Forest, in which the black markings were much extended and suffused. Mr. Kaye mentioned that melanic specimens had been obtained more frequently in recent years than was formerly the case.

Mr. Hy. J. Turner exhibited a number of species of Lepidoptera taken by Dr. Chapman in Switzerland during the past summer, among them being series of *Erebia mnestra*, a small race of *E. ceto*, *E. gorge*, *E. lappona*, *E. pronoë* (1), several *Œneis aëllo*, *Satyrus hermione*, a *Brenthis euphrosyne* in which the submarginal circular black spots were united to the inverted V-marks around all the wings, some very fine silvery-spotted *Argynnis niobe* (type) with intermediates to var. *eris*, specimens of *Lycæna pheretes*, a female specimen of

Epinephele lycaon, with three large black spots on the fore-wings instead of the usual two, etc.

Mr. H. Moore exhibited the following Diptera, taken this year in the neighbourhood of Lake Chad, Northern Nigeria: —A short series of a tsetse-fly, probably *Glossina palpalis* (Rob. Desv.), the species credited with infecting man with the "Sleeping sickness"; *Tabanus africanus* (Gray), a gad-fly widely distributed over Africa, south of the Sahara, but only recently discovered so far North-west.

The remainder of the evening was devoted to the exhibition of lantern slides by Messrs. Dennis, West (Ashtead) Tonge, and Main.

NOVEMBER 26th, 1908.

Mr. Adlard, of Bartholomew Close, E.C., was elected a member.

This evening was the Annual Exhibition of Varieties.

Mr. South exhibited, and made some remarks upon, series of *Cirrhœdia* (*Conistra*) *vaccinii*, and of *C. liqula*, which he had received from the Continent, chiefly from Germany.

"In Britain specimens of *C. ligula* are always somewhat smaller than the majority of the examples of *C. vaccinii*, but in Germany there seems to be little difference, as a rule, between the two species in the matter of size; although a few specimens of *C. ligula*, especially those of the typical form, are rather larger than the general run of *C. vaccinii*.

"It will be seen that the specimens labelled *C. vaccinii* are reddish-chestnut in colour, and some of them approach ab. *rufa*, Tutt, in general character. Among the eight specimens labelled ab. *mixta*, Staudinger, are three that appear referable to ab. *variegata*, Tutt; three others seem to agree with the description of ab. *ochrea*, Tutt; one specimen is intermediate between these sub-varieties, and another has the discal area sprinkled with brownish.

"Five examples are labelled ab. *spadicea*, Hübner, but only one of these can, correctly, be referred to that form; in two other brightly-coloured examples, one inclining to ochreous and one to reddish, the central shade is absent, the first and second lines are conspicuously edged with black, and the costa has an interrupted black edging.

"The two specimens from Central Russia were sent as forms of *C. vaccinii*, but were not furnished with names. One of these I make out to be ab. *signata*, Klemensiewiez,

the fore-wings of which are greyish-brown, with black reniform and orbicular stigmata, and a submarginal row of black dots. The other example is darker grey-brown with unicolorous stigmata, outlined in pale grey, and the other markings are very faint; this seems to be ab. *obscura*, Tutt, a very rare form according to that author. I may add that I have not, so far, seen any British example of *C. vaccinii* that has shown a tendency to vary in the direction of either *signata* or *obscura*.

"As regards *C. ligula* the two specimens sent as typical do not agree in colour with Esper's figure or his description of *ligula*, although they more nearly answer to the '*fusco rufescentibus*' of the latter than the still darker colour of the figure. Anyway, these specimens show us the form recognised in Germany as the typical one; also that this is not like the form we regard as the type.

"Of the seven specimens labelled *C. ligula* ab. *subspadicea*, Staudinger, four only are really true to name, the other three are intergrades.

"Only one of the three specimens sent as ab. *polita*, Hübner, will pass muster; and the two examples from Vienna labelled *turtur*, Bang-Haas, although right in colour —blackish-grey—lack the pale grey venation and markings which are characters of this form. The pale bluish-grey specimens labelled '*C. ligula*, ab. *livina*,' is not a form of *ligula*, but it is ab. *livina*, Staudinger, a form of the South European *C. staudingeri*, Graslin.

"One object in exhibiting these specimens is to indicate the necessity of verifying the identifications of one's correspondents. This is more especially desirable in the case of aberrations of variable species; but, of course, we should exercise the same caution with typical examples of the species also.

"The specimens also illustrate another point, this is, that British and continental forms of a species are not always exactly identical, although the same varietal names may be used for them."

Mr. South again exhibited the continental specimens of *Cucullia* shown at a previous meeting (April 9th, 1908) when Mr. Tutt expressed the opinion that, with the exception of, perhaps, two, all those labelled *C. scrophulariæ* were correctly named. Mr. South was unable to accept this view, as he believed that most of the specimens were referable to *C. lychnitis*, and the others to *C. verbasci*. He therefore decided to refer the matter to Mr. F. N. Pierce, who very kindly

undertook to examine the genitalia of the five males in the series. Shortly it may be stated that three of these proved to be *C. lychnitis*, and the other two were *C. verbasci*.

A male specimen of the so-called "*scrophulariæ*" from the Kentish marshes was also sent to Mr. Pierce, and this he found to have genitalia as in *C. verbasci*.

Messrs. Harrison and Main exhibited, and read the following notes on, a long bred series of *Aplecta nebulosa*, and its forms, var. *robsoni* and var. *thompsoni*.

"As is well known, there are three forms of *Aplecta nebulosa* occurring in Delamere Forest, viz. a grey form; a very dark form with grey fringes, known as *robsoni*; and an almost black form, with deep white fringes and white crenulate margin, known as *thompsoni*.

"From larvæ collected in the forest we bred from 88—90 per cent. of the grey form, and 10—12 per cent. of *robsoni*. The form *thompsoni* is very scarce; it is difficult to give an exact percentage, but perhaps about 1 in 500 is not far off the mark.

"We have been breeding this species with the idea of seeing if we could obtain Mendelian proportions. In 1906 and 1907 we bred a considerable number from grey parents, obtaining only the grey form. This year we have bred a series from *robsoni* parents, and obtained 25 per cent. grey, 51 per cent. *robsoni*, and 24 per cent. *thompsoni*, or almost exactly the proportions expected, if it can be assumed that *robsoni* is a heterozygote.

"If this assumption be correct, then both the grey and *thompsoni* forms are homozygotes, and the results we obtained when breeding from grey parents are as would be expected. We have not yet succeeded in breeding from *thompsoni*."

They also showed a gynandromorphous specimen of *Pieris napi* bred from N. Cornwall parents this year. Left side male, right side female (Plate IV).

Mr. Robert Adkin exhibited a series of *Boarmia gemmaria* (*rhomboidaria*), including typical and black forms reared in 1908 from ova obtained from a black female taken wild in August, 1907, and a series reared from ova from a moth taken at Lewisham, together with a portion of Edward Newman's series of *B. rhomboidaria* (*gemmaria*), and of his series of *B. perfumaria* from the Entomological Club Collection. In the course of his remarks he said that there appeared to be no doubt that the specimens of *B. perfumaria* exhibited were the identical specimens that Newman had put into the Club Collection during the time that it was

FIG. 1.

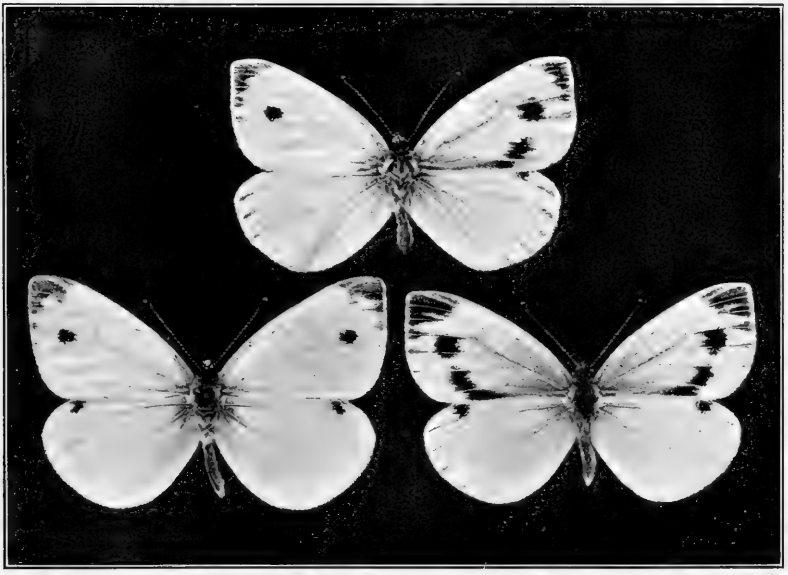

FIG. 2. FIG. 3.

Photos. by H. Main.

Pieris napi.

FIG. 1.—Gynandromorph.
FIG. 2.—Normal male } for comparison.
FIG. 3.—Normal female }

See p. 81.

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under his curatorship. He thought that the members would be interested to see them, as Newman, when he wrote the life-history of *B. perfumaria* ('Entom.,' 1865, pp. 246–9), appeared to have relied entirely upon larval characters and habits, and had not, so far as he had been able to ascertain, published any proper description of the imago. Knaggs ('Ent. Ann.,' 1866) threw very little further light upon the question. But for some reason an impression appeared to have got abroad that *B. perfumaria* was a form distinguishable from the type by its appreciably darker coloration. He thought, however, that a comparison of the series exhibited would show that there was no greater colour variation between Newman's specimens of *B. perfumaria* and *B. rhomboidaria* than was generally to be found within the limits of a brood reared from typical parents. The black form exhibited appeared to belong to quite a different race which has been known to occur in one restricted locality in Kent for upwards of twenty years past. As compared with the typical form, with which it occurs, it is rare, nor does it appear to have shown any comparative increase in numbers in recent years; but if, as occasionally happens, a black female is taken and bred from, the progeny consisted of both forms, the proportion of black specimens being generally somewhat in excess of the typical in point of numbers. He was not, as a rule, in favour of varietal names, except in the case of very distinct and recurrent forms, but he thought in the present case the black form might conveniently be referred to as ab. *nigra*.

Mr. Adkin also exhibited a series of *Zygæna* (*Anthrocera*) *achilleæ* taken in Argyllshire, 1907.

A series of *Nola albulalis* captured in East Sussex in July last, together with Chattenden (Kent) specimens for comparison.

A variety of *Chrysophanus phlæas* in which the hind-wings had a coppery shade, and the red marginal band was represented by narrow bars; also one of *Aglais* (*Vanessa*) *urticæ* in which the apices of the fore-wings were streaked with pale blue-grey, and the blue lunules of the hind-wings were abnormally large.

A case containing pupa-skins of several of the Sesiidæ *in situ*, including those of *Sesia scoliiformis*, *S. culiciformis*, *S. andreniformis*, *S. asiliformis*, and *S. ichneumoniformis*; also cocoons, etc., of some other lepidoptera, viz. the resinous nodules of *Retinea resinella*, including sections showing the workings of the larva and others that had been appropriated

by *Dioryctria abietella*; cocoons of *Nola centonalis* on grass stems, and of *Hylophila bicolorana* on oak leaves. He called attention to the great strength given to these latter by their boat-like construction, the "keel" and "bilge-pieces" giving these apparently fragile cocoons strength to withstand the battering occasioned by the leaves to which they are attached being driven against each other by a high wind, so long as the cocoon remained intact, but the emergence of the moth causing the end to split, the whole strength of the structure went.

Specimens of *Zenillia* (*Myxexorista*) *roseanæ*, B. and B., a species of the Tachinid group of the Diptera not previously recorded as British, which he had reared from larvæ and pupæ of *Tortrix pronubana* during the past summer. He was indebted to Messrs. Collin and Wainwright for their identification, and for the information that the species had been reared on the Continent from *Tortrix roseana* by Bergenstrum, but had not previously been met with in Britain.

Mr. G. T. Porritt exhibited varieties of *Abraxas grossulariata* bred from wild Huddersfield larvæ during the past year. They included a pale female specimen in which the usual yellow was entirely replaced by olive-green, a very pretty pale specimen with broad orange band, and a *varleyata* male with a double row of white rays on the hind-wings, and the only specimen he had ever bred with an inner as well as outer row of white rays.

Mr. L. W. Newman exhibited a long bred series of *Polygonia* (*Grapta*) *c-album* bred from ova including var. *hutchinsoni*, and read the following notes on its life-history.

"During the past season I have had ample chances of studying the habits of this butterfly, having bred over 2000 of them. We all, I expect, think we know the habits of this species. It hibernates as an imago, pairs in the spring, lays its eggs, and dies.

"The larvæ feed up and produce imagines in July; these imagines again pair and lay ova which produce the brood that emerges in September and October, and go into hibernation. The imagines which emerge in July have, as a rule, the light underside known as var. *hutchinsoni*.

"This is, I believe, the general idea.

"Some of this is correct, but, in my opinion, part is quite wrong.

"I will now make two statements, which I do not at all expect you to accept without ample proof.

"The first is, that the first few eggs (some 12 to 20 at most) that a hibernated female lays in the spring, are the *only* eggs that produce the var. *hutchinsoni*.

"The second is that the var. *hutchinsoni* is the *only* form which pairs and produces the second brood.

"The first statement is, I think, beyond dispute, I have known it for many years. So has Mr. E. Goodwin, and several others, I believe. The second is open to question. I will now try and prove what I have stated.

"I go back to 1902, the first year in which I had this species in quantities. Early in the spring I had a female sent to me and from her I obtained a nice batch of eggs. All fed up well, and the first 12 imagines bred (all var. *hutchinsoni*) I placed in a cage with growing nettles. They paired at once, and soon I had a large quantity of ova. I wanted set specimens badly, so I killed and set the rest of the brood.

"I next go to 1905, when I again had the species alive; this year a good many females, but *all* captured *late* in the spring, some as late as June, and when many of them had already laid most of their ova. Now comes an important point—when the imagines emerged in July, I placed the first forty specimens (about equal quantities of each sex) in my cage for pairing. The same day one pair of var. *hutchinsoni* was *in cöp.*, but not another pairing took place. All the other thirty-eight specimens (dark undersides) fed for a few weeks, and then retired into corners of the cages and went to sleep, though all through August and September the weather was nice and sunny. Now and then, on especially hot days, a few would leave their corners and feed, but very seldom. In November, most of them were still alive, but through neglect, or some other cause, most of them died off by Christmas, only two remaining alive till March, and both these died during that month.

"I now come to the present year. I sent my man down to the Wye Valley on April 4th. Owing to bad weather he had to stay nearly three weeks, and then only had two or three fine days, when hibernators were on the wing. On these days *P. c-album* was very common. In one sheltered spot 40 to 50 could be counted in a day. He sent me ten females and about a dozen males. The latter came in very handy as two of my "hens" proved to be virgins. All these females laid freely. I kept them all in a large cage with pots of growing nettles, and as soon as about 80 eggs were laid these pots were removed and fresh ones placed in the cage. These first 80 were reared quite separately. By June 20th I was

breeding out the first brood, and on July 1st I had two of the females captured in April still alive and laying, and their children out and doing the same, so that the two broods (the hibernated females and the summer brood) were both on the wing on the same day. I can also say, that not a day has passed between June 20th and November 1st without one or more specimens emerging from the pupæ in my cages. The last specimen to emerge was on November 22nd; and I think one could net *P. c-album* in the wild on any day between March and November providing, of course, that the weather was warm and sunny.

"To go back to the first 80 eggs: when the larvæ hatched, and had fed a week or so, the nettle leaves were picked off and placed in a sleeve on a fine young elm; the larvæ fed up very well on this change of diet, and the first *65* specimens to emerge were *all* the var. *hutchinsoni*. No. 66 was a dark upper side—all the rest (some 800 or so) were also *all* of the dark upper side form.

"Now I think this clearly proves that it is only the first few eggs laid which produce the var. *hutchinsoni*. I placed in my cage twelve females and twelve males of the var., and by 5 p.m. there were twelve pairs *in côp*. Two or three days later, when the dark upper sides began to emerge freely, I placed three of each sex in the same cage, but they would not even "make love" to each other, nor would the females allow the males of the var. *hutchinsoni* (still alive in the cage) to have anything to do with them, though the latter were only too ready to pair. They behaved exactly like the 1905 specimens, and soon started going into corners; and to-day I have three of them comfortably hibernating, though the other three have "gone home" from some unknown cause.

"The last specimen to emerge from the summer brood was on August 24th, and the first of the autumn brood on August 18th, so that they overlapped well, and I have had *c-album* in *all* stages at the *same* time during the greater part of the summer.

"I have now given you three separate years' experience, and each year has proved to me that the two facts I stated are correct."

Mr. Newman also exhibited a considerable number of paintings of sundry varieties bred and captured by him during 1908, including a fine series of *Dryas paphia*, var. bred from New Forest ova; and of *Chrysophanus* (*Heodes*) *phlæas*, vars. captured at Bexley, etc. In addition he showed a specimen on setting board of *Abraxas grossulariata*, in which the whole

of the fore-wings were coal-black, and with only a faint trace of white on the under-wings. It was a second brood specimen bred from typical parents, the previous generation being var. *varleyata* on the female, and type on the male side.

Mr. W. Crocker exhibited three examples of *Phryxus livornica*, netted at Torquay, May, 1906; a specimen of *Melitæa athalia*, about half the ordinary size, netted in South Devon; a specimen of *M. artemis* bred from South Devon larva, a most abnormal and beautiful variety in both delicacy of colour and markings; two *Gnophos obscuraria*, fawn colour, from Babbacombe, 1902; a very varied series of *Hesperia malvæ*, including extreme and intermediate forms of var. *taras*, and some very silvery forms; and a specimen of *Leucania extranea*, taken at sallow bloom, 10th April, 1906.

Mr. Hy. J. Turner exhibited a box containing the following forms: the specimen of *Brenthis euphrosyne*, previously exhibited, with examples of *B. amathusia*, *B. aphirape*, *B. pales*, and *B. dia*, all from Switzerland, in which the same union of sub-marginal spots and lunules was more or less existent; and a very small example of *Polyommatus damon*, with a specimen of almost twice the expanse of wings.

He also showed a box containing a number of species of butterflies from Biké, in Central Africa, and from German East Africa, including several *Pyrameis cardui*; and another box with numerous species taken by Dr. Chapman near Zermatt, including a nice series of *Satyrus cordula*, with female var. *pœas*, from Vissoye.

Mr. Lucas exhibited the rare earwig, *Labidura riparia*, which he had kept alive for some considerable time. He fed it on fish. Its colour was very pale, no doubt assimilating to the colour of the sand of the shore—its natural habitat. After death the colour in this species becomes much darker.

Mr. Tonge exhibited an example of *Sirex noctilio*, taken in his house at Reigate. It is to be readily known from *S. juvencus* by its black antennæ.

Mr. H. M. Edelsten exhibited a long series of *Nonagria neurica*, Hb., from Sussex, a species recently recognised as new to Britain, with examples of the same species from Germany for comparison. He also showed a long series of *N. dissoluta*, and var. *arundineta*, from various localities.

Mr. Joy exhibited an example of *Argynnis paphia*, having an unusually pale ground colour.

Mr. Ashdown exhibited a long series of varieties of the

Longicorn Coleopteron, *Strangalia armata*, from various localities in the South of England and Switzerland.

Mr. H. W. Andrews exhibited examples of the British species of the *Eristalinæ* (Diptera), a sub-family of the *Syrphidæ*, and read the following notes:—"This sub-family comprises several interesting species, including some of the most showy of the *Syrphidæ*, and some of the best-known examples of mimetic resemblance. The genus *Eristalis*, Ltr., consists of the well-known 'bee-flies': *E. tenax*, Ltr., the 'drain-fly' or 'drone-fly' (it is known by both names), has followed civilisation—in the shape of drains—all over the world, occurring in Europe, Asia, Africa, America (since 1870), and appears to have reached New Zealand in 1888–9. This genus is one of the few among the Diptera whose life-history in the case of several species has been worked out by various naturalists from the time of Réaumur in 1730 onwards. The larvæ are well known as 'rat-tailed maggots,' and I exhibit a specimen of the puparium of *E. tenax*, formed of the larval skin. The resemblance of these flies to bees, and their habit of breeding in stagnant water and putrifying matter, gave rise to the legend of the 'oxen-born bees' of the ancients; and an interesting pamphlet on this subject has been published by Baron Osten-Sacken. Briefly, the recipe to obtain a swarm of bees was to kill an ox and shut up the carcass in a closed hut for two or three weeks; then on opening the hut the body of the ox would be found to have given rise to a swarm of bees.

"Of the other genera, *Mallota cimbiciformis*, Fln., is practically a New Forest species, though there are one or two records from other localities. It is perhaps the most bee-like of the bee-flies.

"*Merodon equestris*, F., is the 'narcissus-fly.' This species was first recorded in England in 1869, and since then has been taken in many southern and midland localities, where the larva has been known to do great damage to various kinds of bulbs. It is an extremely variable species.

"The species of the genus *Helophilus* are mostly marsh-frequenters, and some of them are very handsome.

"I have examples here of twenty-one out of the twenty-two British species of this sub-family, and I may mention that out of this number I have met with fourteen in the North Kent district, and two others are mentioned by Mr. Verrall as occurring in Kent."

Mr. Baldock exhibited more than a dozen species, male

and female, of the genus *Ornithoptera*, mainly from the larger Malayan islands, and including *O. miranda* and *O. andromache*, two exceptionally rare species.

Mr. A. E. Gibbs exhibited a selected series of *Argynnis adippe*, captured in the Vosges Mountains of Eastern France between June 28th and August 3rd, 1908. This species, together with its congeners, *A. paphia*, *A. niobe*, and *A. aglaia*, were remarkably abundant on the grassy slopes of the mountains, being sometimes met with in the greatest profusion. They exhibited a great deal of variation and brilliancy of colouring. In some cases the anti-marginal band is remarkably bright and strongly developed, while the ground colour differs very greatly. The var. *cleodoxa* was occasionally taken.

Mr. T. W. Hall exhibited a cabinet drawer containing *Amorpha populi* and *Smerinthus ocellatus* with hybrids *ocellatus* x *populi*; *Notodonta ziczac* and *N. dromedarius* with hybrids *ziczac* x *dromedarius*; *Selenia bilunaria* (*lunaria*) and *S. tetralunaria* (*illustraria*) with hybrids *tetralunaria* x *bilunaria*; and *Ennomos fuscantaria* and *E. erosaria* (*tiliaria*) with one hybrid *erosaria* x *fuscantaria*. Of this last hybrid only one other specimen is known, and that is contained in the collection of the Hon. Walter Rothschild.

Rev. E. Tarbat exhibited an underside of *Melitæa aurinia*, with unusually small and lightly marked spots, from Kent; a *Tæniocampa gothica* in which the "Hebrew character" on the fore-wings is reduced to two small spots, from Fareham; a *Malacosoma neustria* with a very broad band of uniform width across the upper wings, from Fareham; and a box containing specimens of forty-one species of moths, taken when settled on a white wall, near a strong electric light in the High Street, Fareham, and including *Stauropus fagi*, *Luperina cespitis*, *Nonagria typhæ*, *Triphæna janthina*, *Epunda nigra*, *Cirrhædia xerampelina*, *Ennomos autumnaria*, etc.

Dr. Hodgson exhibited selected series of *Plebeius argus* (*ægon*), from Lancashire, E. Kent, Sussex, and Surrey, 1904—1908, the most notable being a female with several discal spots on the upper side of each primary, with blue about the underside of the right wing, and a male with two silver studs confluent.

Mr. E. Step exhibited "Fungi of 1908," a series of fifty photos, taken chiefly at Ashtead and Oxshott, most of these in their natural environment, and many of the natural size.

Mr. W. West, of Greenwich, exhibited four cases containing his collection of the British species of Homoptera, in-

cluding one species, *Idiocerus rutilans*, new to the British List. The description is in the January, 1909, number of the 'Ent. Month. Mag.' In a fifth case were the various forms of *Philænus spumarius*.

Mr. W. J. Lucas exhibited a large number of photographs of the Scots pine (*Pinus sylvestris*), showing details of bark, foliage, flowers, and fruit.

Mr. Pennington exhibited a small box of varieties of British Lepidoptera, including var. *fowleri* of *Agriades coridon*, and curious forms of *Polyommatus icarus*, *Agrotis exclamationis*, and *Anticlea nigrofasciaria* (*derivata*).

Mr. Stanley Edwards exhibited several species of *Papilio*, among them being some which mimic, more or less faithfully, species of the Danaine section of the Nymphalidæ: *P. danasepe*, *P. telearchus*, *P. slateri*, *P. caunus*, etc.

Rev. W. Wheeler exhibited three cases of European butterflies, including the species and forms of *Apatura*, the closely allied species and forms of the *Athalia*-group of the genus *Melitæa*, and several closely allied and difficult-to-determine species of *Erebia*, among the latter being *E. christi*.

The following communication was read from Mr. J. Platt Barrett, Strada Pozzo Leone, 5, Messina, Sicily:

"I reached here on the 9th of November. The temperature was 73° in the shade, which later on fell to 67°, and at which it now stands. During the last few days rain has fallen heavily, but without lessening the heat.

"The butterflies on the hills near the town are nearly all such as are found (sometimes only occasionally) in England. Those not taken in England are one 'blue,' one 'skipper,' and one 'heath.' I suppose this shows that our English species are not affected by the lower temperature.

"The common butterflies here are *Pieris rapæ*, which occurs in the centre of the town, and *P. brassicæ*. I captured a fine specimen of *P. daplidice* on November 19th. *Colias edusa* flies about rapidly on the hill sides, but I have only taken males. *Pararge megæra* is common near the torrent beds. One *P. egeria* of the local form has turned up. *Heodes phlæas* occurs on the hill sides. *Pyrameis atalanta* is the commonest of the Vanessidæ here, and occurs in gardens, roads, etc. *Pyrameis cardui* has occurred in small numbers; but, strange to say, I have not seen either *Aglais urticæ* or *V. io*. This comprises the list of butterflies I have noticed in mid-November, just a dozen species in all. Moths are scarce: I have taken only three small species. Grasshoppers abound, with a few locusts and beetles. I watched a lizard pounce

upon a good-sized grasshopper, and try to get away with it into a hole in the wall. It slipped downwards two or three feet, but stuck fast to its prey, and eventually disappeared.

"Caterpillars are not much in evidence. I noticed some on a species of heath on Monte Ciccio, but left them to grow bigger. I think they may belong to a species allied to *Lasiocampa quercûs*. During the winter I am not expecting many other species of butterfly to turn up, but shall look forward hopefully to the spring."

DECEMBER 10*th*, 1908.

Dr. Hodgson exhibited a number of species of Lepidoptera from N. Queensland, including a fine series of *Papilio ulysses*, male and female, *P. sarpedon*, *Delias nigridius*, and *D. nysa*, *Cethosia cydippe*, species of *Cyaniris*, and several of the brilliant genus *Danis*, among them being *D. celestis*, *D. illustris*, and *D. sebae*.

Mr. H. W. Andrews exhibited a species of Ichneumon, *Bassus lætatorius*, female, which had been bred from *Syrphus balteatus*, a Dipteron.

Mr. Rayward exhibited the ova of *Tiliacea citrago*, on the leaf scars of lime, which he had found by searching. They were all but one of exactly the same colour as the twig, and most difficult to distinguish.

Mr. Robert Adkin exhibited a female specimen of *Lycæna bellargus*, strongly marked with blue scaling, taken near Eastbourne in September last, in which the red lunules, usually present in the border markings of the upper surface of the hind-wings, were absent; together with other specimens taken at the same time for comparison. Commenting upon the exhibit, he said that it would be seen that the absence of the red pigment from the lunules gave the insect a very unusual appearance, and, in his experience, this form was rarely met with. He further stated that the capture of several specimens showing a considerable amount of blue scaling, this autumn, had led him to alter his opinion, previously expressed, that these blue females were more often met with in the spring emergence and on the North Downs, as he had seldom found specimens more strongly marked in this respect than those taken this year of the second emergence on the South Downs; and he was forced to the conclusion that some other circumstance than locality

or time of emergence must be found to account for the occurrence of these blue forms.

He also exhibited a series of *Melanippe tristata* reared from midland county ova, and called attention to the slight amount of variation shown by the individuals of the brood. Some few had the dark markings slightly intensified, one only had them considerably reduced, and in one other a faint pinkish shade overspread the white ground.

Mr. W. J. Kaye exhibited Herr Niepelt's types of *Heliconius* forms, recently described in the "Deutsch. Ent. Zeit.," 1908, from Ecuador. They included *H. melpomene aglaope*, forms *isolda*, *rubripicta*, *adomoles*, and *gisela*; *H. erato estrella*, form *feyeri*; *H. xenoclea plesseni*, forms *corona* and *diadema*; and *H. xenoclea plesseni*, form *niepelti*, described by Riffarth. These forms of *Heliconius* were remarkable for their great beauty and interest, in connecting what had hitherto been regarded as rather isolated forms. All the specimens exhibited, with the exception of *H. estrella*, form *feyeri*, belonged to the first great division of the Heliconidæ, the Opisogymni.

JANUARY 14th, 1909.

Mr. Tonge exhibited enlarged photographs of several species of Lepidoptera at rest on tree trunks, showing that, even when exaggerated in size, the protective resemblance was remarkable.

Messrs. Harrison and Main again exhibited the results of the breeding of *Aplecta nebulosa*, and its forms *robsoni* and *thompsoni*, to illustrate the remarks of Professor Bateson.

Mr. L. W. Newman exhibited *Abraxas grossulariata* ab. *varleyata*, *Callimorpha dominula*, yellow and red forms, and *Ennomos autumnaria*, type and melanic forms, and gave the following statistics:

A. grossulariata.—1907: 100 ova from *varleyata* all produced the type. 1908: a typical pair of these produced a partial second brood of 31, including 7 *varleyata*, 4 males and 3 females.

C. dominula.—1906: a yellow female paired with a red male produced all red forms. 1907: a typical pair of these produced 44, including 10 yellow forms, in 1908.

Ennomos autumnaria.—1905: 12 ova obtained from a wild typical female. 1906: 8 bred, including 2 melanic (one of each sex); melanic male paired with type female. 1907: 30 per cent. bred were melanic; two pairings made—(1)

melanic male × type female (two broods); (2) melanic female × type male (two broods). 1908: from (1) only one melanic female bred, and from (2) none; have now paired the melanic female and type male of No. (1), and male and female type forms of No. (2), the results of which are awaited.

Mr. Robert Adkin exhibited captured and bred series of *Aspilates ochrearia* (*citraria*), and gave the following account of their history:

"On the 7th and 8th September, 1907, I captured at Eastbourne a couple of females of this species, which deposited ova on the 8th and 9th; these hatched on 20th and following days, and the larvæ were supplied with wild carrot and birdsfoot trefoil, and later on with dock and plantains also, all of which they ate readily, and continued to feed throughout the winter, except when the weather was frosty. Between 17th and 24th May, 1908, the first of them pupated in cocoons among rubbish on the surface of the ground, and the majority of them had spun up in this way before the end of the month. Some few, however, probably about 20 per cent. of the brood, although apparently full-fed, showed no inclination to pupate, and eventually they one by one died off, the last on July 2nd. From the May pupæ some half dozen moths emerged between June 15th and 26th, but the remainder, although kept until late autumn, failed to produce imagines, and were ultimately found to have died as pupæ.

"Among the moths reared in June, there was only one female, which fortunately emerged on the same day as a male; pairing took place readily, and ova were deposited during the night. In due course these hatched, but my supply of wild carrot had given out, and the young larvæ showed no inclination to eat dock, plantain, etc., as the winter larvæ had done, but took to garden carrot with avidity, and on this were fed up. By August 27th all but one had pupated, and the moths emerged between September 9th and October 1st. This other one fed on until the end of September, when, after remaining stationary for upwards of a week, it descended to the surface of the ground, spun its cocoon, and the moth emerged on November 1st.

"When I found that only a portion of the hibernated larvæ pupated in May, I fully expected that the remainder would feed on, and produce imagines at or about the same time as the moths from the summer larvæ came out, as is the case with some of the other double-brooded geometers: and, indeed, the fact of their feeding on for some time after

the others had produced moths rather suggests that, in healthy conditions, this would be so; but, owing to the death of the larvæ, I was unable to fully elucidate this point in the insect's economy."

The series exhibited included specimens captured September, 1907, whose descendants bred June, 1908, and their descendants bred September, 1908; together with examples captured June and September, 1908, for comparison.

Prof. Bateson, F.R.S., then delivered an Address on "Mendelism," illustrating his remarks with numerous lantern slides.

JANUARY 28th, 1909.

ANNUAL MEETING.

Mr. A. SICH, F.E.S., *President*, in the Chair.

The first part of this meeting was devoted to the presentation of the Council's Report, the reading of the President's Annual Address, the adoption of the Treasurer's Balance-sheet, and the expression of thanks to the retiring Officers and Council.

The following is a list of the Officers and Council of the Society appointed for the year:

President.—A. Sich, F.E.S.

Vice-Presidents.—R. Adkin, F.E.S., W. J. Kaye, F.E.S.

Treasurer.—T. W. Hall, F.E.S.

Librarian.—A. W. Dods.

Curator.—W. West (Greenwich).

Hon. Secretaries.—Stanley Edwards, F.L.S., etc. (Corresponding); H. J. Turner, F.E.S. (Report).

Council.—S. R. Ashby, F.E.S.; E. C. Joy; H. Main, F.E.S.; A. M. Montgomery, F.E.S.; A. L. Rayward, F.E.S.; R. South, F.E.S.; A. E. Tonge, F.E.S.

ORDINARY MEETING.

The PRESIDENT in the Chair.

Mr. Buckstone, a visitor, exhibited on behalf of Mr. Baldwin, two males of *Anthrocera filipendulæ*, *in côpula* with one female; a specimen of *Euchelia jacobææ* in which the red markings were very dull in tint; and an unusually

small example of *Polyommatus icarus* in which there was an absence of all the spots, except the discoidal, from the central area of the underside of the wing.

Mr. Buckstone stated that some pupæ of *Pieris brassicæ*, which he was keeping in a flower pot on damped moss, had an unusually pale delicate green tinge while in the damp atmosphere, but that this passed rapidly away when the glass cover was removed. Various suggestions were made that it was an apparent change of colour produced by a thin layer of moisture on the surface of the pupa; and that the moisture rendered the pupal integument more transparent, so that the naturally delicate green of the internal substance showed much more plainly than it does normally.

Mr. Rayward exhibited a female *Polyommatus icarus* captured at Reigate, Surrey, in 1904; a male of the same species taken at the same place in 1905; two males of *Lycæna arion* captured in North Cornwall in 1908; a male *Colias hyale* taken at Reigate in 1901, and a female *Euchloë cardamines* bred in 1906 from a female taken at Horsley, Surrey, in 1905; all being exceedingly small, and very much below the normal size of the respective species.

Attention was drawn to the fact that the *P. icarus*, *L. arion*, and *C. hyale*, when captured, were flying with others of quite normal size, and that the whole of the remainder of the bred brood of *E. cardamines*, although reared in the same cage, and under precisely the same conditions, as the dwarf specimens exhibited, were also quite up to the average of the species.

The exhibitor pointed out that most breeders of lepidoptera were aware of the tendency of many species bred in confinement to arrive at the imaginal state below the average normal size, and the cause is usually—and doubtless properly in most instances—ascribed to unsuitability of conditions, or of food; he thought, however, that this explanation would not always hold good, either with respect to bred or to captured dwarf specimens, and expressed the opinion that the occasional occurrence of these was probably due to natural variation arising from conditions inherent in the constitution of the insect, rather than to unsuitability of conditions or environment.

The Reports of the various Field Meetings were read.

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Mollusca.

Odonata.

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ADLARD AND SON, IMPR., LONDON AND DORKING.

THE ABSTRACTS OF PROCEEDINGS

For 1886, 1887, 1888-9 (1 Vol.),
1890-91 (1 Vol.), 1892-3 (1 Vol.),
1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901,
1902, 1903, 1904, 1905, 1906, 1907, and 1908

Are still in print, and may be had on application to the Librarian.

1886, price 1/6; 1887, price 2/6; 1888-9 and 1890-91, price 3/6 each; 1892-3, price 3/-; 1894, price 3/-; 1895, price 2/-; 1896, price 2/6; 1897, Part 1, price 2/-, Part 2, price 2/-; 1898, Part 1, price 1/-, Part 2, price 2/-; 1899, price 2/6; 1900, price 2/6; 1901, price 2/-; 1902, price 2/6; 1903, price 2/-; 1904, price 2/-; 1905, price 2/6; 1906, price 2/6; 1907, price 2/6; and 1908, price 2/6.

N.B.—MEMBERS are allowed a discount of one third off the above prices.

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MEETINGS OF THE SOCIETY,

HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.

1909-1910.

Thursdays—May 13th, 27th; June 10th. 24th; July 8th, 22nd; August 12th, 26th; September 9th, 23rd; October 14th, 28th; November 11th, 25th; December 9th. 1910: January 13th, 27th (Annual); February 10th, 24th; March 10th, 24th; April 8th, 22nd.

LIBRARY OPEN AT 7 p.m., CHAIR TAKEN AT 8 p.m.

MEMBERS exhibiting specimens at the Meetings of the Society are requested to be good enough to hand to the Secretary, at the Meeting, a clearly written note of the generic and specific names of all specimens exhibited, together with the names of the localities in which such specimens were obtained, and any remarks thereon which the exhibitors have to make. In the absence of such a note in writing the Secretary cannot be responsible for any errors in connection with his report of such exhibits, or for the omission of any reference thereto in the Proceedings.