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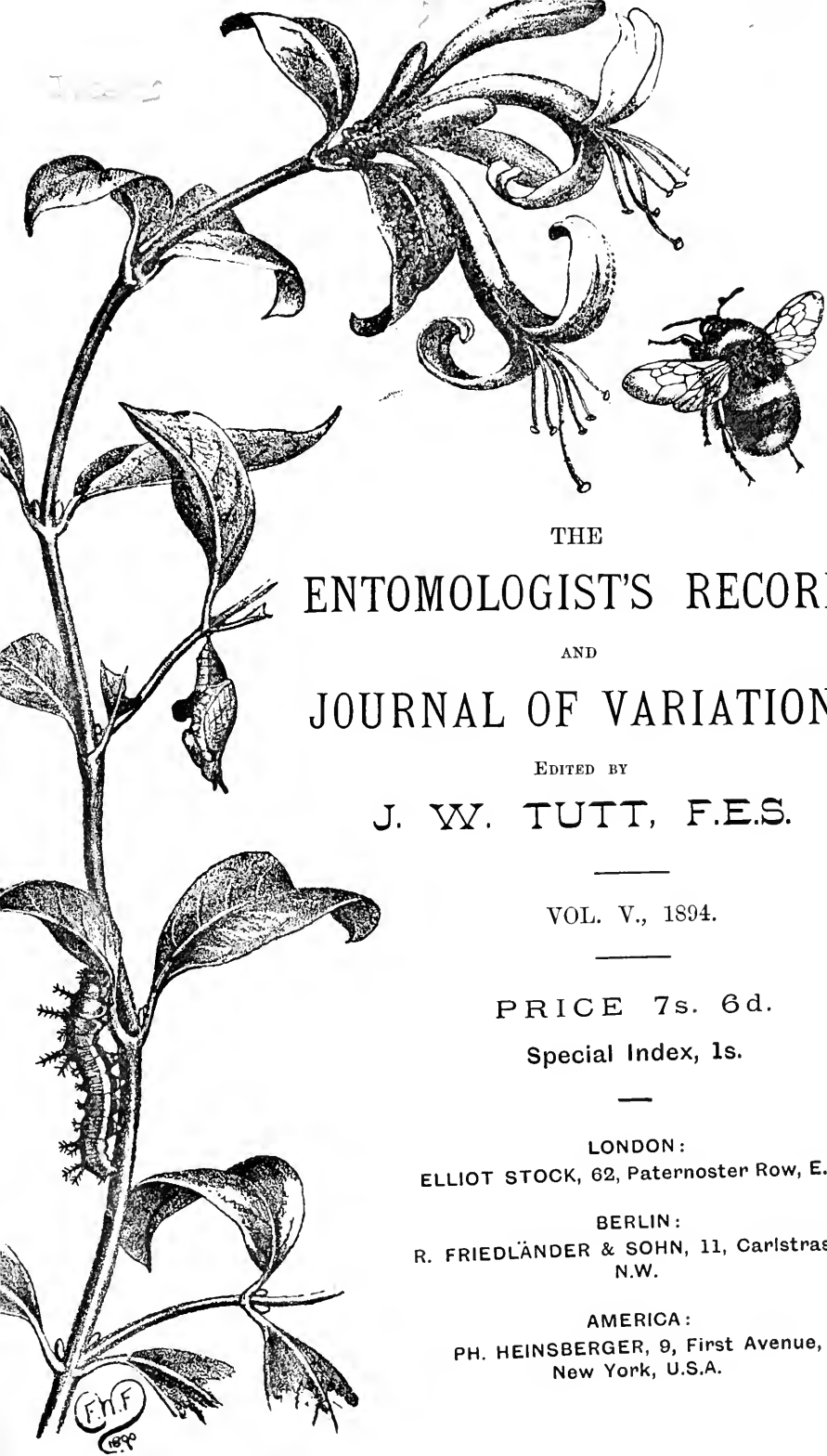

THE

ENTOMOLOGIST'S RECORD

AND

JOURNAL OF VARIATION.

EDITED BY

J. W. TUTT, F.E.S.

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PREFACE TO VOL. V.

At the conclusion of our fifth volume, we beg to thank our now large circle of subscribers, both for their kind personal support, and for the help and sympathy which they have shown us by introducing *The Entomologist's Record* to their friends.

We have attempted to make the magazine a real desideratum to entomologists, by discussing such subjects as are from time to time brought under their notice; by publishing collecting notes, which shall give a fair idea of what is being done from month to month in various parts of the country; by informing our readers of the important articles and records in other magazines, attempting thereby to separate in some measure the wheat from the chaff; by attempting to lead those who have but little opportunity and time, to take a scientific interest in their work. In doing this, it has been somewhat difficult to steer safely between Scylla and Charybdis, to avoid falling into the drivel which so often goes by the name of popular science, or, on the other hand, rising to those ethereal heights, where abstruse subjects are wrapped in mystifying verbiage, and are not understanded by the multitude.

When *The Entomologist's Record* was started, it was felt that descriptive monographs of foreign insects and of little known British Orders, were not altogether suitable for a monthly magazine; that entomologists wanted a monthly fillip, the material composing which should be such that any fairly educated man or woman with a bent for natural history could understand it, and possibly learn something from it. This we venture to say we have provided. The readers of *The Entomologist's Record* have nothing presented to them that does not bear directly on their own work, and are kept *au courant* with what is going on in the entomological world.

The fact that we wish to make the magazine as far as possible instructive and its contents scientifically accurate explains our position, where the editorial lash has perhaps fallen somewhat heavily. If we have injured the personal feelings of anyone we are sincerely sorry, but there are times when ignorance must be exposed. When a man misstates facts and mis-leads his readers, he is doing he knows not what harm. The essence of good work in any branch of science is, that the writer should collect and digest his facts for himself first, and not write on a subject until he has mastered it. A writer is a teacher. If the subject we profess to study is to advance, the youngsters must begin where we leave off, and we are doing the younger generation of naturalists a serious wrong, when those whom they look up to as their masters to-day, teach them error for truth. Ignorance is no excuse for this, and we shall expose it wherever we see that it is doing harm.

In our younger days, it was our greatest trouble to find out the most recent views and facts connected with entomological work. The material we want is scattered over perhaps three or four sets of magazines, and as many sets of *Transactions*, which in our young days we can ill-afford to buy. Our Chapters on the Life-history of a Lepidopterous Insect have been compiled, with a view to meet this want. If our collector readers think them dry, they must consider what a large share of the magazine they usually get. We can only make them as readable as possible, without altering the facts of the science. We all began by collecting. In old days, the collector rarely developed into a scientist; probably not one per cent. became imbued with a desire to know anything of the

insects they collected. But the spread of education has changed that entirely; many of the papers read before the various societies scattered over the country show a knowledge and insight into our science which would have been impossible a few years ago, when the scientific side of the study was rarely presented and when men collected for years probably, before the necessity of thinking came home to them. It is work of this kind that *The Entomologist's Record* sets itself to encourage and to foster.

We are anxious to keep British entomologists in touch with those of similar tastes in various parts of the world. We do not think this is best done by publishing articles on work done, or descriptions of species from distant parts of the world; these must be studied by the specialist who will buy the books he needs. But among the large amount of material which passes through our hands (and for the purpose of enlarging our knowledge of what is being done in different parts of the world, and thus giving ourselves a broader view of the subject, we exchange with all foreign magazines that will exchange with us), there are often articles or books which contain information with which the British collector should be acquainted. These we discuss as occasion demands from our own British standpoint, and we feel satisfied that in so doing, we interest all our readers. Glowing accounts of how to catch Purple Emperors and Jersey Tigers may interest us occasionally, but we cannot continually get up an excitement on such subjects.

One other matter we would mention, and in this we ask for the aid of all right-thinking entomologists. Britishers have been described as peculiar in their tastes and insular in their habits, with regard to matters entomological, and not without good reason. We have no sympathy with the man who prefers to remain ignorant because he is afraid to have foreign insects in his possession for comparison with British, lest he should be thought a cheat. Those men who study entomology as a science are well-known; they are above suspicion. At the same time, our insular prejudices have placed a high (if artificial) money value on rare and local British species. Why should they not have this value if they are thought worth it? That this is the case is proved by the fact that the value is fixed in British sale-rooms. But this artificial money value has led often to wholesale fraud, and we shall continue to protect our science by exposing such fraud wherever we find it existent, not so much from a sympathy with the victims, who sometimes appear to be pleased when victimised and extremely cross when a dirty piece of work is exposed, but on account of the fact that the introduction of foreign specimens as British, falsifies the data on which our scientific work is based, and disseminates error where we want to disseminate truth. Ignorance and error are the two greatest enemies of Science. Science is the well of absolute truth—all her devotees must seek to drink from it.

We are now on the threshold of another year, at the commencement of another volume. To our subscribers and well-wishers we would say, the success of the Magazine simply means a better article for your money, for we wish to put into the Magazine the whole of the funds received for it. To our friends Dr. Chapman and Dr. Buckell our best thanks are due, for kindly help and often valuable guidance. That the Sixth Volume will find a general welcome from all classes of Entomologists is the most earnest wish of

YOUR EDITOR.

CONTENTS OF VOLUME V

INDEX TO LOCALITIES.

PAPERS READ BEFORE SOCIETIES, NOTICED AND REVIEWED DURING 1894.

INDEX TO CONTRIBUTORS.

[*N.B.—The names of the contributors to the "Short collecting notes from the Exchange club books" have not been indexed, nor have those of Secretaries who send reports of Societies*].

LIST OF PLATES.

SPECIAL INDEX.

(Lepidoptera by G. B. Routledge, F.E.S.; other Orders by G. A. Lewcock.)

The Entomologist's Record and Journal of Variation.

VOL. V.

SPECIAL INDEX,

Arranged in order of Species.

CRUSTACEA.

DERMAPTERA.

DIPTERA.

HEMIPTERA—HOMOPTERA

HYMENOPTERA.

LEPIDOPTERA.

MOLLUSCA.

NEUROPTERA.

ORTHOPTERA.

THYSANURA.

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The Entomologist's Record
AND
JOURNAL OF VARIATION.

No. 1. Vol. V. January 15th, 1894.

Danais archippus, Anosia plexippus, or What?

By F. J. BUCKELL, M.B.

By what name ought we to call the butterfly which, as regards its generic designation, sometimes figures as *Anosia*, sometimes as *Danais*, whilst for its trivial name some use *archippus*, others *erippus*, and still others *plexippus*? Dealing first with the trivial nomenclature, it will be necessary, before an answer to the above question can be given, to determine what insect it was that Linnæus described under the name of *Papilio plexippus*. Two rival claimants for this honour are in the field; one, which we may call the American butterfly, is widely distributed in America, has been recorded from some of the islands of the Pacific, and occurred sparingly in southern and western England in 1885, but is not found in India and China; the other, which may be distinguished as the Indian butterfly, is found in India and China but not in America. The rivals are sharply differentiated by the presence in the Indian species of a white fascia, made up of five blotches of varying size and shape, which crosses from the costa to about the middle of the hind margin of the fore-wings; otherwise the general facies is much the same in both.

The first published description (as will be seen hereafter, there is reason to suppose that there was an earlier MS. description) by Linnæus of the insect which he named *P. plexippus* is to be found in *Systema Naturæ*, Ed. X., p. 471, No. 80 (1758) a translation of which is as follows:—"Wings entire, fulvous; with dilated black veins and a black margin with white dots. Habitat, North America. Fore-wings with a white fascia as in the next species (*P. chrysippus*) which it resembles." In the *Museum Ludoviceæ Ulriceæ* (which is a description of the contents of the Royal Museum), p. 262, No. 81 (1764), China is added to North America as the habitat of the species, and the following more extended description given:—"Body black, it as well as the head and neck being spotted with white on the sides and beneath. Antennæ black, clubbed. Feet bluish black. All the wings fulvous, rounded, hardly manifestly toothed, with the surfaces concolorous. Margin black, with white dots arranged in a double row. Black veins, very broad, run through the area of the wings, by which characteristic it is easily to be distinguished from the rest. Fore-wings with broad black apices, in which part, near the white dots, is also a white fascia broken

up into five blotches. Beneath, all the wings are concolorous, but more faintly black." The entry in the 12th edition of the *Systema*, p. 767, No. 177 (1767) is exactly a duplicate of that in the 10th edition. In all these descriptions there is the most explicit reference to the white fascia which the Indian insect has, but which the American has not; moreover, the statement that *plexippus* is like *chrysippus* is true of the Indian, but not of the American species. When we turn to the references given by Linnæus to other authors, it will be seen that they relate to the American species; but there are so many discrepancies between Linnæus' descriptions and his references that the latter cannot be assigned a very high value as evidence in any particular instance. Besides references to Petiver's *Museum*, 58, 527, and to Ray, 138, 3, we find "Sloan. *Jam.* 2, p. 214, t. 239, fig. 5, 6," and "Catesb. *Car.* 2, t. 88." The first of these is to "*A voyage to the Islands Madeira, Barbadoes, ... and Jamaica, with the Natural History . . . . of the last of these Islands*, by Hans Sloane, M.D.; in the second volume of this work (1725) is a description and a copper-plate uncoloured figure, under the name of *Papilio Jamaicensis major*, of a butterfly that is certainly not the typical American species, but agrees with it in not possessing any white fascia. The other reference is to a work by Mark Catesby entitled *The Natural History of Carolina, Florida and the Bahama Islands;* in the second volume of this (1743) is a typical coloured figure of the American butterfly. The description and the references being at variance then, it seems more reasonable to give the former the greater evidential value, and by its aid to arrive at the conclusion that it was the Indian insect which Linnæus described under the name *P. plexippus*, although it is impossible to determine what led him into the error of giving it a North American habitat. This conclusion is confirmed by the evidence of Aurivillius, who in 1882 published, in *Kongl. Sv. Vet. Akad. Handl.*, a paper entitled "*Recensio critica Lepidopterorum Musei Ludoricæ Ulricæ quæ descripsit Carolus A. Linné.* In this he states that the two specimens now remaining in that Museum are of the Indian insect, and that Clerck's figure (in *Icones Ins.* III. (inedit) t. 5, f. 1, 1764) is also of the same. It must be remembered that all Clerck's figures are said to have been made from specimens in that Museum; the copy of Clerck's *Icones* in the British Museum Library does not contain the third part mentioned by Aurivillius, and it has therefore been impossible to verify his statement. On the other hand, Aurivillius states that in what he calls *Schedula*, and which he speaks of as older than the 10th edition of the *Systema*, there is a description of the insect by Linnæus which contains no allusion to the white fascia nor any mention of China as a habitat. If this *Schedula* be, as I imagine, a MS. document preserved in the archives of the Museum, it cannot be allowed to militate against the conclusion arrived at on the evidence afforded by the first *published* description in the 10th edition of the *Systema*.

In the cabinet of Linnæus, at present in the possession of the Linnæan Society, we find in one drawer a specimen of the American butterfly labelled "*Archippus*, Fab., Marsham," and immediately underneath it, four specimens of the Indian butterfly labelled *plexippus*; in another drawer is another specimen of the former labelled "*Archippus*, Abbot t. 6. Georgia." This evidence is of no value quoad Linnæus, as it is clear that the American specimens could not have been labelled,

probably were not placed in the drawer, until after the cabinet reached this country in 1788; it is, however, important as indicating the opinion of Dr. Smith, who purchased the cabinet and who himself wrote on the lepidoptera of Georgia, that it was the Indian species that Linnæus called *plexippus*.

The testimony of Fabricius also leads in the same direction. To estimate its value aright we must bear in mind that, according to a letter written by him to Rev. W. Kirby, dated March 28th, 1803, and quoted in *Zoologist*, 1852, p. 3544, Fabricius had lived two whole years in the greatest intimacy with Linnæus, and, we must further remember, that the latter spoke of the former as a greater entomologist than himself. It is reasonable therefore to conclude that the disciple was well acquainted with the specimens of his great master. Fabricius in *Entomologia Systematica*, Vol. III., p. 49, No. 150 (1793) describes the American species under the name *P. archippus* and says that it differs from *P. plexippus*, Linn. by being rather larger and by lacking the fascia on the fore-wings, in place of which it has somewhat fulvous blotches. He gives *plexippus*, however, an American habitat and says nothing about Asia in connection with it.

Cramer, however, in *Papillons Exotiques*, Vol. I., p. 4., pl. 3., fig. a-b, had, as early as 1779, described and figured a butterfly from Brazil under the name of *P. erippus*, which is now universally recognised as a variety of the American insect; Cramer himself speaks of a species from New York which differs but little from his *erippus*, and in his 3rd volume (1782) figures it under the name of *P. plexippus*, remarking that this is probably the insect Linnæus indicated by the name on account of the habitat he mentions. In the same volume Cramer describes and figures the Indian species under the name of *P. genutia*.

The name *erippus* has never come into general use; for three-quarters of a century, *archippus* was the trivial name by which the American species was most frequently designated, although *plexippus* had a few adherents scattered over that period, notably amongst American authors.

Hübner's action is interesting. In *Sammlung exotischer Schmetterlinge*, Bd. I, pl. 20, fig. 1, 2 (1806?), he figured the American butterfly under the name *Limnas ferruginea plexippe;* in the *Verzeichniss bekannter Schmetterlinge* (1816) he placed *plexippus*, which he then specifically identified as the *genutia* of Cramer, together with *chrysippus* in one genus; and in another, a species to which he gave the name *menippe* and which, by his synonymic references, we ascertain that he identified with *erippus*, Cram. and *archippus*, Fb.; finally in the 2nd volume of the *Sammlung exotischer Schmetterlinge*, pl. 7, fig. 1, 2 (1820-1?) he figured another form of the American species under the name of *Anosia megalippe*. The absence of letterpress, relating to the species, from the copy of this latter work which is in the British Museum Library, deprives us of all chance of ascertaining the reasons which led to these frequent changes of trivial name, but it is clear that though at the outset Hübner supposed *plexippus*, Linn. to be the American, he subsequently came to the conclusion that it was the Indian species.

The revival in modern times of the claim, on behalf of the American butterfly, for the name *plexippus* dates, as far as I can discover, from 1875; in that year, Scudder, in "A Synonymic List of the Butterflies of North America" published in the *Bulletin of the Buffalo Society of*

Natural Sciences, Vol. II., p. 245, adopts the name. He was followed by Godman and Salvin in their *Biologia Centrali Americana—Rhopalocera*, Vol. I., p. 1 (1879); these authors base their action on the habitat given by Linnæus and upon his reference to Catesby. Moore in "A Monograph of *Limnaina* and *Euplœina*," published in the *Proc. Zool. Soc.* pt. 51, p. 201-252 (1883) also adopts the same course. In his "*Butterflies of the Eastern United States and Canada*," p. 720 (1889) Scudder discusses the proper name of the butterfly and declares that there can be no doubt whatever that the American species was first described by Linnæus under the name of *plexippus*. None of these authors, however, attempt to grapple with what is really the crucial difficulty in the way of accepting this conclusion, *viz.*:—the occurrence in *all* his *published* descriptions of the unmistakable reference to the white fascia; nor have I anywhere met with such an attempt.

After taking into consideration the various evidence that has been adduced, the following propositions are submitted as an answer to the question with which this paper opens, so far as concerns the trivial name.

1.—The balance of argument is against the claim that the American insect is the *plexippus* of Linnæus.

2.—The earliest name given to that species was *erippus*, Cram. and, if the "law of priority" is to be pedantically adhered to, this is the trivial name that must be adopted.

3.—The Fabrician name, *archippus*, is that by which the species has been most widely known, and as changes in accustomed nomenclature are to be deprecated, and as, moreover, *erippus*, Cram. is a varietal form found in Brazil, *archippus* should be retained as the trivial name of the species, and *erippus* used as the name of the variety.

With regard to the generic name, the course of events has been as follows:—Latreille in his *Histoire Naturelle des Crustacés et des Insectes*, Tom. 14, p. 108 (1805), created the genus *Danaida*; the only species which he included in it was *plexippus*; in *Genera Crustaceorum et Insectorum*, p. 201 (1809), he altered the name of the genus to *Danaus*; he gives no reason for the change, but it has been suggested that it was made because the earlier name was already pre-occupied in Botany; in *Encyclopédie Méthodique*, vol. ix., p. 10 (1816), he again changes the name, whether intentionally or accidentally does not appear, to *Danais* which is the form it has since retained; Moore, in the monograph to which allusion has already been made, states that Latreille altered *Danaida* to *Danais* in 1807, and gives a reference to Illiger's *Magazine*, vol. 6, p. 292; a careful search has not, however, enabled me to verify the statement. Under all the variations of the name the type species given is always *plexippus*; that by this name Latreille meant the Indian butterfly, although he gave it an American habitat (therein probably following Fabricius). is clear, because in the description he emphasizes the presence of a white band on the fore-wings; moreover, Godart, whose work in the *Encycl. Méthod.* was done under Latreille's supervision, gives the name *plexippus* as synonymous with *genutia*, Cram. This being so, and it being now held that the Indian butterfly is not congeneric with the American, it follows that if any form of Latreille's name be retained it must be for the genus to which the former belongs.

Fabricius in his *Systema Glossatorum* (1807) created the genus *Euplœa*, of which *plexippus* is given as a type in the abstract in Illiger's

Magazine; this name therefore can have no application to the American species.

Hübner in the *Tentamen* (1810?) gave the same species as the type of his genus *Limnas*; in the *Verzeichniss* (1816), the family *Ferruginea* of the stirps *Limnades* is divided into two genera, (1) *Euplœa*, including *plexippe*, *chrysippe*, &c., (2) *Anosia*, including *menippe* which we have already seen to be synonymous in Hübner's mind with *archippus*, Fb. He uses *Anosia* as the generic name for the American insect, when later he figures it under the trivial name *megalippe*. It is not surprising, considering the political history of the time, that Hübner should show no sign of any acquaintance with Latreille's works.

The name *Anosia* seems therefore clearly marked out as the right generic designation of *archippus*, and the graceful alliteration of *Anosia archippus* will furnish the full answer to the question with which we started.

Hair-tufts and Androconia in Eustroma reticulata.

By T. A. CHAPMAN, M.D., F.E.S.

Read before the Cambridge Entomological Society, Dec. 1st, 1893.

Mr. Farren has called my attention to a tuft or brush of hairs on the fore-wings of *Cidaria reticulata*, and has afforded me the opportunity of examining a specimen—I fear to its considerable injury; I have since obtained some additional material from Mr. Hodgkinson.

The precise disposition and relations of this brush were quite new to me, but, as I knew very little about the matter beyond the fact that such brushes occur in various situations (legs, wings, body, &c.), I referred to Mr. Meyrick's paper, *Trans. Ent. Soc. Lond.*, March, 1892, which contains an immense fund of information relative to the external structural anatomy of the Geometræ. From this source I gather that such brushes are rarely found on the fore-wings of Geometers.

Mr. Meyrick places *reticulata* in the genus *Eustroma*, Hb., one of the characters of which he thus describes:—"Fore-wings in ♂ with strong hair pencil lying near inner margin from base beneath, sometimes partially clothing 1b." The other species of this genus which I have examined are *prunata*, *associata*, *populata*, *testata*; the description is fairly applicable to them, the tuft forming a dense pencil which arises in mass from near the base of 1b, its root sometimes extending along a portion of that nervure, and which (in cabinet specimens) lies in the form of a dense brush nearly parallel with the neuration. *C. reticulata* does not agree at all with the above-mentioned species; it comes nearer, perhaps, to the genus *Lasiogma*, Meyr., in which the hairs spring from the whole length of the submedian fold. I have had no opportunity of examining the species comprised in this genus; it may, therefore, be worth while describing the arrangement which obtains in *reticulata*, although it seems improbable that this has not been done already.

In *populata*, which may be taken as a type of the other species that I have examined, the hairs arise from a triangular area, situated on the costal side of nervure 1b. almost at its extreme base, between this nervure and the nervure above. In *reticulata*, the area from which the hairs arise is situated between 1b. and the inner margin; it is quadrangular in shape, its basal margin being rather farther from the base of the wing than is the apical margin of the area (on the costal

side of the nervure) in *populata*; it extends from the nervure to the inner margin, and its length is rather greater than its breadth; by measure it begins 2-mm. from the base of the wing and extends along the inner margin for 2-mm. The hairs do not proceed radially from the base, as in *populata*, but form a fringe or flat brush which lies closely appressed to the under surface of the wing, passing in a direction parallel with the costa; they are about 3-mm. in length, and are pale at their bases but become nearly black at their tips, where they are a little expanded and flattened, and end in a sharp lancet-shaped point.

Associated with this brush is another and more distinctive feature that is not represented in any way in the other species of *Eustroma*, Hb., Meyr., which I have examined. When the brushes are pushed aside and the under surface of the fore-wing, which they cover, is thus exposed, a circular patch of about 1·5-mm. in diameter is seen, lying between 1b and 2; this patch forms an opaque orange mark, very different from the strawy-fuscous colour and semi-transparent texture of the rest of the under surface. At a point on the upper surface of the hind-wing, that is exactly opposite this when the wings are partially extended is an almost identical patch; this is circular, about 1·3-mm. in diameter, and its centre is about at the centre of the transverse nervure terminating the discoidal cell; it is orange in colour, but at its very centre is decidedly darker and denser.

These patches, when placed under the microscope (dried specimens be it understood), present scales of a long ovoid or fusiform shape which look as if they were not flat, but solid; these are perhaps a trifle shorter than the surrounding scales, which latter have square ends and from six to eight terminal teeth and are nearly twice the breadth of those on the yellow patches. These broader scales are striated longitudinally; those on the patches, however, are of a netted granular texture, suggestive rather of contents than of surface markings, and many of them are loaded with black material which is probably air unexpelled by the medium of preparation.

These two patches (of androconia?) then are opposite each other, with the brush-fan lying between them; if they are the real scent-organs, we may suppose the brush to be of use in keeping them sufficiently apart to ensure the passing over them of a current of air.

Notes on Dr. Buckell's Paper on Classification.

By W. F. KIRBY, F.L.S., F.E.S.,
Assistant in Zool. Dept., Brit. Mus. (Nat. Hist.), South Kensington.

Linné appears to have been guided largely by size and general appearance in the arrangement of his groups, as he placed many Nymphalids (e.g. *Morpho*) among his *Equites*, and certain Papilionids among his *Nymphales*. Such errors, of course, were unavoidable in the infancy of Entomology.

Fabricius treated the *Danai candidi* and the *Danai festivi* as two groups, and restricted the name *Danai* to the Whites; *Danaus* was subsequently used by Esper almost in a generic sense. Unless we hold that we must have male mythological names to agree with the masculine *Danaus*, which would be most convenient on the score of expediency, we should probably have to recognise *brassicæ* as the type of *Danaus*.

Dr. Buckell makes no allusion to Hübner's *Tentamen*. This is a mere two-page list of genera with types, but is useful as fixing types. It appears to me to have been issued about 1810, for it contains one name, apparently adopted from the *Systema Glossatorum* of Fabricius, published in 1807. It is more likely that Hübner copied the name from Fabricius than that Fabricius copied it from Hübner.

No difficulty can exist in determining the type of Latreille's *Satyrus*, as *Satyrus* or *le Satyre* is used as the name of *megæra* by many of the old authors.

I am a little doubtful about the date of publication of the ninth volume of the *Edinburgh Encyclopædia*, in which Leach's important article appeared. The date usually given is 1815, but the volume is dated 1819, a discrepancy which I have not as yet been able to clear up. The book may have been issued in parts.

One or two works not noticed by Dr. Buckell may be named. In 1857 Wallengren, in his *Lepidoptera Scandinavie Rhopalocera*, divided the Swedish butterflies as follows:—

PAPILIONES.

TETRAPODES.

Satyroidæ:—*Cœnonympha*, *Pararge*, *Aphantopus* (*hyperanthus*), *Epinephele*, *Satyrus*, [*Chionobas*, not Brit.], *Erebia*.

Nymphalides:—*Limenitis*, *Melitæa*, *Argynnis*, *Vanessa*.

HEXAPODES.

Heliconides:—*Colias*, *Goniopteryx*, *Leucophasia*, *Anthocharis*, *Pieris*, *Aporia*.

Parnasii:—*Doritis* (= *Parnassius*).

Equites:—*Papilio*.

Lycœnides:—*Zephyrus* (*quercus*, *betulæ*), *Thecla*, *Polyommatus*, *Lycœna*.

HETEROPODES.

Erycinides:—*Hamearis* (*lucina*).

HESPERIOIDÆ.

Heteropterus, *Hesperia*, *Syrichtus*, *Thanaos*.

In 1860 Zebrawski, in a work on the Lepidoptera of Cracow, proposed the following arrangement, which, so far as I know, is quite unique:—*Sphingidæ*, *Noctuidæ*, *Bombycidæ*, *Papilionidæ*, *Geometridæ*, *Pyralioidæ*, *Tortricidæ*, *Pterophoridæ*, *Tineidæ*. The *Papilionidæ* are not sub-divided except into genera as follows:—*Doritis* (= *Parnassius*), *Pontia* (= *Pieris*), *Melaryus* (*galathea*), *Pararya*, *Hipparchia*, *Erebia*, *Satyrus*, *Apatura*, *Limenitis*, *Vanessa*, *Argynnis* (includes the Melitæas), *Hesperia*, *Chrysophanus*, *Lycœna*, *Thecla*, *Colias*, *Gonepteryx*, *Papilio*. As I cannot read his Polish, I cannot explain his reasons for this arrangement.

Finally, Schatz and Röber, in their companion volume on genera to the great work on Exotic Butterflies by Dr. Staudinger (1885–92) distribute the families as follows:—*Papilionidæ*, *Pieridæ*, *Danaidæ*, [*Nectropidæ*],* [*Acræidæ*], [*Heliconidæ*], *Nymphalidæ*, [*Morphidæ*], [*Brassolidæ*], *Satyridæ*, [*Libytheidæ*], *Erycinidæ*, *Lycœnidæ*, *Hesperidæ*.

* The families within brackets have no British representatives.

On an Additional Method for Determining the Species of certain Lepidoptera.

By W. S. RIDING, M.D.

It has frequently occurred to me that the structure of the scales of Lepidoptera might be a help in the classification of certain species, which, at present, afford considerable difficulty. Some time ago I examined the subject cursorily with reference to the closely allied varieties of *Orrhodia vaccinii* and *O. ligula*, especially vars. *rufa* (Tutt) and *spadicea* (Hb.) of the former, which have the characteristic apex and hind-margin of *ligula*, a good many of which are taken here. I have long considered these as vars. of *ligula*, but the general feeling of lepidopterists seems to be against this view and such specimens have, I believe, been accepted for the most part as varieties of *vaccinii*. Recently I have again gone into the question, with the result of confirming my previous impression. I find the scales of the upper surface of the forewings of the types of *vaccinii* and *ligula* present a constant difference, and that the special varieties alluded to should be placed, from this point of view, under the species *ligula* and not under *vaccinii*.

In the first place, I examined with a microscope a type specimen of *O. vaccinii* (ochreous, with brown markings and pale wing rays), taking some scales from the base, middle and hind margin of the upper surface of both fore-wings. These I found to vary in the number of teeth, some having 3, others 4, 5, or 6. I added together those having a similar number and took the percentage, with the following result—

Scales with	3	teeth	formed	15	per cent.	of the whole.
„	4	„	„	69	„	„
„	5	„	„	12	„	„
„	6	„	„	4	„	„
				100		

or, 84 per cent. of the scales of typical *vaccinii* were found to have 3 or 4 teeth. I then took the scales of a typical *O. ligula* (var. *ochrea*, Tutt), our common form here, which has a yellowish band before the hind margin, and found that there were no scales with 3 teeth but that—

Scales with	4	teeth	formed	15	per cent.	of the whole.
„	5	„	„	44	„	„
„	6	„	„	36	„	„
„	7	„	„	5	„	„
				100		

or, 85 per cent. of the scales of typical *ligula* had 5, 6, or 7 teeth. These data were confirmed by a general examination of many other specimens, with an approximately similar result. We may thus, apparently, distinguish typical *O. vaccinii* from *O. ligula* by the large predominance of scales with 3 or 4 teeth (about 84 per cent.) in the former, and of scales with 5, 6, or 7 teeth (about 85 per cent.) in the latter. A glance at the field under the microscope is sufficient to do this.

My attention was next directed to ascertaining whether this fact would help us in determining the species of the varieties (hitherto classed as *vaccinii*), *rufa* (Tutt) and *spadicea* (Hb.), having a pointed apex

and a more or less concave hind margin. An examination of a specimen of this form (=var. *spadicea*, Hb. but approaching *rufa*) gave the following result—

Scales with	4	teeth	formed	10	per cent.	of the whole.
,,	5	,,	,,	57	,,	,,
,,	6	,,	,,	32	,,	,,
,,	7	,,	,,	1	,,	,,
				100		

a few with 3 teeth only, amounting to less than $\frac{1}{2}$ per cent., were left out of the calculation. This gave 90 per cent. of the scales as having 5, 6, or 7 teeth (89 per cent. of these having 5 or 6) and clearly placed the insect, as to its scales, in the *ligula* group. A second specimen, similar to the above but still more approaching var. *rufa*, showed a like result—

Scales with	4	teeth	formed	3	per cent.	of the whole.
,,	5	,,	,,	34	,,	,,
,,	6	,,	,,	52	,,	,,
,,	7	,,	,,	11	,,	,,
				100		

or, 97 per cent. of the scales had 5, 6, or 7 teeth and 86 per cent. 5 or 6. On the other hand, similar insects which differed only in having the blunt apex and rounded margin of *vaccinii*—the true var. *spadicea* (Hb.) and *rufa* (Tutt)—showed in one specimen—

Scales with	3	teeth	formed	8	per cent.	of the whole.
,,	4	,,	,,	60	,,	,,
,,	5	,,	,,	31	,,	,,
,,	6	,,	,,	1	,,	,,
				100		

and in another specimen,

Scales with	3	teeth	formed	8	per cent.	of the whole.
,,	4	,,	,,	63	,,	,,
,,	5	,,	,,	29	,,	,,
				100		

or, 69·5 per cent. of the scales had 3 or 4 teeth only—allying the specimens in this respect to the type of *vaccinii*. These data tallied with a previous examination of similar specimens some months ago.

The difficulty frequently experienced in separating *C. russata* and *C. immanata* led me to examine a few of both these species, to ascertain if any similar differentiation seemed possible. Some six specimens of *C. russata* and vars. *perfuscata*, *comma-notata* and *centum-notata* showed a large predominance of scales with 4 teeth, which formed 60 to 80 per cent. of the whole, a few only having 3 and 5 teeth. This proportion seemed approximately constant. One specimen of *C. immanata* var. *marmorata* on the other hand, showed an average of 97 per cent. of scales with 4, 5, or 6 teeth (43 per cent. had 4 only), the remainder having 3; but one of the type of *C. immanata*, with the nearly black median area, showed a predominance of the scales with 4 teeth to the

extent of 70 per cent., the majority of the remainder having 5 teeth and the rest 3 or 6. The latter, then, as regards scales, showed a similarity to *russata*, and no differentiation seems possible. These two last results, based on single specimens, require confirmation or otherwise, but it would appear as though only the one form, *marmorata*, can be differentiated by its scales.

Experiments were also made with the two *Cuspidia, tridens* and *psi*. I have only as yet been able to examine two specimens of *tridens*, not caring to sacrifice more of my series of the bred insect. The average of the two gives—

Scales with	4	teeth	formed	35	per cent.	of the whole.*
,,	5	,,	,,	57	,,	,,
,,	6	,,	,,	8	,,	,,
				100		

or, 65 per cent. were scales with 5 or 6 teeth. One had fewer scales with 6 teeth and more with 4 than the other, but there was the predominance of those with 5, in both. *Psi* on the other hand showed—

Scales with	3	teeth	formed	6	per cent.	of the whole.*
,,	4	,,	,,	74	,,	,,
,,	5	,,	,,	17	,,	,,
,,	6	,,	,,	3	,,	,,
				100		

or, the scales with 3 or 4 teeth formed 80 per cent.

Not only is there this difference between the two, but the scales of *tridens* have also unequal and irregular teeth with projection of the middle ones, giving a ragged appearance, in a very considerable proportion, especially of those from the centre and hind margin of the wings, whilst the teeth of the scales of *psi* are comparatively equal and regular, and show less tendency to projection of the middle ones. This difference is very noticeable. Of course these points remain open for confirmation or otherwise when more bred specimens of *tridens* and the darker varieties of *psi* have been examined. As regards any connection between colour and intensity of colour and the number of teeth of scales, I think, for the most part, the darker insects have their scales with the most teeth, but this is far from invariable, as is seen above, those from the white centre of var. *marmorata* having more teeth than those from the true dark *immanata* or the var. *perfuscata* of *russata*, and I have noticed other similar cases.

I wish these notes to be taken as suggestive for the most part, though I have endeavoured to some extent to guard against the fallacy of too few data by examining the scales from three different parts of each wing and from a considerable number of specimens (except in the cases of *immanata* and *tridens*), still I am quite aware of the fact that many more examinations, corroborative or otherwise, are needed before attempting to generalize, but I think, at all events, I have made out a case for further investigation.—Buckerell Lodge, near Honiton. *November 24th*, 1893.

*On the other hand, the total of scales with 4 and 5 teeth combined give respectively 91 and 92 per cent., a very close result.—Ed.

ON THE LARVA OF ARCTIA CAIA,

With special reference to its correlated variations in Plumage, Moulting and Hybernation.

By T. A. CHAPMAN, M.D.

(*Continued from Vol. IV., page* 290).

I have mentioned that there are at least two varieties of Forwards, those that attain their full growth in the 6th skin, and those that do not do so until the 7th. It so happened, that in my first brood, which was apparently a very normal one, there was quite a sharp line dividing the Forwards from the Normal larvæ; six larvæ altogether were Forwards, and I noted that these, in the 4th skin, lacked the dorsal and lateral pale lines. In later broods this was not always the case, but in the 4th skin the Forwards were if anything paler than the Normals at that stage, and at the same time distinctly larger than Normals in 5th skin.

In after broods there were frequently some larvæ that appeared in doubt as to whether they would be Forwards or Normals, assuming to a slight extent the *caia* plumage in the 5th skin, without being larger than the usual hybernating form in that skin; others passing through a normal 5th skin, nevertheless went on slowly into the 6th skin, with some amount of *caia* plumage, without hybernating. All these completed their transformations without hybernation, but were always a very long way behind the genuine Forwards in point of time. I have since met with these forms, though very sparingly, in broods from wild eggs.

In this first normal brood the whole of the Normals acquired *fuliginosa* plumage in the 5th skin, and there occurred only one decided but also important variety, represented by four larvæ which grew rather larger than the others, appeared to have denser hair than the usual form, had fewer of the long hairs that exist freely, though not conspicuously (usually two on each tubercle), in that form, and were all four of a uniform rich ruddy hue, very like the brightest form of *fuliginosa*; probably these, more than the normal hybernators, suggested this name for the plumage of that stage. These four larvæ were found to differ also in another important respect from the ordinary Normals. It was recognised on September 11th that they had all ceased feeding and desired to hybernate, and they were accordingly placed in a cool cellar. On November 23rd a number of Normals together with these four special larvæ were brought up into a warm room. At the end of a week all the Normals had commenced to feed, but it was fourteen days before these red larvæ did so. It appeared therefore as if these larvæ were not only better nourished and more warmly clad than their neighbours, but had also entered into a more profound winter sleep, and it seemed natural to conclude that they were specially prepared to stand a longer and more severe winter than their brethren.

It is curious that, among the many hundreds of larvæ which I reared after this, I never met with one that presented precisely this combination of characters, not even among the progeny of these very individuals. It may perhaps be going too far to suggest that, as I was breeding exclusively from Forwards, the idea of a warmer climate was sufficiently impressed on the race to prevent such a preparation for unusual cold being made, and that the tendency to make such prepara-

tion was eliminated even from the offspring of these larvæ themselves (I only reared one brood), by the forcing process to which the parents were subjected; inasmuch, however, as similar conclusions are pointed to by other results, the suggestion is, perhaps, not inadmissible.

I did not get a figure of either of these four larvæ, the nearest approach to them, and it was very close in appearance, is represented in Plate I., fig. 2. The larva there figured was hybernating in this form in its 6th skin, and was one of the varieties in the hybernating forms that occurred in later broods but were unrepresented in the first, in which all hybernators assumed *fuliginosa* plumage in the 5th skin, and then hybernated.

(*To be continued.*)

SCIENTIFIC NOTES & OBSERVATIONS.

Pupa of Melitaea maturna.—The pupa of *M. maturna* is very different from that of *M. cinxia*. It is larger and longer in proportion, and, in place of being greyish-brown, is of a *creamy-white*, spotted with intense black, the spots on the thorax and wing cases being especially large; in some specimens the abdomen is more or less brownish. I have often reared this species from the beautiful larva.—F. B. Newnham. *December 6th*, 1893.

VARIATION.

Aberrations of Various Butterflies.—*Cœnonympha pamphilus.*—I caught this summer a very strange ab. of *C. pamphilus*, in which there is a row of *six* ocelli down the centre of the underside of the hind-wings. The pupils of these ocelli are silvery-white, the rings being light brown. *Vanessa c-album.*—I bred, among many others this season, a small ♂ *c-album*, in which what is usually the *C*-like mark, which gives the trivial name to the species, is reduced to a mere straight line. I propose to call this ab. *iota-album*, partly because the name of *I-album* is already employed by Esper to denote an ab. of the European *V. egea*, Cram. and partly because my specimen has no dot. *V. atalanta.*—I, this autumn, reared two specimens of *V. atalanta*, in which the outer row of white spots, usually five in number, exhibits a sixth, this being placed within the red band of the upper wings. *Lycæna icarus ab. icarinus*, Scriba.—This aberration, which is devoid of the basal dots on the underside of the upper wings, occurs rather commonly here in a rough pasture on the S.W. slope of the Ragleth; I have caught many specimens of both sexes. This aberration is generally scarce, at least on the Continent. *L. icarus* varies much in size, my smallest measures $^{13}/_{16}$ of an inch, being much smaller than my smallest *minima*, while my largest expands to 1 $^{9}/_{16}$ inch. These are both females. This small form, which appears about July and is very local, might almost be a distinct species, approaching to the continental *L. eschari*, Hubn. Another aberration is found here, in which the upper side is of a *bright blue* without any trace of purple. This I take to be the *L. dorylas* of the older British authors, but it is very distinct from the Alpine *hylas*

of Esper, or the *dorylas* of Hübner.—F. B. Newnham, Church Stretton, Salop. *December 6th*, 1893.

Varieties of Lepidoptera exhibited at the York and District Field Naturalists' Society.—The following exhibits of varieties and local forms have been made during the past year:—The President, Mr. G. C. Dennis, F.E.S.: a living specimen (bred) of *Arctia lubricipeda* var. *radiata* from Barnsley. Mr. R. Dutton: Vars. of *Abraxas ulmata* and *Arctia lubricipeda*; dark var. of *Abraxas grossulariata* and hermaphrodite specimen of *Epione vespertaria* from York; forms of *Asphalia diluta* and *Hadena protea*, also from York. Mr. J. Hawkins: *Hybernia progemmaria* var. *fuscata*; *Tephrosia bimdularia* var. *delamerensis* (bred), and *Zygaena loniceræ* var. *semi-lutescens* (bred) from York. Mr. S. Walker: Vars. of *Orthosia suspecta* from York; also *Boarmia rhomboidaria* var. *perfumaria*. Mr. G. Jackson: a number of exceptionally fine vars. of *Arctia lubricipeda*, bred from larvæ obtained in the neighbourhood of York during the past few years; amongst these were many thickly blotched specimens, known as the "York form," but none of them approached "à beaucoup près" the now well-known var. *radiata*, and Mr. Jackson stated that he had never succeeded in breeding this variety nor any form nearly resembling it, although he had bred the species for a number of successive years. Mr. W. Hewett: *Bisulcia ligustri* var. *olivacea* from Driffield; dark forms of *Luperina testacea* from Hartlepool; vars. of *Arctia lubricipeda* from Driffield and other localities, that from Driffield having the fore wings typical, but the hind wings of the same colour as var. *radiata*, viz., smoky black, the base, wing-rays and fringe alone being cream-coloured; the head and thorax were cream-coloured, the body yellow, with six black spots down the middle and on each side; the antennæ simple; also a fine var. of *Arctia caia* from Hull, in which the fore wings were of an almost uniform brown colour, the hind wings being black except at the base and fringe; forms of *Anchocelis pistacina* from Hull and Beverley, numerous forms of *Taeniocampa gothica* selected from more than 300 specimens; vars. of *Paedisca solandriana* from Darlington; a beautiful melanic form of *Smerinthus populi* (bred) from Beverley, and a pale form from Hull; a var. of *Vanessa c-album* with the hind wings of a uniform chocolate colour; *Hybernia progemmaria* var. *fuscata* and *Tephrosia bimdularia* var. *delamerensis*, with intermediate forms of both species, from York; melanic forms of *Diurnea fagella* from Sledmere; a var. of *Abraxas grossulariata* having the fore wings almost entirely black, from Beverley, and a similar var., bred this season, from York; a long and variable series of *Lomaspilis marginata* from York; two suffused examples of *Ephyra pendularia* from York; pale forms of *Abraxas ulmata* from Sledmere, as well as an almost white specimen and another lead coloured of the same species from Drewton Dale, Yorkshire; two dark specimens of *Odontopera bidentata* from Hull; very dark *Noctua xanthographa* from Hull; vars. of *Orthosia suspecta* from York; *Zygæna loniceræ* var. *semi-lutescens* from York; a variable series of *Apamea fibrosa* from Wicken Fen; a fine var. (bred) of *Vanessa urticæ*; *Melanthia rubiginata* var. *plumbata* from the North of Scotland; light, dark, and intermediate forms of *Agrotis puta* from Kent; several fine dark and light varieties of *Abraxas grossulariata*, bred this season at York.—Wm. Hewett.

NOTES ON COLLECTING, Etc.

CHELONIA PLANTAGINIS DOUBLE BROODED.—On the 10th of November the pupa of *C. plantaginis*, of which I spoke in the November issue of the *Record*, yielded its imago, a ♂, which is quite typical. The ova hatched on the 4th, 5th, and 6th of June; the larvæ were kept throughout in a very damp room, near a window facing east which got but a very small modicum of sun.—F. B. NEWNHAM. *December 6th*, 1893.

LARVÆ OF MACROGLOSSA STELLATARUM.—The larvæ of *M. stellatarum* were rather common here in August, and kept feeding on *Galium verum*. We all know the full-fed larva; when young it is *dark* olive green, the head and horn of a still darker shade, while the sub-dorsal and spiracular lines are faintly indicated by a shade lighter than that of the body. It feeds in the same localities as *C. porcellus*, of which, strange to say, I have not seen a single specimen in the larval state this season, though it is usually common here on the same food-plant.—F. B. NEWNHAM. *December 6th*, 1893.

TIME OF FLIGHT OF LUPERINA CESPITIS.—During September I twice noticed *L. cespitis* on the wing between 4 and 5 p.m. I have seldom taken it at light before 11 p.m., so that it seems probable that there are two distinct times of flight.—J. H. D. BEALES, West Woodhay Rectory, Newbury.

MACROGLOSSA STELLATARUM NEAR MANCHESTER.—On June 20th I took a specimen of *Macroglossa stellatarum* in one of our greenhouses, and heard that others had been seen in the neighbourhood.—WILFRID STONES, Northwood, Seymour Grove, Old Trafford, Manchester. *November 25th*, 1893.

SECOND BROOD OF NEMEOPHILA PLANTAGINIS.—In looking over the "Notes on Collecting" in this month's *Record*, I notice that the Rev. F. B. Newnham mentions an instance of a larva of *N. plantaginis* spinning up in September. That does not appear very strange to me, as I have found no difficulty in rearing a second brood of *N. plantaginis*; in fact, I have reared a second brood every year for several years, and last year tried to get a third but was unsuccessful. I obtained larvæ at Scotstown Moor in the beginning of May. The first imago emerged on June 18th. On June 21st I got eggs from a female which hatched on June 28th, and the larvæ began to spin up on August 14th. The first imago of the second brood emerged on August 27th. I had then some difficulty in getting a pairing, and it was September 4th before I got eggs from the second brood. These hatched on September 11th and fed up with little trouble until the middle of October, when, unfortunately, I could not attend to them as they required, so they hybernated. A friend of mine, Mr. J. Duncan, successfully reared a number of a third brood, but he had to put them on their food every day to keep them from hybernating. He fed the larvæ on cabbage.—WM. COWIE, 5, Canal Street, Aberdeen. *November 26th*, 1893.

BLIGHT.—We have in this part of the country a very extraordinary superstition with regard to what goes by the name of "blight." Frequently during the summer, after a spell of hot weather, there follow two or three close and "thundery" days when the sky is completely overcast, though without any sign of immediate rain, the effect being to make everything dark and dismal. If at such a time a

countryman is asked his opinion of the weather, he will, in all probability, say that he doesn't think we shall have any rain, it looks to him more like "blight," and here his knowledge ends. What is meant I have never yet been able to discover, but the general impression seems to be that the air is so densely packed with flies as to obstruct the light, and that it may remain so for several days together—a highly probable event! Another entirely new and interesting fact which I learnt the other day from a gentleman was, "that, after a succession of easterly winds, all trees and plants are found to be covered with thousands of grubs which have been brought by the wind"—perhaps from the depths of the German Ocean? I should like to know if any similar phenomena have been observed by entomologists in other parts of the country.—ALFRED J. JOHNSON, Boldmere, Erdington. *October 19th*, 1893.

LATE OCCURRENCE OF ARGYNNIS EUPHROSYNE.—I took a fine fresh specimen of this butterfly at Darenth on September 6th. Is this not unusually late?—B. SCARFE, Dartford, Kent.

COLIAS HYALE.—This species seems to have been scarce in this locality during the past season. I only saw one specimen, which I captured near Darenth Wood on August 13th.—B. SCARFE, Dartford, Kent.

NOTES OF THE SEASON 1893.

York.—The season which is now rapidly drawing to a close, and which will long be remembered meteorologically on account of the marvellous weather experienced, has not been (here at least) equally memorable for the quantity or quality of the lepidoptera noticed. Many generally common insects have been either very rare, or else entirely conspicuous by their absence; the only species which have been more than usually common at York this season are the following:—*Pieris brassicæ, P. rapæ, Vanessa urticæ, V. atalanta, Acherontia atropos, Sphinx convolvuli, Macroglossa stellatarum, Orthosia suspecta, Anchocelis litura, Phlogophora meticulosa, Hadena protea, Abraxas sylvata, Venusia cambricaria, Lobophora lobulata, Collix sparsata, H. marginata, Thera variata, Diurnea fagella*; whilst of those which have not occurred in anything like their usual numbers the following, amongst many others, may be quoted:—*Zygæna loniceræ, Lithosia mesomella, Arctia lubricipeda, Acronycta leporina, Noctua festiva, N. rubi, Hadena porphyrea* (? Ed.), *Taeniocampa populeti, Pachnobia leucographa. Epione vespertaria, Aspilates strigillaria, Eupithecia satyrata, Acidalia immutata, Hypsipetes elutata, Phibalapteryx lignata*, &c. Of those species which have entirely failed to put in an appearance, and which we generally take each season in some numbers are:—*Nudaria senex, Hydrelia unca, Plusia festucæ* and *Chortodes arcuosa*. My first outing took place on the 14th February in quest of the variety *fuscata* of *Hybernia progemmaria*, of which I took six; my last on the 3rd November, when sugar produced but a few *Scopelosoma satellitia* and *Orrhodia vaccinii*; *H. aurantiaria, H. defoliaria, Cheimatobia boreata* and *C. brumata* were very scarce, whilst *Oporabia dilutaria* and *Himera pennaria* were not seen. I have noticed the gradual diminution in point of numbers of these species for the past ten years; each year they become scarcer in this neighbourhood; why, I know not. Owing to the almost tropical weather, instances of early appearances have been far too numerous to mention here;

on the whole, species have appeared fully a fortnight earlier than usual, in many instances three weeks, and in some exceptional cases even a month in advance of ordinary seasons. *Melanism.*—Instances of melanism in specimens captured this season have not been up to the average. A very large number of the NOCTUÆ and GEOMETRÆ (especially of the former) which occur in the neighbourhood of York, are more or less subject to melanism. A full list of the species which show this tendency and have come under my observation will be given at some future date. *Sallows* were very unproductive, being out by the 10th of March, and doubtless on this account the generally seductive blossoms failed to attract the *Taeniocampae* in anything like the usual numbers. *Sugar*—Whilst we have had very few poor nights at sugar, the quantity has rarely been great, and the quality invariably poor; the reason for this has been in my opinion, not the counter attraction of honeydew at which I have noticed very few moths, but the general scarcity of NOCTUÆ. *Ivy-blossom*—On the 30th September I had my first night at ivy-blossom in the Westwood Beverley, where the ivy is especially abundant, clinging in wild luxuriance around the fine old hawthorn trees which here form such a conspicuous feature of the landscape, but although the night was favourable from a meteorological point of view, the blossom fine, large, and plentiful, and the odour perceptible even to human nostrils, our would-be guests failed to put in appearance, except by ones and twos; it was a very different night at ivy-blossom from those one often reads about. A friend of mine, who has worked ivy on numerous occasions this season, informs me that he has had almost uniform bad luck. *Scarcity of Lepidoptera.*—GEOMETRÆ have been on the whole very scarce, and "mothing" at, and after dusk uniformly unproductive. In the day time at rest on tree trunks, palings, &c., but especially the former, *Tephrosia biundularia* and its variety *delamerensis*, *Venusia cambricaria*, *Asthena blomeri*, *Lobophora lobulata*, *Tephrosia punctulata*, *A. ulmata*, &c., have been fairly common, whilst *H. marginata*, *Thera variata*, *Fidonia piniaria*, could be obtained in abundance by means of the "beating stick." I think this scarcity has been due in a great measure to the extraordinary abundance of their natural enemies—Ichneumons, Wasps, Dragon-flies, and Bats, which together with Swifts, Nightjars and other insectivorous birds have, thanks to the fine weather, been enabled better to follow their work of destruction, and lastly and by no means least, to the great drought which has prevailed; these causes have also undoubtedly tended to minimise the number of larvæ, which have been unusually scarce. *Double-brooded Species.*—The following species of NOCTUÆ, which are not usually double-brooded with us, have this year been either wholly or partially, double-brooded:—*Leucania pallens*,* *Cuspidia psi*, *Viminia rumicis*,* *Noctua plecta*,* *N. c-nigrum*,* *Agrotis segetum*,* *A. suffusa*,* *Hadena suasa*,* and *H. oleracea.*—WILLIAM HEWETT, 12, Howard Street, York. *November 11th*, 1893.

Plymouth.—The collecting season here began early, and continued excellent till June; larvæ were plentiful, and imagines appeared in abundance in our breeding cages and out of doors; unfortunately, our

* We are inclined to doubt whether in most English localities, *Leucania pallens*, *Viminia rumicis*, *Noctua plecta*, *N. c.-nigrum*, *Agrotis segetum*, *A. suffusa* and *Hadena suasa* are not always partially double-brooded.—ED.

opportunities were few whilst this state of things lasted, and when we had more leisure after midsummer, lepidoptera were over, and hard work resulted only in a few solitary additions to our captures. In the spring our breeding cages produced *Amphidasys prodromaria, Asphalia ridens, Eupithecia pulchellata, Selenia lunaria, Smerinthus ocellatus, Acronycta leporina, Acronycta alni, Moma orion, Anarta myrtilli, Thyatyra batis,* and *Geometra papilionaria*; the *Taeniocampae* were plentiful at the sallows; *Notodonta chaonia* and other species came to light; *Nola confusalis* and *N. centonalis** were found at rest on trees; *Melitæa athalia* was plentiful in one locality, and among other captures may be mentioned:—*Macaria liturata, Moma orion, Lithosia mesomella, Gnophria rubricollis, Asthena sylvata, Hecatera serena,* and *Cleoceris riminalis*; the following were some of the larvæ taken:—*Triphæna fimbria, Geometra papilionaria, Asphalia flavicornis* and *A. ridens, Phigalia pedaria, Taeniocampa miniosa, Asteroscopus sphinx, Notodonta chaonia, Panolis piniperda, Eugonia erosaria, Amphidasys prodromaria, Oporina croceago,* and *Psilura monacha.* After midsummer we took *Geometra papilionaria* ♀ and ♂ at sugar; *Anarta myrtilli, Charaeas graminis, Eugonia fuscantaria, Stilbia anomala, Sphinx convolvuli, Noctua glareosa, Epunda nigra,* and *Xylina rhizolitha,* the last three at ivy-bloom; also a few larvæ including *Notodonta dictæa, N. dictæoides,* and *N. trepida, Acronycta leporina, A. alni,* and *Geometra papilionaria.* Our experience is that the dry season has prevented the abundant spring larvæ from getting through the pupal stage and producing imagines.—H. W. Basden-Smith, 6, Hillsborough, Plymouth. *November 30th,* 1893.

North Devon.—I was staying at Morthoe, not far from Ilfracombe, from June 24th to July 10th, 1893, and was able to note certain of the lepidoptera which occur there and in the surrounding district. I may mention that an interesting article on the same locality at a somewhat later period of the year, from the pen of Dr. W. S. Riding, is to be found in *Entom.*, Vol. xvi., p. 246 (1883). Amongst the Rhopalocera, *Pieris brassicæ, P. rapæ* and *P. napi* occurred in some abundance; *Argynnis aglaia* flew wildly along the hillsides, and *A. paphia* frequented the more woody districts, especially near Clovelly. The genus *Vanessa* was well represented; *V. io* and *V. atalanta* were common, *V. cardui* turned up occasionally, while *V. urticæ* swarmed everywhere, and was found in all stages from young larvæ to battered imagines. *Pararge ægeria* and *P. megæra* were occasionally seen; *Satyrus semele* was very abundant; *Epinephele ianira* was, of course, everywhere, and bleached forms were occasionally met with; *E. tithonus* and *E. hyperanthus,* as well as *Cœnonympha pamphilus,* were plentiful; *Thecla quercus* flew over the oaks near Clovelly and Lynton in great numbers; *Polyommatus phlæas* was not abundant; *Lycaena icarus* was common, but interesting, both sexes were large, the ♀s were dark and the ♂s had black spots on the upper side of the hind-wings, a character which I do not remember to have noticed except in Irish or Scotch specimens; *L. astrarche* was represented, so far as my captures were concerned, by a single specimen; probably I was there between the two broods; *Hesperia sylvanus* and *H. thaumas* occurred; *Colias edusa* was not seen.

* Can this be possible? The only known British localities for *N. centonalis,* are, Deal sandhills, Folkestone, Hastings (one specimen), and Isle of Wight (one specimen).—Ed.

With the Sphinges and Bombyces very little could be done. *Macroglossa stellatarum* occurred frequently; of *Zygaena filipendulæ* I only saw one pupa; a solitary *Bombyx neustria* was netted at dusk on the sandhills. Sugar, on the few occasions on which it was tried, proved a failure; consequently one could not get much of an idea of the local Noctuæ, but the following came under my notice:—*Bryophila perla*, one or two specimens at rest; of *Leucania littoralis* I procured a good series flying wildly at dusk and at rest on flowers afterwards; something very much like *L. putrescens* was taken out of a spider's web, but the occupant of the web had treated it too roughly for me to determine its identity with certainty; *Apamea didyma* occurred in the usual variety of forms, and the same remark applies to *Miana strigilis* and *M. bicoloria*; one or two specimens of the last species were unicolorous and of a bright brick-red tint; *Caradrina alsines* and *C. taraxaci* were common, but worn; of the genus *Agrotis* I noted *A. vestigialis*, *A. segetum*, *A. lunigera* and *A tritici*, all of which were taken on the sandhills; of *Triphæna comes* some good forms were taken; one, which was strongly barred, reminded me when at rest of *T. ianthina*; another was a very pale clay-coloured form with straw-tinted hind-wings; a few *Amphipyra tragopoginis* were seen; one or two *Dianthœcia conspersa* were netted flying over flowers of *Silene maritima*, and in the capsules of the same plant were numbers of larvæ of this genus, amongst which I recognised *D. conspersa*, *D. capsincola*, *D. carpophaga* and *D. cucubali*; the imagines of *D. conspersa* were of the usual light southern form, not ochreous as is, I believe, usually the case with the Devonshire variety; a number of *D. capsincola* have since emerged from the above-mentioned larvæ, but the other species appear to be lying over till next year; larvæ of *Cucullia verbasci* had been abundant, but were nearly over. Amongst the Geometræ observed were the following:—*Crocallis elinguaria*, not common; *Boarmia repandata*, frequent; *Gnophos obscuraria*, a rather dark form almost identical with that found in the Clevedon district in Somerset; worn *Emmelesia affinitata*, *E. alchemillata* and *E. decolorata* flew at dusk in the lanes, and larvæ of the first and last of these species were common in capsules of *Lychnis dioica* in company with those of *Eupithecia venosata*; larvæ of *E. pulchellata* were exceedingly common in foxglove flowers, but, as usual, about 90 per cent. were ichneumoned; single specimens of *E. oblongata* and *E. absynthiata* occurred here and there; I gathered a large bag full of the flowers of *Melampyrum pratense* at Lynton, and obtained from it about a dozen pupæ of *E. plumbeolata*; special search was made for larvæ of *E. jasioneata*, its food plant (*Jasione montana*) occurs generally, but as I was some 25 miles from the reputed headquarters of the species, I was not sanguine; however, I managed to find a few larvæ; in this part of Devon it is a scarce and very local insect. *Melanippe unangulata* and *M. galiata* occurred sparingly, while *Eubolia mensuraria* was common. Of the Pyralides I saw single specimens of *Scoparia cembræ* and *S. lineolea*, and plenty of *Pyrausta purpuralis* and *Herbula cespitalis*; *Botys asinalis* was not rare at dusk amongst its food-plant on the sandhills. The Plumes were represented by a few specimens of *Pterophorus monodactylus* and *Chrysocorys festaliella* only. *Anerastia lotella* was common on the sandhills at dusk; specimens of *Homœosoma nimbella* were found at rest on the ragwort heads at the same time, and *Aphomia sociella* was frequent. Among the Tortrices which I noticed, *Peronea*

variegana was common and variable; larvæ were in evidence on the *Rosa spinosissima*, and from a bag full I bred a nice series of *P. permutana* which were small but very brightly coloured; over the same plant *Spilonota roborana* abounded at dusk; specimens of *Orthotænia striana* and *O. ericetana* were netted; *Grapholitha nigromaculana* was abundant flying over ragwort; *Sericoris littorana* was frequent amongst its food-plant on the cliffs; *Ephippiphora brunnichiana* and *E. trigeminana* abounded; *Enpœcilia atricapitana* and *E. ciliella* were frequent; I found *Trycheris mediana* common on heads of *Heracleum sphondylium*, half a dozen specimens or so on every head.—W. G. SHELDON. *December 26th*, 1893.

SOCIETIES.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —*December 14th*, 1893.—Exhibits:—Mr. South; specimens from South Europe of *A. adippe* vars. *cleodoxa* and *chlorodippe*; a var. of *T. rubi* from Ireland, the upper side of which was very dark, whilst there was no green on the under side, but the white spots were strongly developed; also *S. malvæ* var. *taras* from Exeter, in which locality it was said to be not uncommon. Mr. Pearce; a long series of *Chrysophanus hypophlæas*, series of *Colias philodice* including pale form of ♀, *Terias nicippe* with yellow form of ♂, *P. rapæ* and various species of *Lycaenidæ*, all from Alleghany Co., U.S.A.; also *Nathalis iole* from Colorado. A discussion ensued as to whether *C. hypophlæas* should be considered a distinct species. Mr. J. J. Weir; *Planema eurvta*, an Acræine butterfly from the Cameroons, in which the sexes differed materially both in colour and shape, and which was mimicked in each of these respects by the corresponding sexes of *Pseudacræa pirce*, a Nymphaline species. Mr. Turner; a long series (bred) of *T. juniperata*, arranged to show the varied interruption of the band on fore-wings. Mr. Billups; *Driastata basilis*, a rare Dipteron from Bromley, Kent, which had not hitherto been recorded as British; also the following species of Ichneumonidæ, bred by members:—*Ichneumon fuscipes* from larvæ of *A. myricæ* (Mr. Short): *Rhizarcha ærolaris* from larvæ of the Dipteron *Phytomyza aquilegia* (Mr. Billups); *Colas dispar* from larvæ of *M. aurinia* (Mr. Frohawk); *Ichneumon pyrrhopus* from *Eupithecia helveticaria*, *Glypta bicornis* from *Tortrix palleana*, *Anomala cervinops* from *H. dipsacea*, and *Lissonota sulphurifera* from *S. scoliiformis* (Mr. Adkin). Mr. Adkin; a varied series of *T. gothica* from Rannoch. and yellow forms of *Z. trifolii* from Cambridge.—HY. J. TURNER, *Hon. Report Sec.*

ENTOMOLOGICAL SOCIETY OF LONDON.—*December 6th*, 1893.—Mr. W. F. Kirby exhibited, for Dr. Livett, a series of specimens taken at Wells, which Dr. Livett considered to be varieties of *Dasycampa rubiginea*, but which many entomologists present thought were varieties of *Cerastis vaccinii*. Mr. Kirby added that specimens similar in appearance to those exhibited had been taken rather freely during the past autumn in Berkshire, and it was suggested that they might be hybrids between *D. rubiginea* and *C. vaccinii*. Mr. Lovell Keays exhibited, for Mr. A. L. Keays, a series of *Lycaena alexis* with confluent spots on the under sides of the front wings. He drew attention to the fact that the insects were

all taken within a short radius, and probably were in the proportion of about one to forty of the ordinary form. All, with one exception, were females. Mr. Lovell Keays remarked that he had some years ago met with a similar brood near Weymouth in which the confluent spots were entirely confined to females, but in that instance the proportion was much higher. Professor S. H. Scudder, of Cambridge, Mass., U.S.A., stated that he had observed the occurrence of broods with suffused spots in America, but they were not confined to any special locality. Mr. C. O. Waterhouse exhibited the type-specimen of *Coptomia opalina* of Gory, from the Hope Collection at Oxford, and pointed out that it was quite distinct from *C. mutabilis*, W; the distinct punctuation of the whole insect and its striolate pygidium were sufficient to distinguish it at once. Mr. Waterhouse called attention to this because some French entomologists maintain that these insects are the same species. He also called attention to *Silpha atomaria*, Linn. (*Syst. Nat.*, xii., i., p. 574), a Swedish species which appeared to have escaped notice and was not included in any catalogne. The type is still extant in the Linnæan cabinet, and Mr. Waterhouse said he was of opinion that it is *Olibrus geminus* of our collections, but he had not had an opportunity of making a critical examination. He also exhibited male and female specimens of a *Helopeltis* (Tea-Bug) which he considered a distinct species, and stated that it had occurred only in Assam. Mr. M. Jacoby exhibited certain species and varieties of the genus *Ceroglossus* from Chili, and Dr. D. Sharp, Mr. J. J. Walker, and Mr. Champion made remarks on their geographical distribution. Prof. Scudder exhibited the type-specimen of a fossil butterfly—*Prodryas persephone*—found in beds of Tertiary Age (Oligocene), at Florissant, Colorado. He said the species belonged to the *Nymphalidæ*, and the specimen was remarkable as being in more perfect condition than any fossil butterfly from the European Tertiaries; he also stated that he had found a bed near the White River on the borders of Utah, in which insects were even more abundant than in the Florissant beds. Dr. Sharp, Mr. Kirby, Mr. H. Goss and the President took part in the discussion which ensued. Mr. Goss exhibited hybernating larvæ of *Spilothyrus alceæ*, which had been sent to him by Mr. F. Bromilow from St. Maurice, Nice. Mr. W. F. H. Blandford read a paper entitled "The Rhynchophorous Coleoptera of Japan. Part III. Scolytidæ." The President, Dr. Sharp, Mr. Champion, Mr. McLachlan, and Mr. J. J. Walker took part in a discussion concerning the distribution of the group; and the admixture of Palæarctic and Oriental forms in Japan. Mr. G. T. Bethune-Baker read "Notes on some Lepidoptera received from the neighbourhood of Alexandria," and exhibited the specimens. Mr. McLachlan suggested that the scarcity of insects in Lower Egypt was possibly to be accounted for by the fact that much of the country was under water for a portion of the year, and Dr. Sharp said that another cause of the scarcity was the cultivation of every available piece of land for centuries past. Mr. C. O. Waterhouse read "Further Observations on the Tea-Bugs (*Helopeltis*) of India." Dr. F. A. Dixey communicated a paper "On the Phylogeny of the *Pierinæ*, as illustrated by their wing-markings and geographical distribution."—H. Goss and W. W. Fowler, *Hon Secs.*

Birmingham Entomological Society.—*November 20th*, 1893.—Exhibits:—Mr. Rossiter; *A. tincta*, *H. contigua* and *H. protea* from Arley; also a specimen of *X. scolopacina* from Shut Mill. Mr.

Martineau; *Bombus muscorum, B. sylvarum* and *B. cognatus,* and pointed out that these three bees, though remarkably alike in appearance, might easily be distinguished from one another by the arrangement of the hairs. Mr. Bradley; males, females and neuters of *Vespa crabro* from Astwood Bank; also *Ammophila sabulosa* from Cannock Chase, and remarked that Mr. Saunders in his *Hymenoptera Aculeata* gives no Midland localities for the latter species. Mr. Harrison; a nest of *B. cognatus* from Harborne with males, females and neuters; also lepidoptera taken during the Society's trip to the Cotswolds in June, among them being *N. lucina, E. jacobaeæ* and *N. plantaginis.* Mr. Urich, of Trinidad, communicated "Wayside Notes of a Naturalist," in which he described a walk in the neighbourhood of Port-of-Spain. A number of photographs of the district were shown, also a boxful of insects which had all been captured during a single walk. It contained about 50 dragon-flies and 130 lepidoptera.—C. J. Wainwright, *Hon. Sec.*

Lancashire and Cheshire Entomological Society.—*December 11th,* 1893.—Exhibits:—Mr. Harker; living specimens of a *Corynetes* feeding in Copra, from Singapore, and *S. scoliiformis* from the North of Scotland. Mr. Newstead; a nest of *Vespa vulgaris* which had been built to a rafter inside an outhouse. Mr. Gregson; a specimen of *H. peltigera* captured at Wallasey in 1887. Mr. Schill read "A Few Introductory Remarks on the genus *Vanessa* and its allies." He insisted upon the importance of studying single groups rather than of attempting to form gigantic collections of whole orders, and pointed out the chief characters by which the genera and species could be differentiated. Mr. C. G. Barrett contributed some remarks on Mr. Merrifield's recent experiments upon the effect of temperature on the genus *Vanessa.* Mr. C. E. Stott showed a specimen of *Ammophila lutaria,* Fb. captured near Blackpool in July, 1892, and read some notes on the species.—F. N. Pierce, *Hon. Sec.*

City of London Entomological and Natural History Society.—*Tuesday, December 19th,* 1893.—Exhibits:—Mr. Battley; a short series of *Himera pennaria* from Epping Forest and bred specimens of *Eupithecia lariciata,* also several doubtful "Pugs" from Hale End, most of which were thought to be *E. castigata.* Mr. Prout; bred *Emmelesia alchemillata* from Sandown, also *E. affinitata* from various localities; there was no appreciable difference between the specimens, except the slightly superior size of the *affinitata.* Mr. Riches; *Orrhodia vaccinii* from Salisbury. Mr. Clark; a series of *Thera juniperata* (bred) from Perth, concerning which he remarked that they were paler than the southern form, as is usually the case with this insect. Mr. Gurney; *Hybernia defoliaria* from Hale End, including some pretty varieties. Mr. Nicholson; one of the new opera glasses brought out Mr. Aitchison of Poultry; this instrument is particularly suitable for field work on account of its extreme lightness (being made of aluminium), its compressibility, and the power and beautiful definition of its lenses. Dr. Sequeira; a short series of *Triphæna fimbria,* including a magnificent red specimen, also *Dasychira pudibunda* and *Hybernia defoliaria.* Mr. Southey; *Dicranura bifida* and *D. furcula, Notodonta palpina* and *N. dictæa, Cucullia chamomillæ* and *C. umbratica, Epione apiciaria, Hypsipetes elutata* and *Camptogramma fluviata,* all from Highgate and mostly bred. —C. Nicholson and A. U. Battley, *Hon. Secs.*

A DITTY.

'TWAS one p.m.: I sorely wished
My appetite were blunter;
Five hours since my last meal was dished!
I met a bad bug-hunter.

He gave me food, he gave me drink:
His air was gay and frisky:
The food was sandwiches, I think:
The drink, I know, was whisky.

I liked his commissariat:
I did not like his manner:
He wore a large and airy hat:
He waved a red bandana.

The dust it blew: his coat so brown
Was powdered like a miller:
I took my cap and brushed him down:
He'd caught a black Sibylla.

I smoothed his hair: I tied his tie:
His boots with treacle painted:
I asked him for his butterfly:
He gave it up—and fainted.

His nose I smote: his nose it bled:
My ears with joy were ringing:
He oped his eyes, and as I fled
I heard him softly singing.

"I creep all day along the down:
I crawl through copses shady:
Take here a dusky Meadow-Brown,
And there a Painted-Lady."

'Twas five p.m.: I sipped my tea:
My appetite grew blunter:
"Sibylla black belongs to me!
Bless, bless that bad bug-hunter."

G. M. A. HEWETT.

NOTICES AND REVIEWS.

Random Recollections of Woodland, Fen and Hill, by J. W. TUTT, F.E.S.—This is a book that should be in the hands of every lover of nature; whosoever delights in the sights and sounds of God's earth, and for whom the breezy down, the leafy wood, the flower-clad fields, the country lane, possess more of interest than the garish city, will read it with enjoyment, and will find that its perusal has given an increased zest to his communion with nature. It is of the type with which we have been made familiar by the writings of the lamented Jeffreys, and of the talented author whom we know as "A son of the marshes," and if the subtle artistic flavour be less manifest than in the works of those authors, the deficiency is amply atoned for by the more profound scientific insight displayed.

The book consists of nine chapters, each dealing with a specified locality and each, as is evident from the incidents, humorous and otherwise, introduced, containing a reminiscence of visits of longer or shorter duration paid to the locality by the author. The localities are very various both in kind and in their geographical situation; Wicken, Chattenden, Deal, the Western Highlands, the South Foreland, Strood, Cuxton, Paris and Freshwater, are each in turn the subject of a chapter; the reader is made the companion of the keenly observant author in his rambles, and not only learns something of the occupants of each locality and their habits, but is introduced to many of the scientific problems which occupy the mind of the thoughtful student of nature. These are, however, dealt with in untechnical language, and in a manner easy of comprehension.

As might be expected from the well-known proclivities of the author, the insect world comes in for a large share of attention, but the observations on birds, reptiles and plants, with here and there a glance at the forces at work upon the solid earth itself, reveal a many-sidedness not so evident in the writings of the authors before

alluded to. Many passages tempt to quotation. As the readers of the *Record* will probably be chiefly interested in the entomological portions of the work, these will be selected as the source of one or two extracts. Frequent reference is made to the marvellous resemblance of the Lepidoptera to the plants, &c., among which they occur and to the way in which nature has brought this about, thus leading to their protection from their enemies, and securing the perpetuation of the species. Here is one such taken from the chapter on the Western Highlands:—

"Ah! there is a specimen of a "carpet" moth as it is called (*Cidaria immanata*), black with faint wavy lines on it, and there is another and yet another. Why! is not that the same kind of moth that we found so abundant on the birches by the Donich Burn? but those were all pale, of a beautiful silvery grey tint, and were difficult to detect on the bark of the birches. Yes, it is the same kind, the very same, but how different in appearance, how variable in hue! What has caused the difference? This is not far to seek. The birds in these Alpine regions have to search keenly for food. A pale moth on this black rock would be conspicuous and would fall a ready prey, but we have noticed how difficult the dark ones are to see. The dark ones are best protected, therefore most of them escape, and the dark race has become permanent here. On the birch trunks the dark ones would be conspicuous, the pale ones protected; hence the dark ones are eaten, the pale ones left; a pale race would be favoured under these conditions and would establish itself there."

The following account of the "Love-making of the Ghost" is a good example of the author's descriptive powers: "See yonder! away on that open piece of grass land, a large white moth swings to and fro with pendulous motion. Its sheeny white colour is striking and remarkable; it attracts your attention. It looks as if it were tied to a string, so regularly does it oscillate. Mark another and yet another, all oscillating in the same regular fashion. What does it mean? Have they a purpose in their oscillation? Watch! Whilst you wait you perceive a faint but pleasant odour as of almonds; as you wonder whence it comes a dark-coloured moth suddenly passes before your eyes; you see it strike the white moth you are watching, and they disappear as if by magic. Where are they? Gone, absolutely vanished into the mists of these marshes, perhaps flying now a mile away in different directions. Perhaps it was an accident. Perhaps the white eerie-looking pendulum was disturbed by the sudden collision with that dark moth and took fright. Let us watch another. The same scent, another rush of a dark moth, a similar collision, a similar sudden and absolute disappearance. You watch again and again always with the same result. Light your lantern, if you have one! Look on the herbage at your feet! There, scattered all over the grass and hanging from it in every direction, are large yellow moths, whilst attached to each is a white one such as you watched. Did it not fly away then into the misty distance? No! the dark moth that flashed across your eyes is the yellow one below. The scent which you noticed had attracted her from afar. She had come to seek her mate, conspicuous by his sheeny whiteness. The sudden knock against him was simply to inform him of her presence and of her readiness to receive his love embrace, and there are those happy moths, which had disappeared so suddenly from sight, hanging from the grass culms at your very feet."

Another point to which attention is frequently directed is the life-history of insects and the changes through which they pass in their progress from the egg to the perfect state, with a glance from time to time at the anatomical and physiological facts involved in these changes. The process of changing its skin which the caterpillar of every butterfly and moth goes through more or less frequently in the course of its existence, is thus described in connection with the Swallow-tail butterfly. "A plant of wild carrot at our feet is next examined. A little spiny black caterpillar with a white saddle on its back sits in the centre of a leaf, and represents this magnificent butterfly in an early stage, and there, higher up on the same plant, is a magnificent fellow in brilliant green with velvety black rings and orange-golden buttons. It is still the same species but of older growth. . . . . But how does the small, black, spiny caterpillar become changed into a smooth brilliant green one? Perhaps in the course of our morning's walk we shall be able to learn. Yes! there is a caterpillar quite at rest in the centre of that wild carrot leaf. Look carefully! You will see that it has spun some white silk on the surface of the leaf, and has firmly fixed the hooks at the end of its feet into the silk to get a firm foothold. It appears sickly and is quite immovable, but presently it jerks itself from side to side, and as we look, the skin splits at the back of the head, and a gentle swaying from side to side increases the slit. Then a new head is withdrawn from the old one, put up through the first opening, and the previously immovable caterpillar is now full of life. It struggles and wriggles from side to side, and first one segment and then another is pulled out of the old skin until it is finally free and the empty skin is left, sometimes so perfect as to be quite deceptive, whilst the caterpillar rests after its exertion till its soft skin gets tougher by exposure."

These must suffice, but it would be easy to fill a very considerable space with equally interesting quotations.—F. J. Buckell, M.B.

CURRENT NOTES.

The British Naturalist, we are glad to hear, is not to be allowed to collapse. It will in future be located at Warrington.

A fine exhibit of *Spilosoma zatima* was made at the South London Entomological Society's Meeting on Jan. 11th by Mr. W. H. Tugwell, side by side with some picked York varieties. The latter, of course, bear no resemblance to the extreme vars., and it is peculiar that in those specimens (obtained by crossing *zatima* with *lubricipeda*), which nearest approach the York vars., there is great difference between the York forms and the hybrids both in the transverse band of dark spots on the fore-wings and the arrangement of the dark spots on the hind-wings. Many correspondents still ask whether *zatima* and *lubricipeda* are really the same or closely allied species.

The *Pieris daplidice* recorded *ante* Vol. IV., p. 299, is offered for sale in a contemporary with reference to notice in our pages. *Verbum sap.*

We have living larvæ of *Vanessa atalanta* received from Mr. Wolfe, Skibbereen, Co. Cork. Rather unusual for Jan. 11th.

Mr. J. A. Clark, F.E.S., has again been re-elected President of the City of London Entomological Society. The members evidently know when they have a good man.

The Entomologist's Record
AND
JOURNAL OF VARIATION.

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THE EVOLUTION OF THE LEPIDOPTEROUS PUPA.

A SKETCH.

By T. A. CHAPMAN, M.D., F.E.S.

The earliest insects did not possess a pupa proper. It may be doubted whether the term can be rightfully applied to any stage of some of the Orthoptera, or even of some Hemiptera and Neuroptera, the transition from larva to imago being gradual, and extending over several moults, and the habits of the insects differing little in the larval condition from what they are in the imaginal. As the imago came to differ in form and habits from the larva, so there appeared to arise a necessity for a quiescent intermediate stage, which became more and more pronounced as the difference became greater, the change probably taking place along several different lines of evolution.

As we are concerned only with the Lepidoptera, it is not necessary to allude to the illustrations of this furnished by other orders, nor to refer to the systems of classification which may be and have been founded upon this circumstance, and which agree with and confirm those based on other and wider considerations. It would follow, however, from the broad consideration of all orders of insects, that those which possess the most quiescent pupæ have been the most recently evolved, and in that sense, are the highest.

When we come to the Lepidoptera, and, applying this principle, look for the species or family which has the least inactive pupa, we find it in *Micropteryx*, which has been by common consent, on other grounds, regarded as a very low, if not the lowest, lepidopterous type, and presents strong points of affinity with the Trichoptera. In it the segments of the pupa are distinct, and preserve a certain amount of independent movement, all the appendages (palpi, legs, wings, &c.), are separate and distinct from each other, and the whole pupa is rather soft.

When we go to the other extreme, to seek the most inactive pupa, we find, in each family of the Butterflies, pupæ possessing no movement whatever, and which consist of a smooth, rounded, hard case, with the several segments and appendages represented only by obscure lines on the surface. A few species, classed amongst the Tineina, appear to have reached a similar point by an independent route.

Looking for intermediate stages between these two extremes, we find many of them represented, not perhaps always, nor even often,

by a form in the exact genealogical line, but by forms which have branched off at different stages, and which have gone longer or shorter distances on their own paths. The great mass of our larger moths (Macros), Sphinges, Bombyces, Noctuæ, Geometræ, quite independently of the Butterflies, have reached a very advanced point on this line, and seem quite satisfied that it is as advanced as is necessary; they have evolved a tolerably uniform and apparently very fixed type of pupa, in which the appendage-cases are firmly incorporated with the general mass of the pupa, and in which complete solidity and rotundity are wanting only in so far as that the 5th and 6th abdominal segments still retain the power of movement on those next to them.

When we examine these pupæ of the large moths, and those of the Butterflies, more closely, we find that they agree throughout in certain characteristics. Of these, the most notable are, that the wings and leg-cases are fused into a mass which always includes the 4th abdominal segment, neither more nor less, the margins of the wings and the extremities of the antennæ and of the third pair of legs usually reaching to its hind margin; whilst the next incision, that between the 4th and 5th abdominal segments possesses movement, except in those Butterflies where mobility is entirely lost. We find also sundry other points of importance. Firstly and chiefly, the appendages represented on the surface are the wings, antennæ, portions of the two anterior pairs of legs, and rarely more than the extreme tips, and these often wanting, of the hind pair; but there is no sign of any mouth-part except the maxillæ (proboscis) which are usually well developed; true, there are points representing the mandibles, and the labrum may be identified with a portion of the head, but the labium with its palpi, as well as the maxillary palpi, such marked features in *Micropteryx*, are entirely wanting. There is also wanting a part which we should not perhaps think of looking for, until we had examined other forms of pupæ in which it is present, and that is the dorsal plate of the head segment.

Beginning at the bottom of the scale and tracing our way up to these, we find a wide gap between *Micropteryx* and the form that we can at all regard as next lowest and the nearest to it. We may take *Nepticula* or *Adela* as representing such a form, though I do not wish to suggest that these are very closely allied; rather, indeed, that they (and possibly others), though low in the line of evolution from the primary form represented by *Micropteryx*, have already diverged considerably from each other. Here we find head, thorax and appendages fused together into one mass with one or more of the abdominal segments, but only loosely, so that they are easily separated by a trifling amount of force and separate from each other, more or less, when the imago emerges. At the hinder extremity we find the last three segments, the 8th, 9th and 10th abdominal, fused into one mass in the male pupa, whilst in the female the 7th is added. This difference is no doubt related to the difference in the number of segments which become hidden in the imago within the then terminal segment.

The advance from this form seems to take the shape of an increase in the number of abdominal segments that are incorporated in the thoracic mass. Two segments are so incorporated in *Adela* and *Nepticula*, three in many Tineæ, Psychidæ, Tortrices, as also in *Cossus*, *Hepialus*, &c., and four in *Gracilaria* and *Lithocolletes*.

Evolution did not, however, proceed along a single line, and at some point there branched off the PTEROPHORINA, which have only three abdominal segments in the thoracic mass, but differ from all the species we have hitherto considered, in rarely having a cocoon, and in being fixed by the tail and not possessing any longer the power of locomotion shown in other "Micros" by forcing themselves out of their cocoons when the moth emerges.

Another line, starting off from the main trunk very early in the evolutionary process, since all its forms have still only two abdominal segments involved in the thoracic mass and all force themselves out of their cocoons for emergence, differs in that the larvæ feed more or less exposed, the larvæ of all the others so far (except of some PTEROPHORINA) feeding under webs, within leaves, stems, seeds, &c.; this line, however, reaches a very advanced point in the *Zygaenidae*.

It is a very curious circumstance, and one that has a deeper meaning than I have yet been able to fathom, that, with the exception of *Lithocolletes* and *Gracilaria*, all the forms in which the first four abdominal segments are included in the thoracic mass, also differ in a very important particular from those so far considered; they lose the 7th abdominal segment as a free one in the male, the 5th and 6th alone remaining so, and in some cases these also become fixed. It seems very probable that this step was taken in several different lines of development, or if not, that divergence began immediately after it had been taken.

The Butterflies originated very low down, probably as low as the *Hepialidae*, probably having *Castnia* as a stage, or rather as a side branch from a low and extinct portion of the butterfly stem. (This is usually what is meant when speaking of a lower form as representing a stage of a higher, and not that it is at all a lineal ancestor). The Macros certainly had a separate origin, and represent the highest point on another line of development; I have already alluded to their chief characteristics. The *Chlocphoridae* (*prasinana*, *chlorana*, &c.), have reached a high stage of development, but probably along a separate line. Their pupal characters are almost identical with Macros. Then there are a large number of families that have a pupa largely of the Macro type; the thoracic mass is solid and includes four abdominal segments, and only the 5th and 6th are free; these are to a large extent no doubt side branches from the main stem supporting the Macros, though some may have had a separate origin. They are all separable from the true Macros, by their larvæ possessing prolegs with complete circles of hooks; but they also differ as pupæ in that almost every family has one or more characters which the Macros have lost, but which the earlier forms possess; many have the dorsal head-plate, others have some trace of the maxillary palpus, some dehisce after the manner of the earlier forms, the head- and antennæ-pieces separating together, whilst a few even retain the eye-cover attached to the dorsal head-plate. These are represented by the PYRALES and their allies the CRAMBI, PHYCIDÆ, &c., as well as by families hitherto placed with TINEINA, such as *Hyponomentidae*, &c.

The lowest Butterflies, the Skippers, are very parallel with this last section. The mass of true butterflies differ but little essentially from the Macros, but, unlike them, do not settle down in that form in a fixed manner, but proceed in various ways to higher points, until what we

must regard as the terminus of perfection for a lepidopterous pupa, marked by complete fixity of all parts, and roughly speaking, by complete rotundity, is reached.

CONTINENTAL LEPIDOPTERA SOLD AS BRITISH.

By J. W. TUTT, F.E.S.

Probably never since the sale of the late Dr. Harper's collection, has a collection been brought to the hammer which, nominally purely British, yet contained so many distinctly non-British specimens, as that of the late Rev. Henry Burney.

In the sarcastic article on part of this sale, from the pen of a correspondent adopting the *nom de plume* of "A Country Cousin," which appeared in the December number of this magazine and of which there is a continuation in the present issue, the facts are graphically dealt with, but I should like to let a little more daylight into some of the dark problems which this sale has opened up.

First, how were this and similar collections formed? On the same lines as those which were made in "the good old times," when the correct naming of the specimens was the ultimate aim of the individual forming the collection, and the possession of a larger number of species than his friends and correspondents, his main object in doing so. Only as necessary for the first purpose would the older entomologists, with a few notable exceptions, ever invest a few shillings in a book, and only as subserving the second, would they subscribe to a magazine. Stainton's *Manual* was their salvation in the one direction, and *The Entomologist's Annual* (a yearly magazine showing the additions to the British fauna) in the other. Everything else was outside their province: they could do nothing to advance scientific knowledge, save within these very limited boundaries, and possibly thought that only lunatics could imagine that there was any science outside such limits.

Such were the lepidopterists of the old school until the new and philosophical method of treating natural science involved entomologists along with other naturalists in its vortex. When this took place, the old school became divided into two sections, the broader-minded men being ready and willing to adapt themselves to the changing conditions of study, whilst the narrow-minded, and frequently ill-educated, section kept in the old ruts, lifting up their voices from time to time, now in a chorus of discontent, then in a wail of despair, as they beheld the destruction of "science," as they knew it. Gradually this latter section became more and more fossilized; they still added to their collections, occasionally made a stir by naming a variety as a new species after the manner of the heroes of old, spent enormous sums of money on any specimen that added a species to fill up a blank in their cabinets, but beyond this, became perfectly indifferent to the advance of science which was going on around them.

That this is no overdrawn picture, every advanced lepidopterist well knows. To this day I have two correspondents who, once or twice a year, write and tell me of the additions which they have made to their collection, and how near they have got to a complete representation of the lepidopterous fauna of Britain by obtaining typical specimens. One gentleman writes me that he has added *peregrina* from Burney's collec-

tion, *satura* from Canterbury, and so on: it is his science, all that he lives for, and the poor fellow enjoys it in his way.

It will be no insult to the late reverend gentleman to say that he belonged emphatically to the old school of collectors. For years he has taken practically no interest in entomology beyond the amassing of a large collection, which probably not half-a-dozen men have seen during the last quarter of a century. Out of touch with the newer entomology, ignorant as to what species had been foisted on the British public as natives which had no claim to that position, as well as of the swindlers who live and thrive on the gullibility of collection-makers and rare-species-seekers, he spent vast sums of money upon insects which were foisted upon him as British, by gentlemen (?) who found him an easy prey, and whose specimens, with the warranty of the "Rev. H. Burney's collection" attached to them, are now dispersed to all parts of the British Islands, to crop up as British at some future time to puzzle scientific workers and to throw doubt upon conclusions and deductions that they may have made. Who believes that a single specimen of the *Leucania musculosa*, the *L. loreyi*, the *Notodonta tritophus*, in short of nine-tenths of those species mentioned by "A Country Cousin," had a really British origin? Some do, you say, or they would not have bought them. Just so, but these buyers knew that the specimens are worth their money as an investment, and buy them as such to sell to other collectors either now, or at some future time when their own collections go to the hammer. But, apart from the buyer, who does believe in their British origin? Well, I will leave it to each individual's own common sense to find an answer to the question.

Now there are two kinds of people who are involved in this fraudulent sale of British specimens. Kent has for many years had an unenviable notoriety. Canterbury and its neighbourhood have been, and perhaps still are, a by-word in entomological circles. London perhaps comes next, unless indeed it has to yield to Aberdeen, which, during the last few years has out-Heroded Herod, whilst the Isle of Wight has increased in shadiness in recent years. But this is due to individuals who outdo themselves, whom the older collectors know too well, and who have to find a fresh coterie of buyers among the younger additions to our ranks on whom to try their charms. These persons send out their specimens of *A. lathonia*, *P. daplidice*, *L. acis*, *V. antiopa*, *Sphinx pinastri*, *Deilephila livornica*, *Deiopeia pulchella*, *Lythria purpuraria*, *Aplasta ononaria*, *Eubolia moeniata*, *Leucania musculosa*, and so on, on their own account, trusting to their cheek to help them through. But there is another class of rogues who use the names of well-known lepidopterists to conjure with. An illustration referring to myself will suffice. In the Burney collection was a specimen marked in the Catalogue as "*Cerastis erythrocephala* var. *glabra* (Mr. Tutt)." This was Lot 169. Then Lot 184 reads:—"*Herbariata* (Mr. Tutt) 2." Now I have never seen a living specimen nor have I exchanged a specimen living or dead of either of these insects in my life; nor had I ever seen these specimens until they were exhibited for sale in the Rev. H. Burney's collection. Some rogue therefore, either in my name, or in his own with a forged guarantee, sold these to Mr. Burney, and thus a clue is obtained as to the way in which that gentleman became possessed of his rarities. A space to fill was sufficient, money did the rest. I never wrote to Mr. Burney in my life. I wonder whether anyone would pass off these species on any of our

younger men so easily; I fancy that such would make enquiry of me before they bought them. All I would say to future workers concerning the specimens from this collection is, "If at any time you are posed by apparent facts deduced from specimens obtained from Mr. Burney's collection, and if such facts are contrary to conclusions that you would otherwise have drawn, stick to your common-sense conclusions, and suggest that the owners of the specimens should in the cause of Science, place them in the fire at the earliest opportunity.

This subject has long been before the public. In my position as Editor of this magazine, I have learned facts which have long since carried me past the stage of disgust. During the last two months material has been put into my hands concerning two men from Aberdeen, that would keep them from imposing on entomologists for a long time if one of the victims took proceedings against them. Our own note at the head of the Exchange column explains itself, but whilst collectors show so much anxiety to make up their collections at the quickest possible rate, they must expect to get a liberal education—and to pay for it. Of course Science is not always the aim of those who advertise in the Exchange column; in the pages of the magazine these exchange swindles have no place, and I only incidentally refer to the matter here, as indirectly bearing on the swindling which distorts, distracts and muddles our science.

I would give something to know who sold the *herbariata* and var. *glabra* to Mr. Burney. Not a dozen men knew that I possessed Coverdale's *herbariata*, until the December number of the *Record* was issued, so that evidently the originator of this *coup* knew me well. The var. *glabra* is of a particular style of setting, which I believe I have seen exhibited at one of our London Entomological Societies. If so, it should be traceable, and perhaps the near future will bring us some further information.

NIGHT WORK.

By Rev. G. M. A. HEWETT, M.A.

All who wander in the night will acknowledge the strange fascination which holds them during that mystic season. It is not easy, however, to say exactly wherein lies the weird spell. Sometimes, as I am walking in a sunken, high-hedged lane, and the wind goes wailing overhead, trailing along the half-visible cloud-drift, I can almost see the spirits of the air, and long to comprehend the strange songs that they sing as they fly. From the unknown they come, and to the unknown they sweep away, and what is it to them if a longing wanderer sees their trailing garments and listens to their music as they pass. So different are they too, and so manifold the feelings that they evoke. To-night you will see a strong spirit, who calls on you to be up and away with him, to shout aloud and lift up your voice mightily in unison with his. He has the strong face of a man, so far as you may behold it. One alone is he and he rules the whole expanse of sky. On another night numbers will not count them; the air is full of them, and every song that you have ever heard makes a strange patch-work of melody in your brain; on some evenings they sing of hope and much possibility of living and doing, and on other evenings of despair,

and that nothing has been or ever shall be. And there is pleasure of a kind even then. Best of all my haunts do I love that sunken lane, with the winds overhead and the stillness of its sheltered banks, where the light-winged moths flit across the ray of my lantern, and the hedgehogs creep after the beetles, while the plovers and the partridges call to their mates over the fields around. Sometimes again I am on the hills, with a breeze coming up along the slopes of the valley. This breeze only *comes*; it never *goes* like the others. Everlastingly up and up the slopes it runs and stops and vanishes. And it too sings its song, but what the song is I cannot hear, although the breeze comes and comes, again and again, and whispers it in my ear. I think I cannot hear it because the breeze never seems to pass beyond me. There is no time for it to echo in the brain. But there is a suggestion in it of health and freshness, of dewy-scented flowers at daybreak before the sun is high. Perhaps it is like the songs of the birds, only to be felt, and not to be translated into notes and words. Like the birds' songs, I can recognise its variations, and that now it sings of this and now of that, but its meaning and its message are too deep, and come from too far off in the future. Perhaps its meaning is hidden because it comes from that chamber of mysteries—the Sea.

And besides all these older and immortal spirits of the breeze, there are the little earth-born fairy zephyrs, some haunting for days the same hill-top and the same dell, and others, born for a moment in any corner, which touch the cheek and die. Voiceless little elves are these, but still presences to increase the sense of wonderment and awe. Men talk of being alone at night, I am never less alone. What does it matter that I laugh at myself and my fancies in the broad sunlight? Night comes again and I know them to be true.

Such are some of the mysteries of the air. And the mysteries of the earth are not less manifold. First come the perfumes—the fresh clean smell of the earth that makes the heart strong, the elder-flowers, the wild rose, the thyme, and, best loved of all by me, the honeysuckle; all unmistakeable in themselves, but suggesting somehow in the darkness all the host of flowers as well; lilies of the valley where none can be, lilac, jasmine, and many an aristocrat of the conservatory. Then the sounds of the earth and its inhabitants. The creaking of the boughs as they sway in the breeze; the rustle of the mice in the wayside grass; the fox's bark; the clamorous good-night of the pheasant as he flies up to his roost; the owls that cry like lost souls; the goat-suckers that clap their wings overhead, and ventriloquise along the bough. Until the nervous system is well trained to all these, there is more than mystery in them, there is terror as well; sometimes terror so abject that the knees give way, and a faint shock creeps up the nerves from the heels even to the hair. I never quite get rid of this creep of the nerves, nor do I greatly care to. It has become a refined sort of pleasure to me—that ultimum of pleasure which is on the borderland of pain.

Look, too, how all the little stunted bushes become gnomes and dwarfs and dull impish figures ready to spring out from the holes and corners. I am never sure whether a perfectly still night is the more awesome, or one whereon a breeze makes the gnomes and dwarfs nod their shapeless heads and beckon with a weird and uncouth finger, and sends the shadows of the branches in the fitful moonlight, flitting like ghosts,

backwards and forwards across the path. Sometimes even the strongest nerves must get a shock. The frightened wood-pigeon clattering from his roost is hard to bear without a start. A cow, frightened by the light of the lantern and blowing across the hedge, seldom fails to thrill the nerves. But I have had worse surprises even than these. I had to stand and wait while a badger came burrowing through the underwood to look at my light. What a size he looked! Unspeakable ferocity glared from his eyes. I must have sat down, resigned to the worst, if he had not fled. Again in the Forest, after my system had got well drenched with mystery and expectant of anything, while wandering through aisles and aisles of gigantic trunks, where the darkness shut me in like a wall outside the rays of my lantern and massed itself like storm-clouds, layer upon layer up among the towering branches, I have shaken a bush to disturb the moths, and with the moths have roused from his woodland lair,—oh, horror!—with a savage snort, the Forest-pig. More frightened than I? No, a thousand times, no! And yet once more. Wending my midnight way from Crabbe Wood, and gazing from the hill-top over the sleeping valley, with a half-moon low in the west and streaks of light cloud far away in the south, have I not stopped in sudden wonderment, to see, darting up from the horizon, in and out among the clouds, up to the very zenith of the heavens, a pale and restless ray of light? I could have endured it better had it remained there, but it vanished and came again, slanting now to east and now to west, and then executing a kind of dizzy dance in the heavens. I suppose it was the search-light from an ironclad in the Solent, but it took me many minutes of anxious thought before I was far enough recovered to proceed.

Such, in brief, are some of the charms and fancies of a night-wanderer. Pages would fail to tell of them all, and pages more might be added to describe some of the discomforts and catastrophes. But how far the ever-present charms outweigh the occasional troubles and disappointments, is a question which no true son of the night will care to discuss. Good Night! Yes. Better than day, even as expectation is better than certainty. Good Night! Who would live by day, were it not for the day's work that must be done in the day. Good Night.

ON THE LARVA OF ARCTIA CAIA,

With special reference to its correlated variations in Plumage, Moulting and Hybernation.

By T. A. CHAPMAN, M.D.

(*Continued from page* 12).

It may shorten the description of the further results observed, if I say at once that the subsequent broods I reared differed from the first by showing an increase in the number of Laggards and much variety as to habit and plumage of the Normals; they also presented very varied forms, intermediate both between Forwards and Normals and between Normals and Laggards, and this multiplication of forms was, on the whole, more marked in each successive brood. So much was this the case, that though I began to arrange in a tabular form the different varieties that occurred, and had reached about fifteen headings; yet after raising another brood or two, I found that each of these headings would have

to be subdivided four or five times, and that several additional headings would have to be supplied, so that I concluded that a tabular arrangement in any detail would make my results less, instead of more intelligible.

The first and largest variation among the Normals was that a large section reached the *fuliginosa* (hybernating) stage only in the 6th instead of in the 5th skin, and there were some that did not do so till the 7th skin. Then of these some would tend towards being Forwards: that is, though passing through a *fuliginosa* stage they would go on, after a very short and formal hybernation, to *caia* plumage and maturity; others, tending towards Laggards, would do much the same, but very slowly.

The greatest interest attaches, however, I think to the Laggards; various types of these were numerous in the later broods, but only a few appeared in the first brood or in any brood from wild ova. By the time Laggards were sufficiently numerous to be studied, they, like the Normals, had assumed a variety of different types.

In all cases they fed more slowly and made less growth at each moult than the Normals, so that a Laggard would be only in its 3rd skin, when a Normal was already prepared to hybernate in its 5th skin; the former also would in its 5th skin be no further advanced as regards size and plumage than a Normal in its 3rd or 4th skin (see Pl. ii., figs. 1, 2, and 3). In one case a Laggard did not reach its last skin until after 13 moults. Others would pass on to *caia* plumage, and progress more rapidly after reaching a certain stage. Though they all seemed willing to perform a modified hybernation at any stage (that is, to eat very rarely and grow very slowly), they were unable fully to hybernate, if taken so to speak unawares, even when they had reached *fuliginosa* plumage. But many individuals would begin hybernation at very uncertain stages, some in *spilosoma*, some in *fuliginosa*, and some in *caia* plumage, but were usually easily forced. It also happened that some aberrant Normals in the later broods prepared to hybernate in distinctly *caia* plumage.

Some figures showing the proportions of different forms may be interesting. Thus, of the second brood: at a particular date there were 4 Forwards in pupa; 1 Intermediates in 6th skin and *caia* plumage; 8 intermediates in 6th skin, but apparently hybernators; (three jars) say 120 Normals hybernating in 5th skin; 30 Laggards with 4th plumage but in 5th skin; one Laggard in 6th skin with 4th plumage. Twenty-five days later these 30 Laggards were thus accounted for; 10 still feeding in 6th skin, 5 laid up for 6th moult, 14 in 7th skin; of these 14, 1 was still in 4th plumage, 3 in ordinary 5th skin plumage, while 10 were similar but tended to be ruddy in front, and 4 of them were almost in adult plumage.

Third Generation.—Brood A was composed of 19 Forwards, 547 Normals, and 130 Laggards. Brood B contained, in the portion which I reared myself, 4 Forwards, 7 Doubtfuls, and 136 Normals; the other portion, which I sent to Mr. Merrifield and which he reared, as already noted, at a temperature of 80°, yielded 150 Forwards, and 50 Normals. It ought perhaps to be stated that Mr. Merrifield expressed his inability to say whether the 50 that were not Forwards were Normals or Laggards, as they became very unhealthy owing to the high temperature, and to their monotonous diet of cabbage.

A second brood raised from eggs laid by the moths produced from the four larvæ of the first brood, to which allusion has already been made (the grand *fuliginosa* form), yielded 1 Forward, several Doubtfuls, 530 Normals, but no Laggards.

A fourth brood, raised in June, was the only one that formed any exception to the rule that Forwards were as rare as in earlier broods. When the brood was four weeks old, a census showed that it was then composed of 76 Forwards: 12 in 5th, 51 in 6th, and 13 in 7th skin; 85 Normals: 35 in 4th, 46 in 5th, and four in 6th skin; 49 Laggards: three in 2nd, two in 3rd, and 44 in 4th skin. In this brood it was very difficult to divide the larvæ into groups, for there was a regular gradation of forms between the 3 Laggards in 2nd skin at one extreme, and the 13 Forwards in adult plumage at the other. The brood no doubt had the benefit of a slightly higher temperature.

Of a sixth brood, some were kept warmer than the rest and yielded 15 Forwards and 34 Normals; of which 14 were larger and 20 smaller hybernators; the remainder, 232 in number, presented 15 Forwards, 79 Intermediates, 44 larger and 85 smaller Normals, and 9 Laggards. Many of them became unhealthy, either from inbreeding, domestication, or want of care, and the experiment was allowed to terminate. The differentiation of the hybernators into a larger and a smaller form was very marked in the later broods, and was usually, but not always, associated with the hybernation of the larger form in 6th skin.

Although a tabulation of forms is, owing to their great number and to their frequently passing into one another, difficult to make either complete or intelligible, yet a tabulation of the principal and most distinct forms may be useful.

Forwards.—1. Passes from 4th (*Spilosoma*) to 5th (*caia*), omitting *fuliginosa* plumage, feeds up rapidly, and does not hybernate.
   a. Adult in 6th skin.
   b. Adult in 7th skin.

Normals.—2. *Fuliginosa* plumage in 5th skin, in which it hybernates; *caia* plumage in 6th skin.
   a. Adult in 7th skin.
   b. Adult in 8th skin.

3. Larger Form; more profound hybernation.

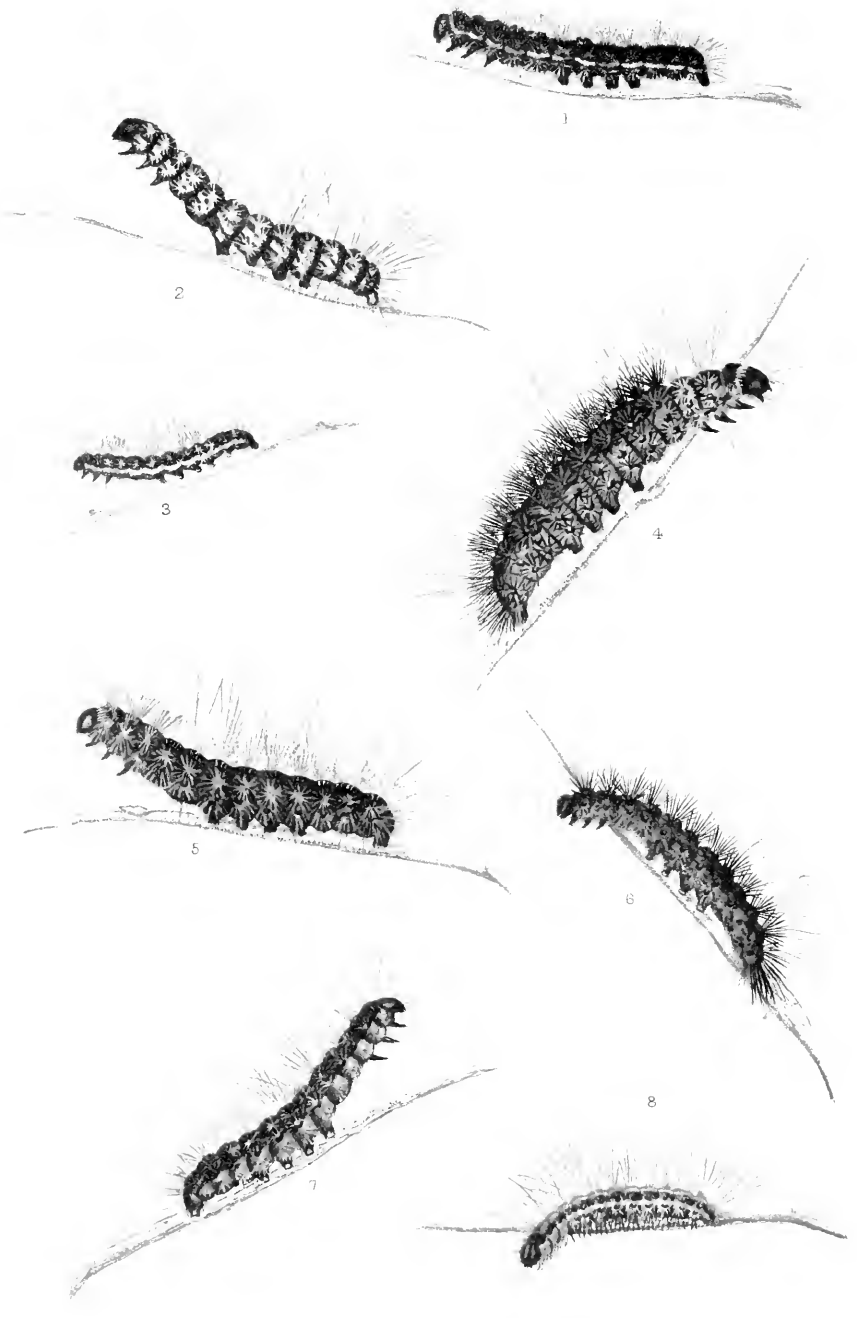
4. Assumes *fuliginosa* plumage in 6th skin after hybernation; adult in 8th and 9th skins.

5. Assumes *fuliginosa* plumage and hybernates in 6th skin.

Laggards.—6. Feeds slowly, never assumes distinct *fuliginosa* plumage; reaches *caia* plumage in 8th and 9th skins.

7. Many variations, in which hybernation takes place in 6th, 7th, 8th, or 9th skins, and either in *fuliginosa* or in *caia* plumage.

I have several times taken "Laggards" at large; *i.e.*, larvæ apparently in the plumage of the 3rd or 4th skin, found in September or October, and that feed on slowly and do not go into *fuliginosa* plumage, nor attempt to hybernate. It is therefore certain that, though in England the great mass of *caia* larvæ is of what I have called the Normal form, that is, the form which is specially well clothed in the 5th



West Newman, Chromo

Varieties of Larvæ of Arctia Caia.

skin, in which skin the larvæ hybernate, nevertheless, both the Forward and Laggard forms do occur not uncommonly, and it is not perhaps unfair to assume that the various intermediate forms met with in my experiments also occur, though very rarely.

DESCRIPTION OF PLATE I.

All Figures amplified × 2.

Fig. 1. Hybernating form in 5th skin; resembles Laggards.
Fig. 2. Hybernating form in 6th skin; plumage resembles red form met with in Brood 1.
Fig. 3. Laggard in 5th skin.
Fig. 4. Ordinary form, 6th skin; *caia* plumage.
Fig. 5. Hybernating form, 6th skin, long whitish hairs; *caia*-like plumage.
Fig. 6. Laggard, in 6th skin.
Fig. 7. Forward, 4th skin.
Fig. 8. Normal, 4th skin.

NOTES ON PLATE I.

I may remark, in connection with the plates, that perhaps of all larvæ, that of *caia* is the most difficult to figure satisfactorily. Buckler's attempts to do so were far from successful; these, however, were made in the earlier years of his work on larvæ, and he would, no doubt, had he attempted it, have been more successful later. In view of this difficulty, acknowledged by such a master as Buckler, and of the further fact, that what have to be shown on my plates are variations in length, colour and density of plumage without any structural difference, I think Mr. Knight is to be congratulated on his successful delineations and on their reproductions in the plates, which are not so far behind the original drawings as sometimes happens. Fig. 8 represents a Normal larva in the 4th skin, *i.e.*, the last stage with *Spilosoma* plumage; whilst fig. 7 represents the same stage, 4th skin, of a Forward larva, but an unusually dark form, in which the lateral yellow line is reduced to one set only of the diagonal dashes, of which in its most definite development it consists; frequently in this stage the Forward is even paler than the Normal form. These two are from larvæ of the 4th brood. Fig. 4 is a Normal in 6th skin that in which it assumes *caia* plumage.

Figs. 1, 2 and 5 (with fig. 4, Plate II.) represent various forms of hybernating larvæ (Normals): I have already commented on fig. 2. Fig. 1 is in 5th skin, and is a variety that, by its smaller size, shorter hairs, and very definite lateral line, more resembles some forms of Laggards than Normal hybernators. Fig. 5, on the other hand, has various long white hairs, and is of a darker colour; it makes a distinct approach to *caia* plumage, and is in 6th skin. Fig. 4, Plate II., except that it is rather dark, or rather that the dark skin is too distinctly represented in the drawing, and overpowers the effect of the paler plumage, is a Normal hybernating larva in 5th skin.

Fig. 3 is a Laggard in 5th skin; compare for size with Normal in 4th skin (Fig. 8).

Fig. 6 is a Laggard in 6th skin, smaller than a normal hybernator in 5th skin: it is rather larger and darker than most Laggards at this stage, and has no lateral line.

(*To be continued*).

"LEAD US NOT INTO TEMPTATION."

(PART II).

By A COUNTRY COUSIN.

Having recovered from the shock which my first appearance in a sale-room produced, I felt I should like to see the rest of the specimens in the late Rev. H. Burney's collection and witness their sale. I started for the place early, so that I might have time for a good look at the insects, and here I am.

The first thing that strikes me is that there are nothing like so many people patronising this part of the sale as were present when the Macro-lepidoptera were sold. I at once set to work to inspect the specimens, but find that if anything their origin is more difficult to trace than was the case with the previous lot. *Crambus alpinellus* and *C. myellus*, without data, keep company with a single *C. cerellus*, similarly situated. The latter is so very rare in Britain that this specimen is useless without a clue to its origin. A long series of *C. contaminellus* are all *salinellus*: there isn't one of the real Simon Pure among them; then come ten *C. rorellus*, without any indication as to who captured these specimens of a species which, though very abundant on the Continent, is exceedingly rare in this country. Then comes *Phycis obductella*, only six, without a hint of their origin and probably from the moon, as I think only about three British specimens have been properly recorded; whilst one *Eromene ocellea* may have come from the Equator or the Pole. Here are twenty-one *Anerastia farrella*, including two of the original type specimens from New Yarmouth described by Curtis. But which are these types? Without labels, there is no clue to guide anyone as to which is which; the twenty-one specimens here have been moved and mixed, and Curtis's types are now a doubtful quantity to be guessed at, unless indeed some wiseacre will come forward and swear which specimens Mr. Burney pointed out to him as he glanced through the collection some years ago. This may be science, but I fail to see it. Nothing wonderful appears until the TORTRICES are reached. Here are some very fine bred *T. piceana* and four *T. gnomana*, with an excellent series of *T. semialbana*, and then we reach a marvellous series of *Peronea cristana* and *P. hastiana*; some of the special vars. are really grand specimens. Then some fine *P. umbrana* and *P. maccana* appear; these, of course, although without labels, are British and no question arises in the mind as in the case of the CRAMBI—*obductella*, *rorellus*, etc. Ah! here is *Penthina grevillana*, hardly a distinct species I should think; whilst these are followed by long series of what are generally considered rare species. Then in the middle of the TORTRICES the true character of this collection comes out. Crammed higgeldy-piggeldy into store boxes, pushed in here, there and everywhere, mixed up in almost inextricable confusion, utterly useless for scientific purposes, are the remainder of the TORTRICES and the whole of the TINEINA, half of which must have been utterly unknown to the owner as to whether they were in his possession or not.

Here is a lovely series of *Stigmonota tranniana*, there some fine *Stigmonota interruptana*, yonder some *Eupœcilia manniana* and *E. degreyana*. No wonder the catalogue-maker had given up his work in disgust and grouped together whole boxes full of good insects as single lots, some

of which contain 450 or even 500 specimens. Ah! among the mass of muddle the PSYCHIDÆ have been re-arranged; most of the known British species are represented, and there are twelve specimens of *Scardia arcuatella*, a sight for sore eyes now-a-days. Then the glorious muddle begins again. Hundreds of moths! Thousands of moths! Ay, very many thousands too, huddled together, not only without data as to whence they came or by whom they were taken, but even without names, are mixed in utter confusion. Two or three men, though, are eagerly scanning these heterogeneous masses! There is a young fellow who carefully jots down notes as he goes along. He has a happy look on his face, and one feels certain that he has discovered some hidden rarity that he sincerely hopes will not be detected by anyone else. There is another earnest watcher! A much older man, who seems very keen, though with only one eye! He is very alert, watches every change on the young fellow's face, makes a mental note of the drawers and boxes over which the most complacent smiles of self-satisfaction are made, and then, later on, dives into the mysterious depths of those same drawers and boxes, looks radiant as he detects the cause of happiness in his predecessor's face and makes a note, which augurs ill for the facility with which either of them will buy cheap, despite the muddle. I go on. Lovely *Coleophoræ*, rare *Gelechiidæ* one comes across at every glance. Ah! there is a *Lyonetia padifoliella* mixed up in the same lot with 900 other specimens. Then we come to the Plumes, mostly in very bad condition. What a muddle! Four species mixed up in the series of *Pterophorus pilosellæ*, and yes! there is the historical *P. brachydactylus*. Knocked down with a broomstick, jumped on with hob-nailed boots, set out with a poker, and you have a fair notion of this historical *brachydactylus*. It may be a distinct species, but if it were in good condition it might probably be easily referred, as a variety, to one of our commoner species. Well, this appears to be the end of the collection. No, not quite the end, for now we come across the "unarranged and duplicate specimens." "Unarranged" must be meant "sarcastic," as if any of these small things ever had been arranged, but these remainder specimens must be those which the reverend gentleman bought during the last few years and did not add to the previous confusion. Here is a box of Macros and they look interesting. There are four *Chrysophanus dispar* and some *Lycæna acis*, whilst we meet four *Vanessa antiopa* and the catalogue-maker has put against one "*probably* from Tunbridge Wells." Then there are sixteen remnants of *Agrotis subrosea* and some more *Cerastis erythrocephala* with a var. *glabra*. The latter has a little label on it "Mr. Tutt," and—yes! there are two specimens of *Acidalia herbariata* with a similar label.

But let us go on—*Plusia illustris!* What does the catalogue say? "*Probably* one of the original specimens *said* to have been taken on Salisbury Plain by Mr. Spratt in 1810, *vide* Westwood's *Brit. Moths* and *E.M.M.*, xxv., p. 223 et p. 246." What a nice little history to build up on the word "Probably"! What is the money value of that one little word? Then comes an American specimen of *Agrotis subgothica!* What does the catalogue say about this? "*Probably* the type specimen from Mr. Raddon, *said* to have been taken near Barnstaple, *vide* Stephen's *Ill. Brit. Ent.*, II., p. 126, and *E.M.M.*, xxv., p. 224 et p. 246." Another nice little history based on the word "Probably." Surely "Probably" is not science, and if the owner of

the specimen is not sure where it came from such histories as these are disgusting. Here is *Acontia solaris* var. *lucida*, and here *Heliothis scutosa*! There is *Gonepteryx cleopatra*; and now we come to a remarkable little history as told concerning Mr. Rogers of the Isle of Wight. Now, ye workers! mark! In the year 1892 Mr. Rogers sent to Mr. Burney—"Four *Sterrha sacraria*, two *Leucania vitellina*, two *Catephia alchymista*, two *Noctua flammatra*, four *Laphygma exigua*, with one specimen 'doubtful' sent therewith, one *Micra ostrina* and one *M. parva*." Where was that Mr. Hodges in 1892? What is the use of getting *Agrotis lunigera* year after year, when *Laphygma exigua*, and *Catephia alchymista* are obtainable? After this *Mecyna polygonalis*, *Anesychia bipunctella* and *Sesia andreniformis* are likely to pall, and even another *Crambus rorellus* fails to evoke much interest. But I have got to the end of this most wonderful collection at last, a real collection, a collection in which the insects have been brought from the four winds of heaven and by the age of their settlement here have become naturalised British specimens, some people may consider *sans peur et sans reproche*.

There is still a short time before the sale begins, and so I turn over the *Catalogue*. Nothing except some poor specimens of *Vanessa antiopa* and *Lycaena argiades* appear among the Rev. Mr. St. John's butterflies! Ah! There are some of the *Deilephila euphorbiae*, the larvæ of which have been stated to have come from New Quay, Cornwall. The remainder of this collection appears to be much like what most people get together by exchange during a few years' work. Ah! Two specimens of *Nonagria sparganii*, vouched for by Mr. Hanbury and with the highly specialised information "taken with others in a south-east county." Poor old Hythe canal! How mysterious you have grown in common with the Deal marshes; and here is a *Pachetra leucophaea* "taken with others by Mr. F. J. Hanbury, Southdown, 1892.' "Southdown" means "South Downs" I suppose, but are not the Ashford and Wye chalkhills part of the North Downs? *Xylina conformis*, one of the dark Welsh, the other of the ordinary German type, next attracts attention together with a strange *Abraxas grossulariata*, in which a malformed or reduplicated nervure has produced the development of the central portion of a wing on the costa.

But here are some odds and ends, the seller's name not marked in the Catalogue. *Deilephila galii* six, "Eton Marshes, 1893," *Lasiocampa ilicifolia* two, "Ascot, 1891-2 taken by A. Edmonds" are remarkable "odds," whilst a vast number of bred *Pieris daplidice*, *C. erythrocephala*, &c., bred in Britain and set in British style, figure among the "ends." A wonderful lot of insects certainly are in the room to-day. Very wonderful! Almost remarkable!

And now the auctioneer mounts the rostrum and the sale begins.—*Crambus alpinellus*, 9s. for six, is not much of a start, and then some one gives 7s. for a dataless *C. rorellus*. "They don't think much of it" whispers a voice at my elbow, or "it would have fetched a good deal more than that if they believed it to be British." *C. myellus* also must be under a cloud, for two specimens go, with a number of other insects, for 14s. and another, with a large lot, for 6s. Well! what will the bidders do with *C. rorellus*? only 10s. for nine, and another with thirty-six other specimens goes for 4s. The public isn't keen on these yet; it appears to be suspicious. But then comes 10s. for a badly set

Eromene ocellea. "It looks as if it has been reset and the wings have slipped back," says the voice at my elbow, and then the buying public shows how suspicious it is by letting a lot with four *Phycis obductella* go for 11s. Here a little life is infused at the sale over Curtis's types of *A. farrella*. One feels pleased to see the buyers waken up at the first scientific atom that has appeared in the collection, though how they will know which are the original specimens is questionable. Things get shaky again until a fine pair of *T. piceana*, with a very long series of each of *T. lafauriana* and *T. decretana* go for 35s., and then some vars of *T. costana* with a pair of *T. gnomana* fetch almost as much. *Tortrix semialbana*, produces a guinea for six, twice over, the third and fourth lots being sold for 18s. and 16s. respectively. The series of *Peronea cristana* is sold for £8 12s. 6d., one specimen being bought for 28s., but the *P. hastiana* although equally fine go for 22s. No one appears to believe in *Penthina gervillana* and it goes in a cheap lot, and then there is a complete breakdown in the prices until some white vars of *Sciaphila perterana* are reached. *Stigmonota tranaiana* brings the prices up again, as also does *S. interruptana*, but the lots now consist of some 300 to 400 specimens and, as may be expected, the prices get a little higher. The *Psychidæ* fetch good prices, £2 5s.; £2 15s.; £2; £1 10s.; £2 15s. being paid for almost successive lots whilst the twelve specimens of *Scardia arcuatella*, in three lots of four each, produce 16s., 8s., and 12s. respectively. A lot with two *T. simpliciella* produces £1, and then the *Œcophoræ* go for £2, and the *Butales* for £2 5s. A lot consisting of 400 *Gracilaria* produce 24s., whilst the following lot of 500 containing fifteen *Stathmopoda pedella* produce only 6s. Then come 800 specimens of *Lithocolletis* for 22s., and 350 *Hyponomeutas* and *Depressariæ* for 26s., among the latter no less than seventeen *D. cinifloncella*. The *Gelechiidæ* and *Coleophoridæ* are all in equally large lots and most of them fetch good prices, 45s. being the highest, except a lot of 900 moths containing most of the *Nepticulæ* and a specimen of *Lyonetia padifoliella*, which commands £4. The whole of the Plumes, about 700 specimens, produce only £3 10s.

By this time the end of this grand muddle has been almost reached and the specimens appear to have been, with the exception of a few very noticeable Crambi and Phycidæ, chiefly *bonâ fide* British, but certainly valueless from a scientific point of view. There were some *Anesychia bipunctella* though which were bought cheap for British specimens, considering that the insect is not yet certainly known to occur in this country.

When the remainder of the Macros are reached more life is infused into the business. A pair of *Chrysophanus dispar* minus body and antennæ are brought for £2 10s., whilst another moderate pair of the same produce six guineas. *V. antiopa* (even when labelled "Coles, Scnr.") produces only 7s. per pair (I wonder how this can happen in a British collection), and another pair of them recorded in the *E.M.M.*, go for the same price. Then comes some remnants of *N. subrosea*. Remnants indeed, for they are mere rags, but even remnants produce 24s., 35s., and 26s. for lots of four each. Then come three *C. erythrocephala* one var. *glabra* ornamented with a label on which "Mr. Tutt" has been written. The auctioneer explains that Mr. Tutt has disowned any knowledge of the moth, and then someone gives 8s. for these undoubtedly foreign specimens. Can human gullibility farther go? Now

to "probably." The "probably" in connection with *Plusia illustris* is valued at 12s., but in connection with *Agrotis subgothica* at 21s. The value of the American "probably" therefore exceeds that of the German or French "probably" by 9s. What a scientific value these specimens must have, when even their late owner did not know that they were what they were supposed to be! What! No one believes in this *Acontia solaris* after its "probabilities" have been discussed? Yes! Its "probability" is worth 10s., but the discussion on *Heliothis scutosa* has raised its value from 4d. to £5 10s. Fourpence, I think that is the money value of all specimens of *scutosa* but this one. I suppose this one was born or made differently. Of course I am very ignorant and these buyers very wise. They would not buy it unless it was worth the money, and yet it don't look very different from dozens of others that I have seen. Then comes 13s. for a *Gonepteryx cleopatra*. What a fauna we are getting in Britain now. Then come Mr. Rogers' wonderful 1892 specimens. Now we shall see the price of real British rarities. Four *S. sacraria*, 8s.! Three *Leucania vitellina*, 14s.! One *C. alchymista*, 14s.! Two *Noctua flammatra*, 14s.! Four *Laphygma exigua* with one doubtful, 7s.! One *Miera ostrina* and one *M. parra*, 7s.! Well! how can we fathom this? If these are British, they are worth ten times this sum according to the wiseacres here. If not, why do people give about six times their continental value for them? Do these honest looking people really buy them hoping that some day the "Open Sesame" of "Burney's collection" will repay them tenfold? If so—Ugh! I'm getting giddy. Again the auctioneer gives forth that Mr. Tutt disowns the two *Acidalia herbariata* to which his name is attached, and then a non-British species *A. bipunctella* and a *Mecyna polygonalis* go with the outsiders for 7s. These four "bugs" could surely be bought at the dealer's whence they evidently came for less than 1s. But I feel revived as some good honest-looking *Eupoecilia gilvicomana* produce about 15s. per pair. Then comes *Sesia andreniformis*, its value just doubled by its position, 15s. Ah! here are some *D. galii* and *C. celerio* included with 320 other specimens going for 7s.! Gone! without the buyers of similar lots attempting to stay their disgrace. Here's *D. compta* going with 450 other moths for 18s.: this is the way to extend your collection; and there are many more wonderful things. "Beg pardon," says a voice as an attendant nearly knocks me down. I soon waken up and find the next collection on the *tapis*. The sale of the great Burney collection is over. *Herbariata*, *polygonalis*, *bipunctella*, *euphorbiae*, *galii*, *celerio*, *erythrocephala*, *niobe*, *lathonia*, and every other reputed species in the British list have been scattered broadcast over the country, and the words "Burney's collection" will in the course of the next few days be ticketed to hundreds of specimens, to which no label was ever attached by their owner. *Verellus* or *erythrocephala*, *vorellus* or *celerio*, label-less and data-less from Mr. Burney's collection cannot possibly have any scientific value, what will be their value in other collections with the charmed label attached to them?

But the day's sale is not over yet. The Rev. J. Seymour St. John's insects are to be sold. Three *Vanessa antiopa* from "Dr. Marsh, Norfolk," only produce 6s. each. How is this? Did not *V. antiopa* from Messrs. Wigan and Parry produce about a pound apiece? Then a pair of *Lycaena argiades* (again "received from Dr. Marsh") produce £4 10s.,

whilst three of the specimens of *D. euphorbiae* referred to recently in the *Record*, only fetch £2 15s., £2, and £2 2s. respectively. How is this? Did not two specimens, only "probably" from Mr. Raddon, and with I dare not say how much of the mists of antiquity surrounding them, produce £6 16s. 6d. and £6 6s. per specimen? "Comparisons are odorous," says a smelly individual near me. At any rate, "*euphorbiae*" evidently improves with age, and when I'm properly tempted, as I'm getting very likely to be, I'll make mine as musty as possible. The strange abortion of *Abraxas grossulariata* produces 22s., but as there are no other rarities in the collection no other high prices are obtained. Well, this is very sleepy work! Does it pay to make a collection of British insects where almost every lot produces on an average from 1d. to 2d. a bug? I must make a collection for the purpose of selling it soon, but shall I make it of rarities or good honest British insects? What am I thinking about? "Lead me not into temptation" is my cry again, as I discover the train of thought into which I am falling. "Lead me not into temptation," I mutter again, as I pass out into the pleasant afternoon sunshine. The sun and fresh air revive me. I'll make no collection at all. I'll just do as I always have done, watch the fruits of Nature's handiwork, as exemplified in these the most beautiful of her creatures, enough to know that there is more joy therein than in the greedy striving of the sale-room world. Never again will I so unsettle my mind, never again come in contact with those who cheat and those who delight in being cheated. Absence is certainly the best way to avoid being led into temptation. I have received a liberal education in these two visits, and as some wise man says that "Enough is as good as a feast," I'll take great care that I receive no more. Truly this is collecting of a kind. Who are the worse? Those who struggle against temptation and fall, or those who lead their poorer brethren into temptation? I do not know; both perhaps are equally bad, and one feels almost tempted to imagine, from the keen delight that the gulled ones take in being gulled, that after all less blame should fall on those who gull.

RETROSPECTIONS AND FORE-CASTS.

By A. J. HODGES.

A bright and clear morning ushers in the month of February, and as I sit in my study the genial rays of the thrice welcome sun awake, from their hybernation, those pleasurable anticipations of the approaching season, in which one is apt to let fancy run wild amid the scenes of the past, gilding them with a halo of the unknown possibilities of the future. Who would say that in the indulgence of these healthy and excusable anticipations, we have not ample justification in the immediate past, as in the glorious annals of the early days, of the pursuit of that most practical aspect of our favourite science of Entomology, "the mere collecting"?

And while the natural instincts of every Englishman for that active exercise, which is so prominent a feature in successful collecting, retain their present pre-eminence, so long will "field-work" (a modern euphemism for "collecting") command the hearty support of that immense majority of more or less leisured collectors, whose enthusiasm

is the backbone of all entomological enterprise, and will awake, I doubt not, the secret sympathy of even our most advanced Scientists (a Capital S, Mr. Printer, please.)

Who would have dared predict, when the first captures of single specimens of *Plusia moneta* were recorded in 1890 from Emsworth (Hants), Tunbridge Wells and Reading, with scanty additional records the next year from the same and neighbouring localities, that in 1893, as many as thirty-three specimens would be bred from larvæ collected off monkshood (*Aconitum napellus*) in May by one gentleman alone? Who would give up hopes that any of our earlier prizes may not again occur when in the pages of an esteemed contemporary the opinion is expressed, by a writer whose *bonâ fides* and knowledge are alike beyond criticism, that the long lost *Glyphisia crenata* needs but "careful, persevering and intelligent search" to be again added to our list of modern captures, even after the interval (in this instance) of forty years. A collector, of the past generation, now resident in Liverpool, and well-known for his capabilities of sincerity in friendship and bitterness in hatred, the latter occasionally finding relief in verse (I had almost said, poetry) expresses in his usual energetic manner that the only reason why *Lasiocampa ilicifolia* does not figure now in the captures from Cannock Chase, is the sad decadence exhibited by the "so-called collectors" of to-day. A touching compliment to the confidence in this gentleman's sincerity was paid by the joint owner of the writer's "Eddystone," when arrangements were almost completed for the transference of that powerful illuminant to the wilds of Cannock. A possibly more convincing case in point may be found in *Notodonta bicolor*, which has undoubtedly been re-discovered in Kerry, in S.W. Ireland, its claims to a residence in the British Islands having been dormant for over a quarter of a century, since it had last been captured at Burnt Wood, in Staffs. (a spot now a household word in the mouths of all collectors through this one species alone) or since last reported from that lovely country, where it has presumably survived in retirement during this long interval. We might multiply instances, but the sun is shining, the season advancing, and the swelling buds of the sallows announce to us the near approach of that period when the faithful lantern, the companion of many a dark night's excursions, the trusty net, worth many a more modern "improvement," and the thousand and one off-shoots from these main stays of the lepidopterist, must be brought out and prepared for action.

Before we leave the comparative leisure of the winter season, we would linger awhile among the many pleasant recollections of the past few months, for when the active season commences, meditation and discursiveness are both alike at a discount, and the pleasant and chatty letters from correspondents innumerable, which have brightened many a busy morning, will have dwindled to that cold formality in which "brevity" is certainly the only "wit." Who can not recall the pleasant evenings when, in friendly discussion with some congenial spirit, the open cabinet becomes seemingly a magic chamber, and the series after series of "specimens" become, as it were, instinct with life; how these few, too few, *Nonagria cannae* recall the sunny Norfolk Broads with their waving beds of the great Reed Mace (*Typha latifolia*) and the weary hunting for stems in which the larva had made its last home; how that fine series of *Sesia sphegiformis* brings back vividly the

long days spent at Tilgate Forest, with the tedious searching in the thick bushy suckers at the foot of the alders for traces of the ravages of the larva; whilst those fine *Nonagria concolor* can only recall the generosity of a well-known entomologist, together with a feeling of surprise at the way in which its locality and successful working can for so long past have been preserved a mystery.

How many are the friendships, commenced with the most casual acquaintance in the field, that are cemented during these winter months and that bear fruit in due season, in the true desire to be of mutual assistance in promoting both the growth of the collection and the pleasure of collecting, and that act as the only check upon the vast and elaborate systems of exchange that grow up around us. It is worth recollecting too, the anticipations with which a precious parcel from some friend whom it were treason to call a "correspondent" merely, is unswathed from its ample packing; anticipations, the pleasure of whose fulfilment can only be excelled by that of being in the proud position of knowing some "desideratum" which will gladden the heart of the owner of the box on its safe return. Surely this experience will survive the rude shock of the disappointment sometimes caused by the greed or incapacity, or even worse, of those whose advertisements sometimes unwittingly obtain publicity, whilst it is those who, unfortified by these pleasant recollections, can only be pitied for offering gratuitous insult to those whose true assistance in promoting the best interests of entomology, is unavoidably occasionally abused by design.

It is during such social moments, when friend opens his heart to friend, that the secret of some locality concealed, possibly for years, is revealed, and arrangements are made it may be, for a midsummer trip to Braemar, for *Zygaena exulans*, in its elevated home, necessitating a 2,500-ft. climb, or to the Isle of Man, where, along its prettily indented rocky coasts, in more or less inaccessible spots, among the flowering bladder-campion (*Silene inflata*), the quick-flying *Dianthoecia caesia* may be netted in June, and the still rarer *Lithosia caniola* occurs a few weeks later. In this pleasant chat, with which the long winter evenings are beguiled, many a hint has been given and taken, the recollection of which, when the advancing season has given a chance for its trial, has awakened a feeling of gratitude to the more advanced collector who thus kindly places his experience at the disposal of the tyro.

When at last the cabinets are closed and the duplicates freely overhauled, who is there that cannot afford a hearty laugh, whilst the fire blazes cheerfully and the chairs are drawn closer, at those undoubtedly trying experiences, of which the past season is sure to have contributed its share, to the most experienced and fortunate collector? We recollect with a momentary shudder, that early, too early, fortnight during May and June, in Fen Land, when the N.E. wind blew with a keenness worthy of January, or when on stiller evenings the fog rose, white and opaque, damping everything but the spirits (animal *not* ardent), when the sheet, soaked to transparency, weighed its poles so heavily into the yielding soil as to gradually sink to earth, leaving the light aloft, sole illuminant of the marshy and weird wastes.

What merriment is provoked by the visions of two drenched figures battling with a "South-Wester" on cliffs 600-ft. above the sea, the scud flying wildly, but the moths, alas! more deterred by the

weather than their would-be captors, who succeed in lighting their lanterns only to see them, like their hopes, suddenly extinguished.

Again, it is the perfection of summer weather, hot and glaring, whilst in the depths of a forest far from any hostelry, a party have been engaged for hours, netting *Nemeobius lucina*, and other irritatingly active day-fliers. The inner man has not been forgotten, and a hamper contains liquid and solid refreshment; the halt is called, and the parched throats revert instinctively to the "liquids," when alas, a stumble! and ale, sherry, water and milk, mingle their streams and "run to earth." We can laugh now, with our tumblers at our elbows, but it was no laughing matter then. In such reminiscences we lose our too aggressive individualism, and learn to respect in one another those little personalities which oft-times bristle upon us brothers of the net, as "spines on fretful caterpillar."

(To be continued.)

CURRENT NOTES.

Many of our subscribers will learn with regret that Mr. T. Henderson, of Glasgow, died on December 11th, 1893. As a generous correspondent and keen field-naturalist, he will be missed by many, and it is with genuine regret and a remembrance of many past kindnesses, that we ourselves mourn his loss.

Dr. Knaggs recommends methylated ether as a cure for grease in moths. He suggests the subjection of greasy insects to repeated baths until the grease is soaked out. It is a cheaper fluid than benzine and, according to those who have since tried it, much more effectual. We always, after soaking our specimens, bed them on magnesia; then, whilst wet, we put more magnesia on them, and leave them there a short time, when most of the magnesia falls or may be blown from the scales. A camel-hair brush will at once remove refractory particles.

The January number of *The Canadian Entomologist*, gives a first-class portrait of the Editor, the Rev. C. J. S. Bethune, whilst an ode by our valued contributor Mr. A. R. Grote, is printed in honour of the quarter-centenary of our excellent contemporary.

There is a very old and quaint saying which shows a certain connection between one's maternal grandparent and the power of sucking eggs. Of course, this is a very rude saying, but we were reminded of its triteness when we saw in a contemporary that Mr. Frohawk was giving lessons to Dr. Chapman on "How *Epinephele ianira* pupates." Such a teacher! Such a scholar!

Hybernia defoliaria was very abundant in the autumn of 1893, at Victoria, in Vancouver Island. It is really marvellous what a vast range some of our species with apterous females have. Mr. Danby writes of the moths in Vancouver Island:—"The markings of the males vary very much; I have a series of six which are wonderfully unlike each other; in fact, *H. defoliaria* varies in its markings just as much as *C. bruceata* or *E. sommaria* do, and some are beautiful by the very reason of their wonderful contrast to the type. While one has the bands nearly black, another has apparently no median band, but is thoroughly suffused." Mr. J. Fletcher, of Ottawa, adds to Mr. Danby's note:—"I believe the British Columbian insect to be identical with the

English, as I can find no difference between either the moths or the caterpillars."

Mr. Eustace Bankes, with his eagle eye, has determined that *Lithocolletis trigintella* is only a variety of *L. fagimella*. The original description was based on a *single* specimen taken by Mr. J. W. Douglas at Sanderstead. No one regretted more than did Mr. Stainton in his later years these early descriptions made from single specimens, and yet, even now, we find collectors, who are field-naturalists and not students, occasionally naming species from two or three specimens, without reference even to the Continental figures and descriptions of the allied non-British species in the same genus.

The cheap three-penny edition of "The Accentuated List" to which Capt. Thompson alludes in his paper, can still be obtained of Messrs. Gurney and Jackson, 1, Paternoster Row. Will not our present-day University entomologists prepare a new edition, in which the many additional names, both generic and trivial, which have obtained currency since 1859, should be included, and from which we might obtain guidance, as to the correct accentuation of the sub-family (*ina*) and tribe (*idi*) names?

One of the most amusing incidents that has occurred at our London Ent. Societies lately, took place at the City of London meeting on Feb. 6th. It was practically a vote on Mr. Frohawk's power of eyesight, as to whether certain male varieties of *Argynnis paphia*, belonging to Mr. J. A. Clark, had, or had not, a green tint round the pale spots present on the hind wings. Nineteen members were present, and voted with perfect unanimity against Mr. Frohawk, everyone being able to see the colour. We condole most sincerely with Mr. Frohawk on this adverse judgment.

PRACTICAL HINTS.

Boarmia repandata is a very interesting species to breed; the larvæ may be found, on mild evenings in early spring, feeding on all sorts of low-growing plants; ivy, honeysuckle and bramble seem to be the favourite food-plants hereabouts.—J. Mason, Clevedon. *January 12th*, 1894.

The best time to capture *Melanthia rubiginata* (*bicolorata*) is about an hour before sunset, when I find it on the wing in this neighbourhood among alders.—J. Finlay, Meldon Park, Morpeth. *January 29th*, 1894.

In Epping Forest *M. bicolorata* does not fly until sunset, but may be beaten out of blackthorn in crowds during the afternoon.—F. J. Buckell, Canonbury.

VARIATION.

Boarmia repandata var. conversaria.—The specimens of this variety taken at light on June 10th, 1893, by Mr. Vivian at Glanafon, Port Talbot in South Wales, are remarkable in that their ground colour is of a much purer white than is the case with specimens from any other district which I have seen. Mr. Moberly writing of these specimens

says:—"I have in my collection New Forest specimens of that variety and also one which I took near Totnes, but none of them have the white colour so distinct as in his specimen." Mr. Mason, of Clevedon, writes:—"I take var. *conversaria* similar to Mr. Vivian's specimens in this locality, in fact I bred a nice series last summer from larvæ collected in the early spring, the average proportion of *conversaria* being about one in twenty. I believe those larvæ which were fed exclusively on ivy produced the largest percentage. At the same time I bred two specimens much darker than the ordinary type form, and very similar to examples received from the Rannoch district." Mr. Sydney Webb writes:—"The *conversaria* from the West always seem to be of a purer white and black than those from other places, the dark hind margin of one of Mr. Vivian's specimens makes it in particular a lovely example."—J. W. Tutt, Westcombe Hill. *January 31st*, 1894.

Some remarks having special reference to varieties of Argynnis paphia.—Mr. Frohawk occasionally delights in running his head against a brick wall, although unfortunately the operation does not seem to hurt him; this time he has run amuck at an off-hand statement of mine concerning *Argynnis paphia*. From the warmth he exhibits, one would think that he alone has any personal interest in *A. paphia*, and that no one but himself and Mr. Carpenter ought to have any of its varieties. Taking the matters at issue seriatim let us see what they amount to:—

(1). Mr. Frohawk states that at a meeting of the South London Entomological Society on October 12th, "Mr. J. H. Carpenter exhibited a very fine series of white-spotted forms of *A. paphia*, numbering some three dozen specimens; Mr. Tutt then alluded to Mr. Clark's 'remarkably fine series' of white-spotted forms, stating that many of them had patches of the green colouring of the var. *valesina* represented in *both* sexes" (*Entom.*, p. 69). I find on turning to the South London Entom. Society's report for October 12th, that I am reported by Mr. Williams as follows:—"Mr. Tutt remarked that this pale-spotted form was frequently tinted with green as in var. *valezina*, more especially the females" (*Record*, iv., p. 305). Turning to the original report of the City of London Entomological Society's meeting, at which the exhibition was made, Mr. Battley's report reads:—"Mr. Clark exhibited . . . *Argynnis paphia* with its var. *valezina* and intermediate forms. With regard to the vars. of *A. paphia*, Mr. Tutt remarked that several of the males were distinctly green on certain portions of the hind wings, and that frequently these specimens were those which developed pale spots both on the fore and hind wings, thus showing a double tendency towards var. *valezina*, the area around the pale spot being the first to become green" (*Ent. Record*, iv., p. 259). These remarks were made with a very long series of *Argynnis paphia* before me, occupying one side (at least) of a very large store box and I believe a part of the other side; they were *bona fide* conclusions drawn from the specimens before my eyes when being exhibited at a full meeting of the Society, and can be vouched for by every lepidopterist in the room; and because Mr. Clark has been kind enough to show Mr. Frohawk eight specimens, six males and two females, and these did not happen to show the particular phase of variation to which I carefully and at length drew attention at the meeting, Mr. Frohawk wants to know what reason I have for making "such an erroneous assertion" as he styles it. He is entirely at fault. Mr. Clark exhibited a long series of such forms and of the accuracy of my

conclusion, undoubtedly Dr. Buckell, Mr. Battley and others could speak if there were need (which indeed there is not); what has become of the remainder of the exhibit is Mr. Clark's business, but Mr. Frohawk must not lose his head nor make himself childishly ridiculous over my *bona fides*. I do not suppose that, with such a series as Mr. Clark had, he would keep the whole for himself, and I suppose that some of the specimens have been distributed. My statement is beyond cavil, and I do not feel inclined to pry into Mr. Clark's business as he evidently showed Messrs. Frohawk and Carpenter all he cared to, and if they went to him in the same spirit as Mr. Frohawk has shown in his note, I am not surprised that they did not see the series even if Mr. Clark should have happened to have kept them. With Mr. Clark's series vividly in my mind when I inspected Mr. Carpenter's, the latter looked a most uninteresting lot.

(2). Mr. Frohawk further writes:—"When I exhibited the specimens of a second emergence of *A. paphia* . . . . Mr. Tutt stated that he had lately seen examples of a second brood of *A. paphia* in the collection of Mr. J. A. Clark, who had obtained them from the New Forest during the autumn." This is nearly but not quite the truth. In the report of the meeting (*Ent. Record*, vol. iv., p. 306) Mr. Turner reports:—"Mr. Tutt remarked that he had seen specimens of a second brood of *A. paphia* and had bred second broods of *Vanessa urticae*, *V. atalanta*, *V. io* and *V. c-album*." Now this very fairly states what I did say, but in a desultory conversation carried on across part of the room and when I was busy talking with a friend, Mr. Frohawk asked me where I had seen them and I immediately told him "at a recent City of London meeting," and in answer to another query I remarked that they might have been, or most probably were, Mr. Clark's. This is all I remember. Some small specimens of *A. paphia* were exhibited and these were in some way connected with remarks about a second brood. Mr. Frohawk seeks to bind me down to an off-hand statement that was only given as such and simply as an attempt to give a courteous reply to a question on which I had given but a passing thought, and which to me has no real scientific value. To be the first to breed an odd autumnal specimen seems to be quite an important scientific feat. Well! So be it! Mr. Frohawk should not leave his "painting" for "mud throwing" as it does not add *éclat* to his artistic powers, nor should he set himself up as an authority on my statements or on my power of eyesight.—J. W. Tutt. [Since the above was in type, the specimens shown to Mr. Frohawk by Mr. Clark have been exhibited at the City of London Entomological Society's meeting, and it appears that he really did see the green-tinted specimens. Owing to Mr. Frohawk's serious statements a vote (as to whether the males showed a green tint or not) was taken. As the vote was unanimous against Mr. Frohawk, perhaps it will be more charitable to say that Mr. Frohawk would not see what every one else can see. Though why?—Ed.]

Variation in Irish Lepidoptera.—The following are the only noticeable variations which I have met with here:—*Pieris brassicae*, ♀ of spring brood very large; *P. rapae*, 4 ♀ of a yellow tint; *P. napi*, some ♂s spotless, some ♀s very dark; *Coenonympha pamphilus*, some almost spotless; *Hepialus velleda* var. *carnus* and intermediates; *Thyatyra batis*, 3 specimens with the spots brown instead of rosy, the type also occurs here; *Xylophasia polyodon*, some quite black, others as

light as any that I have seen in the South of England, others intermediate; *Agriopis aprilina*, 6 specimens (from 100 dug pupæ) with the space between the base of the wing and the 1st line almost clear.—(Capt.) E. W. Brown, Enniskillen.

Variation in Lithomia solidaginis—I spent two or three days early in August in the wild district near Kindnocout, and observed that the specimens of *Lithomia solidaginis* which occur there closely resemble the Yorkshire form, but are quite distinct from the form that I take on Cannock Chase.—(Rev.) C. F. Thornewill, Burton-on-Trent.

Errata.—Page 12, line 41.—For "females" read "males" and for "small" read "large." Page 12, line 43. For "*eschari*" read "*escheri*."

NOTES ON COLLECTING, Etc.

The result of a "Gratuitous Offer."

I was induced recently to try the experiment of making a gratuitous distribution of my spare duplicates for two reasons; firstly, because of my dislike of the bargaining and huckstering inseparable from the exchange system; and secondly, from a desire to adopt a method which was not uncommon in the days of the old masters in entomology, a race now passed away "to that bourne whence no traveller returns" (I allude to such men as Stainton, Newman, Westwood, Doubleday, Shepherd, Janson, and a host of others, for whose successors we look in vain); it may be of interest to readers of this journal to learn the result of my experience.

My main idea was to offer an opportunity of filling blanks in their cabinets, to those younger lepidopterists who lived in districts where chalk insects are not found, by placing them in possession of examples of those insects; and, in order to prevent disappointments, I requested that written applications should precede the despatch of boxes. I may here parenthetically state, that I had several hundreds of duplicates which I desired to place in the cabinets of others.

Before I had even seen the notice in the Journal, I received several applications; one from a gentleman with a particularly Hebrew-sounding patronymic resident near London, who sent me a post-card informing me that a box was coming by the next post in order that he might secure a "fair share of my superfluities." This gentleman evidently considered that I was holding a sort of entomological scramble, and that it was a case of "first come, first served." It appeared from his letter that he required the insects to add to a collection already made by his son. Why did he not collect them for himself?

There followed, during the next few days, a perfect storm of letters, post-cards, and even boxes. One gentleman inquired if he should send a store box (he obligingly gave me the precise dimensions), into which, I could with ease, have packed three or four hundred insects; while several applicants asked for 20 or 30 of a species, to renew, or increase their series. It occurs to me that these gentlemen should have endeavoured to obtain a supply of such dimensions through the medium of exchange; a gratuitous offer could hardly be intended to apply to them. Some, forgetful of the proverbial gift horse, stipulated that

the insects should be on pins of a particular size or on black pins. Some, I am sorry to say only a very few, offered to make some return; in the majority of instances the species offered were those described in the *Manual* as "common everywhere." Nevertheless, I was greatly obliged by their offers, and in one or two instances was glad to avail myself of them.

And now a word as to the boxes sent. These were a very mixed lot, the "common or garden" cigar box occupying a prominent position. It will not be out of place, perhaps, for me to remind your younger readers, that such a vehicle, with an address label stuck on the top, and without a shred of packing, offers an opportunity too good to be lost, to the Post Office officials, to "punch the bag." In several instances, the integrity of the boxes had suffered from their treatment, they being more or less smashed in; in one case, the whole concern was broken up; in another, some insects, which were being sent to me, were reduced to such a condition, that I was half inclined to suppose that the sender, having a laudable desire to prevent their receiving any *further* injury whilst passing through the post, treated them to a few turns in a coffee mill before despatching them; the insects, wings, thoraces, abdomens, legs, etc., being reduced to a fine powder.

And now for the moral. Whilst some of the letters received came undoubtedly from gentlemen of education, with whose modest requirements I had great pleasure in complying, I am, with regret, compelled to say, that I fear the majority of those who wrote to me, were of the genus "grab." Some of the former I hope to be able to supply with additional insects in the autumn of 1894; for even my long rows of duplicates were, in several cases, too short to enable me to supply every one. To the latter I would say, "Amend your ways, and remember the saying relative to the assistance rendered to those who help themselves.

My boxes are now practically empty, but after my recent experience, I shall hesitate before I undertake to collect and preserve any considerable number of insects for another year's indiscriminate and gratuitous distribution.—Arthur Lovell Keays, Upwood Tower, Caterham Valley.

Note by the Editor.—The results of our correspondent's "gratuitous offer" do not come as a surprise to me, although, in themselves, unsatisfactory enough. For half-a-century or more, those who have tried the effects of indiscriminate gratuitous distribution have told the same sorry story, and have, more or less, deduced the same moral. Further, the lesson which they have learned they have applied to their practice, and have ventured no more in the same direction. But some of our correspondent's generalisations will not hold water. Probably two of the "old school" to which our correspondent refers, "Stainton and Doubleday," were of so entirely generous a nature, that many undeserving appeals met with a ready response from them but I doubt whether even they, after a little experience, ever went in for indiscriminate distribution, although, to get an introduction through a mutual friend, was sufficient for them to become willing benefactors. But it is to the phrase "a race now passed away," that I take most exception. This shows that our correspondent is not at all *au fait* with British entomologists, for I could mention half-a-dozen living lepidopterists who give away freely year by year a greater number of insects than

did any of those gentlemen mentioned by him at any time in their careers; and this, in spite of the fact that in the "good old days" books were scarce, and there was a class of people who were really thankful to these benevolent gentlemen for their charity (in the form of named "types"), but who would now scorn to be recipients of their bounty. I refer here to the better educated collectors who, with the text-books now published, can name their own captures, but who, before the days of *The Manual* and "Newman," were entirely at the mercy of loosely-worded Latin descriptions, unless they could afford Humphrey and Westwood's expensive work. The advent of books has made such wholesale generosity less necessary, and the particular phase of it to which I have just alluded, absolutely unnecessary; but this does not show that the generous-minded lepidopterist is not as keen as ever in helping those who really want material for scientific study and investigation. As for giving types of butterflies to those people who pretend to study entomology but are too mean to buy a shilling text-book and find out the names of their captures for themselves, well, we are thankful that the good old times are altered, and that people have to look up the matter for themselves. To want types of well-defined species such as exist among *Sphingidae* and *Sesiidae*, is ridiculous; the species are clearly defined in the very cheapest text-books, and such an application only shows the peeping out of "grab" referred to below. Let beginners show that they have some grit in them, by working the species up for themselves, and let them possess their souls in patience until their zeal leads them to success. The use of "types" of a few of the species of *Leucania* and *Eupithecia*, or of some of the smaller fry, is permissible, as there is a real difficulty in identifying some of these with certainty from descriptions. That the generosity, which gave away so-called "types" and encouraged laziness, has died out, is a cause for much thankfulness. We may certainly have fewer so-called entomologists, but those we have are a better lot. That generosity in lepidopterists has not abated one iota, I can affirm from my own knowledge. Probably no one, during the last few years, has attempted more work requiring abundant material than myself. *The British Noctuae and their Varieties* is enough to prove my point. During the three years which I spent over that work, I had some two thousand specimens in the finest condition, some of great rarity, and all of the utmost service as representing species from localities which I had not worked, given me freely, without hope of a return. Three or four thousand more were sent to me in exchange for what I could spare; I did my best, which I am afraid was only a bad "best," but no one complained of it. Last year I asked for material connected with British butterflies, my aim being to get out some scientific particulars relating to this group, with the stated intention of publication. One-half the British butterflies were sent to me in one or other of the earlier stages, and some gentlemen must have spent a considerable sum of money, as well as putting themselves to inconvenience, in supplying my wants. I maintain, therefore, that the generous race of entomologists has not passed away. The advance of education has directed their generosity into other channels, through which it has aided in the production of scientific work, rather than in encouraging another feather-bed collector or two to make a collection, which he will inspect through £. s. d. spectacles, and at which he will only glance with satisfaction, when he can determine that he has made it at a profit based on the gullibility of his friends (?) and correspondents.

There is only one other point in our correspondent's letter which I would discuss, and that is, his "genus 'grab.'" I have touched on it above, but is it not really the natural outcome of the misplaced generosity which our friend so much deplores, or has it not a still deeper origin situated deep down in our national life? Education, so-called, has the tendency at the present time to resolve itself into a process of driving into students the greatest possible amount of information in the shortest possible time. The digestion and assimilation of the mental food are of no consequence; superficial results are the only things aimed at. Everything is to be made easy; our teachers have to simplify, dilute and pour in knowledge ready for use; we, the students, have only to imbibe as much of it as possible. Not an effort do we put forth. The student leaves school; he becomes say, a lepidopterist; immediately he goes off to some well-known man, taking his bugs to be named, because, forsooth, it would take too long to search out their names for himself. The mental training thus given is nil. There is a short cut, and the young student (?) takes it as a matter of course, thinking little and caring less what trouble he is putting his mentor to. Besides, why should he get a book? It is sixpence or a shilling saved if he can borrow it, and this leads us straight to the "grab" development. The first part of our education is a sort of sucking-in or rather soaking-up process, in which the student, more or less, resembles a sponge. When this has reached a certain point the second begins, and may be summarised in the one word "grab." Our social system demands "grab." Those who get the largest amount of this world's goods, "grab." Englishmen are noted the wide world over for their pushing capacity; in other words, for their "grab." Why, then, should our correspondent complain at what has been elevated into a national virtue, or suppose, that what are the exigencies of one situation, will be altered by the individual when his energy is directed into another channel. The man who never buys a work because he can borrow it, he, who never takes in a magazine because a friend will lend it, he, who never subscribes to a Society because he cannot regularly attend the meetings, he, who will help in no movement having the general advance of our science as its object because he is not an active participator, are all equally governed by "grab." But to suppose that such men are naturalists or have even the instinct of one. Ugh! It makes one who revels in the sunshine, who delights in fields and flowers, shudder. Poverty is their excuse but it is a lame one, as those can vouch who know what work some really poor men do.

With the rest of our correspondent's article I cordially agree, but to suppose that generosity is dead amongst entomologists, will not do. My wider experience teaches me a very different lesson. Nature still has her devotees, rich and poor, who love her for her own sake, and who attempt to read her secrets, in spite of the parody on the students of Nature, which the genus "grab" represents.—J. W. Tutt.

Notes Relating to the Past Season.

Sheerness and Rochester.—A nice series of *Pogonus luridipennis* was taken at Sheerness in August. Coleoptera were, on the whole, scarce in the neighbourhood of Rochester.—S. Kipping, Holsworthy, Devon, *January 20th*, 1894.

Oxon, Bucks and Somerset.—*Agrotis obscura* (*ravida*) first appeared

on May 28th, and on June 3rd was quite common. Altogether I and my two lads captured 200 fine specimens. A second brood appeared in the middle of August but was less numerous than the earlier brood. I captured *Vanessa polychloros* at sugar in my garden, and met with *Melitaea artemis* in small numbers on the top of the chalk hills, a strange place for this butterfly; I presume, however, that it feeds on the scabious, which is plentiful there. I met with single specimens of *Melanargia galathaea* near Wendover, and on several occasions at Chinnor; the capture of solitary specimens of gregarious species seems to me worth recording. *Pamphila comma* was more abundant that I had ever previously noticed it; it evidently has a wide range in both Oxon and Bucks. In the latter county I observed *Ino geryon* in thousands during May; they were accompanied by *Lycaena minima*, which in one place was in immense profusion. *Mamestra abjecta* occurred sparingly at sugar; I captured it in my own garden. *Colias edusa* was very common at Orchard Woods, Taunton, in August, and at the same place I took several *Thecla betulae* at rest upon blackthorn hedges.—A. J. Spiller, Helston.

Southampton.—After a still, hot day in June, at 10.45 p.m., I placed an ordinary duplex lamp in a room on the first floor of a house in the outskirts of this town, which was a long way from any wood or real country, and then threw up the window. Returning at 11.15 p.m. I found that moths had already begun to arrive, and for the next two hours they gave me plenty of employment. I captured 36 specimens, representing the following species:—*Leucania pallens*, *Caradrina cubicularis* (*quadripunctata*), *Hecatera serena*, *Aplecta advena* (1), *Hadena dentina*, *H. chenopodii* (*trifolii*), *H. oleracea*, *Cucullia umbratica*, *Plusia chrysitis*, *Acidalia imitaria*, *A. aversata*, *Eupithecia pumilata*, *Coremia unidentaria*, *Cidaria dotata* (*associata*), *Chesias obliquaria* (*rufata*) 1.—J. C. Moberly, 9, Rockstone Place, Southampton. *January 29th*, 1894.

Dorking.—On Oct. 2nd, 1893, I was fortunate enough to capture a good specimen of *Leucania albipuncta* at ivy; the date is noteworthy, as it is six to eight weeks later than those of the captures recorded by Mr. Hodges and Mr. Prout (*Ent. Rec.*, vol. iv., pp. 253 and 279). I may say that Mr. Hodges has seen and identified my specimen.—Thos. W. King, Dorking.

King's Lynn.—I took 4 specimens of *Halonota ravulana* last year, as against 3 in 1892.—E. A. Atmore, King's Lynn. *January*, 1894.

Coleoptera at Ipswich in 1893.—The drought of the past season affected Coleoptera to a much less extent than was the case with Lepidoptera. Seeing this would probably be the case, I decided to collect the latter during the hours of darkness only and so devote the whole of the daylight to the pursuit of the former. There is little doubt that the number of British coleopterists is scarcely half* that of our lepidopterists, but why this should be the case is not easy to determine. I have never in any one year taken more than 950 specimens (254 species) of Lepidoptera, and that was many years ago, when I was a beginner and "everything was rare;" whilst in 1893, I captured 1,352 specimens (350 species) of Coleoptera. The following record of my

* This appears to be a very high estimate, if we may judge from the proportionate number of records made respectively by coleopterists and lepidopterists.—Ed.

"battles" will give some idea of the facilities with which beetles may be obtained, and of the situations in which they may be found by the merest tyro and novice at the art.

Commencing operations about Jan. 28th, I took, within a ten-mile radius of Ipswich (which locality is to be understood as indicated throughout this paper when no other is mentioned), chiefly at the base of large poplars, oaks and elms, where they may readily be turned up at the roots of the grass by the ever-useful garden trowel, the following:—*Carabus violaceus*, *Nebria brevicollis*, *Calathus melanocephalus*, *Pterostichus madidus*, *P. nigrita*, *Amara bifrons*, *Ocypus olens*, and the remains of *Lucanus cervus* ♂.

February was, for the most part, wet and foggy; conditions not favourable to pupa-digging, nor early coleopterising which involves much the same kind of work; however, still working the "unconscious" trees, as Rev. Joseph Greene terms them, I met with very fair success, turning up:—*Carabus granulatus*, *Clivina fossor*, *Pristonychus subcyaneus*, *Pterostichus vulgaris*, *P. inaequalis*, *Amara curta*, *Harpalus atenuatus*, *Bembidium quadrimaculatum*, *Hydroporus palustris*, *Hydrobius fuscipes*, *Creophilus maxillosus*; *Silpha atrata* and *Olibrus corticalis* were found under bark; *Aphodius fossor*, *Erirhinus rorax*, *E. validirostris*, *Anthonomus pedicularius*, *Lema cyanella*; the last four were obtained from under bark on aspen and willow.

March was a grand month, when beetles were galore; among those taken were:—*Notiophilus biguttatus*, one under a stone at Epsom; *Carabus nemoralis*, *Amara plebeia* and *A. communis*, running in sunshine; *Anchomenus oblongus* (?), *A. albipes*, *A. prasinus*; *Tachyporus hypnorum*, *Oxytelus rugosus* and *Stenus speculator*, from sods; *Quedius picipes*; *Geotrupes stercorarius* and *G. mutator*, flying at dusk; *Aphodius granarius*, under stones at Epsom: *Agriotes lineatus*, *Apion difforme*, from sods; *Hypera punctata* and *Sitones lineatus* in plenty by searching grass-stems with the aid of a lantern at night; *Chrysomela varians*, at Epsom. The 26th was a red letter day so far as ADEPHAGA were concerned, and on that day I took, on the cultivated downs behind Brighton, from under pieces of matting:—*Pterostichus vulgaris*, *P. madidus*, *Calathus cisteloides*, *Leistis ferruginens*, *L. spinibarbis*, *Badister bipustulatus*, *Anchomenus prasinus*, *Brachinus crepitans*; *Agriotes lineatus*, *Ocypus similis* and hundreds of *Stenus* (probably *speculator*) on the under side of an uprooted, rotten turnip.

Prolific as March may appear to have been, April, with its abnormally fine, sunny dry days, on which insects of all kinds simply swarmed, far surpassed it, as regards both the quantity and quality of its Coleoptera. *Broscus cephalotes* was obtained from sand-pits; *Anchomenus micans*, *Loricera pilicornis*, *Demetrius atricapillus*, *Harpalus proteus* commonly, *H. ruficornis* under stones, sods, &c.; *Amara familiaris* and *A. acuminata* "sunshiners;" *Bembidium quadriguttatum and B. lampros*; *Pelobius hermanni*, *Haliplus obliquus*, *H. flavicollis*, *Hydroporus reticulatus* (?), *H. dorsalis* and *H. palustris*, from ponds; *Acilius sulcatus*, *Hyphydrus ovatus*, *Gyrinus marinus*, *Enochrus bicolor*? *Ocypus similis*; *Necrophorus humator*, *Silpha rugosa*, *S. sinuata* and *S. thoracica* from dead rabbits; *Coccinella septempunctata*, *C. 22-punctata*, *Lasia globosa*; *Dermestes murinus* and *Nitidula bipustulata* from dead moles, weasels, hawks, &c.; *Meligethes* (sp. ?) from dandelion; *Geotrupes sylvaticus*, *Aphodius inquinatus* from dead heron; *A. erraticus* and

A. haemorrhoidalis from horse dung; *Athous vittatus* under stones; *Coeliodes quadrimaculatus, Centhorhynchus pollinarius, Apion difforme, A. laevicolle, Otiorhynchus ovatus, O. picipes, O. scabrosus, Polydrosus micans*—all the Rhynchophora were beaten—*Phratora vitellinae, Chrysomela polita* beaten; *Prasocuris phellandrii* and *Gastrophysa polygoni* from reeds over ponds; *Meloë violaceus* walking along a path in the wood; *Blaps mucronata* from a cellar; *Adimonia capreae* beaten from bushes. Truly a pretty list, and one that contrasts very favourably with that of Lepidoptera for the same month.

In May few new species were met with; the most notable were:—*Dytiscus marginalis* ♀; *Colymbetes pulverosus* from a pond; *Lema melanopa*; *Melolontha vulgaris*; *Telephorus lividus*, beaten; *Aphodius depressus*. On the 13th, a very fine specimen of *Callidium violaceum* was found crawling in our Museum here; it had evidently just emerged from some wooden relic.

The list was further augmented in June, by the addition of *Malachius bipustulatus, Philonthus politus, Telephorus pellucidus, T. fulvus, Athous haemorrhoidalis*, which fell with every stroke of the beating-stick; *Coccinella bipunctata, C. 14-punctata* and *Telephorus bicolor* in abundance; *Donacia dentipes*; *Rhizotrogus solstitialis* gyrated round young trees during the middle of the month; at the same time *Strangalia armata* and *S. melanura* occurred on umbelliferæ; *Cistela murina, Gyrinus opacus, Necrophorus vespator, N. vestigiator, N. mortuorum, Hister unicolor* (?), *H. cadaverinus, H. neglectus, H. virescens* (?), *H. purpurascens* (?), from dead rats, moles, &c.; *Malthinus punctatus, Malachius marginellus, Cholera grandicollis, Dorcus parallelopipedus*, a bad specimen of *Prionus coriarius, Pterostichus striola, Cercyon haemorrhoidalis* and *Sphaeridium bipustulatum* end the list, together with a host of *Aphodii*, including *A. foetens, A. fimetarius, A. prodromus, A. sordidus* and *A. rufipes*, from horse dung.

July was less productive of Coleoptera than of Lepidoptera: the latter came freely to light, and the woods swarmed with Geometræ. I however secured:—*Strophosomus coryli* and *S. obesus* in great numbers; one fine specimen of *Leptura livida* from umbelliferæ, about 8 p.m.; *Onthophagus fracticornis*. On the 10th, various Hydradephaga were secured by means of a water-net, including:—*Ilybius ater* and *I. fuliginosus, Colymbetus fuscus, Agabus striolatus, A. sturmi, A. uliginosus*, whilst *Serica brunnea* and *Donacia linearis* occurred commonly; *Goniocteua litura* and *Agriotes pallidulus* were taken flying about in the heat of the day.

The very remembrance of the beginning of August causes a thrill through my veins. On the 1st, I did the very best thing possible, viz.:—Got inside a suit of flannels, and strolled to my favourite hunting ground some five miles out. I was rewarded by a very fine specimen of *Hypera fasciculata*, as well as *Staphylinus stercorarius*, and a box full of common species. Two *Notoxus monoceros* next fell to my net, and were followed by *Rhynchites megacephalus* (or *R. germanicus*), *Dromius quadrimaculatus, Adimonia sanguinea, Mantura matthewsi*; two *Chrysomela fastuosa*, and one *Donacia lemnae*, from the banks of the Waveney, near Beccles; *Ptinus fur* from the suburbs of London; fifty *Geotrupes stercorarius*, in one evening, near Brighton; *Dromius linearis, Thyamis lycopi*, and *Psylliodes napi*, concluded the month at home.

September was redolent with new species of the smaller Brachelytra

and Rhyncophora, which were rudely disturbed in their dreams of winter quietness and warmth, at the root of this poplar, or under the soft bark of that willow, by finding themselves scattered indiscriminately over the surface of an inverted umbrella. Sept. 1st, was productive of:—*Necrophorus vespillo, Sitones puncticollis, Limobius mixtus, Thyamis lurida, Choleva watsoni, C. sericea, Apion difforme, A. laevicolle, A. immune*, and *A. hookeri*: followed later by:—*Lina aenea, Tribolium ferrugineum, Choleva chrysomeloides*; a dozen *Silpha atrata* from Maldon, Essex; *Notiophilus aquaticus, Helops striatus, Triplax russica, Dromius quadrinotatus*; and *Carabus catenulatus*, at sugar.

After September, beetles, together with other insects, fall off rapidly in number; Oct. 28th is perhaps the only day worthy of notice, but that was exceptionally good and yielded the following:—*Geotrupes stercorarius*; *Silpha atrata* under bark and at roots of oak; *Coccinella septempunctata*, unusually common this year, beaten; *Coccinella bipunctata* and *Bembidium littorale* under bark; *Aphodius inquinatus, A. contaminatus* and *A. lividus* from manure; *Apion difforme, A. immune, A. virens, A. hookeri* (?), *Sitones lineatus, Prasocuris marginella, Demetrius atricapillus, Mantura matthewsi, Stenus speculator*, and another of the genus, *Oxytelus nitidulus, Tachyporus hypnorum, T. chrysomelinus* and *T. obtusus*; four other Brachelytra and three Palpicornia. In addition to the above, October yielded *Boletobius trinotatus, B. exoletus* and *B. pygmaeus* from fungi. In November few fresh species were added:—*Achenium depressum, Tachyporus humerosus*, an unidentified weevil from oak bark, and several tiny Brachelytra. In December I wound up the season by taking sixteen *Helops striatus* from one sod, the *débris* of *Prionus coriarius, Coccinella variabilis*, and several common species.—Claude Morley, High Street, Ipswich.

SOCIETIES.

The Entomological Society of London held its 61st Annual Meeting on January 17th; Mr. H. J. Elwes, F.L.S., was elected President; Mr. H. Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S., Secretaries for the ensuing year. The balance sheet showed a balance in the Society's favour. In the absence of the President, his address was read by Mr. Merrifield. Mr. Elwes commenced, by insisting upon the share in furthering the progress of the science of entomology, which might be taken by the collector who, if he be but careful and orderly in his collection, and exact and accurate in his observation and in the records which he keeps, "has it in his power to observe and place on record, facts which must be of greater eventual importance than they now seem," and thus to provide solid material for the use of the few men of far-seeing intellect, who can explain the phenomena of nature in a way that all can follow them. Having noticed the appointment of Mr. Warburton to succeed Miss Ormerod as consulting entomologist to the Royal Agricultural Society, Mr. Elwes, from his experience as a practical farmer, as a gardener and as a planter, expresses doubt "whether, even when the life-histories of noxious insects have been thoroughly worked out, we shall be able in nine cases out of ten to apply that knowledge economically to their destruction," although he admits that in the United States "the measures which have been adopted by

Prof. Riley, and his numerous assistants and followers, have often been highly successful." The bibliography of the past year is then glanced at; the barbarous trivial names given by M. Oberthür are alluded to, and the announcement, interesting to students of synonymy, is made, that Dr. Staudinger is preparing a new edition of his celebrated *Catalogue*. It is to be hoped that in this, the veteran author will show a wider acquaintance with British authors than was the case in the 2nd edition. Mr. Elwes then passes on to call attention to the difficulty which is occasioned to the student of entomological literature, by "the rapid increase of the number of short notes, descriptions, and papers, and the great number of periodicals in which they are published," and suggests the appointment by the Royal Society, of a committee to consider the subject. His own idea is, that a description of a new species should not be recognised by scientific men, unless it is either in Latin, English, French or German (it is suggested by him that Spanish might be added) and is published in some journal, either already existing or to be created, which shall have been determined upon by international agreement as the recognised medium in each country for such publication. The importance of attaching good locality-labels to specimens is emphasised, and the death-roll of the year is then passed in review. It is noticeable how many of the names were those of veterans; Hagen, Blomefield (formerly Jenyns), Pascoe, Burney, Bowring, Morris and Speyer were all over seventy years of age, and some of them had passed four-score years.

At the meeting of The South London Entomological and Natural History Society, on Jan. 11th, Mr. J. J. Weir mentioned, in connection with an exhibit of American Butterflies by Mr. W. A. Pearce, that the female of *Papilio turnus* was dimorphic, and that *Limenitis disippus* was mimic of *Anosia archippus*. Mr. Tugwell, in some notes on *Spilosoma lubricipeda*, described the York City form under the name of var. *fasciata*; he also exhibited a pair of *Plusia moneta*, which had been bred by Mr. Matthews; also a long series of *Psilura monacha* bred from New Forest ova, some of the specimens being very dark; also a pair of *Pachetra leucophaea*, taken by Mr. Hanbury on the North Downs. The twenty-first annual meeting was held on Jan. 25th. Mr. Edward Step was elected President; Messrs. Jenner Weir and C. G. Barrett, Vice-Presidents; Mr. H. J. Turner, 13, Drakefell Road, Hatcham, S.E., Reporting Secretary; and Mr. S. Edwards, Kidbrooke Lodge, Blackheath, Correspondence Secretary for the ensuing year. The retiring President, the genial veteran Mr. J. Jenner Weir, delivered the Presidential address, of which we subjoin an abstract.

Before commencing, Mr. Weir made the Society a present of a beautiful album, and trusted that members by inserting their photographs therein would enable their successors to see the men who were their predecessors in the Society's early days. Mr. Weir's vast experience, and fund of information based on his knowledge both of British and Exotic insects, always make his generalizations of value. He first referred to the pleasurable excitement of collecting, and the fact that as an out-of-door exercise, the occupation of the field-naturalist tended to longevity. Turning then to the scientific aspect of the year's work, he pointed out that the great feature of the work of the South London Entomological Society, was the skill exhibited by its members in rearing lepidoptera from the egg. He deplored the paucity of

observations made by those who indulged in this interesting occupation, and showed how the ontogeny and phylogeny of insects could only be studied by such as bred them, and that exact observation by careful men would elucidate many entomological puzzles. He then passed a high and well-deserved eulogium on the scientific work of Dr. Chapman, which was undoubtedly never better deserved, especially referring to his work relating to the genus *Acronycta* and the ontogeny of *Cuspidia psi* and *C. tridens* and also to his work on classification. Mr. Weir quoted some remarks made by Professor Westwood many years ago relative to the position of the *Zygaenidae* near the *Sphingidae*, and pointed out the way in which Dr. Chapman had discovered their real affinities. He then discussed the experiments of Mr. Merrifield, and pointed out how valuable were the results obtained, both from the phylogenetic and the ontogenetic points of view. Touching on colour variation in general, Mr. Weir took the more advanced view as to its being often due to physiological causes, the result of the unsettlement of the normal constitution &c. of the larvæ. The direction of the attention of entomologists to these and kindred subjects, Mr. Weir observed, broke down the exclusiveness of British collectors who were obliged to get material from abroad for their generalizations. He was astonished that, in Dr. Smith's recent classification of the Noctuæ the learned Professor sub-divided them into only three groups, of which the *Thyatyrinae* and *Brephinae* bore no comparison with the large and comprehensive *Noctuinae*; but here we are rather at issue with the Ex-President, for the *Thyatyrinae* and *Brephinae* are such distinct connecting groups that we can well understand the Professor preferring to regard them as of equal value with the compact mass of moths which are evidently very closely allied, and sub-dividing this latter group into families of more or less equal value. The Brephides too, Mr. Weir remarked, had been by Mr. Meyrick supposed to be Geometrae, but here too we would point out that the consideration of the early stages at once showed Mr. Meyrick's position to be untenable. Some interesting notes followed on hybridisation, but in a short *resumé* like this it is impossible to do even approximate justice to a really valuable addition to our scientific knowledge. We offer the Ex-President our hearty thanks for his address, and await its publication with some amount of impatience in the *Proceedings* of the Society.

At the meeting of The Birmingham Entomological Society on Dec. 18th, 1893, Mr. Bradley exhibited the following Diptera, all of which were additions to the British list:—*Dactylolabis gracilipes*, Lw.; *Goniomyia jucunda*, Lw.; *Ephelia rarinervis*, Ztt.; *Clinocera lamellata*, Lw.; and *Didea fasciata*, Macq. Mr. Harrison exhibited three boxes of Hymenoptera, taken during the past year, including:—*Andrena trimmerana*, from a spot in Edgbaston, where he has seen it for several years; in 1893, the parasite *Nomada alternata*, which Mr. Harrison saw for the first time, was commoner than its host: *Halictus smeathmanella*, *Mimesa dahlbomi*, *Crabro unicolor*, *Coelioxys rectis*, *Osmia bicolor*, &c. Mr. A. H. Martineau also exhibited Hymenoptera taken in 1893:—*Crabro interruptus* from Middleton Woods; *Mimesa dahlbomi* from Wyre Forest; and *Agenia variegata* from Selsley, Glos. Mr. H. T. Sands showed *Vespa crabro* from Alvechurch, where it has been unusually abundant. Lepidoptera:—Mr. G. W. Wynn exhibited *Notodonta chaonia* from Wyre Forest: Mr. Bethune-Baker, *Crambus ericellus*, *C. furcatellus* and

Psodos coracina (*trepidaria*) from Rannoch; Mr. G. H. Kenrick, *Calocampa solidaginis* from Sutherlandshire, which were lighter and greyer than the Cannock Chase form; Mr. Bradley showed a variable series of *Chrysophanus phloeas*. Mr. Bethune-Baker alluded to Mr. Merrifield's experimental breeding of the species, which led that gentlemen to the conclusion that, larvæ reared at a high temperature, produced imagines of dark and dull colours, whilst those reared at a low temperature, produced paler and brighter imagines. Mr. Bradley said that he had taken some very light forms in September and October, and these must have fed up during the hot months.

In South Wales, The Penarth Entomological Society seems, judging from the report presented at the annual meeting on Jan. 20th, to be doing good work. The papers read during the past year cover a wider field than is usual in such societies, and show that the members are interested in the scientific problems that confront the thoughtful naturalist. Sir J. T. D. Llewellyn, J.P., is the President, and Mr. John Wallis, Kendrick House, Penarth, the Secretary for the coming year. It is to be hoped that the regretful reproach which is levelled at them in the report, will induce those members who have hitherto only been "ornamental" to join the ranks of the "useful ones."

City of London Entomological and Natural History Society.—*January 2nd*, 1894.—Exhibits:—Mr. Stillwell; a variable series of *Hybernia defoliaria* from Epping Forest. Mr. Lane; a series of *Chelonia plantaginis*. Mr. Bacot; a bred series of *Vanessa c-album*, one of which had white triangular marks on the underside of the hind wings in place of the usual "comma" marks; he stated that this species rested with its fore wings much further forward than is usual among butterflies, so that there was a larger interval between them and the hind wings, the habit serving to intensify its resemblance to a dead leaf. Mr. Bell; a specimen of a Noctua taken on sugar at Tooting Common, its peculiarity being that a semi-circular patch at the outer side of each fore wing was entirely devoid of scales; the patches were remarkably symmetrical; the specimen was considered by most of those present to be a ♀ of *Cerigo cytherea*. Messrs. Clark, Hill, Prout, Battley and Dr. Sequeira exhibited Scotch lepidoptera. Mr. Oldham; dragon-flies and bees from Cambridgeshire. Mr. Hill read a paper entitled "Random Notes on Collecting Lepidoptera in Scotland," which he illustrated by the contents of three cases. The paper was based on the writer's experiences at Rannoch, in August, 1891, and in the Orkney and Shetland Islands in August, 1892. Having described the locality, Mr. Hill passed in review the insects he had captured. Two specimens of *Vanessa urticae* were very strongly marked and larger than those met with in the South of England. *Erebia blandina* was met with abundantly in one particular spot on the banks of the Tummell; any number might be taken by simply walking about in the grass and netting those that flew up; the species was however extremely local; its flight was very similar to that of *Epinephele ianira*, but it always disappeared entirely and refused to be kicked out, as soon as the sun went in; the species was also noticed in the Pass of Killiecrankie. It was too late for *Coenonympha typhon*, and only three specimens were secured; these were flying over the heather on the mountain sides at a considerable elevation. Two larvæ of *Smerinthus populi*, found on aspen, yielded in the following season two ♀ imagines which were much

paler than the ordinary pale form, and were suffused with pink. *Dicranura furcula* was bred from one of two larvæ found on the same aspens, by Mr. Salvage; this was the first time Mr. Salvage had seen this species at Rannoch, although he had worked the locality for 15 or 20 years. *Cymatophora or* was bred from larvæ found on aspen; they spend the day between two leaves spun together, coming out to feed at night; the imagines are much smaller than those received from Winchester, and their fore wings are suffused with a pink or pale mauve tint. One female *Stilbia anomala*, was taken on the wing in the afternoon; it seemed to have a tendency to fly round in a circle, and its movements were exceedingly rapid. Pupæ of *Taeniocampa gothica*, yielded in the following spring, an interesting series of imagines, which vary considerably both in colour and in the usually dark central mark; in some of the specimens the mark is practically unicolorous with the rest of the wing. Are these the true var. *gothicina*? * Sugar was an entire failure. Of Geometræ: *Larentia didymata* swarmed in every locality visited, the specimens being smaller and darker than the ordinary southern type. *Larentia caesiata* was also common, both at Rannoch and in the Shetlands; it was very difficult to discover, owing to its perfect resemblance to the rocks and stones on which it rested; the Shetland specimens are much more strongly marked, and have a much darker median band than those from Rannoch. *Larentia ruficinctata*, of which a fair number were taken, also rests on the rocks at considerable elevations on the mountain sides, and is so exactly like a yellow lichen which grows freely on the rocks, that the practised eye is necessary to detect it. The variation of *Melanthia rubiginata* in Scotland is considerable; a form occurs not infrequently in which the fore wings, and to a less extent the hind wings, are suffused with black. *Cidaria populata* was fairly common on the mountain sides flying over the heather; in some of the specimens the wing-markings were almost obliterated by a dark suffusion. *Cidaria immanata* was perhaps the most variable insect met with, in fact, no two specimens were exactly alike; the median area varied in colour from jet black to pure white; in the Shetland Isles a form is taken which is entirely different from any of those met with at Rannoch.

Jan. 16th, 1894.—Exhibits:—Mr. Hill; a specimen of *Catocala sponsa*, having a suffusion of black scales near the apical angle of the left hind wing. Mr. Battley; *Cheimatobia brumata*, of both sexes, the wings of the males showing considerable variation in the distinctness of the transverse lines. Mr. Clark; *Mixodia palustrana* from Perth; also a specimen of *Selenia lunaria*, bred on Christmas Day. Mr. Nicholson; two larvæ of *Pararge aegeria*, about half-an-inch long, from a brood which is now hybernating indoors, on grass growing in a flower-pot. Mr. Bacot; living pupæ of *Taeniocampa munda*. Mr. Riches; *Agrotis segetum*, *Mellinia circellaris* and *Anchocelis pistacina*, from Salisbury; the *circellaris* were rather dark. Mr. Southey; a fine series of *Nonagria arundinis* (*typhae*) from Norfolk. Mr. Lane; *Leucophasia sinapis* from Reading, and *Abraxas grossulariata*. Mr. E. H. Taylor, of 52, Mimosa Street, Fulham, was elected a member of the Society.

* For account of var. *gothicina* see *British Noctuæ and their Varieties*, vol. ii. pp. 148-151.—Ed.

Capt. B. Blaydes Thompson then read the following paper on:—

The PRONUNCIATION and ACCENTUATION of CLASSICAL NAMES.

There is nothing in what follows which can in any way lay claim to novelty. I have no new theory to propound, and the statements which I am about to make are neither new, nor do they in any way rest upon my authority. I do not, however, intend you to infer from this that they will not be new to you; on the contrary, I have no doubt that you will be as much surprised as I was, at some of the discoveries which I have made during the preparation of this paper, especially as regards the accentuation of both generic and trivial names. I approach the subject with considerable diffidence; my object has been simply to compile and summarise, to the best of my ability, some of the leading points in this rather thorny subject, and to endeavour to make them sufficiently explicit to interest you.

About thirty-five years ago numerous complaints appeared in the *Entomologist's Weekly Intelligencer*, from Lepidopterists as well as Coleopterists, of the difficulties with which they had to contend both in pronouncing and in accentuating the Latin names of insects, and, notwithstanding the gigantic progress which has been made in education since 1850, such difficulties are still felt by many. There are not a few well-educated and intelligent men, whose classical education has not been very extensive; when such are tempted out of the beaten track of commerce by the allurements of science, and find themselves forced to cope with scientific nomenclature, the difficulties attending the study of whatever branch they may select are greatly increased.

In consequence of the numerous synonyms in use amongst Lepidopterists, there is considerable confusion and uncertainty with regard to the names of many species, and I venture to think that, by pronouncing or accentuating the name of an insect in such a manner as to make it sound like some other name, that confusion and uncertainty are increased.

As regards the term "pronunciation," it may be used as referring either to the two methods which exist in this country, to accentuation, or to quantity. Of the two methods of pronouncing Latin, one is called the "English," the other the "Italian," or more generally the "Continental." The difference between the two consists in the vowels being sounded differently, and in the letters *c* and *g* being invariably hard in the Continental method, whereas in the English method they are hard or soft, according to the vowel which follows them: hard before *a*, *o* and *u*, soft before *e*, *i*, *y*, and the dipthongs *ae* and *oe*. Into the question as to which of these methods is the better, I am not going to enter, but will simply say that each is right, viewed from its own standpoint, and that each is looked upon with favour by its patrons in the United Kingdom. At Oxford the English method is adhered to, whilst at Cambridge the Continental is adopted to some extent; nor is there uniformity of practice among the large Public Schools of the Metropolis, Christ's Hospital adopting the Continental method, Merchant Taylors' the English. Amongst Lepidopterists in Great Britain, the English method of sounding the vowels in pronouncing Latin words is almost universal, and although certain Cam-

bridge scientists hold to the Continental pronunciation the latter does not gain ground; we may accordingly set it down as *un fait accompli* that naturalists throughout the United Kingdom give the vowels the same sound when speaking Latin words that they do when speaking English. It is sometimes maintained that the adoption by us of the Continental method would secure uniformity of pronunciation amongst Europeans, and that thus an ideal "International pronunciation" would become a reality. Strictly speaking, however, there is no "Continental" method, for, as a matter of fact, each nation pronounces Latin after the analogy of its own tongue. In the sound of the vowels, it is true, there is a general sort of agreement, but as regards the consonants there is the greatest diversity of usage. If the Continental nations had attained to an approximate uniformity among themselves there would be reason in the suggestion, but as the matter stands it cannot be logically supported. As an example of the diversity in Continental pronunciation we will take the word *Cicero*: the French pronounce this *Seesayro*, the Germans *Tseesayro*, the Italians *Tcheechayro*, and the Spaniards *Theethayro*.

The result of the correspondence in the *Intelligencer*, to which I have already referred, was that the task of compiling, editing and publishing an *Accentuated List* of the names of the British Lepidoptera was undertaken jointly by the Councils of the Entomological Societies of the two Universities: the President of the Cambridge Society at that time was Charles Cardale Babington, and of the Oxford Society Rev. H. Adair Picard. In this work, which was published in 1859, every name then in use for Species or Genus is dealt with both as regards pronunciation and accentuation, and its derivation given.

The first fact that is patent on looking through the work is that the generic names are mostly derived from Greek words, the trivial names from Latin. In the preface the following table of vowel sounds is given, with the intimation that "every vowel in the *List* is to be pronounced short, unless marked long, thus ë":

"*a*	is to be pronounced	as	in	*hat*;	*ä*	as	in *hate*.
e	,,	,,	,,	*met*;	*ë*	,,	*mete*.
i	,,	,,	,,	*hid*;	*ï*	,,	*high*.
o	,,	,,	,,	*hop*;	*ö*	,,	*hope*.
u	,,	,,	,,	*duck*;	*ü*	,,	*duke*.

ae and *oe* are to be pronounced as long *e*, *ei* as long *i*, and *au* as in *naughty*."

From this it will be seen that the sounds are to be exactly the same as they are in English. The mind of the student need not be unduly exercised as to whether a name is derived from a Greek root or from a Latin one, because from whatever language it has been derived, it becomes a Latin word when inserted in a list of Lepidoptera as applied to an insect. Having adopted the English method of pronouncing Latin words, the vowels and consonants which they contain must be sounded as they are in our own language. The English are accused not only of departing from the genuine sound of the Greek and Latin vowels, but also of violating the *quantities* of these languages more than any other nation in Europe; but if the *quantity* be violated, it is not as chance may direct, but regularly and in accordance with the analogy of the English tongue, which, if not so well adapted to the pronunciation of Greek and Latin as some other modern tongues,

has, nevertheless, as fixed and settled rules for pronouncing them as any other. I have so far discussed the two methods of pronouncing Latin as contrasted with each other, but wish now to call attention to the confusion of them which is not unfrequently heard in the pronouncing of a word partly in accordance with one method and partly with the other. The errors most common are sounding the *i* like our *e*, and the consonants *c* and *g* hard irrespective of the vowel that follows them; for example, *dentina* and *blandina* are pronounced as if written *denteena* and *blandeena*, but the error is not consistently perpetuated in *aprilina*, *sobrina* and *pistacina*, the latter names apparently not lending themselves so easily to the practice. Again, take *Lycaena*; according to the English method the *y* is long, the *c* is soft, and the dipthong is sounded like a long *e*: in the Continental method the *y* is also long, but the *c* is hard, and the sound of the dipthong is like our long *a*. In the one case the pronunciation would be *liseena*, in the other *likayna*, but by pronouncing the word *likeena*, as is often done, the two methods are mixed, and this pronunciation is incorrect. Another instance is the familiar *fagi*; in the English method the *g* is soft and the proper pronunciation rhymes with *magi*; in the Continental method the *g* is hard and the word is pronounced *fahgee*; but if the English vowel sounds are retained, whilst at the same time the *g* is sounded hard, the two methods are mixed, and the rules of the English method violated. The cause of this, in a great measure, is the inference that is improperly drawn that, because the *g* is hard in the nominative case, *fagus*, it must continue hard throughout the declension, irrespective of the vowel that follows it; but this is erroneous.

To the best of my belief, the causes of a great deal of this confusion are to be found in these facts:—1. There is no letter *c* nor *j* in Greek; 2. There is no *k* in Latin; 3. The Greek letters κ and γ are invariably sounded hard in that language; 4. When a name (Latinised of course) which comes from a Greek root is given to an insect and contains the Greek κ, the letter *c* has to be substituted for the latter; 5. The letters *c* and *g* in English, have both a hard and a soft sound, and which of the two is to be used depends upon the vowel that follows them. Reference to an English dictionary will reveal the fact, that whenever the consonant *c* is immediately followed by either of the vowels *a*, *o* or *u*, the *c* is hard; but when *c* is followed by *e*, *i*, *y*, *æ* or *œ*, it is soft. Good illustrations of the hard and soft sounds of *c* are to be found in our Catalogues of Lepidoptera. Among the *Bombycidae* we find *B. quercus* and *L. quercifolia*; in the former the consonant is hard, because followed by *u*; in the latter soft, because followed by *i*, although the latter name is derived from the former. Other examples of the hard *c* are found in *cassiope* and *conspicuata*, of the soft in *centonalis*, *cytherea*, *urticae* and *Coenonympha*.

The letter *g* is in the same category, and is sounded hard or soft in accordance with the same rules. There are several exceptions to the rule in the English language, when *g* is followed by *e* or *i*, as for example, *get* and *give*; but in Latin there are none—the rule must be observed strictly. Examples of the hard and soft *g* are also numerous, especially among the Rhopalocera. In *galatea*, *aegon* and *exigua*, the *g* is hard; in *agestis*, *erataegi*, *argiolus*, *lithargyria* and *megaera*, it is soft.

These two consonants seem to me to be the chief stumbling-blocks in the pronunciation of Latin, by persons who have not had efficient instruction in the language. Such persons do not seem to realise the

fact that when a Latin name is formed from a Greek root, or, as in the name *cærnleocephala*, from a combination of Latin and Greek roots, it becomes *de facto* a Latin word, and that the sound of the Greek consonants is consequently inadmissible. *Lactometer* is the English term for an instrument used in determining the quality of milk; it is derived from the Latin *lac* (milk), and the Greek *metron* (a measure), but it is a purely English word notwithstanding its derivation.

The only other consonant which seems to require notice is *j*. I suppose that if I said there was no *j* in Latin, I should be confronted with proof to the contrary from a Latin dictionary, and should be asked how I got rid of the *j* in *Jupiter* and *Juno*. I, however, must maintain that there is no Latin letter which has the sound of the English *j*, and, in proof of my statement, I produce a school-book called *First Latin Primer*; in the vocabulary at the end of this no words will be found under *j*, and the names which I suggested might be produced to confute me will be found printed *Iupiter, Iuno*. In fact, in none of the Latin educational works now being printed for the use of schools, is the letter *j* to be found; *i* being substituted throughout. There is no doubt that the rounded *j* is the modern form of *i*, as *r* is of *u*, both being used indifferently with vowel or consonantal power. In the *Century English Dictionary*, the following passage occurs;—"*J* is only another form of *I*, the two forms having formerly been used indifferently, or, *J* preferred when final. In Latin, for example, *i* was written where we write both *i* and *j*, and had, now the vowel value of *i*, and now the consonant value of *j*, being pronounced as *y*, where we now write and pronounce *j*; *e.g.*—*Hallelujah*. As a numeral *j* is a variant form of *i*, used generally at the end of a series of numerals, and now only in medical prescriptions; as *vj*, six *viij*. eight." The trivial names *caja, baja, bajularia*, are to be found thus spelt in Stainton's *Manual*, Doubleday's *Catalogue*, and Newman's *British Moths*, and accordingly we often hear them pronounced *kaydga, baydga*, and *baduglaria*; when we turn to the *Accentuated List*, however, or to South's *Synonymic List*, we find them spelt *caia, baia*, and *baiularia*, and in addition we find, that the same change has taken place with *ianira* and *ianthina*. With regard to *Jupiter* and *Juno*, these are the English names of the Roman deities *Iupiter* and *Iuno*, the *J* taking the sound of the English Y.

I trust that I have now succeeded in showing you that the analogy of our own language being the rule for pronouncing Latin, there is not much need for any other directions than such as are given for the pronunciation of English words. The general rules are followed almost without exception, and there is little difficulty until we come to the position of the accent. We have still two points to deal with, *accent* and *quantity*, and both are complex and difficult; I propose to confine myself to a few general remarks on each of the two points, and to offer some practical suggestions.

The word *accent* is not much used now in the classical sense. In modern parlance, *accent* is much the same as *stress*, or *emphasis*. If we say that the first syllable of *honest* bears the *accent*, we merely mean that we lay a greater stress on that syllable in pronouncing the word. As a matter of fact, *accent*, in the proper sense of the term, and *stress*, can exist in the same word independently of each other. The same holds good with respect to *quantity*—the length of time during which a vowel sound is prolonged. In Latin, there are no accentual marks to guide us, but the main rules for accentuation are very simple. With

some trifling exceptions, every dissyllable has its *accent* on the penultimate, independently of the *quantity* of either syllable; every word of three or more syllables, has the *accent* on the penultimate if the vowel of that syllable be long, on the antepenultimate if the vowel of the penultimate be short.

The other point is *quantity*: in other words, whether the vowel which gives the sound to a syllable is long or short. *Quantity* and *accent* are the two component parts of *Prosody*, but, as this is about the most abstruse part of grammar, I shall not weary you with a dissertation upon it, and it would be manifestly superfluous to suggest a close study of the subject. Let us look at it in a practical manner. The two questions which require solution seem to be:—1. How can an entomologist be apprised of the fact, that it is possible that his pronunciation of a Latin word is wrong, either in *accent* or in *quantity*? 2. How can he ascertain what the correct pronunciation is? I may observe that the first question can hardly arise in connection with the trivial names of any of the Geometræ, Pyralides, Tortrices, or Tineæ, because, all these have a distinguishing affix, the penultimate of which is invariably accentuated; it is, therefore, only in regard to the trivial names of the Rhopalocera, Bombyces, and Noctuæ, and in generic names that error is possible.

When a lepidopterist hears the name of an insect pronounced differently, either as regards *accent* or *quantity*, from the manner to which he has been accustomed, he may safely infer, provided that the word be not a quadrisyllable, that either he or the speaker is in error; it depends a good deal upon whether the hearer is of an enquiring turn of mind or not, whether, with the ulterior object of being accurate, he endeavours to ascertain which is the correct pronunciation, or does not. If he had a *Lithosia* or a *Sesia* concerning whose identity he had some doubt, he would probably take the earliest opportunity of consulting some trustworthy book or cabinet, with a view to the resolution of his doubt. I would suggest that, in the case of a doubt about *accent* or *quantity*, the *Accentuated List* should take the place of the cabinet. Two editions of this work are published, one costing only three-pence, and containing only the names, with indications of their *accent* and *quantity*; the other, costing five shillings, and containing in addition, some account of the derivations of the names, with the reasons, where practicable, for the application of such names. Looking at the derivations as a whole, we do not find that they assist the student of pronunciation to the extent that might have been expected; the cheap edition of the *List* is quite sufficient to furnish the enquirer with all that he needs to know, in order to accent and pronounce classical names correctly.

In conclusion, while it is too much to hope that our elders will abandon any errors into which they may have fallen, I would appeal to young entomologists to make an attempt to cope with this somewhat difficult matter and to surmount it. I venture to think that it would be difficult to find any one who would maintain that correctness of pronunciation and accent is immaterial, even in private, for is there not the possibility of the propagation of errors, especially among the rising generation? We are all, however, in the habit of exhibiting our captures in a quasi-public manner, and this necessitates the airing of our Latin pronunciation in public; and I think it will be generally admitted that every effort should be made, not only to avoid errors, but to attain accuracy as far as possible.

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The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

Chap. I.

CLASSIFICATION.

1. On the position of the Insecta in relation to allied Classes.—The Sub-Kingdom Annulosa (*annulus:* a ring) is characterised essentially by the fact that the bodies of the animals belonging to the several classes of which it is composed are made up of rings or segments arranged along a longitudinal axis. It is usually divided into seven Classes, of which Insecta is one. Five of these Classes are grouped together to form the Section Arthropoda, and the classification of this section may be tabulated as follows:—

ARTHROPODA.—Animals having a body composed of segments and jointed; segmental appendages articulated to the body.

Division I.—Branchiata.—Breathing by means of branchiæ or gills.

Class 1.—*Crustacea.*—Head and thorax united into a cephalo-thorax; abdomen distinct; two pairs of antennæ—called respectively antennæ and antennules.

Division II.—Tracheata.—Breathing by means of tracheæ.

Sub-division 1:—*Chelicerata.*—No true antennæ.

Class 2.—*Arachnida.*—No distinct head, the head and thorax being united to form the cephalo-thorax; body divided generally into cephalo-thorax and abdomen; four pairs of thoracic legs; no abdominal legs.

Sub-division 2:—*Antennata.*—With one pair of antennæ.

Class 3.—*Onychopora* (*Prototracheata*).—Body not divided into distinct regions; legs numerous, but variable in number.

Class 4.—*Myriapoda.*—Head distinct; little or no distinction between thorax and abdomen; legs very numerous.

Class 5.—*Insecta* (*Hexapoda*).—Body divided into head, thorax and abdomen; six legs (attached to thoracic segments); usually two pairs of wings.

In a very recent paper "On the nervous system and sense organs of

articulated animals" (*Ann. Sci. Nat. Zool.* (7), xiv., pp. 404-456), M. H. Killanes concludes that the sub-division of Arthropods into BRANCHIATA and TRACHEATA cannot be preserved, and suggests the following table, as expressing better than any other, the affinities of the groups:—

Arthropoda
- Antennata
  - Biantennata ... Myriapoda, Peripatus, Insecta
  - Quadriantennata Crustacea
- Chelicerata ... ... Limulus, Arachnida

2. ON THE SUB-DIVISIONS OF THE CLASS INSECTA.—The Class INSECTA is divided into Orders; the number of these is differently estimated by different authors; Packard (*Entomology for Beginners*, 1889), establishes sixteen. These Orders are generally arranged in three groups, termed respectively *A-metabola*, *Hemi-metabola*, *Holo-metabola*.

A-metabola (without change).—The insects composing this group are such as undergo no distinct or regular metamorphoses. Each stage, from the ovum to the perfect insect, resembles the previous one, except that at every change of skin the insect gets larger until maturity is reached. The members of this group have no wings, and hence are often called Aptera, although the Order is usually known in scientific works as THYSANURA. Examples of this group are Spring-tails (*Podura*), *Lepisma*, &c.

Hemi-metabola (half-change).—This group contains those insects which have their metamorphoses divided into three stages (or four, reckoning the egg), but which do not differ much in appearance in the several stages (excluding the egg). The stages are:—1. The egg; 2. The larva, which is smaller than the perfect insect and differs from it in having no wings; after several changes of skin the larva becomes: 3. The pupa; this is active, has considerable powers of locomotion, and possesses rudimentary wings. The larval and pupal conditions are often now considered as constituting only a single stage, which is called the "Nymph" stage. The pupa or (nymph) undergoes several ecdyses (changes of skin) before the final stage is reached, which is: 4. The mature imago; characterised by the possession of wings, but otherwise showing but little advance on the condition of the pupa. The Orders included in this group are:—DERMAPTERA (Earwigs), ORTHOPTERA (Cockroach, Locust, Grasshopper, &c.), PLATYPTERA (Stone-flies, Termites, &c.), ODONATA (Dragon-flies), PLECTOPTERA (May-flies), THYSANOPTERA (Thrips), HEMIPTERA (Bugs, Aphides, Coccidæ).

Holo-metabola (whole change).—The insects in this group have the metamorphoses divided into four distinct stages, and present a very different appearance at each stage. These stages are:—1. The ovum; 2. The larva; this is sometimes provided with claspers as well as with three pairs of true legs (which are usually ill-developed), and undergoes several changes of skin; 3. The pupa: this is a quiescent form, incapable of movement (except to the most limited extent), and incapable of taking nutriment, it undergoes no change of skin from the time that it is formed until the imago emerges; 4. The imago; this differs exceedingly from both larva and pupa; the claspers of the former have disappeared, only true legs are present; the wings are usually remarkably well-developed. NEUROPTERA (Lace-wings, Ant-lion), MECOPTERA (Scorpion-

fly), TRICHOPTERA (Caddis-flies), COLEOPTERA (Beetles), SIPHONAPTERA (Flea), DIPTERA (House-fly), LEPIDOPTERA (Moths and Butterflies), HYMENOPTERA (Bees, Ants, Ichneumon-flies, &c.), are the Orders into which the *Holo-metabola* are usually divided, but the number of these will vary, according as the weight given to certain characters by different authors varies.

3. ON THE RELATIONSHIP OF THE VARIOUS STAGES IN AN INSECT'S LIFE.—If we consider the characters of the various stages in each of the three groups, we are at once struck by the fact that in the *Holo-metabola*, to which the Lepidoptera belong and in which we are therefore more particularly interested, there is an immense gap between the larva and the pupa, much greater than that between the pupa and the imago. Now we may fairly assume that the original tendency of all insects was to have, not widely separated changes, but rather a sequence of comparatively closely related ones, and that the features which characterise the metamorphoses of the Lepidoptera point to the probability of differentiation in very opposite directions between the adult larva and the pupa, resulting in the quiescent condition now characteristic of the latter. As a matter of fact, we find that the earliest stages of the lepidopterous larva show a development often termed lower, but in my opinion simply more divergent, than that of the larva of the *Hemi-metabola*, so that several stages are apparently missed between larva and pupa; at the same time, the imago has undergone so much greater a progressive development, than have those of the other group, that the gap becomes still more striking.

The study of the metamorphoses of the Lepidoptera has led Mr. Poulton to conclude, that "the suppression of intervening stages has left the first or larval stage in an extremely ancestral condition, so that the larva in Lepidoptera is far more ancient than the first stage of those insects (Orthoptera, etc.) which still retain the more ancestral method of metamorphosis. These, therefore, have lost the early stages, whilst, Lepidoptera, etc. have lost all the stages intervening between the ancient and a very late stage" (*Trans. Linn. Soc. Lond.*, 1889, p. 190). I do not agree with this. My own impression is, that the whole of the metamorphoses of the earliest modifications of the ancestral type, were confined within very narrow limits, and that the slight changes characteristic of the *Holo-metabola* at the present time represent this condition much more correctly than any other, and that their larvæ are the more ancestral, whilst at the same time the needs, habits, etc. of those insects which are supposed to have attained to the most advanced development in the imago state, and which differ profoundly from those more ancestral forms, have also undergone great modification in the form of their larvæ, such modification tending towards a condition of inactive helplessness in that stage. But this does not necessarily show a more ancestral form, but rather a modification in response to environment. That is to say, if these larvæ are all essentially the outcome of the ancestral form, those of Lepidoptera (and the assumed higher groups), must be distinctly more specialised and farther removed from the assumed primitive type, and instead of having reverted towards such, they are, in reality, much more specialised, when compared with the primitive Thysanuran standard which we set up. Instead of approaching the primitive type, then the lepidopterous larva undoubtedly differs very greatly from it, and shows, in reality, a very high standard of specialisation.

Perhaps a reference to the helplessness of our own young is hardly admissible. Certainly development in two opposite directions at the same time, one taken by the larva, the other by the pupa and imago, greatly enhances the difference between the larval form on the one hand, and the pupal and imaginal forms on the other. This idea is borne out by Mr. Jackson, who states that the genital ducts of lepidoptera pass through an Ephemerid stage and an Orthopteran stage before reaching that point characteristic of the Lepidoptera. The former (Ephemerid) stage, he states, ends at about the close of the larval life, *i.e.* (I presume) the genital organs of Lepidoptera are as highly developed (although not functionally active) at this stage, as are those of the Ephemerid adult; this fact does not, therefore, particularly suggest that such larvæ represent a more ancestral type than the Ephemerid larva, as may be assumed from Mr. Poulton's remarks, since the Lepidopterous larva has apparently at this early stage of development reached a point which characterises the Ephemerid imago. The Orthopteran stage, Mr. Jackson tells us, is reached in the quiescent larval stage immediately preceding pupation, which suggests that in this structural feature at least, the Lepidopterous larva is as highly developed as the Orthopteran imago. I see clearly, of course, the great gap which exists between the larva and pupa of Lepidoptera, but I think it is brought about, not so much by the reversion of the larva to a more ancestral type than that exhibited by the larvæ of most other Orders of insects, as by the special development of the larva in a direction opposite to that afterwards assumed by the imago.

(To be continued.)

RETROSPECTIONS AND FORE-CASTS,

By A. J. HODGES.

(Continued from p. 44.)

We must break up our evening gatherings and get to work; one month is gone, and the little we have done with the "winter" moths can hardly be called a start; as we go home, cast a glance at the out-lying gas-lamps; a few Geometers will visit them on suitably warm dark evenings. It will require a very propitious night to attract the hybernating NOCTUÆ to "sugar:" but for females, to obtain ova for breeding, it is worth trying. Recollect *Cerastis erythrocephala* and *Dasycampa rubiginea* are among the hybernators, also all the *Xylinidae*: we will not waste much treacle over this "off-chance," but will pay more attention to the "sallows" when the catkins are more generally in bloom.

A fortnight later, and a day's trip to that good old locality, Epping Forest, draws us from our winter shell in earnest. A lovely morning, all nature rejoicing in its awakening from its winter sleep, and the earliest wind-flowers (*Anemone nemorosa*) are peeping shyly up among last year's dead leaves. The flocks of hungry blue-tits (*Parus caeruleus*) have found out the favourite corner near Theydon Bois, where we take long series of *Brephos parthenias*, and vie in quickness with the most skilful wielder of the long-handled nets, in the avidity with which they seize the wildly-flying moths. An *early* sun and we get our series flying lower, and can afford to pity the exertions of the later comers, and

adjourn to the "Wake Arms" Inn, of convenient proximity. Who can this be, armed with net and boxes, just sallying forth? We greet one another warmly, a friend from the Midlands, staying in town. A few words, captures examined, one *Asphalia flavicornis* is the sum of that species in my bottle, and a warm invitation to run down Cannock Chase, any number of *flavicornis* on the birches there. Regretfully declining the kind offer, we part company at the station after having glanced on the way at the spot near Chingford, where a month later, the very local *Aleucis pictaria* can be found, by searching the sloe-bushes after dark.

The scent of the sallow-catkins greets our nostrils on our next visit, and so recalls the pleasurable expeditions of the preceding spring, that a night is soon arranged; Crohamhurst, near Croydon, being the spot selected, and the results, fine series of *Taeniocampa gracilis* and *munda*, but the following morning brings an eager letter from far-distant Hereford, "Season just on, *leucographa* plentiful." This is a chance we cannot miss, and a few hours later we are in the lovely woods of the distant county. The evening is all that could be desired, warm, still, and with the sallows in their prime, and beginning with the very earliest dusk after sunset we are fully rewarded with long series of *Pachnobia leucographa* and *Taeniocampa miniosa*, with fine forms of each of the allied species, excepting *opima*, which we promise ourselves to-morrow. The *opima* woods are equidistant from Hereford, in the opposite direction, but we *must* take all the species to complete the genus locally. What does my companion say! we can get *opima* at home, on Wanstead Flats? Yes, but we shan't much longer, the "northern" quaker is not at home so far south, and strange irony! it is the favourite game, football, of *opima's* chosen counties, that is fast trampling it out, in its metropolitan home. We will stay a day, and return to our last night's woods, well-known for *Dicranura bicuspis*, probably a day's search will find one last year's cocoon, empty; undoubtedly good practice, but how much more exciting is the chase of *Brephos notha*, which is plentiful here amongst the aspens (*Populus tremula*). No matter if the sun goes in, we will shake them from the slender trees, and try our skill in netting them, ere they can regain shelter. Too tiring! then let us resume trunk-searching. *Lobophora lobulata* is not yet over, and is plentiful, and those old birch stumps show frass between the wood and the bark, evidently of *Sesia culiciformis*, and are worth working; let us get them out carefully, a small, pale, fleshy grub, that's right; don't put them in chip-boxes, or they may share the fate of the *notha*, and get into the ammonia jar instead of the breeding cage.

To those of us whose arrangements are not already mapped out, what can appeal more strongly than an early Easter, welcome harbinger of the longer holidays of the later season, and certainly this year of grace has done its utmost in this direction to shorten the hibernation, which the energies of many of us undergo. The persuasive, though silent eloquence of the "posters" of the Railway Companies is commencing to have its effect, and the rival attractions of the various well-known haunts of lepidopterists, will soon be the subject of earnest consultation. An unwelcome doubt crosses the mind of the older and more staid collector, as to the real advantages which the tyro derives from the modern facilities afforded him, by the numerous cheap excursions to such an ancient "*ultima thule*" as even the New Forest, and which tempt him

to an ambition to begin his career of collecting where the older generation left off. The unbidden thought arises as to whether it will not be the case, in the near future, that familiarity with the distant and mysterious "localities" over which a glamour has been thrown by the records and the results of the doughty pioneers coeval with Doubleday, may not breed an undesirable contempt for a pursuit of fame. Perish the thought! If the reapers are more and their work lightened, yet the results of their labours have an ever-widening and more appreciative public.

In regard to the above possible drawbacks, our energetic friends across the Border, have in some measure compensation for their isolation from the more active and populous centres of entomological activity. No enterprising "Field-Day" party, even though "personally conducted" from our flourishing Metropolitan Societies, can ever hope to penetrate the Highland haunts of *Anarta cordigera*, or *Fidonia carbonaria*, nor to ply the busy chisel to the detriment of the birch plantations, in search of the slow-feeding larva of the rare *Sesia scoliaeformis*.

To A. R. G.

COVER of Night, in other lands than mine,
Of night made mystical by many a sprite
And bashful woodland fancies, made divine
By the moon's shining and the still starlight.

I greet thee, my twin Spirit. Tell thy tale
More often to thy listeners over seas:
Tell how the shadows brood o'er hill and vale:
Tell how the voices whisper on the breeze.

Call forth thy spectres robed in gauzy light,
Thy shadowy Indians and thy old-world fays.
So shall the Old World and the New unite
On Nature's bye-paths and Night's silent ways.

And when one day the still procession moves
To seek those realms that men call Heaven and Hell,
We twain may steal an hour, if none reproves,
To watch the Moths in meads of asphodel.

SCIENTIFIC NOTES & OBSERVATIONS.

PROTRACTED PERIODS OF EMERGENCE.—From my experience it would appear that *Leucania littoralis* continues to emerge over a long period. On May 8th, 1893, larvæ were plentiful on the sand-grass right among the sand-hills, and appeared mostly to be full-fed. Only a few of those which I took rewarded me with imagines, as many of them bit holes through the muslin covering of the breeding cage in which I kept them, and escaped. Of the few that did go on unto perfection, imagines were still emerging on July 16th. I captured the imago plentifully on sugar towards the end of May. The insect is said to remain in pupa only for about fifteen days. *Hadena suasa* (*dissimilis*) is another species that seems to have a very extended period of emergence. I took a couple on May 2nd; two or three more during the first week of May; some more during the last week of that month, from which I obtained ova; two at sugar on June 13th; one at light on July 21st. In September I bred

seven or eight from the ova laid in May; the breeding cage was kept out of doors and there were others which did not emerge then; one or two have done so lately, the pupæ having been placed in a hot-house.—H. W. Vivian, Port Talbot, S. Wales. *December 8th*, 1893.

Records of emergences at unusual periods.—Mr. J. A. Clark reports the emergence of a female *Selenia lunaria* on Christmas Day 1893, and of a male on January 28th, 1894, in a breeding cage kept out of doors and not in any way protected from the cold. Mr. J. C. Moberly bred a *Cucullia lychnitis* from a pupa of 1892 in November last. Rev. C. F. Thornewill reports that larvæ of *Nemeophila plantaginis* which were nearly full-fed in July, yielded imagines about the middle of August, and that a few pupæ appear to be standing over till next season. Captain E. W. Brown took thirty full-fed larvæ of *Pieris brassicae* at Enniskillen on July 12th, 1893. From these, ten imagines (eight ♂s and two ♀s) emerged on August 3rd and 4th, the rest are going over the winter as pupæ. He asks what is the explanation of this, and suggests that it may be due to the northerly situation of Enniskillen or that possibly, considering the abnormal season, the ten that emerged were a partial third brood. Mr. Claude Morley writes that on the evening of Feb. 27th a ♂ *Phlogophora meticulosa* emerged from a pupa taken on Feb. 6th under a felled pine. He assumes it to be from ova of a third brood in 1893.—Ed.

PRACTICAL HINTS.

New Style of Butterfly Net.—I have received from Mr. Graf-Krüsi a net, which folds by means of joints into a very small compass. The ring is made of steel and the joints finished off with brass rings, to prevent friction between the steel parts and the joints. Its peculiar feature, however, is that by means of a simple screw arrangement in the frame that supplants the ordinary ferrule, the net is made to fit any stick whatever. The silk net seems to be a very serviceable material. To those that are particular about their paraphernalia, nothing more useful could be recommended.—J. W. Tutt.

CURRENT NOTES.

We have received a letter from Mr. C. S. Coles, of Brixton, which is too long to insert in full, but probably some among our readers will be interested in the following extracts therefrom. We thank our correspondent for his kindly expressions concerning the Magazine, and shall always be glad to publish suitable articles on the other orders of insects; the difficulty is to get such.—"I should be glad to see other orders of Insects, besides Lepidoptera, dealt with more frequently in the pages of the *Entomologist's Record*. There must be many entomologists working amongst the Coleoptera, Hymenoptera, etc., who would be able and willing to contribute articles or notes on their favourite insects; these would be very welcome to those who, like myself, take interest in other orders than the ever-popular Lepidoptera. There are many things in connection with these other orders upon which I, for one, should be glad of information and advice. For example: some

hints on "The Arrangement of our Cabinets," from the pen of Mr. Hodges, appeared in the last volume. These were limited to the Lepidoptera; but if some Coleopterist, Hymenopterist, etc., would perform the same service for his own special order, the information would probably be of great value to many incipients, whose inclinations may lead them towards Beetles, Bees, Bugs or Blue-bottles. Again: what is the most useful size pin for the smaller bees and other Hymenoptera, and are black or white pins preferable for the whole? I have used Messrs. Kirby, Beard & Co's. No. 5 for the *Bombi*, and for insects larger than, say, *Colletes succincta*, but think that these would be too large for the smaller species. Again: what is the best mode of collecting and killing ants for the cabinet? I have used the laurel bottle, but do not consider it entirely satisfactory. Of course, a box for each specimen, as with bees, is out of the question. Are they usually killed on the spot, or brought home alive to be treated with sulphur? Any information on points like these would be exceedingly acceptable. I have noticed that the subject of verdigris crops up from time to time. Probably no perfect preventive has yet been discovered; it may therefore be of interest to note that I have two butterflies, the remains of a collection which I formed more than 20 years ago but which has long been dispersed. These two specimens have been for many years, unknown to me, lying by in a small postal box. About a year ago, I turned the box out for examination, and was surprised to find the two insects in a perfect state of preservation, with no sign of mites or verdigris, each apparently as good as if only just captured. One is a ♂ *Colias edusa*, taken by myself in the month of May, the other a *Limenitis sibylla*, also taken by myself in, I believe, the same year (1869 or 1870). Both are on white pins (black were unknown in those days), maker now unknown, but they are still in such good condition that I have placed them in my present collection, and, but for the pins, they cannot be distinguished from those I took last summer; in fact, the latter insect is far superior to some individuals of the same species which I have received in exchange as 'good specimens.' Can any explanation be given of this, to me remarkable, preservation of these insects? In conclusion, allow me to thank you for having introduced your magazine to my notice, and to express the hope that you may be able to extend its usefulness in the direction I have suggested above."

Without entering into the discussion between Dr. Freer and Dr. Knaggs, on the relative "energy" in male and female moths, we would call the attention of the latter to a recent article in the *American Naturalist*, vol. xxvi., p. 653, which bears somewhat on the paragraph in which he refers in a mildly sarcastic manner to the experiments of Mrs. Treat. The paragraph referred to runs thus:—"It is just about twenty years ago that I penned a few lines on a similar theory. Speaking of the more noticeable papers of the season (1874), I wrote as follows:—'But, as Alice would say, the 'curiousest' paper of all, is devoted to the subject of controlling the sexes, by a process of starvation (the starvelings being males, and the healthy well-fed examples, females). When it is taken into consideration that the writer is a lady, the whole affair looks very like a satire on the male sex generally.' This article, by Mrs. Mary Treat, which was published in the *American Naturalist*, vol. viii.," p. 129, is endorsed by Messrs. Geddes and Thompson." Now, ridicule is a very useful thing in its proper place, but facts are stubborn

things, and Dr. Knaggs will hardly ridicule people nowadays into any particular line of belief, as to whether energy is required more by male or female products. Geddes and Thompson only quote Mrs. Treat's experiments as *un fait accompli*, they can scarcely "endorse" them. We have ourselves criticised some of these authors' conclusions in *Secondary Sexual Characters in Lepidoptera*. But to return to facts. In one of the Cartwright lectures for 1892, by Henry Fairfield Osborn, on "Heredity and the Germ-cells," we find:—"The causes finally determining sex may come surprisingly late in development, and, according to the investigations of Düsing, and the experiments of Yung and of Giron, are directly related to nutrition. High feeding favours an increase of the percentage of females, while conversely, low feeding increases the males. In Yung's experiments with tadpoles, the following results were obtained:—

Normal percentage	...	57 females	...	43 males
High nutrition ...	...	92 females	...	8 males."

There are arguments on the original neutrality of ova and other matters of general biological interest, and so far as they have a general bearing, directly interesting to the entomological student, and these arguments backed up by experiments, go far to prove that the ultimate development of a male or female product, has more to do with nutrition than the Doctor would appear to think. The following part of Dr. Knaggs' paper appears to us as illogical as the first part is unscientific.

An interesting paper on certain Micro-lepidoptera is published in the current number of the *E. M. M.*, by Lord Walsingham. *Tinea nigripunctella*, taken by Mr. Atmore, at King's Lynn, found hitherto in Britain, only at Bristol and Folkestone. *Sericoris palustrana*, which was originally described by Zeller, and has long been recorded as occurring among pines in Scotland and the North of England, was beaten from a fir-tree on the edge of a marsh near King's Lynn. But much more important is the addition of *Argyresthria illuminatella*, to the British list, from specimens taken at Forres, by Salvage, among larch, and the capture of a series of very similar specimens at King's Lynn, which Lord Walsingham thinks will prove distinct from *illuminatella*, to which the Scotch specimens are referred without hesitation. Two Gelechias "of a uniform purplish-brown colour, with a few pale specklings around the apex and apical margin, and a single obscure dark spot at the end of the cell, the antennæ with a series of three pale spots on the outer third, the outer one of which is a little before the apex; the cilia somewhat paler than the wings, especially about the anal angle, and the hind wings shining slaty-grey, with pale cilia, tending to brownish-ochreous, the abdomen inclining also to brownish-ochreous; legs pale, apparently unspotted. Exp. al. 14 m.m," are indistinguishable from *Xystophora servella*, Z., in the Zeller collection.

Dr. Chapman records the emergence of a *Doritis apollina*, at 2 a.m., on Jan. 19th, in a warm room at 74°. It was then removed to a room at 51°. Next morning, at 9 a.m., the wings were unexpanded, taken back to warm room, and within five minutes, the wings were well on the way to development.

Mr. Beaumont (*E. M. M.*), adds *Diastata fumipennis* (beaten from

Coniferae, at Albrighton) and *D. basalis* (from heather thatch), also *D. obscurella*, from Deal, to the list of British Diptera.

NOTES ON COLLECTING, Etc.

Early appearances.—Mr. W. Reid reports that *Phigalia pedaria* (*pilosaria*) was out in the neighbourhood of Piteaple on December 27th, 1893. Rev. C. F. Thornewill took *Hybernia rupicapraria* on Jan. 16th and *P. pedaria* on Feb. 3rd, 1894, at Bakewell, and remarks that these are in each case the earliest dates at which he has observed the insect. Rev. J. E. Tarbat found a specimen of *Pachycnemia hippocastanaria* at rest on a pine trunk at Weybridge on January 29th, 1894.

Anosia archippus in Jamaica.—Mr. T. D. A. Cockerell writes me from Las Cruces that this species certainly does occur in Jamaica. He also gives the following list of the known Jamaican species of *Danais*:—*D. archippus*, ? *D. berenice* var., *D. cleophile*, *D. clothera*, *D. erippus*, *D. gilippus*, *D. jamaicensis*. The commonest *Danais* in Jamaica, says Mr. Cockerell, is *D.* (*Tasitia*) *jamaicensis*, which is a sub-species of *D. berenice* and belongs to a different group from *D. archippus*. This was probably the form which Sloan figured.—F. J. Buckell.

The Burney and St. John Sales.—The thanks of everyone interested in the morality and well-being of entomology are due to Mr. Tutt, for what has been published lately in the *Entomologist's Record*, relative to the sale of the late Rev. Hy. Burney's and other collections of Lepidoptera. It appears to me, that in every case where possible, it is important to hunt up records, and to contribute towards the clearing up of errors and confusion, and, if there be dishonest dealing, to assist in its detection. With these views, I would ask from those concerned, some explanation with regard to the pair of *Lycaena argiades*, sold from the Rev. Seymour St. John's collection. In the *Entomologist's Record*, vol. v., No. 2, p. 40, I read "Then a pair of *Lycaena argiades* (again 'received from Dr. Marsh') produce £4 10s." Dr. Marsh's name had occcurred just before in connection with "Norfolk." What, I would ask then, is the exact history of this pair of *L. argiades*? Is it the pair which Mr. St. John recorded in the *Entomologist*, vol. xviii, p. 292 (1885)? He there mentions having discovered two specimens (both males), in the collection of a friend living near Frome, and that his friend told him that "he took them with several others, eleven years ago, not two miles from this house" (Whatley Rectory, Frome), "close by a small quarry.' Was this friend "Dr. Marsh"? From the price paid for the "pair" (query ♂ and ♀), it would appear that the purchaser believed them to be authentic British specimens, for the price of Continental specimens is, I believe, sixpence each. It is very likely that the questions I have asked can be satisfactorily answered, and, if so, those concerned will no doubt be much obliged for having an opportunity given them of—so far—clearing up the history of a small fraction of the insects, lately dispersed among British collectors. I say "so far" because the authenticity of Mr. St. John's two Somerset *L. argiades* is still somewhat uncertain; their record did not appear till eleven years after the time of their capture, and their captor was only given to the world as Mr. St. John's "friend."—(Rev.) O. Pickard-Cambridge, Bloxworth Rectory, Wareham. *Feb. 19th*, 1894. (There can be no doubt we

should say that the specimens of *L. argiades* sold were the same as those referred to by our correspondent, for the Catalogue of sale states distinctly:—"*L. argiades* 2, taken in Somerset, in 1874 by Dr. Marsh (see *Ent.*, vols. xviii., 292 and xxv., 21)." The word "pair" may have been used for "two" by our correspondent. We would also ask whether Dr. Marsh is the same as the Rev. T. Marsh (*Record*, vol. iii., p. 195) who captured the specimens of *Syrichthus alveus* reported by Mr. C. G. Barrett some time since as from Norfolk.—Ed.).

NOTICES AND REVIEWS.

Glimpses at American Entomology.

The Twenty-fourth Annual Report of the Entomological Society of Ontario, 1893, contains, as usual, much to interest British entomologists. First among the papers is a critique entitled *Entomological mistakes of Authors*, by the Rev. T. W. Fyles, F.L.S., of South Quebec. Commencing with the school books relating to natural history authorised by Government, he shows that the lesson relating to the butterfly's metamorphoses is made up of a great many errors, or rather, gross blunders, of which the following appear to form a summary. The butterfly is figured as a *Papilio*. The larva and pupa are caricatures of those of *Anosia archippus*, but the larva in the lesson is said to feed on willow, whilst that of *archippus* feeds on *Asclepias*. The reverend gentleman, himself a first-class entomologist, is unable to determine what species is meant, and complains that error should thus be disseminated broadcast in the minds of the young. The *Natural History Readers*, I may add, in use in our own British schools similarly bristle with glaring inaccuracies, copied from obsolete text-books or made up from imaginary observations. The author of the paper then criticises a large number of allusions in well-known works (poetical and prose), to entomological matters, and even Charles Kingsley and our old friend Isaak Walton are brought to book. Kingsley, it appears, makes the dragon-fly emerge from its nymph under water, whilst in *The Complete Angler*, an accurate description of a larva of *Sphinx ligustri*, which ultimately died, is followed by the wonderful guess that "if it had lived, it had doubtless turned to one of those flies that some call flies of prey, which those that walk by the rivers may, in summer, see fasten on smaller flies, and I think, make them their food." The author gives many other interesting and amusing references. He says that Edgar Allen Poe, in one of his highly sensational tales, tells of 'a gold bug.' This bug, he informs us, was a *Scarabaeus*; but we are not to conclude that it was a right down honest 'tumble-bug.' The term *Scarabaeus*, was formerly used for beetles, generally. It may have been a sort of *Cotalpha*, but it had some peculiar qualities; ponderosity was one—it was so heavy that it was used as a plumb; but notwithstanding its great weight, it was very active—it flew on before. Then, too, its pugnacity was remarkable—it bit its captor's hand; and it was not without suspicion of exercising poisonous qualities, like the centipede and the Tarantula." The reverend gentleman further adds:—"I need hardly say that the species has become extinct." The author further points out the way in which men of letters are disposed to under-value "those benevolent,

amiable, and altogether worthy gentlemen, who have been good enough to pursue the study of entomology for the benefit of mankind." He says:—"Does Fenimore Cooper wish to portray an entomologist! He does so in Dr. Obed Batt, and the crowning scene in which this personage is presented is that in which he is brought forward by the Indians, seated upon the *Vespertilio horribilis americanus*, with his butterflies and other 'specimens' disposed about his person—converting him into a sort of perambulating museum;" and then our author adds:—"Yet Fenimore Cooper was considered a decent sort of man! I am told he was a churchwarden!!" This most amusing paper is completed by a reference to "Sir Thomas," Barham's (the well-known author of the *Ingoldsby Legends*) worthy entomologist who, seeking for nymphs, tumbles in the water and is drowned. His wife, is consoled for his loss, by the attentions of Captain McBride, and some time afterwards "Sir Thomas" is fished from the depths "in a dilapidated condition," whilst "from the pockets and other recesses of his clothing, a number of fat eels are taken." The grief of the lady was so great, that she had some of the eels cooked for her supper. And this is what she says of them:—

> "Eels a many I've ate: but any
> So good ne'er tasted before!
> They're a fish, too, of which I'm remarkably fond!
> So pop Sir Thomas again in the pond—
> Poor dear! He'll catch us some more."

Another paper interesting to Britishers is Dr. Holland's "Notes and Queries." We have not space to do more than quote one note, which is as follows:—"The banana merchants in our town (Alleghany, Pa.), have proved themselves possessed of curious entomological stores. I have received from them a couple of living Tarantulas, and not long ago a living specimen of *Caligo teucer*, which had emerged from a chrysalis, hidden in a bunch of bananas. The insect had been transported by sea and land, either from Honduras or from some port in the northern portion of South America, a journey of several thousand miles. This reminds me that in several consignments of eastern lepidoptera, I have found one *Danais plexippus*, Linn." (? *Anosia archippus*, Ed.). "One of the sendings was from Borneo, the other from Java. We shall soon hear of its domestication on the mainland of Asia, and it will probably spread all over China and Japan. The insects taken by the U. S. Eclipse Expedition of 1889, at the Azores, numbered among them two specimens of this butterfly. There were only about a dozen specimens of insects taken at the Azores, by the industrious (?) naturalists of the party, and I judge that it must be common there. Why we have not yet heard of its domiciliation on the African continent is a mystery to me. It will no doubt get there before long."

In a paper on "The Dragon-fly," by T. J. MacLaughlin, of Ottawa, we notice that he quotes Duncan's description of the breathing of the larvæ and nymphs, as follows:—"The larvæ and nymphs, although living under water, must respire, and yet have no external organs by which they can breathe. Their method of respiration is unique; they breathe with their intestines. The large intestine is covered with numerous tracheæ, and when the animal wishes to breathe, it opens the orifice of the intestine and admits a quantity of water. This, of course, contains air mechanically suspended which is taken up by the tracheæ just mentioned." Mr. McLaughlin adds:—"In expelling the water

just taken into the intestine, it is sent out with considerable force, which propels the animal forward with a jerk, several times the length of its own body; by this means, it keeps out of the way of its enemies."

In the address of the President (W. Hague Harrington, of Ottawa), mention is made, among many other interesting things, of "Parasitism in Insects." He refers to Professor Riley's work, and divides parasitic forms into three groups:—(1) *Parasites Proper*, including insects whose whole life is passed upon, and is dependent upon, their host, and which may be sub-divided into *external*, as lice, and *internal* (or sub-cutaneous) as the itch-mite. (2) *Fatal Parasites*, which, in the larval stage, live at the expense of the members of their own class. These are also sub-divided into *internal*, where the larva is nourished within the host upon the surrounding fluids, as are the majority of Hymenopterous parasites, and *external*, where the larva attaches itself to the host (as in *Thalessa*), and sucks its juices. To this sub-division belong many Hymenopterous, Dipterous and Coleopterous parasites. (3) *Inquilinous parasites*, which include the numerous forms which live upon the provision made by other species, for the sustenance of their offspring, or which are found habitually associated with other insects, but not injurious to them. This class is sub-divided into *Fatal inquilines*, where the guest's living means starvation and death to the host, and *Commensals*, where association is mutually harmless, as where beetles are found living in the nests of bees and ants. On the same subject is another article "The economic value of parasites, and predaceous insects," by Prof. J. B. Smith, but, although interesting enough, the argument throughout is weak, and the logic unsound. The Professor begins with an apparent paradox: "No one can realise more than I do, how much parasites maintain the balance and check the increase of injurious species. I am perfectly aware, that were it not for parasites, many an insect would become so abundant that certain crops could not be satisfactorily grown," and yet he goes on to say:—"In fact I am almost ready to say that parasites have no real economic value to the agriculturist." There is a certain amount of "heroics" about the article that is hardly scientific, and Professor Smith only refers to well-known facts, when he says that "parasites do not exterminate their hosts in any instance; their mission is merely to interpose a check to undue increase." But he goes on to say that the farmer "must depend upon his own exertions to save his crop. There are, however, many insects which are very commonly parasitised, and among them may be mentioned the various species of cut-worms (Noctua larvæ). It is nothing uncommon to find in an infested field, that fully one-half, and sometimes as many as three-quarters of the specimens, will have eggs of the *Tachina* flies attached to the skin, and probably others have parasites which are not externally visible." Now mark! The writer continues "yet the fact that these cut-worms are infested by parasites, is of absolutely no value to the farmer." And this is the reason for such a conclusion:—"They eat just as much as if they were not parasitised, and it is really a matter of little importance to the agriculturist, whether the food that is stolen from him makes a moth or a fly. The caterpillar feeds all the same until it is full-grown. Next year, in the same field, there will be just as many cut-worms as there were in the previous year." Just so! "As many," not more. Then this strange logic continues:—"The parasites have kept the number within the same

limit, and the farmer has not been benefitted. If he desires to save his crop, he must himself adopt measures for the destruction of these insects: parasites will not help him in the least." With this wise and logical deduction we will leave the paper.

Another paper, on "Mosquitoes," by J. Alston Moffat, of London, Ontario, is most interesting and instructive. He says in the course of it:—"Travellers have recorded their experience with mosquitoes in all parts of the world; some declaring that those of the Arctic regions are the worst they ever encountered, but South America, from its climatic condition and its low-lying lands, which are frequently flooded, is in a position to carry off the prize against the world for its crop of mosquitoes and that the early travellers there were duly impressed with this fact is evidenced by the names given to places, such as Mosquito Coast, Mosquito Bay and Mosquito Town. In ancient history we read of armies on the march being arrested on the way and made to beat a hasty retreat from the attack of these tiny warriors, which is quite believable; for if we take into consideration the scant and loose covering which they probably wore, which gave the wearers so much more space to defend, they were not in a condition to pursue human foes, when every man of them was engaged in a double-handed conflict with such pertinacious insect enemies."

We had almost overlooked one of the most important papers. It is on pure entomology, and entitled "A contrasted summary of the main external Characters of Butterflies in their different stages of life," by Dr. Scudder. It is in tabular form, and were it not for want of space, we would reproduce it here, but we have no doubt most of our more advanced readers will get it for themselves.

It is impossible to go further into this readable volume, but there is one thing we should like to point out and that is that of 1,761 dollars received by the Society, no less than 1,000 dollars was in the shape of Government grant. Our colony is, therefore, far ahead of us as regards the public interest taken by the Government in entomological work. Many of the articles are purely economic, others are descriptive; but the advantage to agriculturists of such an annual volume which, we believe, the Government distributes broadcast, must be incalculable, as much in leading their powers of observation in the right direction as in the direct information given in its pages. We have no doubt that the secretaries of our Societies could get copies annually in return for their own *Transactions*; at any rate it should be considered a part of the duty of the larger Societies to provide their members with a copy. J. Alston Moffat, Esq., Ent. Soc. of Ontario, Victoria Hall, London, Ontario, would, no doubt, arrange such an exchange.

New Mexico College of Agriculture, Bulletin 10, September, 1893.—Las Cruces, whither Prof. Cockerell has recently gone as one of the State Entomologists, gives us this, and the insect portion is written by our esteemed correspondent. Four of our British species of Lepidoptera come in for notice:—*Vanessa antiopa*, an imago seen on August 5th, whilst a brood of larvæ were taken on the same day feeding on willow. *Carpocapsa pomonella*; apples offered for sale in Las Cruces were observed to be badly infested. *Heliothis armiger* (the corn-worm), the larvæ of which were found on August 16th, living in the sheaths of the young leaves of corn at the College Farm. It is yellowish-grey with short almost invisible hairs springing from small blackish tubercles;

the head is pale ochreous, shiny and spotless. *Leucania unipuncta* (the army worm). Of this Mr. Cockerell writes:—"Early in August I was informed by Mr. Lohman that there was a terrible plague of caterpillars or worms down at the mill, and so went to investigate the matter. Mr. Schaublin conducted me to the field infested and the sight there was sufficiently astonishing: thousands of army worms crawling over the plants and on the ground, and the alfalfa so denuded of its leaves as to be hardly recognizable. They had appeared suddenly, as is usual, and the work of destruction had been rapid. Besides the alfalfa, I noticed they were very fond of eating apples fallen from the trees, and many even ascended the apple trees and fed upon the leaves. They also ate some corn plants, leaving only the mid-ribs of the leaves; they attacked the leaves of sweet potato, and seemed very fond of capsicum pepper, devouring the leaves and excavating the fruits. A wild *Solanum* and *Amaranthus* were also attacked, but though many took shelter under the grape vines they did not attack them. This avoidance of vine leaves for food was noted years ago by Dr. C. V. Riley. I found they were eating the beans, which is noteworthy, as Dr. Riley found that some army worms which he experimented with would not eat this plant, although they would accept peas. On the ground was a piece of cut water-melon on which many of the worms were feeding, and I found they took readily to cucumber. Later I found them eating the leaves of sunflower, and two or three worms were noticed on asparagus." "Mr. Schaublin remarked on the number of toads about; these were undoubtedly feeding on the worms. There were also parasitic flies—flies not unlike a common meat-fly, which produce grubs, whose lives are spent in the inside of caterpillars, feeding on their juices. These grubs eventually kill their hosts and turn into flies (*Tricholyga*, sp.) like their parents. The fly places her eggs on the skin of the caterpillar, and from these the grub hatches. I found one such egg on one of the army worms." "The army worm, when fully grown, burrows into the earth and turns into a pupa, from which emerges the army worm moth, known to naturalists as *Leucania unipuncta*. I caught one of these moths in Las Cruces some weeks ago; it is of moderate size, pale brownish in colour, with no conspicuous marks."—Ed.

The Transactions of the City of London Entomological Society, 1893.—This Society is to be congratulated on having just issued its transactions, for this, the third successive year. Small and unpretentious as the volume is, it contains a vast amount of useful scientific information, all comprised within some eighty pages of closely printed matter. Nor are its contents calculated to interest *members* only. We heartily and emphatically recommend its perusal to *all* entomologists worthy of the name. We may even go further, and say, that if the papers read at future meetings of the above Society continue up to the present level (and we have reason to suppose that they will), no scientific entomologist—we use the qualification advisedly—wishing to be 'up to date,' dare be without a copy. The volume contains the best efforts of competent men.

Among numerous other useful items may be mentioned, a paper read by Mr. Tutt, on the "Genus Xanthia," and the scholarly productions of Dr. Buckell, entitled respectively "Specific Nomenclature, Past, Present, and Future" and "History of Butterfly Classification," giving evidence of great research; also "Notes on certain Coleopterous Insects, found in City Warehouses," by Mr. G. A. Lewcock.

Altogether, it is to be hoped, that the Society will receive a larger amount of financial support than hitherto, in order that it may extend its meritorious labours. It is suggested that a wider circulation of this volume would assist in this direction, and that copies, price 2s., can be obtained of Mr. C. E. Nicholson, 202, Evering Road, Upper Clapton, N.E.—H. E. P.

SOCIETIES.

City of London Entomological and Natural History Society.—*February 2nd*, 1894.—Exhibits: Mr. Battley; the jaw-bones of a fish called the Thornback Ray, which feeds on crabs, &c.; the bones were each provided with a set of flattened, tooth-like plates, which slightly overlapped and seemed to be of very hard material. He also showed a spine of the same fish, and called the attention of the members to the fact that this spine was hollow and very hard. Mr. Clark; *Biston hirtaria, Lobophora lobulata, Zygaena trifolii* (a yellow var.) and *Abraxas grossulariata* (dark var.), all from Perth. He also exhibited, at Mr. Tutt's request, the fine series of *Argynnis paphia*, taken in the New Forest last year. In consequence of some remarks by Mr. Frohawk (*Entomologist*, Feb. 1894) relative to these specimens, the opinion of the meeting was taken as to whether any of the *male* specimens showed traces of greenish coloration; the members were unanimous that such was the case with two of the males. The whole series consisted of twenty-four butterflies, of which the spotted specimens were as follows: Six males with straw-coloured spots, two of them having also *distinct greenish blotches* on the hind wings; six females with greenish blotches, two of them having also bleached looking markings on the fore-wings. Mr. Prout; *Mamestra sordida* (*anceps*) bred last January. He stated that he found this larva at Culver Down, Isle of Wight, feeding on grass at night; it strongly resembled the larva of *Apamea basilinea*; as it seemed disposed to hybernate, he kept it feeding in a warm room, with the result that it pupated in December. He also showed a specimen of *A. basilinea* reared under somewhat similar conditions in 1892. He was inclined to think that *sordida* should be removed from the genus *Mamestra* and placed before *Apamea gemina, A. unanimis* and *A. basilinea*, as in Kirby's "European Butterflies and Moths," with which insects he considered it had more affinities than with the genus *Mamestra*. Mr. Bacot; ova of *Nyssia hispidaria*, laid in captivity. Dr. Buckell remarked that they very much resembled those of its ally *Amphidasys betularia*.

Mr. Bayne, who exhibited a good series of the insect, which included brown, greenish, light grey, melanic and white-margined forms of the ♂ and green and brown forms of the ♀, then read the following paper:—

NOTES ON NYSSIA HISPIDARIA.

On February 1st, 1893, two apterous ♀s emerged in my breeding cage from pupæ dug in Epping Forest in the late autumn of 1892. The preceding week or ten days had been very mild for the time of year. *Phigalia pedaria* (*pilosaria*) had been observed in the open on January 22nd and eight *Hybernia defoliaria* had been bred indoors between the

25th and 29th of that month. Of course, as these ♀ s were certainly not *P. pedaria*, they were at once noted as *Nyssia hispidaria* and Feb. 5th being fine and bright, was devoted to searching for this species, the said search being rewarded, after five hours, by a single ♂ taken on a "spear" oak. *Hybernia marginaria (progemmaria)*, both sexes, and *Anisopteryx aescularia* put in a first appearance on the same day. The emergence of two ♂ s and a ♀ *N. hispidaria* during the night of Feb. 7th, which was warm, gave the impression that there was a possibility that the species might be found more commonly than is usual in the Forest, where three years' searching had resulted in the discovery of about ·75 of a male. The next expedition, on the 12th of the same month, was, however, hardly a success; the wind was fresh, in fact blew a gale from the N.W., the weather was dull with passing showers of hail and rain, and the shade temperature ranged (in London) from 44° to 34°. Only one crippled ♂ and a ♀ with five legs turned up, and Lepidoptera generally were very scarce. The morning of Feb. 19th however, had a very different aspect; the wind was S.E, light, and during the day the temperature ranged from 59° to 46°; a shower fell about 9 a.m.; the weather was splendid for February—mild with bright sunshine, and the clan turned out in force for a grand effort. The first *hispidaria* was quickly found, and before many trees had been searched, it became evident that the moth was in overwhelming abundance. At 10.30 many were seen drying their wings and some with wings quite unexpanded. The general time for emergence seems to be from early morning to about 2 p.m. The height at which they usually sat was four to five feet, but a fair proportion were very much higher. Some were running rapidly up the trunks, while one or two were resting, apparently unconcernedly, with the sun shining brightly upon them. They press themselves very closely into crevices in the bark and are not by any means easy to find. Individuals were noticed on hornbeam, beech, &c. as well as on oak, and even on trailing creepers. Very few cripples were met with. The species must, as would be expected from the apterous condition of the ♀ and the structure of the antennæ in the ♂, assemble, and it was remarked that where a ♀ was discovered one male, if not more, was practically certain to be on the same trunk. To give an idea of the abundance of the insect on this day, I may say that in one favoured spot thirteen were resting on a large oak—nine ♂ s and four ♀ s. The other spring insects were seen on the same day but were none of them present in more than their usual numbers. On the 25th no searching was done—the entry in the diary reads simply thus: "Went to Chingford, weather awful, swore, and went home." On the 27th a single ♀ emerged indoors. On March 5th a good deal of ground was covered and about a score of specimens turned up; the morning was fine but the sky clouded over gradually as the day went on; the weather was mild, wind N.W. but sport generally was not very good. On the 12th of the same month two ♂ s and one ♀ were noticed and the season, so far as this species was concerned, closed at 12.30 on March 26th with the capture of a single ♂ drying its wings. Thus a period of seven weeks had elapsed since the first appearance.

The insect is, I should think, an easy one to pair in captivity. I placed a ♂ which had been out a day or two with a freshly emerged ♀, in a fairly large wooden box, on Feb. 8th, but, though I looked at them morning and evening, I did not witness the pairing; however, on the 11th, the ♀ deposited a number of fertile ova.

I have never seen the male in the act of flying spontaneously, but we caused several to take the air by throwing them up. These flew rapidly and turned very sharply—darting forward and doubling back suddenly, so that they would be difficult to catch on the wing.

In considering the possible causes of this abnormal abundance of the species in 1893, I will first deal with an important factor in the situation—the weather, beginning at the point when we commenced our search for the species, February, 1890. In 1890 one imago was found. Spring probably moderately favourable for larvæ. In 1890-91, winter unusually rigorous; 1891, February very favourable for appearance of imago, none however found. March, April, and May cold, spring very backward, and perhaps unfavourable to larvæ; 1891-92, winter again severe; 1892, spring rather favourable to larvæ; October, a wet month; November, fairly dry, temperature, average; December dry, the first week cold, with low night temperature; then a fortnight of warm weather; the last week exceedingly cold, 17 to 18 degrees of frost; 1893, January, rather dry but cold, especially the early part of the month; February, a wet month, with temperature above the average; March, April, and May, extremely dry; larvæ (I am told) plentiful. The probable effect of the cold winters of 1890-91 and 1891-92, would be to keep down the depredations of the moles, mice, beetles, earwigs, &c., by extending the length of time which they spend in a state of torpidity, and possibly to reduce the numbers of these enemies to pupæ. No imagines were found by us in either 1891 or 1892, though February of the first-named year appeared to be eminently suited for emergence, but the cold dreary spring months of 1891 may have checked any increase by retarding or stopping the due development of the larvæ. I am sorry, however, that I am unable to speak as to the frequent occurrence or otherwise, of the larvæ in those years, for this would give a truer idea of the relative abundance; searching for the imago being often obstructed by the available days happening to be cold or wet. I do not know whether the heavy rainfall of October, 1892, may have favoured the pupæ. Are they liable to dry up? As they usually, I believe, bury themselves to a depth of several inches, moisture, dryness or cold would not be so likely to affect them, as would be the case with pupæ lying nearer the surface. Many, however, do not inter themselves so deeply, as we have found pupæ just under the roots of the grass. Any advantage, too, gained by a very wet and mild season, would probably be more than counterbalanced by the extra activity of the mole, and other lovers of fat pupæ.

Some other ideas suggest themselves. Immigration can scarcely be an important factor in a species with a wingless ♀. It has, indeed, been supposed, that a reinforcement of ♂s might increase the fertility of a species, but it seems unlikely that *hispidaria* should have benefitted in this way, although, from its robust appearance, a long flight would appear quite possible. The sudden augmentation of numbers, it will be noticed, took place in a well-known locality, where the insect is found in greater or less numbers, (generally the latter) every year. An alteration in the fertility or irregular fertility of a species in different seasons, has been suggested, but I do not know whether there are any facts in support of this theory recorded in relation to the macro-lepidoptera. It might be that an unfavourable change in the weather might retard oviposition by the ♀, or even destroy her, and this may

possibly exert a certain influence in some seasons. The day on which we found the single ♂ in 1890, was an example of such a change, the afternoon turning very cold, snow and hail falling fast, and being driven by a strong N.W. wind into the crevices of the bark. I have been told by friends who have reared the species, that the larva is very subject to the attacks of *Ichneumonidae*, *Tachinidae*, etc., but we know so little as to the relative abundance or scarcity of these parasites, that their influence must, I am afraid, remain an undetermined factor.

Hispidaria is, I am given to understand, a very prolific insect, but it seems no marvel, when we consider the perils through which it has to pass, that so few reach maturity. The ova have to withstand the attacks of tits, creepers, spiders, &c.—By the way, the *Paridae* seem to find the forest tree-trunks a prime feeding ground in the winter months; they rove through the woods in large flocks.—The larvæ have to run the gauntlet of the inclemency of our springs, of *Ichneumonidae*, *Tachinidae*, birds, and other enemies; the pupæ are beloved by the mole; the imago emerges in a month so cheerless as is our customary February, and in a very dry or frosty season might even be unable to reach the surface. Our friends (or enemies) the tits may often be observed during the winter months searching on the ground and about the roots of the trees, and no doubt many a ♀ falls to their lot. But the prolificness of the species would render probable its appearance in unusual numbers, whenever the attentions of its numerous enemies was in any degree relaxed, or meteorological conditions were unusually favourable. It may be interesting to note in passing that another moth, *Taeniocampa munda*, was much more abundant than usual in the early part of 1893. Since 1890, this moth has been far from common, but last spring it might have been captured by hundreds at the sallows. Its larva feeds on oak, and undergoes pupation at the base of the tree, favouring similar situations to *N. hispidaria*. I fear, however, that we cannot arrive at any very definite conclusions as to the causes of the phenomenal abundance of the last-named species last year. The only really determinable among the, perhaps, many determining causes, appears to be the favourable spring of 1892 for the development of the larvæ, and the equally favourable February of 1893, for the emergence of the perfect insect.

Hispidaria is a *Vienna Catalogue* name but, as that work contains no description of the insect, we take the following, made from Schiffermüller's specimens by Fabricius (*Mant. Insect.*, ii, p. 191, no. 59), as the type. "*Phalaena* pectinicornis alis cinereo-fuscis: striga undata obscuriore, margine alba punctato, antennis flavis. Nimis affinis *P. hirtariae* at paullo minor. Corpus hirtum griseo-fuscum. Antennæ flavæ. Alæ obscuræ striga media undata obscuriore. Margo albo punctatus." Hübner (*Samml. europ. Schmett.*, iv., fig. 177), figures the insect as pale brown (not greenish), the fore wings with three and the hind wings with two transverse lines. Inferior wings, pale; outer margin of fore wings, yellowish-white. Treitschke (*Schmet. r. Europ.*, vi., 1, 247), seems to have been the first author to mention the ♀; to a diagnosis similar to that of Fabricius he adds "fœmina aptera." Duponchel (*Hist. Nat.*, vii, 154, 3), describes the fore wings as being of a rather dark bistre, with a band of a clearer tint at the outer margin, traversed by three blackish diverging lines, of which two are curved and the third is sinuous and toothed; and the hind wings as being pale bistre,

with two blackish lines, one being faintly marked. The figures agree well with this description. Herrich-Schaeffer, in 1844 (*Syst. Bearbeit.*, iii, fig. 14), figures the ♀.

Turning now to British authors:—Donovan (*Brit. Insects*, xiii, pl. 447), in 1808, figures and minutely describes the species under the name of *Phalaena ursularia* (the thick-haired moth). Both sexes are said to be represented in the plate, but the figures are all of males. Donovan would have referred it to the Bombyces "without scruple . . . . but for the authority of Mr. Drury, who was so fortunate as to rear it from the caterpillar, and which, being of the looper kind, decidedly proves it to be of the Geometræ, instead of Bombyx family." Donovan thought the specimens bred from these larvæ and preserved in Drury's cabinet (which Donovan possessed) were unique. It seems rather curious that he should have thus re-named the insect, as he was acquainted with the *Mantissa*, and especially as he says "our present insect has some resemblance . . to the sp. *hirtaria*, but is smaller," while Fabricius writes "Nimis affinis *P. hirtariae* at paullo minor." Newman, in the *Entomological Magazine* for 1833 (vol. i, 413), described the pale form as a new species, under the name of *Nyssia tanaria*. His description is as follows:—"Fusco grisea, metathoracis margine anteriori, lineaque centrali longitudinali nigris, ♂," and he mentions as specific characters by which to distinguish it from *hispidaria* and *pilosaria*, "its superiority in size to the former of these; the T on the mesothorax, formed by the transverse and longitudinal black lines; the broad pale margins of the front wings, and lastly, the fact that the specimen emerged at such a different time of the year from other members of the genus (which, Guenée states, all appear in March, or earlier), it having been taken by Newman's father, in June, 1832, at Leominster, in a perfectly recent state, and had apparently never flown."

Wood (*Index Entomologicus*, fig. 1675) figures this specimen as *Nyssia tanaria*, but there is a note by Westwood, "*hispidaria* var." Wood gives reference to *Entom. Mag.* and to Stephens (*Ill. Haust.*, iv., p. 391). He also delineated *hispidaria* (No. 466), his figure being of a dirty brownish-grey colour, the inner margin clouded with a darker shade, the outer margin pale and the transverse lines indistinct. Guenée (*Hist. Nat. des Insectes., Geom.* i., 202) referring to the *tanaria* of Newman, as figured by Wood, says "it does not appear to me even a variety. It is a fairly good figure of the type, whilst No. 466 is inexact and much too dark." He adds that he had, however, received from England "an individual much more sombre than the French form." Newman in his *British Moths* omits all mention of *tanaria*, but gives a very good description of our usual form of *hispidaria*.

The varieties of *Nyssia hispidaria* may be roughly classified as follows:—(*a*) Pale greenish-grey, lines distinct: (*b*) pale reddish-brown, lines distinct (Hb. 177): (*c*) ashy-brown, with darker band; this may be divided into two sub-varieties (*c*1) ashy, with a brownish tendency (the type) and (*c*2) ashy, with a greenish tendency: (*d*) similar to the type, but with the outer margin of fore-wings nearly white: (*e*) melanic. The first form might well be called var. *tanaria*, Newm., though it does not always show plainly the black T on the meso-thorax. This is the form to which Guenée refers as the type. Examples of this pale form are, according to our experience, rare; their proportion being about 2 or 3 per cent. I have seen no specimens that agree with Hübner's

figure, though it seems probable that such exist. It would have a similar relation to *tamaria* to that which the ashy-brown type has to the greyer sub-variety. The form with the pale outer margin is also, unfortunately, far from common; it is perhaps the most beautiful form of the species; in the specimen which I exhibit it will be noticed that the pale band is continued across the hind-wings, dividing these into a dark basal area and an outer nearly white area. Melanic specimens are likewise scarce; they usually show traces of the outer marginal band. I exhibit also a few other variations; two specimens show a tendency to the development of a solid black median band; another is a very dull brown diffused example; a third is more thinly scaled than usual. The decidedly paler and more clearly marked character of Continental (especially French) specimens is very evident, both from the figures of Hübner and Duponchel and from the remarks of Guenée. The figures, too, represent the insect as having two lines across the hind-wings; I have no specimens in which these are present but, in a few, there are slight indications of them. The great majority of my examples from Epping Forest are typical, sombre-looking and indistinctly marked.

And now a few words about the ♀. As has been more than once pointed out, there is a pale greenish-grey form and a dark reddish-black form. It is most easily distinguished from the female of *P. pedaria* by the legs, which are nearly smooth in *pedaria* but very hairy (at least the basal joints are) in *hispidaria*. The antennæ of the latter, too, are more pectinated and she is stouter structurally.

Guenée writing of the genus *Nyssia*, Dup. remarks on the strong build and hairiness of the thorax, the semi-transparency of the wings in the ♂ (this transparency is rather noticeable in some examples of *hispidaria*) and the apterous character of the ♀s. He states that all the species are more or less rare; and that he knew only European species. Guenée divided the genus into two groups—the first having the rings of the abdomen in the ♀s adorned by circles of colours often rather bright. This first group includes our *zonaria*, *lapponaria* and *hispidaria* belonging to the second. Our two species (omitting *lapponaria*, of which I know nothing) differ widely in form and in habits, *hispidaria* resting on tree trunks and its coloration assimilating itself to the trees on which it rests, while *zonaria* frequents sandhills, its coloration protecting it among the grasses, &c. of its habitat.

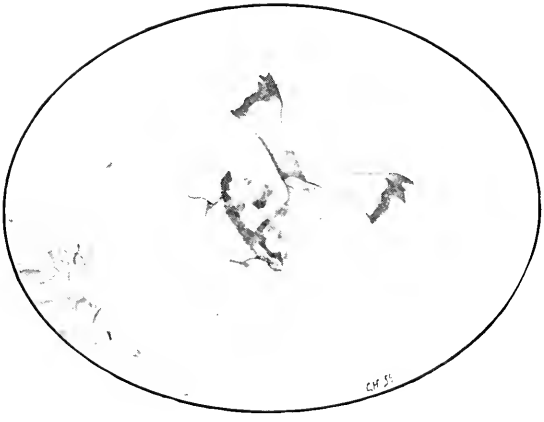
Dr. Buckell remarked that the *Amphidasydae* consisted so far as this country was concerned of six species, three of which had apterous females and the other three females with fully-developed wings. He did not know whether there were any Continental species which occupied an intermediate position as regarded this characteristic.

Mr. Tutt, in rising to propose a vote of thanks to Mr. Bayne, congratulated him on the interesting paper he had furnished, and then went on to say that he quite agreed with Mr. Bayne on the improbability of *hispidaria* having been affected by immigration, although it was remarkable how widely distributed some species with apterous females were, and the males of two species with apterous females, *Hybernia defoliaria* and *H. aurantiaria* were known to migrate. The abundance he considered due to local causes, one important feature that struck him being that the previous year the oaks had been less defoliated than usual by the ravages of *Tortrix viridana*, and it was remarkable that *Taeniocampa munda*, another oak feeder, was abundant the same

year. The effect of the utter defoliation of the oak trees in some years must often act detrimentally on other larvæ which are feeding at the time, and of these *Nyssia hispidaria* would suffer greatly. It was an off-hand suggestion certainly but seemed probable.

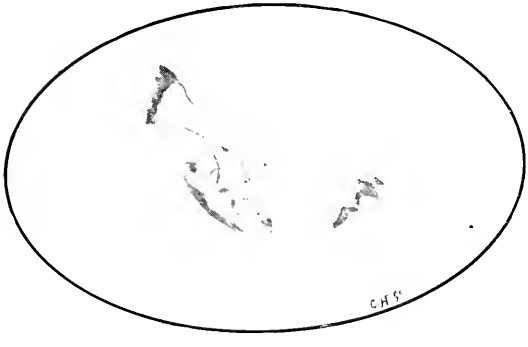
Mr. Bacot, who seconded the vote of thanks, observed that he understood that pupæ had been dug in considerable numbers during the past winter, and that the imagines emerging from these had been in the proportion of twelve or fifteen females to one male. From fifty pupæ which he had received from Epping Forest he had not, as yet, bred a single male. Thinking it probable that "assembling" would occur, he, on February 3rd, took six or seven females to Chingford and placed them in a small gauze cage about five feet from the ground. The evening was favourable, warm and windy though clear. The first ♂ turned up at about 6.45; others followed, in twos and threes at first but afterwards singly and at longer intervals until 7.30, when the last was captured. The total "bag" was seventeen and one or two others were missed. Mr. Bacot watched the cage in order to try and get a sight of the males as they came up, but it was too dark to see them until they were quite close; their flight then seemed to be very rapid and their buzzing against the cage audible some feet away; two of them flew against his face and the blow was more like that given by a beetle than by a moth. On reaching home two males were put into the cage with the females; they copulated about 10.30 but only remained in copulation about fifteen minutes, herein differing from *Biston hirtaria* and *Amphidasys betularia*, which remain joined for some hours. After separation the two males and the virgin females were removed to separate chip boxes for the night; the next evening the males began to get restive about 6.30, and were placed in the cage with the females that had not commenced to lay, to which were added two that had emerged that morning. One of the males, a rather large one with a piece torn out of one of his fore-wings, went in copulation within a few minutes and the pair remained together about fifteen minutes; after they had separated the ♀ was removed and shortly afterwards the same ♂ was found in copulation with another ♀. Mr. Bacot kept this last ♀ apart from the rest, in order that special note might be taken as to whether her ova prove fertile or not, it having been the third time that same ♂ had paired within twenty-four hours. Mr. Bacot thinks that there is probably a second flight, as the males in his cage again began to get lively about 10.30 to 11 p.m.

Mr. Prout considered it probable that the abundance of *N. hispidaria* in 1893, was due rather to meteorological or local causes, than to immigration. He had done a good deal of larva-beating during the last few years, at the spot where Mr. Bayne found the moths most abundant, and the larva seem to have been steadily increasing in numbers, having been specially plentiful in 1892. The larva is not exclusively an oak feeder; it will thrive well on hawthorn, and hornbeam. As hawthorn is obtainable at least a month earlier than oak, a knowledge of its being accepted by the larvæ may be useful to those breeding the species from ova. Mr. Prout was disposed to doubt whether it was safe to assume that the coloration of figures, even of those of Hübner, was always accurate. He had long thought that there must be some kind of connection between winter emergence and the occurrence of apterous females, *Orgyia*, etc., being merely casual exceptions due to some different cause. It was certainly interesting to note that in the *Amphi-*



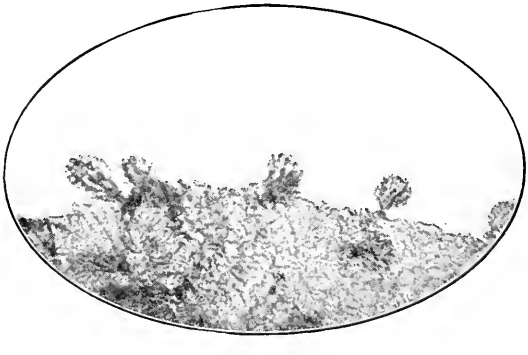
1

1. Head of the Pupa-skin of *Micropteryx purpurella*, showing the jaws partly opened. ×35 diameters.



2

2.—The same, showing the jaws closed. × 35 diameters.



3

3.—Portion of a preserved specimen of a half-grown larva of *Eriocephala calthella*, showing the spiculated globular appendages. × 140 diameters.

From photographs taken by Alfred Watkins, Esq., Hereford.

By the courtesy of Dr. Chapman we are able to give the above representations in illustration of his paper (pp. 87—88).

dasydae, the earliest species have apterous females, while those that emerge later on, are winged in both sexes, the solitary summer species, *A. betularia*, alone having the wings of the ♀ really well-developed.

Mr. Clark mentioned birch as another plant on which the larvæ readily feed, and remarked that, in pupating, the larva frequently descends as much as eighteen inches below the surface of the ground.

At the meeting of the Entomological Society of London on *Feb. 7th*, 1894, Mr. Jenner Weir exhibited, on behalf of Mr. J. M. Adye, a specimen of *Plusia moneta*, which had been captured at Christchurch, Hants, and remarked that this species was apparently becoming a permanent resident here: the food-plant, *Aconitum napellus*, though rare in England as a wild plant, was very common in gardens. Mr. Weir also exhibited a nearly black specimen of *Venilia macularia*, the yellow markings being reduced to a few small dots. Mr. Hamilton Druce exhibited a female specimen of *Hypochrysops scintillans*, lately received by him from Mioko, New Ireland. He said that only the male of this species had been as yet described, and read a description of the female. Mr. F. Enock exhibited a nest of the British Trap-door Spider, *Atypus piceus*, recently found near Hastings by Mrs. Enock. Mr. W. F. H. Blandford stated that he had recently obtained an additional species of *Scolyto-platypus* from Japan, which, though closely allied to the species he had formerly described, showed a very distinct modification of the male pro-sternum. Mr. M. Jacoby exhibited and remarked on a specimen of *Leptispa pygmæa*, Baly, which was doing much injury to sugar-cane in the Bombay Presidency of India. Mr. G. C. Champion stated that he had found an allied species on bamboo. Dr. F. A. Dixey read a paper—which was illustrated by the oxy-hydrogen lantern—"On the Phylogeny of the *Pierinae* as illustrated by their wing-markings and geographical distribution." Dr. Dixey considers that the wing-markings in *Pierinae* are reducible to a common plan, the chief features of which are:—(1) two dark bands or series of spots, one marginal and the other sub-marginal: (2) a dark discoidal patch or patches: (3) various yellow or red patches in pre-costal region and at the base of the underside of the hind-wing. The dark series represent, most probably, the remains of an original dark or dusky ground-colour, which has given way, more or less completely, before an invasion of the white or yellow that characterises most of the present-day *Pierinae*. A consideration of all the evidence attainable seems to bear out the conclusion that the darker colour is, in most cases, the older, and the present geographical distribution of the sub-family confirms, on the whole, the phylogenetic results obtained from the wing-markings as well as from the more specially structural features. Dr. T. A. Chapman read a paper entitled "Some notes on those species of Micro-Lepidoptera, allied to *Micropteryx*, whose larvæ are external feeders, and chiefly on the early stages of *Eriocephala calthella*," of this we are enabled, by the kindness of the author, to give the following epitome:

The family *Micropterygidae* is divisible into two distinct sub-families which have little in common. The *Micropteryges* proper (*purpurella*, &c.) have footless mining larvæ, pupæ of a very low type and possessing immense active jaws (Plate E, figs. 1 & 2), the imagines being without jaws. The *Eriocephalae* (*calthella*, &c.) have larvæ that feed externally and that are furnished with three pairs of true legs and eight pairs of abdominal pro-legs; their imagines have strong useful jaws, with which they eat

pollen. The metamorphoses of *Micropteryx* have long been known, those of *Eriocephala* are now described for the first time. The eggs are spherical and have a covering of minute vertical rods, which gives them a snowy appearance; they are laid, several together, in moss (*Hypnum*). The larvæ are most extraordinary creatures and in general outline are not unlike the larvæ of *Ornithoptera* or of *Antherea polyphemus;* they are short, square, angular and truncate, with eight rows of curious knobbed appendages (Plate E, fig. 3), eight pairs of abdominal pro-legs of a jointed structure, an anal sucker and remarkably long antennæ. The larva feeds on *Hypnum*, is very sluggish in its movements but rarely quiescent, and requires a very moist habitat; it spins an oval cocoon amongst moss.

The other external-feeding Micros are the *Limacodidae* and *Zygaenidae*. This relationship of families is further supported by observations made on the newly-hatched larva of *Limacodes testudo* whose spines have, at that period, an arrangement and structure more resembling *Eriocephala* than any other form. The sucker of *Eriocephala* and the mode of progression of *Limacodes* (almost unique amongst Lepidoptera) furnish another strong suggestion of the alliance. The extra abdominal pro-legs present in the larvæ of *Lagoa crispata* (a Limacodid), which the author hopes to investigate further, seem a reminiscence of the extra abdominal pro-legs of *Eriocephala*. The points suggesting the alliance with the *Zygaenidae* need further study. It is noted that *Syntomis*, *Enchromia* and other forms often associated with *Zygaena* are very distinct from it; they are Arctiids and there is no near relationship between *Zygaena* and *Arctia*. *Eriocephala*, *Limacodes* and *Zygaena*, though more nearly related to each other than to anything else, are nevertheless widely separated and may be likened to the islets which still remain above the surface to indicate the mountain peaks of a submerged continent; there must, in the course of their developmental history, have been many intermediate families. The persistence of systematists in associating Arctiid forms with *Zygaena*, and the Micro patterns of wing-marking common in Arctiids are probably results of some alliances which are at present obscure. The larvæ and pupæ show them to be now widely separated.

The erstwhile Leicester Entomological Club has become the Entomological Section of the Leicester Literary and Philosophical Society. Its first meeting under the new conditions was held on Jan. 25th, 1894, when W. A. Vice, M.B., was elected Chairman, Rev. C. T. Crutwell, M.A., Vice-chairman, and F. Bouskell, F.E.S., Hon. Secretary. It was resolved to hold meetings on the fourth Tuesday of each month. Dr. W. S. Riding's paper (*Ent. Rec.*, Jan., 1894), "On an additional method for determining the species of certain Lepidoptera," was discussed; Mr. Bates considered that, although the number of teeth in the scales might aid in the differentiation of species, yet that more obvious characters were necessary for general use, and it was generally agreed, that if the scales were relied upon, extremely accurate observations of them would be imperative. A new list of the Lepidoptera of the county is in course of preparation* and a list of the Coleoptera is contemplated; Mr. Bouskell will be glad to receive notes relative to the occurrence of Lepidoptera, whilst similar notes concerning Coleoptera should be sent to Mr. F. Bates.

* What has become of the much talked of City of London Society's List?—Ed.

The Entomologist's Record
AND
JOURNAL OF VARIATION.

No. 4. Vol. V. April 15th, 1894.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 68).

Chap. I.

CLASSIFICATION.

4. On the relationship which exists between the several Orders composing the Class Insecta.—One of the most recent attempts to show diagrammatically the evolutionary relations of the various Orders of insects to each other, is that made by A. Hyatt and J. M. Arms (*Guides to Science Teaching*, No. viii.) and reprinted in *Psyche*, vol. vi., pp. 12-13, diag. 1, 2, 3. These authors conclude that, of the higher (winged) forms which may be assumed to have arisen from a common stem, the Neuroptera, Mecoptera and Trichoptera may be considered as forming a sub-group, passing off from the common stem in different directions: the Lepidoptera, Hymenoptera and Diptera, as forming another radiating off in other directions, whilst the Coleoptera have no relations to the others save through the purely imaginary ancestral base. Estimating approximately the degree of specialization attained by the adults (imagines) and taking it as the basis of their conclusions, these authors consider the Diptera, Hymenoptera, Coleoptera and Lepidoptera, to be the highest in the scale of evolution, their relative order being as here set down. The relationship of existing larval forms to a primitive type and to each other is fully discussed, as well as the modifications which particular groups have undergone in their relationship to the primitive type (*Psyche*, vol. vi., pp. 37, 44).

It is, of course, absolutely necessary, that in using the terms higher and lower, we consider as the highest group that which has undergone the greatest degree of specialisation from the ancestral type, and then, undoubtedly the choice lies between the Hymenoptera and Diptera. Lowne says:—"The Diptera are far more remarkable in their development history, and in the modification of structure which they present in the adult or imago form. In this relation, the strong tendency of many to produce their young alive, and the fact that some have a

capacious matrix or uterus, in which the larvæ are hatched, or even attain the pupa form before birth, is not without interest, presenting as it does, some analogy with the viviparous character of the mammalia among vertebrates—whilst the nest-building instincts are more manifest in Hymenoptera and in birds. It is true that the flies and more especially the heavy forms, with a comparatively tardy flight like the blowfly, have been regarded as stupid—Sprengel call them 'die dummen Fliegen'—and do not excite our sympathy and curiosity to the same extent, as the social Hymenoptera; but it is impossible to judge of the intellectual functions of an insect. The manner in which the blow-flies, and their near allies, the horse-flies, have made themselves at home with man, speaks for their power of adapting themselves to new and varied conditions. They are cunning, wary, and easily alarmed, and except when benumbed with cold, or heavy with eggs, know well how to avoid danger. They appear to me far more clever in this respect, than the bees and wasps."

On the other hand Lubbock writes:—"Bees are intelligent insects and would soon cease to visit flowers which did not supply them with food. Flies, however, are more stupid and are often deceived. Thus in our lovely *Parnassia*, five of the ten stamens have ceased to produce pollen, but are prolonged into fingers, each terminating in a shining yellow knob, which looks exactly like a drop of honey, and by which flies are continually deceived. *Paris quadrifolia* also takes them in with a deceptive promise of the same kind. Some foreign plants have livid yellow and reddish flowers with a most offensive smell and are constantly visited by flies, which apparently take them for pieces of decaying meat."

It must be granted that in one particular the modification undergone by certain Diptera, is very great. The power which the Sarcophaga have of bringing forth their young alive, is an exceptionally strong point in favour of giving them the highest position, but in many other directions, especially with regard to high instinctive faculties, I feel perfectly satisfied that the Hymenoptera are more highly specialised as a group than the Diptera, and I believe that this opinion is very generally held. I should, therefore, place the Hymenoptera before the Diptera in a table of this kind. The anatomy shows very advanced conditions in both groups, but the well-known habits of ants and bees may readily be shown to far transcend any habits of the Diptera, whilst many structural points relating to other members of the Hymenoptera are but little inferior to the special structural peculiarities in certain Diptera.

5. On the origin of insects.—I shall not attempt to discuss the different views which have been put forward as to the origin of insects. Packard supposes them to have been developed from an ancestral form resembling *Vermes*; Müller and Dohrn, that they sprung from forms resembling the *Zoëa* or larval condition of the Crustacea; Lubbock and Brauer consider that the ancestral form closely resembled the existing genus *Campodea*, one of the *Poduridae*, which they suppose to be the nearest representative of the primitive form of insect at present in existence; Häckel considers *Prothelmis* as the ancestral form from which Echinodermata, Arthropoda, Mollusca and Vertebrata have been evolved. M. Cholodkovsky believes that insects were derived from *Scolopendrella*-like ancestors, and further adds "even Graber considers

it probable that the ancestors of insects were myriapod-like. If, however, we weigh the great difference between the Crustacea on the one hand and the rest of Arthropods on the other, a close relationship between Insecta and Crustaceans appears simply impossible. The *Nauplius*-form of larva, an exclusively Crustacean possession, the remarkable resemblance in embryonic development between Insecta and *Peripatus*, and the constitution of the respiratory and excretory organs, are facts which all compel us to conclude that the Arthropods are at least diphyletic in origin. The Crustacea, indeed, are to be derived from marine Annelids, which in the course of their development passed through the Trochosphere stage (which in the Crustacean development became transformed into that of *Nauplius*), while for the ancestors of the Tracheata we must look to terrestrial or freshwater Annelids, more of the Oligochæte type." All these theories are necessarily of an extremely speculative nature; the present state of our knowledge on the subject, and the disconnected and scrappy information hitherto yielded by geological research, do not, at present, furnish the materials for any confident conclusions.

6. On the antiquity of insects.—The fragmentary information furnished by geology is sufficient to show that the Mammals, and in fact the Vertebrates in general, of the present day had no exact counterparts in ancient geological times. The Eocene and Miocene Mammalia bore but little resemblance to those now in existence; the Saurians and flying reptiles of the Oolitic period differ entirely from any existing animals; even the fishes of the Devonian and Old Red Sandstone ages, have scarcely representatives in our fauna of to-day. But this is not so with regard to insects; not only do the fossil insects which have been found belong without doubt to the well-defined Orders of Coleoptera, Orthoptera, Neuroptera, Lepidoptera, etc., with which we are familiar, but palæontologists refer the dragon-flies and beetles which evidently existed in Mesozoic and Palæozoic times even to the genera of to-day. The great antiquity of insects has been proved most conclusively therefore by geological research, but the various Orders are not equally abundant in the oldest rocks; the remains tend to show that whilst Neuroptera and Orthoptera are probably the most ancient Orders of insects, Lepidoptera is among the newest, and it is supposed that this Order branched off from the Neuroptera about the commencement of the Tertiary period. What the original stem form of the Lepidoptera was like has long been a matter of speculation. Oppenheim refers certain fossils, found by Hieberlein in the Solenhofer slate to an Order connecting Neuroptera and Lepidoptera, and this has sometimes been looked upon as a probably primæval type, but of Lepidoptera proper he considers *Cossus* to be probably the oldest existing family. Dr. Walter looks upon *Micropteryx* as the original lepidopteron, and Dr. Chapman has recently discovered that this genus has species which in the pupa have functionally active mandibles. Brandt, by a different process of reasoning, supports Oppenheim's view, that *Cossus* is the oldest form. But the further consideration of the various arguments which have led up to these views would be out of place here, and I will only repeat again that lepidopterists are mainly agreed that the Lepidoptera originated from the Neuroptera, and that the early part of the Tertiary epoch saw the first beginning of the Order.

7. On fossil insects with prothoracic wings.—It would be

impossible to give even a brief *resumé* of the work which has been done in connection with the study of fossil insects; those interested can refer to special authors such as Scudder (*Fossil Butterflies*, Salem, 1875; *Four Memoirs on Tertiaries, and of Fossil Insects of the United States and Canada*, Washington, 1878), or to the series of papers written by Goss, in the *Ent. Mo. Mag.*, vols. xv. et seq., entitled "Introductory Papers on Fossil Entomology." The following note is, however, worth recording here. As is well known, the wings of the imago are carried on the mesothoracic and metathoracic segments, but the following would appear to prove that insects have been known with three pairs of wings, the third pair being developed on the first or prothoracic segment. The occurrence of these most remarkable fossil insects is recorded by Mr. Charles Brongniart in the *Bulletin de la Société Phelomathique* (with two plates). These three insects "differing considerably in structure, were found in the rich carboniferous beds of Commentry, France; two of them show, besides fully developed mesothoracic and metathoracic wings, a pair of prothoracic wings bearing much the same relation to the others as the mesothoracic tegmina of tropical Phasmidæ bear to their metathoracic wings. They are short sub-triangular lobes, having a well-defined basis which is narrower, sometimes much narrower, than the parts behind, and from which course three or four radiating nervules. Although in these individuals these parts spread laterally like the wings behind them, and are sometimes so broad at the base as to appear at first sight more like lateral lobes of the prothorax (especially in an English Carboniferous insect described by Woodward, which Brongniart also places here), M. Brongniart believes that they were movable, and could be extended backward along the body so as to cover the base of the mesothoracic wings. As to the question which naturally arises, whether these members are to be regarded as atrophied organs, and therefore pre-suppose a progenitor equipped with three pairs of fully-developed and similar thoracic wings, M. Brongniart prefers to wait for further palæontological facts. One recalls in this connection the discussion between Haase and Cholodkovsky, in the *Zoologischer Anzeiger*, Nos. 235, 239 and 244" (*Psyche*, vi., pp. 31-32).

(*To be continued.*)

DEALERS AND STEALERS.

By H. ROWLAND BROWN, M.A., F.E.S.

Entomology is a science; it is also a hobby, a pastime. Professionalism, which has crept into most of our pastimes, has not let the pastime, entomology, go scot free. The reason for this is obvious. The amateur, who has either no leisure or lacks the inclination to work for himself, looks to the purveyors of insects who exist all the world over to provide him with specimens for which he is willing enough to pay. This fact is as noticeable in America as upon the Continent, and I, for one, should be the last to throw a stone at the professional naturalist, who has probably contributed as much to our scientific knowledge as the amateur who stays at home and confines his operations to the neighbourhood in which he lives, or to such localities as may tempt him to make holiday visits to them. The real evil which the entomologist objects to and views with dislike and suspicion, is the existence of the "carpet-bagger." By this term I don't mean the

collector of certain interesting Geometers, but the man who invades the ranks of the amateur sportsmen and turns their wants and their generosity to his own profit.

The communication made by Mr. Keays to the February number of the *Record* and Mr. Tutt's comments thereupon, bear ample testimony to the fact, not only that the "carpet-bagger" exists, but that he exists to such an extent as to be a positive nuisance. Sometimes he conducts his exchange business from a suburban address, operating on the credulity of correspondents with a drawer or two full of reputed "Britishers" picked up at a mixed sale. More often he does not even trouble to buy his bogus rarities at all, but sends his cigar-boxes (empty) to too confiding distributors, and converts whatever he may receive to his own commercial uses. It is quite conceivable that a very decent cabinetful might be got together in this way, and then handed over to the auctioneer spiced with innocent little locality labels and augmented with reset "foreigners" selected from a dubious miscellany of Continental envelopes. I do not say that this has been done, I hope it has not; but that such a thing is possible, the curious "Tutt" labels in the Burney collection testify; and, as the older generation of entomologists passes away, the possibility of similar frauds will, unless some safeguard is devised, be augmented a hundred-fold. What could be easier, for instance, than for an unscrupulous vendor to dupe the unsuspecting purchaser by affixing to his precious insects such labels as "from Mr. Doubleday," or "from Mr. Stainton," with further data of the capture of the specimens in this or that locality where the rarity has been known to exist?

So far as I am aware, we have only one solitary macro that defies reproduction *ad libitum*—the one-time indigenous *Chrysophanus dispar*. This beautiful butterfly may consequently be bought or exchanged with impunity. But it stands alone, and all the host of Continental HETEROCERA, to say nothing of "Kentish" *P. daplidice*, *A. lathonia*, *et hoc genus omne*, afford ample consolation to the "carpet-bagger" in search of pence and specimens. It may be objected that the maxim, *caveat emptor*, applies to entomological as much as to any other commercial transactions. Very well! but how is a purchaser living, say in Limerick, to ascertain the *bona-fides* of a correspondent in Canterbury, especially when the said correspondent has gone to the trouble of sending a circumstantial account of his captures to a recognized entomological magazine? Such proceedings break down the safe-guard of published records, on which, in my opinion, too much reliance is wont to be placed. My reason for this opinion is as follows:—Numbers of reports appear in our newspapers every year; some of these are sent by gentlemen who write, as unversed in entomological lore, to local papers to announce that they are convinced that they have (any time between March and October) seen the celebrated Camberwell Beauty in their back garden; others come from experienced observers who have compiled careful lists of captures and observations in some chosen spot. Between these extremes, there are unquestionably a number of well-meaning collectors whose knowledge of identity is about on a par with their scientific information; in their eyes certain common species often do duty for allied but much rarer members of the same genera; whilst, *vice versa*, the rarity may fail to be differentiated from its common congener—a mistake, by the way, to which many advanced

students have sometimes to plead guilty. Herein, therefore, lies the danger of placing too much faith in records. A. (an incipient) sends to his favourite organ a long list of nice captures. B. (the bogus amateur aforesaid) spots A.'s interesting notes and, on the strength of them, tickets his miscellaneous department accordingly; he may, as I said before, even go so far as to publish a supplementary notice on his own account corroborating the all-unconscious A. And so the evil continues, encouraged by the sublime indifference manifested by those collectors who are quite satisfied with the purchase or exchange of rarities "on simple note of hand" (Cf. any number of insects in the Burney collection).

How is this kind of thing to be stamped out? I can only suggest one way, and perhaps that will only "scotch the snake, not kill it." We cannot have entomological Inspectors, like a college of heralds, making "a view" of the counties and overhauling the store boxes of the young gentlemen who send lists to the magazines. But we have energetic entomological societies in many parts of the country, as well as field clubs which in some degree turn their attention to this particular branch of natural history. Perhaps it would not be too much to ask that, in addition to the official note taken of the exhibits of the members of these societies and clubs and duly recorded in their *Transactions*, each such society or club should undertake the duty of requesting from correspondents to the magazines, who are not members, further particulars relative to any captures recorded within the area covered by the institution, and the transmission of any important specimens to the society for exhibition. It would only be necessary to adopt this course when any very striking announcement was made, and, while it would be entirely satisfactory to a *bona-fide* captor to have his record thus substantiated, the bogus collector would have some difficulty in maintaining his claim. A whole crop of theoretical objections may be raised to such a proposition, but I think that, in actual practice, the plan would, in discreet hands, be found to answer to some extent the purpose for which it is intended. The great majority of collectors are known to some at least of their fellow-entomologists: a very large proportion are themselves members of some society interested in science, or are known to some of its members; only a very few are so far isolated as to stand apart from all entomological intercourse, and the names and achievements of many of these are a sufficient guarantee of their good faith. Among this last class, however, the black sheep are unquestionably included, and in the best interests of the entomological fraternity they should be singled out for judgment.

The system suggested above would chiefly operate in respect of contemporary records; the difficulty still remains with regard to the cabinet and other labels of professedly old standing, which set out, often circumstantially, the reputed time and place at which the specimen was taken, with very often a series of names of previous possessors, which still further lend an air of veracity to the guarantee. How are we to discover the truth or otherwise of these statements? There is no test save that of documentary evidence, and this must be substantiated, as being in the handwriting of those whose signatures or names are attached to it, by men who were acquainted with them. But even in the earlier days of "the Aurelians" (the golden days of

collecting, if we are to believe half we hear) there were records and "Proceedings," and very few captures of extreme rarities failed to be noted either in print or in manuscript, which notes may possibly still be extant. It is the duty, therefore, of purchasers to insist on being furnished by dealers with full and convincing evidence of the nationality of specimens reputed to be British, and auction-room rarities unaccompanied by such evidence should be regarded as doubtful, or better still, be severely left alone.

SCIENTIFIC NOTES & OBSERVATIONS.

DOES CUCULLIA CHAMOMILLÆ HYBERNATE?—Merrin, in his *Calendar*, includes this moth among the hybernated species which have been found in February, and, in the following month, mentions it as having been taken at rest on various materials, adding "probably hybernated." Does it hybernate? Neither W. F. Kirby (*European Butterflies and Moths*), Stainton nor Newman, mentions the fact (Is it a fact?—ED.), but the dates of appearance given by the three authors vary, both as regards imago and larva. Kirby, speaking for Europe, gives April to June for the imago, and June to August for the larva. Newman says that the imago appears on the wing in April and May, and that the larvæ emerge at the end of May or beginning of June, and are usually full-fed at the end of June, although stragglers may be occasionally met with as late as the third week in July. Stainton gives later dates than the others—the end of May and June for imago, July and August for larvæ. During the last season or two, I have taken the handsome larvæ feeding on *Pyrethrum maritimum*, the earliest date being April 27th, and the latest, July 7th. (On July 19th I failed to find a single larva). Whilst small, they require to be carefully searched for, owing to their resemblance to the flower-buds and to their habit of curling themselves round the stems of the food-plant. On several occasions I have found half-grown larvæ on a plant of *Pyrethrum*, which, ten days before, I had searched carefully without finding any. The larvæ prefer low-growing flat plants, rather than the more robust ones; frequently, on the same plant, are some nearly full-fed and others very small; they feed up very rapidly. Kirby (*l.c.*, p. xvi) says "larvæ of *C. chamomillae*, bred from eggs, have been known to reach their full growth in 14 days. Considering their size, and their habit of feeding exposed in the sunshine, they are singularly free from the attacks of parasites; the percentage of imagines reared, is much larger than is the case with *C. verbasci*. The earliest date at which I have known imagines to emerge from pupæ which were found in May, is Feb. 2nd; from July pupæ, the earliest emergence was on March 15th. Out of many pupæ which I had in 1892 and 1893 (in the latter year nearly 100), not one imago appeared in the autumn, though Merrin mentions the species, in November, as hybernating in that stage. If the moth does hybernate in a state of nature, surely some specimens would emerge during the autumn, when artificially reared and to a certain extent forced. I have never taken the imago in the autumn, and my experience leads me to suppose that the species does not hybernate regularly in this state, but I should like to hear the opinion of others.—(Major) J. N. STILL, Seaton, Devon. *Feb.*, 1894.

(We believe that Merrin's error has previously been discussed in the entomological magazines. The moth has a long period of emergence when the meteorological vagaries of different years are taken into account, although not specially prolonged for any given season. The imago may occur from February to May, the larvæ from May to August, according to the season in which they are found. It always, we believe, passes the winter in the pupal state and sometimes goes over two seasons.—Ed.)

Ephestia kühniella in Aberdeenshire.—Last autumn, a baker, in the little village of Monymusk, Aberdeenshire, complained to me that "maggots" had got among his flour. On examination, I discovered that they were the larvæ of *E. kühniella*, which were swarming both outside and inside some of the sacks. Many of them were in the act of pupating, and I noticed that they always attached their cocoons to the sides of the bags, and never spun them loosely among the flour.—A. H. Horne, Aberdeen. *Feb.* 1894.

Nyssia hispidaria.—The paper by Mr. Bayne, published in this month's *Record*, has induced me to send you the following notes on this species. The first thing that strikes an angler, is the wonderful resemblance of the ♂ to the large-winged artificial fly, called "the Alder;" the thorax and body resemble in a remarkable degree, both in colour and texture, the fuzzy body of the fly. Again, no description that I have read, does justice to the extreme beauty of the fringe of the wings, which, if held to the light, will be seen to be of a most beautiful sheeny gold, very much the colour of *Plusia chrysitis*, only lighter and brighter. So far as I am aware, the moth has not been taken in this neighbourhood till this year, and I was much surprised to find, on the morning of Jan. 31st, a freshly-emerged ♂ in my breeding cage, from a pupa which I had dug here a week previously, at the root of a poplar. On Feb. 8th, I found another ♂ in my illuminated trap, and between that date and March 6th, took eight more in the trap. It is curious that, though I have dug here regularly, and have found hundreds of pupæ, I never before came across one of this species; and that, though during the whole of January, February and March of last year, my trap was set nightly in the same spot as this year, I never took a specimen of it. All my ten specimens have a broad band towards the hind margin, lighter than the rest of the wings, which extends over about one-fourth of the fore wings, and one-half of the hind-wings. In one specimen this band is quite white, the remainder of the fore wings being greenish-brown, and of the hind wings very light ashy-grey. Some of the specimens are of a very light ochreous-green, others are very dark, while still others are intermediate in shade; in fact, the series shows much the same range of colour, as I find in my series of *Biston hirtaria*. I have also taken this year, for the first time in this neighbourhood, *Asphalia flavicornis*; one specimen in my trap, another bred from a dug pupa. *Taeniocampa munda* is plentiful here this year, as it was also last year. Mr. Prout suggests that there must be some kind of connection between winter emergence, and the occurrence of apterous ♀ s, and considers *Orgyia* a casual exception, due to some different cause; I had myself been struck by the coincidence, and am inclined to think there may be more than mere coincidence in it, but still the view is not free from difficulties. Can Mr. Prout tell us what is the "different cause" which accounts for the apterous ♀ s of *Orgyia*, and why the same cause should not also account for those of the

Geometers? Why are Geometers alone affected in this way by winter emergence, and not other groups? *Poecilocampa populi* coincides in point of time with *Cheimatobia brumata*, *Asphalia flavicornis* with *Nyssia hispidaria*, *Taeniocampa pulverulenta* and *Tortricodes hyemana* with the *Hybernias*, and the last two, in this district, precede *Anisopteryx aescularia*. Again, all Geometers are not so affected, for *Larentia multistrigaria*, which emerges at the same time as *A. aescularia*, has a ♀ with fully-developed wings. Mr. Prout's remarks in relation to the *Amphidasydae*, if well founded and if the same state of things obtains in the other families in which species with apterous ♀s occur, would be most important as indicating, at all events, some seasonal influence. But is it a fact that, as a general rule, the wings of the ♀ *A. betularia* are better developed than those of *A. strataria*? Stainton, in his *Manual*, says, speaking of the two species indifferently, "wings ample, alike in both sexes;" and Newman figures the ♀ of the latter species, with ample wings, and gives no indication in his description of any lack of development in them; nor can I see any such difference in the specimens I possess; possibly the wings of *A. strataria* are more rounded than those of *A. betularia*, but is this sign, a sign of defective development? Turning now to the *Hybernüdae*, we find *H. marginaria*, which emerges in February, with the wings of the ♀ to a considerable extent developed, whereas *Anisopteryx aescularia*, which does not emerge till a month later, has an absolutely apterous ♀; this seems to be retrogression with the advancing season, rather than progression.—E. F. Studd, Oxton, Exeter. *March 30th*, 1894.

A probable new species of Euchloë.—For some time I have been of opinion that we have two species of this genus in England. The insect which I now take to be a species new to our fauna, is much smaller than *E. cardamines*, measuring, on an average, only about an inch and a quarter from tip to tip of the fore-wings. The discoidal spot is placed, as in *E. turritis* and *E. gruneri*, at the juncture of the orange and white spaces, not, as in *E. cardamines*, well within the orange tip. When viewed under the microscope, the wing-scales appear very different from those of *E. cardamines*. This insect differs from the true *E. turritis* (which is now, I think, very generally looked upon as a distinct species*) by its smaller size, which appears constant, and by the costa of the fore-wings being dotted with black. I should be glad if collectors will look out for this insect during the coming season, and also examine their series of *E. cardamines* for any specimens answering to the above description; if they possess any they will be able to see the specific differences for themselves. It is much rarer here than *E. cardamines*, and is restricted, so far as I know, to a small area. I have collected lepidoptera for many years, both in this country and on the Continent, and, after studying the various European species of the genus, have personally no doubt that this smaller insect constitutes a distinct species which has hitherto been overlooked, in the same way that *Pamphila lineola* was for a long time overlooked. I propose to call this new species, *Euchloë hesperidiles*.—F. B. Newnham, Church Stretton, Salop. *April 4th*, 1894.

*We should be glad of references to authorities upon this point.—Ed.

VARIATION.

NOTES ON SOME VARIETIES OF BRITISH RHOPALOCERA.—During 1893, whilst looking over various collections, I was struck by the general resemblance of some of the varieties of the *Rhopalocera* contained therein to Continental forms. Mr. Barrett (*Lep. Brit. Isl.*, vol. I.) gives many notices of varieties which resemble Continental varieties, and I can quite agree with him in every instance. Appended I give a list of varietal forms from notes made from the examination of sundry collections.

Pieris napi.—I saw a ♀ captured in Oxfordshire, which bears a strong resemblance to var. *bryoniae*, Och., an Alpine form; it is a little smaller than the average *napi*, and is, perhaps, not quite so dark as the the typical *bryoniae*; the wings are of a decidedly yellowish ground colour with the nervures very dark, and the whole of the wings are suffused with greyish scales, thus giving the insect a very dusky appearance. [Is not this var. *sabellicae*, Stph. ?—ED.].

Euchloë cardamines.—A very small ♂ was taken by myself at Kennington, near Oxford, in April, 1893, which measured $1\frac{3}{16}$ in. from tip to tip; other small examples were netted at the same place, so that, apparently, a small-sized brood had been produced there; a ♀ taken with the above has the blackish markings at the apex of the fore-wings almost obsolete. I believe that the small var. figured by Mr. Barrett (*l.c.*, pl. 4, fig. 2 b, c) is called *turritis*, Och. on the Continent. [See p. 97.—ED.].

Gonepteryx rhamni.—A ♀ taken at Oxford appeared to me at first to be an hermaphrodite; the fore-wings were yellowish, the spots at their margins being bright reddish-brown; the hind-wings were of the usual colour, but the orange spots in their centre were much smaller than the average.

Chrysophanus phloeas.—Mr. Holland took var. *schmidtii*, Gerh. near Oxford in the autumn of 1893, and other specimens very closely resembling this var. have been met with in various places. I possess two examples from the Cotswold Hills, in which the glossy coppery colour has faded almost to white; this is a form intermediate between var. *schmidtii* and the type. I have met with the recurrent variety with the smoky wings at Hawkesbury on the Cotswolds.

Lycaena bellargus.—I have a gynandromorphous example, which was captured at Ventnor in 1893, in which the left side is that of a ♀ and the right that of a ♂. I have only come across stray specimens of this species round Oxford, where it is very rarely seen, but it occurs abundantly on the Cotswolds; on August 11th, 1893, the second brood was already nearly over.

Lycaena corydon.—A singular var. of this species, approaching in colour the Continental var. *apennina*, Zell., was shown to me from Bournemouth; the light bluish colour has altogether faded to a whitish tint; the markings on the underside, though very indistinct, are nevertheless well defined.

Nemeobius lucina.—Some specimens taken in Bagley Wood, Oxford, vary from a light brown to a dark brownish black; in some examples the black transverse bands are very broad, and absorb nearly the whole of the tawny spots, making the wings appear quite black; in another larger example the black bands are very thin, being broken in many

places, so that the whole area of the wings appears reddish tawny; there are other forms intermediate between these two. [Is not this to a large extent sexual?—Ed.].

Argynnis paphia.—The type occurs abundantly at times on the outskirts of Bagley Wood, but var. *valezina* has not yet been taken at Oxford. A large ♂ was taken there early in 1893, which is almost $\frac{3}{8}$ in. wider in expanse than any other specimen which I have seen.

Argynnis adippe.—Out of a very long series of this butterfly taken at Bagley Wood, at Splatts and Lower Woods, Gloucestershire, and in other localities, only one specimen differs from the rest; this approaches var. *cleodoxa*, Och. and in it the spots, although they are distinct on the hind-wings, yet lack the silvery colour which characterises them in the remaining specimens being, instead, of a dullish tawny colour. The var. *cleodoxa* is totally devoid of the silvery spots.

Argynnis euphrosyne.—A beautiful example of this species was captured by me in Bagley Wood in 1893, in which the upper sides are smeared with black blotches that cover the whole of the wings, the brownish colour only showing itself in small triangular-shaped spots, at the extreme edges of the wings; it resembles the variety figured by Mr. Barrett (*l. c.*, pl. 25, fig. 2b) but is more suffused with black than that.

Melanargia galathea.—A specimen referable to var. *procida*, Hbst. was taken in August, 1893, at Change Cliff, Cotswold Hills, which appeared to have just emerged; it must have been a late individual, as another specimen captured a few days before was very much worn and seemed to have been on the wing for a considerable time. *Procida* is found in Turkey, Armenia, Syria and the Mediterranean region, Spain excepted (Stgr. *Cat.*, II., p. 27). The species is very rare in the vicinity of Oxford, being found only, so far as I have ascertained, at Holton Stone Pits, near Wheatley; in 1891 it was unusually abundant on the hills between Wantage and Farringdon and at Childrey, Berks.

Satyrus semele.—Amongst a number of specimens taken at Bournemouth, in 1892–3, I notice one which closely approaches var. *aristaeus*, Bon., whilst a number of others incline to this form. According to Staudinger, var. *aristaeus* is found in Corsica, Sardinia, and on some parts of the coast of the Mediterranean.

Pararge egeria.—This species occurs on the outskirts of Bagley Wood, and in a few secluded spots on Shotover Hill; it is not so common at Bagley as it was formerly, but is still to be met with in its old haunts; individual specimens differ considerably in the colour and markings of the wings, but I have not seen any striking varieties.

Epinephele ianira.—Several specimens with bleached patches on the wings were taken in various parts of Oxfordshire, the occurrence of which I attribute to the great heat that prevailed last year.

Epinephele hyperanthus.—One specimen taken by me, in July, 1893, at Oxford, exactly tallies with the figure in the *Entomologist*, vol. xxvi, p. 281; for it I propose the provisional name *lanceolata*.

Coenonympha pamphilus.—Varieties of this species are not common in the Oxford district. I quite agree with Mr. Barrett, that the var. *lyllus*, of British entomologists, is an error. *Lyllus*, Esp., is a larger insect, and as Mr. Barrett, quoting Lang's *Rhopalocera Europae*, says "has the hind margins often with a narrow ante-marginal black line (which is invariably present); the undersides of the wings are of a light

yellow colour, with a central reddish streak descending from the costa, about two-thirds across the wing; the fore wings have the apical spots more distinct than in the type." I have not seen Mr. Lang's figure, but the description given by Mr. Barrett is quite correct. Up to the present I have not seen a true British *lyllus*, but I have no doubt that it may have occurred on our south coasts.

Syrichtus malvae.—A specimen of var. *taras*, Meig. (*lavaterae*, Haw.), was taken by myself in 1892 in a field opposite the barracks at Cowley. Several other specimens were taken at the same place in 1893, but I was unable to find any larvæ, nor did I see a ♀ in the act of oviposition. They only occurred in a small spot, a few yards in circumference. Out of a large series of *S. malvae*, captured at Dorchester in 1893, not one differed from the type.

Vanessa urticae.—A specimen was taken, drying its wings on some palings near Dorchester Mill, on July 6th, 1893, which has a peculiar greasy or semi-transparent appearance, and in which the reddish colour has quite faded.—JOHN W. SHIPP, Oxford, *Jan.* 1894.

I have noticed the following varieties and aberrations among the RHOPALOCERA.—*Vanessa atalanta*.—A number of specimens showed a distinct white spot in the scarlet band*; some specimens bred by a friend, from larvæ taken near here, are of a very dull colour, the band being of a brownish-red hue, instead of the usual brilliant vermilion; in this strange brood were two specimens in which the wings are much shorter on one side than the other (see *Ent. Rec.* ii., pp. 95, 119, ED.), *Chrysophanus phlocas*, captured at Prestwich Carr, by Mr. Dunn of Wylam, has several of the black spots on the fore wings suppressed. *Lycaena icarus*. Several ♀s of this species are of a very brilliant blue, almost as gay as the ♂s.—CHAS. H. CRASS, South Shields, *Feb.*, 1894.

CURRENT NOTES.

Those who have read Mr. Elwes' "Revision of the genus *Oeneis*" published in the *Trans. Ent. Soc., London*, will be interested in the criticism thereof by W. H. Edwards in *The Canadian Entomologist* for March. It would appear therefrom, that the paper, so far as it relates to the American species, is a most unsatisfactory production, and we quite agree with the critic in his concluding remarks, that "there never will be a final authoritative revision of any genus of butterflies till the preparatory stages in every species of it are known. Species are as clearly distinguished by the form and sculpture of their eggs, by the forms and appendages of the caterpillars, and by the peculiarities of the pupæ, as by the facies of the imago. This feature has been the occasion of the endless and irreconcilable differences that prevail in nearly all genera up to this day. To proceed further in the same direction is plainly a waste of time. It is a case of the blind leading the blind, to undertake to bring order out of the confessed confusion by appealing to facies."

Mr. J. W. Douglas has described (*E.M.M.*) another new species of *Aleurodes* under the name of *A. spiraeae*, with excellent drawings of the larva by Mr. E. F. Tugwell.

*This is very common. See *Ent. Rec.* iii., p. 247.—ED.

Dr. Knaggs tells us that the corrosion which ruins many of our entomological specimens, and which we have hitherto called "verdigris," is in reality oleate of copper.

An excellent article by Mr. Eustace R. Bankes, on "*Lita instabilella* and its nearest British allies," has been commenced in the current No. of the *E.M.M.*

A very interesting paper on an "Aberration of *Epinephele ianira*," with incidental notes on the variation of many other butterflies, appears in the April number of *Societas Entomologica*.

A new book by Mr. J. W. Tutt, entitled *Woodside, Barnside, Hillside, and Marsh*, is in the press. It will consist of a series of illustrated literary sketches on somewhat similar lines to *Random Recollections of Woodland, Fen and Hill*, the publication of which has proved so successful. The new volume will be published at 2s. 6d., and will be illustrated by many plates. It will appeal alike to entomologists, botanists, geologists and ornithologists. The essays are written in popular and untechnical language, but yet from the standpoint of the most recent scientific knowledge.

At the South London Entomological Society's meeting on March 8th, an amusing scene occurred which shows our scientific (?) studies in the light in which they are understood by some people. A remarkable arrangement, by means of which a dummy Red Admiral butterfly was made to move its wings, and a comprehensive contrivance for capturing butterflies by decoy, after the most approved method of the Whitechapel birdcatcher, were set up for exhibition. The unscientific nature of the whole affair, and the obvious want of taste which led to its exhibition at a so-called scientific meeting, impressed many of the members, who sarcastically asked whether a patent had been taken out for the apparatus. These remarks appear to have annoyed at least one of the members present, who made quite a stirring speech to the effect that this was not a subject for ridicule but a really scientific discovery, which might be put to good use in the Tropics, although it might not do for use in England. It strikes us that, whether in the Tropics or in England, the business of jiggling one's leg up and down to move the wings of a *Vanessa atalanta*, and the pulling of a string at some thirty yards distance, is not a form of entomology that the intelligent scientist or even collector wants to have anything to do with. It may be an interesting discovery to aid in the extermination of rare insects, and is of about as much interest to science as a thumbscrew. Men who collect for information we understand; men who collect for "sport" as they call it, and because they must kill something, we have repeatedly met; but from the man who catches his bugs with an intelligence (?) excelling that of the Whitechapel bird-catcher who wrings the necks of all his hen victims because they are not cocks, may we be delivered. We suppose the reference to its use in the Tropics when it would not do in England is on the lines that an ignorant white man is able to do in front of intelligent black men what he dare not face before the sensible farm labourers of his own nation. Floreat Entomologia à la Whitechapel.

Lepidopterists are proceeding apace. Only last month we chronicled the hope of a well-known correspondent that he might be able, with a friend of similar tastes, to do a little bug-catching after he had shaken off this mortal coil, and now in the *British Naturalist* we have

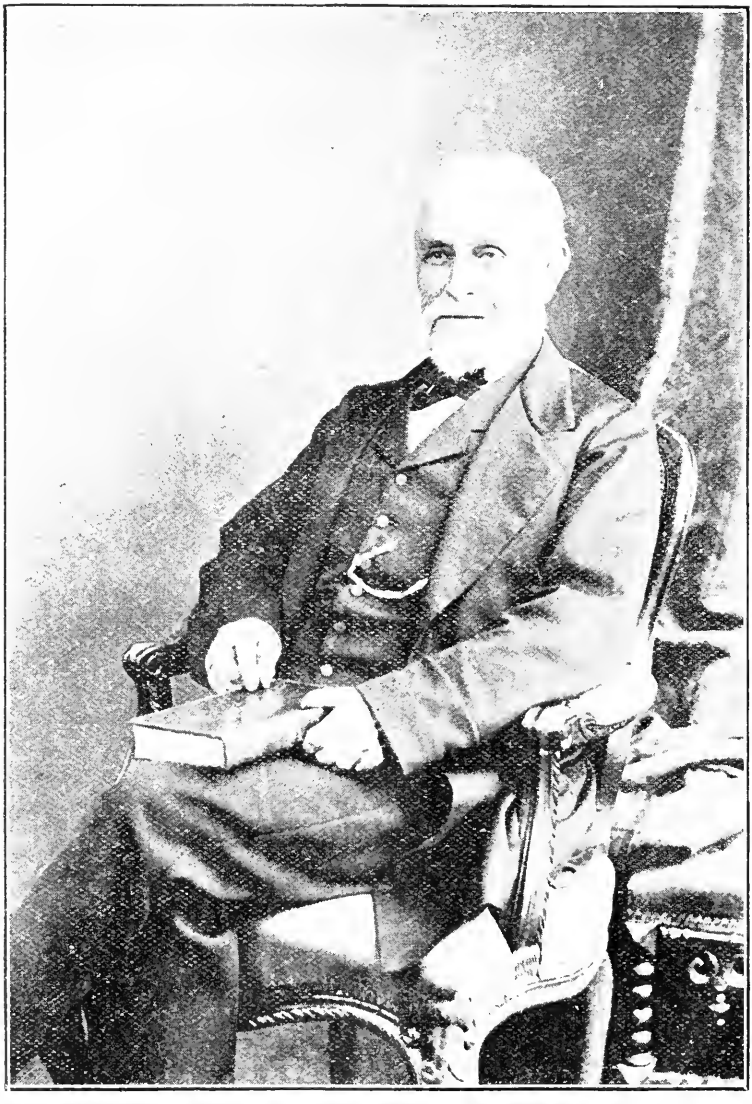
still more advanced views promulgated. Mr. Dale therein states, in no measured terms,—"Moreover he (Haworth) did not possess *spilodactylus*, Curt." Now if this be meant for a joke, we must congratulate Mr. Dale on the excessive profundity of his wit, but if it be meant as a real solid statement, it really behoves us to ask Mr. Dale in what part of the Shades he meets the spirit of the late Mr. Haworth, to discuss with the latter what he had in his collection at the beginning of the century. When our poetical friend last month suggested that the departed might do a little bug-collecting on their own account, we little knew that Mr. Dale had already solved the mystery by being in spiritual communication with the late Mr. Haworth.

Dr. T. A. Chapman will read a paper "On Butterfly pupæ and the lines of evolution they suggest,' 'at the London Institution, on April 17th. The Council of the City of London Entomological Society give a hearty invitation to all entomologists to be present, and trust that as many as possible will attend.

We would ask those gentlemen who get eggs, larvæ or pupæ of any British butterflies to spare, to send them direct to Dr. T. A. Chapman, Firbank, Hereford. It is intended to publish a scientific work on our British Rhopalocera as soon as the material can be collected. Eggs and larvæ of *Leucophasia sinapis*, and the Skippers are particularly desiderated at present, but those of other species are required.

NOTES ON COLLECTING, Etc.

Spring Notes.—Mr. Beadle of Keswick, reported as follows on January 24th:—"Insects are out early so far; I took a specimen of *Hybernia leucophearia* as early as December 31st, and it has been plentiful during the past week with *Phigalia pedaria* and *Hybernia defoliaria*." Mr. Freer (Rugeley) reports, on March 6th:—"I have had one *Endromis versicolor* out, but lack of sunshine probably will keep most of them back. All the early spring Geometers have been earlier than usual, though not common." Capt. Robertson (Cheltenham), on March 13th, reports:—"I tried my moth trap on February 28th, but only took a few *Hybernia progemmaria*, *H. rupicapraria* and *Anticlea badiata* (one specimen). I took, however, two more *A. badiata* on March 8th, a month earlier than last year. On March 7th I tried sugar, and captured *Scopelosoma satellitia*, *Orrhodia vaccinii*, *O. spadicea* and one *Taeniocampa munda*, with more of the last-named since." Mr. Robinson reports:—"Insects are beginning to emerge in my breeding cage. To-day (March 19th) *Amphidasys prodromaria*, *Asphalia ridens*, and *Eupithecia irriguata* have come out all from New Forest larvæ beaten last year. I find *A. prodromaria* apt to be deformed, and the larvæ of which I had a large number were very much ichneumoned, with the result that I got but few pupæ. *E. irriguata* is a pretty little species when bred, and I feel well repaid for the trouble of searching them out from the chaos of the beating-tray. Last year one could hardly beat an oak in the New Forest without getting larvæ of *A. ridens*, and of many other species too." Mr. Hooker (Winton, Hants), reports the capture of "*Lycaena argiolus*, on April 2nd," and "the larvæ of *Eumydia cribrum*, taken very freely since the beginning of March, some of which have since pupated." At Hereford insects were



JOHN JENNER WEIR, F.Z.S., F.L.S., F.E.S.,

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Plate F.

abundant at sallows during the last fortnight of March. *Hoporina croceago, Scopelosoma satellitia, Xylina socia, Orrhodia vaccinii* among the hybernators; *Taeniocampa pulverulenta* and *T. munda* in abundance; *Pachnobia rubricosa, T. miniosa, T. instabilis* and *T. stabilis* common; *Pachnobia leucographa, T. populeti* and *T. gracilis* rare; *Pterophorus monodactylus* and *Eupithecia abbreviata* also came to sallows; *Brephos notha* was common round the aspens, and *B. parthenias* over the birches, but the fine weather kept them out of reach of the net, and they were not to be captured. Hybernated specimens of *Polygonia c-album, Vanessa io* and *V. urticae* were observed, with fresh specimens of *Pieris rapae, Xylocampa areola*, and several *Lemmatophila salicella*, and one *Epigraphia steinkellneriella* flitting about a hawthorn hedge. *Lyonetia clerckella* and *Hylopoda pariana* were seen in a similar situation.—J. W. Tutt. *April 2nd*, 1894.

OBITUARY.

JOHN JENNER WEIR, F.Z.S., F.L.S., F.E.S.

(Born August 9th, 1822. Died March 23rd, 1894.)

One by one the human links in the chain which connects the old science with the new drop out, and entomologists have recently had to bear more than their fair percentage of loss. The loss is more severely felt in some cases than in others, depending largely upon whether or not the departed one has kept in touch with the younger generation in the onward progressive march of science which the last few decades have witnessed.

Such a man we have to mourn now. The death of Mr. J. Jenner Weir has removed from our midst a man of keen and vigorous intellect, whose life has been one long devotion to the study of the natural objects everywhere around him, and to the advancement of science so far as in him lay. He brought to the consideration of every problem an open and unbiassed mind, and formed his opinions on the facts at his disposal at once free from narrowness, and without a tinge of personal bitterness. He was essentially a modest man, retiring and diffident, and yet, when necessary, he acted with decision, forming quickly sound and accurate judgments, and although he published but little his mind was a storehouse of information that was always at the disposal of his numerous friends.

His greatest pride was his knowledge that in a modest way he had helped the two great naturalists of the time, Darwin and Wallace. It is well known that many of the entomological references in the works of the former were due to Mr. Weir, and for the latter he undertook, in 1868, a series of experiments on the relation between insects and insectivorous birds, more especially on the relation which existed between the latter and the colour and edibility of Lepidoptera and their larvæ. The conclusions based on these experiments were formulated in a paper read before the Entomological Society of London on March 1st, 1869, and published in the *Transactions* for that year, followed by a second paper read on July 4th, 1870, and also published in the *Transactions*.

Entomology was not his first love. In conjunction with his brother, Harrison Weir, the well known painter, he first formed a collection of a large number of living Vertebrata. An unbroken interest in vertebrates was kept up, as the brothers' labours connected with many of our great exhibitions at various places testify. British birds' eggs and botanical specimens both attracted his attention before, in the summer of 1843, the study of entomology seriously took a hold on him. At that time he was 22 years of age and resided at Camberwell, which, in his own words, was "within an easy walk of Dulwich Wood of 80 acres, to which access was to be had without difficulty. London, in those days, broke off abruptly, and at four miles from London Bridge one was as much in the country as if fifty miles distant. There were rookeries at the Tower, in St. Dunstan's Churchyard, and one nest in Wood Street, Cheapside. Swallows had their nests in the Custom House, and I have often seen falcons on the spire of St. Dunstan's Church. One Peregrine Falcon took up its residence in the spire of Shoreditch Church, and committed sad havoc among the pigeons in Spitalfields, and it was no unusual thing for my own pigeons at Camberwell to be suddenly swooped upon by a falcon."

In 1844 Mr. Weir became friendly with Messrs. Douglas and George Bedell, and soon afterwards with Mr. Stainton. These friendships soon led him to become as ardent, if not so well-known, a micro-lepidopterist as themselves. At the end of the year he attended a meeting of the Entomological Society, and was elected a member in January, 1845. This led to his acquaintance with most of the leading entomologists of that time, such as Spence, Stephens, Westwood, Doubleday, Newman and many others.

In June, 1845, we find him chronicling the capture of *Ino geryon* (until then only a reputed British species), *Agrotis cinerea* and *Crambus pygmaeus* (*cerusellus*) at Lewes, and from that time onwards various notes from his pen are to be found scattered over the pages of the Entomological magazines.

His connection with Darwin and Wallace led him to take more than ordinary interest in the philosophical aspects of science, and whilst most of his contemporaries continued on in their species-making lines, he ranged himself at once with the younger men, and fought manfully in their ranks. An accident in 1870, by which he lost the top of his left thumb, and was thus incapacitated from manipulating small and delicate insects, led him to give a much greater portion of his time to the study and consideration of the larger species, and butterflies attracted his attention, the subject of mimicry having an immense fascination for him. In furtherance of his studies in this interesting subject, he made a very large collection of the Danaine Rhopalocera and the families of butterflies that mimic them. He made a number of exhibits of these specimens at the South London Ent. and Nat. History Society, and the Entom. Society of London, and read most carefully prepared notes thereon, but at the former Society he oft-times felt a want of sympathy with his more advanced ideas, for very recently he said in a letter to the writer,—"I do hope you will be present to-night. I have some notes to read which will interest you, and I want your support. It is difficult for a man at my age to understand that comparatively young men publicly delight in expressing their disbelief in evolution, and almost in the same breath inform you

that they have never read the main works thereon, whilst at the same time pretending to do scientific work." Old views die hard, and in talking the matter over afterwards we agreed that it was good so much had been accomplished in such a short time.

He was on the Council of the Entomological Society of London intermittently since 1849. For seven years he was Treasurer and twice Vice-President. Why such an able man was never President is most inexplicable. Probably it was due to his natural modesty, but for all that it remains one of those things that "very few Fellows can understand." He has been Vice-President of the South London Entomological Society for many years in succession, and only last year (1893) at the age of 71, the Society honoured itself by electing him President. His solicitude for the welfare of this Society was almost on a level with that shown by Mr. Capper for the Lancashire, and Mr. Clark for the City of London Societies, the three men standing out as public benefactors in their anxiety to further the interests of Science and the progressive welfare of all.

With the writer, many will feel that they have lost a respected and honoured friend. Many of us, too, will feel that we have lost a teacher, a man of extensive erudition and knowledge, a generous patron of our studies to whom we might turn for help, for information, for sympathy and be certain that we should obtain either or all, so far as was in the giver's power. Through many a younger man, who has learned at his feet, it may be well said that he being dead yet speaketh, and the imprint that he has made will show the futility of belief in annihilation. He has done his work; his successors will say he has done it humbly but well.—J. W. Tutt.

SOCIETIES.

At the meeting of The Entomological Society of London, on Feb. 28th, 1894, Professor August Forel, M.D., of the University of Zürich, was elected an Honorary Fellow of the Society, to fill the vacancy caused by the death of the late Professor H. A. Hagen, M.D. Mr. G. C. Champion called attention to a supposed new Longicorn beetle, described and figured by Herr A. F. Nonfried, of Racknitz, Bohemia, under the name of *Callipogon friedländeri*, in the *Berl. Ent. Zeitschr.*, 1892, p. 22. He said that the supposed characters of the insect were due to the fact, that the head had been gummed on upside down! The Rev. Theodore Wood exhibited *Saturnia carpini*, with semi-transparent wings, a large proportion of the scales being apparently absent, bred with several examples of the type-form at Baldock, Herts; also a pale variety of *Smerinthus populi*, which was said to have been bred, with several similar specimens, from larvæ marked with rows of red spots on both sides.

At the meeting of the South London Entomological and Natural History Society, on Feb. 8th, 1894, the following among other exhibits, were made:—Mr. Carpenter; a form of *Agrotis cursoria* from Aberdeen, which was not distinguishable from a southern form of *A. tritici*. Mr. W. F. Warne; about two dozen species of Lepidoptera taken near Rockhampton, Queensland, in a single morning; among them

were *Anosia archippus* and *Deiopeia pulchella*. Mr. Dennis; a specimen of *Vanessa io*, with a small additional ocellus on each hind wing, and a smaller dark blotch below the central blotch on the fore wings. Mr. Jenner Weir; *Eucheira socialis*, Westwd., perhaps the most archaic form of the *Pierinae* extant. Mr. Frohawk; a bred series of *Argynnis euphrosyne*, which were nearly eleven months in the larval stage. Mr. Manger; a land crab (*Ocypoda cursor*) from Lagos, which was so nimble, that it could only be obtained by shooting it. Mr. Carrington; the eggs of a snail (*Bulimus oblongus*) from Trinidad; these were so exceedingly calcareous, that they might easily be mistaken for the eggs of a bird. Mr. Adkin pointed out, and illustrated by examples of the several species, the characters by which the closely allied species might easily be distinguished:—*Crambus ericellus*, *C. dumetellus*, *C. pratellus*, *C. myellus*, *C. pinellus*, *C. furcatellus* and *C. margaritellus*. Mr. W. A. Pearce exhibited the following insects taken by himself in Alleghany, U.S.A., in 1892-3:—*Pyrameis atalanta*, *P. huntera*, *Vanessa antiopa*, *Polygonia interrogationis*, *P. comma* (both broods); also bred series of *Telea polyphemus* and *Samia cecropia*. A discussion ensued with regard to the gregariousness of the larvæ of *V. antiopa*, the imagines being seldom met with in company.—At the meeting on Feb. 22nd, Mr. Jenner Weir exhibited a new butterfly, belonging to the sub-family *Euplaeinae*, which he had described under the name of *Cadaga crowleyi*. Mr. Carrington; a shell of *Helix pomatia*, cut to show the spiral and the smooth internal surface, which latter, he stated, was siliceous. Mr. Auld (for Mr. Tugwell, in order to correct an error in the report of the meeting held on Jan. 11th); a series of the York City form of *Spilosoma lubricipeda*, for which Mr. Tugwell suggests the name var. *eboraci*, also series of var. *zatima*, and of the selected brood originating from Yorkshire, for which he suggests the name var. *fasciata*. Mr. Pearce; *Fenisca tarquinius*; spring and summer broods of *Lycaena pseudargiolus*; *L. comyntas* and *Thecla edwardsii*, all from Pennsylvania, U.S.A. Mr. South; a specimen of *Argynnis aglaia*, from Hampshire, which was a modification of var. *charlotta*, the silvery spots being converted into long streaks; also for Mr. Rose, of Barnsley, a bred series of *Phygadia pedaria*, of which some were uniformly black, without a trace of markings; for Mr. Fowler, of Ringwood, a specimen of *Euchelia jacobaeae*, in which the costal stripe was carried round the hind margin to meet the spot; for Mr. Allis, of York, a photograph of three specimens of *S. lubricipeda*, in the Allis collection at York, two of which were undoubtedly the *zatima* form, although not extreme examples.

At the meeting of the Birmingham Entomological Society on January 15th, 1894, Mr. G. T. Bethune-Baker exhibited *Agrotis obscura* (*cavida*) from Wicken; three specimens of *Tapinostola concolor* taken near Wicken by Albert Houghton; also a collection of lepidoptera from the neighbourhood of Alexandria; these showed a mingling of Mediterranean with Indo-Persian forms but there were no true Ethiopian forms amongst them; the collection contained twenty-two species new to science and is probably the largest hitherto received from Egypt. Mr. Bradley exhibited specimens of *Andrena fulva* and *A. cineraria*, which had been dug up at Sutton December 28th, 1893, a date at which they should have been in the pupal stage; Mr. E. Saunders had informed him that Mr. F. Enock had on one occasion dug up an *Andrena* with a parasitic *Nomada* in December, but that he knew of no

other similar case.—The annual meeting of the Society was held on February 5th, Mr. G. H. Kenrick was elected President; Mr. G. T. Bethune-Baker, Vice-President, and Mr. C. J. Wainwright, 147, Hall Road, Handsworth, Secretary for the ensuing year. Mr. P. W. Abbott exhibited *Acidalia humiliata* from the Isle of Wight, one specimen taken by himself in 1891, others captured by Mr. A. J. Hodges; an unusually dark specimen of *Hadena nana* (*dentina*) from Sutton, and a pale chalk-cliff form from the Isle of Wight; these were utterly unlike in appearance; a specimen of *Lobophora viretata* from Sutton, which was small and pale and lacked the usual median bands. Mr. A. H. Martineau exhibited workers of *Myrmica rufa* and *M. sanguinea*, and stated that he had found a nest of the latter species at Wyre Forest last year.—On March 19th, Mr. Martineau exhibited a small collection of Lepidoptera, mainly Butterflies, taken on Lundy Island by Mr. R. W. Chase, many of the specimens being distinctly below the average size. It included *Satyrus semele*, *Vanessa atalanta*, *V. urticae*, *V. polychloros*, *Bombyx rubi*, *Zygaena trifolii*, *Z. filipendulae*, etc. Mr. P. W. Abbott exhibited single specimens of *Leucania obsoleta* and *Scuta maritima*, from the neighbourhood of Ely.

No notice of the doings of the Cambridge Entomological Society has appeared in this magazine since April last; the Society, however, has not been idle. Since our last report eight meetings have been held. At these the following among other exhibits have been made. Mr. Theobald, who during the winter lectures in North Kent on insects injurious to crops, &c. showed several cases illustrative of the life-histories of such insects; also specimens of the Tortoise beetle, *Aspidiomorpha sante-crucis* from the Elephanta caves of Bombay; also Stylopised bees and mounted specimens of both ♂ and ♀ *Stylops*. Mr. Jones; a specimen of *Vanessa antiopa* taken at Cambridge in 1876 and *Triphaena subsequa*, taken at Chippenham Fen in 1891. Mr. Rickards; *Thecla w-album*, *Agrotis obscura* (*ravida*) and *Epunda lutulenta*, taken at Cambridge; also some parasites bred from larvæ, of which he gave the following history:—

"Early in June I found several green larvæ, presumably those of *Polia flavicincta*; on or about the 17th I noticed on one of them some small objects which resembled green Aphides, but which, on examining them through a lens, I discovered to be parasites; they were attached at the junction of the several segments of the larva, or, in some instances were found where the false-legs or claspers joined on to the body. In appearance they resembled small flask-shaped vesicles, filled with a very bright-green solution of chlorophyll, and showed no traces of either internal or external organs; by the 20th they had increased in size, and began to assume a milky or clouded appearance and to exhibit some slight indication of structure; up to this date I believed that they were external parasites; their development was now rapid; on the 21st most of them had freed themselves from any connection with their host, were whitish-grey in colour, and in two individuals a small black rounded mass (much like the head of a small fly) made its appearance at one end; on the morning of the 22nd all of them were provided with these black masses, which I could now see were of an excrementitious nature. Towards night several of them had assumed a more or less sooty-grey appearance, one being very nearly black; the legs were now plainly visible through the skin of the nymph or pupa; on

the morning of the 23rd most of them had become black, and by night all were black excepting four. They left their host tail foremost, their tail ends all pointing away from the body of their late host, and changed to nymphs with the ventral surface uppermost. Some ten or twelve emerged on the 6th of July and by the next morning there were about forty of them out: the antennæ of the ♂s were branched, and the branches kept opening and closing as the insect walked about. I believe they belong to the genus *Chirocera* of the family *Chalcididae*, which follows next to the *Ichneumonidae* in Westwood's classification. I found two larvæ infested; the one I kept under observation had forty-four of these parasites." On December 1st Dr. Chapman read the paper published on page 5 of the current volume of the *Record*, and in connection therewith Mr. Farren exhibited Swifts, Noctuas, Geometers and Deltoids having hair-tufts either on their wings, bodies, or legs, &c. On May 12th Mr. F. V. Theobald, M.A., F.E.S. read a paper on "Parthenogenesis in Insects," of which the following is a short epitome. Having briefly alluded to the usual methods of reproduction, a short account was given of exceptional cases. The Coelenterata were instanced as showing *metagenesis*, which is an alternation of sexual and a-sexual forms, while *parthenogenesis* is an alternation of two sexual forms and not, as is often supposed, of sexual and a-sexual forms. Parthenogenesis occurs amongst the Hemiptera-homoptera, Diptera, Lepidoptera, Hymenoptera and Coleoptera. The Aphides were dealt with at considerable length and the differences between the oviparous and viviparous generations pointed out; reference was also made to the *Coccidae* and *Chermes*. In Diptera two remarkable cases of larval parthenogenesis or *paedogenesis* occurring in *Cecidomyia* and *Chironomus* were mentioned. Coming to Hymenoptera, allusion was made to the Hive-bee. The queen apparently is only fertilized once in four or five years, but goes on laying eggs that produce ♂s and ♀s until the spermatic influence is exhausted, after which she produces drones only. Examples are not numerous among Lepidoptera, parthenogenesis only occurring in the *Psychidae*, in *Solenobia* and in *Bombyx mori*; in the latter it is probably a recently acquired habit. In Coleoptera *Stylops* was instanced. In concluding Mr. Theobald described the structure and development of the true ova and ovaries of insects, and showed that pseud-ova arise from the pseud-ovaries in the same way, and that the pseud-ovary is not a germ gland but a rudimentary ovary, having the power of precocious and spontaneous development. Mr. Rickard is the President and Mr. W. Farren the Hon. Secretary for the present year.

At the meeting of the Lancashire and Cheshire Entomological Society, on Feb. 12th, 1894, Mr. Stott exhibited *Calosoma inquisitor*, *Geotrupes typhoeus* and *G. vernalis*, taken in Carmarthenshire, in 1893. Mr. Robert Newstead, F.E.S., read a paper on "Correlations of Plants and Insects," in which he discussed the fertilization of the yucca, and explained the process as described by Prof. C. V. Riley, in *Insect Life*, adding notes from his own observations, on the insects which frequent the flowers in this country. He also alluded to the gall-making *Brachyscelidae* of Australia, a group of *Coccidae* peculiar to that country, and to the galls of *Diplosis rumicis*, suggesting it as quite possible that botanists have described malformed "tubercles" of some species of *Rumex*, as he had found a great number of "tubercles" swollen by this

species. On March 12th, Mr. W. E. Sharpe, whose interesting paper on "The New Entomology" in the *Entomologist*, should be read by all students, gave a brief description of the British species of the coleopterous genus *Silpha*, particularly of those which occurred locally, and exhibited illustrative specimens. He quoted some remarks by Prof. A. Giard, on *Silpha opaca*, which is very destructive to the French beet-root crops.

City of London Entomological and Natural History Society.—*Feb. 20th*, 1894.—Mr. Heasler having sent in his resignation of the curatorship, Mr. Bayne was unanimously elected in his stead.

Exhibits:—Mr. Battley: ova of *Diloba caeruleocephala*. Mr. Clark: a short series of *Gnophria rubricollis* from the New Forest, and a curious pad of felt-like material, resembling a pancake in appearance: this had been spun in a pill-box by parasitic larvæ, which emerged from a larva of *Hepialus humuli*: the disintegrated remains of the latter were attached to the pad. Dr Sequeira: the following "Micros" from the New Forest:—*Crambus perlellus*, var. *warringtonellus*, *Harpipteryx xylostella* (*harpella*), *Cerostoma radiatella*, *Retinia pinicolana*, *Eupoecilia ambiguella*, *Paedisca solandriana* and *P. profundana*. There were six specimens of the latter species, three of them having an inner-marginal white spot on the fore wings, and the other three no white spot, but a distinct oblique dark fascia, which gave them a strong resemblance to the genus *Tortrix*. Mr. Lane: *Stauropus fagi* and *Lasiocampa quercifolia* from Reading. Mr. Bayne: *Hybernia defoliaria* from Epping Forest: most of these were of the pale cream variety, with dark bars.

March 6th, 1894.—Exhibits: Mr. Oldham: a short but very variable series of *Hybernia leucophearia* from Epping Forest. Mr. Clark: some freshly emerged specimens of *Taeniocampa gothica*, reared from eggs of var. *gothicina*: the specimens were richly suffused with red but were in other respects of the normal type. Dr. Sequeira: the Indian form of *Vanessa atalanta* and *V. cardui*, which did not appreciably differ from those found in this country: also a sort of spur from the thorax of *Dicranura vinula* with which, he stated, the moth cut its way out of the cocoon. Mr. Bayne: four eggs of the Willow Wren (*Phylloscopus trochilus*), two of which were rather long and speckled with very small reddish dots, while the other two were roundish and marked with reddish blotches. Mr. Battley reported that he had recently taken *Nyssia hispidaria* in Epping Forest by "assembling": on a frosty evening he secured about 20 males, but on a warm evening nearly 70 rewarded his exertions: he also stated that he had found a ♂ *Hybernia marginaria* paired with a ♀ *Phigalia pedaria* and that he had obtained ova from the latter. Mr. Tutt, in connection with an exhibit of some South African flowers and of insects caught by them which had been sent to Mr. Hope Alderson of Farnborough, said that the local name of the plant is the "moth-catcher" and that the flowers close on any insect settling on them and hold it fast till it dies. Mr. Alderson hoped to receive some seed of the plant, which he would try and rear. Mr. Tutt also passed round an auctioneer's catalogue of a sale of the Duchess of Portland's collection in 1786. Mr. Bacot exhibited pupa-cases of *Saturnia pavonia*, *Bombyx quercus*, *Odonestis potatoria*, *Dasychira pudibunda* and *Ocneria dispar*, and made the following remarks:—"It occurred to me that, as many apterous ♀s have the wing-cases well-developed in the pupa, possibly the ♀s of

other species might have specially male characters developed in the pupa. An examination of the pupa-cases of the species exhibited to-night yielded the following results: In *S. pavonia*, *D. pudibunda* and *O. dispar* the antennæ-cases are nearly as well developed in the female as in the male pupa, whilst in the imagines the antennæ are only very slightly pectinated in the ♀ and only occupy a small portion of the space covered by the pupal cases. In *B. quercus* there is no development suggestive of pectinated antennæ in the pupa, though the antennæ-cases are rather more raised in the male than in the female pupa; in *O. potatoria* the development is hardly noticeable; in the imagines of both species the pectinations are strongly marked in the ♂s, slightly so in the ♀s, the latter species being rather the more favoured in this respect. From these facts I am inclined to think that the first group have evolved from a type or types that had the pectinations of the antennæ well-developed in both sexes and in which, probably, either sex would be attracted by and fly to the other, that the ♀s subsequently lost the pectinations through disuse, whilst in the ♂s of *S. pavonia* they have been still further developed. In the second group the evolution would seem to have been from simple to pectinated antennæ, the ♂s having advanced farthest in this respect, whilst the pupæ have not yet fully responded to the change." Mr. Routledge exhibited a collection of Coleoptera taken by him near Carlisle, among them being *Silpha nigrita*, *Coccinella* 14-*punctata*, *Pterostichus versicolor*, *Amara orata*, *Limonius cylindricus* and *Barynotus schönherri*. Mr. Tutt read a paper on "Nature's Scents," in which he pointed out that, as a rule, it was the inconspicuous flowers which had the richest perfume, blue and red flowers being mostly devoid of odour; that this development of perfume subserved the purpose of attracting insects to the blossoms and so ensured cross-fertilization; other scents, both in the animal and vegetable kingdom, were disgusting and probably subserved a protective function. Mr. J. A. Skertchley mentioned the case of a South American flower which was of a deep red colour; it was perfectly scentless by day but during the night, when its colour rendered it practically invisible, it gave off a very powerful perfume; the plant was visited in large numbers by a species of a Hawk-moth.

March, 20th, 1894.—Exhibits:—Mr. Prout; a large number of specimens of *Coremia ferrugaria*, Haw., to illustrate his paper. Mr. Battley; a living ♀ and ova of *Anisopteryx aescularia*, *in situ*, on a twig of birch; the eggs were deposited in a necklace-like ring, encircling the twig just beyond a small shoot; there were about 24 eggs, counting round the twig, and the band varied from 4 to 9 eggs in width, so that in all there were 150-200 eggs. They were covered with down from the anal tuft, and appeared to be ovoid in shape, and attached by their smaller end. Dr. Sequeira; *Amphidasys strataria*, *Panolis piniperda*, *Hybernia leucophearia*, *Aleucis pictaria*, all bred, from the New Forest; also several beautiful varieties of *Larentia cæsiata*, *Melanippe montanata*, *Melanthia albicillata*, and *M. bicolorata*. Mr. Goldthwait; *Colias edusa*, with var. *helice*, and intermediate forms; one of the *C. edusa* had the marginal pale spots so strongly developed on the hind wings, as almost to form a band. Mr. Lane; *Calocampa vetusta* from Aberdeen. Mr. C. Fenn; *C. ferrugata* and *C. unidentaria*, including a Scotch form of the latter, and a specimen with the median band extremely narrow. These two species were also exhibited by other members. Mr. Bayne ex-

hibited *Psilura monacha* from the New Forest, and made the following remarks:—"This species seem to have shown—at least in our experience—a greater tendency to the production of banded forms in 1893, than in the preceding season; and the more frequent occurrence of dark varieties in certain seasons has previously been commented on by Mr. Tutt. At least five, including examples of both sexes, of those captured in 1893, show this condition, and one ♀ in particular has an almost solid black median band across the fore wings. It will be noticed, too, that this specimen is much below the normal size. Now, amongst those taken in 1892, only one or two show a deviation from the type in that direction, and the deviation is slight. All those exhibited were taken either as imagines or as pupæ. In 1893, the larvæ were subjected to the long drought which had been almost total for four months previous to the appearance of the perfect insect. They must also have experienced, both as larvæ and pupæ, great alternations of temperature—hot sunny days and cold nights. The date of appearance varies considerably in different years; in 1892 and 1893, the species was well out at the end of June, whilst in 1891, several fresh examples were taken at the beginning of September. The ♀ appears to be very weak winged—a condition which seems often to obtain in families containing species with apterous ♀s."—Mr. Smith said that he had bred *Amphidasys strataria* on the 18th inst. from New Forest larva. Mr. Battley reported that *Brephos parthenias* was just coming out at Theydon, and that *Asphalia flavicornis* was getting worn. He had also found *Taeniocampa munda* common, and *T. crnda* swarming on the sallows in the same locality, and had taken one *T. populeti*. Mr. Prout then read a paper on "*Coremia ferrugaria*, Haw., and *Coremia unidentaria*, Haw."

A CORRECTION.—Mr. Jenner Weir, who was a personal friend of the late J. F. Stephens, informed me, shortly before his death, that the latter lived not at Eltham, but at Eltham Cottage, Kennington.—F. J. BUCKELL.

Coremia Ferrugaria, Haw. and C. Unidentaria, Haw.*

By LOUIS B. PROUT, F.E.S.

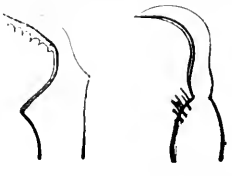
All through the history of entomological nomenclature there has been a recurring tendency, on account of their great superficial similarity, to unite these two as one species, and it was the desire to obtain independent evidence on the question of their identity or distinctness, by breeding both forms from the egg, which first led me into the study of them. After breeding each species several times, and communicating with several entomologists who had information to impart on the subject, I wrote a somewhat tentative article, which appeared in the *Ent. Rec.* of July, 1892 (vol. iii., p. 150). My own personal opinion was at that time, what has since been proved correct, that we had two quite distinct species to deal with, and that the seeming contradictions were to be reconciled through the existence of a red form of *unidentaria*, Haw. so like *ferrugaria*, Haw. as readily to be mistaken for that species.

* Abstract of paper read before City of London Entomological and Natural History Society, March 20th, 1894.

As one of my principal objects in preparing this paper is to bring before your notice and that of entomologists generally, the absolutely certain fact of the distinctness of the two, and the equally certain fact of the existence of red forms of *unidentaria*, Haw., and thus to leave no possible excuse for going over the same ground again in the future history of entomology, my first point must be to demonstrate their structural distinctness, after which I shall group my other remarks under the following heads—Synonymy, Differentiation by Wing-markings, Variation, Geographical Distribution, Habits, Early Stages.

Structural characteristics.—With regard to structural distinctness, my article in the *Record*, referred to above, called forth a response from that careful and accurate observer, Mr. F. N. Pierce, to the effect that the male genitalia differed more widely even than might have been expected in two such close allies, and in the *Record*, vol. iii., p. 177, he gave rough figures of the forms of the "harpes," in each of the two, though unfortunately the names were reversed in the appended note.

Thanks to the great kindness of Mr. Pierce, who stands prominent among the many entomologists who have rendered me willing assistance, a number of specimens have been investigated from this point of view, and he has further obligingly sent me his preparations for study and for exhibition this evening, so that I hope to be able to convince the most sceptical of the invariability of the form of the genitalia, and the consequent confirmation of the view arrived at by breeding and by superficial comparisons. I am indebted to the kindness of Messrs. Battley, Nicholson and Jackson in lending microscopes for this evening, and I trust you will all avail yourselves of the opportunity of verifying Mr. Pierce's observations on the genitalia. It may be of interest to mention that Aurivillius in his new work on the Scandinavian lepidoptera (*Nordens Fjärilar*, 1891) also differentiates *ferrugata* and *unidentaria* in this way.



C. unidentaria. C. ferrugaria.

My attention has also been called to one other structural difference, and that is in the matter of scale structure, which has been so zealously and with such interesting results taken in hand by Dr. W. S. Riding. He has rendered me most willing assistance in examining specimens and tabulating the results as regards the proportion of scales with different numbers of teeth. Without going very fully into details, the general result of investigations along these lines, by Dr. Riding and Messrs. A. U. Battley and A. Bacot, seems to be that however much the scale structure of individuals of a species may vary *inter se*, yet *ferrugaria*, Haw. has always a considerably larger number of many-toothed scales than *unidentaria*. To sum up, *ferrugaria* gave 43 per cent. of scales with 2, 3 or 4 teeth, and 57 per cent. with 5, 6 or 7; while in *unidentaria* 82·6 per cent. had but 2, 3 or 4 teeth, only 17·4 per cent. having 5 or 6, the percentage of 6-toothed, indeed, being but ·2. I shall hope to pursue this subject further at some future time, as I have already some very interesting notes and observations from the gentlemen whom I have mentioned. But I introduced the subject here in order to throw a little additional light on the specific distinctness of the two insects, and need only add that a purple variety of *unidentaria* examined by Dr. Riding agreed with the black forms.

(*To be continued*).

The Entomologist's Record
AND
JOURNAL OF VARIATION.

No. 5. Vol. V. May 15th, 1894.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 92).

Chap. II.

THE OVUM OR EGG.

1. On the external structure of the egg.—The egg of a lepidopterous insect consists of an outside shell, enclosing protoplasm which is at first homogeneous. The outside shell, which forms a thin pellicle, is usually divisible into a base, walls and an apex, the latter being termed the "micropyle." By its base, which is usually flat and devoid of characteristic markings, the egg is attached to the surface of the food-plant or other object on which it is deposited by the parent. The walls are generally sculptured in some form or other, although they are sometimes quite smooth. The micropyle, which is situated at the summit of the egg, is composed of delicate microscopic canals; these vary in number but there are rarely less than four or more than six; they radiate from a small depression in the centre of the summit and round this depression is a rosette or circle of tiny cells, which are usually of great delicacy. The micropyle is always excessively minute; in some eggs, even when viewed under a powerful lens, no alteration of the ordinary outline is caused by it; in others, however, where it is more depressed it is more readily distinguished. It is through the canals of the micropyle that the sperm-cell of the male passes to fertilise the egg.

The number of longitudinal ribs running from the base to the micropyle varies; in the *Vanessidi* there may be as few as eight, whilst among the *Rhodoceridi*, in the genus *Eurema*, there are, according to Scudder, from thirty to forty. The space between the ribs is broken up into fine reticulations which are due to the existence of transverse ribs of a much more delicate nature than the longitudinal ones. These latter, however, vary considerably, sometimes being coarse and at others very delicate, sometimes so delicate indeed, that the surface of the egg appears smooth until it is examined through a lens of high magnifying

power; the transverse ribs show a similar variation. The variation in the elevation or compression of the ribs is another striking character.

Viewed in cross-section, the egg usually appears to be circular, but sometimes the prominence of the ribs gives it a polyhedral appearance: Doherty says that in the Lycænid genus *Poritia*, it is hexahedral. In shape eggs vary a good deal; those of butterflies are classified by Scudder as "barrel-shaped, globular, hemispherical and tiarate." There is a general similarity of shape among those of each of the main divisions, although this rule is not without notable exceptions. The egg of the Noctuæ is usually of a hemispherical shape, somewhat flattened at the base; but that of *Xanthia* has raised ribs rising above the central point or apex and curving down thereto and it is not unlike, in a general way, the egg of a *Vanessa*. The egg of the Geometræ is usually oval or ovoid, but assumes the form of a rather square-based parallelopiped in *Ennomos* (*Eugonia*); the eggs of *Brephos*, *Alucita* and *Thyatyra* also have the usual Geometrid shape. The egg of the Tortrices has the appearance of a flat scale, but so has that of *Limacodes testudo* and of many Pyralides and other Micros. These examples are sufficient to show that although some general forms hold fairly well, yet that there are striking exceptions.

The primeval egg was probably ovoid, colourless and transparent and with no sculpturing on the cell wall. This would soon undergo modifications in many directions under need of protection and concealment, and it is possible under these conditions that one may find isolated examples of almost any form in any of the families, although the simplest form of egg must generally be found in the lowest families, and no highly-developed structure can occur except among the most highly elaborated families.

Among the Rhopalocera, the eggs of the various large sub-families are very characteristic; as, for example, the globular egg of the *Papilioninae*, the nine-pin or spindle-shaped one of the *Pierinae*, the hemispherical one of the *Pamphilidi* and the echinus-like one of the *Lycaeninae*. It is also noteworthy that the egg of the *Parnassidi* is of a somewhat tiarate shape. Superficially, the globular eggs of the *Satyrinae* are not very unlike those of some *Papilioninae*; and one cannot but be struck with the general resemblance between those of certain *Nymphalidae* and those of the *Pierinae*; the former indeed appear to form a rough connecting link between those of the *Papilioninae* and *Satyrinae* on the one hand and the very tall eggs of the *Pierinae* on the other. This would appear to indicate a much more intimate relationship between the *Pierinae* and the *Nymphalinae* than has hitherto been admitted by systematists. Speaking of *Heodes*, a Lycænid genus, Scudder says:—"The base of the egg is broadened to such an extent, that it is only by sufferance that it can be classed as a tiarate egg; it is rather demi-echinoid."

The egg-shell appears to vary a good deal in thickness, but this is probably due in part to the thickness of the ridges and ribs with which it is covered. It is thinnest in *Vanessa*; delicate in *Nemeobius*, in the *Pierinae* and in some genera of the *Satyrinae*; whilst in *Lycaena* and in the *Pamphilidi* it is particularly tough and opaque.

It may be generally assumed that the eggs of closely allied species are very much alike both in shape and markings. A striking illustration of this is furnished by *Vanessa polychloros* and *V. urticae*, the eggs of

which are almost identical in shape. In Sepp's great work (*Nederlandsche Insekten*), the illustrations in which are, as a rule, remarkably good, an egg is erroneously figured as that of the former species which certainly does not belong to it. This figure has been handed down from generation to generation by naturalists, as affording a striking example of the difference which may exist between the eggs of otherwise closely allied species; Newman (*British Butterflies*, p. 8,) grows quite eloquent over a difference which he certainly had never observed, and in Dale's *British Butterflies*, one of the latest systematic works published in this country, the error is still perpetuated, although it had been shown to be an error years before, both in this country (*E. M. M.*, vol. viii., p. 52) and in America (*Psyche*, vol. v., p. 152). Mr. Dale thus writes (*Brit. Butt.*, p. xxxi); "One of the most curious and striking facts is the extreme difference in the eggs of some species which, in the perfect state, closely resemble each other. Thus, the egg of the large Tortoise-shell is pear-shaped and smooth, whilst that of the small Tortoise-shell is oblong, with eight very conspicuous ribs. The characters of each egg are, however, so constant in each species of butterfly, that anyone who has paid attention to the subject, can immediately say to what butterfly any particular egg belongs." This passage, although there are no marks to show that such is the case, is copied verbatim from Newman; it is found in the Introduction to Mr. Dale's work, which did not appear until the work itself was completed, and the curious fact is, that in the body of the work (p. 166), Mr. Dale had already given a first-class description of the real egg of *V. polychloros*, which he evidently copied from Buckler but had entirely forgotten by the time he came to pen his Introduction.

The intimate resemblance between the eggs of allied species belonging to the same genus, while they differ widely from those of species belonging to neighbouring genera, has suggested the use of this character for purposes of classification. Mr. Doherty (*Journal of the Asiatic Society of Bengal*, 1889), has divided the *Lycaenidae* as follows:—

1. *Aphnaeus* group.—Egg large, tubercular, indentations obscurely hexagonal.
2. *Loxura* group.—Egg similar, but not tubercular.
3. *Thecla* group.—Egg small, tubercular, indentations sharply cut, usually trigonal.
4. —*Arhopala* group.—Egg small, spiny, indentations sharply cut, tetragonal.

Coremia Ferrugaria, Haw. and C. Unidentaria, Haw.*

By LOUIS B. PROUT, F.E.S.

(*Continued from page* 112).

Synonymy – Since then, we have two perfectly distinct species to deal with, the next question which arises is the very difficult one of their synonymy. When I tell you with regard to the two red forms which cause all our trouble, that in Germany and America, our red *unidentaria* is known as *ferrugata*, and in Scandinavia as var. (or ab.)

* Abstract of paper read before City of London Entomological and Natural History Society, March 20th, 1894.

corculata, while in Germany, our *ferrugaria* passes as *spadicearia*, I think some at least of you will agree with me, that it is time something was done towards bringing about a common understanding; for, however little value we may attach to the "law of priority," surely nothing but confusion can arise, if we go on applying German notices of *ferrugata* to our British species of that name, when they really belong to our red *unidentaria*.

We owe the name *ferrugata*, to Clerck, who in his *Icones*, 1759, (pl. 6, fig. 14), figures one of our two species under that appellation; Linnæus following with a brief diagnosis in the *Fauna Suecica*, Ed. Alt., 1761 (p. 338, No. 1292); "alis purpurascentibus; strigis tribus albidis, postice cinereis; macula didyma fusca." The next name in the field was Hufnagel's *corculata* (*Berl. Mag.*, 1769, p. 616, No. 94); there can be no doubt that this belongs to *unidentaria*, Haw., rather than to *ferrugaria*, Haw., for though Hufnagel describes it as "reddish-brown," yet Rottemburg distinctly says that the transverse band is "broad, and almost entirely black."

In 1776, the *Vienna Catalogue* gave us *spadicearia*, "the ochre-brownish red-striped geometer," which Fabricius, Illiger, and Treitschke, take for a variety of *ferrugaria*, W. V. Borkhausen's *spadicearia* (*Eur. Schmet.*, V. 190, 1794), is no doubt identical with this, and is certainly the extreme form of *ferrugaria*, Haw., of which I have examples from Dr. Staudinger, at the top of my second drawer.

Esper figures *ferrugaria*, Haw. (*Die Schmett. in Abbild.*, pl. 40, fig. 5) under the name of *alchemillaria*, which must be due to some misunderstanding, for he quotes De Geer, whose *alchemillata* is quite another species, namely *didymata*, *L.*

Next Haworth (*Lep. Brit.* II., p. 308), not knowing Hufnagel's name *corculata*, rechristens the black species *unidentaria*; he had apparently seen red forms of that species, but took them for varieties of *ferrugaria*, for he seems to describe such under his *ferrugaria* var. *β*.

But the most difficult question still remains. Which of the red species did Clerck figure as *ferrugata*? I have spent a great deal of time in studying his figure, and yet I am afraid to express any positive opinion on the question. The figure is very poor, with whitish ground colour, pale red central band traversed with distinct lines, and large didymated spot, coalescing in heart form. On account of the colour of the band and the distinctness of the lines, Zeller, Guenée, and the Scandinavian lepidopterists have accepted it as representing *spadicearia*, Bkh. (= *ferrugaria*, Haw.), and Prof. Anrivillius (to whose courtesy I am indebted for some Swedish specimens sent to assist in clearing up the synonymy) sent me this species as "the true *ferrugata*, Cl." On the other hand, the whitish outer area in Clerck's figure is quite irreconcilable with any representative of this species I have ever seen, but agrees well with my "var. *corculata*" from Sweden, and with the Linnæan type of "*ferrugata*;" both these latter are certainly of the species known here as *unidentaria*. On the whole I am rather inclined to believe that the entire absence of an outer ochreous band shows that Clerck had red *unidentaria* before him, and that therefore, as Freyer, Herrich-Schäffer, and probably Staudinger (all having access to Clerck's work) admit, the name *ferrugata* rightly belongs to the darker-banded of the two species, and that the *ferrugaria* of Haworth should be called *spadicearia*, W.V. or *spadicearia*, Bkh.

But, such conflicting views obtaining about the identity of

ferrugata, Cl., it seems that the synonymy can only be cleared up by ignoring it altogether, and either accepting the *ferrugata* of the *Fauna Suecica*, which is universally acknowledged to be the darker-banded species, as the type, or by calling that species *coreulata*, Hfn. and adopting the *spadicearia* of the *Vienna Catalogue* as the name of the lighter red species (*ferrugaria*, Haw.).

I have drawn out the following synonymic table, bracketing the name *ferrugata*, Cl. as doubtful.

1. (*Ferrugata*, ? Cl., 6. 14; Linn., *F. S.*, 1292).
   Coreulata, Hfn., 94; *Naturf.*, xi., p. 87.
   Linariata, Bkh., V., (*nec.* Fb.), p. 381.
   Ferrugata (*aria*)? Hb., 285; H.-S.; Frr.; Bdv.; Gn.; Packard (and German authors generally).

1a. *Ab. unidentaria*, Haw., *Lep. Brit.*, II., p. 308.

2. *Spadicearia* (W.V., Fam. M., No. 12) Bkh., V., p. 389; H.-S.; Frr.
   Alchemillaria, Esp., 40,5 (& 6 ?).
   Ferrugata (*aria*) Hb., 460; Haw.; Wd.; Lampa; Aurivillius (? Cl.).
   Freyeraria, Stgr., 1861. *Cat.*, No. 524.

In order to complete our studies of the nomenclature of the two species, it may be well to say that there can be no doubt that their generic name should be *Ochyria*, Hb.—already resuscitated by Packard in his *Monograph of the Geometrid Moths of the United States*. In Staudinger's *Catalogue* the group forms part of the great genus, *Cidaria*, Tr. according to Lederer's classification.

Differentiation—Mr. C. Fenn, with a considerable portion of my series of purple forms of *unidentaria* before him, as well as his own material, drew me up an admirable comparative table of the two, which I cannot do better than give *in extenso*.

" Unidentaria. Black.	Ferrugaria. Red.
(*None* of the *characters of distinction* seem absolute.)	
FORE-WING.	
A.—Median band black.	A.—Median band red.
B.—Median band followed by a generally interrupted band or a band becoming obsolete below the middle.	B.—Median band followed by an uninterrupted band continued in full intensity to the inner margin.
BB.—The second band of an ochreous colour edged with grey and divided by a similar grey line; the space between the first and second lines often paler, and sometimes with a few scattered white scales.	BB.—The second band similar to *unidentaria*, but the space between the first and second lines often white or whitish.
C.—The two submarginal spots very conspicuous, black, distinctly margined on their outer edges with whitish or the pale subterminal line.	C.—The two submarginal spots black or blackish but not very conspicuous, faintly margined on their outer edges by the paler subterminal line.

D.—A series of about four black dashes follows the submarginal spots on the extreme edge of the wing.	D.—A row of black dots follows the submarginal spots on the extreme edge of the wing.
E.—A distinct vandyke almost invariably occurs in the front edge of the median band on the subcostal nervure.	E.—An indistinct vandyke sometimes occurs in the front edge of the median band on the subcostal nervure.
HIND-WING.	
F.—The band following the median (B) is rarely continued, and never conspicuously so at its hinder edge.	F.—The band following the median (B) is almost invariably continued distinctly, more especially at its hinder edge.
G.—The lower part of the wing paler than the upper.	G.—The upper part of the wing paler than the lower.
H.—No dark grey shade below the middle of the wing.	H.—A dark grey shade below the pale band.
I.—Four grey threads start from the inner margin but gradually become obsolete; the edge of the wing where they arise is clouded with dark grey and contains four black spots.	I.—Four grey threads above the pale band continued across the wing in equal intensity, commencing on the inner margin as black spots.
UNDER SIDE.	
K.—An apical dark cloud is sometimes present on fore-wing, but no cloud or shade on hind-wing.	K.—A dark apical cloud is always present on fore-wing, and a distinct grey cloud is conspicuous at the outer margin of hind-wing.

GENERAL OBSERVATIONS.

Except that *unidentaria* is slightly the larger insect, I see no structural differences except in the genitalia as already recorded. All the markings are prone to considerable variation, especially the size and shape of the median band, which is often bisected by a broad paler shade. The best character for distinction appears to be the dark shade on the hind wing, as it seems pretty constant both on the upper and under sides (H. and K.)."

I have very little to add to this; I would remark that the median band of *ferrugaria*, Haw., is never black, though sometimes very dull brownish or greyish-red; that a stronger point might perhaps be made of the paler outer area of the fore wings in *unidentaria*; that the fringes of *ferrugaria* are much more distinctly spotted than those of *unidentaria*; that the contour of the outer margin of the central fascia, and of the corresponding line on the hind wings, though very prone to vary, is nearly always distinguishable in the two species; *ferrugaria* seeming never to be so deeply bent inwards below the middle, or the band so attenuated on the inner margin, as is general in *unidentaria*; and that

the dark mark on the underside of *unidentaria*, near the base of the costa, generally so conspicuous, is either weak or wanting in *ferrugaria*. It is also tolerably certain that no form of *unidentaria* corresponds at all to the extreme striated forms of *ferrugaria*, indicated by Staudinger as *ab. spadicearia* ("fascia media in strigis dissoluta") or by Haworth as *salicaria* ("obsolete strigatæ, nec fasciatæ").

VARIATION.—Both species are extremely variable, and it would not be difficult to occupy a whole paper with studies of their variation. A few general observations under this head seem worthy of being first brought into prominence:—

1.—As is usual in closely-allied species, the variation is largely on parallel lines.

2.—The variation of *ferrugaria*, Haw., is largely geographical; that of *unidentaria*, much less so.

3.—On the other hand, the influence of heredity, exceedingly strong in both species, is shown even more strongly in *unidentaria*; so that while the red and black forms exist together in most localities, yet the black forms hardly ever throw red in their progeny.

I will next deal, as well as time permits, with the variation of each species separately.

As I have already shown under the head of synonymy, I regard the red forms as furnishing the type of what we call *unidentaria*. Avoiding the doubtful name *ferrugata*, we may call this type *corculata* Hfn., when *unidentaria* Haw., from its general constancy, is well worthy to be dealt with as ab. *unidentaria*, in which light, rather than as a distinct species, Dr. Staudinger is now inclined to regard it. Packard, the American entomologist, speaks of it as "a good example of melanism."

Hufnagel's description of *corculata*, is as follows:—"Reddish-brown, on the outer margin a black C, at the base yellowish-grey." This of course is so vague as to be practically useless, but "reddish-brown" agrees well enough with some of the "purple" forms, to allow of our uniting this name with *ferrugata*, Linn., and leaving the well-known name of *unidentaria*, to the black forms. The American red specimens (*ferrugata*, Packard), certainly belong to this species, and seem to have the central fascia generally narrower than is common in European forms; my warmest thanks are due to Mr. H. F. Wickham, of Iowa City, for my examples, which he took great trouble to procure, at very short notice.

There is a somewhat rare variety of ab. *unidentaria*, unknown to Haworth, which deserves notice, namely the var. *coarctata*, Warren. This has the central fascia very much attenuated throughout, sometimes reduced to hardly more than a thread; there are two in the British Museum collection, Captain Robertson has one, Mr. Fenn another, Mr. Machin a very beautiful example, and two others have recently been exhibited at our London Societies.

Borkhausen's *spadicearia* was described from a single specimen, and that apparently a somewhat rare form of *spadicearia*, W. V. We must therefore take the type of *spadicearia* (= *ferrugaria*, Haw.), to be (as Borkhausen describes it) a form with a mingled ochre and pale brown ground colour, a broad brownish-red band lighter in the middle, mixed with whitish and traversed with brown lines, the discoidal spot distinct. As it appears to be the earliest name not otherwise pre-

occupied for *ferrugaria*, Haw., it must now stand for the type of the species, and the commoner forms will be the varieties.

Forms with the band more entire, and frequently of brighter colour, such as we get so commonly in the South of England, agree rather with *ferrugaria*, Haw.; his diagnosis is: "alis cinereis fascia parva basi, aliaque lata repanda medio rufescentibus; punctoque postico didymo fusco." It will be noticed that he does not mention any conspicuous ochreous shade in the ground colour, and this agrees fairly well with some of our southern forms, but it has resulted in leading Continental entomologists, *e.g.*, Guenée and Staudinger, to connect his *ferrugaria* with theirs. This is certainly an error; Haworth's type, which I have seen, is an ordinary English form of the species we are now considering, the *spadicearia* of Germany.

Confixaria, H.-S. (334), appears to be, as Bohatsch reports (*Wien. Ent. Zeit.*, iv., p. 177), an aberration of this species "in which the many wavy lines have vanished, so that of the pattern of the fore wings the red-brown central area alone remains; the outer dentated line, with the two blackish spots in the upper third, is also indicated, etc." The band is also reduced in width, and the variation is in some degree parallel to *unidentaria* var. *coarctata*.

Many interesting casual varieties of this species have come under my notice, on which I would fain have commented had time permitted; but I must content myself with summing up its general topomorphic variation in the British Isles. The dark-banded, non-striated forms, and those with but little ochreous in the ground colour and on the border of the hind wings, (in brief, those which bear so great superficial resemblance to "red *unidentaria*"), seem to be confined to the South of England. The Yorkshire moorland form, of which Mr. Porritt very kindly sent his bred series for my inspection, differs from our ordinary southern forms in

1.—The uniform brightness of the ochreous colouring.

2.—A general tendency to an increase of its quantity, *e.g.*, in the marginal area, and on the under surface.

3.—The well-marked hind wings, with more or less ochreous-tinted outer band.

4.—A general difference in the tone of the colouring; the central band never very dark nor distinctly purplish, but rather inclining to ferruginous.

Scotch forms are similar in their general characters to the Yorkshire forms, though with an increasing tendency towards the genuine "*spadicearia*" type—band paler than in southern examples, sometimes almost unicolorous with the ground colour, and often more or less "in strigis dissoluta." Also, as Mr. Reid, of Pitcaple, writes me:—"The band is a little narrower, and, if I may use the term, the whole insect has a looser appearance. I mean the scales are not so firmly attached as in the southern forms, hence it has not such a sleek appearance," &c. The Rannoch form is known among some collectors as var. *salicaria*, Haw., and probably his type of that supposed "species" may have been an *extreme* striated form hereof; I have failed in my endeavours to trace either Haworth's type specimen or the one from Bentley's collection figured by Wood (555), which seems to be a very obscure, nearly unicolorous form.

The Irish forms of this species are very interesting; I am indebted

to Mr. M. Fitz-Gibbon for the few which I possess; also to Mr. W. F. de V. Kane for interesting information on the distribution, &c., and for opportunity of inspecting some of his series. These strongly striated forms, sometimes with remarkably bright ochreous outer area, are, he tells me, abundant in certain localities in Co. Tyrone, Sligo, Westmeath and Monaghan. The variegated appearance due to striation, &c., seems to have become fixed in parts of Ireland as forming a local race, whereas in England it is generally only aberrational.

Geographical distribution.—I have been somewhat surprised to find that the range of our common *ferrugaria*, Haw., appears to be much more restricted than that of its ally. I have no certain information of its occurrence beyond the confines of Europe, though it is very probable that it may extend into Siberia. It is common in Scandinavia; fairly so in Germany and Austria, though generally more local than *unidentaria*; probably common throughout France; and Eversmann, in his *Fauna Volgo-Uralensis*, describes varieties which must belong to this species. Staudinger's "Europe (except Andalusia, Sardinia and Greece); Bithynia; Altai; Amur," is entirely unreliable, as he treats all the red forms as one species.

Unidentaria, as we call it, has, on the other hand, a very wide range throughout the Palæarctic and Nearctic regions; the range of the black aberration is probably co-extensive with that of the red form. We may perhaps safely give this species the same list of localities that Staudinger has given to his *ferrugata*, with the addition of a great part of North America, where, as in Europe, it is dimorphic in respect of colouring, so that American entomologists have supposed that they obtain both the *ferrugaria* and *unidentaria* of Haworth. There is some ground for believing the range of the species is also extended southward to Java. Its general representative in Australasia is *cymaria*, Gn., which comes so near some forms of *unidentaria* that it is just possible it may prove not to be specifically distinct.

In the British Isles this species is less abundant and more local than *ferrugaria*, Haw., and it seems that our climatic conditions are more than ordinarily favourable to the production of the black race. The red form, however, is not infrequent, though a good deal overlooked. I have seen examples from the North London district, Deal, Worthing, Isle of Wight, Weymouth, Exeter, Swansea, Rugby, Wicken, York and from Co. Tyrone in Ireland. Concerning the range of the black form, it will be simplest to enumerate the districts where it does *not* occur or is not common. Mr. Bankes reports that he has met with but very few in his district (Isle of Purbeck, &c.); Mr. Harwood that it "does not seem generally common here" (Colchester); Mr. Porritt that it "does not occur in the Huddersfield district at all so far as I know"; Mr. Reid that he has never seen the insect alive and thinks, "if it occurs in the North of Scotland, it must be either very local or very rare"; and Mr. de V. Kane that his opinion is "that *unidentaria* is much more restricted in Ireland than *ferrugaria*."

Habits.—Both species are generally double-brooded, but they (or at least *ferrugaria*, Haw.) are probably normally single-brooded in the North. Both nearly always hybernate in the pupal state, but Mr. South had a curious experience with a brood of *unidentaria* in 1890–91, when four laggards of a brood from August ova hybernated as larvæ (*Ent.*, xxiv., pp. 172–3).

In many localities the two species occur freely together, but both Mr. Fletcher and Mr. Bankes have independently observed that *unidentaria* seems to have a preference for somewhat moist localities. Mr. Harrison of Barnsley informs me that, while both occur together in the Doncaster district on wooded and low-lying limestone ground, on the "cold northern moorland about ten miles away, with scarcely anything but fir trees," *ferrugata* occurs alone and plentifully.

Dr. Riding remarks that *ferrugata* (as we know it here) is more frequently disturbed by the beating-stick than *unidentaria*, but that *unidentaria* comes the more frequently to light; also that the latter continues later into the autumn.

Early Stages.—Mr. Fenn, whose experience in describing larvæ, &c. is too well known to require comment, has most kindly given me permission to utilize his careful descriptions, made in 1875, which I present exactly as he gave them to me:—

Ferrugaria (*English Form*).—Description made 16th June, 1875, Eltham, Kent:—

Larva.—Elongate, slightly attenuated anteriorly: head rounded, face shining. Yellowish brown, dull ochreous brown or greenish grey, mottled and shaded with dark grey on the middle segments. A series of large pale dorsal diamonds, each containing a conspicuous black spot from 5th to 10th segments; on the remaining segments a dark grey dorsal line. The anterior sides of each of these diamonds most strongly defined. Subdorsal line waved, distinct, paler than the ground colour, and a waved thread between it and the spiracles. Belly and sides below the spiracles prominently pale reddish ochreous. Spiracular line dark brown, sometimes absent. Usual spots whitish, spiracles black. A paler ventral band, margined on each side with a grey band, between which and the spiracles is a row of black spots or dots. Head dull whitish, the outside of each lobe black, and two grey bars down the face.

Pupa.—Highly polished, moderately stout. Anal extremity with a short strong spike. Bright red brown, wing cases and dorsal shade darker brown.

Unidentaria (English Form).—Description 25th September, 1875, Eltham, Kent:—

Larva.—Elongate, slightly attenuated anteriorly; head rounded, face shining. Dark blackish brown on the back and sides; the last four segments paler, often whitish. An orange or reddish ochreous dorsal triangle outlined with black, and often filled up with dark brown on each segment from the 5th to the 9th (or 10th), the apex in front, and enclosing a conspicuous black spot. On the other segments a blackish ill-defined and interrupted dorsal band. Subdorsal line pale ochreous, broad from the 10th to the 13th segments., threadlike on the remainder. Spiracles black; below them the sides are very prominently reddish ochreous and paler. Between the subdorsal line and the spiracles is a pale waved thread. Belly brownish, with a broad, pale, ochreous central band enclosing a brown thread and edged with two brown threads, between which and the spiracles a row of black dots is usually situated, or a broad, blackish, much-interrupted band. Head pale brown, dusted with darker, and with a broad, black dash on the outside of each lobe. A conspicuous black dash in front of the first pair of prolegs.

Pupa.—Highly polished, moderately stout. Anal extremity with a

short strong spike. Dark red brown, wing cases and dorsal shade ill-defined, often not indicated by colour.

Ferrugaria var. *salicaria* (Scotch form from Rannoch), described 19th July, 1875. This form is, I believe, single-brooded.

Larva.—Elongate (stouter than the English form), slightly attenuated anteriorly: head rounded, face shining, spots raised. Ochreous with a pink tinge, mottled and shaded with grey on the anterior segments A series of large pale dorsal diamonds, each containing a conspicuous black spot, from 5th to 10th segments; on the remaining segments is often a dark grey dorsal line. The anterior half of each of these diamonds is outlined with black and filled up with pinkish, thus forming a triangle with blunt apex, having a black spot below the base. Sub-dorsal and a line below it waved, thread-like, of a paler shade than the ground colour. Spiracular line dark grey, spiracles black. Belly and sides below the spiracles pale pinkish-ochreous, sometimes ochreous or reddish. A pale ventral band, edged with a brown shade, containing two black lines, and with a row of prominent marginal black spots, one on each segment, from the 4th to the 10th.

Pupa.—Highly polished, moderately stout. Anal extremity with a short strong spike. Bright red brown, wing cases and dorsal shade darker brown.

"From these descriptions you will observe that there is really more difference between the form *salicaria* and *ferrugaria* than between the latter and *unidentaria*. In the one, mention is made of dorsal diamonds and in the other, of triangles, but the variety supplies the connecting link and explains the reason . . . . . The three larvæ are practically identical, the exaggeration or obliteration of the markings of the one would make the description of the other apply. Here again we have the colour difficulty; they are (I allude to our English species) so excessively variable that mere colour is no guide. Of the Scotch form I had only some eighteen or twenty larvæ and they did not vary much, but this is too small a number on which to base an opinion.

"The pupæ again seem the same, allowing for the colour question" (C. Fenn. *in litt.*, 4th March, 1893).

The larvæ of both species are very general feeders; as already communicated to some members of this Society, I generally breed mine when at home on the common garden marigold.

In conclusion, I have only to tender my best thanks collectively to the very many entomologists (too numerous to mention individually) who have freely given me all the information and assistance in their power in these, to me, most interesting investigations and studies.

AMONG THE ANCIENTS.

By J. W. TUTT, F.E.S.

I had often wondered when it was that insects first began to have fancy values put on them simply because they were British. In my own mind I had settled that it was not till after the days of Haworth, and might probably date from the time when Curtis and Stephens gave such a mighty lift to British entomology. That there were dealers in insects long before this time I did not imagine, and it was with something of a shock that I found Haworth apologising for a blunder which

he had made because of a dealer supplying him with a specimen compounded of the head of one species stuck on to the body of another. Recently however I have discovered that the dealer fraternity and fancy prices for British insects existed at least twenty years earlier than Haworth's time. Through the kindness of Mr. Davies of Kington I have had an opportunity of examining *A Catalogue of the Portland Museum Sale*, which is dated 1786, and in which the prices realised are attached to every lot; possibly it was the auctioneer's catalogue.

Before proceeding to give some account of this interesting relic and its contents, it may be not unprofitable to make an attempt to realise the condition of things entomological in this said year of grace, 1786. On the continent the new binomial system of nomenclature invented by Linnæus had been generally adopted, and his classification was almost universally followed. The *Vienna Catalogue* was little known; it was not till Fabricius called the attention of entomologists to it in his *Mantissa* (1787) that it began to emerge from obscurity, and it was not till 1793 that Hübner began the work (*Sammlung europäischer Schmetterlinge*) which elevated it into that position of supreme authority as regards nomenclature which it for long occupied. Fabricius had produced *Systema Entomologiae, Genera Insectorum* and *Species Insectorum*, and by these, and still more by his personal influence exerted in his numerous wanderings, had come to be a power in the entomological world. The main bulk of those parts of Esper's great work, which relate to Rhopalocera, Sphinges, Bombyces and Noctuæ, had been given to the world, and four volumes of Cramer's *Papillons Exotiques* were published. Probably the works which were in most general use at that time, in addition to the 12th edition of the *Systema Naturae*, were those of De Geer and Geoffroi and the published volumes, five in number, of *Papillons d' Europe* which generally go by the names of Ernst and Engramelle. Hübner was just coming into note, the first part of his *Beiträge* having made its appearance in the year of which we are speaking. In our own country Berkenhout had introduced the Linnæan nomenclature in his *Outlines*, which was probably the "Manual" of the entomologists of the day, and Harris and Wilkes had brought out second editions of their works in which the new names were more or less accurately attached to indigenous species. Barbut, five years earlier, had illustrated the Linnæan genera of the class Insecta by figures of a representative species of each, drawn from nature. Drury's magnificent work on exotic insects was in the hands of those who could afford to obtain it. The Linnæan cabinet had probably not yet reached this country, but negotiations were rapidly approaching completion, if not already completed, for its transfer here. Fabricius had visited England once at least, and was in communication with some of our entomologists, specially with Sir Joseph Banks. From the *Species Insectorum* we learn that many notable collections existed in this country. Fabricius mentions those of Banks, Hunter, Drury and Blomfield in London; of Lee at Hammersmith, and of Blackburn at Oxford. The patron saint of Entomology was undoubtedly Sir Joseph Banks, who had been elected President of the Royal Society eight years previously, and who retained that post till his death in 1820. To his industry in acquiring continental literature and to his generosity in making arrangements for the transfer of his library to the nation after his death, the students of to-day are greatly indebted, for most of the copies of the works of "the Ancients" which are now in the British Museum are from his library.

But *revenons à nos moutons.* The *Catalogue* itself is a fine bit of work with an engraved Frontispiece, and cost each would-be buyer five shillings. The sale occupied 39 days (one day beyond the time estimated) and the objects sold realised some £11,523. Insects formed but a small part of the collection, but it is they alone that interest us here.

At the outset I find a note in the book, evidently written at the time of the sale, to this effect:—"The name of Humphry occurs so often in this *Catalogue* and, as it is well known that he bought almost all on commission for others, to save time, as well as hereafter to fix the proper names of those who(m) he bought for, the initial *H.* only is added. J. L." These initials are those of Jno. Laskoy, Crediton, the original owner of the *Catalogue.*

It would appear that, besides Humphry, men named Dennis, Allanson, Bailey, Francillon, Money, Hunter, Forster, Roper, Seaton, Marsham, Tennant and Pownall purchased the greater part of the Exotics in the collection, but with the exception of Drury, Francillon and Marsham, no one had a chance against Humphry in buying the British insects. Many lots however contained British and Exotic insects mixed, and in some cases no attempt to subdivide them is apparent.

As samples of the prices realised the following are interesting:—"Lot 268. Eight species of very rare Phalenæ, viz., *gonostigma, curtula, salicis, coryli, monacha, atra,* L. and 2 undescribed," £1 3s. "Lot 275. Five rare species of Phalenæ, viz., *absinthii, alni, gamma, circumflexa,* L., and a nondescript," £1 10s. "Lot 277. Eighteen ditto, such as *dromedarius, palpina, leporina, camelina,* &c. all labelled," £2 1s. "Lot 280. Ten rare species of Phalenæ, viz., *fulvago, occulta,* L., &c." £1 12s. "Lot 282. Twenty species of small Phalenæ, chiefly *Alucitae,*" £1 10s. "Lot 283. Ten rare species of Phalenæ, viz., *pisi, chi, gothica, satellitia, triplacia,* &c." £1 13s. "Lot 287. Various lepidoptera, *many of them very rare,* such as *Phalena præcox,* L., of which there are no less than 12 pairs," £3 13s. 6d. With the exception of this last Lot, which was bought by Drury, all the above Lots were bought by Humphry. This was in the Third day's sale. In the Sixth day's sale, a mixed lot, chiefly without names, were bought by Humphry. The important items appear to have been: "Lot 585. Nineteen specimens of English Phalenæ, among which is a pair of *præcox,* L." £2 5s. "Lot 588. Six species of rare English Papiliones, viz., *antiopa, iris, arion,* L., &c. all fine," £1 13s. "Lot 590. Four species of English Phalenæ, viz., *tremula, dromedarius, curtula* and *ziczac,*" £2 18s. "Lot 595. Four species of English Phalenæ, viz., *fagi,* or the lobster, *lanestris,* Spotted Ermine of Harris, &c." £2 3s. Among this, too, was "Lot 593. Fourteen beautiful Papiliones, viz., a pair of *daplidice,* sometimes found in England, *maja,* L. &c." 16s.; these *daplidice* therefore were not sold as British. All the important Lots in this day's sale also went to Humphry. In the Eighth day's sale there are none designated as British; many appear in fact without the slightest data. In the Tenth day's sale however we find a mixture of British and Exotic species. Lots 1020–1033 were all bought by Humphry. "Lot 1021. Nine rare species of English Phalenæ, among which are *falcataria, lacertinaria, defoliaria, pulveraria,* and others." £1. "Lot 1033. Twenty species of English Tineæ, all rare, among which are *carnella, raiella, clerckella,*" 11s. The Thirteenth day's sale contained:—"Lot 1271. Seventeen species of English Phalenæ, most of them rare, and some nondescript,"

£2 6s. "Lot 1272. Twelve *ditto*, some new, all rare," £2 7s. "Lot 1277. Seven species of rare British Phalenæ, among which are *leucomelas* and *pisi*," £1 1s. These again were all bought by Humphry. In the Fifteenth day's sale but little of importance is noticeable, except that *antiopa* and *lineata* figure among the Exotic sales, and that many of the lots consisted of a mixture of British and Exotic species. In the Eighteenth day's sale the same mixture occurs. In the Nineteenth day's sale we find among others: "Lot 1977. Eight rare species of British Papiliones, viz., *lathonia, iris, pruni, argiolus, rubi*, and 2 nondescript," £1 5s. "Lot 1990. Nineteen various species of rare English Phalenæ," £1 11s. "Lot 1995. Twelve curious and rare species of English Phalenæ, among which are *hepatica, myrtilli, miata, prunata*," £1 19s., all bought by Humphry; whilst on the same day "11 curious Exotic Sphinges," produced 3s. 6d., and "11 beautiful Exotic Papiliones," 5s. On the Twentieth day we find "Lot 2091. Seven rare species of English Phalenæ, among which are *tragopogonis, citrago, typica, lucipara* and *præcox*, L." £1 5s. "Lot 1092. Twenty-two curious and rare species of British Phalenæ, amongst which are *geoffrella, pomonella, conwayana*," £1, (both bought by Humphry) whilst "Two of *Phalæna fraxini*," without data, and "Two pairs of *Sphinx nerii*," ditto, were sold. The Thirtieth day's sale is a striking one as in the face of the prices realised both earlier and later; some of its lots must have been very doubtful. Thus we have "Lot 3171. Five species of very scarce British Papiliones, viz., two pair of *virgaureæ*, three *maturna*, one *hero*," &c., 3s. 6d., whilst for "Lot 3178. Eight species, including *falcataria, betularia, lacertinaria, vibicaria, amataria*, and *defoliaria*," 13s. "Lot 3180. Twelve beautiful and rare Tineæ, such as *arcuana, christianana*," £1 2s. "Lot 3182. A very fine pair of *Sphinx atropos*, and a new Sphinx related to *convolvuli*, lately discovered in Yorkshire," £2 4s. "Lot 3184. Eleven species of British Phalenæ, *ulmata, populata, bidentata*, &c." 18s. "Lot 3186, Three extremely curious and rare English Phalenæ, among which is that very uncommon one, *delphinii* or the Pease-blossom moth, *pinastri*, L. &c." £1 12s. "Lot 3187. Two very curious species, viz., *castrensis* or the scarce Lacky Moth, and *versicolor* or Glory of Kent," £1 3s. "Lot 3188. Four species of British Phalenæ, viz., *æsculi, batis*, etc." 14s. "Lot 3189. Three species of the larger British Phalenæ, viz., *sponsa, maura*, and 3 pairs of a new species related to *pronuba*," 14s. "Lot 3193. Various duplicates, including *præcox*," £1 11s. 6d. "Lot 3194. Twelve species of the larger British Phalenæ, *paronia, quercus, chrysitis, villica, nupta, plantaginis, rimula*," 16s. 6d. All these were bought by Humphry.

These are a few of the notes made on rapidly running through the Catalogue. The number of lepidoptera (both large and small) from America is remarkable, and although, generally speaking, British specimens are sold in separate lots from the Exotics, yet many are mixed, and after studying the Catalogue a short time, one need no longer wonder that British collections in the early part of the century contained large numbers of species which have since been proved to have no *locus standi* in the British fauna. If, as may be supposed from this, most of the earliest collections consisted of lepidoptera from many countries, it is no wonder that doubtful species were introduced when British collections began to be the rage. The Catalogue would certainly lead any student to understand that every American and most European

species mentioned by the old authors as British but which are now generally not accepted as such, were of undoubted foreign origin.

The second point that strikes one is the existence of professional dealers and buyers in these early days, but it would appear that such were rather curio dealers in general than dealers in lepidoptera in particular.

The third matter of interest is the difference existing even in these early times between the values of British and foreign insects. Rare indeed is it to find a "Lot" of the former valued at less than 10s., or a "Lot" of the latter at more. The fancy value for Britishers therefore dates back a long way, and it is evident that the gentlemen who now supply the gullible British public had predecessors in existence at least 110 years ago.

A fourth point on which the *Catalogue* throws an interesting light is the nomenclature in vogue at the time; this will be an instructive study to Anti-Staudingerists. Of the macro names given above, all but three are Linnæan; those three, *gonostigma*, *lineata*, and *ulmata*, are Fabrician. The following, which were again revived by Staudinger after an interval of disuse, were in use in this country in 1786: *fulvago* (= *cerago*) *falcataria*, *lacertinaria*, *prunata* (= *ribesiaria*), *pavonia*. On the other hand *aesculi* held the ground, and was not then known as *pyrina*.

RETROSPECTIONS AND FORECASTS.

By ALBERT J. HODGES.

(*Continued from page 70*).

As every advantage has its attendant drawbacks, so doubtless the distant Northern resident collectors will allow their practical monopoly of the many rare species and fine local forms to be a fitting compensation for the frequent absence of those opportunities of congenial society which would so shorten the weary return from many a successful expedition.

How different is the case with the equally rich but more accessible famous hunting grounds in the South and the Midlands; "sugaring" in the New Forest, when the "crimsons" are out, is almost as good an introduction to entomological circles as membership with one of the societies; certain of the "enclosures" with names too well known to need mention, are almost over-run during July with collectors, who meet one another season after season, with unvarying regularity, in pursuit of the graceful *sibylla* and the lordly *iris*, whilst the dank and gloomy Fen, formerly only mentioned with bated breath as a mystery not to be approached by the *dilettante* and frivolous collector of Macros only, is now studded in the mist and darkness with innumerable "lights, like gipsy camp-fires," each with the concomitant weird sheet, whilst the sound of voices, more or less cheerful as the sport waxes and wanes, is borne through the fast-falling darkness, and the most treasured Fenland species are fast becoming "household words" in every cabinet.

Whilst mourning the apparently inexplicable extinction in recent years of some typically Fen species, as *Laelia coenosa*, and of more distant years, *Noctua subrosea*, yet the eager pursuit of equally local species is being carried on with the same avidity, and it seems likely

already that we may have to add *Cidaria sagittata* to the same black list, although hope still lingers on and the pretty larva is searched for, season after season, with perseverance by amateur and dealer alike, upon its common food-plant, the meadow-rue (*Thalictrum flavum*), which is so abundant throughout the Fen.

In this connection, a fertile subject for discussion may be found in the gradually increasing rarity of some species of our Macro-lepidoptera, *e.g. Porthesia chrysorrhoea*, which within very recent years was generally recorded, but has been of late increasingly difficult to obtain, although occurring within the strictly Metropolitan area (*vide, Ent. Rec.*, Vol. I., p. 349, Vol. II., p. 140, *etc.*) and the series in many cabinets are either of a more or less ancient appearance or very incomplete. The somewhat allied species, *Ocneria dispar* is, of course, too well-known an instance of this to need comment, and the series of all of the younger collectors of the day are filled with in-bred specimens, which differ widely in appearance from the genuine old captured examples. The gradual extinction of these species of *Liparidae*, as with *L. coenosa* referred to above, bears quite a different aspect from the prospective destruction of other miscellaneous species through over-collecting to the point of extermination, by dealers and others, of which a case in point is the pretty little *Nola albulalis* of Chattenden fame, and were it not that the Folkestone local *Chortodes bondii* has been discovered in other spots along our Southern coast, towards Dorsetshire, it is to be feared that the day is not far distant when this species would have ceased to claim its place in our lists.

Let us turn from these forebodings to the more congenial anticipations of the season which is so rapidly opening, and do not let us forget that "records" for early appearance of many of our May and June species are being broken season after season, a result possibly due to more energetic and scientific observation, as well as to the grand seasons with which we are being favoured. Now is the time for the lepidopterist whilst held back from the active pursuit of his favourite hobby by those numerous ties and duties (which doubtless act as a most useful curb to the too great devotion of many of us), to cherish that dormant enthusiasm which will surge within until opportunity gives the signal for the inception of some arduous expedition to more or less distant and inaccessible spots, where can be accomplished the wild desire, "To scorn delights and live laborious days." Had Milton ever foreseen the devoted perseverance of the average collector, he would surely have immortalized Lycidas with a lamp and net and for "days" have substituted "nights," but we will forbear, and for a few moments will endeavour to picture the keen delights of a "good night" in early summer on the Fens.

The setting sun is fast disappearing behind a bank of clouds, which impelled slowly upwards by the gentle westerly breeze, meeting us as we leave the village to wend our way laden with the implements for our night's work, gradually overspread the whole sky and confirm our anticipations of that dark warm night in which Fen-workers so delight. As we hasten down the "drove" to our favourite spot we exchange the cheeriest of greetings with a brother of the net, who has already begun work and reports that the early flying Geometers are flitting around the stunted bushes in plenty, and we net short series of *Lobophora sexalisata* and *Epione apiciaria* before the rapidly increasing twilight

warns us that the lamp should be already throwing its seducing radiance around. What is that large pale moth with long drooping body flying heavily on the skirts of yonder reed-bed? A good beginning, as the lucky captor announces a female *M. arundinis*, surely a very early emergence and confirming our anticipations of some sport with the males of the same species at the lamp.

Hardly is the sheet fixed than a "wainscot" emerges from the surrounding gloom and circles once or twice round the lantern, *M. flammea* as expected, and fortunately the precursor of others, which settling on the sheet and on grass stems within the circle of light are soon prisoners. Disappointment is expressed that we have not netted *Viminia venosa* before darkness set in, but we are soon relieved by the rapid dash of a very white-looking Noctua into the bright rays in which we are standing; it is too quick for us, but a second momentary appearance within the verge of the lighted area gives a rapid net the opportunity required. Hardly is this boxed than a sudden rush against the sheet is felt and the first ♂ *arundinis* is seen settled low down and is boxed before he can begin to get lively. For an hour or so we are busy, the first to disappear is *Herminia cribralis*, which had been early and frequent in its visits, and for a while the slackening sport gives us the necessary opportunity for a visit to the numerous sugared "knots" of reeds which we had prepared as an experiment, it being rather early in the season for the usual luck with these. Not much on the Fen itself. An occasional *A. unanimis*, with an early *L. impudens* and a few of the usual "free lances," but as we gain the higher ground just off the fen-level our forethought is better rewarded; a few posts and saplings yield *A. advena* and *N. saponariae*, whilst by good fortune we succeed in boxing a very skittish *C. ocularis*, but we have still another string to our bow, in the lane above, we have prepared numerous baits with sugared flower heads and more knots. Ah! *advena* prefers these and this preference is shared by another fine fellow; *C. elpenor* cannot resist them, especially so near his head-quarters and evident birth-place, he needs a rapid and sure hand to secure and a speedy *quietus* but is worth it all. We must not linger, the witching hour of midnight is past and the distant light on the Fen recalls us and none too soon; *A. fuliginosa* has begun its wild flight and seems to have re-started the more staid Noctuæ, and for another hour we are too busy to heed the busy flight of time and forget all in the glamour of the moment. The weird appearance of our shadows, thrown as within a small illuminated islet in a sea of dense darkness which seemingly surrounds us, adds to the loneliness and novelty of our position, which in its utter contrast to our usual haunts, constitutes that charm which will ever enthral the ardent nature-lover and which will find its votaries year after year, ready to illumine the darkness of night to pursue their loved investigations into the many problems of Nature.

We find fresh incentives to overcome these meditative tendencies in action and whilst the records of the past are recalled and the rarities of former years discussed, a sharp outlook is kept on the lamp for the pretty little *Nascia cilialis*, formerly such a rarity, to-night fortunately added to our captures, whilst hopes of that greatest prize, *Hydrilla palustris*, although doomed to disappointment again, yet tend to the heightening of the weird fascination of the hour.

A little longer and at last even our enthusiasm for Nature begins to

wane before the demands of Nature in a more personal relation, and even now lingeringly and with reluctance, we lower down and extinguish our lamps and fold the sheet which has done such yeoman service. Hiding the heaviest of our paraphernalia in the thick rank growth around, we return to *ourselves*, home, supper and bed.

Who is he, pent-up in crowded city, that does not feel a chord vibrate in sympathy with such recollections and long for the moment when, in healthy and exhilarating sport, the lassitude of the winter may be cast off and a store of health and pleasant reminiscences be acquired for the future; whilst in such recollections lies much of the subtle charm that invariably retains the active sympathies of every individual, who may have been fortunate enough to come within the magic spell of attraction of our favourite hobby.

SPRING.

WHITE and blue in the sky this morn:
Shadows creeping along the hill:
Spring's young life in the bud new-born:
Tinkle of music in river and rill.

Cast off sorrow and cares that kill:
Hie thee forth and be glad to-day.
What are thy years to thee? Youth lives still
In many a heart when flowers the May.

Youth in the heart, though the hair be grey,
Calls us forth to be boys again.
Calls us forth to see Nature play
With her old, old playthings—Joy and Pain.

Joy to the plant, as it drinks the rain:
Pain to the dripping beggar's child:
Joy to the child, as it links the chain:
Pain to the daisy for flowers defiled.

Joy to the hawk in the woodland wild:
Pain to the dove as the claws sink deep.
Over her playthings hath Nature smiled
Since the world and its wonders awoke from sleep.

Lips may smile, when the eyes would weep:
Eyes may smile though the heart be sore.
Nature, must thou thy secret keep?
Lovest thou sorrow or joy the more?

Let me enter thy open door:
Let me dream on thy bounteous breast:
Lay me down on thy flower-strewn floor:
In thy presence is only rest.

Rest to the hawk in its thorn-built nest:
Rest in death to the dove that died:
Rest to the day in the twilight blest:
Rest to the sands when ebbs the tide.

Must then May and the spring's young pride
Sink like this through a minor key?
Shall a man weep as he weds his bride?
Shall a boy's young thoughts as an old man's be?

Fie on thee, Nature; river and lea,
Sparkle of waters and whisper of leaves
Weave no riddles 'twixt thee and me.
Keep thy pain for the heart that grieves.

Time in Autumn to bind the sheaves
Reaped from thy deeper wisdom's store.
Chatter of swallows beneath the eaves
Bids us sorrow in spring no more.

Up then! Out! to the shell-decked shore,
To the still green woods, to the wind-swept heath.
The storms in winter may one day roar,
But better in May is Life than Death.

G. M. A. HEWETT.

ON THE LARVA OF ARCTIA CAIA,

With special reference to its correlated variations in Plumage, Moulting and Hybernation.

By T. A. CHAPMAN, M.D.

(*Continued from page* 35).

In considering the relations which these variations in plumage, moulting and hybernation bear to one another and to the history and habits of the species, some very interesting conclusions present themselves, not indeed as proved, but as highly probable.

In the first place, it is very interesting to find that of a single brood of larvæ treated identically, some should reach maturity in five moults, whilst others take thirteen, and this as a matter of simple variation, and quite apart from any disease. Such a great range of variation may, probably does, exist in other hybernating *Arctiae*, but in no other hybernating larvæ, that I have reared or heard of, is it met with. Mr. Hellins records frequent and continuous moulting in some few instances, but these were always, in his opinion, pathological.

As to the use of these variations to the species; we find in the first place that the Forward forms are decidedly favoured, if not caused, by a high temperature. Now, if only the Normal form existed, it is evident that in a very warm and early season these would be ready to hybernate at midsummer, and would probably largely, if not entirely, perish in consequence; whilst a second brood from the Forward moths would reach the hybernating stage at a fairly favourable date. In an ordinary English summer, no doubt the Forwards themselves or their progeny would perish; hence, no doubt also, the rarity of Forwards in England. It is obvious again, that the fine large hybernating form of larva, noted as appearing in Brood I, from its larger store of nutriment, its denser clothing, and greater resistance to change of temperature, was well adapted for carrying the species through a long and severe winter, that might be fatal to the ordinary hybernating form.

Then the Laggards may be supposed to take up precisely the opposite role, and to be suitable to a very mild winter, in which hybernating would be very difficult, although feeding up would be impossible.

These four forms obviously exist, freely commingled in our English, race of *caia*, but with the Normals largely predominating, though ready to give way to the Forwards under the influence of a high temperature.

My experiments amounted to an attempt to produce a race which should be entirely Forwards, but in this, broadly stated in this form, they entirely failed. They did appear, however, to produce a certain effect on the form assumed by the larvæ. They did, most especially, produce an increase of the Laggards, and not only an increase in their numbers, but an increase in their variety, and in their constitutional stamina. I deduced from this, that there was a closer relationship between the Forwards and the Laggards, than between either of them and the Normals, probably to be explained by the supposition that a warm summer, favouring the production of Forwards, belonged to a climate where the winter was also warm, which would favour Laggards; so that the existence of a race of *caia* consisting entirely of Laggards or entirely of Forwards, was extremely unlikely; one that alternated between Forwards and Laggards was probably not infrequent, and may

indeed very conceivably have existed at some time or place as a pure race, and would have been quite parallel to the many instances with which we are familiar, of winter and summer (or spring and autumn) broods.

This conclusion is assisted by the further fact, that the later broods showed great variation in the Normals, as though they were so crossed with Laggards and Forwards, that there were comparatively few that did not partake more or less of the characters of one or other of these forms, whilst the converse of this is strikingly illustrated in the brood reared from profound hybernators, in which there appeared among 530 larvæ, only one Forward and no Laggards.

Pedigree breeding of *caia* obtained from the extreme northern limits of its distribution, as well as from the southern, to put this conclusion to a further test would be of much interest, and might throw considerable light on the action of climate. Especially it might in some degree elucidate such facts as that *caia*, through many successive Normal broods, can perpetuate the capacity to take on a double brooded habit, with a rapid feeding summer brood and a winter brood hybernating as larvæ.

The conclusions actually ascertained or suggested by the experiments which are the subject of this paper, appear to be:—1. That the larva of *caia* presents three types, each with subsidiary varieties. 2. That each of these types, and indeed each subsidiary variety, is characterised by a series of moults, a succession of plumage, and habits as to hybernation, in which it differs from the others. 3. That *caia*, as we meet with it, may be regarded as a mongrel race, consisting of these three types closely mixed and intercrossed, but capable of separation by appropriate breeding and selection, or more probably of two races, one with hybernating larvæ and a single brood annually, the other, consisting of an alternating summer and winter form. 4. That though these two races may conceivably, under certain climatic conditions, have existed as separate and pure races, (they may do so now in some parts of the world for ought I know), yet that at present in England the hybernating form is most largely represented with a small intermixture of the digoneutic form, which persists, as it enables the species to be continued in exceptional seasons that would be destructive to the dominant monogoneutic type.

DESCRIPTION OF PLATE II.

(All Figures of Larvæ are amplified two diameters.)

Fig. 1. Laggard of 2nd brood, hybernating in 8th skin.
Fig. 2. Laggard of 4th brood, in 4th skin.
Fig. 3. Laggard of 2nd brood, hybernating in 7th skin.
Fig. 4. Normal, hybernating in 5th skin.
Fig. 5. Normal, hybernating in 6th skin; large *caia*-like form.
Fig. 6. Dorsal view of anal armature of *caia* pupa, × 6 diameters.
Fig. 7. Lateral view of anal armature of *caia* pupa, × 6 diameters.

NOTES ON PLATE II.

In Plate II, Fig. 1, we have a form that is very much the same as a Normal hybernator, and the figure gives, perhaps, a better idea of a Normal hybernator than does fig. 4, taken from a Normal hybernating

1

2

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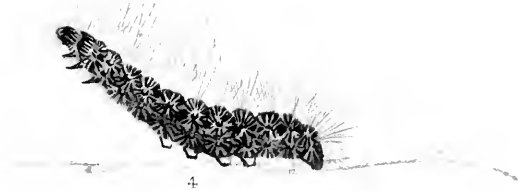

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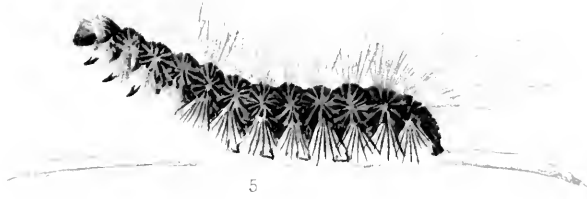

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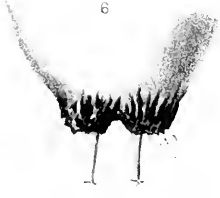

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7

H K del

West, Newman, Chromo

Varieties of Larvæ of Arctia Caia

specimen. Fig. 1 is, however, a hybernating form, assumed by a Laggard at the 8th skin. Fig. 2 is a Laggard in 4th skin; compare with Normal in 4th skin (Plate I, fig. 8). Fig. 3 is a Laggard hybernating in 7th skin.

Fig. 5 is a hybernating form that is rather rare, and is remarkable for its large size and *caia*-like plumage; several of these occurred in later broods; the one figured was in its 6th skin, and was descended from the large red hybernating larvæ already referred to, as the only definite variety of hybernation that occurred in the first brood.

Figs. 6 and 7 represent the anal armature of *caia* pupa; beyond the opportunity afforded for having the drawings made, they have no connection with the subject of this paper, but they interested me as having, more than any other pupa that I have met with, certain features very similar to those of *Acronycta* pupæ. The two definite dorsal spines and the numerous ventral set, being of the same pattern as prevails amongst the *Cuspidiae*, whilst the texture of the pupa reminds one a good deal of *Viminia*. These facts make one suspect that the resemblance of the larvæ of *Viminia* to those of *Arctia* may indicate relationship, extending as it does to an identity of the lateral stripe in *menyanthidis* and *rumicis* with that found in some varieties of young *caia* larvæ.

SOCIETIES.

Three meetings of The Entomological Society of London have been held since our last note.—On March 14th, Dr. D. Sharp exhibited a collection of White Ants (Termites), comprising about a dozen species, which had been taken by Mr. G. D. Haviland, in Singapore; he stated that Mr. Haviland had found in one nest eleven neoteinic queens,—that is, individuals having in some respects the appearance of queens, while in other respects they were still immature; these neoteinic queens were accompanied by kings in a corresponding condition. Dr. Sharp alluded to the opinion expressed by Mr. Herbert Spencer, in his recent discussion with Prof. Weissman, that the different forms of social insects were produced by nutrition, and said that the observations made by Prof. Grassi, showed the correctness of this view. Mr. Haviland stated that two of the species exhibited, certainly grow fungus for their use, as described by Mr. Smeathman many years ago, in the *Philosophical Transactions*. Mr. Goss remarked that Virgil (*Georgics*, Book iv.), referred to the fact that the different forms of social insects were produced by nutrition, and also to parthenogenesis in Bees. Mr. O. E. Janson exibited specimens of *Dicranocephalus adamsi*, Pascoe, from Sze-chuen, Western China, and *D. dabryi*, Auz., recently received from the neighbourhood of Meupin, in the same district; he observed that, although the latter had been quoted by Lucas, Bates, and others, as a synonym of *adamsi*, the two species were perfectly distinct: the females of both were unknown to the authors, and presented a remarkable difference, for whilst in *dabryi* this sex is similar to the male in colour and sculpture, in *adamsi* it is entirely dull black, with the upper surface minutely and densely punctate. Mr. C. O. Waterhouse exhibited, for Mr. E. A. Waterhouse, a specimen of *Colias edusa*, closely resembling *C. erate* (a Continental species), which was taken on Wimbledon Common,

and a series of *Lycaena arion*, from Cornwall. Mr. F. Merrifield read a paper describing further experiments on pupæ of Lepidoptera, with comments on them by Dr. Dixey. In *Pararge egeria*, heat produced no approach to the South European form; those at temperatures of 56° and under, gave the most strongly-marked imagines. In *Cidaria silaceata*, the principal effect of forcing was to reduce the size. In *Araschnia levana*, adequate cooling of the pupæ caused a complete conversion from the *prorsa* to the *levana* form. In *Vanessa polychloros*, forcing tends to yellow, refrigeration to darkness; in this species, as well as in *V. io*, cooling produced marked reversion to ancestral forms. *Vanessa atalanta*, subjected to a very high forcing temperature, developed several additional scarlet spots and groups of scales, corresponding with more conspicuous colouring of the same kind in *V. callirrhoë*. *Grapta c-album* was remarkable for the much greater sensitiveness to temperature of the first (or early summer) emergence, than of the late autumn emergence; the effects on this species are much more strongly marked on the under side. From *V. antiopa* no results were obtained, but this may have been due to the fact that the pupæ were several days old when they reached Mr. Merrifield. Dr. Dixey followed with a paper, indicating the relation of the results obtained by Mr. Merrifield, to the phylogenesis of the species experimented on; he also discussed the theories of Weismann, and the question of acquired qualities in connection with heredity, on which he considered that they threw some light.———On March 28th, sympathetic reference was made to the sudden death of Mr. J. Jenner Weir. Mr. W. Borrer, jun., exhibited a wasp's nest, which had been built in such a way as to conceal the entrance thereto, and to protect the whole nest from observation; he believed the nest to be that of *Vespa vulgaris* (*c.f. Proc. Ent. Soc. London*, 1892, pp. xx and xxi). Mr. G. F. Hampson exhibited a specimen of *Gaudaritis flavata*, Moore, from the Khári Hills, and called attention to the existence in the males of this species, in the closely allied British species *Cidaria dotata*, Linn., and also in two Japanese species (*C. agnes*, Butl., and an undescribed species), of an organ on the underside of the fore wing, which he suggested might be for stridulation; this organ consists of a small scar of hyaline membrane, situated just below the middle of vein 2, which is much curved; this scar is fringed with long hair, and has, running down its middle, a row of sharp spines situated on the aborted remains of vein 1, and which is curved up close to vein 2; the spines would naturally rub against part of the costa of the hind wing, but no spines or unusual roughening seems to exist on that or on any of the veins on the upper side of hind wing against which they could strike; below the scar is situated a large shallow fovea or pit in the membrane, slightly developed in *dotata* and *flavata*, but much more prominent in the two Japanese species which, should the organ prove to be for stridulation, would probably act as a sounding board. Mr. Hampson said that in the Japanese species *C. fixreni* of Brem, closely allied to *flavata*, the males have no trace of this organ, and he hoped that entomologists, who have an opportunity of observing *dotata* in life, would make some experiments on living specimens during the ensuing summer; probably confining males and females together would lead to some results.

On April 11th, the Hon. Walter Rothschild exhibited male and female specimens of *Ornithoptera paradisea*, Stdgr., from Finisterre

Mountains, New Guinea; *O. trojana*, Stdgr., from Palawan; *O. andromache*, Stdgr., from Kina Balu, Borneo; *Oenetus mirabilis*, Rothsch., from Cedar Bay, Queensland; and a few other splendid species from the Upper Amazons. Mr. H. Goss exhibited, for Mr. G. A. J. Rothney, several specimens of a Hemipteron (*Serinetha augur*, Fab.), and of a Lepidopteron (*Phauda flammans*, Walk.), the latter of which closely resembled and mimicked the former. He said that Mr. Rothney had found both species abundantly on the roots and trunks of trees in Mysore, in November last, in company with Ants (several species of *Camponotus* and *Cremastogaster*). The Hemipteron appeared to be distasteful to the Ants, as it was never molested by them, and he thought that the Lepidopteron was undoubtedly protected from attack by its close imitation of the Hemipteron.

At the South London Entomological and Natural History Society, on March 8th, Mr. Adkin exhibited specimens of *Erebia epiphron* from Inverness, which were said to be the type and not var. *cassiope*. It is generally stated in recent works that the difference between the two forms consists in the presence of white pupils in the ocelli in the type and their absence in var. *cassiope*. Knoch, however, in his description of the type, distinctly says that the occurrence of white pupils is not a constant character. They were not present in Mr. Adkin's specimens and Mr. Weir said they never occurred in the forms found in Britain. Mr. Routledge showed specimens of *Selenia bilunaria*, which had lain over the summer of 1892, emerging in April, 1893; also the progeny of a pair of these "lazy-landers," which had emerged at intervals from August, 1893, to February, 1894, and were all moderately small, although in some the pigment was fairly well developed; he also brought a series of *Epunda lutulenta* from Cumberland, which included both var. *lüneburgensis*, Frr. and var. *sedi*, Gn. Mr. Frohawk exhibited ten ♂ and ten ♀ *Pararge megaera*, bred by himself from ova deposited on August 2nd, 1893. Mr. Billups had three rare Ichneumons; *Microgaster russatus*, taken at High Beach in 1884; *Haperacmus crassicornis*, of which only one recorded specimen was known, taken at Oxshot in 1892; *Eurycproctus nemoralis*, taken at Oxshot in July, 1893. Mr. W. A. Pearce; *Attacus luna* and *Citheronia regalis* from Wilkinsburg, U.S.A. Mr. Jenner Weir showed ♂ and ♀ *Heteronympha merope*; the two sexes are so totally unlike that, until quite recently, they have been supposed to be distinct species; the chrysalis is said to be contained in a frail network on the ground. The latter part of the Society's name was justified by the exhibition, by Mr. Williams, of a local snake, *Coronella laevis*, taken at Camberley, in Surrey, in 1883. Mr. Step had found that the flowers of the Butcher's Broom (*Ruscus aculeatus*) were produced in pairs on the *phylloclade*, but that only one bud opened at a time.

On March 22nd, two series of *Hybernia leucophearia* were forthcoming; one, taken by Mr. Turner at Richmond Park, West Wickham and South London, contained a large number of melanic forms; in the other, from the New Forest, shown by Mr. Adkin, the white-banded was the predominant form. Mr. South had a long bred series of *Taeniocampa gothica*, including many var. *gothicina*, which he had received from Mr. Rose, of Barnsley; all were large and of a deep red shade. A locust (*Aedipoda tartarica*), captured at Brixton among vegetables imported from Italy, was shown by Mr. Sauzé.

The meeting of the Birmingham Entomological Society on April 16th, appears to have been a more than usually interesting one. Mr. G. H. Kenrick, in some "Notes on the Migration of Insects," suggested that, in some cases at least, the migration might possibly be similar to what was observed in birds; that in the case of *Pyrameis cardui*, for example, which occurs during the winter in North Africa, Egypt, &c., there might be a migration northwards to moister climates for the production of the summer brood, and a return south again for the winter brood.* Exact information was desirable as to the actual hybernation of this and other species in this country. Exhibits: Mr. W. Harrison; living larvæ of *Melitaea aurinia*, taken in considerable number on devil's bit scabious (*Scabiosa succisa*) at Arley. Mr. P. W. Abbot; three specimens of *Stauropus fagi*, bred from larvæ obtained in Wyre Forest last year; also *Neuria reticulata* from Wicken. Mr. C. J. Wainwright; the following Diptera taken in Wyre Forest at Easter: a long series of an *Echinomyia* (perhaps *ursina*), which was extremely abundant, especially on the sallows; *Cheilosia grossa*, *C. flavicornis*, *Syrphus lasiophthalmus* and *Melanostoma quadrimaculata*, all taken on sallow blossom: he remarked on the bee-like appearance of the *Echinomyia* and *Cheilosia*, the latter resembling *Andrena fulva* so closely that he had had much difficulty in recognising them. Mr. R. C. Bradley; *Bombus latreillus* from Sutton.

Records have reached us of meetings of the Leicester Literary and Philosophical Society (Entomological Section), on Feb. 27th and April 2nd. Mr. Bouskell recommended, and the recommendation is well worthy of being acted upon, the formation by the Section of collections of local and of British insects with life-histories. Economic entomology received attention. As the result of an enquiry as to the best means of dealing with the Onion grub, which is very prevalent in the district, it was recommended that cultivation in trenches and the covering up of the bulbs should be adopted. As the result of excursions to Charnwood Forest at Easter, the following captures, amongst others, were announced:—*Brephos parthenias* in good condition (out fourteen days earlier than last year); *Asphalia flavicornis*, one at rest and one on the wing in the bright sunshine; two *Taeniocampa munda* and one *T. gracilis*. Of Coleoptera: *Rhagium inquisitor* (8) and a number of larvæ out of an old stump; *Ips 4-guttatus*, plentiful under bark; *Ips 4-pustulatus* at sap; *Rhizophagus dispar*, *R. bipustulatus*, *Rhinosomus planirostris*, *Ilybius ater*, *I. obscuris* and *Aclius sulcatus*. The following among other exhibits were made: Mr. Moss; *Sinoudedron cylindricum*, *Dorcus parallelopipedus*, *Barynotus obscurus* and *B. schönherri*, all from near Loughborough: larvæ of *Acherontia atropos*, *Cossus ligniperda*, *Notodonta ziczac*, *N. dictea*, &c. from the same district. Mr. Bouskell; a series of *Nyssia hispidaria* from oak trunks in Budden Wood; none were found at a greater height from the ground than one foot. Mr. Headley; *Monohammus sartor*, taken in Leicester on a willow trunk.

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* We should like to hear whether the author of this paper has collected any information bearing on the return to the South of this or any other migrating species of insect. Information relating to the possibility of *Anosia archippus* doing so has been collected in America, but beyond the fact that the latter are known to "swarm" in the autumn nothing further seems to have been proved. There is, we believe at present, no shadow of reason even for the supposition that they return South. If there be any material or observations on the subject, we should be glad to have references.—Ed.

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The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 115).

Chap. II.

THE OVUM OR EGG.

2.—On variation in eggs.—Everything in nature varies, and there can be little doubt that there is as much variation in the eggs of Lepidoptera as there is in their larvæ, pupæ or imagines; comparatively little attention has however as yet been devoted to the subject. So far as observations have been made, they show that not only do the eggs of different species differ from one another, but also that there is variation in the eggs of the same species; this may affect either shape, size, colour or ornamentation.

a. *Shape.*—Eggs do not always retain the shape which characterises them when first laid. Scudder figures the eggs of two species of *Eurymus* (= *Colias*) with flattened bases, whereas the egg of *Colias* is really remarkably spindle-shaped, tapering rapidly to both ends. Buckler gives two descriptions of the egg of *Colias hyale*; in one he says "the egg is like a canary-seed in miniature;" in the other, "the egg is of a long fusiform shape, one end conical, the other knobbed, or like a bag tied round the neck;" both of these are probably correct. When first laid the egg is very soft, and in some cases, looks as if it were almost fluid. Eggs laid on glass apply themselves to it, and have a very regular and almost perfectly circular or oval outline, but if laid on a leaf or other irregular surface, they apply themselves to its irregularities and become themselves irregular, both in relation to the surface to which they are applied and also as regards their disturbed outlines. Dr. Chapman informs me that this irregularity was very evident in eggs laid by a *Scopula decrepitalis*, which he forced to lay on the deeply furrowed leaves of *Teucrium*. The egg of *Colias* has distinctly, as has just been observed, a very spindle-shaped outline, and is usually very slender, and very pointed at the summit. There would appear to be a tendency when the egg is applied to a leaf under exceptional circumstances, for its basal part to spread

out when soft, and an extreme spreading of the basal tip would produce the exact appearance that Buckler describes as being "knobbed, or like a bag tied round the neck." This semi-fluid condition of the egg when first laid, may explain an observation mentioned to me by a lepidopterist who remarked that eggs of *Gonepteryx rhamni* varied immensely, and that sometimes one side was flatter than the other. Very slight pressure, or other slight external causes, might bring about such a variation. The eggs of *Pieris* and *Euchloë* appear to show a slight basal flattening, which, would probably not occur if they were laid quite free from attachment at the base. Dr. Chapman remarks that in *Glaea*, the egg may be pushed into a chink and become so altered by pressure, that its typical shape and ribbing are entirely lost.

There is frequently a certain amount of variation in the eggs of individual species. When I was at Hereford in Easter week 1893, I examined some eggs of *Brephos notha* under a lens; among them was one which was very different in appearance from the usual form of that species; it was oval in shape, and very much smaller than the others. Dr. Chapman remarked at the time that this was not unusual. The altered shape could not have arisen from pressure, or from any peculiarity in the environment, as the eggs were laid quite open on a twig.

b. *Size.*—With regard to variations in size, the Rev. John Hellins writes as follows:—"Some time ago I corresponded with Mr. W. H. Harwood on the question as to the eggs of Macro-Lepidoptera varying in size, and he mentioned instances, chiefly among the "Prominents," where he had observed some difference in the size of eggs laid by the same female; this difference he had been accustomed to associate with the sex of the future imago, the larger eggs being expected to result in female moths, the smaller in male, but I am not aware that he had tested this theory very exactly: he also furnished me with the experience of another entomologist, who had noticed that the first-laid eggs of Hawk-moths are larger than those which follow. These observations interested me much, and I meant to pursue them with some care, but so far, I have not done what I wished, and all I can now add is this—Last June, I captured an impregnated female of *Smerinthus populi*, and, by shutting her up in a large paper-lined box, managed to secure all her eggs to the number of 230 or thereabouts; I had removed and given away most of them before she had quite finished laying, but luckily retained a few of the earliest, and when I came to compare these with the last half-dozen that left the ovipositor, the difference in size was immediately apparent, and on measuring them with the micrometer, I found the last were just two-thirds of the size of the first. To have made this observation of more value, I ought to have measured the eggs as they came each day (I think she was about five days in getting rid of all her burden), but I did not think of this in time; neither shall I be able to know which sex of the moth these small eggs would have produced, for having to leave home before the larvæ were full-fed, I was obliged to commit them to the care of a youngster, whose conscience was not tender on the point of feeding them, so that on my return I found them all dead. There is another question that has occurred to me, but which I cannot answer for certain; does a female moth, which from any cause has not reached the usual size of the species, lay the same number of eggs as a full-sized moth, her eggs, being like herself, under full size? or does she lay a smaller number of full-sized eggs?

I believe Mr. Harwood and myself both inclined to the latter view" (*Ent. Mo. Mag.*, xix., pp. 208-209). Dr. Chapman has recorded that there is considerable variation in the size of eggs laid by the various species of *Acronycta*. In *Cuspidia trideus*, there are, apparently, at least two races which lay differently sized and differently ribbed eggs, whilst the eggs of *Viminia myricae* also vary very much in size. On the other hand, in the *Arctias* and many NOCTUÆ, the eggs laid are of remarkably uniform size.

c. *Colour.*—Eggs do not differ very much in colour when laid, whitish, pale yellow or pale greenish being the most usual tints, but they change very quickly, and the colour of each kind probably then becomes that which will most exactly harmonize with the surroundings amid which the eggs are laid. They usually appear to make their first change within 24 to 72 hours of being laid. Besides this first change, almost all eggs undergo a change or series of changes of colour during their development; this is generally due to the colour of the embryonic larva becoming visible through the transparent egg-shell. In some species, however, no change in colour takes place, notwithstanding that the egg is fertile.

The first change, however, seems to be probably due to some other cause. Mr. Robson states that "the eggs of all the species of *Hepialus* are white, or nearly so, when first extruded, but in a very few hours they turn to bluish-black. Mr. Hellins thinks it curious that the eggs of *humuli* should turn black, as the young larva is white. If there was anything in this remark, it would apply with equal force to all the species, but the fact is, that the change of colours is of the shell only, and has no connection at all with the larva within, for unimpregnated eggs change in exactly the same way." This change, probably, is dependent on the egg-contents, although it is a change of colour of the shell itself, and is possibly due to the separation of the cell-contents from the cell wall in the very earliest stages of change in the laid egg, which probably takes place as much in an unimpregnated as in an impregnated egg, but does not go beyond this condition in the former case. Thus, again, the egg of *Euchloë cardamines* is yellow when laid, but becomes deep orange in about 24 hours, and undergoes no further colour-change until the larvæ hatch some days later.

With regard to other individual species, Dr. Scudder mentions that in *Cercyonis alope*, the colour changes from honey-yellow to pale pink; that in *Enhydryas phaeton*, the original yellow becomes strongly tinged with brown, and that in *Eurymus philodice*, the yellow gives place to a pale salmon.

On the other hand the egg of *Endromis versicolor*, which is pale green when laid, rapidly becomes yellow in colour, and then, if fertile, gradually changes through orange to purple, whilst the infertile egg remains yellow. The first change, from green to yellow would appear to be somewhat akin to that which takes place in *E. cardamines*, and is, perhaps, not dependent on embryonic development; the later changes, however, are certainly due to such development.

Dr. Jordan (*E. M. M.*, vii., p. 117) records the following observation:—"The well-known chocolate-coloured egg of *Cerura vinula* is common enough; but, at the latter end of June, I found an egg of similar shape, only opaque white; it was on a leaf of *Salix fragilis*. It produced a 'puss' genuine enough in appearance, though it unfortunately died in early kittenhood."

Mr. Hellins, in the article from which we have already quoted, makes the following remarks anent colour changes :—"A third question with regard to eggs is this—Do eggs of the same species vary in colour? or do they always go through the same changes of colour in approaching maturity? Mr. Buckler and myself have noted a most decided variation in the eggs of *Orgyia antiqua*; often they are of a dirty whitish hue, with central brown spot, but sometimes we have met with batches which were quite reddish-brown all over; I believe, too, the eggs of *Dicranura vinula* vary considerably in the depth of their brown colouring. I have notes of a few eggs of *Hepialus sylvinus*, which I once secured; when laid they were all of a dull white, and most of them remained so, with the exception of a tinge of yellow, which came over one side; but one egg became deep yellow all over, and the larva from it when hatched, was of a much deeper yellow than the rest, but I did not manage to rear it so as to see whether this difference remained throughout its growth. I have also notes of various batches of eggs of *Cheimatobia brumata*, which did not all seem to go through the same changes of colour, some of them not showing the dark hue which others put on at the last."

That most of the changes in colour are very closely connected with the developmental changes taking place within, will be manifest, if the egg be kept under microscopic observation. The first change, which occurs very soon after the egg is laid, probably represents the transition of the contents of the egg from their primal homogeneous condition, to the condition which obtains at that period when the blastoderm layer is developed. There is sometimes a distinct change of tint, at others, the whole surface becomes completely covered with black dots; this change would appear to correspond with the separation of the contents from the cell-wall.

The second change appears to accompany the formation of the germinal band, and appears to be intensified as the growth of the embryo continues. This probably accounts for the general darkness of the tint assumed in this stage, dark brown, red, purple, lead, and other tints being frequent, and lasting sometimes for a considerable space of time.

The third change generally exhibits an intensification of the colour in the previous stage, except that the apex and frequently the base of some eggs become pale again. This is an external sign that the embryo is approaching maturity.

These three changes in colour, therefore, are the naked eye appearances of the egg during the condition of embryonic development, and may be said to separate the four periods into which embryonic life may be divided.

Dr. Chapman, in his papers "On the genus Acronycta and its allies," mentions the following facts. The egg of *Viminia auricoma*, which is pale creamy when first laid, passes into a rich reddish chocolate-brown, with numerous white or creamy spots. That of *V. myricae*, is at first yellow, but soon becomes of a pale salmon-pink, and finally, of a purplish-brown, with paler reddish-brown spots. In *V. menyanthidis*, the egg, at first yellowish, soon becomes red, and at full colour is perhaps brown rather than red, getting nearly black as the young larva approaches hatching. That of *V. renosa*, from sulphur yellow, becomes reddish-brown, with paler markings. In *V. rumicis*, the egg, when first laid, is white, or faintly greenish in tint, and soon becomes yellowish, with a net-work of red streaks; there is a central red or brown dot on

the apex, surrounded by a pale zone, and the rest of the egg is finely dotted with yellow or orange dots, on a reddish-brown base; this colouring is assumed in two days in warm weather, but in cool weather the change occupies not less than a week. Coming to *Cuspidia*, the egg of *C. tridens* is nearly colourless, almost glassy, when first laid, but acquires a certain whitish opalescence as the larval development proceeds; that of *C. psi* is very similar. That of *C. abni* is, when first laid, nearly as colourless as the two preceding, but soon assumes some coloration, and in about three days reaches its proper tint, which is colourless on the margin but within of a rich chocolate-brown, marked with creamy-white nearly circular patches, which tend to be arranged in two circles, round a central one; for twenty-four hours before hatching, the egg becomes much darker, with the black head of the larva occupying the summit. The egg of *C. megacephala* when first laid, is of a pale greenish colour, uniform throughout; when fully matured in colour, the colourless margin, due to the shrinking of the inner egg, is wider than in any other species; the inner egg presents a series of brown spots, which are not round, but angular, usually pentagonal, and which differ in size in different specimens, being sometimes mere dots, and at others so large, as to occupy nearly as large an area as do the pale spots in *C. abni*. In *C. strigosa*, the inner egg shrinks away from the outer, leaving a clear margin, but as the inner egg remains colourless, the margin is not so evident as in the coloured species. In *C. leporina*, the egg, of a pale straw colour at first, develops a chocolate dot at the apex, surrounded by a small circular reddish patch which is gradually invaded by the chocolate colour; then round the margin of the inner egg appear five to eight reddish spots, towards which the chocolate area extends angularly, leaving for a brief interval a circle of pale blotches between them; finally, the dark colour spreads over the whole of the inner egg. The egg of *C. aceris*, when first laid, looks very like that of *C. psi* or *C. tridens*, but is a little more opaque; as the inner egg shrinks and leaves a colourless margin, it assumes a rich chocolate colour, with pale straw-coloured spots, which often coalesce and form streaks and blotches. In *Bisulcia ligustri*, the egg is of a pale pearly green, almost colourless, and very translucent; the inner egg shrinks from the cell, but does not undergo any coloration. In *Moma orion* the egg is extremely delicate and transparent; it acquires a pale straw tint, but no deeper coloration nor markings; nor does any change occur as the contained larva becomes ready to hatch, except a slight increase of opacity, the young larva itself being very transparent. The colour of the egg of *Demas coryli*, is pale greenish when laid, and then becomes yellowish, with a circle of small red dots just above the widest part.

d. *Ornamentation.*—The number of the ribs with which lepidopterous eggs are frequently ornamented, often varies very considerably. Dr. Chapman reports that as a rule the egg of *Vanessa polychloros* has eight, but that in a small proportion there are only seven; also, that of thirty eggs laid on the same day by *Grapta c-album*, thirteen had ten, and seventeen eleven ribs. Edwards, writing of the closely allied species *Grapta interrogationis*, which, like *G. c-album*, lays its eggs in little columns, five or six eggs being placed on each other, says that the number of ribs does not vary in the same column, but that the number of ribs which is commonly ten, may be sometimes eleven. He thinks it probable

that the number of ribs is the same for all the eggs laid by one individual. This, however, in the light of Dr. Chapman's observation, is improbable. Mrs. Peart made an observation on the same species, in which she found that the final egg of a chain had eleven ribs, while all the others had nine. Scudder says the number varies from eight to eleven. In the various species of *Acronycta*, it would appear, from Dr. Chapman's observations, that there is no constancy in the number of ribs. In *V. auricoma*, it varies from 57 to 60, in *V. venosa*, from 41 to 45; in *Cuspidia tridens*, the average number is 38, and there are rarely more than 44, whilst in *C. psi*, the number is rarely fewer than 45, and some specimens have as many as 54; Dr. Chapman, however, met with a case in which the eggs of *C. tridens* had from 49 to 52 ribs; these were laid by a very dark moth, and produced large and dark imagines, so that Dr. Chapman thinks that there may be two distinct races of *C. tridens*. The eggs of *C. leporina* are very variable in the number of ribs, two specimens having respectively 41 and 63, but the lesser numbers are the more common. In *C. aceris* there are usually 70 to 75, but sometimes as few as 50.

3.—On eggs as helping to determine natural affinities.—The eggs of Lepidoptera are now much more generally taken into account in attempting to determine the natural position of species. It has been made a great point of by Dr. Chapman, in his researches into the affinity of *Demas coryli*, *Diloba caeruleocephala*, and others (*Ent. Rec.*, vol. iii., pp. 249, et. seq.). Anent this Dr. Buchanan White writes (*E. M. M.*, vol. vii., pp. 230-1):—"Lepidopterologists are not, as a rule, guilty of laying too much stress upon little things; indeed, it may be said with truth, that they have altogether neglected to avail themselves of almost any characters but those afforded by colour of wings, streaks, spots, &c. It thus happens, I suppose, that, till within a very recent period, no attempt has been made to turn to account the characters presented by the form of the eggs, and these beautiful objects have been altogether neglected. The papers upon the ova of certain species of *Acidalia* and *Ennomos*, published by Mr. Hellins in this Journal, prove what good characters are afforded, in some cases at least, by the form and size of the eggs. That the differences of form should give some assistance in determining the position or family of certain species, it is my object in this note to suggest; and as instances, I will select the cases of *Asteroscopus nubeculosa*, *A. cassinea*, *Diloba caeruleocephala* and *Demas coryli*. The majority of, if not all, British authors, have considered that these species should be placed among the true or false Bombyces, but Herrich-Schäffer and some other European entomologists have thought their true position is among the Noctuæ. What aid then does the form of the eggs of these moths give us in trying to determine the question? The Notodontidæ, in which family *Asteroscopus* and *Diloba* are generally placed, have smooth eggs, with scarcely any sculpture, and not at all resembling the usual Noctua-type of egg, but those two genera have ribbed eggs (as have the majority of the Noctuæ), that of *Diloba* especially resembling in shape the eggs of some of the *Bombycoidae*. With the egg of *Demas* I am not acquainted, but it probably differs in form from the eggs of the *Liparidae*, and resembles the Noctua-type. There is nothing, I believe, in the structure of the larvæ of these three genera which would forbid their being placed among the Noctuæ, while the perfect insects resemble Noctuæ far more

than they do BOMBYCES, the stigmata and some of the lines—so characteristic of the NOCTUÆ—being, except in *A. cassinea*, well defined. Why, therefore, these four species should be retained in the position they at present hold in the list of British Lepidoptera, I cannot, for my own part, see. Herrich-Schäffer places *Demas* and *Diloba* in the *Bombycoidae*, and *Asteroscopus* in the *Orthosidae*, between *Trachea* and *Tethea*."

Dr. White's guess, like, I am afraid, so many other guesses, concerning *Demas coryli* did not prove to be correct. Dr. Chapman states that "the larva of *Demas coryli* is clearly a Liparid; *Diloba caeruleocephala*, although more closely allied to the NOCTUÆ, is rather a Notodontid."

With regard to the eggs of these and certain other species of uncertain position, Dr. Chapman writes:—"The only ground for placing certain species among the NOCTUÆ would appear to be the sculpturing of the egg, which is unquestionably of the pattern nowhere common except among the NOCTUÆ; such species are *D. caeruleocephala*, *D. coryli*, *Panthea caenobita*, *Diphthera ludifica*, *Petasia cassinea*, and *P. nubeculosa*. The *Nycteolidae* have, however, never been placed among the NOCTUÆ, yet have a very Noctuid egg, and one that in flatness even exceeds that of *Acronycta*. *D. coryli*, *P. caenobita*, and *D. ludifica* are certainly very close to, if not in, the *Liparidae*, in which group we already have a very great variation in the characters of the ova—*Orgyia antiqua* and *Dasychira pudibunda* with a hard smooth egg, not unlike a Notodont, except the flattening or hollow at the micropyle; *Leucoma salicis* with eggs glued together in a spumous material; *Liparis monacha* with quite a delicate egg, smooth, but with traces of sculpturing not very remote from the Noctuid character of *ludifica*" (*Ent. Record*, etc., vol. iii., p. 274). This note forms a very satisfactory supplement to and criticism of Dr. White's note above.

4.—ON THE NUMBER OF EGGS LAID.—The number of eggs laid by various species differs very greatly, and even among different individuals of the same species there is great variation. Mr. Hellins writes:—"The average number of eggs laid by each species is a matter not always to be ascertained easily; I once counted 1,200 as the number laid by *Triphaena fimbria*, and about the same number in a batch laid by *T. pronuba*, and these are the highest figures I ever knew; something over 200 is, I fancy, a very general number" (*Ent. Mo. Mag.*, vol. xix., pp. 208-209). Mr. Hollis (*Ent. Rec.*, vol. iii., p. 173) records some observations made on *Spilosoma lubricipeda*, from which it appears, that in that species, the number laid is about 400 to 500. Dr. Riding (*Ent. Rec*, vol. iv., p. 1) obtained 123 from a female *Dasycampa rubiginea*, and Mr. Bayne (*ib.*, p. 36) about 70 from a female *Stauropus fagi*. Mr. W. E. Nicholson, writing of *Agrotis saucia* (*ib.*, p. 116) says:—"Three females which were taken, the first on the 27th September, and the two others on the 29th September, laid freely in chip boxes in the course of the next few days. The batches of ova did not look very large, but I subsequently calculated that they must have laid over a thousand ova between them. I have reason to believe, as the specimens were worn, and one only laid comparatively few ova, that this is only a fraction of the number that might be laid in a state of nature." In *Insect Life*, vi., p. 40, the number of an entire batch of ova of *Zeuzera pyrina*, is reported as between 1,000 and 1,100. Capt. Brown (*Ent. Rec.*, vol. i., p. 107) obtained about 200 eggs from each of two females of *Epunda lichenea*.

5.—On the arrangement of the eggs when laid.—The methods adopted by the parent moths in the disposition and arrangement of the eggs when laying them are very various; some lay their eggs side by side in clusters; others lay them also in clusters, but with one egg partially overlapping another; others again deposit them solitarily, either scattering them loosely on the ground as is the habit of *Hepialus*, or attaching them to the bark, to a twig, to a leaf, or on a leaf-bud; whilst the *Micropterygidae* and *Adelidae* are provided with a cutting apparatus, with which they cut out pockets in the leaf and deposit the egg within. There is the same resemblance between closely allied species in the manner in which they deposit their eggs, which we found to obtain in regard to shape. The eggs of the Pyralides almost always have their edges overlapping, imbricated as it is called; this imbrication is almost unknown in the Noctuæ and Geometræ, although among the former it occurs in the sub-genus *Viminia* of the genus *Acronycta*, the allied sub-genus *Cuspidia* having the eggs laid solitarily, whilst among the Geometræ the imbricated arrangement obtains in the case of *Eugonia quercinaria*. The imbricated method of egg-laying must, to a certain extent, depend upon the shape and general flatness of the egg.

6.—On the perils of egg-life.—It is generally supposed, although perhaps not altogether correctly, that a greater destruction of insect life takes place in the egg stage than in any other. Of the great number of fertile eggs laid by insects, only a small percentage come to maturity. Some females, as we have seen, lay considerably more than a thousand eggs apiece, and yet, year by year, save under very exceptional conditions, only about the same average number of imagines is met with. The destruction takes place in all the stages, and it is hard to say in which stage it is the most complete. It may be that natural selection protects one species more perfectly in one stage, another species in another stage, but, so far, young larvæ appear to be the particular form against which destructive agencies are most active. It must, however, be admitted, especially in the case of eggs laid in large batches in the same spot, that, if an attack thereon is made by some voracious entomophagous enemy, the destruction is absolutely complete. Scudder records on one occasion leaving a *Pyrameis cardui* entrapped on a thistle, and in a brief time she laid several eggs; but when he went a second day to see if there were others, he found only the bases of the eggs which had been laid by her, with a single exception; this egg presented a peculiar appearance, for a pair of ants were tugging at it, and had just succeeded in piercing it above, so that the egg was spoiled for him. The same author says, "The chief offenders are mites and spiders of different kinds, and ants, who seem as fond of animal as of the sweeter vegetable juices." Mr. Edwards writes:—"There is a monstrous waste of eggs in *Grapta interrogationis*; out of the thousands which must have been laid by, say, thirty females, hardly twenty butterflies resulted. I have watched the eggs, and they are carried off and no trace left, I suppose by spiders. I had a lot of *Papilio ajax* eggs laid in a keg, over paper, and had left them there to hatch, though I usually cut off the stem and hatch the eggs in the house. I took off the cloth one evening to let the eggs get the night air, and in the morning, there was no trace of an egg on the plant. So it happened with *atalanta*. Nor are these minute objects by any means free from the attacks of parasites, which pass their entire existence within this narrow compass. Witness the not inconsiderable

list of the excessively minute Hymenoptera of the genera *Trichogramma* and *Telenomus*, all of which have been raised by the merest accident from eggs collected in the field. The five known kinds have always been found on the eggs of twelve different species of American butterflies. Were this mode of collection more commonly and authentically employed, doubtless the list would be vastly extended. It is a curious fact, that there are no cases known to us of parasitic attack upon those eggs which winter, and are therefore subjected for the longest period to such chances. I am inclined to believe that on the whole the greatest destruction of lepidopterous life takes place in the egg-stage." Certainly, if the very first larval stage be added to it, the statement would be unquestionably true, but scarcely otherwise in my opinion. The escape of the more fortunate must be put down to (1) The minuteness of the objects; (2) Their extreme numbers; (3) The brevity of their existence as eggs.

Mr. Woodworth writes:—"I watched an *Euvanessa antiopa* while she was laying perhaps one-third of the egg-mass; at first, she seemed to pay no attention to me although I was so close, but finally, probably on account of my moving, she seemed to become restless, laid quite a number of eggs on top of the others, and then, without warning, was off. I cut the stem at once, and noticed on the mass of eggs a little hymenopterous parasite (*Telenomus graptae*), which seemed to be depositing eggs also. It would run across the egg mass, then pause a moment or two over two or three eggs in succession, and then be off to another part of the egg-mass and repeat the performance. The specimen was preserved, and some of the eggs allowed to hatch, but no trace of parasitism appeared in them."

7.—On the way in which eggs are protected.—The eggs are almost always laid on the food-plant in a state of nature although, if the species be grass or root feeders, they may be sprinkled loosely on the ground among the roots of the plants on which the larvæ feed. In the case of eggs which are laid on the food-plant, those which belong to species that will hatch and feed up the same year are usually laid on the leaves, the colour being generally such as will harmonize with the colour of the leaves on which they are placed. Those that will hybernate, are usually of a dark colour, corresponding to the colour of the twig or stem on which the egg is then most frequently deposited. Those that are scattered on the ground, are usually of a dirt-coloured or pearly appearance. In fact, the general colour is such as to protect the eggs from spiders, birds, predaceous insects and other creatures that would feed on them, and from parasites that would lay their eggs on them.

Frequently peculiar developments are noticed. Thus, *Geometra vernaria* lays its eggs one upon the other (to the number of about a dozen), on the stems of *Clematis vitalba*, the *rouleaux* thus formed having every appearance of a broken twig or leaf-stalk. The eggs of *Tolype velleda* (an American species) are laid in strings, and are covered by hairs from the tuft at the end of the abdomen of the female moth, so that the whole closely resembles a hairy caterpillar. The female of *Anisopteryx aescularia*, lays its eggs round and round a twig, covering them with the scales from its anal tuft, until they fairly look like a slight thickening of the twig. Sometimes the eggs are squeezed into crevices, the female being provided with a long ovipositor, as in *Tephrosia crepuscularia*, to put them into deep crannies, quite out of sight.

For the general protection of the eggs, we find them frequently covered thickly with hairs from the abdomen of the female. This is especially the case with the Bombyces, in which many species, such as the *Liparidae*, cover their eggs with a large quantity of fluffy scales. The coating of *Leucoma salicis* has a saliva-like appearance. Placed, however, on the underside of a poplar leaf, it is difficult to detect at a little distance.

SCIENTIFIC NOTES & OBSERVATIONS.

Erratum.—Page 97, line 48.—For "*hesperidies*" read "*hesperidis.*"

Specific Distinctness of Euchloë cardamines and E. turritis.—In answer to the Editor's note, asking for references to authorities on this point, I may say that Mr. W. F. Kirby treats *E. turritis* as a distinct species (*Europ. Butt. and M.*, p. 6), a view held too by Mr. J. Watson, whom he quotes. Three friends of my own, one of whom is no mean scientist, as well as myself, have, after carefully examining this species under an excellent microscope, unanimously come to the conclusion that *E. cardamines* and *E. turritis* are two very distinct species. Dr. Staudinger, on the other hand, makes the latter merely a var. of the former; but I very much doubt if he would do so in his next catalogue, if his attention were once called to the matter.—F. B. Newnham, Church Stretton, Salop. *May 2nd*, 1894.

We have submitted the foregoing to Mr. Kirby, and have received the following note from him on the subject:

I believe that I am the first author who treated *E. turritis* as a distinct species, as Mr. Newnham has correctly stated. Later on, however, the late Mr. B. B. Labrey told me that Mr. Watson had wrongly identified his specimens, and had called *gruneri* or *damone* by the name of *turritis*. If Mr. Newnham has an opportunity of examining the plumules of *cardamines* and *turritis*, and can establish a distinction between them, or if he has any other evidence to offer in favour of the two being distinct species, it will be a matter of considerable interest. We have still much to learn even about British butterflies. The Americans have suggested that the various forms of *Polygonia c-album* may be distinct species; this I think unlikely, but who has bred the insect with sufficient care to prove that they may not be right? Wm. F. Kirby, Brit. Mus. (Nat. Hist.). *May 10th*, 1894.

A probable new species of Euchloë.—I was much interested in Mr. Newnham's note under this heading in the April number. Here, I first came across the diminutive form he mentions three years ago, but did not pay much attention to it at that time, because, as I only met with three or four specimens, I put them down as probably the results of a few half-starved larvæ. Last year, however, I saw a much larger number, and on several occasions this year I have actually seen a greater number of the small form than of the large. The specimens I have captured appear fully to bear out Mr. Newnham's observations, except that the form does not seem to be limited here to a restricted area. I ramble over a good many miles of country, and I come across it wherever I go.—A. Nesbitt, Llandogo. *May*, 1894.

In *The Proceedings of the South London Entomological Society* for 1888 are quite a number of papers on the genus *Euchloë*, which should

prove of great interest during this discussion. As members will have such and non-members can buy *The Proceedings* for a trifle from the Secretary, I will only refer to one of these. It is by the late Mr. J. Jenner Weir, and was read in connection with an exhibit made by that gentleman of British and French specimens of *Euchloë cardamines*. It is as follows:—"I have observed for some years that there is a difference between the Continental specimens of *Euchloë cardamines*, so far as I have been able to examine them, and those captured by myself in Kent, Surrey, Sussex and Hampshire. I have a series of twenty-four males of this insect captured in the above counties; these have the orange spot on the upper wings reaching but slightly beyond the discoidal black spot. The inner edge curves outward, not extending beyond the first median nervure, thus leaving the hinder angle white. This disposition of marking I find perfectly constant in those I have captured. In the Continental specimens I find the orange spot extends considerably beyond the discoidal spot, and is continued to the inner edge of the wing, causing the hinder angle of the wing to be orange. Lang, in his *Rhopalocera Europae*, figures this species with the hinder angle orange, as though the drawing had been taken from a Continental specimen, but the orange of the wing extends only in relation to the discoidal spot to the extent usually seen in British specimens. Newman in his *British Butterflies*, figures the species with the shading in lieu of colour extending to the inner edge of the wing, as usual in Continental but not British specimens. The distinction pointed out is very small, but if it be constant our *Euchloë cardamines* is an insular variety easily separable from Continental specimens of the species" (pp. 40–41).—J. W. Tutt.

Apterous Females and Winter Emergence.—I have read with interest Mr. Studd's comments (*Ent. Record*, v., p. 96) on the opinion expressed by me at the City of London Entomological and Natural History Society, and although the whole question is, I fear, more or less a matter of mere speculation, yet I would venture to offer one or two remarks in reply. First and foremost, I would refer Mr. Studd to some thoughtful observations and suggestions by Mr. Tutt, which he will find in that gentleman's "Secondary Sexual Characters of Lepidoptera" (*Brit. Noct.*, III., pp. viii.–ix.). It is there pointed out that of species with apterous females, "there are two distinct groups which require separate consideration." The first group includes the (relatively few) summer examples, wherein the unusually large size of the body of the female would render adequate wings a disadvantage and where, indeed, the energy usually expended on wing development may be devoted to the production of additional fecundity. In the second group (the winter examples) the scarcity, at that season of the year, of appropriate hiding places about the trees on which the larvæ feed would, I think, have great influence upon the females; and this would tell more on the Geometræ than on *Poecilocampa populi* or *Asphalia flavicornis* (also tree-feeders) for at least two reasons:—1. The greater general exposure of the Geometræ by day. 2. The greater proportional wing area which they present when at rest. It is hard to see how a fair-sized Geometer could protect itself, as *A. flavicornis* does, by clasping small twigs, unless it were an exceptional species like *Anisopteryx aescularia*. *Larentia multistrigaria* has no need to resort to the trees, and may be well protected among dry leaves. But what I had in my

mind was rather that meteorological causes themselves might have some influence, and that, at any rate in the depth of winter, the full vitality and fertility of the females in certain groups might perhaps only be maintainable at the expense of some of the not-indispensable organs of locomotion, and I still think that the *Amphidasydae*, all of which, with the exception of *Nyssia zonaria*, have similar resting habits, lend some colour to this view. Mr. Studd seems to doubt whether the wings of the female *A. betularia* are, as a rule, better developed than those of *A. strataria*. I may be mistaken, but I am certainly under the impression that the latter species is far weaker-winged than the former, although the size of the wings is not greatly diminished; it is also very liable to malformation and I suspect that it is almost entirely unfitted for flight. My experience of *Hybernia marginaria* and *A. aescularia* has always been that they are practically contemporaneous, not, as appears to be Mr. Studd's experience, that the latter is a month later than the former. I am not sure that I know the female of *Tortricodes hyemana*; Mr. Tutt (*l.c.*, p. viii.) cites it as apterous, but this may be only a *lapsus calami*.* Among the TINEINA the *Epigraphiidae* show an interesting parallelism with the *Amphidasydae*.—LOUIS B. PROUT, 12, Greenwood Road, Dalston. *April 18th*, 1894.

ENDROMIS VERSICOLOR.—I had for the first time this spring the opportunity of noticing that this species breaks open one end of its cocoon, and forces the anterior part of the pupa well out, many days before the emergence of the imago. Knowledge of this fact may be of use to those looking for pupæ of the species, as the dark colour makes them very conspicuous objects.—F. B. NEWNHAM, Church Stretton, Salop. *May 2nd*, 1894.

NOTODONTA TREPIDA.—I have a few pupæ of this moth, reared from ova laid in May, 1892, which are only now producing imagines; not a single imago from this brood emerged in 1893.—*Ib.*

EGGS OF LOBOPHORA CARPINATA.—These are remarkable, being very flat and in outline an irregular oval, much the shape of a small acacia bean; their colour is red with a yellow band round the side margin. Has anyone seen the eggs of other species of *Lobophora*? Are they also ornamented with a stripe round the circumference?—W. F. DE V. KANE, Kingstown. *April 25th*, 1894.

SOUND PRODUCED BY NEURONIA POPULARIS.—The following extract from a letter recently received by me from Mr. J. T. Fountain of Birmingham, relates a curious observation on the above subject, made by that gentleman last year, when sugaring on the borders of Epping Forest, not far from Ponders End. "Whilst visiting the sugar, we had to keep crossing the corner of a meadow. I carried the lamp, and my son the net; suddenly I heard a slight sound near my feet—'nick,' 'nick'—as if someone had touched the edges of two knives together. Turning the light in the direction of the sound, I saw a moth flying over the grass, which my son captured, and which proved to be *N. popularis*. During the two evenings we spent there, this incident recurred 23 times; on every occasion but one, whenever we heard the sound, we netted a moth; on the exceptional occasion, not seeing any insect flying,

* Not exactly a *lapsus calami*. Although the female is not fully apterous, the females in my collection have the wings *very* much less developed than are those of the males.—ED.

we went down on our knees, and discovered a freshly-emerged specimen sitting on a grass stem. I do not know how the moth could produce the sound, but every time we heard the latter, the moth was in evidence. Not a single *N. popularis* came to sugar, but they were more numerous near two gate posts that were sugared, as if the scent had attracted them." It will be interesting to learn whether any other entomologist has observed the same phenomenon. (Capt.) B. Blaydes Thompson, 1, Mylne Street, E.C. *May 25th*, 1894.

Sesia tipuliformis in New Zealand.—In the *Record* for September last (Vol. iv., p. 247), some remarks are quoted from a paper by Mr. Lachlan Gibb, on the occurrence of *S. tipuliformis* in Montreal. The species was first observed in New Zealand about eleven years ago, and two years later, was identified by Mr. Meyrick. It is now extremely common in the South Island, where it is working considerable havoc among the currant bushes. It could be observed on any day during the present month, in dozens, resting on the leaves of these bushes and of other plants in gardens. Considering the extreme mildness of the climate, the insect would be certain to increase more rapidly in this colony than in the more rigorous region of Canada. It is very interesting to observe the progress of exotic insects in countries now being colonized.—W. W. Smith, Ashburton, N. Z. *Dec.* 1893.

CURRENT NOTES.

We have already called attention to the fact that an enterprising publisher in Brussels, Mons. P. Wytsman, has undertaken the re-issue of Hübner's *Sammlung exotischer Schmetterlinge*. The first part (livraison) has just appeared, and contains ten finely-coloured plates. The re-issue is a timely one, for the original work is very rare, and, considering the more profound, and at the same time more world-wide view of entomology which is increasingly characteristic of the entomologists of to-day, even in Great Britain, it is of great advantage to be afforded readier means of access to plates and descriptions, from such a hand as that of Jacob Hübner. The usefulness of the book will be greatly increased by the fact, that M. Wytsman has secured the co-operation of Mr. W. F. Kirby, than whom probably no man living has a more thorough acquaintance with synonymy, and who seems to have all sorts and conditions of entomological literature literally at his finger ends. Mr. Kirby will contribute additional notes, and a synonymic index, and by this means, Hübner's grand old book will be brought thoroughly up to date. All societies that can possibly manage it, should secure a copy.

The valuable series of papers that appeared in the earlier volumes of this magazine, on "The genus *Acronycta* and its allies," from the pen of Dr. Chapman, have now been published separately, and may be obtained of Mr. Porter, Princes Street, Cavendish Square, W.

The South London Entomological Society advertises a Field Meeting for July 7th, at Wisley, Surrey, conducted by Messrs. Briggs and Step.

Messrs. Cassell & Co. have just commenced the re-issue in monthly parts, of Mr. W. F. Kirby's *European Butterflies and Moths*; the first part appeared on the 25th ult. This will afford an excellent opportunity to those who desire to extend their knowledge beyond the

lepidopterous fauna of Great Britain, to become possessed of this valuable work. The only subject for regret is that, so far as appears from the prospectus, there is not to be a supplement bringing the book up to date.

We have received from Mr. Cockerell No. 1 of *The New Mexico Entomologist*, a three-page pamphlet prepared by himself and issued by the Entomological Department of the New Mexico Agricultural Experiment Station. It deals in a simple practical way with agricultural pests, and must be of much use to farmers and others. The Codlin Moth, of which in all its stages drawings by Prof. Riley are given, forms the *pièce de résistance*. "In the spring," says the writer, "the moths lay their eggs on the small apples, mostly in the cup at the top formed by the calyx. This is done soon after the flowers fall, while the little fruits are still upright. The caterpillar, or worm, hatches out of the egg, and burrows into the apple: once it is inside the fruit, there is no satisfactory way of killing it. Therefore, it must be poisoned at the very beginning of its life, by means of an arsenical compound. Paris Green is the compound to be used. It must be sprayed on the trees, mixed with water, so that some falls on every forming apple. The worm will then be unable to burrow without encountering some of the poison." Instructions are then given as to the method of using the insecticide, which is pronounced to be quite devoid of danger if only applied to young fruit. Probably our local authorities who have charge of open spaces, might find the same compound useful to protect their hawthorns from the ravages of *Hyponomeuta padellus*.

The very latest thing in entomological science is to be found in *The Entomologist*, p. 172. It may be divided into two portions. (1) Speculation; (2) Discovery. It occurs in a paper or heterogeneous collection of statements by Mr. C. W. Dale, on "The Melanism Controversy." The "Speculative" portion reads as follows:—"The yellow varieties of *Zygaena*, I think, may be cited as another instance of occasional pale varieties occurring on chalk soils. Perhaps some of the pale varieties are owing to their emergence during brilliant moonlight." We dare not give our fancy free play, so will only say that this is the most exquisitely funny of all the funny things that Mr. Dale has written, and that is saying a great deal. At first we wondered whether the editor of our contemporary was away for a holiday, but second thonghts enabled us to understand his position. We would even have printed this *jeu d'esprit* from Mr. Dale's facile pen ourselves. The second part, relating to "Discovery," has a bearing on physical research:—"Leaves frozen on to the ice will also absorb the sun's rays, the ice melting beneath and around them." Rather late in the day for this; we would suggest that even ice itself absorbs the rays of the sun, and that this is the reason why it melts when there are no leaves on it. There is another paragraph which contains a faint suggestion that the study of the process of etiolation of celery, might throw considerable light on the occurrence of pale varieties of lepidoptera, but we must forbear!

We are pleased to recommend to nature lovers, archæologists, and persons interested in folk-lore and kindred subjects, *The Kentish Notebook: A Record of Men, Manners, Things and Events, connected with the County of Kent*, Edited by G. O. Howell, 210, Eglinton Road, Plumstead, Kent. The contents of this handsomely bound volume appeal to all educated men and women, but more especially to Kentish men and

men of Kent, who will find matters of interest connected with their own immediate neighbourhoods dealt with in a manner at once interesting and attractive. Paragraphs, with an old-world flavour, about those charming old-world towns and cities which Dickens so dearly loved; quaint sayings and old-time records; accounts of some of the strange archæological remains which still occur among the glades and hills we love so well; these are mixed together in a charming hotch-potch. Many a pleasant hour may be spent looking over these odd remnants, and it is well that in most of our counties there are to be found a few disinterested men and women who delight in collecting these stray records for our delectation. We cannot suppose that such work ever pays; probably the pleasure of doing it is as great to the writer as is the pleasure of reading it when done to the reader. But at any rate such productions as that under review should not leave the author out-of-pocket, and we trust that many nature lovers in general, and Kentish naturalists in particular, will get their interest raised to a sufficiently high pitch, to lead them to send Mr. Howell a postal order for 10/-, for *The Kentish Note-book*, at which price the book is issued.

It would appear to be the opinion of many of our Micro-lepidopterists that *Lithocolletis dunningiella* is only a form of *L. nicellii*. A well-known lepidopterist says:—"The series in the collections of Messrs. Sang, Gregson, Shields, Bond and Sheppard showed an insect darker, smaller, and perhaps with the fore wings narrower, which naturally appeared to make two of the opposite spots unite into a third fascia, but Stainton, in the *Manual*, describes the larger as *dunningiella*, the smaller moth as *nicellii*, evidently an anachroism!" Here, then, is something for our energetic Micro-lepidopterists to clear up.

It is with a certain amount of pleasure that we learn that Prof. C. V. Riley has resigned his office of Entomologist of the U. S. Department of Agriculture, although we regret to find that considerations of health and peace of mind are among the reasons that have induced him to take this step. Prof. Riley stands out *par excellence* as the practical entomologist among the officials in the service of the United States, as the man who knows the subject from personal observation and is not content to regard the naming of insects as the be-all and end-all of entomology. The almost entire absence in the United States of work in the more scientific branches of entomology done by the professional entomologists, is really remarkable. We rejoice to think that, set free from the unnecessary red tape and the needless restrictions, which seem to characterise departmental life in the United States as well as in this country, Prof. Riley hopes, in connection with his honorary curatorship of the Department of Insects in the U. S. National Museum, to do some long contemplated work of a purely scientific character.

Of what does the family TINEIDÆ consist in America? Prof. Fernald (*Ent. News*, p. 138) writes:—"The family Tineidæ or Leaf-miners, is one of the largest of the Lepidoptera. . . . . The members of this family are principally vegetable feeders, yet a few of them feed on hair, feathers and woollen fabrics, often causing great injury. Many of those living on vegetable matter are of economic importance, since they feed on such plants as are of direct value to man, while a large number of the species feed on plants that are of little or no value. The larvæ of the larger species feed under ground, on the roots of plants; between leaves rolled or drawn together; or burrow in stems, fungi or

decayed wood. Some of the larvæ of the smaller species live in peculiarly-shaped cases, which they form from portions of the leaves on which they feed. The great majority of the smaller species mine between the cuticles of the leaves. These mines are very plainly visible, and their peculiar form is characteristic of the species." This group, with a simple "*idae*" or family termination, would appear, according to Prof. Fernald, to comprise everything which we in our ignorance used to include in the TINEINA, *viz*: part of Dr. Chapman's *Pyraloids* in the OBTECTÆ, and a number of the main groups of INCOMPLETÆ. If this were the ordinary style of studies in Elementary Entomology offered to our brothers of the net in American Magazines, we should pity them. Why do not their teachers level themselves up to modern ideas first, and then teach afterwards? We would recommend a careful working out of the classification of the American moths, on the lines of Dr. Chapman's paper, *Trans. Ent. Soc. Lond.*, 1893, pp. 97-119. We would also suggest that it is high time that some intelligent American entomologist broke away from a classification based on some particular imaginal feature (neuration, palpi, &c.), and attempted something more worthy the name of science. Such a lesson in elementary entomology as this, is something like one on geological science, based only on the Biblical account of the Flood.

Two specimens of *Chrysophanus dispar* sold at Stevens' sale-rooms on May 22nd, realised £10. In the same collection, seven *Pieris daplidice* with 78 other specimens, produced 3s.; five *Vanessa antiopa* with 49 others, 6s.; four *Argynnis lathonia* with 88 others, 3s.; whilst four *Deilephila euphorbiae*, six *D. galii*, one *D. livornica*, and many other Sphingidæ produced but 7s.; a pair of *Agrotis subrosea* produced £1 8s.; another pair £1 2s.; and three females of the same species 16s. Lot 85, containing four *Cleora viduaria*, produced £3, and five *Phibalapteryx polygrammata* £1 12s. 6d.—On the same day, Lots 418, 419, 420, consisting of 15 *Callimorpha hera*, "bred from parents captured in South Devon, 1892;" *Deilephila galii*, "10, very fine, Eton, March, 1892;" *Lasiocampa ilicifolia*, two, "captured by Mr. A. Edmond, Ascot, 1891-2," were brought to the hammer, but we do not know what they produced. This was followed on May 29th, by Lots 301–306; in which were 10 *C. hera*, "bred from parents captured in South Devon, 1892;" four *L. ilicifolia*, "captured by Mr. A. Edmond, Ascot, 1894;" six *Phibalapteryx conjunctaria*, "taken by Mr. A. Edmond in neighbourhood of Windsor, 1894." This last is strange reading; 10 *galii* at Eton, in March 1892, *P. conjunctaria* "in neighbourhood of Windsor, 1894" (the present year, mark !). Who is Mr. A. Edmond who captures these insects?"

VARIATION.

SPILOSOMA LUBRICIPEDA VARS. EBORACI AND FASCIATA.—I would venture to appeal to Mr. Tugwell to publish a description of each of these varieties and so enable those lepidopterists, who have no chance of seeing his specimens, to identify the forms should they ever come across them. If to this Mr. Tugwell would add a diagnosis of the other named forms, he would confer a great boon on entomological students, and as the *Record* is *par excellence* the student's magazine,

probably the description, &c. would most advantageously find a place in its pages.—F. J. Buckell, Canonbury. *April 28th*, 1894.

Melanism in Greenland.—In a paper on the "North Greenland Microlepidoptera" (*Ent. News*) Prof. Fernald writes:—"One of the most interesting features of this small collection is the very dark colour of the insects. The specimens of *Laodama fusca* and also of *Pyrausta torvalis* are much darker than any I have ever seen before, either of those taken in New England or in Labrador, but when we recall that Mr. Mengel states that they rest on the lichen-coloured rocks we have not far to seek for the cause of this dark colour. The lichens, which almost entirely cover the rocks in northern regions, are very dark brown or black, and when insects habitually rest on such places the lighter-coloured varieties are more easily seen and destroyed by their enemies, and the dark forms are left to propagate the species, and as a result a dark race is formed in time." The specimens referred to were taken at McCormick Bay, North Greenland, in lat. 77° 42′ N., between July 25th and August 1st, 1891.—J. W. Tutt.

NOTES ON COLLECTING, Etc.

Spring Notes.—Mr. M. Stanger Higgs of Lydney, Gloucestershire, reports that sallow has attracted nothing but the common *Taeniocampae*, and that beating and ordinary mothing have yielded *Anticlea badiata*, *A. nigrofasciaria*, *Larentia multistrigaria*, *Hybernia rupicapraria*, *H. leucophearia*, *H. marginaria*, *Anisopteryx aescularia*, *Empithecia pumilata*, *Taeniocampa gracilis*, *T. populeti*, and of Micros, *Pterophorus monodactyla*, *Coccyx splendidulana*, *C. argyrana* and *Diurnea fagella*. He also states that larvæ of *Melitaea aurinia* are abundant, and nearly full-fed. ———Mr. T. Greer reports from Bath the capture of *Euchloë cardamines* on April 2nd, of *Pyrgus malvae* on April 20th, and of *Hemerophila abruptaria* at a gas-lamp, on April 21st. He also notes the capture in August last, of *Lycaena bellargus* and *L. corydon* on the ground above Box Tunnel, where the formation is not chalk, but oolitic lime-stone, and of *Bupalus piniaria*, which latter he suggests must have been a second brood.———Mr. L. H. Bonaparte Wyse, Co. Waterford, Ireland, writes:—"On April 23rd I captured a fine ♀ *Leucophasia sinapis*, not in or near a wood but in an open field; although I have searched carefully whenever the weather permitted, I have not come across another specimen; I had no idea that the insect was found in this part of Ireland. Most of the spring butterflies are now out. *Pararge egeria*, *P. megaera*, *Pieris rapae* and *P. napi* are very common, and occasional specimens of *Euchloë cardamines* are to be met with. I have not yet seen *P. brassicae* on the wing, but I always find it later than the other two. Hybernated specimens of *Vanessa urticae* are everywhere; a few *V. io* are met with; of *V. atalanta*, which swarmed in our garden last autumn, I have seen no hybernated specimen."———Dr. Freer, writing on May 29th of the insects of Cannock Chase, says:—"On April 30th I took a specimen of *Notodonta dictaeoides*, which I should think is a record emergence; on the same day odd specimens of *Spilosoma fuliginosa*, *Pachnobia rubricosa* and *Hadena glauca* were taken, with an asymmetrical var. of *Thecla rubi*. The right wings were normal, but the upper left wing had a patch of lighter brown than the rest of the wing,

apparently occupying the area over the discoidal cell. The lower left wing is grey as contrasted with the right brown wing, and the underside of this wing is a distinctly blue green, and contrasts strongly with the three other wings; insect apparently a female, and not a hermaphrodite. *Incurvaria pectinea* was very abundant. May 6th: *H. glauca* and a worn specimen of *Anarta myrtilli*. May 13th: A fine *H. glauca*, *Eupithecia indigata*, and *E. lariciata*. May 18th: *N. dictaeoides* ♀ and ♂ on some palings near a village some way from the Chase. May 20th: Most of the above with the addition of *Eupithecia nanata* and *Tephrosia biundularia* (usual dark form); *E. indigata* is much commoner than usual, but insects are very late."———Mr. Stones writes May 29th:—"I took a very fine specimen of *Vanessa c-album* at rest on the 26th of April, at Llandudno, Carnarvon, North Wales; and on April 14th I took *Nyssia zonaria* at Blackpool, Lancashire."——— The Rev. E. C. Dobrée Fox (Castle Moreton) reports on March 30th, that *Taeniocampa munda* was more plentiful than usual, whilst four specimens of *T. miniosa* occurred in the district for the first time. Day work produced only two *Brephos parthenias* and two *Larentia multistrigaria*.———Capt. Robertson writes, under date of April 14th, "I have just returned from Swansea after an unsuccessful expedition for black *Tephrosia crepuscularia*, of which I only captured three specimens, two of which were typical. The only other insects captured were *Eupithecia abbreviata*, *Xylocampa areola*, *Lobophora carpinata*, *Mesotype virgata*. At my moth trap last night (at Coxhorne) I took *Anticlea nigrofasciaria*, *Selenia bilunaria*, *Larentia didymata*. I captured a specimen of *Encosmia certata* in the garden on the 11th. *Vanessa c-album* appears to be common; a female, captured March 30th, laid a few eggs on nettles on April 2nd, which hatched April 11th. I have larvæ of *Nyssia hispidaria* feeding on hawthorn and willow."———Mr. W. F. de V. Kane (Kingstown) writes on April 24th:—"The season has been suitable for sallow collecting, but the results as to quantity rather disappointing both at Monaghan and Galway, where I spent a week collecting. *Taeniocampa munda*, however, seems to have been more abundant than usual, as hitherto I have rarely met with it; but at Drumreaske, one night's beating produced some twenty specimens to myself and a friend, and I have records of the species from several new localities. The ten specimens which fell to my share are extraordinarily varied in colour and pattern, from a rich buff to grey-brown, with the spots sometimes obsolete, at other times very distinct, and many of them have a very dark band across mid-wing. *T. opima* occurred again in Galway, also *Panolis piniperda*. *Lobophora carpinata* was scarce, but one female laid some ova. *T. gracilis* was abundant, but I noticed that a great many were more or less crippled both in hind and fore wings. The season undoubtedly in some way affected the pupæ of this species adversely. *Brotolomia meticulosa* emerged early in April. *Xylina ornithopus* occurred occasionally on the white bark of birch trees. How is it that *Pachnobia rubricosa*, which occurs but sparsely in Ireland, is sometimes very abundant on sallows growing on the edge of a bog? I have taken a couple of dozen thus more than once, but ordinarily it occurs singly and rarely all over Ireland."———Mr. Moberly on April 30th writes:—"At the New Forest last Saturday, three or four hours hard work only produced six larvæ of *Apatura iris*. The scarcity of common larvæ was very noticeable during our beating. Larvæ of *Cleora liche-*

naria are also scarce, as are those of *Boarmia roboraria*. The exceptions to this rule of scarcity in larvæ seem to be *B. abietaria*, and in imagines, *Asphalia ridens*."———The Rev. C. R. N. Burrows (Rainham, Essex), reports on May 3rd, that *Smerinthus tiliæ* was captured on May 1st, *Ligdia adustata* on April 25th, *Cidaria suffumata* and *Aleucis pictaria* on April 11th.———Mr. Mason (Clevedon), on April 12th, reports:—"The emergence of *T. munda* and *T. pulverulenta* in my breeding cage during the first week of March, the continued mild weather and the absence of sallow bloom, induced me to try sugar. The evening of the 8th was gusty, with south-west wind, and rain at intervals; but not to be disappointed, just before dusk, a line of trees just inside a large wood was sugared, and about 7 o'clock I sallied forth. As I turned my lantern on the first patch of sugar, I saw that moths were literally in dozens. *Taeniocampa munda, T. pulverulenta, T. gothica, T. stabilis, T. instabilis, Orrhodia ligula, O. vaccinii, Scopelosoma satellitia* and one fine specimen of *Dasycampa rubiginea*, perhaps a shade lighter than specimens taken last November, but otherwise, in excellent condition; *T. munda* was in splendid condition and endless variety, some specimens being beautifully banded, others of a dark reddish-brown colour. This first patch was but a sample of all the other patches, except that I got no more *D. rubiginea* on this evening. The next evening another *D. rubiginea* and *S. satellitia* were the only species seen, as there was the suspicion of a frost. The following evening was dull and warm, and insects were even more numerous than on the first night; *Calocampa exoleta, B. meticulosa*, and *X. ornithopus* coming, in addition to the species seen the first evening, whilst two more *D. rubiginea* were captured, with specimens of *O. ligula* var. *subnigra*. The *D. rubiginea* were all males, and I had never yet before seen var. *subnigra* after hybernation. The following evenings were wet, and the sallows were coming into flower, so I gave up sugaring for a time, although on a subsequent evening I took another *D. rubiginea*, missing a second on the same evening, whilst yet another fell to my share from the sallows, late in March, and a friend took another. I find larvæ both late and scarce; *Tephrosia crepuscularia*, too, has been very rare this spring."———Mr. E. A. Atmore (Kings Lynn), on April 17th, records that:—"Micros are coming on apace. I have already taken several species of *Lithocolletis* and *Nepticula, Adela cuprella, Perittia obscurepunctella, Steganoptycha pygmæana, Heusimene fimbriana*, and the early species of Micropteryx—*semipurpurella, purpurella, unimaculella* and *subpurpurella*."———Mr. Finlay (Morpeth), writes on April 24th:—"During the time that the sallows were in blossom I only had one good night, when I captured several *P. piniperda, T. opima, T. populeti, T. gothica, T. instabilis, P. rubricosa*, whilst *T. stabilis* were very plentiful and *T. pulverulenta* a nuisance."

WHITSUNTIDE ON THE COTSWOLDS.—A small party of members of the Birmingham Entomological Society spent May 12th to 15th in the neighbourhood of Selsley. The weather was not all that could be desired, and as a consequence the captures did not come up to expectation. Larvæ of *Nudaria mundana, Callimorpha dominula, Nemeophila plantaginis*, &c. were obtained and imagines of *Nemeobius lucina*, &c. The hymenopterists were well satisfied with their captures, and the dipterists rejoiced in adding two new species of *Syrphus* to the British list, Mr. R. C. Bradley taking a specimen of *Syrphus triangulifer*, Zett. and myself one of *S. annulipes*, Zett.—COLBRAN J. WAINWRIGHT, Birmingham.

COLEOPTERA IN THE HASTINGS AND EASTBOURNE DISTRICTS.—The following species, together with many of less note, have been taken in the above districts since October, 1893: *Agathidium marginatum*, *Amara spinipes*, *Anchomenus oblongus*, *Badister sodalis*, *Bledius atricapillus*, *B. tricornis*, *B. unicornis*, *Brachinus crepitans*, *Choleva angustata*, *C. agilis*, *Cocnopsis waltoni*, *Cryptarchia strigata*, *Dromius nigriventris*, *Dyschirius thoracicus*, *Elaphrus cupreus*, *Gronops lunatus*, *Haltica consobrina*, *Harpalus rotundicollis*, *Helodes marginatus*, *Heterocerus laevigatus*, *H. obsoletus*, *H. sericans*, *Hydroporus ferrugineus*, *Hylastes obscurus*, *Lathrobium longulum*, *L. terminatum*, *Mylloena kraatzii* (?), *Philonthus thermarum*, *Plectroscelis subcaerulea*, *Plinthus caliginosus*, *Phytobius velatus*, *Polystichus vittatus*, *Pterostichus gracilis*, *Rhagium bifasciatum*, *R. inquisitor*, *Saprinus metallicus*, *Stenus pubescens*, *Strophosomus obesus*, *S. retusus*, *Sunius intermedius*, *Thiasophila angulata*, *Trogophloeus halophilus*, *Tropiphorus carinatus*. The following were taken in the neighbourhood of Chatham: *Bledius opacus*, *Otiorrhynchus tenebricosus*, *Plinthus caliginosus*, *Silpha laevigata*.—W. W. ESAM, St. Leonard's. *May* 21*st*, 1894.

DEIOPEIA PULCHELLA IN HERTFORDSHIRE.—I have recently seen, in the collection belonging to the Boys' Farm Home at East Barnet, a specimen of this moth, which was captured by Mr. Rühl, the schoolmaster, in May, 1892, on the bank of the G. N. Ry. near Oakley Park Station. Although a search has been made, no other specimens have been seen.—A. E. GIBBS, St. Alban's. *May*, 1894.

SOCIETIES.

At the meeting of the ENTOMOLOGICAL SOCIETY OF LONDON on May 2nd, Mr. S. Stevens exhibited a specimen of *Argynnis aglaia* var. *charlotta*, taken by the late Rev. James Watson in the New Forest in 1870. Mr. J. A. Clark exhibited a curious variety of *Arctia caia*, having an extraordinary wedge-shaped marking extending from the outer margin to the base of the left hind wing, and also, on the same wing, a small spot which was brown and white in colour, and had the appearance of having been taken from the fore wing and inserted in the hind wing. The specimen was said to have been taken at Abbott's Wood, in July, 1892. Prof. E. B. Poulton exhibited living specimens of the larvæ of *Lasiocampa quercifolia*, which had been surrounded respectively during the early stages of growth, by black twigs and lichen-coloured twigs, the food being the same in both cases. All the larvæ were shown upon a white paper back-ground, but examples of the surrounding twigs which produced the change of colour, were shown beside each batch. The presence of darker or lighter twigs and spills of paper of various colours, was found to cause very great modification in the colour of the larvæ. When lichen-covered twigs were used, the larvæ assumed a mottled appearance, which caused them greatly to resemble their surroundings. Mr. A. E. Gibbs has found that larvæ of *Amphidasys betularia*, fed on birch, assumed a shining brown tint resembling the twigs of the food-plant; others, however, that were fed on the leaves of the garden acacia, which have a bright green petiole, were green in colour. The latter, however, is not uniformly the case; Dr. Buckell reared a brood exclusively on acacia, and these contained both brown and green forms, the brown predominating.

At the South London Entomological and Natural History Society, on April 12th, the President referred to the great loss which the Society had sustained by the death of Mr. J. Jenner Weir, who had always taken such an active interest in its welfare, and it was unanimously resolved that a letter of condolence should be sent to Mrs. Weir. Exhibits:—Mr. Adkin for Mr. Billups, the following rare Diptera; *Meigenia majuscula*, from Dulwich, new to Britain; *Sciomyza rufiventris*, from Ireland; *Degeeria pulchella*, bred by Mr. Adkin from *Peronea maccana*; *Urellia eluta*, from Lewisham, and an unknown species of *Phorbia*: also galls of *Dryophanta divisa* and their maker, with *Synergus albipes*, one of its Inquilines and five parasites, viz.: *Mesopolobus fasciventris*, *Syntomaspis caudatus*, *Upelmus urozonus*, *Decatoma biguttata* and a Chalcid. Mr. Step; a specimen of a fungus (*Morchella esculenta*) from Wootton under Edge. Mr. Jäger stated that he had met with a considerable number of cripples of *Biston hirtaria*, all of which were malformed on the right side. The President gave an interesting account of the curious habit indulged in by some ducks, of killing toads during the breeding season, by dexterously slitting their abdomens.—On April 26th, the following among other exhibits were made. Mr. Dennis; a bred *Pararge egeria*, in which all the light markings were much extended. Mr. Auld; a series of *Taeniocampa munda*, with several examples of var. *immaculata*, from West Wickham; *T. populeti* from Westerham. Mr. Enoch read some "Notes on common insects," and illustrated the paper with about fifty lantern slides. The paper dealt largely with common pests and their parasites, such as the sycamore aphis, with its numerous enemies, the currant mite, the sawfly of the willow with the insects which attack its larva, the flies whose larvæ mine the marguerite plant, the parasites of the Hessian Fly, and last, but not least beautiful, the minute Fairy Flies, of which Mr. Enoch stated that he possessed at least one hundred and fifty species. He laid considerable stress upon the economic side of the subject, and strongly advocated following the example set by the United States Government, in having an entomological section attached to the Agricultural Department. Most of the information given was the result of original observations, and unobtainable in any book.* The admirable manner in which the interesting and peculiar life-histories of these minute creatures were pourtrayed upon the screen and described, excited the greatest admiration among the large number of members and friends present.—On May 10th, Mr. South exhibited a bred series of *Boarmia cinctaria*, together with the female parent which was from Glengariff, Ireland; the specimens were pale, like the parent, but not so pale as those captured by Mr. Kane some time ago. Mr. Frohawk exhibited a specimen of *Vanessa urticae* in which the blue marginal spots were exaggerated and extended about twice as far as usual into the black border. Mr. Williams showed a bred specimen of *Pieris napi* in which only the hind-wings had developed. Mr. Turner exhibited *Sirex gigas* from Box Hill and Chichester, and *Bombylius major* from Box Hill. —On May 24th, the following, among other exhibits, were made:—

* This being so, it would be well if the South London Entomological Society printed the paper in their *Proceedings* as soon as possible. We understood in January last, that the *Proceedings* for 1892 and 1893 were then quite ready for the printer. When will members get this volume?—Ed.

Mr. C. A. Briggs; a specimen of *Lycaena argiolus*, in which some of the spots on the underside were lengthened into streaks; also, a specimen of *Vanessa io* in which the eye was only partially developed. Mr. Dennis; one specimen of *Vanessa urticae* with a perfect and others with an imperfect band on the upper wing. Mr. Adkin; a long and variable series of *Boarmia cinctaria* bred from ova obtained from County Cork; an extreme variety had only a broad marginal dark band, a central light band and basal dark patch. Mr. Hamm; a striking form of *Apamea unanimis*, in which there was a light grey cloud extending from the apex of the fore-wings along the hind and inner margins to the base; also a specimen of *Lithosia griseola* of a brown instead of a leaden hue. Mr. Billups; the following new and rare Diptera:—*Chortophila setaria*, Mg., from Dulwich; *Blepharoptera inscripta*, Mg., from Oxshott and Bromley; *Heteromyza atricornis*, Mg., and *Hypostena medorina*, Schnr., from Oxshott; *Lepsis punctum*, F., and *Callomyia amaena*, Mg., from Bromley. Mr. Turner; two specimens of the rare Homopteron, *Centrotus cornutus*, taken by Mr. Lewcock at Seal Chart; also *Helix lapicida*, from Box Hill.

We are glad to introduce to our readers the Herts Natural History Society and Field Club, which has its head-quarters at Watford, but which is to some extent peripatetic, meeting frequently at St. Alban's, and occasionally at Hertford and other places. The President of the Society is Dr. Stradling, F.Z.S., and its Secretaries Messrs. John Hopkinson, F.L.S., F.G.S., of The Grange, St. Albans, and F. M. Campbell, F.L.S., F.Z.S., of Rose Hill, Hoddesdon. Owing to the fortunate circumstance that one of its most active members, Mr. A. E. Gibbs, F.L.S., F.E.S., is one of the proprietors of *The Herts Advertiser and St. Alban's Times*, its proceedings are very fully reported in this county paper (in a copy before us the report occupies four columns), and thus its educational influence as regards Natural History matters, is very widely diffused. The 181st meeting of the Society was held on April 17th, and was devoted to the readings of carefully compiled summaries of the observations of a great many naturalists in various parts of the county during 1893. Mr. A. E. Gibbs dealt with the Lepidoptera. Sugar during the early part of the year was generally unattractive, but yielded better results in the autumn. Larvæ were very abundant, but pupa-digging was unproductive. One member reported that old sacks, boxes, &c. placed about the garden, proved fertile traps; several good things being taken by their means. As elsewhere, the season was an early one, many species emerging about a month before their usual time. The following species, which had not previously appeared in any of the county lists, were reported: *Setina irrorella*, by Mr. John Bowden from East Barnet; *Bombyx castrensis* and *Pygaera pigra* by Col. Gillum, from the same place; *Agrotis puta*, *Hadena dissimilis*, *Selenia tetralunaria*, *Cheimatobia boreata* and *Eupithecia minutata*, by Mr. S. H. Spencer, jun., from Watford. Butterflies were plentiful, especially in the early summer months; of *Colias edusa*, whose abundance was one of the great entomological features of 1892, there is only a single record in 1893, and that from Harpenden, where a few specimens were seen; the Vanessas were more abundant in the larval than in the imaginal stage, while exactly the reverse was the case with the Whites. *Euchloë cardamines* was more abundant than usual; one member stated that all the specimens he captured were of a small size; *Vanessa polychloros* was getting

scarcer; *Lycaena corydon* was reported from Lilley Hoo, and *L. minima* from a railway-cutting on the Cambridge and Hitchin line. Among the HETEROCERA: two larvæ of *Acherontia atropos* were found in the middle of July, at St. Alban's; these pupated successfully, and the imagines emerged at the end of September or beginning of October; *Macroglossa stellatarum* was everywhere much more abundant than usual; one member reported that a specimen visited a piece of honeysuckle that he was wearing as a button-hole; *Trochilium apiforme* was netted at Colney Heath.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*April 3rd*, 1894.—It was unanimously resolved to send a letter of condolence to Mrs. Weir, expressive of the great regret with which the Society had heard of the sudden death of Mr. J. Jenner Weir. Exhibits:—Mr. Tremayne; *Nemeobius lucina, Lobophora hexapterata, Thecla rubi, Tephrosia extersaria, Notodonta dodonea,* and others taken by him in the New Forest, at Whitsuntide 1893. Mr. Battley; *Nyssia hispidaria* from Epping Forest. Mr. Nicholson; a ♀ *Euchloë cardamines,* bred from ova found in the New Forest. Mr. Southey; *Cidaria suffumata* from Hendon, where it seemed to have become almost extinct. Mr. Lewcock; *Silpha subrotundata* from Ireland; he believed this to be quite distinct from *Silpha atrata*, although it was considered by many as merely a variety of that species. Mr. Tutt; pupæ of *Thais polyxena*; these pupæ appeared to form a connecting link between *Parnassius* and *Papilio*; they were attached to twigs by the tail, and also by a belt, which, however, did not pass round the waist as in *Papilio,* &c., but was held by two hooked processes on the head of the pupa; these hooks were probably evolved from the two ear-like points found in *Papilio*: he also exhibited drawings of a typical pupa of *Papilio,* to illustrate some remarks which he made on some apparently insignificant, but really important points, in the structure of pupæ. Mr. Battley had found *Taeniocampa populeti* fairly common near Broxbourne; it was found chiefly on sallows which were in close proximity to aspens, but could also be obtained by searching the aspen twigs after dark; in the same locality he met with the following species and read:—

NOTES ON THE HABITS OF BREPHOS NOTHA.—This species occurred on the outskirts of a wood near Broxbourne, in which were a few aspens. The moths began to fly soon after 10 a.m., at which time they were, like *B. parthenias,* very sluggish and easy to capture. About mid-day they retreated into the thicker parts of the wood, but at 2.15 p.m. they suddenly appeared in large numbers on the sheltered side; after five minutes' flight they went back again into the wood for about ten minutes, when they again re-appeared; this was repeated several times.

Mr. Tutt said that *B. notha* was to be obtained in some numbers by shaking the aspens at dusk.

April 17th, 1894.—Exhibits:—Mr. Smith; *Thecla betulae* and *Lycaena argiolus* from Epping Forest. Mr. Bacot; *Nyssia hispidaria* and *Taeniocampa munda* from Chingford; the latter, which were bred, consisted mainly of the var. *immaculata*. Dr. Chapman remarked that in years when this species was plentiful the specimens showed no great variation, but when it was scarce, those specimens which *did* occur, usually varied considerably, both from the type and *inter se*. Mr.

Goldthwait; *Asphalia ridens*, bred, from the New Forest, and one dark specimen from Ongar Park Wood, Essex; also a fine specimen of *Vanessa antiopa* taken in Monk's Wood, Essex, on April 7th, by Mr. Whittingham of Walthamstow. Mr. Mera; several hybernated larvæ of *Orgyia gonostigma*, part of a brood hatched last June, the majority of the brood having fed up and emerged in the autumn. Mr. Clark; a black specimen of *Phigalia pedaria* from Barnsley, and two specimens of *Crambus pinetellus* from Scotland. Capt. Thompson; a larva of *Zeuzera pyrina* found in his garden in Myddelton Sq., E.C.; it was comfortably ensconced in a piece of stick only slightly larger in diameter than that of its own body. Mr. Tutt: (1) a typical *Lycaena corydon*, captured in July 1893; (2) a hybrid between *L. corydon* and *L. bellargus*, taken *in copulâ* with a typical ♀ *L. bellargus*, on May 20th, 1893, at which time the latter species was very abundant, *L. corydon* not being on the wing till some weeks later; the specimen retained the external features of *L. corydon*, but had assumed to a great extent the coloration of *L. bellargus*; (3) a typical ♂ *L. bellargus* captured on the same day; (4) a ♀ *L. bellargus*, in which the pigment had failed in one hind wing; (5) a pale var. of *L. corydon*, captured in July, 1886, which was probably to be referred either to var. *apennina*, Zell., usually met with in Italian mountain districts, or to var. *albicans*, H.-S., usually met with in Andalusia; Staudinger says of the former "*pallidior*," of the latter "*albicans*," (*Cat.* p. 12). Mr. Bacot then read the following note:—

On Assembling Selenia tetralunaria.—On April 7th, 1894, I took a freshly-emerged ♀ to Epping Forest, to see if she would attract any ♂s for me. The night seemed a favourable one, being warm, with a light breeze from the E. I hung up the ♀ in a small cage about 6.30 p.m., and she commenced calling shortly after 7. The first ♂ flew up about 7.30, and others continued to come until 8.15. They generally came up singly, and at intervals of five or six minutes; but about 8, I found three on the cage together. I found I could box them without difficulty if I did not use the lantern, but the light seemed to frighten them. On reaching home about 10, I placed one of the ♂s in the cage with the ♀; he was lively for a few minutes, but then quieted down till midnight, when he began to fly again; the ♀ then commenced to call, and they paired at 12.15, remaining together till 9.30 a.m. Some of the ♂s were of a light ochreous tint; I thought this was a characteristic of the summer brood only.

Dr. T. A. Chapman, of Hereford, read a very interesting paper "On Butterfly pupæ and the lines of evolution which they suggest."*

NOTICE TO CORRESPONDENTS.

Will correspondents please be careful to write generic and trivial names as distinctly as possible? By so doing they will greatly assist us in avoiding errors.—Ed.

* This paper will be published in this magazine later in the year.—Ed.

The Entomologist's Record AND JOURNAL OF VARIATION.

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EREBIA EPIPHRON AND ITS NAMED VARIETIES.

A Study in Synonymy.

By FRAS. J. BUCKELL, M.B.

The type.—The butterfly which Knoch described and figured in 1783 (*Beiträge z. Insektengeschichte*, Stuck iii., p. 131, pl. 6, fig. 7) under the name of *Papilio epiphron*, was met with by him in abundance near the Brocken, in the Harz Mountains. From his description and figure we learn that it possessed the following characteristics:—Wings rounded, not pointed at the apex, their upper surface of a dark brown colour; there is an orange band near the hind margin of the fore-wings somewhat narrower towards the inner margin, but not reaching either this margin or the costa; this band is divided by the nervures into six compartments, and in from two to four of these are black spots, which sometimes have white pupils but more often have not. Near the hind margin of the hind-wings are three good-sized, more or less circular, orange blotches, in each of which is a black spot which, like those on the fore-wings, is sometimes white-pupilled but more frequently blind; these three blotches touch one another and so produce a certain band-like appearance; at either end of the three is a faint orange blotch, smaller and without a black centre. The under surface is not represented in the figure and the description of it is very meagre. It may be inferred, however, that it is very similar (in both wings) to the upper surface, save that the ocelli or spots are often more numerous; Knoch says that he has taken specimens with six ocelli. It is evident that he was not basing his description on a limited number of specimens, as was sometimes the case with the earlier authors, for he says that "variations are found in this *Papilio* in large numbers if the eye-points and spots are taken into consideration."

Fabricius notices the species under the same name in 1787 (*Mantissa Ins.*, vol. ii., p. 40, No. 411), having seen specimens in Bœber's cabinet; these evidently all had the ocelli white-pupilled.

Borkhausen, who seems to have been very fond of re-naming species, describes it in 1788 (*Naturgeschichte der Europ. Schmett.*, Th. i., p. 77, No. 16b) under the name of *Pap. egea*. He adds nothing to our knowledge of its characters, and one is inclined to think that he was describing not from nature but from Knoch. Next year (*l.c.*, Th. ii., p. 202) he says that the specimens with white pupils are females, and

inclines to the opinion that the insect is identical with *P. melampus*, Fuessly.

Ochsenheimer (1807) is an authority of considerable importance inasmuch as he deals with both *epiphron* and *cassiope*. Treitschke says that Ochsenheimer's specimens of *epiphron* came from Knoch himself, so that there could be no doubt about their identity. Ochsenheimer says (*Schmett. v. Europ.*, Bd. I., Abtheil. i., p. 258, No. 41) that, so far as he knows, this butterfly is only met with in the Harz Mountains; his diagnosis and description are worth quoting in full. Diagnosis: "Alis integris fuscis viridi nitentibus, fascia rufa, utrinque ocellis nigris pro individuis numero diversis." Description: "The untoothed wings are, on the upper surface, black-brown with a greenish gloss; on the fore-wings, near the hind margin, is a yellowish-red transverse band, which is divided by the nervures into several blotches and in which are found two, three or four black eyes, which in the female are larger and have white centres, but mostly appear only as black spots of varying size, although in none of the many specimens before me are they entirely wanting. The hind-wings are oval and have in the middle of the hind margin a projecting point; along the margin are three or four yellowish-red blotches, which often run together into a band only divided by the nervures, and therein, as in the fore-wings, are black spots or eyes, sometimes with white pupils. The underside is coloured like the upper but is without the gloss. On the fore-wings the yellowish-red band is only sharply defined along its outer margin, passing inwards into the ground colour, so that often the whole area to the base appears, more or less, yellowish-red. The spots or eyes are as on the upper surface, and the same is the case with the hind-wings."

It will be noticed that three new characters appear in this description: (1), a greenish gloss on the upper surface; (2), a projection from the centre of the hind margin of the hind-wings; (3), the occurrence of a reddish coloration over the disc of the fore-wings on the under surface.

We may then define the type as a butterfly in which, on the fore-wings the band is on both surfaces continuous, and on the hind wings consists of more or less coalescing blotches; in which the ocelli are sometimes, especially in the female, white-pupilled; in which the disc of the under surface of the fore-wings often has a more or less coppery hue, and in which the red surroundings of the black spots are well in evidence on the underside of the hind-wings.

a. Var. *melampus*, Esp.—The first variety to get a name was that which Esper between 1780 and 1786, described and figured (*Europ. Schmet.*, Th. 1, Bd. 2, p. 131, pl. 78, fig. 2), under the name of *Papilio melampus*, supposing it to be identical with the butterfly to which Fuessly had given that name in 1775. This form had already been figured by Ernst and described by Engramelle in 1779 (*Pap. d' Europe, Tom.* 1, p. 85, pl. 24, fig. 45), under the vernacular name of *Le petit nègre à bandes jaunes*, from Styrian specimens in Gerning's collection. Esper speaks of it as found very commonly on the mountains of Provence, and as occurring also in Hungary and Styria, and notes that Gerning had found it in 1766, in the Bernese Alps.

The characteristics of this form are to be found in the hind-wings, which, on the upper surface, have only two tiny orange dots, and on

the under surface are without markings. Meyer-Dür (*Nouv. Mém. Soc. Helvet.*, Bd. xii., p. 151, pl. 2, fig. 3) describes and figures a variety from the higher Bernese Alps, which he calls var. *bernensis*, which in some respects resembles the form figured by Esper. It is very possible that var. *nelamus*, Boisd., to which reference will be made in its turn, is identical with this form, in which case, it would be better to sink Esper's name as being already the name of a species, and to adopt Boisduval's name for this form.

β. Var. *cassiope*, Fb.—The name *cassiope*, by which the species has been most generally known, was given by Fabricius in 1787 (*Mant. Ins.*, vol. ii., p. 42, No. 417), to a butterfly which he saw in Schiffermüller's cabinet, and for which he gives Austria as a habitat, and grass as the food-plant. There is no indication that he recognised any close affinity between it and the *epiphron* of Knoch, which he had already described (No. 411). As there is some uncertainty about the exact meaning of some of the words, I give the original Latin. Diagn.: "Alis integris fuscis: fascia rufa; punctis tribus ocellaribus nigris, posticis subtus punctis solis." Description: "Alæ omnes supra nigræ fascia marginis haud attingente, in posticis imprimis maculari rufa et in hac puncta tria nigra. Subtus anticæ concolores, posticæ punctis tribus at absque fascia rufa." Borkhausen, in 1789 (*l.c.*, Th. ii., p. 204, No. 16e), gives what appears to be a free translation of this, as follows:—"All wings above black-brown with an orange band, which on the fore-wings is undivided and does not reach the margins, but which on the hind-wings consists of separate blotches and has three black points. On the underside the fore-wings are marked as above; the hind-wings lack the orange band, but the three black points are present."

Ochsenheimer gives the following diagnosis (*l.c.*, p. 261, No. 44): "Alis integris fuscis fascia rufa, punctis tribus nigris; posticis supra maculis rufis nigro punctatis, subtus fœminæ cinerascentibus, punctis solis;" and he goes on to say: "The ground colour is, in fresh specimens, dark black-brown; in those that have flown, paler. A rust-coloured or orange band, divided by the nervures, is found on the fore-wings near the hind margin; it is uniform in breadth, and two to four black spots are found in it. The hind-wings are oval, with a short projection in the middle of the hind margin; they usually show three or four orange blotches, of which some, rarely all, have black spots in them. In varieties, there are only one or two of these blotches, and the black spots are hardly, or not at all, perceptible. On the underside, the fore-wings are somewhat paler, the orange band is sharply defined on both margins and contains two or three black spots. The hind-wings are black-brown, and not markedly darker from the base to the middle; near the hind margin are one or several black dots in hardly perceptible delicate reddish-yellow circles. In varieties, they are sometimes entirely wanting. The female is larger, has a paler ground colour, and its spots are more numerous and larger on both fore-wings and hind-wings. The underside of the fore-wings is orange, with the costal and hind margins grey-brown; the band is distinct, sharply defined, and somewhat brighter than the disc. The hind-wings are brownish-grey beneath, darker from the base outwards, and three or four black dots stand in hardly-perceptible orange circles, near the hind margin. I have received this butterfly from Styria and Switzerland." Ochsenheimer does not seem to have recognised any intimate connection

between *epiphron* and *cassiope*, but Treitschke, in vol. x. of the same work (1834), expresses the decided opinion that they are specifically identical.

Freyer, in 1831 (*Neu. Beiträge*, Bd. i., p. 37, pl. 20, fig. 1–2), adds that the band of the upper surface of the fore-wings is much fainter in the male than in the female, and that whilst in the male there is little trace of any eyes on the under surface of the hind-wings, in the female, the three eyes of the upper surface appear through and are black-kernelled.

We may, I think, define this Alpine form, as possessed of the following distinguishing characteristics:—Ocelli never white-pupilled on the upper surface; band entire on the fore-wings, but broken up on the hind-wings into three or four orange spots with black centres; on the under surface of the hind-wings the black dots very small, and either not at all or only very obscurely encircled with orange.

γ. Var. *mnemon*, Haw.—In that rare volume of *Transactions of the Entomological Society of London* (i., p. 332), Haworth, in 1812, described under this name a butterfly that he had seen in Francillon's cabinet, and that had been captured in Scotland, by Stoddart. In this, the band of the fore-wings was broken up into four saffron rings, of which the third was the least and slightly exterior to the others; on the hind-wings were only two rings. Beneath, the wings were coppery-brown; the fore-wings had three brown points which were very indistinct, and obscurely surrounded with fulvous; the hind-wings were almost entirely unspotted. This comes very near to var. *melampus*, Esp., but there, the band of the fore-wings was not broken up.

δ. Var. *nelamus*, Boisd.—Boisduval, in 1840 (*Gen. et. Index Méth.*, p. 26, No. 195), establishes this form with only two words "*Sub-coeca* (Alp. Delph.)." Meyer-Dür thought it might be the same as his feebly-marked specimens from high altitudes in the Bernese Alps; and Frey, in 1880 (*Die Lepid. Schweiz*, p. 35), accepts this opinion. Lederer, in 1852 (*Verhandl. zool.-bot. Vereins in Wien*, p. 40), gives its habitat as Mont Dore, in Auvergne, and says that it "has above very little, on the hind wings sometimes no red; on the underside the eyes are wanting, or very obsolete. Lang (*Rhop. Europ.*, p. 241) says: "An alpine form in Switzerland. It has the black spots absent from the fulvous bands on all the wings." As already stated, it is quite possible that this form may be identical with that called *melampus*, by Esper.

ε. Var. *pyrenaica*, H.-S.—Whether this form, which Herrich-Schäffer (*Syst. Bearbeit.*, i., fig. 535–8, vi., p. 11) received from the Pyrenees, but which Lederer says also occurs in the Styrian mountains, is worthy of a distinct varietal name, is perhaps doubtful. The red band of the fore wings has become a series of longitudinal blotches, and on the under surface of the hind wings, are four hardly-perceptible black dots without irides. Lang (*l.c.*) says of it: "Larger than *cassiope*, with large ocelli on all the fulvous bands." This, however, is hardly in accord with Herrich-Schäffer's figures.

One or two other names must be glanced at. Hübner (*Samml. Europ.*, vol. i., figs. 202) figures what he calls *Pap. ianthe*, which he supposes to be identical with *epiphron*, Kn., *melampus*, Fuessl. and *cyca*, Bork. It is very difficult to determine whether this is the type or var. *cassiope*; our two great synonymists differ on the point, Staudinger inclining to the former view, Kirby to the latter. Newman in 1844

(*Zool.*, vol. ii., p. 729) describes and figures as *Erebia melampus* a butterfly taken by Mr. Weaver in the neighbourhood of Rannoch, which differed from the form which he was accustomed to call *E. cassiope* and to obtain from Cumberland. In his *British Butterflies* (p. 80) however, he admits that he was mistaken in supposing it not to be identical with that, and it is not, I think, possible to make any varietal separation of the two.

Staudinger, in his famous *Catalog*, thus distinguishes and locates the several forms, but it must not be forgotten that, at the time of the preparation of that work at all events, he was largely ignorant of British authors:—

Epiphron.—An outer red fascia or maculæ; the female with white-pupilled ocelli. Hab.—Hercyn. Mountains, Silesian Mountains.

Cassiope.—Red obsolete maculæ; black blind ocelli. Hab.—Germany (south), Switzerland, France, Piedmont, Hungarian Mountains *et* Alps, England (north), Scotch Mountains.

Nelamus.—Hardly ocellated with black. Hab.—Alps.

Pyrenaica.—Larger; with large ocelli. Hab.—Pyrenees.

It will be seen that the species is localised in two distinct centres (leaving this country out of the question for the moment). The type form is found in the more northerly area of distribution, its chief centre being the Harz Mountains, although it is also reported from the Riesen Gebirge on the east, and the Vosges on the west; *cassiope*, on the other hand, is an Alpine butterfly. It may be contended that only these two forms should be recognised as named varieties, and it must be admitted that the other forms seem rather to be sub-varieties of *cassiope*, than to be entitled to varietal rank. This question must be settled according to the opinion of the individual student. In this country, both in the Lake District and Scottish habitats of the species, *cassiope* is the prevailing form; the type does occur occasionally in Scotland, but rarely with white pupils, although, according to Dr. Buchanan White, even such are occasionally met with. It is a curious and suggestive fact that Morris, who only knew the Lake District as a locality for the species, nevertheless figures it with well-developed white pupils.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 146).

Chap. II.

THE OVUM OR EGG.

8.—On the probable existence of sex in eggs.—It has been suggested that the sex of imagines bred from eggs will be determined by the conditions in regard to abundance of food or the reverse, under which the larvæ are reared; that under a specially nutritious diet, lepidopterous larvæ tend to produce female imagines, whilst a starvation diet tends to the production of males. This pre-supposes a condition

of neutrality as regards sex in the newly-laid egg, but I do not know that this has ever been proved, even in the slightest degree. The idea of this sex-determining influence of nutrition has probably arisen from the well-known fact that bees and ants govern the sex of their offspring within certain limits, by special feeding; *i.e.* that larvæ, which would under ordinary circumstance produce neuters, can be made to produce queens if a special course of nutritious diet be commenced in the first two or three days of larval life. But so-called neuters are essentially females, not fully developed it is true, but of whose sex there can be no doubt, and I would suggest that what happens in these cases is, that the sexual neutrality of the ovum ceases on fertilisation, and that the special feeding only causes the production of a well-developed instead of an ill-developed female.

That neutrality of the ovum ever exists in insects after the egg has been laid is not probable, for in comparatively early stages of some lepidopterous larvæ, the sexual organs are clearly distinguishable. To suppose, therefore, that any course of feeding of the larva will alter the sex of the resulting imago, is to assume more than scientific entomologists are able to grant. Probably there is a point in its development at which the oval cell is sexually neutral, but this point may be a long way back in its history, possibly as far back as the embryonic stages of the parent. If a process of experimental feeding could be carried out through several successive generations, probably some influence might be exerted; but that any influence upon the sex of the resulting imagines can be exerted by such a process in a single generation, is in the highest degree doubtful. If it should happen that an experiment seems to yield an affirmative result, it is probably only a fortuitous coincidence. Experiments, to be worth anything, must be begun at a time when the ovum is certainly neutral, and then perhaps some definite impression might be made on the progeny.

It is of course quite possible, that the sexual neutrality of the ovum may be continued to a much later period of development in some species of the same class than in others, and in some classes of animals than in others. Further experiments as to the effect of food on sex are needed, but all who have bred large numbers of moths from eggs, know that no amount of nutritious food will ensure a preponderance of females, nor will a strictly starvation diet ensure a preponderance of males, from eggs laid in the ordinary course.

9.—On the sex of imagines bred from successively-laid eggs.—It has often been suggested that there was some general law connecting the succession of the eggs laid by the same moth with the sex of the imagines resulting therefrom, and that this took the form of a regular alternation of sex in successive eggs. It has more than once been asserted that, of two isolated larvæ found on the same bush, one would produce a male, the other a female, the assumption being that the two isolated larvæ were the progeny of successively-laid eggs, and that their contiguity was due to an attempt to facilitate the operation of pairing. This would, of course, lead to the most complete in-breeding, a result which nature usually abhors, and, as was to be expected, experiment does not bear out the assumption. To test the assumption, however, Professor Poulton undertook some experiments, to determine the sex of the larvæ resulting from successively-laid eggs of *Smerinthus populi*. The experiment is detailed at length in the *Trans. Ent. Soc. London*,

1893, pp. 451–6, but the conclusion at which Professor Poulton arrived did away with the notion that there was any regularity in the production of the sexes from successively-laid eggs. On the contrary, "it was found that the relative proportion of the sexes was subject to immense fluctuation on the separate dates on which eggs were laid. As regards eggs laid on any one day, the sexes generally succeeded each other in little groups of irregular size. No law of succession of the sexes could be established."

Bearing on this, is another observation recorded in the *Trans. Linn. Soc. of London*, vol. v., 1890, p. 156, in which Messrs. Jackson and Salter found that the pupæ obtained from different batches of *Vanessa io*, had a large proportion of a certain sex, some batches producing almost entirely males, others consisting almost entirely of females. Such batches, of course, would greatly aid the inter-crossing of the species, and this state of things is much more probable than that the sexes alternate in successively-laid eggs with anything like regularity.

10.—On the duration of the egg stage.—This varies very greatly but depends to a considerable extent upon whether the eggs hatch the same year they are laid, or whether hybernation takes place in the egg-state, and in the latter case upon the time of year at which the eggs are laid. Mr. Fenn (*Ent. Rec.*, vol. iii., pp. 175–76), Dr. Buckell (*l.c.*, p. 255) and Mr. Prout (*l.c.*, vol. iv., p. 292) have recorded some observations bearing upon the question as regards the Geometræ. Of those species whose eggs hatched the same year in which they were laid, the greater number remained in the egg stage from a week to a fortnight. The shortest period recorded by Mr. Fenn is two days in the case of *Acidalia virgularia*; by Dr. Buckell, four days in the case of *Timandra amataria*, and many species have a period of only five days. On the other hand, some species have a much longer period, as will be seen by the following instances from the above-mentioned articles: *Selenia tetralunaria*, 23 days; *Biston hirtaria*, 17 to 37 days; *Amphidasys strataria*, 30 days; *Hemerophila abruptaria*, 14 to 26 days; *Boarmia abietaria*, 19 days; *B. gemmaria*, 20 days; *Hybernia leucophearia*, 38 days; *Larentia caesiata*, 24 days, &c. The period varies for the same species in different years, possibly depending on meterological conditions. *Selenia bilunaria* has the following record:—1860, 1st brood, 16 days; 1883, 1st brood, 28 days, 2nd brood, 16 days; 1890 and 1891, 2nd brood, 15 days. *Selenia lunaria* took 7 days in 1865, 12 in 1861, and 15 in 1886—all 1st brood. Of *Camptogramma fluviata* in 1865, one batch took 5 days, another 10 days and a third 21 days.

11.—On hybernation in the egg stage.—As indicated in the preceding paragraph, some species are known to hybernate in the egg-stage. To what extent this obtains among insects is, perhaps, hardly as yet ascertained with any degree of certainty, but among Lepidoptera there would appear to be scarcely any large group in which some of the species do not pass the winter in this state. Of our British butterflies *Lycaena aegon* and *Pamphila comma* are reported to pass the winter as ova, whilst several of the *Theclidi* certainly do so—among our species, *Thecla quercus*, *T. betulae*, *T. w.-album* and *T. pruni*—whilst allied species do so in America. Scudder says that some of the *Chrysophanidi* winter in this state; the *Parnassidi* also do so, at least *Parnassius apollo* does. Among the Bombyces a large number of species, as *Orgyia antiqua*, hybernate in this stage, so also do a large number of Geometræ,

Noctuæ, &c. Many of the species that follow this course remain in the egg for a very long period. Among the observations anent the Geometræ, already referred to, will be found the following instances:—*Epione apiciaria*, 9¾ months; *Eugonia autumnaria*, 7¾ to 10 months; *Himera pennaria*, 5 months; *Oporabia filigrammaria*, 4¾ months; *Cidaria testata*, 8 months; *Chesias spartiata*, 4½ months.

The condition of the egg during the hybernating period is much more interesting. It is possible that some remain almost in the initial condition as laid all the winter. Buckler records that eggs of *Bombyx mori*, *Trichiura crataegi*, *Eugonia tiliaria*, *E. angularia* (*quercinaria*), *Cheimatobia brumata*, *C. boreata*, *Scotosia vetulata*, *Ptilophora plumigera*, *Xanthia aurago* and *Polia chi* have been examined from time to time until the middle of January, and nothing but the faintest traces of the future larvæ have been detected by a microscopic examination of their still fluid contents, except in the case of *X. aurago*, the egg of which on January 14th was found to contain a partially developed larva. Some species, on the other hand, hybernate with the larva fully-formed inside the egg-shell, and only waiting for the spring to eat its way out and commence larval life. This appears to be a very similar condition to that of many larvæ which hatch from the egg, but hybernate at once without feeding; only in the one case the larvæ hybernate inside, in the latter outside, the egg-shell: in both cases the larva is equally well-formed. Thus in *Parnassius apollo* the larva is fully formed in the egg in autumn, but it does not hatch till early spring.

12.—On the period over which the hatching process may extend.—One of the most important facts in connection with the preservation of a species, is, that in many species of more or less wandering habit, the eggs do not all hatch at one time. I have frequently noticed that of a batch of *Orgyia antiqua* eggs laid in August a few will hatch at once and produce autumnal larvæ, the remainder going over the winter; of these a few will hatch in May and afterwards at irregular periods, until when the last hatch they will have been in the egg state almost twelve months. It is very clear that by this means many insects which would, if the eggs all hatched simultaneously and under unsatisfactory conditions, rapidly become extinct or suffer very considerably, are much aided in their struggle for existence.

13.—On the effects of exposing eggs to extreme temperatures.—Mr. Merrifield, whose researches into the effects upon the various stages of Lepidoptera of varying degrees of temperature have interested us so much of late years, has made some of his experiments on the eggs of certain species. In *The Transactions of the Entomological Society of London*, 1890, pp. 132-133, he reports that spring-laid eggs of *Selenia bilunaria* began to have their vitality affected after being "iced" (at a temperature of 33°) in the central red stage 28 days, and none hatched after 60 days' icing. The case "was worse with spring-laid eggs of *S. tetralunaria*, none of which survived 42 days' icing, and some summer-laid eggs of the same species fared no better. In all the experiments up to 60 days' exposure, and I think beyond that period, nearly all the eggs, after being removed from the ice, matured so far as to admit of the formation of the young larva, which could be seen through the transparent shell. The failure was a failure to hatch."

Mr. Merrifield makes the following remark (which, in the face of the rest of the experiments, almost suggests an error of observation):—

"A curious result happened with some spring-laid *illustraria* (*tetralunaria*) eggs, iced before they had turned red; two of them became blackish while in the ice (where the eggs were kept for 17 days), and hatched the day they were taken out of the ice, or the next day, the rest remaining red for several days, and hatching in from 11 to 13 days after removal from the ice. These are strong examples of individual character manifested at a very early age." This would, indeed, be so, but it is remarkable that two eggs of a batch should exhibit such a decided difference from the remainder.

With regard to high temperatures, Mr. Merrifield reports that the eggs of these two species seemed in all cases uninjured by a temperature of 80° to 90°, their development being on the contrary accelerated by it.

14. On the fertilization of the ovum.—The eggs are developed in the ovaries of the parent, whence they pass down the oviduct into the vagina. In connection with the vagina are one or more pouches called *receptacula seminis*, in which the semen is stored after copulation: from these it passes into the vagina as the egg passes along it to the ovipositor, and sperm-cells enter the egg through the micropylar tubes, one of which fertilizes the egg, so that fertilization of the egg takes place at the time it is being laid, by the spermatozoa passing through the micropylar pores as the egg leaves the opening of the *receptacula seminis*. It is sometimes noticed that the latest-laid eggs of a batch are infertile; this is probably due to the supply of sperm-cells being exhausted before all the eggs are laid. Mr. Bacot, however (*Ent. Record*, vol. v.) records a case where only eight eggs of *E. tetralunaria* out of a batch of 146 proved fertile, and these were laid about half-way through the batch. In some insects the sperm fluid retains its fertilising properties for a very long time. For example, the queen bee and ant pair but once, yet they continue to lay fertile eggs for years. In lepidoptera the sperm can only last from autumn until the following spring, and then only in such species as copulate before hybernation. Usually, of course, it lasts a much shorter time.

A contribution to the Knowledge of the Earlier Stages in the Life-History of Agrotis agathina.

By W. S. RIDING, M.D., F.E.S.

On August 26th, 1893, several *A. agathina* were taken on the heather at Gittisham by my son. One ♀ was kept for eggs. She began scattering these on the stems and leaves of the heather on the 29th, and laid, during the following week, close upon 100. By Sept. 15th some, previously of a dirty-white colour, had become mottled with purple and, in a few days more, many were leaden-coloured and the young larvæ were ready to emerge. A few broke their shells on the 22nd. The eggs are nearly spherical, slightly flattened at the base of attachment and somewhat less so at the apex, about ·875 mm. in diameter, with 26 to 32 rather prominent ribs, each alternate one reaching nearer to the apex which is reticulated round the micropyle. There are faint transverse striations. The young larvæ emerge at the side of the apex and do not eat the shell. The body is bluish-leaden in colour and scattered all over with a few short hairs; the head is brown

and very large. The abdominal legs on the 7th and 8th segments are rudimentary. The larva loops and assumes a sphinx-like attitude at rest: it falls in a double curve, the anterior coil larger than, and in a different plane from, the posterior.

During the second week of October some of the larvæ moulted and became glaucous or pale olive-green, with a brown head which was smaller than the 2nd segment. The latter bore a small chitinous plate. Each division now became swollen in the centre, making the insect appear moniliform. Length 3 to 4 mm. The trapezoidal tubercles were distinguishable as faintly marked black spots, each with a short hair. The abdominal legs on the 8th segment had become much developed, but not fit for use.

By the end of October and early in November many had passed through a second moult; these were 5 to 7 mm. long, and in shape moniliform; their ground colour was dark glaucous to olive-green, with a brownish shade in some; the under surface was almost as dark as the upper. The plate on the 2nd segment had disappeared, but the tubercles were well marked as approximate trapezoidals, two anterior and two posterior to the spiracle. The latter had two hairs, the former one. On segments 4 to 11, the lateral tubercles were posterior and inferior to the spiracles, and had each two hairs. The spiracles were placed at the upper part of the white spiracular line, which was broad and very conspicuous. The dorsal and sub-dorsal lines were pale and distinct, especially the former. The head was pale brown, with darker cheeks and paler central line. The true legs were brown, the abdominal legs pale translucent green with brown extremities, and furnished with many hooks; all the latter were now fully developed and used for progression. Many rested in a straight line, a few only retaining the sphinx attitude. They held on to the food-plant tenaciously, lying prone along the stem and, when they fell, coiled themselves in two different planes as before. They fed indifferently on *Erica vulgaris* and *Erica cinerea*.

Towards the third and last weeks of November a large proportion had moulted a third time and were about 8 mm. in length. The larvæ were now moniliform and somewhat wrinkled transversely, olive or grass-green in colour, and darker on the lateral area than on the dorsal. The dorsal line was almost pure white, the sub-dorsal less conspicuous and tinged faintly with yellowish-green. The spiracular line was a little less conspicuous than before, with a pale yellow blotch in the centre of each segmental section below the spiracles. The post-spiracular tubercles and hairs were distinct—there were no anterior ones. The trapezoidals were much larger on the 2nd segment than elsewhere. The head was pale brown with an olive tint and three pale lines (in one green) with about twenty short hairs scattered over it. The larva, on falling, coiled in a loose flat ring, with its head directed to the abdominal legs, or else rested more or less straight.

By the middle of December, several had passed through their 4th moult, and were 1·1 to 1·5 cm. in length. The larva—moniliform—tapered gradually from the 5th segment to the head. The ground colour was brown, with a reddish tinge, most marked on the dorsum, and darkest just above and below the spiracular line; the underside, brownish and paler. The dorsal and sub-dorsal lines were white and very distinct; the former was widest opposite the centre of each segment, and darkened

at each division. The spiracular line was white, broad and very conspicuous, wrinkled, and with a rusty-coloured blotch shading off to yellow in the centre of each segmental division. The trapezoidals were black, distinct, with a single hair, and the anterior ones were placed in a small paler circle. The head was pale brown, translucent with a darker line on each side.

By the middle of January, many had moulted a 5th time, and the larvæ varied in length between 2 and 2·5 cm. (very nearly one inch). At this stage the ground colour was rich velvety reddish-brown, mottled with pale spots on the dorsum, and with a tinge of purplish or olive-green in the sub-dorsal area. Below the spiracular line, the colour was similar to that of the dorsum, becoming underneath paler and more translucent. The larva was moniliform, tapering from the 5th segment forwards; the 12th segment was larger than the 13th. On the 2nd segment the three dorsal lines were white and distinctly marked, though less so than in the younger larvæ. Elsewhere, the dorsal line was white, very narrow and inconspicuous, and clouded with black at the segmental divisions, so as to appear broken. The sub-dorsal lines were white, much more distinct than the dorsal, and broken in a similar way; they were edged above, on each segment from the 3rd to the 12th, with a thick, black, velvety streak, which, with the pure white of the line, gave a characteristic appearance. The spiracular line was white, broad, and wrinkled, with a rusty-coloured blotch, paler towards its circumference, filling up a large portion of each segmental division. The spiracles were oval, edged with black, and were placed close to the upper edge of the spiracular line on the 5th to the 11th segments. The tubercles on the dorsum and sides were black in pale surroundings, with hairs very inconspicuous and only visible under a magnifying glass. The head was small, partly retractile into the 2nd segment, of a pale translucent brown, with mottled cheeks and two dark brown curved lines on each side (convexity inwards). The true and abdominal legs were of a pale translucent brown; the latter had, at the proximal end of each, a conspicuous black tubercle with a single hair. The larvæ now rested prone, close against the stems of the heather, holding on by both true and abdominal legs. Their colour admirably mimicked the reds and browns of the dead and living twigs with their lights and shades, and made the larvæ very difficult to find. In confinement, they seemed to keep to the thickest parts of the food-plant during the day, in preference to other places of concealment. Some of the smaller larvæ fell in aring, but relaxed at once. My larvæ preferred *Erica cinerea* at this stage, and devoured the leaves regularly downwards, beginning at the upper parts of each twig, which they completely cleared.

Early in February, the larvæ, though apparently healthy, began to die off rapidly, so at last, I determined to keep them in confinement no longer, and placed those left on a couple of small patches of *E. vulgaris* and *E. cinerea*, which I had planted in a corner of the garden. I have not noticed them feeding since, but having been away from home part of the time, they may have done so, or some may have pupated soon after settling amidst their new environment. *Nous verrons.*

During the winter, the larvæ were kept in a cool conservatory, where the temperature was rarely below 40°. I reared some *Noctua neglecta* from the egg at the same time, and was very much struck by the great similarity of the young larvæ to those of *A. agathina* up to

the 2nd moult. Indeed, had they become mixed, it would have been almost impossible to separate them, as the only noticeable differences were matters of degree—those of shades of colour—*N. neglecta*, becoming sooner grass-green, and the white of the spiracular line being less intense in it. Their structure and habits seemed identical up to the time mentioned. The larvæ of *N. neglecta* died off in a similar manner to those of *A. agathina*, without any apparent cause. I may have kept both too long in the conservatory, which, in the early part of the year, often became excessively hot during the day, and the shelter I gave them may have been insufficient.

SCIENTIFIC NOTES & OBSERVATIONS.

HAVE WE TWO INDIGENOUS SPECIES OF EUCHLOË?—Mr. Newnham bases his differentiation of his suggested new species *E. hesperidis*, entirely on characters presented by the imago; his claim, however, can only be admitted when he has proved by breeding experiments that the form to which he gives this name always breeds true and never produces the ordinary *E. cardamines*. Probably, all collectors have met with small specimens of this latter species. Newman, in his *British Butterflies*, p. 158, quotes the following passage from *The Northumberland and Durham Catalogue*, by Mr. Wailes:—"The usual expansion of the wings is one inch and eight lines to one inch and eleven lines, but in the year 1832 none exceeded one inch and three lines; and so marked was the difference all over the country, that many were inclined to consider the specimens as those of a distinct species. The following season there was no departure from the normal size." Newman then adds:—"In Gloucestershire this variation in size has been noticed by Mr. V. R. Perkins both in male and female." Mr. C. G. Barrett (*E.M.M.*, vol. xxv., p. 81), thus writes:—"When living at Haslemere, in Surrey, I used every year to meet with perfect dwarf specimens—about one-half the normal size—in both sexes, and the males of this variety were invariably the earliest specimens seen, the normal males appearing two or three days later. Similar specimens occurred casually in Pembrokeshire, but were not noticed to be earlier than the rest. In a marshy valley near Pembroke, in one season, I found several males of ordinary size, in which the black apical crescent was more or less suffused inwards, and in one specimen so much so, that the suffusion affected one-third of the orange blotch, being blackest on the nervures. This form was searched for in succeeding years without success." Mr. T. D. A. Cockerell in an article on "The Variation of Insects" (*Entom.*, vol. xxii., p. 176), calls this small form *Euchloë cardamines* var. *minor*. With regard to the position of the discoidal spot at the juncture of the orange and white spaces, it would be interesting if every reader of this magazine would examine his series of normal-sized *E. cardamines*, and let us know whether there is any tendency to vary, as regards the position of this spot. The value of the wing-scales in determining specific difference is at present very indeterminate, although it would not seem unreasonable to regard constant and well-marked differences in their shape, as a character of considerable importance. If, as has generally been supposed up to the present time, the small specimens of *Euchloë* are in reality a race of *cardamines*, which has probably been

produced by defective nutrition, it may be expected that some difference will be manifest in the scaling. So far, Mr. Newnham has only told us in the most general terms that "viewed under the microscope, the wing-scales appear very different from those of *E. cardamines*." This one would expect on physiological grounds, even if the small form consists of ill-fed specimens of *cardamines*, for it is very clear that the scales, being structural and built up from the material in the pupa, must suffer in common with the other organs of the imago. Unless, therefore, there is a strongly marked and definite difference between the scales of the two forms, a general difference is not likely to be of much value. Mr. Newnham does not mention the females, but, of course, if this be a true species, they occur with the males. After all, as I have already observed, breeding is the one test to which now-a-days every suggested new species must be subjected, and it is greatly to be hoped that Mr. Newnham has succeeded in getting some eggs, or will succeed in getting some larvæ, and by the results of their breeding confirm, or disprove, his present opinion.—F. J. Buckell. *June*, 1894

I have carefully looked through my series of *E. cardamines*, and am unable to differentiate the specimens in the way suggested by Mr. Newnham. In size, the specimens vary imperceptibly from the smallest to the largest, except in the case of one female which is quite a monster, compared with any other *cardamines* I have ever seen.

The following table will illustrate the connection between the "Size of specimen," the "Position of the central black spot," and "The size of orange blotch" in the males at present in my cabinet. I have a much larger number which I must work out later on :—

Locality, and Year of Capture.	Size of Specimen.	Size of Central Black Spot.	Position of Central Black Spot.	Size of Orange Blotch.
Cuxton, 4.vi.'88	Large	Large	Just within Orange Blotch	Large
Chattenden, v.'88	Small	Small	Almost in Border	Small, and very Yellow
,, ,,	,,	Moderate	,,	Small, and very Yellow
,, ,,	Large	Very Small, and Linear	Well in Orange Blotch	Large
,, vi.'91	Large	Very Small	Well in Orange Blotch	Large
,, ,,	Small	Large	Not far in	Intermediate
,, ,,	Small	Large	,,	Intermediate
,, ,,	Intermediate	Large	Well in	Intermediate
,, 26.v.'90	,,	Large	On Margin	Small
,, v.'88	Small	Small	,,	,,
,, ,,	Small	Large	,,	,,
,, ,,	Intermediate	Moderate	Just within	Large
,, ,,	,,	,,	,,	Intermediate
,, ,,	Large	Large	On Margin	Intermediate
West Ireland, '80	Very Small	Tiny	Well in Blotch	Large (for Size of Specimens)
,, ,,	Very Small	Tiny	Well in Blotch	Large (for Size of Specimens)
Chattenden, 28.v.'92	Small	Large	Almost on Margin	Small
,, ,,	Small	Intermediate	Almost on Margin	,,
,, ,,	Large	Large	,,	,,
,, ,,	Large	Large	Well within	Large
,, 6.vi.'92	Large	Large	,,	Large
,, v.'88	Large	Very Large	Just in	Large

N.B.—By comparing Columns 4 and 5, it will be seen that the position of the black spot with regard to the orange blotch, is due almost directly to the size of the latter, compared with the size of the insect.

There are, I find, two rather distinct forms of the females, one with the apical margin black, the other with it pale grey, although some of the specimens which might be classed as pale, are darker than the others. I had strong hopes that these would work out according to size and give me two distinct sections, but I find there is no tendency in that direction.

The following table will illustrate roughly the variation in size, &c., of the females in my cabinet at the present time:—

Locality, and Year of Capture.	Size of Specimen.	Size of Central Black Spot.	Apical Tip.
Chattenden, v.88	Small	Large	Intermediate
,, vi.91	Small	Large	,,
,, ,,	Small	,,	,,
,, ,,	Large	,,	Dark
,, 2.vi.88	Small	Small	Pale
,, ,,	Very Large indeed	Large	Dark
,, 28.v.92	Very Small	Large	Pale
,, 6.vi.92	Large	Large	Intermediate
,, v.88	Intermediate	Small	Pale
,, v.88	Intermediate	Small	Pale
,, v.88	Intermediate	Intermediate	Pale
,, 18.vi.90	Large	Large	Dark
,, 9.v.88	Small	Large	Pale
,, 9.v.88	Intermediate	Large	Pale
,, 9.v.88	Large	Large	Pale
Willington (bred) 17.v.88	Large	Large	Pale
Chattenden, 19.vi.90	Intermediate	Large	Dark
,, vi.92	Large	Large	Dark
,, v.88	Large	Large	Dark

I find, too, on examination of the male specimens, that the orange blotch varies indefinitely; the least well-developed blotches extending only to the discoidal cell, and falling considerably short of the anal angle of the fore-wings. This, however, is followed by slow and almost imperceptible increase in various specimens, until the blotch is found extending very considerably beyond the external edge of the discoidal cell, and continued downward to and filling up the anal angle, so that the supposed differentiation between British and Continental specimens (*ante*, p. 147), scarcely holds good. It would appear from Mr. Weir's remarks that these variations do not occur in some localities, but they appear to vary between their extreme limits in many others.—J. W. Tutt. *June 28th*, 1894.

Notes on the Breeding of Cyclopides palæmon, Acronycta psi and Pachetra leucophæa.—I have bred this spring three specimens of Lepidoptera that have been of interest to me. (1). I bred a specimen of *Cyclopides palaemon* from a larva kindly sent me last autumn by the Rev. C. R. N. Burrows. For pupation, the larva suspended itself exactly like a *Papilio*, except that the girth was loose, instead of being fixed by sinking into the chitin of the dorsum. The larva possesses an "anal comb," essentially, no doubt, the same appendage as that described by Hofmann (*Ent. Annual*, 1873, p. 61) as existing in certain *Sciaphila* larvæ. I have seen it in other Skippers and also in *Colias*. It would be interesting to know in what other Rhopalocera it occurs. I find a figure of it in a species of *Colias* in Scudder (*Butterflies of New England*, &c.) but cannot discover any reference to it in the text.———2. I have bred a specimen of *Acronycta* (*Cuspidia*) *psi* that had been two years in pupa, *i.e.* it was a larva in 1892 and emerged in May, 1894. Though I have reared hundreds both of this species and of *C. tridens*,

and have several times had individuals that tried to go over into a second year, this is the first time that one has done so successfully. Such cases have been recorded, but the occurrence is a rare one, as is shown by its having only now presented itself in my experience after long-continued breeding of the species. In this particular, *C. psi* and *C. tridens* contrast markedly with *C. leporina*, which rather prefers to go over into a second year, and often takes a third or a fourth year in pupa. ———3. A number of eggs of *Pachetra leucophaea* were sent to me from Kent last spring by my friend, Mr. Jeffreys, and in the summer I had twenty-four larvæ, of which I sent away sixteen and kept eight. These I treated in the same manner as those which I had in the year 1891, but for various reasons they did not receive so much attention as those; as a consequence, instead of obtaining three moths from five larvæ, or the equally good results achieved in the following year by Mrs. Hutchinson, I only succeeded in rearing one moth, which is now in the collection of my friend, Mr. E. R. Bankes. So far as I can learn, however, this is the only moth that has been bred from an unusual number of eggs distributed last spring.—T. A. Chapman, Firbank, Hereford. *June*, 1894.

VARIATION.

Advancing backward: A note on melanism in manufacturing districts.—A marvellous case of advancing backwards occurs in a paragraph written in an unsigned criticism in *The British Naturalist*, p. 152. It reads:—"With regard to the alleged increase of darker insects in our manufacturing districts, we take leave to doubt the fact. When the fact has been demonstrated we shall accept the theory without hesitation; we feel that it ought to be so, but think it is not." Either the critic is entirely ignorant of Entomology, or he has studied the subject such a short time that he has not yet informed himself of what is known about it, or——But we must forbear! *The British Naturalist* is published at Warrington. Some seventeen years ago Mr. N. Cooke wrote:—"The most interesting case of melanism that has come under my observation—and my friend, Mr. Greening of Warrington, can say if I exaggerate the facts—is the total change in the colour of *Tephrosia bimdularia* in Delamere Forest. Some thirty years since, when he and I visited Petty Pool Wood, this species was very abundant, but all were of a creamy-white ground colour; dark varieties were so scarce that they were considered a great prize. Now it is the reverse, all are dark smoky-brown—approaching black; a light variety is very rare. The same change, and nearly to the same extent as regards numbers, has come over *Amphidasys betularia*. Throughout the district from Petty Pool, including Warrington, to Manchester, the black form is now usually found. I am inclined to suspect that climate and manufactures have done more to bring about this change than anything else. During the past thirty years what large towns have sprung up to the west of this district! Runcorn, Widnes, St. Helen's, Earlstown, Wigan, etc., all pouring forth from their tall chimneys chemical fumes and coal smoke, which emanations are carried over our collecting grounds by every westerly wind." A number of similar

observations, chiefly from Lancashire, are quoted in *Melanism and Melanochroism in British Lepidoptera*. A new race of entomologists appears to have sprung up in Lancashire, who commence their studies by doubting the accuracy of the records made by their direct predecessors less than twenty years ago. We can understand a difference of opinion as to the causes which have produced the change so often described, but to question the facts is beyond our comprehension. The writer in our contemporary is probably a genuine Rip Van Winkle. During the last ten years we have been attempting to unravel why these things are so; now we are told that the things do not exist, but when we have proved "the fact, then" the writer in question "will accept the theory without hesitation."

CURRENT NOTES.

It is with extreme regret that we record the death at the early age of 46, of Prof. G. J. Romanes. His was one of those master minds, which can take the facts and observations recorded by the humbler follower of science, and weave them into a philosophical theory which correlates and expounds them. Science has suffered a very severe loss by his untimely but not wholly unexpected death.

In July, 1890, a paper entitled "Notes on the Synonymy of Haworth's plumes," was published in this magazine (Vol. I., pp. 90-95) which brought a very flattering letter from Mr. Stainton, who expressed himself well-satisfied with the conclusions there enunciated. One of the subjects discussed was Haworth's *migadactyla*, and the conclusion there arrived at was that *migadactyla*, Haw. = *spilodactyla*, Curt. After four years Mr. C. W. Dale discovers that the sale of Haworth's insects took place in 1833 and that, according to a sale catalogue in his possession, his father bought the lot of "plumes" "containing Haworth's *migadactylas*" (*sic*). It is well-known that Wood erroneously considered our *bertrami* to be Haworth's *migadactyla*, whilst it is equally well known that Haworth's *pallidactyla* = our *bertrami*. Mr. Dale appears to have known the fact relating to Wood, and immediately inferred that Haworth's usage was the same. He then appears to have referred to such of Haworth's "plumes" as are still in his collection, finds that he does not possess among them *spilodactyla*, and at once jumps to the conclusion that Haworth did not know a species which he describes and locates, perfectly unmindful that (1) Haworth's *migadactyla* type may not have been in the sale at all; (2) That his father (even if he bought all the "plumes") had the specimens many years before his son C. W. was born, and during the time that he was *in nubibus* and *in statu pupillaris*; (3) That his father may have broken, shifted labels, given away, &c. many specimens before Mr. Dale knew anything of entomology, and before the collection came into his possession. Practically, Mr. Dale begins by saying that his father bought the specimen (or specimens), then that he does not possess any specimen agreeing with Haworth's description of it and concludes, therefore, that Haworth must have described a worn *ochrodactyla* as this species, although it is known that Haworth's *ochrodactyla* were called *pallidactyla*, and then, to clinch the matter, becomes scientifically heroic, declares that he "has, at least, one advantage over Mr. Tutt in having had an entomological

father, who was well acquainted with Haworth, Curtis, Leach and other entomologists of former years" and, in spite of all the recent information on the subject, further writes:—"When moths have been on the wing for some time, they fade and become paler than fresh specimens; hence, in olden times, they were often described as distinct species." Now we would ask Mr. Dale a question. If those "entomologists of former years" whom his father knew, "often described in olden times" faded moths that had "become paler than fresh specimens as distinct species," what entomological "advantage" has the present Mr. Dale over Mr. Tutt, because "his father was well acquainted" with a number of men who did such ridiculously stupid things? Not that we consider that these authors did the stupid things which Mr. Dale lays at the door of his father's friends, any more than we consider that Mr. Dale knows anything about the subject which he discusses (?) so glibly. This is nearly as good as the Dale theory of the formation of varieties by moonlight and candle-light! We have heard that editors keep a waste-paper basket!! And this, my masters, is the science of one of our would-be teachers!

We have before called attention to the strange freaks of certain people of Wicken, who anxiously look out for the arrival of the innocent entomologist, visiting the weird Fens for the first time. The following is a verbatim copy of some writing on a slip of tea (?) paper addressed to:—

"Mess. Hodges & Another
Maids Head
Inn
Wicken.

Messrs. Hodge & another
Gentmn

The Chestnuts

Public Notice any person or persons found trespassing on Lands of Messrs I. A & R Aspland and N Fuller in Wicken Fen well be prosecuted

---

Tickets to Entomologists are issued for going on the above Lands the charge per day being 6d each person, they can be obtained at the Post Office Wicken. Mr. I A Aspland has not given permission to any one to go in the Fen"

Now a "Public Notice" on a slip of tea-paper, addressed to "Mess. Hodges and another" is good! Considering that the "droves" in the Fen are public property, and that these are the best collecting grounds; that Mr. Isaac Aspland, the chief owner, had previously given "Mess. Hodges & another" permission to go on his part of the ground; and that one of our best-known lepidopterists, Mr. Moberly, recently bought a piece of the Fen to which they had access; we do not know what term is strictly applicable to the writer of the above "Public Notice!" nor to the person who affixed to such a "Notice" the official stamp of the Post Office of the district!

Mr. H. Swale, M.B., records (*E.M.M.*) that he found whilst examining a bakehouse at Tavistock, a large number of an earwig (*Anisolabis*

annulipes), hitherto unrecorded for Britain. It is easily distinguished from its allies "by the twelfth and thirteenth antennal joints being white, the rest brown, and by the dark ring round the femora of the otherwise testaceous legs."

A hard-working entomologist is most likely to make his mark, by researches among the Diptera. Mr. J. H. Verrall is now publishing in the *E.M.M.*, "A second hundred of new British species of Diptera." Mr. F. V. Theobald, M.A., of Cambridge, has recently published the first volume of *An Illustrated Account of British Flies* (*Diptera*).

Mr. J. W. Douglas adds *Aleurodes avellanae* to the British list, from specimens captured on nut bushes at Glanville's Wootton, by Mr. C. W. Dale, whilst Mr. R. H. Meade describes two new Tachinids under the names of *Degeeria dalii* and *Nemoraea quadraticornis*.

Mr. E. H. Taylor of Fulham, recorded (*E.M.M.*, p. 111) the capture of a specimen of the form of *Xanthia ocellaris*, known as var. *lineago*, at Wimbledon, on sugar. Prof. Meldola now (*l.c.*, p. 161) mentions the capture of two specimens last autumn, at Twickenham, one by Mr. Boscher, the other by himself, in the garden of the former gentleman. Professor Meldola's specimen (*teste* Mr. C. G. Barrett) is also var. *lineago*. The species is much like *X. gilvago*, but can readily be told by the more pointed apex of the fore-wings. Will captors of *X. gilvago* please inspect their captures carefully?

We have to thank the Lancashire and Cheshire Entomological Society for a copy of their Report. It contains nothing of scientific value, except Mr. W. E. Sharp's address, but this is a most valuable addition to our scientific literature, being a thoroughly intelligent exposition of entomology as a science. Slowly, but surely, the scientific entomologist is becoming a force in the wider science of biology. This naturally reacts on us, and we are all slowly learning that naming insects, although very necessary, is hardly science in itself, and that the entomologists of to-day must read the essays of such men as Professor Weissmann and Mr. Herbert Spencer, if they are to understand their own branch of biology on its scientific side, and that the Lamarckian and Weissmannian principles of heredity must be understood by them, if they are to do their work scientifically.

In the *Ent. Mo. Mag.*, pp. 98-99, the Rev. A. E. Eaton writes that in The Ziban, Algeria, towards the end of March, *Pyrameis cardui* (which hitherto had not been commoner in the winter than Tortoise-shells in England are apt to be in spring) became very abundant; some of them were bred in the district, and others were supposed to have migrated from southern districts. So abundant were they, that *Malva parviflora*, *M. sylvestris*, *Filagos parthulata*, and *Plantago ovata*, were utilised for egg-laying. He further reports that during the week ending April 11th, 1894, their numbers had diminished, probably from dispersion or emigration. A later record by the same gentleman, gives them as still abundant, and probably waiting for a favourable chance to be off to pastures new. A day or two before and after June 17th, large numbers of this species suddenly appeared in this country, in districts where it was totally absent last summer and autumn, and during the present spring until the date named. The absence of colour and their ragged condition, points to their being by no means recently emerged, and there can be no doubt that they were immigrants. One feels puzzled though to explain why it is that a certain individual, after having probably

travelled from the Mediterranean shores to Kent, takes up a given position on the roadside, and continues on flight in a space of some 60 yards until it has laid its eggs, when death ensues, but so it appears to be. *Plusia gamma*, in very poor condition, pallid, and of a very different type to our bred British specimens of the autumn, has also abounded since the commencement of June.

In our March number (p. 72) we called attention to a note by Dr. Knaggs, ridiculing the notion that sex might be in some degree controlled by food. Considering the amount of time that is being expended on the subjects of "Heredity" and "Germ cells," it seems to us rather ridiculous that a man should go out of his way in argument to bring forward an experiment which had no very direct bearing on the question at issue, and which was shown at the time by Professor Riley to be based on an entirely fortuitous coincidence, and not on results capable of generalisation. Messrs. Geddes and Thompson unfortunately quote this experiment, and hence have given widespread distribution to an erroneous deduction. It is well known now, thanks to the researches of Professor Poulton and others, what was not generally known at the time of Mrs. Treat's experiments, that the sex of an insect is determined at a comparatively early stage of the larva and, probably, even as soon as fertilisation is effected. But to throw cold water on experiment, and to suppose that there is no connection between nutrition and sex, when experiments by noted biologists tend to prove the contrary, only illustrates the fact that the science of entomology is in some entomologists' minds a thing apart from the general subject of biology. A note by Dr. Knaggs in the current number of the *E. M. M.* is, therefore, interesting. He states in one place—what is now well-known—that larvæ have sex, and speaks of "female larvæ when their ovaries are generally supposed to be furnished with eggs," and yet takes a page to ask innocent experimenters to waste their time on larvæ of *Orgyia antiqua*, to prove that such sexed larvæ can have their sex changed by nutrition. No doubt this is interesting, but the young experimenter will probably assert that this is only one person's work. What we had to complain of before was the ridicule thrown on the general principle, but things are now changed. The doctor now writes:—"The effect of nutrition, or deficient nutrition to shape the future sex of the hermaphrodite or sex-less embryo one can comprehend; the rearing of males, and the failure to rear females by semi-starvation, is by no means difficult to explain." This is all we ask for. So much scientific men have proved or attempted to prove and so much they present for acceptation, and if Dr. Knaggs had gone back to this point in his previous arguments, we should not have found ourselves compelled to disagree with him. Having granted so much, would it not be better for Dr. Knaggs himself to experiment on the embryonic cell or ovum when in a neutral state and give his results, rather than to set our young recruits, who know no better, to rear "hundreds" of *Orgyia antiqua* larvæ when "their ovaries are generally supposed to be furnished with eggs," in order to get male moths from female larvæ? The following information in a foot-note is quite news to us and we thank the Doctor heartily for it:—"Malpighi (*de Bombyce*, 29) discovered eggs in the silkworm larva, and Réaumur (*Mem. In.*, 359) discovered eggs in the larva of the Gipsy moth."

NOTES ON COLLECTING, Etc.

TEN DAYS AT WICKEN FEN.

By ALBERT J. HODGES.

Tempted by the few warm days and nights that set in with the beginning of June, and anxious to inaugurate a season which, as far as I was concerned, had not yet commenced, I made hasty arrangements for a short campaign in Fenland and, accompanied by Mr. Battley, left Liverpool Street on June 6th for Soham, viâ Ely. Our "Eddystone," which has found previous mention in these pages, was, through the kindness of a friend, carefully packed and consigned from Freshwater to Soham; a somewhat circuitous journey but one which was safely accomplished, and the first object that met our view upon changing from the main line at Ely was the familiar post and iron framework, invariably arousing the curiosity of porters and railway officials to the highest pitch, the latest sapient suggestion being as to its problematic uses in "land-surveying."

As is usual when starting on specially hazardous or early season trips, the weather turned cold and the wind "Northered" on the very morning of our departure, justifying the enthusiasm—chilling query of a brother of the net, resident in Ely, as to what we had come for, together with dubious suggestions as to the results of our trip. These prognostications found confirmation from the lips of the local worthies. We heard with dismay that "one gentleman had been down, but he only stopped one night," and the gloom culminated with the assurance that we were in for a regular "North-easter." However, it was too late to turn back, and we hoped for the best and watched, with ghastly interest, the clouds that persistently gathered during the day to dissolve at dusk "like the baseless fabric of a vision." From laborious and persevering observations of the small amount of smoke from cottage chimneys, that had to do duty in our case for weather-vanes, we felt almost qualified to offer our services to the Meteorological Department as prophets, but fearing our jeremiads might arouse the ire of the agricultural as well as the entomological sections of the public, we reserved our opinion.

The first night was certainly a bad beginning, and calculated to crush any but the elastic spirits of the Hon. Sec. of the City of London Entomological Society, but strong in anticipation, we spent the following day in perfecting our arrangements for the following night, which proved much more satisfactory, whilst during our subsequent stay we had the usual very occasional suitable evening, which seems the maximum average allotted to the persevering Fen-worker. With our ears deaf to the charms of the sixpenny tickets issued by the "land-owners" of the Fen (or rather by a "minority of two" of them), and strong in the courteous permission of Mr. Isaac Aspland (which I here have great pleasure in acknowledging, as well as that of a well-known lepidopterist, who has recently acquired a freehold plot in the heart of the Fen), and safe in the knowledge of the mysteries of "rights of way, &c." we fixed our sheet nightly and made the best of such weather as we had; and never can we reproach ourselves upon leaving the field to others, for upon but one solitary occasion was the "Eddystone"

extinguished before its local rivals, and this was when a fen-fog began to rise—a sure sign of a blank evening. First and foremost among our captures were three specimens of *Hydrilla palustris*, all males of course, and mostly in good condition—a very welcome sight after the eight or nine years which have elapsed since this species was last captured, notwithstanding that the spot is annually worked most perseveringly by amateurs and professionals alike. A fourth specimen fell, I believe, to the lot of one of the local professionals and was at once secured for the collection of a well-known lepidopterist. Our sheet was also honoured by the attentions of *Macrogaster arundinis*, but of which we only secured four specimens, owing, doubtless, to the intense cold that usually set in with sunset. *Meliana flammea* occurred sparingly but with fair regularity, whereas *Viminia renosa* only appeared to be attracted on one occasion for a few minutes, during a momentary respite from the heaviest downfall of rain it was ever my fate to encounter in the Fens, and which we endured unflinchingly for over three hours.

The Prominents and the Hawk-moths sent an occasional representative to the scene, *Arctia fuliginosa* cheering us on several nights, and of *A. urticae* two fine specimens were secured, whilst among Geometers, *Eupitheeia centaureata* was the most numerous visitor, and in Micros. the ever-present *Chilo phragmitellus* deserted us not, whilst the delicate little *Nascia cilialis* afforded us about two dozen specimens on our best night, which occasion will ever stand in our recollection as another "Red-letter" night, from the above-mentioned capture of the *H. palustris*, when, needless to relate, we only abated our efforts as the flush of dawn aroused the distant "Chanticleer," and the song of the larks soaring from the corn-fields surrounding the Fen, broke the silence which had reigned since the cessation of the "calling" of the snipe, and the harsh rattle of the corn-crakes. Upon this occasion, common Noctuæ continued to visit the "sugar" at intervals, all night, but there was little variety, *Apamea unanimis* being in 'fine' condition, with an occasional 'fine' *Hadena*, of varying species, and the usual ever-present *Agrotides*. For the more abundant Fen Noctuæ, we were of course too early, as also for *Herminia cribralis*, of which we only secured a single specimen.

Day-work was not neglected, but in our case, Wicken Fen wore too hackneyed an air by day, and the first wild enthusiasm for *Papilio machaon* had long since departed. Arduous trips to Tuddenham (Suffolk) and Chippenham, helped to save us from *ennui* by day, and although the "takes" were diminished by absence of sun, yet we were fortunate in securing series of *Heliothis dipsacea* and *Acidalia rubricata*, with representatives of *Agrophila sulphuralis*, *Acontia luctuosa* and *Lithostege griseata*.

The pleasure of these trips was greatly enhanced by the society of the ever-popular President of the City of London Society, who was making a short stay with another ardent entomologist, at Wicken, and who proved to be as genial an acquisition to the social side of village-life, as to the graver scientific circles of which he is more often a centre.

Owing to the ill-health of our courteous hostess of 1893, we were compelled to stay at the "Maid's Head" Inn, which, with the limited accommodation at its disposal, is mostly occupied during the collecting season, and possibly on this account manages at the close of one's stay, to completely dispel any pleasing illusions which may have been indulged, of rural charges, commensurate with truly rural accommodation, by the

unblushing presentation of an account which would possibly not be out of place at a fashionable watering-place during the season, but which is certainly somewhat of a surprise to many of the visitors to this hostelry. It is with pleasure we learn that some of the more enterprising villagers are now offering accommodation to entomologists, and I would recommend specially, the small and comfortable rooms of Mr. W. O. Bullman, where every attention is lavished on the fortunate visitor.

A visit, replete with pleasant adventure, genial society, and gratifying success, closed on Saturday the 16th June, and will, I trust, be the means of inducing many who have not yet been introduced to Fenland, to spend a few days in scenes which are a complete and pleasant change from the better-known woodland haunts of the active lepidopterist.

NOTES OF THE SEASON 1894.

Vanessa polychloros was exceedingly abundant again this spring in the New Forest, from the middle of March until about the 20th of April.—Ed.

Lydney, Gloucestershire.—Collecting here has been very intermittent owing to unsettled weather. *Sesia formiciformis* turned up, but I only had one day at it, taking eleven specimens. Larvæ of *Thecla w-album* were very scarce both here and at Gloucester, but those of *Melitaea aurinia, Nemeophila plantaginis* and *Aciptilia galactodactyla* were abundant. Amongst other captures have been the following:—*Macroglossa bombyliformis* (rare), *Ino statices, Hepialus hectus* (rare), *Drepana falcataria* and *D. binaria, Hypena rostralis, Tephrosia punctularia, Ephyra punctaria, E. linearia* and *E. pendularia, Asthena sylvata, Bapta temerata, Macaria notata, Panagra petraria, Minoa murinata, Abraxas sylvata, Lygdia adustata, Emmelesia decolorata* (rare), *Thera variata, Anticlea rubidata, Cidaria corylata* and *C. truncata, Anaitis plagiata, Argyrolepia baumanniana.* Sugar has not been successful, the Noctuæ being evidently behind time. The only species taken at it have been:—*Grammesia trigrammica, Agrotis segetum, A. exclamationis, A. nigricans, Noctua triangulum, N. brunnea, Triphaena orbona, T. pronuba* and *Mamestra brassicae.*—M. Stanger Higgs. *June 20th*, 1894.

Bath.—The weather here has been rather unpropitious for collecting, but I have managed to pick up the following among other insects. May 6th: *Heliaca tenebrata, Hemerophila abruptaria, Ephyra annulata, Lygdia adustata* and *Cidaria silaceata.*——May 14th: *Coremia ferrugata, C. unidentaria* and *Abraxas sylvata.*——May 17th: *Emmelesia affinitata, E. decolorata* and *Anaitis plagiata.*——June 3rd: *Sesia tipuliformis* and *Grammesia trigrammica.*——June 15th: *Ephyra linearia, Macaria liturata, Bupalus piniaria* and *Thera variata.* Larvæ have not been very abundant, but nests of *Eriogaster lanestris* are fairly common in hawthorn hedges.—T. Greer. *June 17th*, 1894.

Aberdeen, etc.—The weather is very unfavourable for day-collecting, but sugar is fairly successful when the early summer frosts are absent. The following are some of my captures. *Sand Hills, Tain, Ross-shire*, June 14th (wind W., cloudy, very warm). At sugar: *Hadena dentina*, abundant; I boxed about 100 specimens and left probably double that number; *H. oleracea, H. adusta, Rusina tenebrosa* and *Xylophasia rurea* (the latter all of the typical form) abundant; *Hadena thalassina, Apamea gemina* and *Noctua plecta*, common; several hybernated (? Ed.) *Agrotis*

suffusa. 1 netted *Chesias rufata*, *Scoparia ambigualis* and *Sericoris cespitana*.——June 15th, *Countess Wells Wood, Aberdeenshire* (wind N., clear sky, bright moon). At sugar: 12 *Hyppa rectilinea*, 3 *Acronycta menyanthidis*, 1 *Thyatyra batis*; a few each of *R. tenebrosa*, *H. abusta*, *H. thalassina*, *X. rurea* and var. *combusta*, *N. plecta* and *A. gemina*; 1 *Macaria liturata* and 1 *Cidaria corylata*. At rest: 2 *A. menyanthidis*, several *Eupithecia nanata* and *E. satyrata*. Netted: *Hypsipetes trifasciata*.——June 16th, same place (wind S.W., cloudy). At sugar: 13 *H. rectilinea*, 2 *A. menyanthidis*, 2 *T. batis* and others, as on the 15th. At rest: *Eupithecia pulchellata*, *E. pumilata* and *E. castigata*. ——June 18th, *Sand Hills, Peterhead, East Aberdeenshire* (wind W., sky clear, frosty) only 2 *H. dentina* and 4 *H. oleracea*. ——June 19th, *Countess Wells Wood* (wind S.W., raining heavily). At sugar: 28 *H. rectilinea*, 5 *A. menyanthidis*, other species taken on 15th and 16th abundant.——June 22nd, *Quantarness Moor, Orkney* (wind W., rather strong, sky clear). At sugar: Nothing. Netted: *Hepialus humuli*, *Acidalia dimidiata*, *E. satyrata* and *Melanippe montanata*.——June 23rd, *Countess Wells Wood* (wind S.W., rather cloudy). At sugar: 20 *H. rectilinea*, 2 *A. menyanthidis*, 2 *Noctua brunnea*, 1 *Agrotis exclamationis*, 1 *Triphaena pronuba*, 6 *Noctua festiva*, 3 *Boarmia repandata*, etc.—A. Horne. *June 25th*, 1894. [Is our correspondent quite sure that it was the typical form of *X. rurea* which was found so abundantly? In our experience the typical form is very rare.—Ed.]

SOCIETIES.

The Entomological Society of London æstivates; we are not sure that other kindred societies would not do well to follow its example. The last meeting till the autumn was held on June 6th, 1894, and was a very interesting one. Mr. W. F. H. Blandford exhibited a series of eleven male specimens of *Rhina barbirostris* from British Honduras, of which the largest and smallest examples measured respectively 60 and 17 mm. The difference in bulk, supposing the proportions to be identical, is as 43 to 1. He remarked that this variation of size is especially common in the *Brenthidae*, *Cossonidae*, and other wood-boring Coleoptera. Mr. A. J. Chitty exhibited specimens of *Cardiophorus equiseti* taken near Braunton, on the north coast of Devon, in May, 1891. Mr. McLachlan exhibited for Mr. J. W. Douglas, male specimens of a Coccid (*Lecanium prunastri*), bred from scales attached to shoots of blackthorn (*Prunus spinosa*) received from Herr Kael Sulc, of Prague. Mr. Douglas communicated notes on the subject, in which he stated that the species was common on blackthorn in France and Germany, and should be found in Britain. Lord Walsingham exhibited a series of *Cacoecia podana*, Scop., reared from larvæ feeding on *Lapageria* and palms in Messrs. Veitch's conservatories in King's Road, Chelsea, including some very dark varieties. The Hon. Walter Rothschild stated that he had taken the species on lime. Mr. C. Fenn exhibited a long series of *Selenia lunaria*, part of one brood from eggs laid in May, 1893, by a ♀ taken at Bexley. In all, Mr. Fenn bred about 80 specimens; of these, 17 emerged in August, 1893, one in October or November, 1893, and one in January, 1894; all the foregoing were females with one exception: after January the rest of the brood emerged, the first

dozen or so being all females, and then males and females emerging in equal numbers. Among that portion of the brood which emerged in May were one or two moths which presented the characters of the usual August brood (var. *delunaria*), and one or two others were intermediate between the spring and summer forms. Mr. F. Lovell Keays exhibited a variety of *L. icarus* (female), in which the marginal ocelli on the hind-wings were entirely without the usual orange-coloured lunules. The specimen was captured at Caterham, on May 22nd, 1894, and was the first individual of the species observed by the captor this season. Mr. J. H. Durrant exhibited a series of *Steganoptycha pygmaeana*, Hb., taken at Merton, Norfolk, between the 25th March and the middle of April last. Mr H. Goss read an extract from a report by Mr. J. R. Preece, H.M. Consul at Ispahan, to the Foreign Office, on the subject of damage caused to the wheat crop in the district of Rafsinjan, by an insect which was called "Sen" by the natives, and which he described as "like a flying bug, reddish-olive in colour, with heavy broad shoulders." Mr. Goss said he had been asked by Mr. W. H. Preece, C.B., to ascertain, if possible, the name of the species known to the natives as "Sen." Dr. Sharpe said that in the absence of a specimen of the insect, it was impossible to express an opinion as to the identity of the species. The Rev. Canon Fowler exhibited for Miss Ormerod, specimens of *Dilobo-derus abderus*, Sturm, *Eucranium arachnoides*, Brull., and *Megathopa violacea*, Blanch., from the La Plata district of the Argentine Territories, where they were said to be damaging the grass crops. Mr. Hampson raised the important point as to what was the legal "date of publication" of Part I. of the Transactions of the Society, 1894. He pointed out that the question of the priority of the names of certain new species described therein, would depend upon the date of publication.

City of London Entomological and Natural History Society.—*May* 1*st*, 1894.—The following gentlemen were elected members: H. H. May of Balham, P. R. Richards of Peckham Rye, G. H. Shields and D. C. Bate of Dulwich. Exhibits:—Mr. Battley; a series of *Brephos notha* from near Broxbourne, with specimens of *B. parthenias* for comparison. He remarked that the cream-coloured blotches so conspicuous in *parthenias* were practically wanting in *notha*, and the orange band on the hind wings in *notha* was not so direct as in *parthenias*; the antennæ of male *notha* were most decidedly pectinated. One of the specimens of *notha* had the left fore wing of a dirty-whitish colour, and the hind wings were much suffused with black. Mr. Bacot; a series of *Selenia tetralunaria* captured by "assembling" at Epping Forest. Mr. Gurney; *Silpha quadripunctata*, *Coccinella 14-punctata*, and *C. 22-punctata* from the New Forest; also *Dermestes vulpinus* from the dead body of a jay in Ongar Park Wood. Mr. Lewcock; a small but perfect specimen of *Biston hirtaria* from which a parasitic (dipterous) larva had emerged and since pupated. Young *hirtaria* larvæ had also come forth from the opening made by the parasite; these had of course been hatched in their parent's body from undeposited ova. Mr. S. J. Bell; some curious ova laid on a primrose flower taken from a bought bunch. In shape they resembled butter tubs and were of a pale grey colour with a dark brown ring round the top and another round the base; there were also two brown spots between the rings. The eggs were laid in a row. Mr. Battley remarked that queen wasps were extremely plentiful at South-end, and recommended members to kill all they came across in order to lessen the probability of another plague like that of last year.

The Entomologist's Record
AND
JOURNAL OF VARIATION.

No. 8. Vol. V. August 15th, 1894.

Notes on the Variation of Spilosoma mendica

With some thoughts on the Ancestral Type of the Genus.

By J. W. TUTT, F.E.S.

A few years ago (1885), British entomologists were startled by the capture of a pale form of the male of *Spilosoma mendica*, in Co. Cork, Ireland, by Mr. H. McDowall. The species, as is well-known, is usually in this country very distinctly sexually dimorphic, the males being of a deep sooty-brown colour, whilst the females are white with a few scattered black spots, and are much less thickly scaled than the males. When Mr. McDowall discovered this pale form in Ireland, he captured a male and a female, and from the latter was fortunate enough to obtain eggs which he distributed to many English collectors, among others to Mr. R. Adkin of Lewisham. That gentleman took special pains in rearing the larvæ which hatched from these eggs, and made many observations on their habits and economy; he was, however, unable to detect any difference between them and those of our ordinary form, and they pupated in a similar manner.

Many specimens, the outcome of these eggs, were distributed throughout our collections, but comparatively few individuals have since been taken at large. Three specimens were taken at light in Antrim in 1886, and five in the following year, one of which was almost pure white. Mr. W. F. de V. Kane is responsible for the statement that another specimen was taken in Co. Cork in (or before) 1885. Females have been taken in Dublin and Waterford, but what form of male occurs there has not yet been determined. It would appear, however, that no very dark male has as yet been taken in Ireland.

In England, the species does not, as a rule, tend to vary, but a few remarkable cases of variation have been recorded. From eggs obtained from a female taken at Eltham, by Mr. C. Fenn, 21 males and 22 females were bred. The females varied little from the ordinary type, except in the case of one specimen which was curiously blotched with dark grey on the left fore-wing. The males varied from specimens of the usual English type, to others of a dull pale yellowish-grey, and quite 50 per cent. diverged more or less from the usual blackish-grey form. The pupæ were exposed to the weather in a very cold and damp spot, and it has been suggested by Mr. Fenn, that these conditions upset them so as to produce this large amount of variation. Another very similar

brood, obtained from eggs laid by a ♀ from North Kent, is in my own collection. It is remarkable that both these broods showed females tending to be darker than usual, whilst the general tendency of the males was to be paler—an approach to uniformity in the sexes it would appear.

Under some conditions therefore, probably pathological and constitutional, (in the brood I have, some specimens were crippled), it would appear that there is a tendency in our usually strongly-marked dimorphic English form, to produce an insect approaching the Irish race.

Mr. Adkin afterwards crossed the Irish form (♀), with a male of the English form. From the ova thus obtained, two males were bred, and they differed from both the Irish and English forms.

Another remarkable race of this species has been bred by Mr. G. T. Porritt, but in this the variation is in the direction of the females becoming streaked with black as sometimes occurs in the allied *S. menthastri* and *S. lubricipeda*. The females here had a great excess of black markings. Some of the most important aberrations are figured and described (*Trans. Ent. Soc. Lond.* 1889, pp. 441–43). It is, perhaps, worthy of note that at Barnsley (not far from Huddersfield), the ordinary English form only is obtained, in fact, it has there, if anything, rather paler males than usual, and less strongly-spotted females.

The variety with white males is known as var. *rustica*, Hb., and is the subject of an interesting article by Mons. A. Caradja, who is devoting himself to the study of the Roumanian fauna; this article appears in *Societas entomologica* for June.

In Roumania M. Caradja met with *S. mendica* var. *rustica* from the middle of May to the end of June, and in some years, he says, there is a partial second brood in August. Basing his statement upon a collection of 200 males, the author says that the form is very little subject to variation; the chief point of difference is in the number of black spots which in the fore-wings ranges from 2 to 8 and in the hind-wings from 0 to 3. In eight of the captured specimens there was a slightly smoky tint, which the author suggests may have been the result of a cross with the type. The males fly freely to light, but hide away very well during the day, so that, whilst M. Caradja had no difficulty in netting females in the day-time, inasmuch as that sex flies in the sunshine with a short heavy flight, soon settling again in the grass, he had only once taken a male in that way. The larvæ hatch on the sixth day after the eggs are laid, and pupate before the beginning of August. The larvæ in all their stages resemble those of the type. From some 200 pupæ which the author reared in 1892 no moth emerged until the following spring; but from the fact that he beat several half-grown larvæ from a hedge at the end of September or beginning of October, 1891, he concludes that there is sometimes an incomplete second brood. The article then proceeds to deal with the geographical distribution of the variety. Several localities in the north of Moldavia are mentioned, and it is suggested that it was from the neighbourhood of Foscani in this district that Hübner received the specimens which he named *rustica*; the variety appears to replace the type in the whole of Moldavia, and the same is true of Bucovina, an Austrian province lying immediately to the north of Moldavia; but all round these two districts the ordinary type alone occurs, and the variety is not found. The author mentions

an isolated spot in one of the southern Alpine valleys where the white-maled variety is also found, although its habitat is there confined to a few square kilometers; he does not seem to be aware of its occurrence in Ireland. The true home of var. *rustica* is stated to be the Caucasus, and the author suggests that its centre of distribution may hereafter turn out to lie farther east or south of the Caspian. M. Caradja suggests that, according to the law which holds good in the geographical distribution of plants, this island-like occurrence of var. *rustica* in the middle of districts inhabited by the type points to the conclusion that in the past it was the predominating or even the sole existing form, and that its more limited distribution to-day is due to the type being better protected by its darker colour. Further, seeing that on the margins of the districts which it now inhabits there must be frequent crossings between it and the type, he thinks that its entire disappearance from Europe is only a question of time. In support of the opinion that the dark-maled type has developed from the white-maled form, he refers to the cases of *Amphidasys betularia* var. *doubledayaria* and *Psilura monacha* var. *eremita*. The author seems, however, to think that, where the white form still holds its own, white may really be the best protective colour for it, seeing that it occurs at a time when the ground is littered with the white petals from the fruit trees. On one occasion a specimen settled at his feet in the garden, but he was entirely unable to discern it among the fallen petals, and was actually going to remove it with the petals, which he was clearing away in order to find the moth. He concludes that the white variety is better adapted to the dry (or cold) Continental climate of Moldavia, Bucovina, and the Caucasus than the type, which seems to have sprung up in ocean-bordering districts.

It may be well here to glance at our common species of this genus as a whole. *Spilosoma menthastri* shows but little colour variation in southern Britain, being almost pure white with black dots in both sexes. As, however, we travel north and west colour variation sets in, and distributed over northern England, Scotland, and Ireland (so far as I have obtained specimens) is a buff race known as var. *ochracea*, White, which has, moreover, as I have noticed in my bred specimens, a tendency to become smoky coloured if ever so slightly crippled. Both sexes, however, thus become yellower, and the variation does not tend in the direction of sexual dimorphism.

S. lubricipeda is an interesting species, inasmuch as even in our southern English counties it keeps the buff colour which *S. menthastri* only takes up in Scotland and Ireland, and locally in northern England. But even then the colour is higher and deeper in the damper districts, as in the western Highlands and certain parts of Ireland. In spite of this, however, there is a distinct sexual difference of tint, the yellow and buff of the males being much brighter than is that of the females, but this sexual difference is less marked in southern and eastern England than elsewhere.

Now, it is very remarkable that it is just in those areas where the sexual difference of *S. lubricipeda* is least marked that the sexual difference of *S. mendica* is most strongly accentuated, the latter occurring, however, and showing but little difference from our southern specimens, in Aberdeenshire. The tendency in this latter species has been to produce a white female, less pigmented probably, certainly

more transparent, and perhaps of a purer white than even *S. menthastri* shows in its southern haunts, whilst the male is of a brown so deep that it is sometimes termed black, and quite unapproached by the ground colour of any *S. lubricipeda*; nevertheless, in Ireland under ordinary and in England under pathological conditions, there is a partial assumption of the normal buff coloration of the group.

From these facts a simple deduction or two may be drawn. I am of opinion that the ancestral type of this group was buff-coloured, because this is the coloration to which under special conditions of environment, &c. all the species revert. I take it also that this ancestral type was accustomed to a damp and moist climate, for it is in such a climate that the buff coloration appears in all the species; the white *S. menthastri* of southern, eastern, and middle England becomes buff in the moister districts of Ireland, Scotland and northern England; the pale buff of the *S. lubricipeda* that we meet with in our drier areas becomes deeper in tint in the same areas; whilst in the more isolated and moister parts of our islands where *S. mendica* is found the deep brown of British specimens retains the ancestral coloration; even the white *S. urticae* tends there to become cream-coloured in many specimens.

The facts, that in *S. menthastri* both sexes assume a buff coloration in these moist areas, that in *S. lubricipeda* the sexual difference of colours is less strongly accentuated there, whilst in *S. mendica*, though the males become buff, the females are often much less white than those from England, all tend in the same direction, and point to a time when the immediate progenitor of these species had a buff male and female which were suited to its then environment; and after the differentiation of our present species we see how possible it is for natural selection and climatic changes to have produced the differences we now know so well.

One other thought suggests itself. This extreme sexual differentiation in *S. mendica* is probably of very recent origin. That it is recent (as such things go) is certain from the occurrence of the ancestral form in local areas distributed from Ireland to the Caucasian mountains; but the recent development of the "Huddersfield" race renders it highly probable that the climatic changes in Britain and Central Europe, due to the advance of civilization and forest clearing, may have been an important factor in evolving the present forms.

Without seeing the specimens and knowing the locality mentioned by Mons. A. Caradja, it is impossible to say how near they are to Irish specimens, but his reference to them as the "milchweisse form," and his special mention of the fact that "eight of the specimens are of a smoky tint" remind us that one of the Antrim specimens was nearly white. Strange, too, the specimens recorded by Mons. Caradja appear to be entirely restricted to the valleys of the Pruth and Danube or to isolated mountainous valleys, at Tirgu Neamtu, Kloster Neamtu (in Carpathians), Costisa (in the Bistrita valley), Husi (a small town south of Jassy), Jassy, Dorohoi, Comanesti, the whole of Moldavia, Bucovina, Czernowitz, Radanti, the Bergell (a southern Alpine valley); yet he refers to these comparatively low-lying districts as possessing a Continental climate. It would be interesting to get records of the climate and meteorological conditions of the localities where the variety is found, so that we might compare them with our Irish conditions. I am inclined to think, however, that the assumption of the extreme tints both paler (whiter), and darker than the buff-coloured ancestral

form, have been obtained and retained for protective purposes, and that the pure white males are as much a development in a special direction suited to special localities and conditions, as are the dark males of our central European hedgerows, coppices, and woodsides.

Since the above was written, Mons. A. von Caradja has published in *Societas entomologica*, vol. ix., p. 49, another article on this interesting subject. His article is called "*Spilosoma mendica*, Cl. var. (et. ab.?) ♂ *Standfussi*, Caradja," and he writes:—"By this name I denote the hybrid form, obtained by crossing the female of *S. mendica*, with the male of its variety, *rustica*. The female of this hybrid naturally does not differ from the females of the type; the male, however, is exactly intermediate in colour between the dark smoky-brown male of *mendica*, and the milk-white male of var. *rustica*; the wings, thorax and abdomen, both on the upper and under sides, are of a very peculiar grey-brown tint, which appears something like a faint pearl-grey cloud spread over the white ground colour. The ordinary black spots on the fore and hind-wings contrast strongly with the ground colour. This new and interesting form, which occurs in nature, I name in honour of my highly-respected friend Dr. Max Standfuss of Zurich. All my last year's broods were unfortunately largely decimated by "pebrine," so that I only obtained a single pair of this crossing from 250 larvæ. This year I hope to obtain better results."

"I may here mention some extremely important facts. The crossing of males of var. *rustica* with females of *mendica*, is at all events fruitful; every egg yields a larva. On the contrary, of females of var. *rustica* crossed with males of *mendica*, only 0·15 per cent. produced larvæ, and all of the first crossing failed."

"With regard to the hybrid copulation between females of *S. luctuosa*, H.-G., and males of var. *rustica*, reported upon last year, I have to report that this year I have obtained entirely different results, which proves that the results of a single experiment are not always to be relied upon. From five crossings I did not obtain a single larva; but from the sixth I obtained 141 larvæ, which developed vigorously, the first-laid eggs being those which yielded the larvæ, whereas the remaining 194 eggs proved infertile. The reversion of the sexes in this crossing, *viz.*, the pairing of male *luctuosa* with female var. *rustica*, and also male *luctuosa* with female *mendica*, were entirely unfruitful."

The pairing of *S. mendica* with its variety *rustica* was carried to a successful issue some years ago in Britain by Mr. Adkin. It would appear that the single male cross obtained by Mons. Caradja (he only bred two moths, and describes both sexes) is not unlike many of our purely-bred Irish males. How far Ireland is an area where the type and var. *rustica* overlap has not yet been determined, dark males not having yet, I believe, been recorded from Ireland.

The rearing of true hybrids between *S. mendica* and *S. luctuosa*, adds another to our already long list of hybrids obtained from allied species. It would be interesting to know whether *S. luctuosa* will cross successfully with typical *S. mendica*, or only with var. *rustica*. If only with the latter, the fact would have a strong bearing on the ancestral form of the genus.

TWO ENTOMOLOGICAL ANTIQUES.

By F. J. BUCKELL, M.B.

In a volume of oddments, mostly of a scientific nature, which some worthy of a century ago had had bound together and which recently came under my notice, were two entomological "antiques." The first of these was the English translation of *Fundamenta Entomologiae*, a work which, although usually bearing the name of Linnæus and published in the seventh volume of that author's *Amoenitates Academicae*, was really written by one of his pupils, Andrew John Bladh. The translation is by W. Curtis, Apothecary, and bears date 1772. The work is in the nature of an "Introduction to Entomology," and may be taken to represent the scientific knowledge of the time. There were evidently scoffers in existence then as now, for the author thus opens the third section:—"As insects furnish but few of the necessaries of life, the ignorant and uncivilised part of mankind have not scrupled to stigmatise the ingenious enquirers after them with the name of fools, as these animals appeared to them altogether contemptible, and deserved to be considered only as punishment inflicted on particular countries for the sins of its inhabitants." The author farther on suggests that "if we understood how to apply insects properly, we might use them as we do cats against mice, and by attending to the design of Nature, prevent much damage." The importance of method and the advantage of accurate synonymy are insisted upon. Next follows a catalogue of the principal authors that have written on insects, in which our countrymen receive due recognition. This is succeeded by a description of the several parts of an insect, after which the Linnæan classification is explained. Lastly, the sources of the mythological names so largely used by Linnæus for butterflies are indicated: those applied to the *Equites* are taken from Trojan history, the sable butterflies with red or bloody spots at the basis of their wings receiving the names of the Trojan nobles, while those ornamented with a variety of gay colours were distinguished by the names of the Grecian heroes. The *Heliconii* derive their names from the Muses. The names of the sons and daughters of Danaus are bestowed on the *Danai*, "and as these species are sub-divided into two sections, *viz.* the white and parti-coloured, the metaphor is so conducted that the white ones preserve the names of the daughters of Danaus, and the parti-coloured ones those of the sons of Egyptus." "The names of the fourth section, *Nymphales*, are taken from various nymphs of antiquity; and those of the fifth section, *Plebeii*, are selected from different men among the ancients, whose names are worthy of remembrance: so that by this means a knowledge of the ancients may be interspersed, and this agreeable science be made doubly pleasing." The author concludes by earnestly recommending those gentlemen, whose summer residence is in the country, to devote their leisure moments to "the bringing up of the larvæ of insects and attentively observing their various transformations, their œconomy in procuring food, their dexterity in preparing habitations, and every other thing they are engaged in. By this means many insects and their wonderful properties, which have remained in obscurity from the beginning of time, would be brought to light, more especially if these gentlemen would themselves describe or communicate their discoveries to some

academy of sciences. Thus would they at one and the same time enrich the science of natural history, and transmit their names to posterity with honour."

The other "antique" is *The Aurelian's Vade Mecum*, by Matthew Martin of Exeter, in which city it was printed, the date of publication being 1785. This is a list of plants, arranged in the alphabetical order of their vernacular names, with the Linnæan names appended. Under each plant are arranged the species of Lepidoptera whose larvæ are stated to feed upon it. Of these the Linnæan name is given in one column, the vernacular (where such exists) in another, and in a third the initial of the author from whom the information has been derived; for the work is a compilation, and does not embody the results of the compiler's own experience. He tells us that he has consulted the writings of Linnæus, Ray, Reaumur, Geoffroy, Berkenhout, Withering (botanical), Harris and Engramelle. There are some interesting vernacular names of plants, which seem to have been lost in the century that has since elapsed. *Chenopodium* is Blite; *Chaerophyllum sylvestre*, Cicely; *Lemna*, Duckmeat; *Triticum repens*, Quich-grass. There are, too, some interesting vernacular names of insects: *Phalena antiqua*, is the White-spot Tussock moth; *Ph. chrysitis*, the Green Brazen moth; *Ph. quercus*, the Great Egger moth; *Ph. lacertinaria*, the Wild Rose moth; *Ph. betularia*, the Spotted Elm moth; *Pap. rubi*, the Green butterfly; *Ph. oxyacanthae*, the Ealing moth; *Sph. atropos*, the Bee Tiger Hawk moth; *Pap. semele*, the Black-eyed Marble butterfly; *Pap. lucina*, the Small Fritillary butterfly; *Ph. libatrix*, the Furbelow moth; *Pap. camilla*, the White Admirable butterfly; *Pap. atalanta*, the Admirable butterfly; *Ph. humuli*, the Otter moth; *Ph. syringaria*, the Richmond moth; *Pap. malvae*, the Brown March butterfly; *Pap. antiopa*, the Willow butterfly. As regards the identification of the Linnæan names, the author followed the usage of his time, and seems to have taken Harris as his guide. The following are instances of mistaken identity:— Butterflies: *argus* is used for (=) what we now know as *icarus*; *virgaureae* = *phloeas*; *maera* = *megaera*; *megaera* = *tithonus*; *maturna* = *athalia*; *camilla* = *sybilla*. There was at that time no doubt about the identity of *Pap. malvae*, Linn; the history of the subsequent confusion of that identity is an interesting chapter which, some day, may be worth elucidating. My knowledge of moth-synonymy is not sufficient to enable me to trace the identity of the moths. It seems, however, from its vernacular name of the Yellow-tail moth, that our *auriflua* was then supposed to be *chrysorrhoea*, Linn. With regard to food-plants: *Ph. aesculi* is to be found in alder, apple (within the branches), ash (within the bodies in nurseries), horse-chestnut, pear (inside of branches?), and privet (do.); for *Pap. machaon*, the following are mentioned:—Angelica, burnet saxifrage, carrot, fennel, hemlock, milky parsley, rue and wild spignel; *Pap. rubi* is said to feed on the buds of bramble; *Ph. lapella*, within the seeds of burdock; on the authority of Linnæus, *Ph. pisi* is allotted cucumber as a food-plant, but there is evidently a doubt about the accuracy of this, as it is added in brackets (*cucumere*, L., Fruit?); *Ph. hecta*, is said to feed on the roots of grass, and *Ph. serratella*, within the leaves of pear, in a tufted covering.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 169).

Chap. IV.*

EMBRYOLOGY.

1.—General remarks on the study of embryology.—Embryology concerns itself with the cycle of changes that take place in the fertilized ovum, and that have as their result the production of an individual resembling its parents. Biologists are agreed as to the supreme importance of the subject, for many of the profounder mysteries of living creatures can only be interpreted by its aid. More and more, therefore, of late years has its study engaged the attention of scientific men, and entomology, like other branches of natural history, has received illumination from their labours. It is now well known that all animals during their embryonic life undergo a series of remarkable changes both in form and structure. Sir John Lubbock tells us that *Chlöeon* (an Ephemerid insect) moults some twenty times before reaching its final stage of development, whilst every entomologist has watched the more or less sharply defined metamorphoses that other insects undergo. I may remark that for the present I give the word Embryology a wider meaning than, strictly speaking, is warranted, and include all the conditions through which the young pass before reaching actual maturity as simply extensions of the embryological condition. How great are the changes which various animals and plants undergo during development, we all know. In the case of a fern there is first the spore; this gives rise to the prothallium, which in its turn produces antheridia and archegonia; the latter undergo fertilization, and it is not till the consequent development of the germ-cell is completed that the cycle of change is ended by the reproduction of a fern. Again, we may take a branching coralline; this gives off a vast number of huge, free-floating jelly-fishes, which in their turn produce cells from which free-swimming ciliated animalcules are developed; these after a time become attached to rocks and reproduce the coralline. Or, taking an example from an insect, the larva of a Dipteron (*Cecidomyia*) produces asexually other larvæ; these pupate, and from the pupæ male and female imagines emerge; pairing ensues, and eggs are laid from which larvæ hatch, and the cycle begins again. In some cases the greater part of embryonic life is got through before the embryo has a separate existence from the parent, in others after it has such separate existence; so that although the embryonic condition is often spoken of as if it were limited to the development of the young within the egg, the term really has a much wider application.

2.—On the similarity between the earliest embryonic stages of widely differing creatures.—In their earliest embryonic stages the various divisions of the largest classes of the Animal Kingdom present a remarkable similarity as regards their structural features.

* Chap. III. on Parthenogenesis will follow this chapter. The material for it is not yet complete.

Between the early embryos of mammals, birds and reptiles there is such a strong likeness, that Von Baer tells us that, of two embryos in his collection which were unlabelled, he could not say even to what class they belonged; they might be lizards, birds or mammals, "so complete is the similarity in the mode of formation of the head and trunk in these animals." Again, many of the Crustacea are exceedingly alike in their early stages, although they become very different in the adult stage. When we come, however, to genera and species, we find that the similarity of their early stages is much more pronounced, the similarity extending even to small matters of detail. Thus the furze which when mature bears prickly leaves, has in its early stages the ordinary trifoliate leaves of its leguminous allies; the young of the lion is striped like so many other carnivora; the young blackbirds are spotted after the characteristic manner of the thrush family—and so on. It must be noticed that these similarities in embryonic characters do not usually bear any relation to the conditions of existence. Young mammals, birds and reptiles, passing through their earlier stages under such different conditions, alike have a peculiar development of the branchial arteries. It cannot be supposed that, in the womb of the mother or in the egg of a bird, these have any functional value or any relation to their then mode of existence, and we can only look upon the peculiarity as a survival of a common ancestral feature, which at one point in the line of descent had a fundamental value.

3.—On the effect of the differing conditions of embryonic life.—I have already intimated that embryonic life cannot be held to be limited to the egg-stage, and the proportion thereof that is completed in that stage differs greatly in the different classes of the Animal Kingdom. The embryonic changes in the egg of a bird bring the young bird very much farther on towards the adult, both in form and development, than those in the egg of an insect, in which the larval and pupal condition are also distinctly embryonic.

It will be readily understood that when an animal embryo completes its development to a great extent within the body of its parent (animal), or is entirely dependent on its parents for nourishment (bird), there is less need for it to take on any special characters for its own protection than when it becomes actively independent early in life (crustaceans and insects, &c.). When, too, the method of life, the habits, environment, &c. of the active embryonic form are entirely different from those of the adult, it is evident that the difference between them must be correspondingly great if the adaptation of the two forms to their different conditions of life is to be equally perfect. We may find, therefore (and the Lepidoptera give us a number of instances) that the larvæ of allied species differ very greatly owing to the difference of their habits, &c., whilst the imagines are very similar; conversely the larvæ may show a close relationship, though the imagines may be very different; the larvæ and imagines with similar habits may both bear a strong resemblance to each other. Thus the larvæ and pupæ of *Viminia venosa* and *V. rumicis* show throughout a very strong resemblance, which represents a real relationship, whilst their imagines are as different as can well be supposed, indeed, until quite recently, *Viminia venosa* was, on the strength of its imaginal appearance, separated generically from *rumicis*, and its superficial resemblance in the imago state led to a general belief among entomologists that it was allied to

the genus *Leucania* (a purely Agrotid genus). Then there is the remarkable brotherhood of *Cuspidia tridens* and *psi*, whose larvæ, under very similar methods of life, are much alike, and their imagines (with the same habits) scarcely distinguishable. Under such conditions therefore, it is evident that the actual relationship of allied larvæ on the one hand, of imagines on the other hand may, among Lepidoptera, be very much obscured. Where, however, their conditions of life are similar, the larvæ, although active, will obey more or less perfectly the law of embryonic resemblance.

4.—On embryology as indicating lines of descent.—The student in dealing with this question has two great points to keep in mind; (1) whether the similarities which he sees are phylogenetic, that is, whether they are due to the transitory reappearance of the characters of a bygone epoch in the ancestral history, or (2) whether they are œcological in their origin and due to similar relationship of the animals to their organic and inorganic environment. The characters manifested in the egg-state must almost of necessity belong to the first division; those in the active larval (considered as an embryonic) condition may belong to the first or second.

As Darwin says: "We are so much accustomed to see a difference in structure between the embryo and the adult, that we are tempted to look at this difference as in some necessary manner contingent on growth," but it must be agreed that there is no reason, if such were the case, why the whole adult system should not be sketched out in the earliest stage, and development proceed continuously along these lines to perfection instead of the transitory appearance of certain structures which rapidly disappear. That the latter happens, therefore, shows that such a supposition as the above is wrong in principle, and that the changes have a real phylogenetic significance.

We must also bear in mind that it is almost impossible for the same individual to show all the stages of development in the long line of descent through which it has passed; one will leave out some (perhaps many) stages, which may be shown in others. The complete study of embryology must, in time, give us much more correct notions of actual relationships than any other line of enquiry; for it is highly probable that the embryonic stages show us, more or less completely, the line through which the ancestral form has been developed, to produce the present condition of its offspring. It is to embryology, therefore, that we must look, to furnish us with the clue to the true relationships which exist between animals, and a true genealogical classification can only be formulated by the aid of the knowledge which it contributes. We aim at obtaining a "natural system." What is this but an indication of the line of descent of the various species we study and their connection with each other? Can we wonder, therefore, that, in the eyes of most naturalists, the structure of the embryo is of more importance than that of the adult? Darwin says:—"In two or more groups of animals, however much they may differ from each other in structure and habits in their adult condition, if they pass through closely similar embryonic stages, we may feel assured that all are descended from one parent-form, and are, therefore, closely related. Thus, community in embryonic structure, reveals community of descent; but dissimilarity in embryonic development does not prove discommunity of descent; for in one of two groups the developmental stages may have been

suppressed, or may have been so greatly modified through adaptation to new habits of life, as to be no longer recognisable. Even in groups, in which the adults have been modified to an extreme degree, community of origin is often revealed by the structure of the larvæ. . . . . As the embryo often shows us more or less plainly the structure of the less modified and ancient progenitor of the group, we can see why ancient and extinct forms so often resemble in their adult state, the embryos of existing species of the same classes. . . . . Entomology rises greatly in interest, when we look at the embryo as a picture, more or less obscured, of the progenitor, either in its adult or larval state, of all the members of the same great class."

In this slender outline of the subject, I can only hope to have said enough to convince my readers of the importance of the study of embryology. I trust, too, that it will be evident to entomologists, why it is no longer possible to rest content with systems of classification, based upon imaginal features (palpi, wing-markings, neuration, &c.) and why, more and more, scientific men are demanding that classification shall take into account the whole life-history.

SCIENTIFIC NOTES & OBSERVATIONS.

ON EGGS AS HELPING TO DETERMINE NATURAL AFFINITIES.—With reference to that portion of Mr. Tutt's paper (*Ent. Rec.*, vol. v., p. 142) which deals with this subject, I should like to be allowed to make a few remarks. As far as I am aware, entomology is the only branch of zoology which has clung tenaciously to the doctrine, well expressed by Haeckel's terse phrase (*Generelle Morphologie*, 1866), "ontogeny recapitulates phylogeny," in an approximately literal sense, and although I will not accuse Mr. Tutt or any other thoughtful entomologist of entertaining the notion that all moths at present existing have sprung from ancestors, each of which resembled the egg that the imago now develops from, yet, nevertheless, there seems to be an undercurrent of feeling pervading entomological literature, the tendency of which is to consider Lepidoptera with similar ova as more closely allied than those with dissimilar ones; this I hold to be quite unsupported by facts, and quite at variance with the conclusions to be drawn from other developmental histories. Anyone who has glanced at the rudiments of general embryology must be aware of the extremely diverse embryonic types of many families, genera, or even species; *e.g.* in the well-known case of *Balanoglossus kowalewskii* and *B. kupfferi*, the latter closely resembles in its Tornaria stage a free-swimming star-fish larva, and was in fact originally mistaken for one, while the former has an opaque larva which burrows in mud. These facts, and many others which could be brought forward indicative of a completely different fundamental organization in the larva of undoubtedly allied genera, show, I think, the absurdity of basing any classification on such points of similarity in ova as number of ribs or external outline, which seems to me like trying to classify birds by the number of spots on their egg-shells. In fact, in general, I think, entomologists are far too apt to rely on embryonic peculiarities for purposes of classification; *e.g.* if a new caterpillar were discovered to-morrow with four claspers, whatever its

internal structure or whatever peculiar characteristics the imago might possess, it would almost certainly be placed among the Geometers, and from this it follows that a heterogeneous mixture becomes packed together into one group; in fact, a similar mistake was originally made by Swammerdam, and subsequently by Lamarck and Newman, in employing the degree of metamorphosis as the sole ground for their primary divisions of insects, and in these cases it was soon found that closely allied forms, such as *Libellulidae* and *Neuroptera* were separated, while other quite remote forms, *e.g. Rhyncota* and *Orthoptera* were brought together, and although insect classification is even now in a very undecided condition, the tendency seems to be *not* towards a system based on any one particular set of characters like those already mentioned, or that of Fabricius based on the structure and function of the mouth parts, or that of Linnæus based on the comparative development and form of the wings, but towards a system which has for its foundation a combination of all these characters and others besides, such as that of Latreille or of Westwood. In consequence of this, naturally related forms are now brought closer together, and the groups now recognised are more uniform and more homogeneous than in the past; but, nevertheless, even now too little attention seems to be bestowed on the internal organisation of insects and, perhaps, especially of Lepidoptera, and I need hardly remind any of the readers of this magazine that perhaps the most dangerous maxim for a scientific man to follow is that of resting on the laurels won for him by his forefathers.—F. P. Bedford, 326, Camden Road, N. *July 7th*, 1894.

I print the above because it purports to be a criticism of what I myself have written, and I do not wish to appear to act unfairly by suppressing such criticism; but I must own that I have not the slightest conception of the way in which the criticism cuts, or how it is supposed to touch the facts that I dealt with. It is interesting to learn that "entomology is the only branch of zoology which has clung tenaciously" to Haeckel's famous phrase; as a matter of fact, entomological writings as a rule, are wonderfully lacking in even the simplest rudiments of such scientific assumptions, and I should be pleased to have references to articles in which this "tenacious clinging" is expressly shown. Is there any entomologist, thoughtful or otherwise, who believes that "moths have sprung from ancestors each of which resembled the egg that the imago now developes from"? The suggestion that some do, shows that the person who could imagine that any entomologists believe such a thing, either denies the possession of common sense by entomologists, or else is stating his own peculiar views on Haeckel's biological principle.

"Nevertheless, there seems to be an undercurrent . . . . . to consider Lepidoptera, with similar ova, as more closely allied than those with dissimilar ones; this I hold to be unsupported by 'facts.'" I am pleased to hear that there is such an undercurrent, for there can be no doubt of its general truth; of this, a single season's observation in the field would convince anyone with average powers of observation.

"These facts . . . . . indicative of a completely different fundamental organisation in the larvæ of undoubtedly allied genera, &c." If there is a completely different fundamental organisation in the larvæ of two undoubtedly allied genera, I should be interested to know why they are so "*undoubtedly* allied." My notion of relationship or alliance has

always been that it is indicated by a connection, similarity or resemblance in fundamental organisation.

"These . . . . show, I think, the absurdity of basing any classification on such points of similarity in ova, as the number of the ribs, &c." Will Mr. Bedford kindly give us the name of any entomologist who has based a system of classification on the number of ribs in ova.

"In fact, entomologists are far too apt to rely on embryonic peculiarities for purpose of classification." This is refreshing. I have been working for a long time at entomology now, but have never come across any writings (at least, in Britain) in which this has been done. I may have overlooked them, in spite of a very strong desire to read such, and shall be very glad to be furnished with the names of a few. With regard to the assertion that if a larva were found to-morrow with four claspers, &c., it would certainly be placed in the Geometers, I would recommend that Mr. Bedford should write to Dr. Chapman or to Professor Poulton, or even to a few less-well-known giants, and propound to them the following conundrum:—"If a larva were found to-morrow with four prolegs: In spite of its internal economy, where would you place it?" I have no doubt the final destination of that larva would be a matter of profound interest to many.

The next phrase "that a heterogeneous mixture is placed in one group" based on such assumptions as these is very ingenuous. Does Mr. Bedford mean to say that the Geometers are such, and if so, will he kindly give us the experimental evidence from their "internal structure" which separates them, and tell us how they should be separated. We are willing to learn, but we cannot pick up much from such bald statements as these.

I am quite willing to believe that Swammerdam, Lamarck, and Newman were very naughty men, and did much to trouble the minds of those who should follow after them, but I am pleased to hear from Mr. Bedford that something has been done, and I am not even much alarmed to find that "insect classification" is now in a very undecided condition.

How joyfully I subscribe to the next sentence need hardly be said. "The tendency seems to be *not* towards a system based on any one particular set of characters . . . . . but towards a system which has for its foundation a combination of all these characters." Such a statement as this, I welcome from any and every source. I have proclaimed the same truth in season and out of season, wherever and whenever I have had the chance, and so have a number of other entomologists as well.

How Mr. Bedford can consider that the class of people, who would put any caterpillar with four prolegs into the Geometers in spite of internal peculiarities, who have learned from observation that certain great resemblances are to be found in the early stages (eggs, larvæ and pupæ) and give broad clues for classification, and who have hammered away at these points, can possibly have produced a system in which "naturally related forms are now brought closer together," so that "the groups now recognised are more uniform and more homogeneous than in the past," is beyond my comprehension, considering the general contempt he shows for them in the first part of his article; I would add that when Mr. Bedford (whose work I am sorry to say I do not know) has worked out and published an account of the "internal organisation" of one small genus of insects that will bear even a remote comparison

with Dr. Chapman's essay on "The genus Acronycta and its allies," based on their external structure, then we shall be able to judge how far we are all wrong in our methods of work, and how much reason there is for considering Mr. Bedford as a "Prophet in Israel."—J. W. Tutt. *July 10th*, 1894.

On hybernation in the egg stage.—Last autumn I took on ivy a female *Xanthia aurago*, which laid a few eggs shortly afterwards. The majority of these began to change within a week or two, and were leaden-coloured, with the young larvæ ready to emerge, before the end of November. They remained in this condition till the spring, hatching at the end of March or beginning of April. (As I sleeved them on beech I cannot give the exact date of hatching). The remaining eggs, that did not change, shrivelled up after a time, showing that they were infertile. I found the larvæ nearly full-fed in the sleeve towards the end of May, and they soon afterwards began to pupate. This experience of the larva hybernating in the shell is similar to that which I recorded in this Magazine last year (vol. iv., p. 172), and it seems probable that it is the usual occurrence with this species, and that Mr. Buckler's (Mr. Hellins' ?) description of the larva being undeveloped in the egg till early in the year, which Mr. Tutt quotes in the July number (p. 168) as a constant condition, is exceptional.—W. S. Riding, M.D., Buckerell, Honiton. *July 20th*, 1894.

On immunity from grease.—Mr. C. S. Coles asks in your issue for March (p. 72) if any explanation can be given why specimens set more than twenty years ago are perfectly free from grease, verdigris and mites. For some years past I have received many specimens from Southern India, and have been struck with the perfect immunity from grease of them all, not a single one out of hundreds being affected, not even the thick-bodied moths. On the other hand, my own captures in England have suffered from the common enemy. In both cases I use white pins, and the treatment generally is the same, but there is this difference:—the Indians are not pinned or relaxed until they are bone dry and brittle, being sent home in papers, whereas the Britishers have been pinned and set as soon as possible. Is this a likely explanation? Perhaps other collectors of tropical specimens will give us the benefit of their observations. I am subjecting all this year's captures, by way of experiment, to a thorough drying before pinning, as I conceive this must have an appreciable effect on the ultimate condition.—Jno. Pratt, The Cedars, New Barnet.

A remarkable incident.—Last night, upon going into my larval room, I found that during the day several imagines of *Bombyx quercus* had emerged and developed. I put three of these (two males and a female) into a cardboard box. Upon lifting the lid about ten minutes afterwards, I was astonished to find the two males in copulation (if I may be allowed the term), the spinster being quite deserted. These two males remained paired for about an hour and a half before separating. On the surface, neither of them appears to me to bear any marking distinctive from ordinary males, with the exception, perhaps, of the abdomen of one of them, which has a slightly feminine look about it. I have never previously met with a similar incident, and think that one of these "males" may perhaps be hermaphroditic in its internal structure.—Alfred J. Johnson, Erdington. *July 16th*, 1894.

The two males mentioned in the preceding paragraph were sent to

me by the Editor for examination. To all appearance they were both normal specimens of male *B. quercus*, and in no way approximated to the structure of the female. I concluded, from my examination of them with the naked eye, that the circumstances in which they were placed had caused their genital structures to become accidentally entangled; nevertheless, I at once prepared them for the microscope, only to find, as I expected, that both were typical males. Taking into consideration the curious structure of the genitalia, which consist of a pair of backward hooks that appear to be a modification of the *Harpes*, and a single, very strong hook, almost at the extreme apex of the abdomen (the *Uncus*), and all exserted, one is not surprised that some entanglement of the ancillary organs took place under the conditions in which these individuals were placed. It is well known that the females of this species have the power of producing extraordinary sexual excitement in the males, as is evidenced by what is termed "assembling."—F. N. Pierce, 7, The Elms, Dingle, Liverpool. *July 27th*, 1894.

CURRENT NOTES.

In concluding his paper on the Nepticulæ (*E.M.M.*, pp. 150–4) Dr. Wood discusses the power of the larvæ of this genus and of *Lithocolletis*, to delay the ripening and death of the part of the leaf they are occupying. The leaf "shall have put on its red or yellow autumnal tint, it shall even have dropped from the tree, have died and turned brown, but the area in which the larva is feeding will remain alive and green, not merely for days, but for weeks, provided it be not exposed to excessive dryness." It has been suggested that the afflux of sap brought about by the larva is the cause of this, but Dr. Wood considers that "looking at one of these green patches, with its margins fading gradually into the surrounding brown area, it is almost impossible to escape the conviction that, it is produced by some substance we may call a poison, or a preservative, which, taken up by the sap is carried to the cells, and being appropriated in its progress, gets more diluted and attenuated the further it travels." Dr. Wood cannot tell us what the substance is, or how it is excreted, but "the whole of its singular influence over the leaf is exercised" when the larva is very young, and making its preliminary gallery, and that some substance is then produced which being absorbed by the vascular bundles, among which the creature is burrowing, gets distributed to the parts of the leaf they supply, where it is taken up and appropriated by the cells. The remarks bearing on gall-formation are also most interesting. The independent life of that part of the oak-leaf in which the larva of *N. subbimaculella* is, long after the leaf has fallen from the tree and is dried, shrunken and dead, must make as great an impression on others as it did on Dr. Wood. But the essay is too good to be treated like this; those who are interested in Nature's wonderful methods of work, must read the original.

From the *Daily Chronicle* of July 16th, 1894, we learn that "the effect of a hot summer, followed by a mild, dry winter, is already beginning to be felt in Scotland in the presence of a plague of caterpillars. The pest, which is for the moment devastating various districts, is the larva of the antler moth (*Charaeas graminis*), whose

special weakness is grass. Miss Ormerod tells us that in 1884 these caterpillars devastated an area of about ten miles in extent of the mountainous parts of Glamorganshire, and next year spread over a tract of about seven by five miles in Selkirkshire. The district at present infested is that in which the voles have been doing so much damage; only the mischief done by the caterpillars is so great that the graziers are looking back almost with affection to the more merciful plague of mice. It is possible that the drenching rains of the past week may check the increase of the larvæ. For it is noticed that a sudden wetting or rapid change in the state of their food induces violent purging, which soon reduces the grub to a mere empty skin."

PRACTICAL HINTS.

I want to recommend the use of methylated spirit instead of rum for mixing with the sugar; the attracting power seems to be greatly increased thereby.—(Rev.) C. R. N. Burrows, Rainham. *July 23rd*, 1894.

Flies always pester me to infuriation. I have found that a liberal sprinkling of Eucalyptus oil on the coat collar and face deters them from annoying me.—F. J. Buckell, M.B.

NOTICES AND REVIEWS.

Woodside, Burnside, Hillside and Marsh, by J. W. Tutt, F.E.S.—In his new volume Mr. Tutt gives us a second series of sympathetic pictures of rustic scenery, of birds, flowers, and insects; and these sketches are even more idyllic, and perhaps also more matured, than those which were presented to us in *Random Recollections of Woodland, Fen and Hill*. An eminent Canadian has recently urged the desirability, in this age of science, of the cultivation of the humanities. Such a pleasant blending of these two—surely not absolutely opposing elements—as Mr. Tutt's work displays, is unfortunately, however, rarely met with. We open a book full of profound learning: it appals and repels us by its technicalities, its dry and frigid style. We pick up a volume written by a master of charming language, and perhaps find therein much that will scarcely stand the test of close and sober reasoning. Here, however, we have a work which, if not of the highest literary merit, is at least clearly and intelligently written, and the scientific information contained in whose pages has been compiled in the full light of the latest discoveries and speculations. It is eminently a book which urges us to throw off the "old Adam" of the collector, and to attempt to penetrate farther and yet farther still into the *arcana naturæ*. The author carries us in spirit through some of the scenes in which Mr. Pickwick and his satellites displayed their many-sided abilities. The first chapter, giving a glimpse of the Kentish Woods with their thickets and flower-bestrewn clearings, introduces us to the famous Inn at Cobham with its memories of Dickens, and we almost sight in passing the home of the great novelist at Gads Hill. The third describes the chalk hills and downs in the

neighbourhood of Rochester on a brilliant day in July; the fourth, the mysterious and, to a mind not attuned to the minor key of nature, the rather dreary marshes and meadows on the banks of the Medway and the Thames. But though these may appear monotonous to the superficial observer, how wonderful are the inhabitants of their pools and swamps. The second chapter, however, leads us far away from Kent, and we are wandering over the glorious hills and valleys of the Highlands, where we see, midst other sights strange to southern eyes, waterfalls, burns, lochs, precipices, rocky crags and towering mountains. But whilst we are all nature-lovers, it is the entomological portions of the book which will appeal most strongly to readers of the *Entomologists' Record*; and here, revelling in his own pet subject, our author is treading on firm ground—he is on the chalky hillside, not on the yielding marsh. Many are the references to the close and important connection between plants and insects; we are shown the Bee-hawk moth extracting the honey, whilst on the wing, from the masses of bloom of the rhododendrons; the little Tortrix in its myriads and the Plume, in company with the bees, visiting the heather, and taking from its abundant nectar for their sustenance. We are led to examine more closely and to observe how fertilisation is accomplished by these means; to dive deeper still into the mysteries of nature, and to perceive that the flowers which are most inconspicuous and those whose colours are lowest in genetic sequence are frequently provided with delicate odours, as if in compensation for their meek humility, and it dawns upon us that the plants are really bidding for the bees. But here we must quote Mr. Tutt's own words, linking this attractiveness of flowers for insects with the difficult and complex question of the relative development of the different senses of the latter. He says:—

"Let us see whether we can discover at least some of the uses of scents in flowers. Have you ever heard of the wonderful keenness of the sense of smell in insects? Watch yon white butterfly! It is flitting along the hedge, but suddenly leaves it, as a piece of white paper is gently blown by the passing breeze along the road. The butterfly flies to the paper, toys with it, leaving it only to return again and again. Catch it carefully! Do not injure it! It is the Small White Butterfly *(Pieris rapae)*. Whatever did it mean by fluttering so lovingly around a moving piece of white paper? Ah! there are two other butterflies of the same species really love-making. The male butterfly flutters about and postures himself, evidently to make himself agreeable to his lady-love; but the piece of white paper is gently blown along the road again, and he leaves the lady to toy around the piece of paper as his predecessor had done. He flutters and postures around the piece of paper as he did about the lady, and appears to detect no difference between the shadow and the reality. Once or twice he approaches the paper with his antennæ, and then in a very short time he satisfies himself that the paper is a fraud and delusion, and flies off. The female butterfly still lingers on the hedgeside yonder, and soon the recreant and fickle knight spies her, and love-making recommences. Strange, you say, that the white butterfly cannot distinguish between a piece of white paper and a lady of its own kind; but so, at first, it really was, and only a close inspection with its antennæ enabled it to discern the difference."

"If you examine carefully the butterfly which you captured, you will find that its eyes are large and well-developed; each consists really

of quite a mass of eyes, all bound together, each of which has a separate hexagonal facet, the surface of the compound eye being strongly convex. Yet with such an apparently well-developed eye, the organ as an optical instrument is very defective; practical experiment has proved that with the exception of a remarkable power to discriminate masses of colour, of a keen appreciation of slight differences of light and shade, and of an ability to recognise objects in motion, the eyes of most insects are practically useless, and so far as the sight of the white butterfly is concerned, we have seen that it is attracted by anything of its own colour as quickly as by a female of its own kind." What an overturning of many of our old ideas!

Mr. Tutt's great subject, "Variation," too, is once more in evidence. The vagaries of the Carpet moths are glanced at. These are discovered both in the wood and on the mountain side, now as patches and scars on the tree-trunks, now as lepidopterous cracks and crannies of the rocks. The blackening of the resting-places of moths by the vast and continuous eruptions of smoke in manufacturing centres is explained, and the great axiom is driven home that nothing in nature is fixed, everything is variable and capable of adaptation to its surroundings, this adaptation ensuring the continued existence of the species. Besides, of course, the form and origin of markings which are protective are speculated upon, and, speaking of the metallic spots and blotches displayed on the underside of the larger Fritillaries (*Argynnis aglaia* being the species particularly referred to), Mr. Tutt writes:—

"We may obtain a clue to the manner in which these silver spots have been developed from the relatives of this butterfly. Very many of these have spots somewhat similar in shape and position to those we see here, but in some species they are pale yellow, in others white, whilst in many the spots are more or less of this metallic character. Is there any connection between the three colours? Yes, it would appear from what we know that one is derived from the other; probably the yellow gives rise to white, and this in turn to the metallic silvery white. In a very near relation, the High Brown Fritillary (*Argynnis adippe*), we find specimens which shows every possible gradation of size and development, as regards the spots, from entire absence of silver when the spots are pale yellow or whitish, until the spots unite to form silvery streaks. Here, then, the transition is very evident, and when we turn to those species in which the silver markings are now so fixed and constant, there can be but little doubt in our minds that the development has been a result of natural selection, and is of the greatest possible service to the insect. The insect before us closes its wings. How inconspicuous it at once becomes, for, as it clings closely to a thistle-head, the shiny spots resemble very distinctly the shiny bracts around the capitulum on which the sun is shining."

But the other orders of insects are not neglected, nor is the economic side of our science forgotten. We have disquisitions on galls, and on the damage caused by *Sesia*, *Zeuzera*, *Agrotis*, *Tortrix* and many others whose habits of living are so destructive to trees, roots and grain. The varying metamorphoses of the dragon flies and grasshoppers, and the economies of the social Hymenoptera, are described and commented on, and while dealing with the last, Mr. Tutt gives the following explanation of the origin of the system of slavery prevalent in the nests of certain ants:—

"How this slave-making instinct originated is doubtful. It is well known that ants which are not slave-makers will carry off pupæ of other species, to be used for food. If these pupæ hatched before they were required for that purpose, they would naturally do such work as they would have done in their own nest, and their presence proving useful to those in whose nests they found themselves, the collection of pupæ would probably be persevered in, and in time such collection may have become the sole aim of certain species, their household duties in the same manner becoming gradually and at last entirely delegated to their prisoners."

And now, when the evening is fast drawing on, and whilst the air is perfumed with the sweet scent of the "Wood-mother," as the Spaniards poetically term the honeysuckle, we part company with our Mentor. He leads us out of the marsh and leaves us beneath a hawthorn bush, looking out over the weird flat country, and we are alone with Nature—alone, but with a feeling of gladness and peace, for are we not in the presence of the Great Mother whose manifold and wondrous works he has been endeavouring to make us more rightly and more clearly understand. We have only lightly skimmed this charming book, whose attractiveness is greatly heightened by copious illustrations; it is a volume which will and must be read by every reasoning, right-thinking entomologist.—A. F. Bayne.

Abstract of Proceedings of the South London Entomological and Natural History Society, for the Years 1892 and 1893.—We are pleased to acknowledge the receipt of this volume, and to bear witness to the liberality of some of the members of the Society, which enables the Council to publish such an interesting volume. There are at least two papers within its covers which would raise it far above the level of the commonplace, even if there were no other matter of interest on its pages. These are the Presidential addresses delivered in 1892 by Mr. C. G. Barrett, and in 1893 by the late lamented Mr. J. Jenner Weir. The former is essentially an essay on Mimicry as exhibited in our native lepidoptera, written by a keen, observant and enthusiastic naturalist, who sees more than most people, remembers what he sees, and conveys clearly to his readers his own ideas of the bearing of the observations which he makes. It is an address, to overlook which is a serious loss to the lepidopterist who misses it; an address which every student will require for reference in the years to come. The other address is equally valuable. Thoughtful, closely-reasoned, and scientific is the criticism which Mr. Weir offers on Science as it is. Sympathetic and genial are his references to those whom we are pleased to own as our masters in the philosophical natural history of to-day. Intelligent and scientific are the remarks he makes on those points of the subject which he touches. It is a remarkable paper, which will long live in the memory of those of us who were privileged to know him. But these papers are by no means all. The notes accompanying the exhibits made by Messrs. Adkin, Weir, South, Tugwell, Hawes and others, are worthy of all praise. Three other papers, "Remarks on *Pieris napi* and allied forms," "Notes on the Wet and Dry Season forms of certain species of *Rhopalocera*" and "Isochromatous Lepidoptera," by Mr. Weir; "Notes on the Cocoons of *Eriogaster lanestris*," by Mr. R. Adkin; "On the unusual abundance of *Polyommatus phlœas* in 1893," by Mr. Hawes, together with other papers of perhaps equal interest, show that this is a

volume which, from a scientific point of view, is of the utmost value, and which will have to find a place on the book-shelves of all entomologists who wish to keep their knowledge of matters entomological up to date, and who wish to keep *au courant* with the members of this Society. The work is published at the Society's rooms, Hibernia Chambers, London Bridge, S.E., and its price is three shillings.—Ed.

NOTES ON COLLECTING, Etc.

Winchester.—The weather is too bad for words. The only thing worthy of note that I have done is to capture seven splendid *Triphaena subsequa*, one of which woke me in my bedroom at two in the morning by settling on my face. I got up and boxed it on the window (most of which was open), being too sleepy to look what it was—purely out of revenge for being woken—meaning to slay it in the morning for rousing me from my slumbers. I did slay it—blessing and not cursing.—(Rev.) G. M. A. Hewett. *July* 1894.

Ireland.—Stainton's account of the larva of *Eubolia mensuraria* is:—"Hardly known, feeds on grass." Between the 15th and 25th of June I found several larvæ feeding exclusively on vetch by night. The ground colour is dull flesh-colour with rather darker linear stripes on the back and a row of black lateral stripes. On July 14th, along the shores of L. Erne I took a hundred and fifty *Acentropus niveus* flying about the flowers of *P. pectinatum*. During this month I have found larvæ of *Pygaera curtula* on almost every sallow bush.—W. E. H. Porter, Belleisle, Lisbellaw, Co. Fermanagh. *July 24th*, 1894.

Rainham, Essex.—*Agrotis obscura (ravida)* swarms here this year. From July 5th, when I captured the first specimen, up to the present time I have taken in all 96 specimens. Many of them are very finely marked. They begin to come to the sugar almost as soon as it is put on. My two best nights were July 21st and July 24th. On the former I secured 27 and on the latter 17 specimens. All the specimens but one were taken in my own garden; that one was taken about a mile away, but sugar applied in several directions around here failed to yield any more. I have also noticed this year an extraordinary amount of variation in *A. exclamationis*, and have taken several specimens with the stigmata more or less united. My experience is too limited to enable me to say whether the variation is out of the common, but I cannot help thinking that many of the common species are given, here on the marshy ground, to considerable deviation; there is no doubt that some are very different from the forms found on more elevated localities. I have had some strange catches this year. I took *Dyschorista suspecta* (which, however, is fairly frequent at Brentwood) and also *Erastria fasciana (fuscula)* in my garden. I thought the latter was a wood insect—we have no woods at all. *Acidalia trigeminata* also is not rare.—(Rev.) C. R. N. Burrows. *July 31st*, 1894.

SOCIETIES.

At the meeting of The South London Entomological and Natural History Society on June 14th, Mr. Adkin exhibited a very variable

series of *Cyclostoma elegans*, Müll. taken at Reigate on June 9th; three hybernated specimens of *Vanessa antiopa* from Montreal; also a series (bred from Rannoch eggs) of *Asteroscopus unbeculosa*, some of which had been three years in pupa. Mr. Frohawk (on behalf of Mr. Fremlin) exhibited a specimen of *Apatura iris* that was intermediate between the type and var. *iole*; also (on behalf of Mr. South) a dwarf captured specimen of *Euchloë cardamines*, measuring only $1\frac{1}{4}$ inches in expanse, and another specimen in which the apical patch was of two shades of yellow. Mr. Manger showed a specimen of *Acherontia atropos* from Shanghai. Mr. West (Greenwich) exhibited specimens of *Cryptocephalus nitidulus*, Gyll. and *C. coryli*, Linn. from Box Hill; also two very rosy males of *Smerinthus populi*, which had been "assembled" by a bred female. Among a bred series of the same species brought by Mr. Filer was a male with the colouration of the female, and a specimen in which the discoidal spot on the fore-wings was much smaller than in the rest of the brood, this specimen having emerged in August last. Mr. Step exhibited *Helix rufescens* and *Lymnaea peregra* var. *acuminata* from Epsom; also a side-blown egg of *Helix pomatia*, of which many were found at Reigate. — On June 28th the following exhibits, among others, were made:—Mr. C. Fenn: a bred series of *Geometra papilionaria*, being part of a brood of which some of the remaining larvæ were not yet fully fed; also a specimen of *Heliothis peltigera*, having the blotch in the dark border of the hind-wing very large. Mr. Dennis: eggs and young larvæ of *Bombyx rubi* from Reigate. Mr. Turner: *Lycaena bellargus* from Box Hill, some of the females having a considerable amount of the male colouration. Mr. Adkin: a specimen of *Pachetra leucophaea*, taken on a bank-side at Reigate on the occasion of the Society's Field Meeting at that place on June 9th. Mr. Manger: a specimen of "British Coral" (*Lepralis foliacea*) taken from a portion of the French Atlantic cable, about sixty miles from Brest.

The Birmingham Entomological Society met on May 21st, 1894, when Mr. A. H. Martineau exhibited pupæ of *Crabro interruptus* which he had dug from a rotten stump at Middleton, in which locality he had previously met with the perfect insect. Mr. P. W. Abbott read a paper, of which, through the kindness of the author, we are enabled to give the following abstract:—

On the Genus Hadena.—The author considered that the correct position of the genus would be next after *Apamea*; he only knew of the occurrence of nine species (*protea, glauca, dentina, dissimilis, oleracea, pisi, thalassina, contigua, genistae*), in the Birmingham district, but thought it probable that *H. trifolii* (*chenopodii*), might occur there. Turning next to the subject of variation, Mr. Abbott said:—"So far as one is able to judge from a local race, it seems to me that *Hadena glauca* shows a large amount of ordinary variation; but upon local races it is hardly safe to form an opinion; however, the fact remains, that this species exhibits in our district a large amount of variation. The feature that first strikes the eye, upon examining the series of this insect placed before you to-night (bred from this district), is the variety of the shades of colour, ranging from ashy-grey to smoky blue-black; with the darkening of the ground colour comes the intensifying of the orbicular and reniform, and sometimes of the claviform—I say sometimes, because the claviform is more often ochreous. I think I may

say that in this race the claviform is seldom constant, sometimes being so large as to almost obliterate the black bar-like mark beneath the orbicular and reniform, whilst occasionally it is entirely absent, and every degree may be observed between these two extremes. In other cases you observe that the orbicular and reniform are only outlined in black on the hind-marginal side, and almost unite on the inner side, giving the appearance of a whitish-grey splash on the costal margin. When the fore-wings have a deep ground-colour, I usually find the hind-wings follow suit. I think I need say no more to show how variable this species is with us. In *H. dentina*, variation seems confined to the depth of colour, and our almost black local form presents a strong contrast to specimens from the South Coast." The paper concluded with the following notes on "the life-history of *H. glauca*."—"The eggs are laid in batches on sallow in May, and are spherical and indented on the top, with a number of ribs from top to bottom; they are of a pure white when first laid, changing to cream, and finally to a deep brown. The young larva emerges in about fourteen days, and rests on its food-plant in a sphinx-like attitude; it is of a pale green colour, changing with the several changes of skin, first to a darker tint of sap-green with a pale green stripe in the region of the spiracles, then to a rich velvety bistre brown, indeed almost black. When the larva is full-fed, the head is pale shining brown and is narrower than the second segment, and the body gradually thickens towards the end; the larva is then hairless, and in colour a pale umber brown, with an indistinct medio-dorsal stripe and a dirty-white line in the region of the spiracles; the back is reticulated with darker shades of brown, and the spiracles are pure white. If annoyed, it is extremely irritable, and falls to the ground, lashing out in all directions. It pupates just below the surface of the ground in a loose cocoon of silk and earth. The pupa has a squarish tail with four spines, and every segment is armed with a ring of spines; it is very active, moving at the slightest touch; its colour is pale mahogany-brown, turning to black before emergence."———On June 18th, Diptera and Hymenoptera were to the front. Of the former, Mr. Bradley exhibited *Syrphus triangulifer* (new to Britain), *Cheilosia chrysocoma*, etc., and Mr. Wainwright, *Syrphus annulipes* (new to Britain). Of the latter, Mr. H. Martineau showed *Osmia xanthomelana*, *Andrena bucephala*, *Nomada ochroctana*, a remarkably dark form of *Bombus muscarum*, etc. All the foregoing were captured at Selsley, at Whitsuntide. Of Lepidoptera, Mr. Bradley showed a specimen of *Thecla rubi*, which had no trace of white markings on the underside. Mr. Rossiter: *Chærocampa porcellus*, *Notodonta dictæa*, etc., from Wyre Forest.

City of London Entomological and Natural History Society.—*May 15th*, 1894.—Mr. T. L. Rix, of 20, Hartham Road, Tottenham, was elected a member of the Society. Exhibits:—Mr. Battley; preserved larvæ of *Miana strigilis* showing two *distinct* forms of coloration, *viz.* grass-green and dirty cream colour, and a third form intermediate between these two. Mr. Clark: a bred series of *Aleucis pictaria* from the New Forest. Mr. May; larvæ of *Geometra papilionaria* from Hayes, Kent. Dr. Sequeira; varieties of *Ennomos quercinaria*, including a fine dark-banded form. Mr. Prout remarked that some larvæ of *Miana furmicula*, which he had once bred, were very similar to those of *M. strigilis* exhibited by Mr. Battley. Mr. Battley stated

that, during a visit to the New Forest at Whitsuntide, he had taken a larva (nearly half-grown) of *Apatura iris* from the same branch of sallow from which he took one in 1892. Captain Thompson said that he had received a letter from a Birmingham correspondent, who wrote that he had captured about twenty specimens of *Neuronia popularis*, flying low over the grass in Epping Forest, and that they had revealed their whereabouts by a slight clicking noise. Mr. Prout, Mr. Nicholson and others referred to other instances of clicking noises produced by butterflies and moths.

June 5th, 1894—Exhibits: Dr. Buckell; two eggs of the common fowl, connected at the small ends by an albuminous band; they had separate yolks and the shells were quite soft. Mr. Clark; three female specimens of *Endromis versicolor*, bred from Monmouthshire ova. Mr. S. J. Bell; three pupæ of *Pseudoterpna pruinata*. One of these was of a greenish tint, the larva having spun up in a leaf; one was suffused with very dark grey, the larva having pupated in a cocoon on the surface of the earth; the third was normal, although the larva had mingled particles of earth in its cocoon. Mr. May; a blackish suffused male specimen of *Ellopia prosapiaria* from Weybridge. Mr. Bayne; a specimen of *Notodonta dictaea* from Wood Green. Mr. Mera; a bred series of *Cidaria silaceata* from Morpeth; they were similar to southern specimens. Mr. Nicholson; two specimens of *Atelabus curculionoides* from Epping Forest. Mr. Battley; *Pyrrochroa serraticornis* from Loughton. Mr. Bacot read the following:—

"Notes on the Ova of Selenia tetralunaria.—On April 7th I paired a bred ♀ of this species with a perfectly sound ♂ captured in Epping Forest; they remained together from 12.15 p.m. to 9.30 a.m. and were in no way interfered with. Both were rather large specimens; the ♀ was very dark and the ♂ very light in colour. The ♀ commenced laying the next night, and continued to lay a few eggs each night for eight or ten days. The eggs, bright green in colour, were generally laid singly and attached by their side to the box. On April 13th I noticed two or three bright red eggs in the chip-box, and there were a few more observed on subsequent days. Altogether the batch consisted of 8 of these red eggs and 136 green ones. The first larvæ hatched on May 8th, and a few more appeared during the next few days, but *only the red eggs* were fertile. My impression is that these were not laid until the 12th, as I could see no change or difference of colour in any of the eggs up to that day. I examined them every morning, and am quite sure that while there were no red ones in the box on the morning of the 12th, there were two or three present on the 13th. It is strange that such a small number should have been fertilised, seeing that copulation was in no way interfered with. It would appear to have been a few of the eggs from the middle of the batch that proved fertile, and not those first laid, as might have been expected."

June 19th, 1894.—Exhibits: Dr. F. J. Buckell: a specimen of *Pararge egeria*, sent by Mr. Hodges from Guernsey, which was very nearly identical with the Linnæan type (*egeria*), which differs from the ordinary British form (really var. *egerides*, Stdgr.) in having the spots dark brownish-orange instead of straw-coloured. Mr. Battley: various species of *Taeniocampa* from Broxbourne, including a specimen of *T. stabilis* with the stigmata confluent on both fore-wings, a single line

surrounding both; Mr. Bate said he had bred a similar specimen this year. Mr. Clark: several specimens of *Selenia lunaria*, forming part of a brood which had been gradually emerging since Christmas last. Capt. Thompson: cocoons of *Plusia festucae*, sent by Mr. Arkle from Chester, with an accompanying letter to the effect that he had taken them on the 13th of June spun up in leaves of sedge; the leaves were bent downwards at an obtuse angle by the contraction of the silk of which the cocoons were made; this bending did not take place with the yellow iris on which they were *occasionally* found, but on which the larva readily feeds. Mr. Prout: a bred specimen of *Melanippe sociata* of a yellowish tinge; this specimen had lain over in pupa throughout the winter, the remainder of the brood having emerged in the previous autumn. Mr. Bate: a specimen of *Polyommatus virgaureae*, which was given to him by the son of the Rev. S. Fellowes of Pulham St. Mary Magdalene, Norfolk, at which place he believes it was taken about ten years ago. Mr. Francis Buckell of Romsey, Hampshire, who was present as a visitor, exhibited drawings, made by himself, of the microscopic appearance (under a magnifying power of about 300 diameters) of the POLLEN-GRAINS of many species of plants. He said that he was not aware of any record of observations on this subject. He had already examined and sketched the pollen-grains of nearly 700 species of plants, and found that there was considerable diversity as regards their shape, size, colour and density. The usual colour was yellow, but some were purplish-black and others of a beautiful red, whilst those of the grasses were transparent like glass. The prevalent shape was some form of oval, and the species composing each Natural Order presented broadly (with a few singular exceptions) a general similarity as regards their pollen. Thus in the *Compositae* the grains were round or oval, and furnished with a large number of projections; the *Umbelliferae* had smooth narrow spindle-shaped grains; those of *Onagraceae* were mostly very large and triangular, and often with marked projections at the angles; the pollen of the *Boragineae* was somewhat like a short dumb-bell, and one of the genera in this order, *Myosotis*, presented grains of excessive minuteness, although curiously the species with the smallest flower (*M. versicolor*) had the largest pollen of any in the genus. In the *Geraniaceae* the grains of the species with the smallest flowers were quite as large as of those with the largest. A very curious shape characterised the pollen of *Limnanthes douglasii*, each grain being somewhat like a two-legged stool. The grains of some species of the genus *Salvia* presented the most beautiful and elaborate surface-markings. Mr. Buckell suggested that the explanation of the varied forms of the pollen-grains would have to be sought, partly in the stigmatic exigencies of the flowers and partly in the structure of the organs of the different insects engaged in fertilising the ovules by carrying the pollen from one flower to another; doubtless a process of evolution with regard to the grains might be discovered by careful investigation of the various orders, genera and species. Amongst the drawings exhibited was one showing the results of an examination of the pollen from the leg of a humble-bee; there were grains from five or six different species, and it was evident that this humble-bee, at all events, had not limited its visits to a single species of flower, as is alleged to be the case with the honey-bee.

The Entomologist's Record
AND
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OBITUARY.

WILLIAM MACHIN.

Born 1822. Died August 13th, 1894.

Another veteran entomologist has passed from among us. A kind-hearted genial friend, an upright and conscientious man, a keen and enthusiastic lepidopterist, an observant and diligent student of nature was William Machin whose loss we deplore to-day. Born in Bristol in 1822 and brought up as a compositor, he is to be numbered among that large band of entomologists in whom an innate love of nature has developed itself in spite of the drawbacks attendant upon want of leisure and of a first-class education. From the first his entomology was not carried out on a collection-making basis, although he has always been an ardent and diligent field-worker, and his very earliest records of captures made in the entomological magazines are accompanied by notes of their habits and life-histories. One of that pioneer band who aided Mr. Stainton in the "fifties" to collect the material relating to the life-histories of the Tineina, he achieved remarkable success in the rearing of the members of this heterogeneous group, and the remarkably fine setting resulting from the careful manipulation of his insects soon made his duplicate specimens of the smaller species much desired by his brother entomologists, especially those of the old Haggerstone society, of which I believe he was an original member. Many were the communications he made to the old *Weekly Intelligencer* and to the early volumes of *The Entomologist*. In 1856 we find his name mentioned in the "List of British Entomologists" which Mr. Stainton compiled for the *Entomologist's Annual* of that year, whilst a glance through the lists of rare species captured and published in each year in those interesting volumes reveals his name over and over again, far too many times to be repeated here. *Phoxopteryx upupana* at West Wickham, the breeding of *Retinia sylvestrana* from *Pinus picea*, with rare *Elachistas* and *Coleophorae* are mentioned among his discoveries. From these we find that the genus *Coleophora* was an especial favourite with him, and to his keenness and discrimination we first owe *Coleophora vibicigerella* and *C. maritimella* as British

species, whilst the marshes on both banks of the Thames, especially towards its mouth, were among his favourite hunting grounds. But he did not neglect the Macros, and the careful notes and dates which he kept of the species he bred often proved of the greatest value, and he published a considerable quantity of data at the time of a furious discussion on "The prior emergence of male and female Lepidoptera" in *The Entomologist*, vol. iii. As an example of the number of species he frequently bred in a season, we find a very long list in 1868 (*Id.*, pp. 126 and 154). Latterly his health has been very unsatisfactory and more than one serious attack of illness has prostrated him, but breeding insects still kept all its old charm for him, and to his kindness many of us owe our lovely specimens of *Phorodesma smaragdaria*. So recently as April 17th last it was my pleasure to have a chat with my old friend, and although I expressed the hope that his health would improve, suffering was evidently written on his features and the disease (cancer) from which he died had left a serious mark on him. To the end his active interest in Entomology was maintained, and he was perfectly *au fait* with every addition to the British fauna. Even so lately as in the July number of *The Entomologist's Record* an exchange notice appeared offering one of his earliest loves—*Selenia lunaria*. He has exceeded the three score years and ten allotted to man, he has led a happy and useful if unobtrusive life, opened up for us some of the many bye-ways to Nature's secrets, endeared himself to many friends who will not blot out readily the memory of him from their minds. His collection is a very fine one, being especially rich in Tortrices and Tineina and the whole are in the most perfect condition. It is one of those reliable collections composed entirely of British species which represent a labour of love spread over a man's whole life.—J. W. Tutt.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 195).

Chap. IV.

EMBRYOLOGY.

5.—On the limitation of the subject in the present paper.—As I have already stated, the embryonic life of an insect must be held to include all the stages between the fertilization of the ovum and the emergence of the imago. The following notes, however, only deal with that portion of the embryonic development which takes place within the egg, and it must be understood that hereafter I use the term embryo with that limitation.

6.—On the method of observing the changes that take place in the egg.—This can only be done by the aid of a microscope. In examining eggs with a microscope, very little in the way of apparatus is necessary. My own instrument is a very simple one with no

accessories, and I do my work with two lenses, a 2/3 and 1/6, which I find sufficient for all practical purposes. Should anyone wish to go more deeply into the subject, his requirements will teach him what he must get in addition, but, for the simple observation of development in the egg, this is sufficient. When we have placed a suitable egg under the microscope, and watched the various changes which it undergoes, we are compelled to admit that—

"There is a wondrous workshop here,
E'en in this dainty little pod,
Here that mysterious workman Life,
Builds matchless temples to his God."

To get eggs for this purpose, take an ordinary glass tube and enclose a few females of some common Tortrix moths. They will usually lay eggs on the glass, and their egg-shells are so transparent, that the changes may be most readily observed. The eggs of *Pararge megaera*, *Nemeobius lucina*, and many others, are also good objects for this purpose.

7.—On killing eggs in which the embryo is developing for future observation.—It is sometimes inconvenient to study the embryological changes which go on in an egg under a microscope at the time that they actually occur, and in *Insect life* (vol. i., p. 316) a very good method is described, by which the eggs may be killed and preserved for future observation, although it is one which requires a considerable amount of care in manipulation. The eggs are obtained in the ordinary course, and as soon as a batch is laid, the eggs are distributed in a number of homœopathic phials, each about one inch high, with data, etc., on the cork. At the end of the first day one phial is filled with carbolic acid, another on the second day, and so on, until on the last day a bottle is filled containing newly-hatched larvæ. It is found that the acid renders the eggs perfectly transparent, so that the embryo can be observed in various stages of development. The recorder states that he mounts in benzole balsam direct from the carbolic acid. Of course there are many insects whose eggs cannot be served in this way; at the same time there are hundreds of species whose eggs can be thus manipulated. Mr. Woodworth describes another method of attaining this end:—"The method of preparation which seems to have given the best results, is to kill by heating in water at 80°C, which fixes the tissues very well. Eggs must now be punctured with a sharp needle. This is essential in order that the reagents used may penetrate. The most satisfactory stains are Grenacher's borax carmine, and Czochar's cochineal. The latter is especially good. It is prepared as follows:—Place 1 gramme each of cochineal and burnt alum in a mortar, and reduce to a powder; add 100 cc. of distilled water, and boil until there are but 60 cc., cool and filter; a few drops of carbolic acid should be added as a preservative. The hardness of the egg-shell makes the egg very difficult to section, but if removed, it is so delicate as to be almost certain to go to pieces during the further manipulation. The parafin method of imbedding was employed, and the sections cut on the rocking microtome made by the Cambridge Instrument Co."

8.—On the formation of the egg.—The evolution of every living being from a single unicellular germ is an established fact of science. The egg in insects is not quite the earliest condition of the creature, because the primitive ovule can be traced back to the ovariole or even to the primitive ovary before the ovariole is developed.

The primitive ovary is composed of a mass of cells, which after a time become covered with a coating of connective tissue. The cells are then said to fuse to form what is called a syncytium. To learn the earliest condition of the egg, it is almost certainly necessary to examine the structures forming the ovaries present in the pupal or even larval stage.

In the ovaries of butterflies there would appear to be, besides the cells that form the syncytium, three other kinds of cells—the egg-cells proper, epithelial cells, and nutritive cells. At the time of emergence of the butterfly from the chrysalis, the ovarioles are well developed, and consist of long slender filaments made up of divisions which have been called "oval units" or "egg-chambers." Those egg-chambers nearest the external portion of the ovary are larger than those which are more interior, and the egg-cells in them can be distinguished from the epithelial and nutritive cells by their better-developed nucleus and nucleoli.

An egg-chamber is formed by the rapid multiplication of epithelial cells, forming columnar structures surrounding the egg-cell. When the egg-chamber has increased to almost the size of a fully-formed egg, the egg-cell commences to grow rapidly at the expense of the epithelial cells, which surround it and form the egg-chamber, the latter being finally reduced to a practically infinitesimal quantity of waste. The nucleus in the egg-cell also grows rapidly, and occupies a position on one side and near the upper end of the cell; it has a distinct nucleolus. As the egg approaches maturity the nucleolus disappears in the nucleus, the latter also afterwards disappearing and apparently diffusing itself in the yelk.

The egg is now really a mass of yelk, surrounded and embedded in living protoplasm; then another nucleus is developed and forms the female pronucleus, which also is surrounded by protoplasm. This at the time of fertilisation sinks into the yelk. The pronucleus and the protoplasm subdivide into cells each with a nucleus and plasma, and the surrounding yelk is used as food. The increase and development of these cells continue with the consequent degeneration and absorption of the yelk. There appears to be a certain amount of analogy between the breaking up of the yelk and its consequent destruction as such, together with the building up of nucleated cells therefrom, and the histolysis of the pupal tissues.

9.—On the development of the embryo in the egg.—At the time that the egg is laid the main mass of it is made up of yelk-spherules. These spherules become granular, and the granules gradually replace the spherules and are themselves again changed into yelk-cells, the probability being that they are thus changed in order to form suitable nourishment for the young embryo. At this time the newly-formed blastoderm-cells begin to pass towards the circumference, leaving the degenerated yelk-cells in the centre. In addition to these yelk-spherules, the egg contains a homogeneous fluid which has the ordinary composition of protoplasm, and consists essentially of the chemical elements—carbon, hydrogen, oxygen and nitrogen. The great characteristic of this protoplasmic fluid is its vitality, its ability to break up and sub-divide, to develop cellular structure, and to build up tissue from the cells produced by cell-division. After fertilisation the protoplasmic fluid inside the ovum remains in a homogeneous condition for a certain

time; this varies for different species, but is comparatively constant in the same species. The first change that the protoplasm undergoes is that of the ordinary yelk-segmentation, but, once this is set up, development continues generally with more or less rapidity. The segmentation starts at a point on the surface of the yelk called the "first segmentation nucleus," and this nucleus undergoes cell-division in such a manner as to form a superficial blastodermic layer; side by side with this process of segmentation, the yelk separates from the outside cell-wall and appears to become enveloped in a sac. The blastodermic layer (or layer of segmentation cells) has an elongated ventral plate formed in it, and in this the development of the embryo commences. This ventral plate broadens anteriorly, but the posterior part is divided transversely into segments. This development is at once followed up by the formation of a longitudinal depression, the outer sac gradually enclosing this depression on either side until at last the opposite sides of the epiblast, or outside layer of cells undergoing segmentation, unite over the depression, leaving it as a longitudinal tube. This becomes detached as a solid cellular mass, which splits into two longitudinal (mesoblastic) bands. At this period it would appear that the amnion is formed. Dr. Osborne writes:—(*Science Gossip*, vol. xxi.) "After the yelk has become surrounded by the growth of cells called the blastoderm and after the germinal stripe, or foundation of the embryo has been differentiated along one side of this blastoderm, a double fold of the latter grows up all round the circumference of the germinal stripe and finally closes in over it, the edges of the fold fixing together and the two layers (of blastoderm) of which it is composed, at the same time separating from one another. The inner of these continuous with the embryo itself, and lying immediately over it, is the amnion; the outer, continuous with the blastoderm surrounding the yelk, is the serous membrane. Two sacs are thus formed, the one within the other, and between them lies the yelk. In the lepidopterous egg the yelk next finds its way into the space between the amnion and the serous membrane, flowing over the former and depressing it and the embryo beneath it till both are completely submerged in yelk, and consequently hidden from view." After this the mesoblastic bands become divided into somites, and the first traces of the ventral segments may be noticed, followed by the appearance of the three thoracic segments. The somites coalesce and the common body-cavity thus enclosed is called the coelom. The three thoracic segments bear legs. The head, which appears to be formed of four segments, and the eye-spots (of which there are two clusters of six, placed at the base of the 3rd segment, reckoning from behind forwards) are then developed, followed in turn by the ventral prolegs. The inner part of the hypoblast is absorbed to form the alimentary canal. The cells now contained between the outside egg-wall and the newly-formed alimentary canal divide up into clusters, which are gradually differentiated into the various internal organs. The first of these to be formed is the dorsal vessel, which is so called because it is placed in the dorsal part of the larva; this corresponds with the heart of the higher animals. The other organs gradually undergo differentiation, and the mouth organs also become developed. At this period of development faint pulsations of the dorsal vessel are discernible. The separation of the alimentary canal into an œsophagus, a widened sac or stomach, and another contracted tube or intestine is clearly discernible, whilst the outer proteid

part of the egg-contents is probably absorbed by cutaneous endosmosis. The tracheæ are developed from the spiracles inwards, but do not become visible until injected with air. Such are the broad outlines of the larval development in the egg. From a tiny mass of protoplasm in the yelk of the egg we get a larva produced such as we know it when newly hatched. The egg-shell of most of our larger species is too opaque to allow these changes to be seen, but they can be readily observed in the eggs of Tortrices or Pyralides, owing to the thinness of the walls of the eggs in these groups.

10.—On the early changes observed in the eggs of Vanessa antiopa.—Mr. Woodworth (*Butt. of New England*) gives the following account of these:—"The earliest stage known in the development of the egg is when there are about twenty cells present. These are about uniform in size, and all at quite a distance from each other, for at this stage as soon as a cell divides the resultant cells separate. This is facilitated by the degenerated condition of the yelk-spherules in this region; the cells are amœboid in shape, and the nucleus very indistinct but of considerable size; after dividing several times the cells arrange themselves in line and commence a migration towards the circumference. In going through the degenerated yolk they sometimes leave, trailing out behind them, a long process of protoplasm; on reaching the edge of this region they pause, gather themselves together and plunge into the mass of undifferentiated yolk. While in transit, the cells divide so as to keep about the same distance apart; they do not all reach the edge at the same time, but those on one side take their station long before the others. On reaching the protoplasmic layer, the cells at once appropriate that immediately before them and so increase rapidly in size. Owing to the granular material in the absorbed protoplasm, the cell-plasma becomes darker and the still unaltered nucleus becomes very distinct. On the outside of the protoplasmic layer there was a layer of greyish material; this now forms a cap over each cell and extends down each side for a considerable distance. When all these cells have reached the circumference of the egg the blastoderm may be supposed to be fully formed, though at no time do all the cells that form it resemble each other; some commence their further development before the others reach their proper position; the blastoderm is complete about twenty-four hours after deposition. Besides the blastoderm-cells there are in the centre of the egg a large number of other cells, mostly yolk-cells; they have no definite arrangement, but are pretty evenly distributed over the whole egg."

"The blastoderm-cells on one side of the egg continue to divide, so that when the blastoderm is complete, the cells on one side are much smaller in diameter than on the other; they have, however, increased in thickness, and so made a thicker and more compact layer; this is the beginning of the ventral plate. The cells which make up this structure are at the bottom of the egg, and extend half-way up one side. The transition between this area is quite abrupt. In the farther development, the ventral plate sinks deeper into the yelk. This is accomplished within three days after deposition. The first indication of the process, is a slight infolding of the upper end; the blastoderm-cells begin to grow over the ventral plate from this point, and extend down the sides; the edge of the ventral plate sinks down at the same time. During this process of infolding, the whole ventral plate begins an upward move-

ment, and increases somewhat in size; when the infolding is complete, that is, when the outfolded edges of the blastoderm cells have met and closed over the whole ventral plate, the latter is about as long as the egg, but so curved as only to reach about three-fourths way to the top. It will be seen that the embryo has now two layers of cells outside of it, one extending all around, and the other only across the outside face of the ventral plate; between these two layers the yolk penetrates freely. Great confusion exists as to the nomenclature of the membranes, but I prefer to follow Balfour in this matter, and designate the inner as the amnion, and the outer as the serous membrane, though the reverse is perhaps the more common practice. From this history of their formation it is evident, that both layers and the ventral plate are modified blastoderm-cells, and that the membranes can in no sense be called moultings of the ventral plate."

11.—On the embryonic development of Tortrix ferrugana.—I have recently been studying the embryonic development of *Tortrix ferrugana*. It appears certain that there are in its embryo four distinct cephalic segments, which in the early stages of embryonic development are large, (compared with the other segments which are developed later), and are made still more distinct by the possession of buds or processes. As development goes on, these four segments get welded together, and become not only proportionately, but absolutely smaller than at first. When the abdominal segments are in course of development, there certainly appear to be eleven of them. The three thoracic segments are, in the early stages of development, large and almost circular, and the next segment (1st abdominal) is of the same character, looking at this time much more like a thoracic than an abdominal segment, though it has, of course, no appendages. The eye-spots in this species are remarkably conspicuous as two reddish patches, and become apparent at about the same time that the abdominal segments first show. As development proceeds, the cells of the developing *T. ferrugana* appear to be stained here and there with red patches, especially along the ventral area of the alimentary canal, but differently distributed in different examples; these afterwards spread over the whole of the embryo. Dr. Chapman suggests that this colour is probably connected with the larval skin. When the embryo begins to show traces of segmentation, the thoracic segments are seen to develop three pairs of jointed buds or legs. At this time the embryo occupies a somewhat curved position, with the head slightly bent round towards the anal extremity, but with the legs outside, *i.e.*, the larva is bent back on itself so as to form a curve agreeing roughly with the curvature of the shell, with what afterwards becomes the ventral surface of the larva outside, and the dorsum towards the centre. The embryo then gradually changes its position, the anal segment curling round and being pushed by the growth of the preceding abdominal segments, slowly up the ventral surface of the larva, whilst the dorsum gets pushed out, as it were, towards the centre of the egg. During this process the embryo becomes shaped something like the letter S, the movement continuing until a complete reversal of the embryo has been effected; the next stage is that in which the head and anus are in contact, each half running almost parallel, and this again is followed by an almost circular position, in which the dorsal area is outside, and the ventral surface (with the legs) on the inside. The head during all this time scarcely

changes its position. Very little further change in position takes place, the embryo by this time occupying all the available space in the egg.

12.—Reversal of position of embryo in eggs.—In dealing with the embryonic development of *Tortrix ferrugana*, I have shown that, during the first stages of development, the ventral side of the embryo is external, or lies along the convex side of the egg, development commencing (as is usual in the Articulata and Vertebrata) on the ventral side of the insect, and that, as development and the growth of the segments proceed, the embryo, on account of the turning of the anal segment and its gradual upward movement, and that of the growing segments behind it along the venter, changes its position, the ventral part of the embryo gets turned towards the centre of the egg, whilst the dorsal part is turned towards the outside.

Dr. Osborne (*E.M.M.*, vol. xix., pp. 99-100), writing upon the way in which this reversal of position is brought about, says:—"How it gets into this position, if it develops in the usual Arthropod way, is a point which I have only seen adverted to by Kowalevski. Speaking of the development of *Sphinx populi* and *Gastropacha pini*, he says ("Embryolog. Studien an Würmern und Arthropoden." *Mémoires de l'Acad. Imp. des Sciences de St. Petersburg*, Series vii., Tom. xvi., No. 12, p. 56):—'Wenn der Rücken schon gebildet ist, biegt sich das Schwanzende des Embryo auf die Bauchseite und zwar so, wie wir schon beim *Hydrophilus* gesehen haben. Dem Hinterende folgend, dreht sich der ganze Embryo so, dass er jetzt der ihn noch bedeckenden serösen Hülle den Rücken zuwendet, und die Extremitäten erscheinen nach innen gerichtet. In diesem Zustande, mit fast vollständig ausgebildeten Organen, bleibt der Embryo vollständig in dem ihn umgebenden Dotter, den er nun vermittelst der unterdessen vollständig ausgebildeten Mundorgane zu verschlucken beginnt * * * die * Larve liegt [jetzt] schraubenförmig auf der Bauchseite Zusammengerollt bis sie das Chorion zerreisst und ins Freie gelangt.' The embryo of the sawfly, *Zaraea fasciata*, does not, at any rate, get into the loop position by any molar movement of this sort. When the posterior end of the growing embryo has reached the remote end of the egg, it is bent ventrally on itself, and so grows forwards till the tail comes in contact with the head. As the length of the embryo still continues to increase, the head is withdrawn to about the middle of the straight or upper side of the egg, and the larva about to hatch lies in a spiral, with the tail opposite the head on the other side of the body. It turns its sharp mandibles towards the shell, bites at it and draws it in till it is pierced and, by means of a foot thrust through the opening, draws the flexible chorion still more within the power of the mandibles, which soon effect an opening large enough for its escape. This ingrowth ventrally of the caudal end of the embryo appears to be not uncommon in the Arthropoda, where the length of the embryo exceeds that of the shell, and occurs even in the case of the globular egg of *Astacus*, as described by Huxley (*The Cray-fish*, p. 203). In the case of an embryo making such a revolution in the egg as that described by Kowalevski, the head would occupy two different positions in the same end of the egg, relatively to two opposite sides before and after the revolution. The egg of *Rumia crataegata* would be specially favourable for making this observation; the shell at the cephalic end being distinguished by an ellipsoidal ridge: the pointed end of the ellipsoid corresponds with the position of the head of the larva just

before hatching; and, of course, the rounded end to that of the tail. While the embryonic venter is still external, the relative positions of these parts, on Kowalevski's principles, should be just the reverse."

CURRENT NOTES.

Mr. Butler refers our *Plusia verticillata*, Gn. to *Plusia eriosoma*, Doubleday, *Dieff. New Zeal.* i., p. 285, n. 114 (1843). It would be well if this were thoroughly investigated.

Mr. Hodgkinson reports a specimen of *Stigmonota ravulana* caught in May at Grange-over-Sands. Mr. Dale adds *Sesia conopiformis* to the British fauna, but it would be well if this were confirmed by some other authoritative entomologist. *Pieris daplidice* is recorded from Addington (Croydon) by Mr. N. H. Joy, and from Margate by Mr. S. Cooper. Mr. G. Richardson of Peckham records five *P. leucophaea* from Wye, Kent, and it is also recorded from the same locality by Mr. Chittenden; *Plusia moneta* from Dover, Tonbridge, Tunbridge Wells, Weybridge, Merrow (Guildford), and Sprowston (Norwich), whilst Mr. Waller records the breeding of two specimens of *Sphinx pinastri* from larvæ captured in Suffolk. The most startling record of the year thus far, however, is the capture of two larvæ of *Catephia alchymista* in Abbot's Wood on July 5th, by Mr. H. W. Shepheard-Welwyn. These larvæ would undoubtedly have been objects of interest had they been exhibited at one of the London Societies' meetings, but they spun up next day. One would hardly have expected that any resident British entomologist would have been able to identify larvæ of *C. alchymista* off-hand, and probably the record is erroneous. It would also be well to enquire whether July 5th is at all a likely date for the pupation of the larvæ of this species.

A strange example of *Zygæna trifolii* with two normal fore-wings, the left hind-wing replaced by another wing exactly similar to the fore-wing and the right hind-wing absent was taken by Mr. Christy on June 18th in West Sussex. Mr. J. E. R. Allen records the capture of a specimen of *Zygæna filipendulæ* with the usual red on all the wings replaced by pale yellow.

The *British Naturalist* for August contains an important contribution to economic entomology in the shape of a comprehensive paper (illustrated) on "The Hessian Fly" (*Cecidomyia destructor*) by Mr. F. V. Theobald, M.A. If our Government were alive to their duties, they would reprint this paper and circulate it widely among farmers. Mr. Dale propounds further conundrums, but his inability to apprehend a joke almost suggests that he must have Scotch blood in his veins.

Micro-lepidopterists have just added another species to the British fauna. It was discovered by that keen observer Mr. W. Farren at the end of June, 1893, and during the first fortnight of July, 1894, by sweeping herbage near Cambridge. The species is described and figured by Lord Walsingham in the current No. of the *Ent. Mo. Mag.* under the name of *Cataplectica farreni*. *Cataplectica* is a new genus, created by Lord Walsingham for the reception of *profugella*, *anromaculata*, *fulvaguttella*, *stataricella*, *lacerpitiella*, *silerinella* and *farreni*, the

genus *Heydenia*, in which these species have been previously placed, being retained for *devotella*, which has the "veins 7 and 8 of the fore wings separate," whilst *Cataplectica* has "veins 7 and 8 of the fore wings stalked."

Dr. H. Guard Knaggs, discussing the value of various moth-grease solvents, says:—"Methylated chloroform does its work more quickly, with less waste than ether, and without the slightest danger of causing a conflagration; either of the ethers (methylated ether, pure ether, petroleum ether) mentioned, on the other hand, turns out a better finish, besides being less powerfully anæsthetic than chloroform, while the price of the methylated preparation is comparatively insignificant, On the whole, I still consider methylated ether to be the most serviceable for entomological purposes, especially at the price" (*E. M. M.*).

Mr. K. J. Morton records the yellow male of *Hepialus humuli*, as captured in South Lanarkshire.

Mr. J. J. Walker writing of the beetle *Bagous argillaceus*, captured in July, at Sheppey, writes:—"So accurately was the colour of the beetle adapted to its surroundings (the mud in the bed of a nearly dried-up ditch), that it could only be detected when in motion, becoming to all intents and purposes invisible as soon as it stopped."

Mr. A. Thurnall, with his usual perseverance, has at last discovered the larva of *Bactra furfurana*. The larvæ were discovered on May 12th, in stems of *Eleocharis palustris* (not *Scirpus lacustris* as mentioned in the *E.M.M.* p. 184), ejecting green frass, and finally pupated in the stem in a light silken cocoon. Six specimens emerged between June 23rd and July 2nd. A description of the larva, with another of the allied *B. lanceolana* for comparison, is published.

Mr. C. Nicholson, 202, Evering Road, N.E. will read a paper on "*Oeneria dispar*" at the next meeting of the City of London Entomological Society to which all entomologists (members or not) are cordially invited. Mr. Nicholson is desirous of borrowing a few types of the original British race of this species, and would be pleased to hear from anyone willing to lend him specimens for exhibition of which, it is needless to say, the utmost care would be taken.

SCIENTIFIC NOTES & OBSERVATIONS.

Erratum.—On p. 195, line 13 from bottom, before "families, genera, etc.," insert the word "allied."

Blight.—I think that the "very extraordinary superstition" described in detail by Mr. A. J. Johnson under the above heading (*ante*, pp. 14-15), is by no means confined to his neighbourhood, but prevails very generally throughout the country: it is certainly an article of faith among the gardeners and natives of this district, and although when cross-examined about the matter they are unable to give any very lucid explanation, their idea apparently is that the dark clouds are mainly due to the presence in the air of vast multitudes of winged aphides, which pass across the country and settle on the fruit trees, &c., in their lines of flight. The belief doubtless originates in the fact, that such weather is especially favourable to the migration of winged

aphides, and under those conditions I once, in rather open country, with neither trees nor hedges very close though at no great distance, drove through a flight, out of which numbers settled on the coats of all our party. This superstition is referred to by Mr. Theodore Wood, in *The Farmer's Friends and Foes*, p. 66 (1888), where in the course of his explanation he says:—"The easterly wind, acting upon the young and tender plants tenanted by the progenitors of the swarm, has checked their growth and rendered their sap unhealthy. Wing-bearing young have been immediately produced, borne along by the self-same wind which caused its appearance, and deposited in more or less distant localities, and so the easterly wind has really "brought the blight," although not at the time or in the manner usually supposed by the farmer. Thus it is, that easterly winds in the early part of the year damage vegetation so extensively, not only by checking and weakening the young and delicate plants, but by bringing a host of mischievous creatures to feed upon them while still in an unhealthy and debilitated condition." He adds: "Aphides migrate merely by rising from their food-plants and allowing the wind to carry them whithersoever it will; and in no other manner can they possibly travel to any appreciable distance." Surely the latter part of Mr. Johnson's note refers to this same phenomenon, for if in place of the word "grubs" in his informant's narrative, we substitute "winged aphides," we have a passable account of what actually happens.—Eustace R. Bankes, The Rectory, Corfe Castle, Dorset. *July 11th*, 1894.

Note on the distribution of Tinea nigripunctella.—In his *resumé* (*ante*, p. 73) of a paper on certain Micro-lepidoptera, by Lord Walsingham, in the *Ent. Mo. Mag.* for March last, Mr. Tutt says:—"*Tinea nigripunctella*, taken by Mr. Atmore at King's Lynn, found *hitherto* in Britain, *only* at Bristol and Folkestone." The words that I have emphasized by italics are not used by Lord Walsingham, who merely says "a species of rare occurrence, formerly taken near Bristol," and are—Mr. Tutt will, I know well, forgive me for saying so—certainly erroneous, for *T. nigripunctella* has already been recorded from *five* localities in this county (*Proc. Dorset N. H. and A. F. C.*, vi., p. 166 (1885); *Entom.*, xix., p. 120 (1886); *Lep. of Dorsetshire*, p. 48 (1886); *Entom.*, xxvi., p. 88 (1893), and from *one* locality in Sussex (*Trans. Chichester and W. Sussex N. H. Soc.*, No. 5, 1886). In three of these six localities it, to my knowledge, occurs *regularly* though sparingly, and it is highly probable that it would be found in many other parts of the country, if carefully searched for at the right time in old out-houses, stables, &c. In such places, it may be found sitting about on the walls, reminding one strongly of a *Gracillaria* by its attitude, and may be readily boxed, for although it shows, by waving about its extremely long antennæ, that it is well aware of one's approach, it does not, according to my experience, see fit to take any steps to avoid capture.—Eustace R. Bankes, The Rectory, Corfe Castle, Dorset. *July 11th*, 1894. [We are much obliged to Mr. Bankes for this correction. Ed.].

Further notes on Euchloë hesperidis.—Out of twenty-two males of *E. cardamines*, taken by myself in Oxfordshire, Cheshire, Shropshire, and Montgomeryshire, which range in size from $1^{7}/_{16}$-in. to $1^{13}/_{16}$-in., not a single specimen exhibits the discoidal spot in any position other than well within the orange "tip." On the other hand, out of seven males of the insect which I call *E. hesperidis*, which vary in expanse

from $1^3/_{16}$ in. to $1^5/_{16}$ in., *all* have the discoidal spot placed at the juncture of the white and orange. The females of this latter, of which I have four specimens, resemble small females of *E. cardamines*; mine vary from $1^5/_{16}$-in. to $1^6/_{16}$-in. Both sexes appear much more slender than *E. cardamines*, even allowing for difference of size. Under a powerful microscope, the plumules of *E. hesperidis* are narrower and proportionately much longer than those of *E. cardamines*, while the whole appearance of the wing is much more even and not nearly so rough as is the case in the latter species. Among those species of the genus *Euchloë*, in which the males, at least, are tipped with orange, *cardamines* and *damone* have the discoidal spot placed within the orange tip, while in *gruneri*, *eupheno* (*euphenoides*) and *dourí* (*eupheno*), the discoidal spot is situated at the juncture of the yellow and orange. I regret to say that I have been unable to get any larvæ of *E. cardamines*—far less of *E. hesperidis*—though I have both searched and swept for them in localities in which the former are usually abundant. I quite agree with Dr. Buckell, that it would be a very good thing to obtain, if possible, the larvæ of *E. hesperidis*, but I emphatically differ from him when he seems to infer that without this knowledge the differentiation of species is impossible. Every entomologist must be aware, that even now there are many well-established species, whose larvæ are as yet unknown, but which nevertheless *are* distinct species. In the past, this was the case in very many more instances, but how often did the subsequent discovery of the larva tend only to ratify the prior supposition! Before finally coming to a conclusion on this point, it would be well to compare as many species of the genus *Euchloë* as possible, as some of them will be found to offer differences which are but slight, at least to the uninitiated.—F. B. Newnham, Church Stretton, Salop. *August 2nd*, 1894.

VARIATION.

A rare form of the larva of Acherontia atropos.—On August 11th, 1894, Mr. Lewcock found in my garden here two larvæ of this species, one of which was a full-grown specimen of the very rare dark olive-red variety, mentioned by Stainton (*Man.*, vol. i., p. 89). The following description of it may be of interest. *General colour*: dull reddish-brown. *Face*: pale, with three fine black lines on each side of the anterior surface; these incline towards the centre, where the innermost pair meet. *Body*: the first three segments whitish, but much mottled with reddish-brown at the sides, and with a fine pale dorsal line, which passes through the very dark brown, well-defined, subdorsal area; the remaining segments reddish-brown, and marked on the upper surface with rounded whitish spots, in place of the black spots of the normal larva. The stripes, which in the ordinary form are yellow and violet, are here replaced by dark, almost black, broadish crossed lines, which form a regular series of St. Andrew's crosses, the widest part being at the junction of the segments. These dark crossed lines appear to replace those which are usually violet, which latter, however, do not cross, but end in a point at the back of each segment. *Tail*: black, with whitish nodules. *Spiracles*: deep black, circular. *Legs, and prolegs*: blackish-brown.—(Rev.) C. R. N. Burrows, Rainham, Essex. *August 14th*, 1894.

VARIETIES OF THE LARVA OF SMERINTHUS POPULI.—In a brood of larvæ of this species from a batch of eggs laid by a ♀ captured in the heart of Islington, there are three distinct forms. (1). The majority are of the usual form, with bright green bodies, and yellow spots and lines. (2). Two specimens resemble the foregoing in colour, but in addition to purple blotches round the spiracles, have a sub-dorsal row of the same colour. (3). Three specimens are grey-green or sage-green in general colour, and the lines are much fainter. I am keeping the three forms separate, in the hope of determining whether there is any difference in the resulting imagines.—F. J. BUCKELL. *August 24th*, 1894.

VARIATION IN EPHYRA ANNULATA.—I have bred a good many *Ephyra annulata* (*omicronaria*) this year. They are decidedly darker in their markings and larger than those I bred and captured last year. The moister, colder weather, certainly seems to have produced finer forms. Again, I have found the smoke-coloured ring in the centre of the fore-wings absent from several; is this variation common in other parts of the country? I have also bred another interesting variety, in which the smoke-coloured lines and rings are replaced by ochreous ones.—W. S. RIDING, M.D., Buckerell, Honiton. *June 14th*, 1894. [In our Kent woods, this species is partially double-brooded, the early brood being much larger and less orange than the later specimens. ED.].

NOTICES AND REVIEWS.

Species des Hyménoptères d'Europe et d'Algérie, by Mons. E. André.—We have to acknowledge the receipt of the July part of this well-known work, which is being published in quarterly parts by M. Duboscland, 78 Boulevard St. Michel, Paris, the annual subscription being 16 francs. The part just to hand comprises pp. 337–400, and contains descriptions of some of the genera of the *Opiidae*, and of the species in nine genera of the *Alysiidae*, together with three beautifully executed plates. As an inducement to such hymenopterists as have not yet subscribed for the work to do so, the publishers offer to forward the complete work to would-be subscribers, to be paid for at the rate of 10 fr monthly, or 30 fr. quarterly. Four volumes have already appeared, and the fifth and sixth (dealing with the *Braconides* and *Chrysides*) are now in course of publication.

Victorian Butterflies, and how to collect them, by E. Anderson and F. P. Spry.—We are pleased to acknowledge the receipt of the second and last part of this work. This part contains an account of the *Lycaenidae* and *Hesperiidae*, which, considering how little has hitherto been done in the way of systematic work on the butterflies of any of the Australian colonies, reflects great credit on the authors. The fauna of Australia will always have a great fascination for naturalists. The great antiquity of its isolation as a zoological region, and the traces everywhere apparent of an old Antarctic fauna and flora, have made Australia of special interest to palæontologists, botanists and naturalists in general. When we come to study the insects of such a district we have to consider them from two points of view:—(1). Those that belong to dominant types, that have spread widely in comparatively recent times.

The present volume gives us an example of these in *Lampides boeticus*, which has been taken in Britain, and extends throughout the South of Europe and North Africa, into India, and almost continuously to Australia. (2). The antique forms which are remnants of a very ancient type, preserved by isolation through vast periods of time, and from which we may learn many pregnant lessons. The *Chrysophanidi* have traces of small tails to the hind-wings, suggesting this character as a very ancient and withal a very persistent one. Sexual dimorphism is frequent throughout the group, a highly interesting fact in face of Doherty's statement (which is probably correct) that it is very rare in the tropics. The ocellation of the undersides, too, teaches many an important lesson, and shows that it also is a very ancient and persisting character. As is, perhaps, to be expected, the life-histories of very few species have been worked out, but there is no doubt that the production of this book will teach local workers what is still desiderated, and lead to a more complete knowledge of the early stages. The life-histories of one or two species, notably *Hypochrysops delicia* and *Ogyris olane*, have been worked out in considerable detail, although it is to be hoped that a future edition will give us a much more detailed account of the structure of the larvæ and also of the pupæ. Of *H. delicia* the authors write:—"The larvæ are invariably attended by a number of small black ants; indeed, watching the ants is one of the best ways of detecting the larvæ." In the description of the eggs, too, it is to be hoped we shall be told the peculiar shapes, &c. of the micropylar cells, the number of ribs, the peculiarity of any reticulations there may be, &c. The wandering habits of the larvæ of *O. olane* and the consequent production of a starved race are most interesting. In the Hesperids it is rather interesting to note that the androconia are placed in a sac which runs, as in our species, from the lower exterior tip of the discoidal cell, but instead of running obliquely towards the base of the wing, as in *H. sylvanus*, *H. thaumas*, &c., it runs transversely to the inner margin, ending not far from the centre. We quite agree with the authors that *H. perornata* is a female form of *H. ornata*, unless, indeed, a male form of *perornata* obtains; the androconia of *H. ornata* are highly suggestive that a similar adornment should be found in males of *perornata* if it be a distinct species. We have but little doubt that the issue of this welcome volume will soon reduce the noticeable blanks in the life-histories so strikingly manifest, and that they will be worked out in a complete and satisfactory manner by such competent observers as Messrs. Anderson and Spry in the course of time is, we venture to think, quite certain. We are pleased to see that the authors have submitted, through Mr. J. A. Clark, to Mr. W. F. Kirby the doubtful material described for comparison with the British Museum collection, an example which might be followed with advantage in many other cases. The complete work is to be obtained from Mr. J. A. Clark, The Broadway, London Fields, N.E. for five shillings.

The Effect of External Influences upon Development, by August Weismann, M.D., Ph.D., D.C.L. (Henry Frowde, Amen Corner, E.C. Price 2s.).—Quite a pathetic interest attaches to the publication of this volume—The Romanes Lecture for 1894—owing to the recent death of Professor George Romanes, the founder of the Lectureship, who was present at the delivery of this lecture by the talented author. The name of the author is a sufficient guarantee that the scientific public are

to have a mental treat, food for reflection, something to learn and unlearn, something to add and much to subtract from their previous tenets. Commencing with a statement of Nägeli's conception that the evolution of the organic world originated in virtue of inherent internal forces, he states that there are probably few naturalists who now adhere to it, and then plunges at once into the potency of external influences, which one sees invariably to bring about ultimately all the vital manifestations of animals and plants as reactions to such influences, and at the same time owns that we are "not yet quite clear" as to the way in which external influences have formed and transformed organisms. The remarks on hibernation (p. 9) will be of particular interest to our readers, and after discussing the phenomenon of adaptation by applying the principle of selection not only to the organism as a whole, but also to its constituent parts (intra-selection), he illustrates his farther arguments largely from the insect-world. The change in coloration of the imagines of *Polyommatus phloeas* under varying temperatures, and the dimorphism of *Vanessa levana-prorsa* are discussed, as also the protective resemblance of the larvæ of the two broods of *Lycæna psendargiolus* which vary in colour, the caterpillars of the summer brood being well protected on the white flower buds of *Cimicifuga racemosa*, whilst those of the later brood are yellow or olive-green in colour, and live on the flower buds of *Actinomeris squamosa*, which bears yellow flowers. Reference is made to the variation of larvæ under differing colour surroundings, and the conclusion is arrived at that "in these and similar instances, the dimorphism is not consequent on double sets of primary constituents of which only one or the other can attain to development," but that it "depends on the different susceptibilities of the histological elements which in exquisite combination make up the skin." The "differentiation of sex" next occupies attention, and the remarks on the neuters or workers of state-forming insects—bees, ants and termites—must be read to be appreciated. The conclusion, that poor feeding is not "the *causa efficiens* of sterility, but merely the stimulus which not only results in the formation of rudimentary ovaries, but at the same time calls forth all the other distinctive characters of the workers," appears to be based on pretty safe ground. The experiment detailed, too (p. 31), on *Musca vomitoria*, could be supplemented by every British lepidopterist who pays attention to the rearing of his specimens. The bearing of a starvation diet on larvæ and the resultant imagines is discussed, and the author states that "the disappearance of a typical organ is not an ontogenetic but phylogenetic process; it never in any case depends on mere influences of nutrition such as affect the development of each individual, but is always due to the variations of the primary constituents of the germ, which to all appearance can only come about in the course of numerous generations." Having given a definition of "ids" the secondary units, each of which contains within itself all the primary constituents that are necessary for the development of an individual, contained in the germplasm, the author discusses the production and development of workers, males and queens among the state-forming insects, and concludes that "selection is the all-sufficient principle on which the development of the organic world has been guided on its course." A brochure for every scientific man to read, mark, learn and inwardly digest, it appeals with especial force to those naturalists who are first and foremost entomologists. —Ed.

NOTES ON COLLECTING, Etc.

LEUCANIA ALBIPUNCTA AT SANDOWN.—I have much pleasure in recording the re-occurrence of this insect here; a fine specimen, apparently fresh from the pupa, visited my sugar on August 18th. As this was on the same ground where I took one of my two specimens last year, I hope the species has been breeding here, and that others may yet fall to my lot.—LOUIS B. PROUT, Sandown. *August 21st*, 1894.

EASTER IN CONNEMARA.—I had a pleasant trip into Connemara during the Easter holidays. The weather was beautifully fine, but too dry in the evenings for moths to be very plentiful. Still I had very fair sport at the sallows. The hotels at two places, Recess and Leenane, are in the midst of sallow trees, which were at their best during my visit (March 28th, to April 1st.). *Taeniocampa gothica* was plentiful, and in great variety; of *T. gracilis* only two or three came each evening, with a few reddish forms; *T. stabilis* (dark-banded), *T. instabilis*, *Pachnobia rubricosa*, *Xylocampa areola*, *Larentia multistrigaria*, *Eupithecia pumilata*, and *E. abbreviata*, all occurred sparingly. Larvæ of *Odonestis potatoria* were in great abundance. Since the beginning of April, the weather has been very unfavourable, and I have taken little. I have almost completely missed the larvæ of *Melitaea aurinia*, which were common last year.—J. E. R. ALLEN, Galway. *June 6th*, 1894.

TAENIOCAMPA STABILIS IN JULY.—As I was sugaring in the New Forest on July 10th, I was surprised to take a fresh specimen of *T. stabilis*. Is this not a very unusual occurrence? Was it ever recorded before, or was the species known to be double-brooded? I could at the same time have beaten many larvæ of the same insect. I took *Agrotis obscura* near here, on August 7th.—W. J. CROSS, Ely. *August 9th*, 1894.

NOTES OF THE SEASON 1894.

SHORT NOTES FROM THE BOOKS OF THE EXCHANGE BASKETS.—Major Still reports the capture of *Dedephila livornica* at rhododendron flowers, in the second week of June, at Horrabridge.———Mr. Fenn writes from Lee on June 12th:—"Except the miserable weather there is little to record; whether insects are really scarce or not I cannot say. They are not to be beaten out in the day-time, nor will they fly at dusk, and such of my friends as have tried sugaring, have had no result whatever. Some larvæ are abundant, *Tortrix viridana*, for instance, most of the oak trees in the woods near here being utterly defoliated."———Mr. Mason, writing from Clevedon on June 22nd, says:—"I have been fortunate enough to take two fine specimens of *Cucullia chamomillae* at *Lychnis dioica* within the last week; the only previous capture that I know of in this locality was made in 1892."———On June 23rd, Mr. H. Bickerton Jones reports from Liverpool:—"I have done little or no collecting since Easter, when (at Llangollen), there were any quantity of *Taeniocampa gothica*, *T. pulverulenta*, *T. stabilis*, *T. instabilis*, *Pachnobia rubricosa*, *T. munda*, *Orrhodia vaccinii*, *Scopelosoma satellitia* and *Calocampa exoleta* on the sallows. *Anticlea badiata* in fine condition and a few *Selenia bilunaria* and *Larentia multistrigaria*, were also captured, and I managed to get a few specimens of *Taeniocampa opima*."———On June 30th, Rev. E. C. Dobrée Fox writes

from Tewkesbury :—" We all seem to agree that the season is a very bad one. Sugar is a total failure, but as I have often found this to be the case until the elder is out of bloom, we may do better presently. Still, undoubtedly, things are very scarce."———On July 2nd, Mr. Corbett writes from Doncaster :—" This season is a woefully bad one for imagines. I have sugared on all sorts of nights—wet and fine, warm and cold, calm and windy, dark and bright—and all have been alike bad. Beating produces a few common geometers and micros."——— On July 7th, Mr. E. A. Atmore writes from King's Lynn :—" Of late, there has been considerable improvement in the weather, and insects have been very abundant. Macro-lepidoptera seem to be more plentiful here than they have been for several years. Sugar has recently attracted swarms of common species, but very few species worth taking. The outlook just now is not promising—heavy rain last night and again this morning, with a low barometer, and the mercury, alas! still sinking." ———On July 10th, Mr. Freer reports from Rugeley :—" Matters are a little better. I got about thirty *Lithosia mesomella* the other day, and four *Notodonta dictaeoides* ; I also saw *Plusia interrogationis* flying round honeysuckle. Light seems a complete failure this year."———On July 17th, Mr. Mason writes from Clevedon :—" Collecting has certainly improved this last fortnight, but sugar is still a failure, possibly owing to the quantity of limes in flower. My row of lavender will soon be at its best, but it is not so attractive as usual. I have turned up *Perinephele lancealis* this season, in some numbers, in a marshy plantation, but though the locality has been regularly worked by myself and others for the last ten years, I have never seen or heard of a specimen being taken before. I beat the insects from *Eupatorium cannabinum*."——— On July 26th, Dr. Riding writes :—" The season here is as bad as any I remember. All methods of capture fail—even light, which is generally more or less successful here. I hear from friends in Scotland that they have been having a good time."———On July 28th, Capt. Robertson writes from Cheltenham :—" I have just returned from Swansea, where I went after *Calymnia pyralina*, but did not see a single specimen. I also tried my trap every night with the same result. I never remember having such a bad season. About the only thing I took at sugar was a very unusual visitor to the sweets, *Cossus ligniperda*, which was undoubtedly either sucking or smelling it. I also took *Acronycta* (*Cuspidia*) *leporina*, which is new to my list of Swansea insects. Day-hunting, only periodical, yielded a couple of *Hydrelia unca*, and a var. of *Epinephele ianira*, with a white patch on the right fore-wing. I tried larva-beating but got nothing."———On July 29th, Mr. Greer reports from Bath :—" Insects seem to be scarcer than usual this year. Amongst others, I have taken the following :—*Hepialus sylvinus*, *Procris geryon*, *Nudaria mundana*, *Selenia lunaria*, *Geometra vernaria*, *Lobophora sexalisata*, *Camptogramma fluviata*, *Scotosia undulata*, *Leucania pudorina*, *Coenobia rufa*, *Dianthoecia carpophaga*, and *D. cucubali*. The majority of the Noctuæ were taken at light, sugar proving a total failure."——— On August 2nd, Mr. A. W. Mera writes :—" I have just returned from a visit to the Suffolk coast, and like most of my brethren, have found insects much less abundant than usual. Sugar was no good ; nearly all the Noctuæ I took were attracted to some flowering grass growing by the shore. On one or two nights common things were really abundant, but the weather was generally too boisterous to do much. The only

things I noticed more plentiful than usual, were the larvæ of *Pyrameis cardui*."———On August 11th, Mr. E. A. Bowles writes:—"I have but little to report of my two visits to the New Forest. The earlier one, in May, was rather successful, as I got a few nice *Macroglossa bombyliformis*, and larvæ were fairly plentiful; the oaks were stripped by common geometer larvæ, and the beating-tray revealed a mass of such plebeian customers after each beat. Last month's visit was spoiled by the weather. *Argynnis adippe*, *Heliothis dipsacea*, and *Acidalia straminata*, were fairly plentiful, but larvæ were absolutely wanting, and the fresh green foliage of the oaks was utterly unattacked. Nothing came to sugar, and no geometers flew at dusk in the woods."———On August 13th, Capt. Brown writes from Enniskillen:—"The season here has been very wet, sugar has been entirely useless, and, as I have not the conscience to tramp about the mowing-grass, of which the country round here mostly consists, and a great deal of which is even yet not cut, my movements have been hampered."———On August 15th, Mr. Beadle writes from Keswick:—"Sugar has little attraction, or else moths are very scarce. The only good day I have had was amongst *Erebia epiphron*, which I think came out all at once during the sudden burst of hot weather at the end of June. I went up Skiddaw for *Saturnia carpini* but only got one larva and two late larvæ of *Bombyx callunae*. I was glad also to get a series of a *Crambus*, which Mr. Tutt has determined to be *C. ericellus*. The time of its appearance, so far as I know, is from the middle to the end of June; it flies, or is easily disturbed, in the day time, and the only place where I have found it is in Green Crag, Borrowdale, near Keswick. I succeeded in hatching forty or fifty larvæ of *E. epiphron*, and fed them till they were about a quarter of an inch long when they died. The eggs are at first yellow, changing to pink and darkening just before hatching. The larvæ are dull yellow at first but change to greenish after commencing to feed. I fed them on a common species of grass of which they ate the edges of the blades."———On August 17th, Mr. Finlay reports from Morpeth:—"The weather here at present is so wet that collecting is impossible, and insects are not plentiful."———On August 20th, Rev. C. R. N. Burrows writes from Rainham, Essex:—"Things entomological have undoubtedly improved since the end of June. I, at least, have found it so in my part of the world. My collecting, however, is chiefly confined to the use of sugar; it is but rarely that I get a chance of using the net or in fact collecting in the day time."

Lee, Kent.—I am afraid I must add my testimony to that of others, that this is really a bad year. There have been worse lately, but, after the promise of the early spring, it is rather disheartening. Micros are getting a little more plentiful, but I think I have known days when Macros seemed entirely absent, not even *Cabera pusaria* appearing on the application of the beating stick. Sugar is entirely useless here. I have turned most of my time and attention to rearing larvæ, and have done pretty well in this way, as indoors the weather has little effect. I have just got a nice brood of *Acronycta alni* into pupæ, and out of a big brood of *Selenia lunaria* the few I kept for myself turned out nearly all of the summer brood (*delunaria*). I have just set out the last specimen of the 2nd summer brood of *Selenia bilunaria*, *i.e.* the 3rd emergence this year, and have got eggs which I hope will not produce a fourth, for they are the result of a cross between Yorkshire and Sutherland

imagines, and I hope they will produce a dark race. The summer broods are very rich in colour. *Geometra papilionaria* has not been rare here but, unfortunately, all I took were males. They fly late, about 11 p.m. I have a small brood of *Lophopteryx cucullinâ* feeding, thanks to the kindness of the Rev. B. Smith of Great Marlow. They are very interesting larvæ. The egg is laid simply on the underside of the maple leaves in shady woods. In confinement they will eat sycamore. *Acidalia emarginata* is a desideratum with many people but it is really very generally distributed. It may be beaten out of the long grass in woody places in the day time, but flies commonly at 11 p.m. and later. It may often be found at rest at dusk, on the long grasses under bushes and hedges. The weather was so utterly bad at the time many of our local Tortrices appear, that I failed with nearly all of them; even of *Phoxopteryx upupana* and *S. punctocostana*, usually not scarce, I did not see an example, and the same may be said of *Tortrix diversana*, but *Orthotaenia branderiana* and *Catoptria conterminana* were rather common.—C. Fenn, *August 8th*, 1894.

Sandown and Lyndhurst.—From July 14th to August 4th I was at Lyndhurst, and managed, despite rather poor sugaring, to obtain one *Triphaena subsequa*, one fine *Noctua stigmatica*, good series of the "Crimsons," short series of *Nola strigula*, *Hypenodes albistrigalis*, &c., &c. As I did not commence working at Sandown until August 6th, I was of course too late to report on some of the summer species. Only two poor *Agrotis lunigera* (♂ and ♀), two or three *Leucania conigera*, six *Caradrina taraxaci* (absent since the first two nights, though not then worn), and one *Agrotis tritici* were taken by me. Sugar has never been quite a blank, and one or two nights have been very decent. *Cerigo matura* and *Amphipyra tragopoginis* have been commoner than usual; *Agrotis puta*, *Miana literosa* and *Apamea didyma* nearly, but perhaps not quite so common as usual; *Miana bicoloria* and *Agrotis nigricans* have been decidedly scarce (for them). Only three *Agrotis suffusa* have turned up at present, and no *A. saucia*. *Noctua c-nigrum* is just coming out but is apparently going to be common. *Gnophos obscuraria* has been plentiful, but the "blues" are deplorably scarce.—Louis B. Prout, August 21st, 1894.

Southend.—I have taken or bred the following insects since the end of May. On the 3rd of June I took *Agdistis bennetii*, *Epichnopteryx radiella* and *E. reticella*, *Ephippiphora cirsiana*, *Eupoecilia affinitana*, *E. rectisana*, *Bucculatrix cristatella*, and *Dasycera sulphurtella*. Much time was spent in hunting for cases of *E. reticella*, cases of *Fumea nitidella* and *E. radiella* were easily found, but those of *E. reticella*, although the ♂s were not uncommon, must have been hidden away, for a close search did not yield a single case. *Bombyx rubi* emerged; the larvæ had been successfully hibernated for the first time. 5th June. Tried 'sembling with *Bombyx rubi*, and attracted one ♂. Dug up many roots for larvæ of *Sesia chrysidiformis*, which used to occur in this neighbourhood, and found plenty of larva of *Hepialus humuli*. *Eupithecia vulgata*, *Cnephasia musculana*, *Sciaphila subjectana*, were netted. On June 7th, *Rumia luteolata*, *Scoparia dubitalis*, *Phtheochroa rugosana*, and *Plutella cruciferarum* were netted, *Acidalia marginepunctata* taken at light. 9th June: *Triphaena pronuba* emerged, and a pair of *Arctia villica* taken. 10th June: *Tortrix costana* was bred from *Epilobium angustifolium*. *Sciaphila hybridana* was abundant on the salt marshes. 11th June,

Hadena suasa emerging; I found the ova in May of last year, attached to dead stems of *Aster tripolium*. On 12th June: *H. humuli*, *Crambus pratellus*, *Xanthosetia hamana* were taken. On 13th June: *Hepialus lupulinus* was abundant. On 14th June: *Sericoris littoralis* and eggs of *H. suasa* were obtained at Shoeburyness, and a few young broods of larvæ of *Bombyx castrensis* observed. On 16th June: *Crambus hortuellus*, *Platytes cerussellus*, ♂, ? *Crambus falsellus*. 17th June: *Lycæna astrarche*, *Argyrolepia zephyrana*, *Dichrorhampha plumbagana*, *Crambus pascuellus*, *Endopisa nigricana* (?), *Pionea forficalis*, *Sciaphila virgaureana* bred from sea lavender. 18th June: *Orygia gonostigma* emerged. 24th June: *Fumea nitidella*, ♂ bred. 25th June: *Euclidia glyphica* and *Xylophasia lithoxylea*. Two or three broods of *Eriogaster lanestris* seen. 26th June: *Phorodesma smaragdaria* emerging. 27th June: *Sesia tipuliformis* bred. 28th June: *Xylophasia polyodon* everywhere. 29th June: *Uropteryx sambucaria* and *C. maritima* bred. 30th June: *Tortrix viburniana* bred from sea wormwood. *Hemithea strigata* netted. 1st July: *Leioptilus lienigianus* emerging. On 3rd July: *Nudaria senex*, and *Crambus culmellus* taken. Fresh females of *P. smaragdaria*, exposed by the river wall until 11 p.m., failed to attract males. 5th July: *Tischeria dodonæa* bred. *Crambus perlellus*, *Catoptria cana*, *Tortrix unifasciana*, *Leucania impura*. On 8th July: *Arctia caia* emerging. *Pamphila sylvanus*, *P. thaumas*, *Cœnonympha pamphilus*, *Nomophila noctuella* taken, but no *P. lineola*. July 9th: *Cidaria fulvata*, *Rivula sericealis*, *Eupithecia pumilata*, *Hedya ocellana*, *Tortrix heparana*, *Eubolia limitata*, *Galleria mellonella* netted; at sugar, *Apamea didyma*, *Leucania lithargyria*, *Agrotis exclamationis* and *Caradrina alsines*. 10th July: *Tortrix ictericana* taken. 11th July: *Bombyx quercus* emerging. *Argyresthia nitidella*, *Tortrix ribeana*, *Scoparia mercurella*, *Acidalia dilutaria*, and *A. emarginata*, *Sphinx ligustri*. 13th July: *Pyrameis cardui* larvæ on the thistles, and a fine fresh *H. binerella*. 14th July: Larvæ of *Lavernia epilobiella* abundant; *Dichrorhampha politana* and *Homœosoma sinuella* netted. 15th July: *Pterophorus monodactylus*, *Hedya aceriana*, *Eubolia bipunctaria*, *Strenia clathrata*, *Mimœscoptilus pterodactylus*, *Herbula cespitalis* taken. July 19th: *Tinea pellionella* and *L. epilobiella* emerging. July 20th: *Xanthosetia zoegana* at light. July 21st: *Sideria achatana* bred; *Bryophila perla*. July 22nd: *Pelurga comitata* bred. Cocoons of *Zygæna filipendulæ* everywhere. *Pamphila lineola*, *Platyptilia bertrami*, *Acidalia immutata*, *Crambus selasellus*, *Epinephele janira* and *E. tithonus*, *Crambus culmellus*, *Catoptria candidulana* and *C. tripoliana* taken. July 23rd: *Phibalapteryx vitalbata* emerging. The wet weather during the past week has quite upset my out-door work.—F. G. Whittle. *July 26th*, 1894.

Weymouth.—I cannot say that I have found the season so bad as have many entomologists. The weather has certainly greatly hindered collecting, but moths have been fairly common and of good quality at Portland where I do most of my collecting. It has been a good year for *Agrotis pyrophila*, and a moderately good one for *A. lucernea*, whilst *A. lunigera*, which is sometimes abundant at Portland, has been very scarce. *Chamliodes dancellus*, of which I have before only taken odd specimens, has been abundant in the larva state in the wild carrot. I have often looked out for this larva but never before came across it. I understand that it is usual for this species, like many others, to have an occasional year of plenty and at other times to be almost absent. Of wasps I have not yet seen a single worker. The

♀s were abundant in the spring as might be expected from the extreme abundance of wasps last summer. I hope they may take a few years now to get up their numbers again, for though they are doubtless very useful insects they are never welcome when in great numbers.—Nelson M. Richardson. *July 30th*, 1894.

Freshwater.—During my temporary absence in Guernsey upon business, my brother was fortunate, with the assistance of my nephew, in capturing a very richly mottled specimen of *Laphygma exigua* at sugar on Aug. 31st, and promptly followed up the success by taking an equally fine *Leucania albipuncta* on Sept. 4th, also at sugar. Common species are coming very freely, *Noctua c-nigrum* and *Phlogophora meticulosa* being especially a nuisance, whilst *Agrotis obelisca* and *Aporophyla australis* are occasional visitors. I have also to record single specimens of *Plusia festucae* (query, second brood,) and *Heliophobus hispidus*, neither of which I have ever taken here before, although the latter was reputed to occur in numbers formerly near Totland Bay, where I have frequently searched by day without success. A second specimen of *L. albipuncta* was captured at sugar last night within a few feet of the spot at which the former was captured.—Albert J. Hodges. *Sept. 8th*, 1894.

SOCIETIES.

At the meeting of the South London Entomological and Natural History Society on July 12th, Mr. R. Adkin exhibited a bred series of *Dianthoecia nana*, all of which were very very dark and some unicolorous. Mr. Oldham; a specimen of *Rumia luteolata* with a well-developed waved line on all the wings. Mr. Auld; a bred specimen of *Phorodesma smaragdaria*, in which only the discoidal spots were present. Mr. C. A. Briggs; a specimen of the rare Lacewing Fly, *Nothochrysa capitata*, taken at Wisley. Mr. Perks; the egg of a *Coccinella*, deposited on the point of a thorn. Mr. Turner; *Lycaena minima* from Galway, showing gradual diminution of spots on the underside, and a brown-suffused specimen of *L. astrarche* from Reigate. Mr. Hall; *Drosera rotundifolia* and *D. intermedia*, from Wisley.—On July 26th, Mr. Carpenter exhibited a bleached *Epinephele ianira* from the New Forest, which he said was the only insect captured worth recording during a fortnight's hard work; sugar was an absolute failure. Mr. R. Adkin; *Coccyx strobilella* together with the spruce cones from which they had been reared. Mr. Auld; a series of *Ephippiphora foenella*, bred from roots of mugwort; the roots were shown with the pupa-cases *in situ*. Mr. Moore; a number of fossil shark's teeth, taken out of a cargo of guano from Bull River, South America. Mr. Frohawk said that blackbirds and thrushes were still in full song, and remarked that it was unusually late for this to be the case. Mr. Step reported the appearance on a ceiling in his house of a rare fungus (*Peziza haemastigma*).—On August 9th, Mr. Hall, in exhibiting bred series of *Xanthia fulvago* from Derby and Croydon, stated that it was usual to obtain a greater proportion of var *flavescens* from the north than from the south. Mr. Adkin (on behalf of Mr. South) exhibited a bred series of *Hypsipetes sordidata* from Northwood, having a very dark ground colour; bred series of *Cleoceris viminalis* from Blatchworth, some of which were melanic while others were very pale; a specimen of *Tortrix xylosteana* which had jet black markings instead of rich reddish-brown; a series

of *Prays curtisellus* collected round Macclesfield, which included both the normal and the uniformly fuscous forms. Mr. Turner showed a dark specimen of *Melanippe fluctuata* taken at Brockley, referable to var. *neapolisata*.——The meeting on August 23rd does not seem to have produced anything worthy of record.

City of London Entomological and Natural History Society. —*July 3rd*, 1894.—Exhibits:—Mr. Clark: a large number of Australian Lepidoptera received from Mr. Anderson; also living larvae of *Selenia lunaria*. Mr. May: an empty cocoon of *Plusia moneta* from Weybridge. He stated that the moth had emerged from this a few days previously. Mr. Hollis: bred specimens of *Ocneria dispar*. Mr. Prout: bred series of *Eupithecia assimilata*, upon which he made the following remarks:—"These specimens were reared from five different females taken in 1893. Brood No. 2 was a failure, but the others showed a decided tendency to heredity. Brood 1 was composed of small specimens, inclining to a dull unicolorous form; Brood 3, similar, but larger; Brood 4, fine large reddish specimens, well marked, especially behind the central spot; Brood 5, delicate greyish tone, recalling the tint of *E. subnotata*. This species is only partially double brooded. Brood 1, from a female taken 11th June, 1893, produced three at the end of July, 1893, the remainder emerging in May, 1894; Brood 5, from a female taken 11th August, 1893, fed up during the autumn, the imagines appearing in May. They fed either on currant or hop, but refused flowers, while the allied *E. absynthiata* feeds on ragwort flowers, and refuses hop." Dr. Sequeira: *Meliana flammea*, *Viminia venosa* and *Macrogaster arundinis*, all from Wicken Fen. Dr. Buckell: *Nisoniades tages*. He called attention to the presence in the males of a fold along the basal half of the costal margin of the fore wings. The same character is also present in *Pyrgus malvae*, and is probably a scent organ. Mr. Bacot: full-grown larvae of *Amphidasys prodromaria* feeding on cherry. Mr. Battley: flowers of *Orchis pyramidalis*, *Ophrys apifera* (Bee orchis), and *Gymnadenia conopsea* (Scented orchis) all from Reigate. Mr. Bate said that he had made further enquiries as to the specimen of *Polyommatus virgaureae* exhibited by him at the last meeting, and that no doubt seemed to exist as to the authenticity of the capture, which took place in July or August, 1880.

July 17th, 1894.—Exhibits:—Mr. Oldham: a specimen of *Rumia crataegata* with very distinct transverse lines; also some rats killed by poison. Mr. Battley: *Macrogaster arundinis*, *Hydrilla palustris*, *Herminia cribralis* and *Nascia cilialis*, all from Wicken, and *Spilodes sticticalis* from Tuddenham. Mr. May: bred specimens of *Plusia moneta*, *Geometra papilionaria* and *Ellopia fasciaria*. Dr. Buckell; living specimens of *Bombyx quercus* received from Mr. A. J. Johnson of Erdington, near Birmingham. He read a letter from that gentleman, in which he stated that he had placed three bred specimens (two males and a female) in a box, and shortly afterwards noticed that the two males were *in cop*. He further suggested that one of them might be hermaphroditic, although they appeared to be typical males. Capt. Thompson: pupæ of *Nonagria elymi* in stems of *Elymus arenarius*.

August 7th, 1894.—Exhibits:—Mr. Sauzé: a long series of *Coccinella variabilis* from Sydenham and other localities. Mr. Lewcock: a nearly full-fed larva of *Smerinthus tiliae*. The meeting was very small, many of the members being away for their holidays.

August 21*st*, 1894.—Mr. Clark, in referring to the death of Mr. William Machin, formerly a member of the Society, proposed that a vote of sympathy be sent to his relatives; this was accordingly done. Exhibits:—Mr. Gregor: *Acidalia marginepunctata*, *Agrotis strigula* (dark), *Cidaria populata*, *Larentia olivata*, *Hypsipetes sordidata* (some fine forms) and a suffused banded form of *Camptogramma bilineata*, all from North Wales. Mr. Gates: a number of microlepidoptera, mostly bred, from the Hammersmith neighbourhood, including *Fumea intermediella*; the females of this species never leave the larval case. Mr. Clark: *Meliana flammea*, *Bankia argentula*, *Acontia luctuosa* and others from Wicken. Mr. Lewcock: *Pachyta collaris*, *Cryptorhynchus lapathi* and many other coleoptera; the larva of *C. lapathi* feeds in the stems of willow and sallow. Dr. Buckell: *Bupalus piniaria* (♂ s) from Oxshott and West Wickham, with a Scotch specimen for comparison; one of the Oxshott specimens had those portions of the wings which are usually yellow as white as in the Scotch specimen, whilst in another specimen the black had encroached much more than usual on the yellow, and on the hind-wings had almost entirely obliterated it; also two pupæ of *Nemeobius lucina* attached to a withered primrose leaf; the larvæ hatched on June 12th, and pupated on July 23rd; during their earlier stages the larvæ remained on the fresh leaf all day, but in their later stages they left it during the day and rested on the bottom of the glass in which they were being reared; this facts suggests that the larvæ might be looked for during the day under leaves resting on the ground or on the ground close to the plant; when the time for pupation came neither attached itself to the fresh leaf, but both retired to the withered leaf on which they now are, and which happened to be in the jar; also a specimen of *Miana strigilis* from Highgate, with a reddish band near the hind margin of the fore-wings. Dr. Buckell also read:—

Notes on the parallelism, in their earliest stages, between Eugonia quercinaria and E. autumnaria.—I obtained a batch of eggs last year from a bred ♀ *E. quercinaria* paired with a bred ♂, both of them from larvæ taken in Kensington Gardens. In April last Capt. Thompson brought me some eggs of *E. autumnaria* to rear for him. Rearing the two species side by side, I was struck with the following points of parallelism between them. 1. The eggs were (to the naked eye) indistinguishable, their shape is peculiar (vide *Ent. Rec.*, vol. iv., p. 236); Mr. Tutt describes it (*Ent. Rec.*, v., p. 114) as "a rather square-based parallelopiped." 2. In both cases the eggs were laid overlapping one another (imbricated)). 3. In both alike the hatching process extended over very nearly a month. 4. For pupation both spun leaves together, *E. quercinaria* very loosely, *E. autumnaria* somewhat more firmly.

Mr. Riches announced that he had bred several specimens of *Apamea ophiogramma* from "Ribbon-grass;" a discussion ensued as to the proper food of this larva when in a wild state; Dr. Buckell said that the Rev. C. R. N. Burrows of Rainham had bred 3 ♂ and 3 ♀ *Anticlea berberata*, which he placed together in a glass-topped box with a spray of the food plant; on the first night each ♀ found a mate; on the following night some were paired again, and the same thing happened on the third night. Mr. Bacot read:—

Further notes on Selenia tetralunaria.—From the fertile ova of the batch upon which I communicated some notes to the Society on

June 5th, I bred 6 imagines, which emerged during the first week of July. I tried "assembling" with them on two occasions, but without success; probably it was too early for the 2nd brood in a state of nature. I, however, paired two of those I bred, and, with a view of following up my former observations, removed the female to a fresh chip box each day. The pairing took place on the night of July 4th. On the night of July 5th 97 eggs were laid; these were deposited in one large loose patch and several smaller ones (the female of the spring brood laid her eggs in twos and threes only), they had not turned red on the night of the 6th, but were all red next morning (7th). On the night of the 6th 34 were laid; they were more scattered than on the previous night, but there was one loose patch of 18; at 1 p.m. on the 8th these were darkening but not yet red; by 7 a.m. on the 9th they had turned red. On the night of the 7th 11 were laid; at 7 a.m. on the 9th one of these had turned red, the rest were only flesh-coloured; by 9 a.m. on the 10th all were red. On the night of the 8th 11 were laid; at 7 a.m. on the 9th all these were of a dull orange except one, which was red; on the morning of the 10th two more had become red, and on the evening of the same day all were pale red—one very dark red or purple. On the night of the 9th 4 were laid, which were all pale orange the next morning, and all red on the 12th. On the night of the 11th two were laid; next morning one of these was pale red, the other dirty yellow; on the 15th both were dark red. These observations seem to confirm the opinion I expressed in my notes on the spring batch to the effect that the few fertile eggs of that batch were laid in the middle of the period of deposition. I did not take note of the exact tint of the freshly-laid eggs for the first two or three days, but I do not think that they differed much from the infertile ones of the former batch. Some of the later ones, however, if not orange-coloured when laid, must have changed very rapidly, as they were already of that tint when I examined them only nine or ten hours after their deposition, and it will be noticed that one egg turned red in this short space of time.

SONG OF THE SEASONS.

Come forth: come forth: the spring to thee is calling:
The plover cries his love o'er moor and hill;
The skylark's notes from heaven to earth are falling:
And in the hedgerows nods the daffodil.

Come forth: come forth: the summer's fiery glances
Bid thee come dream beneath the greenwood's shade:
Near where the streamlet mid the bracken dances:
And the tall foxglove blushes in the glade.

Come forth: come forth: the autumn mists are creeping
About the garden where the robin sings:
The spider in his dewy net is sleeping:
And to his hoard his nuts the squirrel brings.

Lie still and rest: the winter winds are wailing:
The sparrow puffs his feathers on the tree:
And sullen clouds o'er sullen skies go trailing.
What can the dead earth tell to thee or me?

G. M. A. H.

The Entomologist's Record
AND
JOURNAL OF VARIATION.

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BUTTERFLY-CATCHING IN THE NEIGHBOURHOOD OF MONT BLANC.*

By J. W. TUTT, F.E.S.

Overhead the sky is of a lovely blue. The sun's rays pass through the larches and fall upon a sloping hollow that is filled knee-deep with scabious and thyme, marjoram and gentians, umbellifers and trefoils, barberry and juniper. Two lazy fellows are lounging idly in the shade at a little distance from each other, each trusting that the other believes him to be working as hard as possible while he is really glorying in his own laziness as he feasts his eyes on the snowy dome of Mont Blanc, or on the necklet of cloud from out of which stands up, black and grim, the sharp point of the Aiguille Noire de Peteret. Yonder the Glacier de Brenva shows its white névé, glistening in the brilliant sunlight; whilst The Grammont and Chétif smile grimly across the Dora Valley at the two make-believes on the opposite side. Lovely is the Dora Valley, with its turbid glacial streams, its emerald green, its snow-capped mountains, and its beautiful flowers. Round this delightful spot, in favourable localities, butterflies and moths don't simply exist—they swarm.

Let us glance at some of the butterflies that may be captured round about Courmayeur on a morning in early August.

In the valley below there *Papilio podalirius* flies lazily but gracefully about, sipping from every muddy spot. The few *P. machaon* we see are worn and broken, and a half-fed larva, picked up on the bank, tells us that we have hit on a time between the two broods or else that the summer brood is past. But *the* butterfly of these slopes is *Parnassius apollo*. A lazy, high-living chap is he, sucking away greedily at the nectar of knapweed or scabious, too intent to mind the fingers that pick him tenderly from his food, simply throwing out his fore legs in a wondering sort of way as much as to say, Where am I now? As we put him back he goes on sucking again, flaps his wings once or twice to satisfy himself that he has discovered where he is and then, after a time, spreads his wings and launches himself in the air so lightly and easily that you fail to see his wings vibrate to keep him in motion. A really fine fellow it is, with its crimson spots varying in size and number, dependent, my companion says, on sex; but this flight makes one

* Read before the City of London Entomological Society, Sept. 4th, 1894.

think that, in spite of the neuration being so different, the osmaterium of the larva is a better guide, and shows that it has closer affinities to the Swallow-tails than one would otherwise be inclined to suppose. *Leucophasia sinapis* threads its way slowly through bush and grass and occasionally settles as lazily as it flies, in spite of the fact that some of our English collectors think that this species has solved the problem of perpetual motion. In yonder lucerne fields *Aporia crataegi* disports itself, the almost diaphanous females reminding one of *P. apollo* and giving one the notion that the most perfect specimens are but in poor condition. With it are *Pieris brassicae* and *P. rapae*, but *P. napi* does not put in an appearance, although we met with it later on at Aix-les-Bains. *Pieris daplidice* flits easily along, but a regular "artful dodger" it is. It flies slowly, and you cannot help distinguishing it at once on the wing, notwithstanding all that has been said to the contrary. But for all its slow flight you often miss it; it dodges just as you strike, changes its mind perhaps when the shadow of the net falls on it; at any rate you miss about as many as you catch. *Gonopteryx rhamni* is just coming out, but no *G. cleopatra* are seen. The "Yellows" are in fine condition and in the humour to hunt a fellow on the hill-side. You may talk about hunting butterflies but I have quite made up my mind that these Clouded Yellows hunt me. One took me a pretty dance, I nearly broke my neck—and got a peep at him; had after him again—and got a telescopic view at about six yards; then he beamed on me as he turned suddenly and passed within an inch of my nose, just as I was calculating whether I was to sink gracefully on my back on the bank or roll with the loose stones I had incautiously stepped on and thus end my existence; then, when I recovered, I saw him hovering over a flower at the very spot whence I had started; but when I got there he was just sailing away over the larch trees. I didn't give them much chance of hunting me though, for we soon arranged matters satisfactorily, and whilst *C. edusa*, *C. hyale* and *C. phicomone* flew peacefully about the bank I lay in the shade and watched them. Argynnids were in thousands, *A. aglaia* and *A. niobe* in dozens; and what grand fellows some of the latter are! what marvellous variations they show in their silvery undersides—and in their uppersides, too, for the matter of that. *A. adippe* and an occasional *A. paphia*, together with a much larger but closely-allied species, with a really grand underside of green and red, were mingled with such lovely *A. latona*. Just out of pupa, they waved their wings airily, now on a flower, then on the rock at one's feet. *A. selene* I saw once, I believe, but *A. euphrosyne* was not. A half-dozen other species besides perhaps fell in our way here, but their names are not on British lists, except perhaps *A. dia*, which sometimes is and ought not to be. All our British Melitæas occurred and many others besides—*M. cinxia* on the hill-side, *M. aurinia* high on the mountains, probably long over in the lower regions, and *M. athalia* here and there, with *M. parthenie*, *M. aurelia* and many other species. The larvæ of *Vanessa urticae* occurred high on the mountains, where nine-tenths must starve before they come to maturity, and plenty of imagos appeared as well. *V. antiopa*, fine strong-winged fellow, was only once seen here, but others appeared in the Cogne Valley, where a pupa and evidences of some hundreds of larvæ in the shape of their cast skins were found upon the willows. *Vanessa io* and *Pyrameis atalanta* were in no great abundance, but *P. cardui* and its larvæ were everywhere.

This species was found up to the highest points we reached, sailing over the top of Mont de la Saxe and the Glacier du Miage, free and unrestrained. *Limenitis camilla* occasionally haunted a shrubby honeysuckle, and *Melanargia galatea* kept company with *P. apollo* almost everywhere on suitable slopes. We made a special hunt for *Erebias*, and got some, although *Erebia aethiops* occurred but twice and both times at low levels (at Bourg St. Maurice and Grésy near Aix les Bains), but some allied species swarmed. *Erebia epiphron* in varied conditions of dotting and spotting was sometimes not uncommon. *Pararge megaera* and some allied non-British species occurred, but rarely in the higher levels, although the species was abundant in the Val d' Aosta, whilst *H. semele*, fine grand fellows some of them, were met with in many places. *Epinephele ianira*, with a double-spotted relation, and *Coenonympha pamphilus* were not uncommon. Of the Hair-streaks only one, and that a non-British species, occurred, but the lovely Coppers made up for them. Brilliant little gems are the males of *Chrysophanus virgaureæ*, and abundantly they skipped from flower to flower, whilst *C. phloeas* gave us here a bright form, lower down the dark form which Mr. Merrifield has proved to accompany a high temperature and which has helped to prove that melanism is often the result of a physical (pathological) process which may be engendered in a variety of ways. But *Lycaenas* are the insects *par excellence* of the banks here. *L. corydon* and *L. bellargus*, *L. aegon* and *L. argus*, *L. astrarche* and *L. icarus*, *L. aeis* and *L. minima*, *L. argiolus* and *L. argiades*, with fine dark *L. arion* sport here, and quite a dozen non-British species besides: the thyme and marjoram teem with these strange little creatures, which make their wings appear to rotate by a process of moving those on opposite sides in different directions. No *Nemeobius lucina* were observed here, although a second brood turned up at Aix, but *malvae*-like Skippers were in dozens. How many species there were I dare not say; whether *Pyrgus malvae* was in fact one of them it is equally unsafe to assert. *Nisoniades tages* and some butterflies which resembled but were not it occurred, not here but at Aosta; but here, with the Yellows and Fritillaries, thousands of *Pamphila comma* dart about diving their probosces deep into thistle and scabious, hustling the Burnet moths, the *apollos*, and even the bees. *P. linea* and *P. lineola*, *P. sylvanus* and *P. actaeon* all occur here, *P. lineola* much the most frequently.

Thus much for some of the butterflies round Courmayeur. Those species which are not found in England find so little favour in the eyes of British collectors that this must be my excuse for not naming them; but when three-fourths of our British species and as many other non-British species besides, can be seen in one or two morning walks among some of the most beautiful scenery in the Alps, with the Sovran Dome of Mont Blanc keeping silent and watchful guard, where, when butterflies and Burnet moths pall, one can turn to lovely flowers, glacial torrents, glistening snow, sparkling cascades, silent and majestic mountains or deep deep blue sky, can watch the filmy haze weave itself into fanciful shapes around the aiguilles yonder and float off a wraith so fairy-like and light that the blue of the sky appears to pierce it, whilst the sound of the cow-bells comes peacefully from the pastures above and woos the sleepy dream-god, then I feel it safe to assert that there are many worse occupations than catching "Hampstead Heath" *antiopas*, "Dover" *latonas*, "Folkestone" *daplidices*, and Midland *dias*, on the breezy slopes of the mountains around Courmayeur.

THE LIFE-HISTORY OF OCNERIA DISPAR.*

By C. NICHOLSON.

I have chosen this insect as the subject of a paper because, having reared it repeatedly through all its stages, I have noticed several features in its history which led me to think that it would prove specially interesting, and furnish food for thought and discussion.

I will deal first of all with its nomenclature. Why the moth received its English name, "The Gipsy moth," I do not know, but the female is figured under that name in 1742 by Wilkes, *(Bowles' New Collection of English Moths and Butterflies in 12 prints, all drawn from life*, pl. x., fig 2.), who seems to have been the first British author to notice it. Scientifically it is probably best known to entomologists as *Liparis dispar*, though it is now called by the name which appears in the title of this paper. It seems to have had no specific synonyms worthy of mention, although generically it has experienced numerous vicissitudes. Linnæus called it *Phalaena (Bombyx) dispar;* Haworth, *Bombyx disparus*; then we have Hübner with *Porthetria dispar*, and Ochsenheimer with *Liparis dispar*; then Stephens and Curtis with *Hypogymna dispar*, and finally Herrich-Schaeffer with *Ocneria dispar*.

The generic name, *Ocneria*, is probably derived from the Greek *oknêiros*—"sluggish"; if this be the origin of the word, it is particularly applicable to the female Gipsy moth. The trivial name *dispar*, meaning "unlike," is most appropriately bestowed on this species because of the striking dissimilarity between the sexes.

As most of you are doubtless aware, this moth is remarkable from the fact that it has ceased to exist in a wild state in Britain and has degenerated into a purely domestic article of produce. On the Continent, however, it is anything but extinct; in fact, it occasionally becomes so excessively abundant as to strip large tracts of trees of their leaves. It is also unpleasantly in evidence on the other side of the Atlantic, in the State of Massachusetts, where Brother Jonathan employs many men whose sole business it is to keep the numbers of this insect in check, with a view to ultimate extermination. I wrote to Prof. Riley for information concerning the ravages caused by this species in the aforementioned State, and received in reply the three Reports now on the table; each of these, as you will observe, is entitled: "Special Report of the State Board of Agriculture on the work of extermination of the Gypsy Moth." The Moth seems to have been accidentally introduced into America about 35 years ago, and it gradually increased and spread to such an extent that, in 1890, £10,000 was voted by the Legislature to be expended in efforts to get rid of it. Those efforts are still going on merrily, and you will see, by the map in the Report for 1894, that about half the infested district (that is about 100 sq. miles) has been cleared of the pest. The expenditure last year amounted to about £15,000. One of the reasons given, in the Report for 1893, for its great destructiveness in America is, that it was introduced without its natural enemies; and this is the reason why those "insect pests which are of European origin have been far more injurious" in America "than they were ever known to be in their

* Read before The City of London Entomological Society, Sept. 18th, 1894.

native homes." In the same Report twenty-four species of American birds (including the famous Blue Jay, immortalized by Mark Twain) are mentioned as feeding on the insect in three of its stages; there are are also four species of insects which have been found to destroy the ova, and seven true parasites which live in the larvae. I cannot give you any information as to its parasitical enemies in Europe, but I do know that the audacious British sparrow alights on the scullery roof just outside my sitting-room window, and greedily snaps up the female moths which I discharge when I have a superfluity of them.

It has been suggested by more than one author that the species was originally introduced into this country artificially, and the following remarks by Wilkes, in the 1st edition of his *English Moths and Butterflies* (1746-60) lend some support to the suggestion. He says:—"This moth is very common in Germany, and was produced [in England presumably—*C.N.*] from a nest of eggs, that were sent to Mr. Peter Collinson, who gave them to Charles Lockyer, Esq. He bred moths from them . . . . . and having turned numbers of them wild (as I have been informed) about Ealing, near Brentford in Middlesex, they are to be found there, but not anywhere else that I have heard of." However that may be, there does not seem much doubt that it became extinct somewhere about 1855, although it is reported to have swarmed at Horning Fen in Norfolk about 1830, where it seems to have fed on sweet gale (see *Ent.*, vol. xxv., p. 259). All efforts to re-establish it appear to have been crowned with failure.

It is a remarkable coincidence that the other British lepidopteron which bore the name *dispar* is now also extinct in this country; both having been found in the same locality, and both becoming extinct within a very few years of each other.

The eggs of the Gipsy Moth are laid during the months of July, August and September in America, and I presume the time is about the same wherever the insect occurs. They are usually deposited on the trunks or branches of trees and not on the leaves, since they have to pass the winter in the egg state and would be carried away with the falling leaves, thus making it difficult for the young larvæ to obtain food in the spring. While the female is depositing her eggs she remains quiescent on one spot, no part of the insect moving except the extremity of the abdomen. The eggs are about $^1/_{16}$ in. in diameter, and are shaped like a rather flat orange. They are laid in large patches of one or more layers, each patch containing from 150 to 300 eggs thatched over with a kind of fur, which is in reality the dark, velvety scales so conspicuous at the end of the abdomen of the female. This furry substance is plucked out by means of an apparatus specially formed for the purpose, and resembling a pair of forceps in miniature. When newly laid, the egg is of a pale and somewhat watery chocolate colour; but in a week or two this changes to a dark smoky grey, and it remains of this tint throughout the winter until spring arrives, when it becomes almost black a few days before hatching.

The hatching of all the eggs in any one batch is not simultaneous, which is contrary to the usual rule in such cases, but the young larvæ continue to come forth, a few at a time, for three or four weeks, in fact throughout April. The result of this arrangement is that larvae in all stages of growth, pupæ, and even imagines are found at the same time.

When first hatched the juvenile larvæ are of a light brown colour, but they soon become a very dark greyish black, the head being quite black and *shining*. They are then about $\frac{1}{8}$ in. long, and rather hairy. The hairs are black, and spring from small black tubercles; some of them are nearly as long as the larva itself. The larva moults, or casts its skin, four times, at intervals of from 7 to 14 days. After the first moult the colour is not appreciably altered. After the second moult the head becomes *dull* black, and the body is adorned with a dorsal series of about six orange spots. The casting of the third skin reveals a more elaborate coat, the tubercles now becoming coloured and the whole body of a paler tint; the head is also marked with yellow. The only change after the last moult is that the head is much more suffused with yellow. When full-grown, the male larva is about $1\frac{3}{4}$ in. in length; the female about $2\frac{1}{2}$ in. They are similarly marked. The head is of a rich orange colour, delicately mottled and irrorated with black and having two black stripes down the face. The body is black or grey, varying with the individual. On the back of each segment of the body are two tubercles, which emit short bristly hairs; and along each side of the larva are two rows of warts from which spring longer and softer hairs curving downwards. All the hairs are golden brown. The dorsal tubercles are dark blue on the first five segments, and blood-red on the remaining seven. Mr. Bacot drew my attention to some small tubercles situated between the large red dorsal tubercles on the 9th and 10th segments. These have been mentioned by Mr. Poulton, who, if I have heard rightly, was unable to determine their use.

Anyone who has had the somewhat doubtful pleasure of rearing a large number of these larvæ will probably have marvelled at their wonderful capacity for eating. They never seem to need the aid of the dainty little "Beecham" or "Pepper's Quinine and Iron Tonic" to improve their appetites. The only preparation of iron that would be of any service would be the woodcutter's axe, so that one could fell a few oaks and beeches, with whose leaves the perpetual cravings of the larvae could be appeased. When engaged in the, to them, pleasant business of getting outside the maximum of greenstuff in the minimum of time, the noise made by the jaws of some 200 larvæ resembles the gentle pattering of a shower of rain, as it falls on the leaves of trees and bushes. I have heard it repeatedly myself.

I have noticed a peculiar trait in the character of these larvæ, *viz*: their sensitiveness to certain sounds. When I have been talking while leaning over the aquarium-glass in which they were feeding, I have frequently seen them kick up their tails in a most irritated way, as if they were annoyed at the sound, which was probably intensified by the vibration of the glass. Similar results may be produced with other larvæ, as was mentioned in the *Ent. Rec.* for Sept. 1893, pages 240-241, where *Vanessa urticae*, *Bombyx quercus*, *Nemeophila plantaginis* and *Callimorpha dominula* are referred to as being affected in a similar way.

The larvæ of *Ocneria dispar* rest in a straight position on the stems and branches of their food-plant. If annoyed they fall from their resting-place, spasmodically jerking their heads and tails up and down. This is more particularly the case when they are young and frisky; as they become older and more staid they seem to take life more smoothly,

and are not easily worried. These remarks apply equally to the larvæ of *Psilura monacha*, to which species *O. dispar* is very closely allied in every stage of its existence.

Although the larvæ are moderately hairy, I have not found that the hairs possess any "urticating" properties; but the short bristly ones on the back are capable of giving a sharp prick when brought into contact with the tender parts of the hand.

The larva attains full growth in about eight weeks after leaving the egg; it is a rapid crawler and does not roll into a ring on the approach of real or fancied danger. It spins a very rough, open network of silk in some convenient corner, or between leaves, and therein becomes a pupa. This network in no way hides the enclosed pupa, but is only just sufficient to restrain it from rolling about or falling out.

The pupæ of both sexes are of a dark brown colour, and are besprinkled with little tufts of short hair of a lighter shade of brown. The male pupa is only about half as large as that of the female; it is rather squarer at the head and decidedly more pointed towards the tail. Both sexes rotate the tail segments very actively when touched.

The moths appear in July and August, about a month after the pupation of the larvæ.

In the early stages of this moth there is not a very striking difference between the sexes; but as soon as they arrive at the imago stage they present very few points of similarity. The male differs very materially from the female in size, colour and shape, as is evident on the most cursory glance. The antennæ of the male are beautifully plumose; those of the female pectinated. The fore-wings of the male are of a rather greyish-brown colour (either shade occasionally predominating) with darker transverse wavy lines; the hind-wings are always of a lighter brown than the fore-wings, and, as a rule, appear to be destitute of markings, with the exception of a central dark lunule; there is, however, sometimes an indication of a line parallel with the hind margin; though this is rather more distinct in the female. The fringe is alternately light and dark on all the wings. The female agrees with the male in the style of the markings, but the ground colour of all the wings is creamy-white. Both sexes have a blackish dot and a V-shaped mark rather above the middle of the fore-wing. The distinctness of the transverse lines varies in both sexes, but especially in the female, and a variety of that sex occasionally occurs in which the V-shaped mark alone is present.

I am indebted to Mr. Samuel Stevens of Norwood for the loan of 2 males and 2 females of an original British race. You will notice that the second male is a very strikingly banded variety; otherwise there is no particular individuality about our old fen form.

You will see in my boxes a number of small males very much lighter than usual, and having a good deal of buff colour on the fore wings; many of them also have the thorax greyish. They are the produce of several generations, and were bred in the first instance from ova received from Mr. Bacot, who got them from Mr. Wade-Gery of Winchester College.

It was by means of a score of larvæ, which I obtained in 1886 from Mr. J. Potts of Hull, that I first made acquaintance with the species; and the acquaintance had ripened into friendship with succeeding generations, when I unfortunately lost the race in 1891.

The male Gipsy moth is extremely excitable, and flies wildly in a zigzagging manner during the day in precisely the same way as its humbler relative *Orygia antiqua*, which, in many ways, it closely resembles. The female, on the contrary, is very lethargic, usually sitting quietly within a few inches of the pupa shell from which she has emerged. In one of the Reports above referred to the following remark occurs: "The female does not fly, except diagonally downwards." Those which I have bred did not seem to fly at all, but they occasionally fluttered about in the box in a manner remarkably like that of the female Silkworm moth. It is probable that in a state of nature the female flies late at night.

The males, in common with those of the other species in the family *Liparidæ*, "assemble" very freely. In connection with this I tried an experiment with the present species in my sitting-room, which is about 11 feet square. One day I found that three females had emerged in my box, and I put them close together on the mantel-board, and let a small male loose in the room. The window and the door were wide open, but he made no attempt to escape, and it was very interesting to observe the steady business-like way in which he searched about, carefully investigating the corners of the floor and the ceiling, and working up and down the walls. The whole proceeding was in most striking contrast to the wild zigzagging flight above referred to. It took him about half an hour to find the females; I suppose this was because there was no breeze to assist him in localizing their position. I paid a brief visit to the Natural History Museum some time ago, for the purpose of looking up this species and its foreign allies, and was much struck with the very great similarity which many of the latter bear to *O. dispar* and *Psilura monacha*, several of them forming connecting links between the two. For instance, the male of *Enome incerta*—an Indian species—has wings almost identical with those of *O. dispar* in colour and marking, but it has a pink body like that of *P. monacha*. *E. japonica* (from Japan) is simply a larger edition of *O. dispar*, except that the female is more suffused with brown, and has only the V-shaped mark distinct. *E. umbrosa*—likewise a native of Japan—is also, in appearance, very closely related to *dispar*. The scourge of Massachusetts is figured in the Reports on the table, and seems to be very near to the ordinary forms which we now breed, which I suppose are Continental.

In conclusion, I regret that I have not any foreign types to show you, but I desire to thank those members who have brought their series here this evening to help to illustrate the paper. If I may venture to suggest some points for discussion, I think these two may be productive of some interesting opinions:—Why did *Ocneria dispar* become extinct in this country? and, Why are the wings of the female so well developed, supposing that they are *not* used for flight?

Photography is making entomologists more closely known to each other. In the *Entomological News* for September, 1894, is a photo of twenty-seven American entomologists, including some well-known names. We are also indebted to Mr. Capper for a photograph of many valued correspondents, who make Liverpool their entomological home, and look up to the respected President of the Lancashire and Cheshire Society as their entomological parent. The latter photograph will be reproduced in an early number of *The Entomologist's Record*.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J W. TUTT, F.E.S.

(*Continued from page* 217).

Chap. IV.

EMBRYOLOGY.

12.—Reversal of position of embryo in eggs.—(*Continued*).—With regard to the development of the embryo in the egg of *Rumia lateolata* (*crataegata*) and the position of its head in the ovum, Dr. Osborne writes (*E. M. M.*, vol. xx., p. 147):—"The earliest eggs were laid on or about the 15th of June. On the 28th I noticed the first appearance of the eye-spots, and the first hatching took place on 2nd July. My note on 30th June runs as follows:—'The eye-spots from their earliest appearance occupy the same position relatively to the sharp end of the polar oval as they do in these advanced embryos (and which is their position up till hatching): consequently the aspect and orientation of the dorsal and ventral surfaces is constantly the same.' That is, unless the embryo makes, more than four days before hatching, that revolution in the shell asserted by Kowalevski for the lepidopterous embryo in general, and which would necessarily bring its head from one side of the shell to the other. The presumption then would be that the embryo of *R. crataegata* gets into the loop form by such a ventral incurvature and forward growth of the tail-end, as we have seen already in *Zaraea*, and as is described by Huxley in *Astacus*."

To this (in *Science Gossip*, vol. xxi.) Dr. Osborne adds:—"Perhaps the subject may be made clearer by a brief consideration of the different kinds of motion which may be observed in eggs. These may be classed under four heads; 1st, Movements due to gravitation. The ventral or developing side of the yelk in the egg of *Gastrophysa raphina*, *e.g.* turns always towards the upper surface, though this change takes place so slowly that it may occupy several days in completion. 2nd, Movements of growth: strikingly illustrated in the egg of *Calopteryx*, in which the embryo becomes inverted in the shell (Balfour, *Comp. Embryol.*, i., 334). 3rd, Embryonic movements; by which limbs or parts show movements without any change in the whole; and lastly, 4th, Larval movements; when the perfectly formed embryo changes its position in the shell or acts in any other way as if it were independent of it. The loop form of the lepidopterous embryo Kowalevski supposed to be due to the latter class of movements, whilst in reality it is only a movement of growth. When in its final stages, as stated by Kowalevski and as observed in these eggs by Mr. Jeffrey, the embryo of *Botys* devours the remainder of the yolk and cuts its way out of the shell, these actions may be fairly described as larval movements."

As there was here a decided discrepancy between Dr. Osborne's and Kowalevski's observations, and as my own views agreed with those of Dr. Osborne, *viz.* that the change in position was due to the growth of the embryo pushing up the anal segment between the venter (placed outside) and the shell wall, the body being gradually pushed back into the

egg as the anal segment was driven forward by the growing segments towards the head, which remained comparatively fixed in position, I asked Dr. Chapman, whose experience is so wide, to look through my own notes and these, and to be kind enough to formulate his own observations for me to use. This he has very courteously done, and now writes:—

"Mr. Tutt asks me to describe the phenomena associated with the change of position that occurs in the young lepidopterous larva within the shell before hatching. I must, in the first place, disclaim all idea of being an authority on the subject, and can merely endeavour to make clear what others have described, so far as my own observations have enabled me to understand the subject. I have followed the development of the young larva in sundry Pyralides, of which *Botys hyalinalis* is quite as good as any; *B. verticalis* has larger eggs; *Scopula prunalis* is fairly satisfactory for the purpose; the transparent-egged *Acronyctas*, especially *A. strigosa*, afford good subjects for observation, but the ribbing of the shell somewhat obscures details; *Limacodes testudo* also gives a very satisfactory egg for the purpose.

"In all cases the larva first appears on the surface of the yelk-mass as a flat plate, of which the central line is the middle of the ventral surface, and the margins are the two sides of the dorsum still far apart. These margins however rapidly curl in and, at the head and tail, the young embryo soon has the cylindrical form we associate with a larva, but centrally there remains a wide opening through which the mass of the yelk is continuous with that portion of it contained in a central cavity of the larva; this central cavity is the future alimentary canal, not yet provided, however, with any opening towards either the head or the tail. The communication between the intestinal cavity and the yelk-sac gradually becomes smaller, and portions of yelk leave the sac and pass into the intestine, and contribute to the growth of the embryo. During this period, it is easy in flat eggs like those of the Pyralides, Tortrices, *Limacodes*, &c., to see the embryo curled round a greater or less portion of the yelk-sac, with its ventral surface towards the margin of the egg, and its dorsal surface (aspect rather than surface, as the surface is still broken by the umbilical opening) applied to the yelk-sac. There is a little variation in the degree to which the yelk disappears before the umbilical opening closes, but when this takes place the larva forms a horse-shoe or circle, with the venter towards the shell-wall and its anterior and posterior extremities in contact. At this period, also, there are a varying number of globules of yelk free in the egg-cavity around the larva; whether these are set free by the movement of the larva that now takes place, or still later by the jaw action of the larva I am not sure, but after the movement has taken place the young larva swallows these; this swallowing of the remaining yelk may indeed be regarded as a first step towards eating its way out of the egg. Before the closing of the umbilical opening, the embryo may be regarded as an appendage to the yelk-sac, attached thereto by its dorsal aspect. As soon as the opening closes, however, the young larva is truly a young larva, possessing no organic connection with the other egg structures. The first use it makes of this liberty is, to bend the tail forwards, and, as it were, creep up its own ventral surface, assuming in this process an S or pot-hook shape, until at length its position is reversed, the dorsum being now along the circumference of the egg, and the venter

being central. The head and tail sometimes merely meet (in the flattest eggs), sometimes slightly over-lap, whilst, in the dome-shaped eggs, the head so over-laps, as to take very often a central position in the vertex of the egg, forming a dark spot there, as in *Acronycta*, Skippers, and many others.

"The essential importance of this observation is, that it shows that the embryonic position of the nervous system is the same in insects as in vertebrates, and since it must therefore be identical also in the mature animal, it follows that the venter of insects corresponds anatomically with the dorsum of vertebrates, and *vice versa*.

"As regards the actual change of position itself, and the position afterwards taken by the larva, it seems to me that the important point is, that the larva whilst still truly an embryo, that is, whilst still attached to the yelk and egg structures, has the venter outwards, and the dorsum towards the centre of the yelk or egg; but when it becomes free it is no longer an embryo, it moves how it likes, and though the position it takes up seems to be very uniform throughout each species and even throughout whole families, still this has little, if any, embryological significance. I have frequently seen larvæ making this S-movement, and though I have called it "creeping up its own ventral surface," it goes on slowly, without any apparent voluntary or even muscular movements, and appears to be due to the mere force of the growth and development of the larva. Sometimes it seems as if the lengthening of the larva led to the extremity of the tail impinging against the side of the egg-shell and, instead of sliding onwards, being caught and bent up. It is associated no doubt with the completion of the growth of the dorsal surface previously defective by the large umbilical opening, and now more abundant in proportion to the ventral surface. I should class it therefore under Dr. Osborne's second heading rather than under his fourth. It proceeds slowly and steadily, so that usually some progress may be noted in five or ten minutes.

"Very shortly after, what appear to be voluntary movements of swallowing take place, the remainder of the yelk disappears, and the remaining fluid is either absorbed by the larva through the skin, or evaporates through the shell; the tracheæ become visible by getting filled with air, and the larva begins the process of eating through the shell."

Of the forward movement of the anal segment after its curvature, and at the time when it is pushing back as it were the ventral surface of the larva from its previous contact with the eggshell, Mr. Jeffrey (*E.M.M.*, xxiii., p. 173)* writes of *Botys hyalinalis* that on the seventh day at 5.20 a.m. the terminal segment had become ventrally incurved, gradually increasing in length; that in two hours more the incurvature had perceptibly increased, and that soon after noon the anal segment had reached to the first pair of thoracic legs and he "could plainly see it advancing towards these legs and actually push them forwards in its course," whilst at 6 p.m. the anal segment had reached quite to a level with the eye-spots—pressing all the thoracic legs down in its course.

* This reference is to one of the most complete accounts of the embryonic development of a lepidopterous insect published in the British magazines. It is impossible to quote it at length, and as it is easily available to all our readers there is no real need. Dr. Osborne's article in *Science Gossip* for 1885 is also well worth reading.

13.—On the first appearance of the tracheæ.—Mr. Jeffrey *E.M.M.*, vol. xxiii.) thus writes on the first appearance of the tracheæ in the embryo of *Botys hyalinalis*:—"On the tenth day, at 4.30–4.35 p.m., the first tracheæ came suddenly into view. As the tracheæ were almost invisible in some of the other larvæ, I watched one closely with the view of noting the cause of their appearing so suddenly, and saw them injected as I suppose with air for the first time. At 5.15 p.m. the filling of the tracheæ commenced in the posterior segments, a sort of cloud gathering at the band where it is close to the head and in a line with the eye; I saw an apparently dark flood start from this spot, and creeping along with a sort of spasmodic effort, filling the branches in its course till it reached the head and the whole tracheæ became conspicuously visible on that side of the body."

14.—On the earliest traces of pulsation in the embryo.—Of the earliest traces of pulsation in the embryo of *B. hyalinalis* Mr. Jeffrey (*E.M.M.*, vol. xxii., pp. 126-7) writes:—"From the 5th to the 17th of last August (1885) I was engaged in watching the development of the embryo in some eggs of *Botys hyalinalis*, which I had been so fortunate as to secure, laid upon slips of glass, thus affording a good opportunity for observing them under the microscope. The early stages, interesting as they were, may be passed over here, but by the 15th being the tenth day after incubation, the young larva was well formed, and most of the organs could be made out. That morning the dorsal vessel became visible, and at 8 a.m. I noticed the first traces of circulation in it. The pulsations at first were very faint and feeble, taking place somewhat irregularly at long intervals of twenty and even thirty seconds; at 2 p.m., they had become more distinct, with shorter intervals between each beat, and became still more accelerated by the evening. At this time the beautiful ramifications of the tracheæ came rather suddenly into view. The oral organs were well-developed, and conspicuous from their brown colour. The œsophagus also could be distinctly traced, especially when, by a sucking action, a bolus of yelk-granules was drawn down, and seen to pass into the alimentary canal, which effort was continued at intervals on the 16th, till all the remaining yelk-granules had been ingested. Then a period of rest took place during part of the 17th, when a beautifully clear view of the heart and its action was obtained, the pulsations being timed at 40 per minute, increasing to 60 at 8 p.m., the larva escaping from the egg at 8.10. Thus, it will be seen some sixty hours had elapsed from the time I was first able to detect a circulatory movement in the dorsal vessel."

15.—Hints from the embryo as to the number of abdominal segments in the lepidopterous larva.—Considerable difference of opinion exists between the older entomological authorities and those of to-day as to the number of abdominal segments in the lepidoptera. Packard was the first to draw attention to the fact that there were ten somites in the larval abdomen, the old authors only giving nine. Jackson (*Trans. Linn. Soc. Lond.*, 1889, p. 151) refers to the fact that Kowalevski found ten somites in the embryo of *Smerinthus populi*, all ten somites bearing feet (*Mém. Acad. Imp. St. Péters.*, xvi., 1871, p. 53; Taf. xii., figs. 8–10), whilst in an abstract of Tichomiroff's paper "On the development of *Bombyx mori*," it is stated that he found eleven abdominal somites in the embryo, all provided with feet except the first (*Naples Jahresberichtes*, 1882, p. 142); Graber records that the

abdominal segments of the embryo of *Gasteropacha quercifolia* were at first devoid of appendages, and that when they did appear they developed only on those segments on which they persist in the adult (*Morp. Jahrbuch*, xiii., 1888, pp. 609–610). This last author also finds the abdomen of the embryo insect to consist of eleven true segments, and he believes that he has found distinct traces of coelomic cavities in the eleventh segment.

16.—On the origin of the blood-tissue (Blutgewebe).—The important part played by the blood-tissue in larval nutrition, together with the supposition, for many years entertained by certain eminent scientists, that circulation of the blood did not take place in insects, has led to considerable attention being devoted to the subject. The origin of this "blood-tissue" was worked out at considerable length in 1891 by Graber ("Ueber die embryonale Anlage des Blut- und Fettgewebes der Insekten." *Biol. Centralbl.*, Bd. ii., Nos. 7-8., pp. 212-224) and by Wielowiejski. The latter, who approaches the matter from an anatomical point of view, at the same time expresses some general opinions as to the origin of the structures included under this term. He is very careful not to postulate a common origin for all the component structures of his "Blutgewebe," but includes them under this common term; whilst Graber does not hesitate to conclude that the different tissues comprising Wielowiejski's "Blutgewebe" are genetically related, and from the study of insect embryos, Graber arrives at the following conclusions:—1. That oenocytes (certain cell-masses) are derived from the ectoderm. 2. That they are metamorphosed into the fat body. 3. That the blood corpuscles arise from the fat body (and also directly from the oenocytes?). According to Graber therefore all these—oenocytes, fat body, blood-corpuscles, are ectodermic structures, a very bold conclusion when, as Wheeler says, "we are accustomed to derive the corpuscles and the connective tissue from the middle germ-layer." Tichomiroff, a Russian embryologist, described in 1882 ("The embryonic development of the Silk-worm (*B. mori*)." *Publ. Labor. Zool. Mus. Moscou*, vol. i.) segmental masses of cells originating from the ectoderm near the stigmata; whilst Korotneff, another Russian embryologist, in 1885 ("Die Embryologie der Gryllotalpa," *Zeitsch. f. Wiss. Zool.*, Bd. xli.) also described these cells. Wheeler, in discussing these articles (*Psyche*, vol. vi., p. 255 et seq.) considers Graber to be correct in referring the cells described in them to the oenocytes of Wielowiejski, but ascribes the development of the "fat-body" to an entirely different source from that indicated by Graber. The fat-body, according to Wheeler, is a "thickened part of the inner coelomic wall, due to an accumulation of fat-vacuoles in the cytoplasm of the mesoderm-cells." According to Graber it is (as we have said) an accumulation of the embryonic oenocyte cells or those cells which become oenocytes in the larva. Wheeler gives reasons for supposing that there is no connection between these oenocytes and the blood corpuscles, except in so far as they are both "blood-tissue," and concludes that the fat-body (as we have seen above) is not derived from the oenocytes, but is of mesodermal not ectodermal origin, as indeed has generally been supposed, and that there is no evidence for the origin of the blood from the oenocytes. His final conclusions on the origin of the blood-tissue are fully summarised in *Psyche*, vol. vi., p. 257.

Wheeler calls attention to the fact that, whereas most insect embryos develop and possess these large oenocytic cells, only "the winged

Orders of Hexapoda" appear to possess oenocytes in their larval and adult forms. He then goes on to say that the oenocytes are of very general perhaps universal occurrence among the *Pterygota*, Lepidoptera being one of the Orders in which they are found. Of their occurrence in this Order he writes:—"Few insects appear to be better adapted for tracing out the origin of the oenocytes than the Lepidoptera. This is especially true of the larger Bombycid moths. That the segmental cell clusters arise by delamination from the ectoderm was conclusively made out in the embryos of *Platysamia cecropia* and *Telea polyphemus*. Each cluster is several cell-layers in thickness and lies just behind and a little ventral to an abdominal stigma. The succulent cells constituting the cluster are at first polygonal from mutual pressure, but as the time for hatching approaches they become rounder and more loosely united. I have not traced them through the larval stages and merely record these fragmentary observations because they completely confirm Tichomiroff's and Graber's observation on the origin of the oenocytes from the ectoderm."

17.—On the origin of the reproductive cells.—The earliest development of the ovum and spermatozoon in the embryo of insects is very obscure, but it would appear that the primitive ovaries are composed of a mass of cells, produced by an infolding of the ectoderm; but whilst some writers assert that they arise from the oetoderm, others consider them to be derived from the mesoderm, whilst still others trace their origin back to certain so-called pole cells, which originate even before the blastoderm is formed. However this may be, it would appear that they are in that early stage quite indistinguishable from the other blastoderm cells.

Therefore it would appear that whilst the great mass of cells become differentiated into various structures which subserve a special purpose, or perform their several functions, certain cells in the ovary retain their primitive condition, and with it the power, under suitable conditions, of forming another individual of the same species. On this subject Mr. Woodworth writes (*loc. cit.*):—"About the time of the completion of the blastoderm, the already differentiated ventral plate infolds at a point on the median line about two-thirds from the upper end, and forms a very narrow pocket. The cells composing it look like the rest of the cells of the ventral plate at this time; they are almost round, and have a lining on one side made of the grey matter which originally bordered the whole egg, but which became a part of the blastoderm-cells. The pocket remains open but a short time, but there is a long depression at the upper end of the bunch of cells; the mass of cells is soon cut off from the ventral plate and they are then free in the body cavity, but remain in contact with the ventral plate at the point where they were produced. Later stages show that these cells produce the generative organs; the generative organs thus appear to be produced by an infolding of the ectoderm, or possibly of the blastoderm, before the ectoderm is produced, but from a portion which is later to become ectoderm. The general idea has been that the generative organs in insects are produced from the mesoderm, although Metschnikow, as early as 1866, showed for certain insects a different origin."

18.—On the homologies of certain organs and appendages.—There is a remarkable paper by Mons. N. Cholodkovsky "On the Embryonal Development of *Phyllodromia germanica*," published in the *Mém. de l'Acad. de St. Pétersbourg*, 7th series, v., p. 38 (1891), and

translated in *The Annals and Magazine of Natural History* for Dec. 1892. It is much too extensive to notice in full, but the following conclusions are particularly interesting. The author considers that:—"1. The head of insects contains more than four protozonites, probably six, of which one is pre-oral, but the rest are post-oral. 2. The antennæ of insects belong to the first post-oral segment, and are entirely homologous with the remaining ventral extremities. They do not correspond to the antennæ of *Peripatus*, but probably to the chelicerae of spiders, and perhaps to the second pair of antennæ of Crustacea. 3. Since the possibility that a number of segments in the germinal streak of different Arthropods have disappeared is not excluded, a homology of the mouth-parts of the different classes of Arthropoda cannot at present be set up. 4. The abdominal appendages of the Insectan germinal streak (including the cerci) are homologous with the thoracic legs. Herein it makes no difference whether these appendages are attached to the middle, at the side, at the front or hind margin (are meso-, pleuro-, pro-, or opisthostatic in the terminology of Graber), provided only that their cavity is immediately continuous with that of the somite to which they belong. The fact that the abdominal appendages usually remain unsegmented in nowise tends to show that they are not of the nature of limbs, since, for instance, the mandibles also are unsegmented. 5. Many of the abdominal appendages of larvæ and perfect insects are homologous with the thoracic legs, even when they are secondary in ontogeny. 6. The primitive function of the first pair of the abdominal appendages was ambulatory, as also that of the remaining appendages. The ancestors of the insects were therefore undoubtedly homopod, not heteropod. 7. The many-legged insect larvæ are to be derived from the six-legged just as little as are, conversely, the hexapod larvæ from the polypod; both forms developed independently of one another. 8. The embryonic envelopes of the insects probably correspond to the remains of a trochospere."

It may be added that in Graber's "Vergleichende studien am keimstreif der insekten," the antennæ are shown to be decidedly post-oral in their origin," and it is highly probable that they "correspond to the second pair of antennæ in Crustacea," a conclusion practically reached by Cholodkovsky in No. 2 above.

CURRENT NOTES.

Mr. Harrison G. Dyar offers some very useful criticisms on Hampson's *Moths of India* in the current number of the *Entomological News*, which should not be lost sight of by British lepidopterists. Some of the suggestions relate to the genera of many of our common British moths. There is a very suggestive note comparing some of Hampson's generic nomenclature with Kirby's; it appears to us remarkable that, in the search for truth, men working in the same room and with the chance of continually exchanging opinions and discussing points of difference, cannot agree as to the correct names to use.

Mr. W. Denison Roebuck, F.L.S., the editor of *The Naturalist*, has given us already a Bibliography of the records of Lepidoptera published with regard to the north of England for the years 1884—1890. The

current number of *The Naturalist* contains the first instalment for the year 1891. We notice that under Dr. Buckell's name (p. 309) the compiler has confounded Leigh in Essex with Leigh in Yorkshire. Some marvellous records, too, have appeared on Mr. Arkle's authority. —*Asteroscopus sphinx* for example, captured between Jan. 23rd and Feb. 10th. We would suggest that Mr. Arkle was rather mixed either as to nomenclature or dates when he recorded this.

"If you want work done give it to a busy man," is an old proverb, well illustrated by our indefatigable friend, Mr. W. F. Kirby. Not content with being *the* authority on entomological nomenclature, we observe that he has written an excellent literary and scholarly treatise, entitled, "The Hero of Esthonia and other Studies in the Romantic Literature of that country" (J. C. Nimmo, 14, King William St., Strand.).

Professor Carlier records the capture of a specimen of *Catocala fraxini*, at rest on the stump of a small alder tree on the banks of the river Wensum, some two miles above the city of Norwich, on the morning of September 18th.

The larvæ of *Neuronia popularis* have occurred in great abundance in the north of France this year, and have caused great consternation among agriculturists.

Dr. Mason records the addition of the Psyllid, *Trioza centranthi*, Vallot (= *neilreichi*, Frfld.), to the English fauna. The insects were bred from a corn stalk gathered near Bretby in Derbyshire; the plant was deformed, the flowers being crowded together and the bracts broadened. The larvæ were found within the upper reflexed portions of the bracts.

Mr. Meyrick has discovered another entomological pickle. He affirms that *Heydenia* is preoccupied in Hymenoptera; *Microdonta* in Coleoptera, and suggests the substitution of *Hierophanta* (type *bicoloria*, Schiff.); *Cleodora* pre-occupied in Mollusca, and substitutes *Paltodora* (type *cytisella*, Curtis); *Pœcilia* in Pisces, and substitutes *Stenolechia* (type *nivea*, Haw.); *Chauliodus* is three times pre-occupied—in Pisces, Neuroptera, and Aves, and substitutes *Epermenia*, Hb. He further points out that some of the species referred to the genus *Cataplectica*, Wlsm., by Lord Walsingham, have veins 6 and 7 clearly separate, instancing *profugella*, *auromaculata* and *fulviguttella*, but thinks that the character may be variable.

Dr. Sharp and Mr. Champion regret that some of our more interesting British beetles are disappearing from the New Forest. The supposition appears to be based on the fact that they did not find them in a month's visit there this year. If this be the only reason, the lepidopterists might also raise a wail over losing almost the entire fauna in that locality. But we do not lose our fauna even piecemeal without some explanation.

"Hope deferred," etc. We have long looked for Mr. Briggs' Monograph of the *Psychidae*, and now we find Mr. C. G. Barrett actually publishing one on these interesting insects in the *Ent. Mo. Mag.*

Reminiscences of Wm. Machin.—It is with mingled feelings of pleasure and sorrow that I string together a few reminiscences of our recently departed friend William Machin, whom I have known more or less intimately for nearly fifty years. He was reminding me, only a few weeks ago, of our first meeting in Darenth (or Darn) Wood, which took place somewhere about the year 1846. As usual, each one

showed his captures; I had taken several *Acidalia rusticata*, an insect at that time comparatively rare and which he had never taken. I told him the locality and from that time he was always able to get it. Many a time have we dined together on Sunday at the old Fox and Hounds Inn at Darenth, where, during the season, there was sure to be a good sprinkling of the old-time entomologists, and where an excellent dinner was served at the very moderate charge of three shillings, and a bed with the whitest of sheets could be obtained for sixpence. Among the brethren of the net whom we used to meet there were the two Standishes, kind, genial and generous; cautious Henry Harding with the big appetite; Peter Bouchard, lively and impetuous; the elder Norman, quizzical and cynical; Randolph Oxley, full of fun and practical jokes; Holmes, refined and courteous; and many others, whose names I have forgotten, now, alas! all gone. Some few still remain, among them S. Stevens and Oldham.

Never shall I forget those jolly dinners, seasoned with smart sayings, jokes, repeated and playful badinage. Our old friend Machin, though not a *bon vivant*, used to enjoy them, though, like many Englishmen, he took his pleasures seriously. After those old times when we used to meet frequently there was a long interval during which we only saw each other occasionally, but whenever we met there was always something to be learned from him, and what I have always admired in his character was the readiness with which he gave any information that was asked of him. Of late years we have again been much more intimate, and I have abundant reason to remember him gratefully for his kindness in assisting me in arranging and naming my Macro-lepidoptera. His memory was surprising and his knowledge of larvæ and their habits something marvellous.—J. S. Sequeira, M.R.C.S., Crescent House, Cassland Road, South Hackney, N.E. *Sept. 4th*, 1894.

SCIENTIFIC NOTES & OBSERVATIONS.

Notes on the capture and habits of Cataplectica farreni, a Lepidopteron new to Science.—Sweeping on the side of a road, about a mile and a half south of Cambridge on June 26th, 1893, I took the first specimen of Tineina, which turned out to be new to Science, and which has been described and named as above by Lord Walsingham in the *E.M.M.* for September of this year.

When I netted the first one, I had just taken a specimen of *Gelechia nœviferella*, which species I imagined it to be until I had had a closer look at it through the glass bottom of the box, I then saw it was something I had not taken before; and failing to determine it by the usual methods, *viz*: "Stainton" and comparing types in the cabinet, I put it aside for a less busy time.—On the 1st of July following I swept three more in a locality about a mile from the first, and on July 9th two more about another mile still farther removed. Its shape while at rest in the net, caused me to look particularly for it among the odd genera coming near *Æchmia dentella*; this was not taking me far from the proper place in the list, as it appears *Cataplectica* is not far removed from *Æchmia*. Working for the species this year, I took the first on July 3rd, and it was in fairly good condition on the 12th and even later.

I took them entirely by sweeping and did not find one part of the day particularly better than another, the end of the afternoon being perhaps slightly the best. It is a very sluggish insect at any time and although I took a goodly series, I only saw a single specimen before it was in the net, and then only by carefully searching among the herbage on hands and knees; to its retired habits I should attribute its having been overlooked prior to last year, not by any means, as suggested by Lord Walsingham in the *E.M.M.*, to its resemblance to some of the obscure species of *Elachista*. It never struck me at all as being like any *Elachista*, and I don't think it could have been overlooked for such—in fact I think any micro-lepidopterist boxing it would not *pass it over or overlook it* at all.

The herbage, among which I swept it, was fairly mixed, but I formed an opinion at first that it was most profitable to confine my attention chiefly to *Centaurea nigra*; Lord Walsingham, however, wrote me that all the known larvæ of the genus and its near allies, fed exclusively on the seeds of various *Umbelliferæ*, and acting on his suggestion I was taking them more freely by paying particular attention to a spot where there was a lot of *Pastinica sativa*. During the month of August I kept a close look out for spun-up seeds on these plants of *Pastinica*, and in the last week detected small holes in many of the seeds, I found two seeds spun together and a small lepidopterous larva inside. I then gathered all the seeds with holes in I could find, and after a day or so saw larvæ crawling about in the bag; if not *C. farreni* they are something very nearly allied, but as I found them feeding on the only plants from which I swept the imagines, I feel fairly sanguine that I have only to wait till next July to breed *Cataplectica farreni*. Lord Walsingham has made a note of the description, and had figures made of the larva to publish as soon as it is proved that they are correct. The larvæ appear to enter the seeds at the base, and eating the contents pass out at the side, slightly spinning the eaten seed to another which it continues to feed on, and so on. There appears however to be very little sign of spinning, it being always very slight. I trust any of my old micro correspondents who do not hear from me, and who would like types, will write.—W. Farren, Union Road, Cambridge. *Oct. 2nd*, 1894.

On eggs as helping to determine natural affinities (*vide, ante* pp. 195–198).—Mr. Bedford has sent me a further communication bearing on this subject, the greater part of which, however, has no reference whatever to Insecta. As I do not think that a long (and probably fruitless) discussion on the general subject would be of the slightest interest to most of the readers of this Magazine, nor that it would properly find a place in a purely entomological magazine, I therefore only print such parts of the letter as refer to insects. Mr. Bedford writes:—

(1). "Mr. Tutt seems still to hold the opinion that there can be no doubt of the general truth that Lepidoptera with similar ova are more closely allied than those with dissimilar ones. In another place (*Ent. Rec.*, vol. v., p. 194) he says that "developmental changes have a real phylogenetic significance."

(2). "Mr. Tutt in his remarks on my letter says, 'as a matter of fact entomological writings, as a rule, are wonderfully lacking in even the simplest rudiments of such scientific assumptions' (*viz.*, such as those implied in 'Haeckel's famous phrase'). Would that they were!

But how does this statement tally with the following:—'The eggs of lepidoptera are now much more generally taken into account in attempting to determine the natural position of species' (*Ent. Rec.*, vol. v., p. 143)? If this is true (and I have no reason to doubt it), I cannot imagine a better instance of that 'tenacious clinging' to which I alluded in my letter."

(3). "Why am I expected to give the name of any entomologist who has based a *system* (italics mine) of classification on the number of ribs in ova"?

(4). "Why is it incumbent on me to give 'experimental evidence' which separates the Geometers? I am not aware that anything is known of the internal organisation of more than the commonest of the group, and until section-cutting and staining are preferred to the drying up or blowing out to which the best imagines are too often subject, any classification adopted merely blinds our eyes to our own ignorance of the most important features we classify."—F. P. Bedford, 326, Camden Road, N. *August 18th*, 1894.

With regard to the four points enumerated above, I would answer:—(1). Certainly I still hold the opinion. It is impossible for a man to inspect the eggs of the species in any well-defined genus of butterflies or moths and come to any other conclusion. A microscope increases the conviction that the conclusion is a right one.

(2). Mr. Bedford's quotation of a statement of mine in no way helps him. My statement is an assertion that when difficulties of classification arise entomologists do consider now, more frequently than used to be the case (when they do not appear to have considered anything except the general appearance and markings of the imago) the earlier stages of the insect. Dr. Chapman's "Acronycta and its allies" is a case in point. But that is a *new* departure (not a "tenacious clinging") and a very good one. Mr. Bedford says, "entomology is the only branch of zoology which has clung tenaciously to the doctrine well expressed by Haeckel's terse phrase, 'ontogeny recapitulates phylogeny'" (*ante*, p. 195), I asked for references to "articles in which this 'tenacious clinging' was expressly shown." Mr. Bedford gives me none, because (and I am sure all entomologists who are *au fait* with their subject will agree with me) there are none.

(3). Because when a man suggests the inference (and a very strong one) that entomologists do go in for the "absurdity of basing a classification on such points of similarity in ova, as number of ribs or external outline," he should be ready to prove up to the hilt that entomologists are as absurd as he infers them to be.

(4). Because when a man states that entomologists are crassly stupid, for that is what it amounts to when he says that, "if a new caterpillar were discovered to-morrow with four claspers, whatever its internal structure, or whatever peculiar characteristics the imago might possess, it would almost certainly be placed among the Geometers, and from this it follows that a heterogeneous mixture becomes packed together into one group," he should be ready with the proof that they are such. Mr. Bedford now not only appears to have no knowledge of the "heterogeneous mixture that he says the Geometers form, nor to be able to give any experimental evidence even that they are a "heterogeneous mixture" at all, but he owns that he is "not aware that anything is known of" that "internal organisation" on which he led us to assume he came to the conclusion that the Geometers were a "hetero-

geneous mixture." I do not understand what is meant by the "drying up or blowing out to which the best imagines are too often subject;" we dry imagines and some collectors blow out larvae, and I am inclined to consider that blown larvae are of very little value, except for collectors to name their captures by. I should be delighted if more entomologists did their work with microscope and pencil, but these are not altogether unknown even in the entomological world.—J. W. Tutt, *Oct.* 10*th*, 1894.—[We must ask any contributors who join in this discussion, if there be any further discussion, to limit their facts and arguments to insects, and not to travel over the whole field of zoology. —Ed.]

NOTES ON COLLECTING, Etc.

Collecting at Cromer.—I spent twelve days at the end of July with my friend, Mr. R. W. Robbins of Clapton, at Sidestrand, three miles east of Cromer, on the top of the cliff. We were within a mile of the famous "Garden of Sleep," and there was no mistake about the "poppyland;" there were fields full of poppies everywhere; we found all the four British species with *red* flowers. We had fairly good weather, but it was decidedly mixed—generally damp and muggy, with white mists; at no time during our stay was it cold enough for an overcoat. We could have done with more sunshine, and were not surprised to find butterflies practically absent, the ubiquitous *Epinephele ianira* being the only species at all common. Among the moths, Geometrae were very scarce. The only ones of any note were *Eupithecia subfulvata* (1 sp.) and *Melanippe unangulata* (common; rather worn), both of which we took on bramble-flowers. We tried treacling heads of ragwort, dock, hogweed, &c. on the cliffs on *one* night. Noctuae were numerous, but not select; *Agrotis exclamationis* principally, with *A. segetum*, *Axylia putris*, *Xylophasia monoglypha*, *Triphaena pronuba*, *Caradrina alsines*, *Miana strigilis*, *Leucania pallens*, *L. lithargyria*, *L. conigera*, *Noctua c-nigrum* and *N. plecta*. But undoubtedly the best insect we took was *Noctua ditrapezium*; seven very decent specimens on treacle on ragwort heads. We were surprised to see that the *strigilis* were mostly dark, many being almost as black as var. *aethiops*. Bramble flowers produced, besides many of the above, *Cerigo matura* (1), *Noctua umbrosa* (1), *Triphaena comes* (5 or 6, varying from pale pinkish buff to dark grey-brown), *Charaeas graminis* (1). We also took several fine specimens of *Agrotis nigricans* on treacle, all dark. We found the flowers of bladder campion very attractive to Noctuae, especially *Leucania pallens*, which was a nuisance everywhere, though there were some nice reddish forms to be had. Daywork resolved itself into searching for *Bryophila perla* on the flint and cement walls which are a feature of this part of the country. In the majority of cases the flints were of the "cobble" type, and were stuck endways into the cement, thus leaving projecting round knobs under which *perla* was fond of sitting; on one occasion I found a fine specimen of *Macroglossa stellatarum* at rest (in the daytime) on the *top* of one of the round knobs. The age of the wall and the quantity of the lichen thereon were no criteria as to the presence or absence of *perla*; many most eligible walls (in appearance) were destitute of occupants, while the most productive of all was comparatively new, and not at all thickly "lichened." On this wall, which was near Trimingham, we found a fine sandy

form (var. *flavescens*, Tutt); it was common on this, the only wall where we found it. On this wall we also took the type and some dark forms, evidently near var. *suffusa*, Tutt. There was, too, a very pretty form, apparently a combination of var. *suffusa* and var. *flavescens*. In several of the var. *flavescens* the stigmata seem to be pale blue, probably from contrast. As far as we could see, there was no reason why var. *flavescens* should have been (seemingly) confined to this wall; there were yellow lichens on it, certainly, but not to a greater extent than on other walls in the neighbourhood. Query: Does *perla* feed on one species of lichen only, or on *any* species? By means of a newly-emerged ♀ *Bombyx quercus* (found on a gate post), we obtained eight males in good condition by "assembling," and we were able to divide about 100 ova between us; the young larvæ are being fed on willow and plum, and are now in their fourth skin and an inch and one-eighth in length. The garden of the farmhouse where we stayed was very productive as regards *Abraxas grossulariata*, and the specimens were very fine. I took one of a pale cream colour with the usual markings; the expanded wings measure just two inches across. Larva-beating was not a success, because there seemed to be no larvæ, and very few suitable places to beat for them if there had been; the east side of Cromer being very sparsely wooded, and the trees mostly sycamores; what oaks we did see had an unpleasantly fresh and "uneaten" appearance. Speaking generally, however, I should think the locality (especially west of Cromer) would be a good collecting ground in a favourable year, as soon as one got used to the country.—C. Nicholson, 202, Evering Road, N.E. 1*st October*, 1894.

Eggs of Bombyx rubi "ichneumoned."—During the annual visit of the North London Natural History Society to the New Forest at Whitsuntide last, Mr. C. B. Smith captured a female of this species and placed it alive in a large glass-bottomed pill-box, in which it laid two patches of eggs. He left the eggs in the box, which he used occasionally with his other boxes in the ordinary way. Some days subsequently he kindly presented me with some of the eggs (about 38), and gave the rest to Mr. L. B. Prout. In due course mine commenced to hatch, and all yielded up their larvæ except about eight. I kept these for some time, wondering why they did not hatch, and was one day surprised to see several very minute ichneumon-flies in the box. I examined the eggs, and found in one or two of them the holes made by the flies in emerging. The whole of the eggs which did not hatch eventually proved to be tenanted by these little ichneumons, of which I bred about 30; that is, an allowance of three or four flies to each egg! The question is, how did they get there? I saw the moth in the box with the eggs, and there was no sign of the fly there then. Mr. Smith assures me that he had not noticed any insect in the box other than lepidopterous from the time the *rubi* was put in until he handed the eggs over to me, and, curiously enough, none of Mr. Prout's eggs were "stung." Although eggs are occasionally "stung," this is the first instance which has come under my notice; and, if any hymenoptera-loving correspondent would like a specimen or two of the ichneumon, I shall be pleased to forward some. They seem closely akin to *Microgaster*.—C. Nicholson, 202, Evering Road, N.E. 1st *October*, 1894.

Colias edusa in Surrey.—Last Saturday, whilst in the train, I saw a fine fresh specimen of *Colias edusa*—female—flying on the railway bank between Weybridge and Byfleet stations. The train was travel-

ling very slowly at the time, and I was able to have a good view of the insect. This is the only one I have seen this year, and in fact since 1892, when they were fairly plentiful in this district as they were in most parts of the country. I am sorry to say I have found this season a most unprofitable one, and I have scarcely added to my collection at all.—S. G. Russell, Priory Villa, Woking. *Oct. 3rd*, 1894.

Callimorpha hera in South Devon.—I had a very enjoyable time in South Devon with Mr. Jäger hunting for *Callimorpha hera* and obtained twenty specimens, but only some half-dozen were fine enough for cabinet purposes. I kept the damaged females for eggs and have some from all three forms, *viz*: those with red, orange, and yellow under-wings. We took the species over miles of ground, and I should say it has been there for many more years than most people imagine and has not been taken because the district has been practically unworked, whilst from the nature of the ground there is no fear of its extermination. *Pyrameis cardui* and *Plusia gamma* were both common and several *Colias edusa* occurred. As elsewhere sugar was of no use whatever and indeed it was quite an event to see a Noctua at all.—G. T. Porritt, Huddersfield. *Sept. 4th*, 1894.

SOCIETIES.

The September meetings of the South London Entomological and Natural History Society were marked by many interesting exhibits, among which were the following.—*Sept. 13th*:—Mr. Step: several specimens of *Polyporus perennus* from Oxshott. Mr. R. Adkin: a branch of the rare Star-thistle (*Centaurea calcitrapa*, L.) from Eastbourne. Mr. Manger: a specimen of the rare Stalk-eyed crustacean (*Gonoplex angulata*) which had been dredged off Weymouth. Mr. West of Greenwich: a specimen of the rare beetle, *Lebia cyanocephala*, from Bookham, and specimens of the two races of *L. chlorocephala* for comparison. Mr. A. Hall: a splendid var. of *Pyrameis myrinna* from Bogota, South America, with the type form for comparison. Mr. C. G. Barrett: a specimen of *Plusia moneta*, taken at Norwich by Mr. Tillett; also a beautiful red var. of *Oenocera ahenella*, taken at Folkestone by Mr. Purdey. Mr. Murray (per Mr. R. Adkin): a bleached var. of *Erebia aethiops* from the neighbourhood of Carnforth. Mr. W. F. de V. Kane (per Mr. R. Adkin): a pale grey form of *Agrotis segetum* from the north of Ireland.———*Sept.* 27th.—Mr. Winkley: four clutches of young of the mollusc, *Helix pomatia* which had recently hatched. Mr. R. A. Adkin (per Mr. Adkin): the following molluscs from Eastbourne:—*Helix aspersa*, *H. cricetorum*, an unusually large *H. virgata*, *H. caperata*, the first three species having abnormally high spines. Mr. Perks: a photograph of the Fox shark (*Alopecias vulpes*), recently captured off the coast of Devonshire. Mr. Williams: a specimen of the intestinal worm, *Gordius aquaticus*, which had emerged from the body of a water spider. Mr. Auld: a larva of *Phorodesma smaragdaria* which had been feeding for fourteen months. Mr. Jäger: a series of *Callimorpha hera* taken by him in S. Devon this year; the red, yellow, and terra-cotta forms were all represented. Mr. Winkley: two specimens of a second brood of *Smerinthus populi*, bred this year. Mr. Filer: a bred series of

Papilio machaon, from Cambridge, among which was a specimen in which the marginal band of the hing wings was so extended as to unite with the discoidal spot. Mr. H. Moore: a specimen of *Vanessa urticae* from Vienne, in which the two spots were only represented by a few dark scales. Mr. A. Hall: about twenty species of Rhopalocera from Japan, identical or almost so with British species, and including *P. machaon, Leucophasia sinapis, Gonepteryx rhamni*, &c. Mr. Adkin: *Zygaena exulans* from Braemar; *Sesia scoliiformis* from Rannoch. Mr. Tugwell (per Mr. West) also exhibited *Zygaena exulans* taken this year at Braemar, with cocoons *in situ* on crowberry.

At the meeting of the Birmingham Entomological Society on August 20th, Mr. C. J. Wainwright showed *Stratiomys potamida* taken in Sutton Park; it is the first *Stratiomys* which has been taken in the Birmingham district. Mr. R. C. Bradley read some notes upon *Merodon equestris* which he had been breeding from larvæ sent to him by Mr. McLachlan; he said that they took a very long time to dry their wings—24 hours after emergence some of them were still quite limp—this he attributed to want of sun; the species was getting not at all uncommon round Birmingham, and he had taken a number at Sutton, though probably a few years ago it did not occur here. Mr. A. H. Martineau had been making a series of experiments upon different killing substances in order to ascertain their effect on the colours of insects; the fumes of sulphur seemed to preserve and even heighten the colours of Diptera and Hymenoptera; yellows and reds, if affected at all, seemed to become more brilliant and never turned black, as was the case when cyanide of potassium or ammonia was used.

City of London Entomological and Natural History Society.—*Sept. 4th*, 1894.—Exhibits:—Dr. Buckell: *Epinephele tithonus* (♂ s) from Leigh, Essex, showing extra ocelli. Mr. C. G. Barrett (*Lepidoptera of the British Islands*) remarks, that this species is liable to develop extra ocelli in maritime localities. Mr. Nicholson: *Eugonia quercinaria*, bred from ova laid by a female, which was bred from a larva beaten in the New Forest in 1893; many of the specimens were strongly suffused with brown at the base and hind margins of the fore wings, although neither parent was specially conspicuous in that respect. Mr. Clark: *Dicranura bifida* from Monmouthshire ova; he stated that he found it impossible to obtain eggs from this species in captivity. Mr. Mera: a very beautiful and variable, though short, series of *Agrotis tritici* from the East Coast. Mr. Sauzé: a series of *Formica nigra*, showing males, females and neuters, also a female after the wings had been snapped off. Mr. Bacot: young larvæ of *Dipterygia scabriuscula*; also a short series of *Selenia tetralunaria*, bred from the ova on which he read a note at the meeting on June 5th. Dr. Sequeira: a specimen of *Agrotis pyrophila* among other insects taken at Ilfracombe. Mr. Huckett: *Dianthoecia albimacula* and *Sesia chrysidiformis* from Folkestone. Capt. Thompson: *Eupithecia nanata, Scodiona belgiaria* and *Pleuronota bicostella* from the West Riding of Yorshire, and *Grapholitha nigromaculana* from Rainham. Mr. Tutt then read some interesting notes of a holiday spent with Dr. Chapman in the Alps.*

Sept. 18th, 1894.—Exhibits:—Mr. Oldham: males of *Odonestis potatoria* from Wisbech; one of them was of a buff colour, except the usual oblique dark streak which was somewhat faint. Mr. Riches: *Ocneria dispar*, and some "Ribbon-grass" (*Phalaris arundinacea varie-*

*See *ante* p. 233

gata, also called *Digraphis arundinacea*). Mr. Gates: among other insects, *Gortyna ochracea*, and the stems of burdock from which they had emerged. Mr. Battley: 2 bred males of *Lasiocampa quercifolia* from Wicken; also *Apatura iris* (♀) and *Geometra papilionaria* from the New Forest. Mr. Bayne: *Noctua dahlii* from the New Forest and Aberdeen. Mr. Tutt remarked that this species is sexually dimorphic at Aberdeen, the males being chestnut brown and mottled, the females, dark purplish in tint, and that a similar phase of sexual dimorphism occurred at York and in Essex. In Sligo, on the contrary, both males and females were of the dark purplish tint, and the mottled chestnut males appeared unknown, whilst at Morpeth in Northumberland the females were of the usual purplish coloration, but the males were sometimes chestnut coloured, at other times dark purple like the females. He further remarked that it was a species well worth studying, both from the points of geographical and of sexual variation. The red form exhibited by Mr. Bayne he considered very peculiar and certainly very rare. Mr. Bell: young larvæ of *Cerigo matura*, which Mr. Tutt stated fed throughout the winter on grass. Mr. Nicholson then read a paper on "The Life-history of *Oeneria dispar*."† Mr. Tutt, in rising to propose a vote of thanks, said that he would take the queries suggested by Mr. Nicholson *seriatim*. He considered that the reason why the species was extinct in this country was because it was not a native. Its whole history proved it to be an imported species even when it first became known. Thousands of specimens in all stages had been set loose in various parts of the country, but with the exception of an odd specimen here and there, no specimens were taken wild. Its abundance in the Fens for a year or two simply pointed to the care with which it was put out, and to the temporary existence of favourable conditions. There were thousands of acres of land, to all intents and purposes fitted for its establishment here, but it—possibly the agriculturists would say fortunately—will not establish itself. With regard to the second point, he doubted the statements that the females of this species did not fly in the ordinary way. Many moths were known to pair and lay some eggs in the immediate vicinity of their emergence, before flying away to lay the remainder of their eggs at a distance from their place of birth. This was particularly noticeable among the *Aretiidæ*, and probably some similar habit prevailed here. In looking over the mapsattached to the reports dealing with the spread of this insect in America, one had to bear in mind that it dealt with thousands of square miles, with an area much larger than the British Islands, and presenting great variation in physical features, and it was impossible to suppose that, however energetic the larvæ were, they could surmount rivers or mountains, or even spread over continuous large districts if their own special food plants did not exist. For himself, he felt satisfied that their supposed inability to fly was an error of (or rather want of) observation, and that at present it simply meant that they had not been observed at the right time, probably very late at night. The discussion was continued by Mr. Clark, Mr. Gates and others. Mr. Nicholson in reply said, that it certainly would seem difficult for the species to have spread without flight on the part of the female, until one was acquainted with the crawling powers of the larvæ. As would be seen from the Reports on the table, they travelled considerable distances, clearing the trees and bushes of their leaves, and even devouring low plants when arboreal vegetation failed.

†See *ante* p. 236

Plate G.

C. F. JOHNSON, J. WATSON, C. G. BARRETT, R. NEWSTEAD, REV. A. W. CARTER, J. W. ELLIS, H. CAPPER, L. GREENING
L. C. THOMPSON

R. WELDING, C. S. GREGSON, B. H. CRABTREE, S. J. CAPPER, C. G. BIGNELL, W. JOHNSON.

The Entomologist's Record
AND
JOURNAL OF VARIATION.

No. 11. Vol. V. November 15th, 1894.

OUR PHOTOGRAPH.

The genial and kind-hearted President of the Lancashire and Cheshire Entomological Society appears never so happy as when he has around him the naturalists of his own immediate neighbourhood or when he is entertaining entomologists from other districts who are making a stay for business or pleasure in the vicinity. It has become an annual institution for him to invite a few entomological friends to spend a few days with him, and then to ask the celebrities of the entomological world in and about Liverpool to meet them.

At such a gathering as this "Our photograph" was taken by Miss Annie Capper, and its reproduction will, we hope, give pleasure to many readers at a time when almost every local Society both in England and abroad has, thanks to the kindness of some member or other, an album in which to keep the portraits of those with whom they have become intimate by correspondence. "Our photograph" contains the portraits of the following gentlemen, commencing with the left-hand corner of the back row:—

1.—C. F. Johnson of Stockport, a student of our British Lepidoptera. 2.—J. Watson of Manchester, who has a wonderful collection of the *Pierinae* of the world. 3.—C. G. Barrett, F.E.S., the late President and present Vice-President of the South London Entomological Society, one of the Editors of the *Ent. Monthly Mag.*, and one of our best authorities on British Tortrices. 4.—R. Newstead, F.E.S., the Curator of the Grosvenor Museum, Chester, who is becoming well-known for his excellent work with the Coccids. 5.—Rev. A. W. Carter of Huyton, who claims only a general interest in our pursuit. 6.—J. W. Ellis, M.B, F.E.S., of Liverpool, a diligent student of British Coleoptera. 7.—H. Capper, the eldest son of the President of the Lancashire Society. 8.—Linnæus Greening, F.L.S., one of the Editors of *The British Naturalist*, with a strong liking for Reptiles. 9.—Isaac C. Thompson, F.R.M.S., F.L.S. who goes in more especially for Microscopic studies. In the second row we have:—10.—R. Wilding, another student of British Lepidoptera and Coleoptera. 11.—C. S. Gregson, an entomologist of the old school, a keen and enthusiastic collector in days gone by, a thorough Britisher with a penchant for "Gooseberry moths" and "Tigers"; who once believed that anything would do for

a name, and now sings the virtues of his friends in verse. 12.—B. H. Crabtree of Manchester, another student of British Lepidoptera. 13.—S. J. Capper, F.L.S., F.E.S., the host and worthy President of the Lancashire and Cheshire Entomological Society, who for 17 years has kept together a very powerful and happy band of naturalists, and whose home is the haunt of the entomologists of the neighbourhood, as is his collection the reference library (as it were) for the younger members, and the varieties it contains the cause of breaking the 10th Commandment to most of his visitors. 14.—G. C. Bignell, F.E.S., of Plymouth, well-known for his researches in Ichneumonidæ. 15.—W. Johnson of Aspull, near Wigan, another lepidopterist of the old school, (whose kindness some 15 years ago is not forgotten by the writer). Now we come to the row who occupy the front:—16.—W. E. Sharp of Ledsham, an able and philosophical naturalist, with an interesting style of writing, besides being an excellent student of Coleoptera. 17.—C. H. H. Walker, interested in Insect microscopy, and whose papers on the "Wings of insects" are an educational treat, and show that the observer can explain what he sees. 18.—J. Collins of Warrington, well-known to all our readers as an ardent and successful lepidopterist. 19.—H. H. Corbett, M.R.C.S., of Doncaster, a micro-lepidopterist, a skilful collector and observer, who ought to put a great deal more of his work into permanent form than his modesty will at present permit him. 20.—W. Webster of St. Helen's, another student of British Lepidoptera.

Some faces are missing that ought to be here - notably F. N. Pierce, F.E.S., the Secretary, to whom the Society owes a great deal. The dictum that a society depends almost entirely on its President and Secretary was never better exemplified than in this flourishing provincial society.—Ed.

RANDOM NOTES ON ZYGAENA EXULANS AND ITS VARIATIONS.

By J. W. TUTT, F.E.S.

Zygaena exulans has been probably one of the most interesting of British lepidopterous insects for the past few years, not so much from the fact that there has been any very great interest in its scientific claims to recognition, but because the regulation three inches or half-row in the box or cabinet has been a blank (with a label at the bottom) waiting for its occupants who have been so tardy in arriving. We are always most interested in the insects we have not got; we advertise for them; we speculate on what they will look like when we get them; and then, when we have got them, we forthwith forget all about them, and are on the look out for other desiderata. No tangible result in the way of information is forthcoming from that loving look we gave them, and so, whilst the blank spaces in many cabinets have been slowly filling up, and whilst the excitement of many of our friends has been at boiling point, some of us, devoid of this keen and intense desire merely to possess, have been looking out for some scientific remarks, some observations, some lengthened notice of the habits of the species from those who have captured it, or some notes at any rate on its variation

from those who have filled up that blank which causes a shock to some fellows when they show another fellow their cabinet drawers. This experience has been mine before now, so I only describe what I know to be a fact. Perhaps some of my readers will say "sour grapes;" may-be that is so—although I do not quite believe it. But though *Zygaena exulans* has been so rare a British insect in the past, we have changed all that now. Exhibitions galore of the species—nearly a hundred in one exhibit—show that it has been obtained in great abundance, and that everyone who wants to fill up that wretched "blank" will soon be able to do so, if indeed, the consummation has not already been reached.

But whilst our friends at Braemar were catching and setting their hundreds of *Zygaena exulans* in this year of grace 1894, I myself had the pleasure of seeing this fine interesting moth hurtling along the high rocky slopes with its booming flight, or greedily fighting its friends on the bright-tinted flowers of a clear-air'd Alpine mountain-side. I do not know whether there was anything in my personal appearance, but it must be owned that *Zygaena exulans* would never discover itself to me in the almost incredible numbers, which, on two occasions, were met with by my friend Dr. Chapman.

The specimens obtained or observed, however, were very interesting, and it is of these I would speak; and if my Scotch friends do not like my comparing their wonderful Braemar specimens with the more variable and sometimes much more beautiful specimens which exist on the Dauphiny Alps, or those of Savoy and Piedmont, they must neither put it down to a one-sidedness on my part in drawing conclusions, nor to a superfluity of that natural modesty of which I possess so large a share, but to the fact that I still have a great blank (which still causes a great shock) in my cabinet, waiting for those fine forms which evidently do not occur at Braemar, but are probably waiting to be discovered elsewhere on the heathery braes of the Scotch Highlands.

The first British specimens of *Zygaena exulans* which I possessed, were kindly given to me by my friend Mr. W. H. Tugwell in (I believe) 1886. The insect was at that time a great desideratum, and even specimens not in the finest condition were eagerly welcomed. How much we were indebted for a share in the results of the labour of those gentlemen who first captured this species, and what trouble they had to obtain those early specimens, only those who have collected in outlying Alpine districts know. The specimens which were given to me by Mr. Tugwell were a little rubbed, and corresponded excellently with Dr. White's definition of what a Scotch *Z. exulans* (a somewhat diaphanous form) should be. They evidently belonged to the variety which Dr. White created specially for these rather rubbed specimens, and which he called var. *subochracea*. But since then, Messrs. Reid, Horne and others have put up on the ground for three or four years in succession and for a considerable length of time, whilst Mr. Tugwell has also received considerable consignments, and as a result, a great change has gradually come over our notions of how a really fine Scotch *Z. exulans* ought to look.

My next experience in connection with the species was the receipt of some specimens from the Swiss Alps, sent to me by Dr. Standinger and Professor Blachier of Geneva. These were comparatively finely scaled insects, and, so far as I could judge, were largely females, although without the pale nervures that the females of the Scotch specimens

(even in much poorer condition) exhibited. With this amount of material, in the possession of which I suppose I was better off than ninety-nine per cent. of British entomologists, who, for some unknown reason, will not (whether on account of their moral character, or for fear the specimens might bite them, I have never quite discovered) have a Swiss specimen in their possession, I considered that I had reached the *ultima Thule* of the information, &c. to be obtained from the study of the dried bodies of *Zygaena exulans*. However, to prove that this was so, I tried one resource, Staudinger's *Catalog*. There it said :—

Zygaena exulans, Hochenwarth and Reiner, *Bot. Reisen*, 1792, p. 55, T. vi., 1 *; Esp., 41, 1–2; Hb. 12, 101; B., *Mon. Z.*, 3, 3; *Ic.*, 54, 4–5; Frr., 200, 2; 590, 1; Dup. ii., 5, 5 a.b.	Summæ Alpes: Pyrenees.
a. var. *ranadis*, Dalman, *Zyg. Suec.*, 223, 6. † (parcissime squamata, albo non mixta).	Lap.; Scand. Mont.

* This should be *Zygaena* (*Sphinx*) *exulans*, Hohenwarth. Reiner und Hohenwarth's *Bot. Reisen*, p. 265; Pl. 6; fig. 2 (1792).

† This should be *Zygaena ranadis*, Dalman, *Kongl. Vetensk-Ak. Handl.*, 1816, p. 223.

Was I not happy? "Sparsely scaled and not mixed with white," was the diagnosis of var. *ranadis*; by assumption or inference therefore the type must be well scaled and mixed with white. There I was. My Swiss specimens were well-scaled and not mixed with white, whilst my Scotch specimens were poorly scaled (probably rubbed, as they were bald-headed), but two specimens had traces of pale nervures and pale thoracic patches, which I thought might be considered as being "mixed with white."

Now all this was delightfully clear, because everything appeared to be exactly as it ought not to be, and when at last, about two years ago, I saw some really good male Scotch specimens, which were almost or quite as thickly scaled as, but far less brightly tinted than the Swiss specimens which I possessed, and observed that the thoraces of the female Scotch specimens were always mixed (sometimes strongly so) with pale yellowish or whitish, *i.e.*, the Scotch specimens presented a clear and defined sexual dimorphism, of which the main characteristics were that the females were more thinly clothed with scales, and possessed pale nervures extending from the base to beyond the discal cell, as well as a pale inner margin to the fore-wings, I began to feel doubtful where I was in the matter. On the material I then had, leaving out the ephemeral difference of scaling, I knew two forms only—a very brightly coloured form, the females without white nervures, and a darker (Scotch) form, showing fairly defined sexual dimorphism.

I was in this clear and definite condition of mind when Dr. Chapman, who had gone on ahead of me into Savoy, picked me up at Chambéry towards the end of July, 1894, and, although I had been travelling some 24 hours and was exceedingly hungry, insisted on my glancing through some glass-topped boxes (which he had ready for my inspection in his coat pocket) whilst I vainly tried to dispose of breakfast, and gave me glowing accounts of what he had seen in the La Grave district, especially in the neighbourhood of Lauteret.

Among other specimens exhibited to my admiring gaze was a grand fat female *Zygaena*. I had never seen anything like it before, and although the Dr. insisted that it was a local form of *Zygaena exulans* (which ultimately proved correct), I preferred to doubt the fact—a proceeding that will not be wondered at by those who know me—and to appear exceedingly wise in my utter ignorance. However, they (there were two or three others) were grand specimens, large, broad-winged, with orange nervures (extending from the base of the wing to the outer spot), and an orange inner margin to the fore-wings, orange patches on each side of the thorax, and somewhat similarly tinted fore-legs. One had laid a batch of eggs, and these were forwarded to a well-known authority on Burnets in the South of England, who, if he has nothing to record anent those eggs, I, for one, shall consider to have forfeited a great share of his reputation as an authority on these interesting insects. This was the first local form met with; suppose we call it for short, var. *flavilinea*. [I don't much like the look of that name though, it puts me in mind of the classics which used to emanate from a well-known city in the north-west of England some years ago, as the production of an excellent observer who sometimes now writes verse about his friends, and who always says something funny about me when he gets the chance, but to whom I bear no ill-will—*teste* this parenthesis].

The next time the species was met with was above Gimilian, on a hillside that slopes down towards Cogne, on the north side of the valley. Here only two or three specimens were taken; these were all males, and identical with the Scotch form in good condition; so identical that, mixed with Scotch specimens, more than one good lepidopterist has picked them out as Scotch, in preference to real natives. They were moderately well-scaled, and were without traces of paler markings.

The species was met with again high up in the Lauzon Valley, on the zig-zag path which leads to the King of Italy's shooting-box, well up on the way to the Col leading over to Val Savaranche. The weather was dull, and insects would not fly in the afternoon when we were on the spot where they occurred, some 8,000 feet above sea-level. The form, however, that occurred there was a good one; the insect was brightly tinted and closely scaled, and the marks, which in the specimens from the La Grave district were orange, were somewhat paler—of a pale yellow rather than of an orange tint. The nervures and inner margin were both strongly lined with the paler colour, but in size the specimens were less than those from La Grave. It is, however, only a modification of var. *flavilinea*. Up to this time, we either possessed no males of the *flavilinea* form, or the males are ornamented like the females, as appears to be the case with some of the Val Grauson specimens.

High up the Grauson Valley, Dr. Chapman once more met with the species in large numbers. He captured a good many, almost all those taken being *in copulâ*. Most of these I put on our limited supply of setting boards and they turned out a very fine series of more than seventy specimens. About one-fourth of them are dark, strongly-scaled specimens, with no trace of paler markings either on the thorax or wings. These appear to be entirely males, and there is no difference whatever in the scaling, tint of colour or red spots, between these and Scotch specimens. But a most important character, however, does present itself. One of the supposed distinguishing sexual characters in the Scotch specimens, *viz.*, the pale collar of the females, is here more or less developed in the males;

some few are without it as in the Scotch specimens, others have it but faintly marked, whilst others have it very distinctly marked. But whilst some of these Val Grauson specimens are thus identical with the Scotch form, the remainder grade off into specimens of a somewhat paler green tint, with an access of white mottling, not only on the thoraces, but also on the nervures, the white scales appearing even as a pale dusting on the wings. It would be possible to grade the series off from darkest to palest without a break, and yet the two extremes are as different as possible, whilst the strongest marked "lined" (pale nervure) forms compare more than favourably with the bright specimens from the Lauzon Valley. These latter (the "lined" forms) are characterised by the varying amount of pale mottling on the thorax (some specimens have it entirely covered with pale grey scales), whilst the nervures and inner margin are also pale, differing however, *inter se*, from an almost inconspicuous pale condition, to well-marked and clearly-defined pale lines. These specimens are not only as a rule brighter and yet paler in tint, but more thinly scaled. The extreme forms in scaling show an almost total want of pigment, approaching a Scotch specimen in my own collection, and others which I have seen exhibited, in which the scale coloration has almost entirely disappeared both in the ground colour and in the red spots, leaving the whole insect almost transparent. This condition is, without doubt, due to the hard struggle that these particular individuals have had to come to maturity, which has necessitated the use of all their energy for the formation of their vital organs, and has left no surplus to bestow on such a non-vital part of the organism as colour, for there can be no doubt that these hardy fellows have, if they happen to be placed under unsatisfactory conditions as young larvæ, a very hard struggle to exist in the Alpine solitudes which they beautify. This want of colour must not be confounded with a want of scales due to rubbing, for the abdomina and thoraces of the specimens are perfectly scaled, a very good test of general condition. In size, these specimens vary from ·75 to 1·25 inches.

It follows, therefore, from these notes, that, as a general rule, the specimens of the Grauson Valley exhibit considerable variation *inter se*; that the better scaled and darker coloured specimens are usually (but not solely) males, and belong absolutely to the Scotch form of the insect, whilst the brighter and paler specimens represent more nearly than any other form yet seen by me, the type of *Zygæna exulans*, as described by Hohenwarth (not Hochenwarth as Staudinger has it) and exhibited by the specimens from Glockner in the British Museum collection. It also shows that what is a general dimorphic condition in one locality, may cease to be so in another.

Now let us turn to the Scotch specimens. I have examined a considerable number of these, and large exhibits of them have recently been made at the meetings of the various Entomological Societies. The males of the Scotch form have a dark ground colour, and fairly well developed red spots; in some specimens these spots are really strongly developed; the females are less strongly scaled; their coloration, both in ground colour and spotting, is less marked, and rarely so bright; whilst the pale shoulder marks (not entirely a sexual character as we have seen in the Grauson Valley specimens) and pale nervures are usually present, even if not well-defined and clear. The legs, too, are paler in colour. There is thus a fair amount of sexual dimorphism exhibited in the Braemar specimens.

Although I had recently had the pleasure of seeing so many specimens, I thought it advisable for the purpose of this paper to write to Mr. Horne, who had obtained a number of specimens this year, to substantiate the views I held or to contradict them. He writes:—"I think all the female *Z. exulans* have more or less whitish (or rather yellowish) nervures to the fore-wings. I never, however, saw a male with any trace of the same." This bears out my own observations on the Braemar specimens.

The Scotch form, or race, being practically identical then with part of that found in the Grauson Valley (although without the range of variation exhibited in the latter) but entirely different from the specimens which I have from other localities excepting Cogne and Lapland, it becomes necessary to compare the specimens obtained, and to enquire as to the extent of minor variation exhibited by this particular race. Some of the males from the Grauson Valley and Braemar are so completely identical that they are, as before stated, inseparable, lepidopterists picking out Swiss for Scotch, and *vice versa*. The same dark ground colour and the same tint of red characterises both in their spotting, although an occasional Val Grauson male is, perhaps, slightly brighter than any Scotch specimens I have yet seen, but the difference is really immaterial in so well-defined a local race. Males with pale collars, however, do not appear to occur in Scotland. In the latter country this appears to be exclusively a female character. In the Val Grauson, on the contrary, the males often appear to have it. But it is chiefly among the females that the greatest range of variation exists. The least well-marked of the Grauson Valley female specimens present no difference from the Scotch, but others of them are so strongly marked with whitish nervures, etc., that they form a very decided range of variation beyond their Braemar relatives. Their red spots, too, are often altogether brighter, and the ground colour paler. These extreme forms of the female can as readily be separated from ordinary Scotch specimens, as could those from the Lauzon Valley or Lauteret. The heathery environment in Scotland is altogether different from the high Alpine pastures or the rocky mountain sides of the Grauson Valley, and the usually wet cloudy weather of the Scotch mountains gives place to the clear air, bright sunshine, dry atmosphere, and high day temperature of the Alps. Perhaps herein lies part of the reason for this tendency to a brighter coloration.

But these Cogne, Grauson (in part) and Braemar specimens form a very distinct race, and deserve a distinctive name, if they are not indeed the type form This, from the definition of the ground colour and pale markings mentioned in the type description is rather improbable, but at the same time, the study of Scandinavian authors makes it certain that their form is identical with ours, and it is very clear that Dalman, as far back as 1816, described the female Scandinavian specimens as *Z. exulans*, and the male as *Z. ranadis*.

It will now be interesting to enquire into what Dalman says. In a paper entitled "Forsok till Systematisk Upstallning af Sveriges Fjärillar," by J. W. Dalman (Fortsättning), published in the *Kongl. Vetenskaps Academiens Handlingar*, 1816, pp. 222-223, Dalman writes:—"*Zygaena exulans*. Alis anticis fusco-virescentibus, subdiaphanis, subtus concoloribus, maculis quinque rubris inæqualibus (venis albidis); posticis rubris margine fusco-virescenti; antennis vix clavatis; pedibus luteis. Och., ii., p. 40, No. 9; Hb., fig. 12 and 101. Specimen meum e

Lapponia Dom. Hæffner. debeo. Antennæ quam in præcedentibus (*filipendulae*, *lonicerae*, *trifolii*, *meliloti*) breviores minusque incrassatæ. Pedes distincte lutei ; collare lutescens. Alæ latiores et magis rotundatæ quam in *Z. lonicerae*, cui etiam semper minor." Then on the following page (223) we read :—"*Zygaena ranadis*. Alis anticis fusco-virescentibus subdiaphanis, maculis quinque rubris, basali exteriori elongata, posticis rubris margine fusco-diaphano latiore ; corpore pedibusque nigris pilosis; antennis brevibus clava crassa. Habitat in Lapponia. Species ut mihi videtur distincta, apud Auctores vix invenienda, magnitudine et statura *Z. exulantis*, sed collare pedibusque nigris, nec venas alarum unquam albido-squamatas in hac specie inveni, nec macularum forma omnino eadem. Antennæ nigræ subtus atræ, minime cærulescentes, clava crassa, multo breviores quam in *Z. lonicerae*, apice obtusiusculæ. Thorax niger hirsutus, haud virescens. Abdomen et pedes thorace concoloria, valde pilosa. Alæ anticæ latiusculæ squamulis parum nitidulis fusco-cyaneis tenere et parcius adspersæ, unde alæ sub-hyalinæ apparent. Maculæ quinque rubræ, colore et ordine ut in *Z. lonicerae* ; basalis interior brevis ovata, exterior elongata, usque ad maculam anteriorem medii paris parvam ovatam producta ; discoidea media, et apicalis singula, subquadrato-rotundatæ. Posteriores rubræ margine lato hyalino-fusco."—"Var. *β*. Alis anticis fusco-cyaneis maculis 5 sanguineis, apicali majori extus indeterminata." "Differt non nisi colore saturatiore, et macula apicali majori subrotundata extus indeterminate evanescenti. Corpus et pedes, immaculata, et de cetero omnia cum var. *a*. (*ranadis*) conveniunt. Specimen hujus varietatis unicum, bene conservatum, e Lapponia, vidi in Mus. Dom. Schönherri."

The description "fusco-virescentibus" applies to no Alpine specimens that I have yet seen, except those from the Cogne Valley and part of those from the Val Grauson, and the whole description of *Z. exulans* is an excellent one of a female Braemar specimen —"sub-diaphanis, venis albidis, pedibus luteis," are very characteristic terms, independent of the colour definition which very certainly fixes the form. From the description, var. *ranadis*, which Dalman states appears to him to be a distinct species, is of the size and build of *Z. exulans* and differs from it as we see from the above description only in the points which we have learned to look upon as belonging to the male specimens of *exulans*. It is very evident that Dalman had never looked into the little matters which seem important to us and that from our point of view all his specimens formed a local race differing from the Alpine type. His var. *β*. "fusco-cyaneis," shows that he observed the colour dimorphism of green and purple (blue) so common in almost all Zygænas. Here evidently then is the earliest description of that race which occurs in Lapponia, Scotia, Cogne and Val Grauson, and its name must clearly be *ranadis*, whilst the var. *subochracea* of White, must sink.

To make this as complete as possible, I looked over the specimens from Lapland in the British Museum collection. They appear to be all males, and are distinctly of the dark Scotch form, probably a shade larger than the ordinary examples captured, although differing in no way from selected specimens of the Scotch race. They are all labelled var. *ranadis*, and compare very accurately with Dalman's description. Two Lapland specimens received from Mr. Maddison (one an exceptionally large one) are also of this dark form. These two are both males.

We have now to consider the type, and to see what Sigmund von Hohenwarth says in the *Botanische Reisen nach einigen Oberkärntnerischen benachbarten Alpen* of Joseph Reiner. In the Preface, p. iii., we read:—"In the Appendix, Herr von Hohenwarth furnishes descriptions and accurate figures of some hitherto unknown, and other still very rare insects." The insect is figured Pl. vi., fig. 2, and on p. 265 we read:—"*Sphinx exulans* (Der verwiesener Demmerungsvogel). *Sphinx*. Alis superioribus hyalino-virescentibus, albido nervosis, maculis quinque rubris utrinque conspicuis; inferioribus, præter marginem apicis hyalino-virescentem, rubris immaculatis." Then follows a long German description:—"This moth has the size of *S. statices* or *S. filipendulae*. Head, thorax, abdomen, and the whole body are above and below dark black, covered thickly with similarly coloured scales. The head small, almost globular, somewhat narrower and stumpily pointed below, and bent downwards. The two palpi are curved upwards, round, black-haired; the tongue lying between them wound spirally, and glittering black-brown in colour. The eyes beneath the antennæ raised, naked and black. The antennæ moderately long, black, not transparent, thread-like, roundish, thickish towards the end, awl-shaped at the point, in front marked with many ring-shaped incisions. The thorax cushion-shaped, with a whitish hairy band, interrupted in the middle. The abdomen longish, almost uniformly thick, stumpy. The six feet whitish or light yellowish. The four wings longer than the abdomen. Fore-wings somewhat oval, of a watery-greenish colour, almost semi-transparent, with four raised whitish ribs, running longitudinally from the base to beyond the middle of the wing, and five red spots apparent both on the upper and under sides." Then comes a description of the shape, size and position of the five spots, which it is not worth while to translate here. He then adds:—"The hind-wings have a watery-greenish coloured margin, with a white outer margin, the remainder of the wings being entirely red, unspotted, almost semi-transparent. This moth lives on the extreme Alpine summits of the Eis-gebirge at Glockner, on the so-called Pasterze, and lives probably on the "Eis-" or "ährengetragenden Beifuss" (*Artemisia glacialis*?) which are almost the only plants of this perpetual winter land."

It appears very evident from the "hyalino-virescentibus," of the diagnosis, that the "water-green" specimens of the Alpine heights were characteristically inclined to be diaphanous, whilst "albido nervosis" shows that the description was probably, but not certainly, made from female specimens. This latter fact, however, makes it clear that the type is not the insect usually sent out by the Continental dealers as such, and which we usually receive from Switzerland, but is another local race, in which the females are brightly tinted and have distinct white nervures, agreeing in fact only with the extreme females which I have already mentioned as occurring in the Grauson Valley, with and as an extreme female (and more rarely male) form of var. *ranadis*.

The unsatisfactory nature of description apart from specimens was partly obviated by the satisfactory discovery of specimens of *Zygaena exulans* from Gr. Glockner in the British Museum collection, and as the original description was made from specimens from this locality, we get some idea of the form. Hardly any brighter than the Scotch form, the males show, so far as may be judged from half-a-dozen specimens, scarcely any difference from that, but the female is identical with my best "lined" Grauson specimens. I have no doubt therefore that the Grauson specimens exhibit in their brightest phase an absolute identity

with the Glockner specimens. The important fact to remember is that the very bright specimens usually sent out as typical Swiss specimens do not represent the type form. It is clear, since the type occurs in the Grauson Valley with var. *ranadis*, that the latter is in that locality simply an aberration, whilst in Scotland it forms a true variety or local race, and thus adds another to the similar examples mentioned in the pamphlet *Stray Notes on the Noctuæ*.

We have still the known Swiss valley specimens to consider. Those I have came (as I have before stated) from Dr. Standinger and Prof. Blachier. They are altogether brighter green in the ground colour, and the red spots, too, are brighter; the wings appear to be actually broader compared with their width, and all the specimens that I have, both males and females, have traces of a pale collar; the females, too, have no distinct whitish nervures or pale inner margin. I only write of what I have, but what I know of the species from the Alps of Piedmont and Savoy, makes me diffident in drawing conclusions from so small a series as a dozen specimens. Nothing is so utterly absurd in the study of variation, as to attempt to build up generalisations about the local forms of various districts, or even countries, on the knowledge obtained from two or three or even half a dozen specimens.

The principal forms known to me, therefore, are as follows:—

1.—Well scaled, brightly coloured, with short, broad wings, somewhat clearly defined dark margin to hind wings. Females almost as bright and well scaled as the males, with pale collar, but with no whitish markings on thorax, nor whitish nervures. Specimens from the Swiss Alps = var. *clara*, n. var.

2.—Well-scaled, dark-green ground colour, less brightly coloured, males usually without pale collar, or mottling on thorax or pale nervures; females with pale collar and pale mottling to thorax, and pale nervures to fore-wings; the dark margin to hind-wing variable, but broader and sometimes merging indistinctly into the red; females more thinly scaled than males = specimens from neighbourhood of Cogne (above Gimilian); Braemar; some specimens captured with type in Grauson Valley. This variety (in Scotland), or aberration (Grauson Valley), was named *subochracea* by Dr. Buchanan White. It had, however, been described in 1816, as var. *ranadis*, by Dalman. In fine condition, the males particularly are neither so thinly scaled nor devoid of red colour, as has generally been supposed by British collectors, who, usually possessed only poor specimens; the scaling of the males being well-developed, and the coloring often moderately bright, yet they are on the whole, perhaps, rather more diaphanous than var. *clara*. As a local race, however, its chief character is the much darker ground colour of the fore-wings. This variety as diagnosed by Staudinger "parcissime squamata, albo non mixta," reminds one strongly of rubbed males of the Scotch type, or even of the starved aberration (*starrata* would make a good name) which I have previously mentioned, in which health and colour alike are gone. The original description however makes us understand that Dalman's *ranadis* was not this starved form, but represents really good males of the Scotch form of which he called the females—*exulans* = var. *ranadis*.

3.—The ground colour of the males dark green, the females very strongly marked with pale thoraces and pale nervures. Specimens in the British Museum collection from Glockner, whence the original types came. The males close to var. *ranadis*, the females to 4*b*. Taken in abundance with var. *ranadis* in the Val Grauson = *exulans*.

4. *a*.—This is by far the finest form of all those I have yet seen. The specimens I have of these are all apparently females (picked perhaps on account of size and beauty, before I thought of writing any notes on the species). They are well-scaled and very large, with bright orange nervures, and orange mottled thorax = the specimens from Lauteret in the La Grave district = var. *flavilinea*, n. var. *b*. A subvariety, closely resembling above (4*a*), slightly smaller, with pale nervures, and thoracic mottling yellow, rather than orange. The specimens I have of these are also apparently selected females. How stupidly we often do these things? A few of the most brightly coloured and strongly marked Granson Valley specimens would also come in here.

Such are the variations of *Z. exulans* which have come under my notice. The above notes are not drawn up from a few specimens, but from the examination of some two hundred Scotch, and almost as many Alpine specimens. To look at the female insect in a cabinet, gives no idea of its exquisite beauty when alive. Then its wings are sprinkled with the finest, palest scales, which makes it look as if it had just tumbled out of a flour-bag. The Lauteret females, with their orange peppering, looked perfectly lovely whilst alive, and suggested a bag of gold-dust, rather than a flour-bag, as their last resting place.

In the description used in this paper, I have used the term "well-scaled" and "poorly scaled" in a comparative sense. With the exception of vars. *clara* and *flavilinea*, the species never exhibits any scaling comparable say with *Z. trifolii* or *Z. lonicerae*.

Anyone who has once seen *Z. exulans* in its mountain homes, on the borders of the region of perpetual snow (none of the places I have mentioned in the Alps are less than 6,000, and it is most abundant from 8,000 to 9,000 feet) will cease to wonder why so many rubbed specimens used to be obtained. The insect is, of course, a sun-lover, and on dull days gets well down among the grass and herbage, probably as a protection from the ground frosts, which are frequent even in summer at a high elevation. Add to this that in Scotland, the Braemar locality is heathery, and one has a full explanation of the matter. A fine day, when the insect is just emerging, will give good specimens; an occasional fine day with several intervening wet ones will give an abundance of specimens, but in poor condition, their beauty having been damaged probably by their scuttling about in the herbage, or by the wet itself.

In this paper I have tried to compare my summer captures with our Scotch race, but we have yet much to learn about *Zygaena exulans* and its variations. When will one of those collectors who get hundreds of Scotch *exulans* attempt to get some Scandinavian and Lapland examples, and increase our knowledge, by telling us whether these show the same local variation and differences that I have shown to exist in the Alpine races? I am sure this would be more interesting than filling up blanks in one's cabinet with questionable British rarities. But to those who enter into the work, my experience offers a word of warning, and that is, that comparison is not only useless, but absolutely misleading, when based on narrow lines and worked out on insufficient material. Compared with the Continental races which I have seen, the amount of variation in Scotch specimens *inter se* may be put down as practically nil, but they want comparing (as a race), very closely with other races.

CURRENT NOTES.

Prof. Poulton wishes it to be known among entomologists who may desire to study the material in the Hope Collection at Oxford, that greater convenience and comfort exist for students than has hitherto been the case. One large room has been fitted up as the library, what was Prof. Westwood's room has been thrown into the large insect room, a room has been set apart for photography, and another has been fitted up as a biological laboratory. Prof. Poulton states that there is a large quantity of material which wants working through, and invites entomologists to do it.

The copy of the ninth volume of *L' Encyclopèdie Méthodique*, in the library of the Zoological Department of the Natural History Museum, is still preserved in two parts, as originally issued. Part I. comprises pp. 1–328; Part II., pp. 329–828. The latter part contains no indication of the date at which it was published, but Hummel, writing at St. Petersburg in 1825 (*Essais Entomologiques*, Tom. I., No. 5, p. 48), says that it did not appear till 1824. Much of it must, however, have been written some years before that date.—F. J. B.

As the trivial name *exulans* seems likely to be a good deal in men's mouths just now, it may be useful to point out that the correct way to pronounce it is to accent the syllable *ex*, and to make the *u* short.—B. B. T.

NOTES ON COLLECTING, Etc.

The autumn season (1894) in the Isle of Wight.—An unusually bad June and July in my usual haunts had combined to drive me to "fresh fields and pastures new," with results very gratifying both as regards an increased number of species "not known" at Freshwater, and with respect to increased knowledge of some of those rich collecting grounds, which, as the Norfolk Broads and the Cambridge Fens, present so marked a contrast to the breezy cliffs of my headquarters. Towards the end of August, the reports from a brother, who was energetically maintaining the campaign during my absence, grew gradually more encouraging, and I returned to the old spots in the first week of September. I was agreeably welcomed by a sight of the *L. exigua*, recorded last month (*ante* p. 229), and by an already captured *L. albipuncta*, and at once commenced operations by promptly securing a second. Encouraging reports from Sandown raised fresh hopes which have found due gratification during the whole of the month, and the pleasure of success has been considerably enhanced by being shared with several friends who were able to embrace the opportunity offered. Of species which, during the long time I have worked the western end of the island, I had never previously met with are the following: *Noctua glareosa* (1), Sept. 15th; *Heliophobus hispida* (1), about Sept. 1st; *Calamia lutosa* (1), Sept. 25th (Mr. Tait); *Plusia festucae* (1), end of August; *Hadena protea*, several, Sept. 20-27; whilst of others, which from their lateness or comparative scarcity I have only met with singly are, *Epunda lutulenta*, *Orthosia lota*, *Heliothis peltiger* (1), (sugar, Sept. 26th, Mr. Tait), and *H. armiger*, (2) (sugar, Sept. 27th, Mr. Tait), and, in addition, I must not fail to record a very fine female *Heliophobus*

popularis, knocked down by Mr. Abbott, whilst sugaring. The regular autumn species have hitherto but rarely put in an appearance before the early frosts have driven their would-be captor into metropolitan hibernation, but this year I have been pleased to meet with even such common species as *Xanthia ferruginea*, *Scopelosoma satellitia*, *Anchocelis litura*, *A. lunosa*, etc. The features of the season have been, firstly, the capture of two dozen specimens of the rare and little-known *Caradrina ambigua*; next, the comparative abundance (and lateness) of *Triphaena subsequa*, of which over two dozen specimens fell to the lot of Mr. Abbott, myself, and friends, but which were, unfortunately, mostly very worn; further, the comparative abundance of two good local species, viz. *Agrotis obelisca* and *Aporophyla australis*; and lastly, the agreeable diversification of the usual monotony by the occasional appearance of such rarities as *Laphygma exigua* (2), *Leucania albipuncta* (6), *Heliothis armiger* and *H. peltiger*. I must here express my indebtedness to the Rev. C. R. N. Burrows for his valuable hint as to the use of methylated spirit instead of rum, my experience going to prove that it is a most effective as well as cheap substitute. It has during the month past met with a very fair trial, as it has competed over and over again with rum on level terms, and proved its equal if not superior merits, evidently a proof that the Noctuid palate is not a refined one. The weather has been most unsettled, and, from the farmers' and visitors' point of view, most unsatisfactory, but in so far as the absence of the usually early frosty nights goes, the entomologist has much cause for gratitude. Light has not been worked owing to the proximity to the sea, or the captures would have been largely increased, but *A. lunosa* has been unusually plentiful at sugar, but as is usually the case with the males, in very poor condition; a few females have on the contrary proved exceptionally fine. *Agrotis puta* has not been the feature that it was last year but it has been amply revenged by *Noctua c-nigrum* and *Phlogophora meticulosa*, which have been in great numbers on some nights, whilst *N. xanthographa* has been but in normal quantity. Among the occasionally common things, *Agrotis saucia* has occurred but very sparingly and seems unusually late in its appearance, whilst *Leucania vitellina*, evidently exhausted by its efforts in 1893, has been a much-mourned absentee.—In Diurni very little has been done, as "setting" has proved ample occupation for the shortening daylight hours, but when sunshine has tempted an expedition *Colias edusa* has been found in twos and threes in its old haunts, from the middle of August to the end of September, and *Vanessa atalanta* appeared very freely towards the latter date. *Pyrameis cardui* has proved most disappointing, the anticipations of plenty indulged in on the strength of reports of numerous larvæ and of the early appearance of fine imagines, being doomed to partial disappointment. *Plusia gamma*, at the last only, appeared suddenly in numbers and imparted extra vivacity to the sugared patches at night and to the Downs by day, whilst in Geometers *Aspilates citraria* was early and soon over, although plentiful for a few days. In larvæ, nothing was attempted worthy of mention but *Agrotis ripae* again proved scarce in its very limited quarters, although not so much so as in 1893, two visits producing about 50 and 15 respectively; possibly the second (upon Sept. 27th) was too late. Wasps have been extremely scarce, but myriads of tiny flies of two species have on several occasions absolutely crowded the "sugar," making one wish for the society of an enthusiastic Dipterist.

Various *Tipulidae* and *Trichoptera* have also been in considerable numbers.—A. J. Hodges, 2, Highbury Place, London, N.

An entomological trip to Forres, N.B.—Notwithstanding the fact that Forres is considered one of the driest localities in Scotland, the miserable atmospheric conditions that prevailed over the greater part of the kingdom this year penetrated even there, rendering each day during our visit more or less moist and unpleasant. Having had a foretaste of what we might expect before leaving London, we arrived on Thursday, Aug. 2nd, at 11 a.m., in the midst of a miserable drizzle, accompanied by a cold N.E. wind, armed with family "gamps" and waterproofs. Arrangements had been made with Mr. Reid, of Pitcaple, to meet us on our arrival, but through a misunderstanding as to the dates, he was not there, so we had to drive disconsolately to our lodgings. Finding, however, that everything had been arranged for our comfort, our spirits considerably revived, and, after a substantial luncheon, the rain having cleared off *pro. tem.*, we determined to have a look round our new ground and plan where we should commence operations. Our ardour was considerably damped by the general outlook, every likely hunting ground appearing to be at a considerable distance from the town of Forres. We therefore determined to rest until the following day, and to make enquiries as to the whereabouts of already published localities, such as Altyre Woods, Culbin Sands, &c. I will now put our experiences in diary form:—*Aug. 3rd.*—Bright morning, sunshiny and warm, started for Altyre Woods, about 2 *Scotch* miles from Forres. On arrival there, we got about half-an-hour's searching and secured about 2 doz. *Erebia æthiops*, when down came the rain, and we had to beat a hasty retreat, kill our first captures, and "wait till the clouds rolled by." Went out again after dinner, saw *Vanessa urticæ* on the wing and larvæ on the nettles. Went to station to meet our friend Mr. Arthur Horne of Aberdeen, from whom I knew I should get all particulars as to where to work until Mr. Reid's arrival. Tea over, we trimmed our lamps and filled our "sugaring" tins, fully expecting to do grand work. Alas! our expectations were sadly disappointed, as when we had well sugared the trees over the *Noctua depuncta* ground, we sat down to have a happy chat over the pros and cons of the season, when down came the rain in torrents which we faced for a considerable time until it was dark enough for us to examine our "sugar." Not a single insect, and in most instances our sweets completely washed off the trees. So much for our first night's work; we went home, if not wiser, certainly wetter than when we started, vowing vengeance, however, on *æthiops* the following morning. *Aug. 4th.*—Slight rain in the morning but looking as if it would clear, we started in good time for Altyre Woods accompanied by Mr. Horne; rain gradually increased until by the time we arrived there it was coming down fast. *Æthiops* was out of the question, so had to be content with 1 *Larentia olivata*, at rest, and having the ground pointed out where I might get larvæ of *Endromis versicolor* and *Eupithecia togata*. We then hurried back to the station, where my friend got an early train to Aberdeen, trusting to find better weather there. Sugar absolutely blank; we caught on the wing at dusk *Thyatyra batis*, *Plusia pulchrina*, and a few common things. *Aug. 6th.*—Bright morning, *E. æthiops* very plentiful in Altyre Woods, but getting worn owing to the heavy rain. Some nice forms of *L. olivata* and *Hypsipetes sordidata*. Sugar still useless.

Aug. 7th.—Findhorn by coach, distance 5 miles; saw on sandhills —*Satyrus semele* worn, *Polyommatus phlæas* worn, *Lycæna icarus* worn, and by beating and searching, we found many beautiful forms of *Agrotis cursoria* and *A. tritici*. Wet in evening, did not try sugar. *Aug. 8th.*—Altyre Woods. *E. æthiops* still in plenty and a few *L. olivata*. Sugared in Hedgefield Wood—utter failure. *Aug. 9th.*—Coast working for *A. cursoria* and *A. tritici*. Heavy rain. *Aug. 10th.*—Met Mr. Reid by early train, had an early dinner, and started for Culbin Sands, about 4½ miles distant, found few *A. cursoria* and *A. tritici*. Sugar in evening only produced 1 *Noctua depuncta*, and a few normal *Xylophasia monoglypha*; ragwort bloom would have paid our labour much better had it been dry, wet as it was we got *Xanthia cerago* and var. *flavescens*, *Agrotis nigricans*, *tritici*, &c. *Aug. 11th.*—Whilst having breakfast Mr. W. Salvage called, having arrived the previous night, then I knew that with two professional collectors I should have a lively time of it. Arrangements were made for a tour round, which meant a walk round of about 15 miles, distance appearing little object to these two gentlemen. Our captures were very poor during the day, but we did better in the evening at ragwort, although sugar certainly did not pay the trouble of working, so we agreed to work bloom only, for a few nights. *Aug. 13th.*—Findhorn by early coach; *A. cursoria* and *tritici* in plenty but getting worn—my daughter caught the first pair of *Agrotis præcox*, this was to me a new experience, never having seen this species before—but not a single example of *Triphæna*, although Mr. Salvage had got *subsequa* in plenty on the same spot some years ago. Wet at night, did not go out. *Aug. 14th.*—Altyre Woods, found *L. olivata*, *E. sobrinata* worn, and larvæ of *E. togata* feeding in fir cones on trees standing from 20 to 40 feet high, by no means an easy species to work for, as many trees may be climbed without finding infested cones. An opera glass would be a great *desideratum* here. Ragwort at night produced 2 or 3 *N. depuncta* together with species already enumerated. *Aug. 15th.*—Mr. W. Salvage informed us that *Melanthia bicolorata* was very variable in one locality, the var. *plumbata* being of common occurrence. So we agreed to work for it, and certainly had the season been at all a good one we would have got a lot, as it was we each got 2 or 3. Mr. Salvage's splendid knowledge of the Forres district was certainly well worthy of comment. Ragwort produced no fresh species. *Aug. 16th.*—Went to Culbin Sands and got several *A. præcox*, *cursoria*, and *tritici*, but these sands are most difficult to work. Bloom work produced nothing new. *Aug. 17th.*—Went to Inverness sight-seeing, no collecting in evening. Mr. Reid left Forres, his week's stay was one of hard work, but at the same time great enjoyment and genial companionship. *Aug. 18th.* Beating for *M. bicolorata* and var. *plumbata*, found few but worn; wet night. *Aug. 20th.*—Setting and packing up generally. *Aug. 21st.*—Started for Aberdeen, had a night on Murkar Links with my friend Mr. Horne. Sugar not working, we got back early, and went over his splendid collection, then "sampled" his duplicates. *Aug. 22nd.*—Travelling all day *en route* for London—thus ended a wet but very enjoyable holiday. I forgot to enumerate larvæ found, and herewith append without dates. *Acronycta leporina*, few; *A. rumicis*, few; *Bombyx quercus*, scarce; *Notodonta camelina*, few; *N. dromedarius*, few; *N. ziczac*, few; *Phalera bucephala*, plenty not taken; *Spilosoma menthastri*, few full-fed; *Chariclea umbra*, plenty, very variable, on rest-harrow, &c.—J. P. Mutch, 359, Hornsey Road, N.

NOTES OF THE SEASON 1894.

Short notes from the books of the exchange baskets.—Mr. Atmore (King's Lynn) writes on July 21st:—"Insects have been very plentiful during the last month, but uncertain, and wet weather makes collecting difficult. What a nuisance the night-jar (*Caprimulgus europaeus*) has been in this district this season. A night or two ago, I visited a district in which *Lithosia complana* and *Acidalia inornata* are of annual occurrence. I succeeded in taking a few fine specimens of each, but I believe the noisy, and this year numerous night-jars got far more. I saw *A. inornata* taken once or twice by them, but neither shouting nor stronger measures proved sufficient to cause them to take their departure; they stuck persistently to their favourite corner."—Mr. H. Page (New Cross) writes on August 25th:—"Insects at Folkestone were decidedly scarce during the month I spent there—July 25th to August 24th. At the time of leaving *Lycaena bellargus* had not even put in an appearance. On August 10th, I saw 4 *Colias edusa*, but did not hear of any others having been seen save 1 var. *helice*, which however was not captured. *Pyrameis cardui* appeared in fair numbers but, although otherwise fine and fresh, about 90 per cent. of them were chipped, probably as a consequence of the prevalent high winds. *Lycaena corydon* and *Aspilates gilvaria* were not at all abundant, but *Gnophos obscuraria* was in fair numbers. *Plusia gamma* swarmed everywhere, and *Zygaena filipendulae* was abundant on the outskirts of Dover. Sugaring was only productive of common insects and those in limited numbers."—Mr. A. Adie Dalgleish (Glasgow) writes on Aug. 28th:—"Every one seems to be crying out about the dearth of Lepidoptera this season, and I am forced to do the same. The spring of the year in the Glasgow district produced literally nothing, the outcome of several nights' sugaring in April being only some half dozen each of *Taeniocampa gothica*, *T. stabilis* and *T. instabilis*. May was even worse; the evenings were cold and a raw east wind prevailed during the greater part of the month. In June I paid a visit to Cowal (Argyleshire), and took some *Scopula decrepitalis* and a few other things. It was not until July, when I paid a visit to Stonehaven, that I captured insects in any quantity. *Lycaena astrarche* var. *artaxerxes* was in goodly numbers, and I obtained some nice varieties of *L. icarus* (♀). *Zygaena filipendulae* swarmed on the top of the cliffs, and, in the evenings, *Hepialus velleda* in the bays below. Sugaring brought quantity but hardly quality. Many common Noctuids simply swarmed on some evenings, whilst a few each of *Apamea gemina*, *Caradrina taraxaci*, *Mania typica* and *Phlogophora meticulosa* were taken. At flowers I took *Leucania conigera*, *Abrostola tripartita*, *Plusia pulchrina* and *P. chrysitis*. A few specimens of *Gnophos obscuraria* were captured, and *Coremia munitata* was secured in quantity at several places, together with a host of commoner geometers. August again has been quite as unproductive as the early months of the year, the only insect that I have taken in abundance being *Sciaphila octomaculana*."—Mr. Sydney Webb (Dover) writes on Sept. 3rd:—"Constant rain, week after week, is, I believe, almost unprecedented in the south-eastern counties. Larvae were literally washed away by it in the spring, and our common chalk-hill butterflies and moths are now strikingly absent."—Dr. Riding (Honiton) writes on Sept. 3rd:—"Though the weather changed for the better a week ago, there is not much difference as yet in the abundance of insects. Three visits to the heather

on the hills were fruitless. A few *Noctua xanthographa* and *Plusia gamma* were the only insects we saw; presumably the autumn (August) insects have not emerged, as not even a *Noctua glareosa* could be found. A few insects came to light, but sparingly, and good ones singly for the most part. *Luperina cespitis*, *Cleora glabraria*, *Lobophora viretata*, and *Engonia tiliaria* have been the best up to date. There seems to be an abundance of larvæ of *Pyrameis cardui* feeding on the thistles, here as elsewhere, and the heat has brought out some of the common butterflies at last. A fortnight ago a *Papilio machaon* came out in one of my breeding cases, another having emerged in July and the first in April —all of the same brood!"—Dr. Freer (Rugeley) writes Sept. 4th:—"*Stilbia anomala* did put in an appearance, but unfortunately I was away for my holiday at the time and so did not get any. I have reared a considerable number of *Hadena glauca* from the egg this year, and they have done well so far. They vary considerably in colour in their early stages, ranging from all hues of yellow-green to green, and from greenish-brown to rich bistre brown, which is their invariable colour when full fed. The larvæ of *H. contigua*, which are now feeding, show the same peculiarity in their earlier stages."—Mr. Christy, writing from South Argyleshire on Sept. 11th, says:—"In this district the larvæ of *Bombyx callunae*, *Saturnia carpini* and *Acronycta menyanthidis* were rather more numerous than I ever saw them on Scotch moors in the month of August. *Clostera reclusa* larvæ are also common."

Mr. Cannon (Mannofield) writes Sept. 22nd:—"I have done no collecting for some time. Insects seem to have disappeared altogether. The only insect I have seen of late has been *Polia chi*, which was fairly common sitting on the stone dykes."—Rev. E. C. Dobrèe Fox (Castle Moreton) writes on Sept. 27th:—"My experience has been much the same as that of most other entomologists in this country. The season has been a wretched one. Sugaring was throughout a total failure. I started for Swanage on August 6th. Entomologists whom I met told me that *Pamphila actaeon* had been plentiful, but I was too late for it and had to work hard to obtain about 5 dozen specimens. With the exception of a few *Gnophos obscuraria* and *Zygaena trifolii* [This is a remarkably late date for this insect.—Ed.] I got nothing else worth speaking of, during the week I remained in Dorsetshire. A gentleman showed me two or three *Colias edusa* that he had taken, but I saw none myself."—Mr. T. Maddison (South Bailey, Durham), writes on Oct. 3rd:—"This has been about the worst year for collecting I have ever known. During the summer, I have been in Cornwall, at Scarborough and at Saltburn, and found insects very scarce everywhere. Even the commonest kinds appeared in very few numbers."—Mr. Finlay (Morpeth) writes on October 8th.—"Insects during June and July were very scarce and late. On Sept. 24th, *Celaena haworthii* were plentiful, flying over the mosses on the moors about 3 p.m., whilst *Nonagria fulva* was also abundant, flying freely about 5·30 p.m. I swept the larvæ of *Hadena pisi* off heather in large numbers, and the larvæ of *Bombyx rubi* are more abundant on the moors than I have seen them for many years. Sugar is an entire failure."

Deal.—I have just come back from Deal where at this time of year there is of course little to be done entomologically. *Aporophyla australis* and *Anchocelis lunosa* were common at sugar, but there was little else: the only things worthy of mention were 1 *Epunda lichenea* (dark form), which is I think new to the locality, 1 *Xylina socia* (ditto),

and a few *Calocampa vetusta* and *Epunda lutulenta*.—C. Fenn, Lee, Kent, *Oct. 5th*, 1894.

Sandown, I. of Wight.—After writing my note which appeared in this month's *Record* (p. 224), I had the good fortune fully to realize the hope there expressed: and as records of the occurrence of *Leucania albipuncta* are not very frequent, the details may perhaps possess some interest. After some days of wretched weather, sugaring began to improve on Aug. 24th, when some fine forms of *Agrotis puta* and *Noctua c-nigrum* were attracted, but no unusual visitor except one *Cosmia affinis* (common inland, but rare on the Downs, where of course I now sugared as regularly as possible). On August 25th and 26th I was in London, but returned to Sandown on the 27th in time to sugar the same evening. During that week, my success was very satisfactory—August 27th, one good *L. albipuncta*; 28th, two fair; 30th, one worn; 31st, one good, one worn: the latter completely sacrificed in the hope of obtaining eggs; another fairly good one followed on September 4th, making a total of 8 for the season. *Aporophyla australis* has been fairly common, considering that I seem to have had, as it were to make the locality for it; in 1891 and 1892 working all through the season, I took respectively 5 and 6, in 1893 some two dozen, while this year it came regularly almost every night, though generally in very small numbers. I also take this opportunity of recording the capture of a fine *Caradrina ambigua* and of a rather worn *Triphaena subsequa*, (the latter new to Sandown) both on Sept. 10th. Rather curiously, though I took all our six species of *Triphaena*, yet four of them were only represented by one poor specimen each: it is needless to add, the exceptions were *T. pronuba* and *T. orbona*. Other species which made their first appearance on my sugaring ground this season were *Catocala nupta*, a fine specimen on August 29th, *Noctua glareosa*, one specimen on September 20th, *Xanthia fulvago*, two specimens, and *Gonoptera libatrix*, two or three. The autumn brood of *Larentia viridaria*, the occasional occurrence of which I have previously noticed (see *Entomologist*, vol. xxvii., p. 62), also appeared almost every night in September: I have never known this species come to sugar before. Some fine forms of *Luperina testacea* were taken off unsugared fences and grass stems, but *Hepialus sylvanus*, which usually accompanies it, was much scarcer than usual, and *Nemonia popularis* was not observed at all. Working for larvæ proved a failure on the whole: *Eupithecia pimpinellata* and some of the common "pugs" were quite scarce, and so were *Emmelesia alchemillata* and *E. unifasciata*, while *Eupithecia succenturiata* and *E. subfulvata* (obtained last year) were not to be had anywhere. On the other hand, I was pleased to find *Charicleа umbra* in unwonted plenty on the *Ononis*; in my experience, the larva feeds exclusively on the flower, chiefly on the corolla; I did not offer it knotgrass, not recollecting Newman's statement that it "feeds greedily" thereon—knowledge which would have been most welcome to me, as it was difficult to keep up the supply of *Ononis* flowers, and the larvæ were much given to cannibalism when reduced to short rations.—Louis B. Prout, 12, Greenwood Road, Dalston, N.E. *Sept. 24th*, 1894.

Freshwater, Isle of Wight.—Upon my arrival at Freshwater on Sept. 17th I was glad to learn that *Caradrina ambigua* had been taken on several occasions within the past few days by Mr. and Mrs. Abbott of Birmingham, and by Mr. Hodges. During the next ten days I captured 8 specimens (nearly all fine ones) in various localities within about a

mile. The moth sits fairly quietly on the sugar and, when not knocked off by the ever-present *Phlogophora meticulosa*, is easy to box. Among my captures is one which, owing to the slightest possible malformation of the right fore-wing, has developed into a good variety; the orbicular and reniform spots are united within one very clear circumscription, and thus form a large asymmetrical blotch. On Sept. 25th, a very fine *Heliothis peltigera*, and the following evening two equally good *H. armigera*, were taken at sugar. On Sept. 27th I was fortunate enough to take a perfect specimen of *Leucania albipuncta* at sugar; it is of a rather darker brown tint than usual. The emergence of this species must be very protracted, for the earliest specimen was captured on Sept. 4th, more than three weeks earlier than mine.—R. Tait, Jun., Manchester. *Sept. 30th*, 1894.

PRACTICAL HINTS.

On pairing moths in captivity.—In the summer I began to get anxious about securing sufficient *variety* to keep up with the demands of the Exchange Club, and wrote to a correspondent in Suffolk asking him to get me some ova of *Anticlea berberata*. He replied thus:—"As I had a fair supply of pupæ of *berberata*, I have not found time to go for more wild ones. Many bred couples paired; several however did not lay, and of the many eggs laid by the rest, I do not find any that will hatch, all seem to shrivel up." He kindly beat some larvæ and sent to me, and I reared a fair number of imagines. I then paired several couples, isolated the females, and participated in his experience, for they either did not lay or else laid infertile eggs. Partly in disgust, partly in despair, I left three pairs together for three consecutive nights. The first night all three paired, the second night some paired, and the third night a similar thing occurred. The glass-topped "tie" box in which I had them was now pretty well sprinkled with eggs, and after the first night the sprig of the food plant was also favoured; in due course plenty of larvæ appeared. I had just been thwarted by two females of *Phorodesma smaragdaria* in a similar way, and was feeling very keenly that one scarcely knew how to treat such shy layers. One had laid 12 eggs of which three hatched, the other laid none, and I must say that my experience with *A. berberata* rather opened my eyes. Do not we entomologists who try to breed fine specimens or varieties often waste specimens unsuccessfully by not going quite far enough? May it not be, that, at least in captivity, the vitality of the males is so much impaired that they are not able to fertilise more than a small number of ova? Are we sure that even in nature one pairing is sufficient, and that lepidoptera do not pair again and again? When anxious for eggs I shall in future not be in such a hurry to separate the parents but leave them together until they die. There is another curious point about this subject, *viz.*, if the females mate a second or third time, there must be some sort of attractive force left in them, and it seems possible that we might perhaps use females which we know to have paired as lures for wild males. I would not of course suggest that all species are alike; probably many vigorous forms pair once and for all, but when we are dealing with "in-bred" races, I think a little investigation might pay. (Rev.) C. R. N. Burrows, Rainham Vicarage. *October 5th*, 1894.

NOTICES AND REVIEWS.

Förteckning öfver Macrolepidoptera funna i Finland efter år 1869, by Enzio Reuter. Published by J. Simelii Arfvingars. Boktryckeri, Aktiebolag, Helsingfors.—This is a little book which should be carefully studied by those who work at the British Lepidoptera. To a great extent the Scandinavian fauna is like our own, and the author has worked out his subject so systematically that compilers of systematic lists will have carefully to look up the new local races and varieties which are herein described. We notice, however, that a great many of the names of local varieties overrun those already given in England, and must sink into synonyms. We find among the butterflies two of our north and west country forms of *Pieris napi* described; ab. *sulphureotincta* as "Alis superne sordide flavescentibus, posticis inferne laetius sulphureis, ♀," considered distinct from Schöyen's ab. *sulphurea* (our well-marked Irish variety approaching var. *bryoniae*). We are under the impression that *sulphureotincta* has been named before. The bright Irish form of *L. icarus* appears under the name of var. *coerulea*, Schilde, whilst a new variety of *Melitæa athalia*, is added to the already long list, under the title ab. *fennica* described as:—"Alis superne magis conspicue nigro limbatis, fasciis nigris transversis anticarum angustioribus; al. posticis inferne a basi usque ad fasciam mediam unicoloribus fulvis, maculis basalibus subnullis; ♂." As with us, *Argynnis adippe* var. *cleodoxa* is only of very occasional occurrence. The occasional appearance of *Colias edusa* is noted, as is also that of *Coenonympa typhon* var. *laidion*. Our rose-tinted specimens of *Smerinthus populi* are described under the name of var. *roseotincta*. Mr. Clark's var. *centripuncta* (*Ent. Rec.*, i., p. 329) of *Smerinthus tiliæ* is referred to under the name of *maculata*, Mützel, whilst the hitherto considered var. *karelica* of *Nola albulalis* is referred to another species, *N. aretica*. There are some very interesting notes on *Eriogaster lanestris* var. *aarasaksae* and *Bombyx rubi* var. *pygmaea* is described as:—"Multo minor, corpore obscuriore, strigis transversis alarum anticarum rectis, magis approximatis, obsoletis, extrorsum obscurius et magis distincte terminatis, ♀; nolgit. al. expans. 44 mm." Some varieties are mentioned which appear to be British, *viz.*:—*Cerura furcula* var. *borealis*, which we believe is one of the forms described under another name by our old British authors, *Pheosia dictaeoides* var. *frigida*, Zett, whilst a new var., *N. dromedarius* var. *polaris*, appears as if it will have to sink as a synonym of our var. *perfusca*. A variety of *Cymatophora or* (called by Clerck's name *flavicornis*) is noticed as *mimaculata*, Meves, whilst *Asphalia flavicornis* is called by Göze's name *cinerea*. Among the NOCTUÆ are some very interesting notes on the better known northern forms, including a few varieties that we have not before noticed. *Agrotis (Noctua) baia* var. *punctata*, J. Mev. is one, whilst the *sagitta* of Hübner, our northern streaked var. of *A. cursoria* (?) is treated as distinct, with a newly described variety *brunnea*, stated to be "Obscurior, alis anticis rufobrunneis." Scandinavian examples of *sagitta* should be compared with British specimens to see whether identical forms are known by the same name in the two countries. The variegated var. of *Hadena dissimilis* is renamed *laeta* and described as "dilutior, alis anticis lætius griseo-variegatis"; *laeta* will of course sink. The author speaks of *capsophila* as a var. of

Dianthoecia carpophaga, a conclusion for which there is no proof yet forthcoming. The collectors who raged when *oculea*, Gn. was changed to *didyma*, Esp., will be interested to learn that this species is here called *secalis*, Bjerk; *Plusia pulchrina* has a variety *percontatrix*, Auriv., of which we do not remember to have heard before, whilst *Toxocampa* is dropped for *Ophiusa*. Among the Geometræ, *Acidalia fumata* gets in addition to var. *simplaria*, Frr., a new variety *perfumata* described as "Obscurior, alis omnibus squamis fuscis densius immixtis, fusco-grisescentibus." *Boarmia cinctaria* var. *maculata* is another newly described form, whilst *Eucosmia undulata* has a variety *subfasciata* described as "Alis anticis fascia media obscuriore." A new variety of *Cidaria (Melanippe) fluctuata* is described as *incanata*—"Obscurior, alis anticis canescentibus, fascia media usque ad marginem inferiorem distincte extensa." This banded form, we believe, has been before described as var. *virgata*, but cannot place our hands on the description. Numbers of varieties of common species occurring in the west of Ireland and Scotland have been described and are referred to here, although their names are strange to British eyes and ears. We are rather of opinion that Hoffmann's dark var. *pyharvaara* of *Acronycta auricoma* will have to sink under the name of *pepli* (*British Noctuæ and their Varieties*, vol. i., p. 23); whilst a var. *phantoma* of *Cerura vinula* is interesting. It is we think greatly to be regretted that the author has not made himself acquainted with the works of British entomologists. The book shows a very good knowledge of the up-to-date work of German writers, but an almost complete ignorance of that of our own countrymen. It would perhaps be too much to expect familiarity with the stores of entomological knowledge contained (we had almost said entombed) in our magazines, but an author dealing systematically with fauna having such close affinity with that of Great Britain and Ireland, ought at least to have studied Barrett's *Lepidoptera of the British Islands*, and Tutt's *British Noctuæ and their Varieties*. This attitude of contempt towards British workers, of which Standinger's *Catalog* is such a conspicuous example, may be a just punishment for our own insularity, but it is not scientific. It is, moreover, in marked contrast with the state of things that obtained in the earlier days of entomological literature. Linné makes constant reference to the works of Ray, Petiver and Wilkes, the only British writers in his day, although it must be confessed that his references are not infrequently misleading. Geoffroy, Esper, Borkhausen and Fabricius also thought the works of these writers not unworthy of study, and Ochsenheimer added Lewin to the list. Notwithstanding this, as we think, serious blemish, however, the little work is well worthy of the attention of students of Scotch and Irish Lepidoptera, and should be obtained by our Societies. Its price is not stated on our copy, but a note to the author, Enzio Reuter, Helsingfors, Fredriksgaten 45, Finland, should be sufficient to produce the information.—F. J. B.

SOCIETIES.

The Entomological Society of London resumed its meetings after the summer recess on October 3rd. Mr. W. F. H. Blandford exhibited specimens of a sand-flea, chigoe or nigua, received from Mr. Szigetváry, of the Imperial Maritime Customs, China, who had found them in the ears of sewer-rats trapped at Ningpo. Mr. Blandford stated that the

species was allied to, but not identical with, the American species, *Sarcopsylla penetrans*, L., one of the most troublesome pests in Tropical America and the West Indies to man and various domestic and wild animals, the female burrowing into the skin, usually of the feet, but also of any other accessible region. He said that the distribution of the chigoe was recorded over Tropical America and the Antilles from 30° N. to 30° S., and of late years it had established itself in Angola, Loango, and the Congo. Mr. F. C. Adams exhibited a specimen of *Mallota eristaloides*, a species of Diptera new to Britain, taken by himself in the New Forest on the 20th July last. He said the species had been identified by Mr. Austen, of the British Museum. Mr. Tutt exhibited specimens of a form of *Zygaena exulans*, well scaled, and with the nervures and fore-legs of a decidedly orange colour, collected during the last week in July, by Dr. Chapman, in the La Grave district of the Alps, at a considerable elevation; also specimens of the same species taken by himself and Dr. Chapman near Cogne, and others from the Grauson Valley, the females of which were less well-scaled. He also exhibited Scotch specimens for comparison, and stated that he was of opinion that the latter were probably as thickly scaled as the Continental ones, but that, owing to the differences in the climate of Scotland and Switzerland, collectors had fewer opportunities of getting the Scotch specimens in good condition. Mr. P. M. Bright exhibited a specimen of *Sterrha sacraria*, taken at light, at Mudeford, in October, 1893. Mr. J. J. Walker exhibited a living specimen of a large species of Pulex, which he believed to be *Hystricopsylla talpae*, Curtis, taken at Hartlip, Kent. Lord Walsingham read a paper entitled "A Catalogue of the *Pterophoridae*, *Tortricidae* and *Tineidae* of the Madeira Islands, with Notes and Descriptions of New Species." In this paper thirty-six species of Lepidoptera belonging to these families were recorded as occurring in the Madeiras, of which, thirty were noticed as peculiar to the Islands, twelve as common to the Madeiras and Canaries, of which two were not known as occurring elsewhere, and one extends its range only to North Africa. Over thirty species were added to the list, and one new genus, seven new species, and two new varieties were described. ——On *Oct. 17th*, Mr. G. C. Champion read a letter, dated 15th August last, from Mr. J. Y. Johnson, of Funchal, Madeira, on the subject of a recent visitation of locusts to the Island, and exhibited specimens. Mr. Johnson mentioned that Darwin, in his "Origin of Species," recorded that in November, 1844, dense swarms of locusts visited Madeira. He said that since then, until August last, these insects had not visited the Island. Mr. Champion remarked that the species sent by Mr. Johnson was *Decticus albifrons*, Fabr., not a true migratory locust. Mr. H. Goss read a letter he had received from Captain Montgomery, of Mid-Ilovo, Natal, reporting large flights of locusts there, extending over three miles in length, on the 31st August last, and exhibited a specimen of the locust, a species of *Acridium*. Captain Montgomery stated that, as a rule, his district and most of Natal was free from the pest, but that an exceptional invasion had occurred in 1850. Mr. Elwes exhibited a series of *Chionobas alberta* ♂ ♀, *Chionobas uhleri*, var. *varuna*, and *Erebia discoidalis*, from Calgary, Alberta, N.W. Canada, collected in May last, by Mr. Wolley-Dod. He said that the validity of *C. alberta*, which had been questioned by Mr. W. H. Edwards, was fully established by these specimens.—[We are unable to agree with this, the specimens appearing to bear no distinct specific characters,

whatever, so far as a cursory examination of the specimens when being exhibited allowed us to judge.—Ed.]

At the Meeting of the South London Entomological and Natural History Society on October 11th, Mr. R. Adkin exhibited a bred series of *Eupithecia fasciocata* from Ireland; also on behalf of Mr. South, *Paedisca sordidana*, *Peronea hastiana*, *P. comparana*, *P. comariana*, and *P. schalleriana*, from Macclesfield. Mr. H. Moore: a ♀ *Lycaena corydon*, with male coloration. Mr. McArthur: *Toxocampa craccae*, *Noctua glareosa*, *Acronycta rumicis* and *Agrotis agathina*, all from N. Devon. Mr. C. A. Briggs: types of *Plusia ni*. Mr. Winkley: a specimen of *Helix pomatia*, showing the temporary epiphragm formed at the commencement of hybernation. Mr. Tutt: a narrow-winged specimen of *Eupithecia subnotata*, bred from *Artemisia* by Mr. Baxter, of St. Anne's-on-Sea. Mr. Tugwell and Mr. Tutt both exhibited a large number of specimens of *Zygaena exulans*.——On *Oct. 25th*: Mr. Johnson exhibited a specimen of *Abraxas grossulariata*, from his garden at Walthamstow, which had only a few black scales, in place of the usual markings. Mr. McArthur: bred series of *Hypsipetes sordidata*, the lighter specimens being from bilberry-fed larvæ, and the darker ones from sallow-fed larvæ. Mr. Mansbridge: the dry carcase of a mole, taken from a barn-door, which was covered with lepidopterous cocoons and pupa-cases. Mr. H. Moore: two specimens of the Violet Carpenter bee (*Xylocopa violacea*), from the Gironde. Mr. R. Adkin: a specimen of *Lycaena aegon* from Oxshott, having the two costal spots on the underside of the hind-wing united.

The Meeting of the Birmingham Entomological Society on September 17th, was chiefly characterized by the exhibition of specimens from the New Forest. The exhibit of Mr. R. C. Bradley and Mr. C. J. Wainwright was the outcome of ten days spent there in the middle of July, and included the following Lepidoptera: freshly emerged specimens of *Lithosia mesomella* and *Erastria fasciana*, which were thus a full month late; *Cleora glabraria* and *Calligenia miniata*, etc.; there were eleven species of dragon-flies, and a number of Aculeate Hymenoptera, including *Ammophila sabulosa*, *Crabro vagus* and *C. cribrarius*; the chief feature of the exhibit, however, was the collection of Diptera, among which were:—*Alophora hemiptera* and *Echinomyia grossa* (both common), *E. lurida* (2), *Myolepta luteola* (2), *Laphria marginata*, *Dioctria reinhardi*, *D. flavipes*, *Limnobia bifasciata*, and many species not yet fully identified, including a probably hitherto undescribed species of *Dicranomyia*. Mr. E. C. Rossiter had spent the month of July at Brockenhurst, and showed *Triphaena subsequa*, *Cleora glabraria*, *Macaria alternata*, etc. Of insects obtained nearer home, Mr. E. C. Rossiter exhibited *Asthena blomeri*, *Cymatophora fluctuosa*, etc., from Arley, and *Hepialus velleda* from Clent: the latter species had occurred more freely than usual this year, but the specimens were much below the average size. An interesting antiquarian exhibit was made by Mr. C. F. Haines, who showed insects captured by his father thirty years ago; among them was *Cymatophora octogesima*, from Bewdley.

The opening meeting of the Lancashire and Cheshire Entomological Society for the winter session, took place on Oct. 8th. Mr. C. S. Gregson stated that *Dasychira fascelina*, which he had supposed to have been exterminated from the sandhills, was in profusion at Formby in the larval stage; he exhibited specimens of *Lithosia sericea*, taken by himself this year; also *Melanippe hastata* var. *hastulata* from Suther-

landshire. Mr. P. Bright of Bournemouth, exhibited a series of a smoky form of *Spilosoma menthastri* from the North of Scotland; *Zygaena exulans* and *Crambus furcatellus*, taken by himself this year at Braemar; *Sesia scoliiformis* from Rannoch; a dark and well-marked specimen of *Noctua glareosa* from Montrose; dark forms of *Psilura monacha*, *Tortrix piceana* and a chalky variety of *Pyrgus malvae*, from the New Forest.

City of London Entomological and Natural History Society.—*Sept. 2nd*, 1894.—Exhibits:—Mr. Prout: a series of seven *Leucania albipuncta*, taken on sugar at Sandown, S.W., from which he had been unable to obtain ova. He had also taken one specimen each of *Caradrina ambigua* and *Triphaena subsequa*. Mr. Battley: *Eubolia bipunctaria* and *Zygaena filipendulae* from Bere Regis, Devon. The former were very neat, and he specially drew the attention of the members to two of the latter; one of these had the black band on the hind wings occupying nearly the whole of the wing, as is often the case in *Z. trifolii*; the other specimen had the upper spot of the middle pair of spots, reduced to a mere dot, and the spot nearest the tips, strongly bisected by the wing-ray. Mr. Bloomfield: bred *Nonagria typhae* from Bures, Suffolk. Dr. Sequeira: *Pterophorus monodactylus*, *Amblyptilia acanthodactyla*, *Oxyptilus tenerii*, *Platyptilia zetterstedtii*, *Aciptilia spilodactyla* (? Ed. from Folkestone) and *A. tetradactyla*, all from Folkestone. Mr. Bacot: larvæ of *Rusina tenebrosa* from ova, from Ongar Park Wood; he remarked that they were very slow feeders, and would probably hybernate when full-grown: also a bred series of *Triphosa dubitata* from Chingford. Mr. Hanbury: a very striking, pale form of *Agrotis tritici* from Hunstanton. Mr. Clark: a variable lot of *Gnophos obscurata* from Folkestone Warren. Mr. Tutt, commenting on these, observed that this species was one which responded very readily to its environment, and hence produced very strongly marked local races. Being an insect which rested on the ground, and occurred on a variety of geological formations, it was interesting to note how "natural selection" had stepped in, and perfected these local races. The dark New Forest and Perth races were, perhaps, the most melanic; another very distinct race occurred at Clevedon, whilst the palest local race yet obtained in Britain, came from the neighbourhood of Lewes. At Folkestone, it was widely spread, occurring by the road-sides, and being scattered over the Warren. The geological conditions of Folkestone were not at all uniform, the Gault and Chalk both playing, however, a large part in the localities inhabited by this insect. The hedge-sides, too, with their peaty and leafy coverings, side by side with the bare chalk-hills, tended to preserve dark and light specimens somewhat indiscriminately, with the result that a sort of polymorphism was set up in the species there, of which, however, the palest rarely equalled the Lewes specimens, nor the darkest the Perth specimens, whilst a very pretty form with a dark central band occurred some years in fair numbers, and was rather remarkable. Mr. Tutt: specimens of *Zygaena exulans* from Braemar, Cogne and the Grauson Valley, all of which were referable to Dalman's var. *rauadis*; also specimens from Lauteret in Savoy, and from Lauzon in Piedmont; the Lauteret specimens were beautifully streaked with orange along the nervures, as were the Lauzon specimens with yellow. The extreme Grauson specimens were almost identical with the Lauzon specimens, yet, at the other end, they were inseparable from Scotch specimens. Mr. Battley referring to *Zygaena filipendulae* var. *cervina*, said that this variety could be obtained at Lyme Regis, in one small spot, where it bred regularly every year.

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ENTOMOLOGY AT RAINHAM, ESSEX, IN 1894.*

By Rev. C. R. N. BURROWS.

I feel that, before commencing to address you, I should offer some apology for appearing before you this evening, and disclaim at the very beginning any pretence of being able to *instruct* you in matters entomological. I must assure you, then, that I feel in the position of one pushed into publicity, and I should have much preferred to remain the "*mute*, inglorious Milton" I have ever been, and to have taken the seat of a listener, while someone better qualified than myself interested and instructed us upon the subject of the evening.

While disclaiming any right to lecture you in a learned or purely scientific strain, I may yet lay claim to a certain amount of experience in collecting, gained through a long course of years.

Though not born with a net in my hand, my earliest memories are entwined with entomology, for amongst the first things which I can call to mind, is a visit with two spinster ladies to Hounslow Heath, in search of *Anarta myrtilli*, when myself too young to join in that healthy but somewhat exhausting exercise.

You will not then, I hope, take me for a novice, but rather for what I really am, an *entomological dabbler*—perhaps I should say an unscientific collector—of long standing, whose spare time for a great number of years has been devoted, whenever possible, to discovering and recording the Lepidoptera which *can be taken* in the various localities where my life has been spent.

So far, I have been introducing myself and not the subject before us, but it is really this lifelong passion for collecting, which has been the cause of my appearance before you to-night.

All English entomologists (perhaps I ought to say lepidopterists) seem to have been complaining of this year, 1894, as having been a very bad one for our pursuit. My systematic hunt has resulted in putting into my hands a number of insects which, though not, perhaps, what can be called rarities, seem to me to have a good deal of interest; and as this belief seems to be shared by my entomological advisers, I have allowed myself to be prevailed upon to lay before you an account of my captures.

* A paper read before the City of London Entomological Society, on Oct. 16th, 1894.

Rainham, the seat of my present investigations, is not itself a very inviting place. If any of you travelled to Southend in days gone by, or to Gravesend by Tilbury now-a-days, you will, I am sure, know the place. *It is the place for stinks.*

Here cabbages, onions and other vegetables are grown for the London markets; and here, also, the condemned fish from Billingsgate, the blood from Smithfield, and the bones from everywhere, are worked up into manures. The sweepings of streets and markets, the dust and rubbish from contractors' yards, sometimes even the offal from the slaughter yards, all, I believe, make their way to Rainham, spreading their aroma far and wide, until they are converted once more into cabbages, and sent back whence they came.

But you must not suppose that you know Rainham from what you see from the railway line. The parish extends over a wide area. My boundaries extend three miles north-east and three miles south-east, while some two-and-a-half miles of the northern bank of the river Thames come under my care. This district embraces a variety of country. Towards the river, it consists of marshes, reed-beds and coarse-grass lands, with occasional saltings and mud-banks; while to the north and east, the land rises gradually and becomes more wooded. But even this higher land is not so productive as one would expect. The farmers fell what trees they dare, and the hedges are cropped down in the merciless fashion, which denotes, I believe, the presence of "high cultivation" and "scientific farming."

But be the district what it may, so far as actual collecting goes it interests me little. My occupation limits my efforts chiefly to the use of sugar. It is rarely that I get a chance of using the net. Happily I have a decent garden, and this garden I "sugar" regularly every night, from March or April to October, by which time I find that human nature refuses to set out any more insects, and my captures generally go either mouldy, or else hopelessly stiff. I sugar then regularly in my own garden, just beside the railway station (where, by the way, I notice sometimes that a whistle from a passing engine will startle insects off the sugar), and also, once a week, in a spinny some three miles away, which spinny is my nearest approach to a wood. Once or twice I have tried sugar among the reed-beds, with no result, save the very curious captures which will be noticed farther on.

Every night, during the months I have indicated, the sugar pot is brought out (usually by a small boy duly instructed in the art), almost every tree and post in the garden is smeared with the mixture, and the "round" is visited by me as early or as late as I can manage.

I use the coarsest, moistest, darkest sugar obtainable. All of you know, of course, what a difference there is in sugars. Like the nigger, they may be known *by the smell*. The ideal sugar, for our purpose, "Jamaica Foots"—so difficult to obtain now—being the lowest part of the contents of the hogsheads of *unrefined* sugar, was always to be known by its sweet *sugary* smell, but most samples now obtainable lack this, and I imagine, that they are either prepared from beet-root, or else have gone through some new process of refining, which has removed the nice, though it has certainly developed the nasty, odour. This odour is itself deceptive, for I have heard of an entomologist, who felt sure that the sugar which he used was the right, because it *smelt of feet*.

I mix the sugar with beer to the consistency of treacle, add methy-

lated spirit (instead of rum), and a flavouring of oil of aniseed or essence of jargonelle pears (amylic acetate). I have tried the addition of poppy-heads and chloral hydrate to the mixture, hoping more effectually to stupefy the insects, but without much success, though I fancied that the poppy heads did quiet them a little; at any rate, this much is certain, that these latter additions do not drive the moths away.

A brother collector tells me that he once tried adding *gin*, and that he did not repeat the experiment, because he found that the insects fell from the trees and lay stupefied upon their backs on the ground before he could get round the first time!

I am certainly under the impression that change and variety in the way of scents and flavours prove an advantage, and that I have noticed particular moths to frequent particular mixtures. This seems to me to be reasonable, because natural scents and flavours are various, and no doubt some prove more attractive than others. Yet I would most carefully guard myself against seeming to imply that I think that insects have the same idea of scents or stinks that we have. *Apatura iris* is said to like offal—I don't. My only serious attempt to capture his majesty, with a drowned pig and a rotten rabbit, certainly drove him away, if he was in the neighbourhood at all, and I don't blame him either. The French are said to "sugar"! with rotten decomposed soap-suds, and the largest catch of insects I ever saw, was made with a mixture of sugar and *urine*. And besides this, three years' residence in Rainham has taught me that if insects appreciated sweetness as much as we do, they would have used their advantage over men by flying away as fast as possible, and that collecting in the neighbourhood and for miles round would be perfectly useless.

I never consult temperature, wind or moon, agreeing with a correspondent that all depends upon the temper of the moths. Sometimes they won't come, sometimes they will, and I have found that, given the sugar, it does not much matter what the other conditions may be. The only condition which stops me is, when heavy rain, running down the tree trunks, washes the sugar off, and this difficulty I have partly overcome, by nailing pieces of board on to the trees, so placed that the running water does not pass over the sugar.

I must now pass on to my experience in the past season. My diary, which has been posted up with more or less regularity for a good many years, and which contains entries as far back as 1870, tells me that up to the end of May few things were about. During June, matters improved slightly, though the species taken were of the commonest, and the specimens few and far between.

On the last day of June (a Saturday, I remember, because being out of rum, I felt that it was not quite the thing for me to go either in person, or by deputy, into a public-house bar, on that particular evening) I first added methylated spirit to the mixture, and from that date fortune smiled upon me once more. Whether the novelty of the scent (a trace of paraffin oil), or a change in the weather, or a general agreement amongst the moths that *strikes were played out* led to this happy change I do not know; all I do know is, that with the use of methylated spirit my luck turned, and I had no longer to write in my diary "nothing at sugar."

It is unnecessary to say more about methods of collecting, therefore I will content myself with mentioning, *seriatim*, those amongst my

captures which seem to me to call for notice. Specimens of most of these I have arranged in the two cases which I have brought with me to-night.

On July 5th, I took the first specimen of *Agrotis obscura*, a lovely specimen, the neat appearance, glossy wings, and bright red costa of which, both delighted and puzzled me. I had never seen the species alive before, and, like so many of my recent correspondents, I had only very poor specimens in my cabinet. I confess, without shame, that I thought at first that I had taken a curiously-marked *Noctua augur*, a mistake which was made the more excusable by the capture, the same evening, of a very red specimen of the latter insect, the red tint being very much the same as that on the costa of the former.

I have very little doubt that I passed over several more specimens of *A. obscura* before I discovered what it was, and it was not until the 8th, three days later, that I noticed a second specimen.

The numbers taken on different evenings, ranged from 1 to 27, and the captures extended from the 5th of July, until the 6th of September. Two females, which I had boxed for eggs, escaped alive and well on the 11th of September, and I do not doubt but that, had they remained prisoners, they would have lived some time longer.

The species was most common in the last week of July, but did not show much trace of wear and tear until the end of August. I took in all about 120 specimens, mostly in good condition. How many escaped me I cannot say (some nights they were very lively, and flew directly they saw the light), and how many my cat ate I do not know; I got weary of them towards the last, and was not very much concerned when they got away.

In the case before you are 62 specimens, selected by Mr. Tutt as representing the chief points of variation. I notice that the typical *A. obscura* has the costa red, whilst the var. *rarida* has, in addition, a black mark between the stigmata. These two forms are, I think, well represented in the first and second columns. There seems also to be a tendency to the development of the complete transverse lines on the upper wing which occur in several other *Agrotides*, and some very distinct specimens of this variety are in the third column, while the fourth column shows the forms which incline towards general suffusion and obscurity. A few specimens show also the development of a ladder-like series of lines between the elbowed and subterminal lines, which will also be very distinctly seen in some of the forms of *A. nigricans*, to be noticed later on.

After several failures, I succeeded in getting a good many eggs. These do not promise well; at first yellow, they have now turned leaden black and have lost their form. This is not, I know, a proof that they will not hatch, for I have before noticed eggs, notably of *Orthosia suspecta*, which seemed to shrivel up and flatten till they lost all shape, but, after all, hatched in due course. That these eggs are not simply infertile seems to be certain, because there are (as is usual) a few infertile ones which still retain their yellow colour.

The next species which I will refer to, is *A. exclamationis*. Though so common, I think that it is well worth examining for variation. Looking over the 62 specimens in the case before you, I feel that I cannot say that the majority are much out of the common, though they were all taken on account of some peculiarity. Many of them exhibited

when alive a distinct redness of costa (again recalling *A. obscura*), but I must acknowledge that I don't see much of it now that they are dry, though here and there I think it may still be traced.

The most remarkable are the five in the third column with united stigmata, particularly the one with the scorched appearance of the fore-wings. There are also two with the outer half of the fore wings clouded with a darker shade, giving them a very strange and distinguished appearance, as though related to *A. ashworthii*. I have remarked the same tendency in *A. obscura*, but it is, I suppose, unusual in both species. One specimen seems to me to be remarkably dark, and curious from the entire absence of all red tinge. The malformed specimen at the bottom of the first row seems to deserve attention, inasmuch as the slit in the right hand fore-wing is fringed all round, and the claviform, placed upon the abnormal lobe, is double. Were it not for this position of the claviform, one could almost persuade one's-self that the insect possessed a fifth wing.

The infinite differences in the form and development of the stigmata, the difference in length and width of the claviform, the almost total absence of both orbicular and claviform, and the smudged appearance of the reniform, are all noticeable, as well as the ladder-like series of lines between the elbowed and subterminal lines. The pale central area of the wing is also, in some specimens, reduced to a mere dot placed between the stigmata.

I have placed in the same case six specimens of *A. segetum*, on account of remarks which visitors have made about them. These black females I have always taken freely, and I should like to hear to-night whether other collectors have also found them common. For myself, I cannot help thinking that the reddish unicolorous specimen at the bottom is the more remarkable.

I come next to 124 specimens of *A. nigricans*. I may be pardoned, perhaps, for the confusion which I experience when I try to arrange them in order, and far more when I attempt to describe them, more particularly because I have neither taken nor noticed such varieties before.

A series of six, placed in the last row, represent the pick of my takings in 1893, and it is curious to remember that one or two of them suggested *A. obscura* so strongly, that I had actually entered them in my diary as that species, with a query intimating my doubt. At that time, I did not possess a specimen of *A. obscura* to refer to, and was guided entirely by Newman's figure which you will all remember. I imagine that the distinct transverse lines in that figure led me astray. I was again deceived in the same manner this year by a specimen in the fifth column, which occurred with *A. obscura* and actually got mixed up with that species as a small specimen, and when you look at it you will, I think, agree that I was justified.

The variations of *A. nigricans* seem to me truly remarkable. I knew nothing of the species three years ago. Common though it is generally considered, I am convinced that if a correspondent had sent me a few years since as *A. nigricans* some of the varieties in my case to-night, I should have put him down for an ignoramus and myself (of course) for a wise man.

The differences of colour, no less than the differences of markings, are confusing to a degree, and one can see but little likeness between the

almost brick-red form with yellow markings of the first, and the almost totally black of the last, between the almost spotless reddish-grey, and the finely-marked greyish-black.

The last four specimens of all appeal to me most strongly, and I think they "take the cake," both for coloration and for delicacy of pattern. I do not possess even one specimen of *A. agathina*, but imagine that these pretty little forms approach that species.

With a series like this before me, one feels the (almost) absurdity of Newman's solitary figure, and also of Stainton's six-line description:—"F.-w., dull-dark brown, clouded with black, sometimes of a reddish tinge; the more conspicuous markings are, a short blackish streak from near the middle of the base" (which, by the way Newman says, looks as though it had been scraped with a knife); "a black spot before the orbicular, a rhomboidal black spot between the stigmata, orbicular sometimes pale, reniform always so, especially its hind margin."

One cannot help feeling, in the face of such variations as these (and *A. nigricans* is by no means alone), that we are indeed still in the fog, if we longer content ourselves with speaking of a light or a dark, of a red or a black, of a streaked or a blotched, so-and-so. Possibly some of my correspondents would be glad of some of the forms before us to-night, but how on earth are they to acquaint me with their wants, unless the forms have a name. Can we not come *to an agreement* to name varieties? It is done in some cases not nearly so necessary as this. "A black *Amphidasys betularia*" would convey a clear intimation of what was in question, as would "a dark *Miselia oxyacanthae*," but to speak of a red-grey or a black *A. nigricans*, by no means meets the necessities of the case.

Besides being here so often reminded of *A. obscura*, I also find myself in some doubt as to where to draw the line between some forms of *A. nigricans* and *N. xanthographa*. You will, perhaps, smile and say to yourselves, why! the form and the structure forbid such a mistake. But *N. xanthographa* has sometimes narrower wings, and I have seen specimens (one of which, though a poor one, is in the case) which run so very close, that I do not like to decide for myself to which species they belong. And this is especially the case, where the white hind wings of the male *A. nigricans* have only a faint lunule but still possess the well-developed marginal band which we associate with the male of *N. xanthographa*.

I come now to a few other species taken this year, which seem to me to be somewhat out of the common. First, are four specimens of *Xylophasia monoglypha*; the pale one, bred; the three dark forms taken at sugar. The last specimen seems to me to be most interesting, for the reason that, although as dark, or nearly so, as the northern forms, it yet retains the pale spot on the inner margin, which occurs in the type.

Then I will ask you to notice a short series of *Anchocelis pistacina*, ranging from yellowish-brown to a fine red, the former colour appearing to me to be most curious; another series of *A. lunosa*, their colour varying from yellowish, through a decided red, to grey and even black (the last specimen is a puzzle to me, because, through the general darkness of the under wings, I fancy I can detect the lunule and broken band of this species; otherwise, it would be certainly a specimen of *A. pistacina*); two specimens of *Noctua baia*, the first red, which I take to be the ordinary form, the second purple, which almost suggests *N. stigmatica*, but is without the rhomboidal dark mark between the stigmata charac-

teristic of the latter species; one or two specimens of *Caradrina cubicularis*, which seem to be much darker than usual, a form which appears to have been rather common with me this year; lastly, a row of *N. xanthographa*, some red, and three very curious silvery-grey specimens which I take to be unusual.

Having gone through my exhibits, which I hope will at least interest some of the less experienced of your members, I may, perhaps, unless I have already taken up too much of your time, mention a few more species which I either have or have not taken at Rainham. First of all, the genus *Cerura* (*vinula* and her sisters), seems to be entirely absent, although poplars, willows and sallows, as is natural in such a marshy place, abound. *Gonepteryx rhamni* I have not caught sight of in three years, although a single *Triphosa dubitata* told me that there must be buckthorn within reach. *Dasychira pudibunda* must be very rare; a single larva found last week, alone proving its occurrence. None of the "sharks," except *C. umbratica*, occur.

I have taken single specimens of the following species, and cannot account for their presence, unless it be that, as travellers, they were, perhaps, trying to find out what sort of a place Rainham was, and if it be so, they have every reason to be dissatisfied:—

Diycla oo, a species dear to me, of which I have had 80 specimens on the boards at once. There is scarcely an oak near. *Orthosia suspecta*: there is but one birch tree for miles. I suppose that, although the books say of the larva "food-plant unknown," most of you know that it will feed up on birch. These two species are those to which I referred as being remarkable, inasmuch as they were the only captures worth noting taken in a reed-bed.

Two *Xanthia gilvago*, one last year, and one this. I am not so much surprised at taking this insect, as at not having taken more, for elms are common enough. *Phibalapteryx vitalbata* (at sugar); there is no clematis within three miles. *Drepana falcataria*. Remember the absence of birch. *Erastria fasciana*: taken flying, at 8 a.m. in my garden; of interest to me, because Newman says this species is common in the bogs of Killarney. I have only seen it in woods. A *Geometra papilionaria* must also have felt disappointed to have found no birch.

Larvæ of *Acherontia atropos* are fairly common. Last year I had five and reared three. This year I have had eight, none of which have produced moths so far.

Apamea ophiogramma is an insect which everybody seems to want. It was very rare at Brentwood, where I lived for six or seven years previous to settling in Rainham. I had no sooner got into the latter place, than I began to look about for means of enticing it into my garden. The striped ribbon-grass is a well recognised lure, and of this I found that I possessed one stunted specimen, growing in a stony path. I divided this, and, as is its habit, it increased and multiplied. The first summer, I got no *A. ophiogramma*; in 1893, I secured seven, and this year, twelve, between July 6th and August 15th. I have now large quantities of the food-plant growing, and hope next year to succeed in rearing some in captivity.

But what a difference there is between catching *A. ophiogramma*, and possessing specimens good enough for one's cabinet, if one is particular. How often what one thought good at first sight, fails to satisfy after it is set out. I am inclined to think that this, with some other species—

such as *Rusina tenebrosa*, &c.—require much more careful handling than the majority of insects (the scales seem to be more loosely fixed), and I now kill *A. ophiogramma* with oxalic acid, and set it with the least possible delay.

A. saucia seems to have been entirely absent from Rainham this year, for I have not seen a single specimen, good or bad. The local form is a beautiful one, being much clouded with light grey, and the specimens are considerably larger than those which I have been accustomed to meet with elsewhere.

A. lunosa has been very abundant on sugar this year. One seems to have taken it more frequently at light, and I find a note that the first time I ever saw it at sugar, was on September 27th, 1892. Perhaps it is a case of acquired taste, which has become hereditary.

I took a specimen of *Hadena thalassina* at sugar, on Sept. 4th; Stainton gives June and July; Merrin, May, June and July; Newman, May and June. I bred *H. suasa* (one out of a number of pupæ), on the 15th of August; Stainton gives June; Merrin, May, June, and sometimes, August; Newman, June.

A friend took a single *Zygaena filipendulae*, at Southend, on the 4th of September; I myself took one at Penzance, on August 11th, 1890; Stainton gives June and July; Merrin, June; Newman, June, beginning. I found a freshly-emerged ♀ of *Metrocampa margaritaria*, sitting on a grass-stem at the foot of a tree, on the night of Sept. 5th; Stainton, gives July; Merrin, June and July; Newman, July. I find I took a specimen at light on the 30th August, 1893.

A friend writes me that he was taking *Agrotis tritici*, on Sept. 14th, of this year; Stainton, gives August; Merrin, July and August; Newman, July. I took *Leucania impura* a week ago.

Some of these are doubtless instances of partial second broods; some, perhaps, cases of the survival of the fittest, most vigorous and latest developed. One can understand that, when an insect's period of flight covers perhaps a month, some individuals may be delayed some little while beyond the rest, and some of these may live long beyond the time of those first developed. Or, a change of weather, when the larvæ are feeding, may check the growth of some, kill others, and perhaps, not affect the remainder, who may have got beyond the stage where the check can be felt. In confinement, the larvæ which lag behind the others generally seem to me to die, but in a wild state, they may possibly pick up again, and go through their changes successfully, and, possibly, in solitary grandeur. In the year 1886, I found on June 3rd, a magnificent ♀ *Saturnia carpini*, evidently just emerged, a month late at least.

One last word to those who, like myself, hope against hope, for a grand catch of rarities—people who have seen *Vanessa antiopa*, but have not caught it. May it not be that we, who call ourselves the unlucky ones, are to have our luck amongst varieties, instead of amongst species? I suggest, of course, that there must be varieties of common Lepidoptera which are as rare as *V. antiopa*, as rare, perhaps, as *Valeria oleagina*, and some varieties may prove to be unique. If luck does not favour us one way, it may another. The very commonest species may produce a prize. How many have been cheered and gratified by a grand var. of *Arctia caia*, or of *Abraxas grossulariata* (I once threw away a whole brood of semi-transparent specimens of the latter species, only troubling to set two, to show how *wretched* they were). A great

friend and I once could get nothing by beating but larvæ of *Cabera pusaria*. *He bred from his lot a moth which was entirely grey.* I sent the same friend, from Cornwall, a number of larvæ of *Spilosoma menthastri*. He bred from them some melanic forms, which, to say the least, are not to be picked up every day, and which fetched a good price when he sold them. I must conclude, by thanking you for your kind attention, and by another humble apology for the imperfections and commonplaces of my paper.

The Life-History of a Lepidopterous Insect,

Comprising some account of its Morphology and Physiology.

By J. W. TUTT, F.E.S.

(*Continued from page* 247).

Chap. III.

PARTHENOGENESIS or AGAMOGENESIS.

We have seen in Chapter II. that, among the Lepidoptera, it is generally necessary that the two generative elements should unite before reproduction can take place, that these two elements are produced in different individuals, the two sexes never being combined in the same individual, and that copulation between the sexes is necessary for the fertilisation of the ovum and the consequent production of young. Still it would appear that, under certain conditions, neither the two sexual elements nor the copulation of the sexes is necessary for the production of young, since eggs will occasionally produce larvæ without such union, which larvæ will develop into fully matured and fertile imagines.

In the section on the variation of eggs in regard to colour (Chap. II., Sect. 2c), it is pointed out that the initial colour-change, which takes place more or less in the eggs, is no sign of fertilization having taken place, but that it occurs in unfertilized as well as in fertilized eggs and is the outward sign of an embryonic growth or cell-change which is taking place within the egg itself. In the unfertilized egg this growth usually goes but a very short way, although a much more complex embryonic structure is developed in some species than in others, and there are cases on record in which this has gone so far as to give rise to a fully developed embryo, which has in due course hatched and become perfected. Nature then, under special circumstances, produces and perfects progeny from virgin females, without the intervention of the male. The fact has long been known, and the old authors termed the phenomenon "Lucina sine concubitu." Virgil refers to it in the *Georgics*. In later days the phenomenon has been termed "agamogenesis" or "parthenogenesis." Spontaneous generation was the explanation given by the older philosophers. Rejection of the facts was the method by which the latter-day cynic tried to persuade himself of the impossibility of such an occurrence. But much as there is to be said for those who insisted that the experiments were not conducted with sufficient care, and that the observations were not sufficiently accurate, it must be admitted that the accuracy of many of the observations is beyond question, and a scientific explanation of the phenomenon must be sought.

In the lowest Invertebrates, as is well-known, reproduction takes place either by cleavage or by gemmation. In the latter case, little cells grow out of the parent cell, which finally become detached, and mature into perfect cells; in the former, the parent cell itself sub-divides by fission, each part becoming an independent organism. There is yet a third method in which the whole cell becomes covered with a gelatinous cyst, within which the protoplasmic body is broken up into a number of cells; these after a time break open the cyst, and leave it as separate individuals, the process being termed encystation. In the Hydrozoa, reproduction is carried on all the summer by gemmation, but in the autumn, sperm cells and germ cells are produced in the same individual, the former fertilizing the latter and producing ova, in which stage these creatures pass the winter. This method of sexual reproduction (minus the summer gemmation) is very common as we ascend in the animal scale, but when we come to insects we find that the sexes are differentiated in separate individuals, and, as a rule, that coition is necessary for reproduction.

Among the Crustaceans, to which insects are closely allied, we find such species as *Polyphemus oculus*, *Apus cancriformis* and *Limnadia gigas*, which, according to Newman, "contain only female individuals, the presence of a male being the exception." *Daphnia* has males as well as females, but the females, according to Lubbock, appear equally prolific in the absence of the males.

Newman also states (*Essay on the employment of physiological characters in classification, etc.*, 1856), that "in Arachnida, males and females are familiarly known; but the fertility of the female is not dependent on coition with the male. I have found the isolated female of *Epeira diadema*, invariably produce her circular mass of eggs, and have as invariably found these to be fertile. If coition had taken place at all, it would have been while the females on which I experimented were in the infant or larval state, and prior to the first ecdysis; affording, if this be made out, an instance of a phenomenon altogether abnormal."

Most of the records of the occurrence of parthenogenesis in Lepidoptera are, from a scientific point of view, of the most unsatisfactory nature, being based rather on chance observations than on any specially devised experiments. This, however, need not be wondered at, for those entomologists who breed insects in the largest numbers, usually do so in order to obtain fine imagines for their collections, and if they wish to inbreed any species, they, as a matter of course, pair their females with males, to ensure the fertilization of the eggs. For even when a species has a parthenogenetic tendency, only a very few of the eggs that are laid by an unimpregnated female are found to be fertile, and a very large number of female moths have to be sacrificed in order to obtain a very small supply of parthenogenetically fertile eggs.

This has been well illustrated by Mons. Jourdan in his article dealing with this subject as exemplified in *Bombyx mori* (*Comptes Rendus Hebdomadaires des Séances de l' Académie des Sciences, Paris*, vol. liii., 1861, pp. 1093–1096), where he remarks that the reproduction of "papillons" by virgin females has often been noticed by scientific observers, and that it has long been customary in the silk-producing countries of France, "to regenerate a worn-out race by using 'la graine vierge,'" that is to say, eggs produced from females without contact with the

males. He then goes into detail and shows what proportion of female moths give fertile eggs parthenogenetically, and states that in his "researches into the subject of sericulture in the South as well as in Piedmont and Lombardy, the same remarks have often been heard." He adds:—"Although we do not attach a great belief in this singular phenomenon among animals so highly organised as butterflies, in the face of all these affirmations and of some doubts it became necessary to submit the fact to experiment." In 1850 some partial experiments, which gave no certain results, were made, the experiments not having been followed up to the hatching of the eggs considered to be fertile. In 1851, further experiments were made on yellow cocoons from Briance or Milan, of a form which gives only one generation per year: the experiments were surrounded by every possible precaution, and were made on a large scale. A summary of the results is then appended.

The first experiment was as follows:—In June 1851, three hundred cocoons were selected, and, so that there should be no communication between the imagines on their emergence, each cocoon was placed in a small cardboard box carefully covered with gauze, which completely imprisoned the moth on its emergence. These three hundred cocoons produced 147 females and 151 males. The boxes containing the males were removed, and those containing the females were carefully preserved without being uncovered.

Of the 147 females, 6 only gave, in the course of their laying, really fertile eggs. 2 of these gave seven, 2 four, 1 five, and 1 two. These 29 eggs, preserved in their respective boxes without being uncovered, to render error impossible, were the only ones which hatched in May 1852. There were also a large number of other eggs, which passed from the pale yellow (which is their colour when newly laid) to the more or less slaty-grey which replaces it after some days in fertile eggs; but at length these eggs, which gave at first the characteristic sign of fecundity, shrivelled up, whilst a few others, which preserved until spring the usual form and colour of fertile eggs, did not produce larvæ; on opening these last eggs they were found to contain putrefied matter, apparently recently formed.

In this experiment, therefore, based on the eggs of 147 females, only 29 larvæ were produced. The total number of eggs was about 58,000, so that the completely formed eggs were about in the proportion of 1 : 2,000.

In July of the same year (1851), a second experiment was made on white cocoons coming from South China, of a form giving five or six successive generations in one year. Fifty cocoons were shut up as in the last experiment, and from these emerged 23 females and 26 males. Seventeen of the twenty-three females gave completely fertile eggs. These fertile eggs were in the proportion of 1 in 17, and hatched 17 days after being laid. One of these females gave 113, and the least productive gave 12. The total number of eggs laid by these 23 females was 9,000, of which 520 produced caterpillars.

The conclusions arrived at by Mr. Jourdan (*l.c.*, p. 1095) are very interesting. The experiments proved conclusively that virgin females of the silkworm moth could reproduce their kind without copulation with males. This parthenogenetic reproductive power was, however, exceedingly feeble, as the figures quoted prove. Again, of the two

different varieties experimented on, the form with five or six successive generations per year was much more reproductive parthenogenetically, than that with a single generation.

One of the most interesting of the early essays on this subject is, that by Von Siebold, which was translated by Dallas, the translation being entitled, "*On a true parthenogenesis in moths and bees.*" Siebold was led into his enquiries by some observations made on the reproduction of a species of moth belonging to the genus *Psyche* which, as he noticed, propagated without copulation. Following this up by observations on bees and the silkworm moth, he found that the phenomenon of reproduction by virgin females was not at all uncommon, and adopted the term "parthenogenesis" (originally suggested by Professor Owen), for this peculiarity. Owen, however, had originally used the term "parthenogenesis" for what we now know as "alternation of generations" a vastly different phenomenon.

According to Siebold, the oldest communication relative to reproduction by female insects, *sine concubitu*, was made by a surgeon, J. P. Albrecht of Hildersheim, who in the year 1701, relates, in a memoir, that he took a brown pupa which had spun itself up on a black-currant bush, and preserved it under a glass in his summer-house, to see what moth would be evolved from it. At the end of July, a moth of yellowish-white colour escaped from it (supposed to be a Bombyx or Noctua), which in a few days laid a great number of eggs and then died. In April of the following year, Albrecht again looked at the glass, and was astonished to find young black caterpillars in it instead of the eggs. One may fairly suppose from the surprise of Albrecht, and the communication he made to the Leopoldine Academy of Naturalists, that he was satisfied that copulation had not taken place. Bernoulli, in 1772, recorded that Baster had obtained fertile eggs from an isolated female of *Gastropacha quercifolia* which had been bred from a caterpillar, and further, that a caterpillar of *Episema* (*Diloba*) *caeruleocephala*, having changed to a pupa, the pupa was left in a closed box without farther attention, and that, about fifteen days after, he was surprised on opening the box to find, besides the enclosed moth, a family of young caterpillars "which had already devoured the pupa-case of their mother, and a portion of their own egg-shells." Denis and Schiffermüller, the well-known Viennese entomologists, pointed out in 1776 (*Syst. Verz. der Schmett. der Wiener Gegend*, &c., p. 293), the possibility that these cases were simply errors of observation, whilst Von Scheven declared that fourteen days, from caterpillar through all the phases of pupa, moth, eggs and dead larvæ, was hardly a reasonable period, and that the larvæ were probably from eggs laid by another female moth, previously confined in the same box.

Siebold, being very dissatisfied with what was known about the subject at this time, turned his attention to the "case-bearers"—*Solenobia lichenella* and *S. triquetrella*, and during the years 1850, '51 and '52 (the time it may be observed when Mons. Jourdan was conducting his experiments on the silkworm moths), he collected several hundred cases. To his great astonishment none but females emerged from these cases, and they commenced almost immediately to lay eggs. They "possessed such a violent impulse to lay their eggs, that when I removed them from their cases . . . . they let their eggs fall openly. If I had wondered at the zeal for oviposition in these husbandless *Solenobia*, how was I

astonished when all the eggs of these females, of whose virgin state I was most positively convinced, gave birth to young caterpillars, which looked about with the greatest assiduity in search of materials for the manufacture of little cases!" This production of fertile eggs without previous copulation has also been observed in *Solenobia lichenella*, by Wocke and Rentti. Of *Psyche helix*, Siebold says:—"Of this extremely remarkable moth we are at present only certainly acquainted with the female. In the caterpillar state it lives in a case, which in its form resembles a sinistral snail-shell." Siebold, to convince himself of their sex, made dissections of many of the wingless and almost footless moths, whose unfertilised eggs, concealed in the pupa-case, developed in the same year.

In 1795, Constans de Castellet, General Inspector of the silk industry in Sardinia, reported to Réaumur that he had reared caterpillars from unfertilised eggs of the silkworm moth. "Ex nihilo nihil fit" was Réaumur's short and sceptical reply. Herold, in 1838, reported that amongst the eggs of an unfertilised silkworm moth, some here and there passed wholly or partially through the same changes which were observed in eggs fertilised by true copulation, although most of the eggs remained unaltered; and the same author even distinguishes (*Disquisitiones de animalium vertebris carentium in ovo formatione*, Fasc. II., 1838, Tab. 7, fig. 31) between the fœtus developed from fecundated and that developed from unfecundated eggs, the former making its escape as a larva, whilst the latter remained in the egg-shell and died. Herold further furnishes an exact and detailed description of the changes which may be detected with a lens, as taking place in a determinate sequence in different silkworm eggs which developed without fecundation. He distinguished readily "various degrees of the faculty of development of unfertilised eggs, which manifested themselves by infinite differences in the disposition, number, form and strength of colour, of the coloured part of the egg." In some of these unfecundated eggs the faculty of development had attained such a high degree, that Herold "was able to extract a fœtus from one of them in the middle of winter." According to Herold's account, embryos capable of development were not found in all the unfertilised eggs which he examined, nor had he seen young caterpillars creep out of unfertilised eggs, as just before the period of hatching they ceased to live. It must be borne in mind, however, that Malpighi as far back as 1669 (*Marc. Malpighii Dissertatio de Bombyce*, Londini, p. 82), was well acquainted with these differences, and even then knew that the eggs were not fertilised at the time of copulation, but that each one was afterwards fertilised separately.

Siebold quotes a communication made to him by Mons. P. de Filippi, in 1851, to the effect that a celebrated English entomologist, Mr. John Curtis, when passing through Turin, had told him of an isolated chrysalis of *Bombyx polyphemus*, which he had received from America, and from which a female emerged, all of whose eggs developed, adding that he believed the same thing happened with *Bombyx mori*, even when altogether separated from males. In proof of the latter, Filippi stated that in 1850, he observed it in that variety of the silkworm moth known as *trerotini*, a species having three broods in the year, that Mons. Griseri who was also much interested in the silk industry had found that many eggs of virgin females developed, and had been informed by many other silkworm raisers that they had observed the same fact. Siebold also

mentions that various silkworm breeders in Breslau and Munich gave him similar information, and one of them, Herr Steiner of Breslau, enabled him to carry out some experiments on an extensive scale. He noticed "exactly the same well-known change of colour which took place in the fertilised eggs soon after their deposition" in a large number of unfecundated eggs as had previous observers, but many stopped at various stages, some only becoming reddish or violet, and very few unfertilised eggs passing through the entire series of colour-change to slaty-grey. Siebold obtained no larvæ from them, but in 1854, Herr Schmid of Eichstadt sent him unfertilised eggs from which he got larvæ. He tells us that he expected to breed only males, his mind having already been influenced in the matter by reading Lacordaire's account of Carlier's observation "that he obtained, without copulation, three generations of *Liparis dispar*, of which the last gave only males, which naturally brought the experiment to an end." Siebold, however, reared both males and females, which copulated freely, and appeared to have quite the ordinary amount of vitality, whilst Dr. Kipp had previously recorded the rearing of both males and females from some unfecundated eggs of *Smerinthus populi*. Schmid at the same time made some experiments which gave a similar result.

Erratum.—Page 246, line 22, for "octoderm" read ectoderm.

SCIENTIFIC NOTES & OBSERVATIONS.

Notes on the Life-history of Melanippe rivata and M. sociata. —Writing of the specific distinctness of these two geometers, which I suppose no one with any knowledge of them could now question, Newman (p. 162), quotes Hellins as saying that "The difficulty of obtaining both species in the same stage, at the same time, no doubt renders this comparison" (of the larvæ)" less perfect than it might be, could they be placed side by side," &c., &c. This remark has always surprised me, and shows either that Mr. Hellins did not take any great pains in the matter, or else that *M. rivata* occurs earlier, or lasts for a shorter period, in some districts, than in the Isle of Wight. It is quite true that the time of the appearance of *rivata* in the imago state is, roughly speaking, intermediate between the two broods of *sociata*, but at Sandown, the two always overlap in the latter part of July and first few days of August, for a period of from two to three weeks, according to circumstances. Of course, for the purpose of a comparison of the larvæ, it matters not that *rivata* has been on the wing longer than *sociata*, since I have always found that, however worn it is, it is good for a few eggs at least, and I have sometimes obtained quite fresh specimens after *sociata* was well out. By the way, I strongly suspect that Newman's statement that *rivata* is "never double-brooded in a state of nature," is not quite accurate; it is, in captivity, a somewhat erratic species, some broods keeping rigidly to the long pupal period, others producing one or two precocious imagines in the autumn, while a friend of mine had one small brood (from a June ♀) which reached the imago state the same summer—I believe in only five or six weeks. I, unfortunately, have only limited opportunities of collecting in June, but the *rivata* which I breed emerge from the extreme end of May to about

June 26th, and if this is anywhere near the normal period at Sandown in a state of nature, the good specimens which I met with a month or two later (this year I took one absolutely perfect on August 30th), must belong to this class of "forwards," and as they are certainly entirely fertile, we shall have a complete second cycle, or a genuine, though partial, "double brood." At any rate, whether the August *rivata* belong to a second brood, or are retarded emergences, I determined this year to make them serve my purpose of obtaining a side-by-side comparison of the early stages, and though I did not arrive at Sandown until August 4th, too late to meet with many *rivata*, I managed to capture a worn ♀ on August 13th, and took a ♀ *sociata* the same day for my comparison. In order not to lose time, as I feared the *rivata* would not last long, I slipped a small shoot of *Galium mollugo* into each of the boxes where I confined my ♀ ♀, and on my arrival home, I found that both had commenced to lay; the *rivata*, however, only laid six eggs, and was dead by the morning of the 15th; the *sociata* had then laid 70, and I let it go. Both species will lay freely in chip boxes on the little bits of *Galium* introduced, but very rarely if ever, on the box itself, when they can get the food-plant. Both laid the eggs singly, on the underside of the leaves, at the edge, and generally near the tip, one only (*sociata*), on the stem. The eggs, superficially viewed (I was not able to subject them to microscopic examination), are similar in form and consistency, of the ordinary ovoid form of the group, smooth and shining; but *rivata*, besides being of course the larger, is distinctly paler, so that I should describe it as almost cream colour, while *sociata* is decidedly tinged with yellow; it also appeared that *rivata*, was perhaps, slightly the narrower proportionately, at the narrower end. No change takes place till very shortly before hatching (I have no precise observations to record, but certainly well within twenty-four hours), when the usual darkening, through an opaque but not dark greyish to quite a deep leaden tint, occurs. A few *sociata* hatched on August 23rd, and the rest very shortly after; one *rivata* on August 24th, four more within a day, the sixth proving infertile. The duration of the egg stage with *rivata*, may thus be taken as one day longer than with its ally, atmospheric conditions being identical. This observation is supported by one made upon the two species last year, within ten days of one another, when (in July), each hatched a day more rapidly than this year (in August), but the relative period was the same. The larvæ when first hatched are very similar, and, rather curiously, the size difference is less observable than in the eggs; indeed I wrote that they were "apparently of practically the same size." They are of a unicolorous greyish-yellow, the head deeper, and more of an orange tint. Both would occasionally drop by a web when touched, a habit which most of the "carpet" larvæ seem to have in their first skin, though, as far as I recollect, only *galiata* retains it into the second, and even in this case the maturer larva entirely abandons it. Most of the *sociata* reached their first moult on August 28th, the more backward ones being just the size of their contemporary *rivata*; on that day I again compared the non-moulting larvæ, and remarked that *rivata* was decidedly brighter in colour, almost apple-green, while *sociata* was of a duller, more glaucous green, and also that *rivata* was smoother, *sociata* being a little rugose laterally. *Rivata* reached its first moult the next day (August 29th), and after this, another comparison of the contemporaries showed similar differences to those just noted;

I also observed a slight difference in the favourite resting posture, *rivata* appearing to be more partial to a *straight*, or nearly straight posture, whether holding on with its fore-legs, or not, *sociata* to an attitude more or less curved. Many of the *sociata* entered their third skin on September 3rd, the *rivata* on September 4th; that day I again compared the latter with a backward *sociata*, which had been isolated for the purpose, *i.e.*, one which also had only recently entered this skin. As is usual with the *Larentiidae*, the characteristic markings now appear, and the two species are now exceedingly similar, much more so than in the previous skin: a very careful comparison led me to doubt whether there was any difference except those slight variations, which one constantly observes between individuals of the same species, or even of the same brood. *Rivata* was a trifle larger and paler, the dorsal pattern being in a lightish brown, instead of dark brown as in *sociata* (dorsal spots and sub-dorsal line in *sociata*, nearly black); the V-mark on the face, on the other hand, was perhaps the better defined in *rivata*. Compared again two days later (September 6th), I made the following notes:—"Dorsal line on hind segments quite black in *rivata*, greenish-grey in *sociata*, dorsal pattern also generally presenting a different appearance: in both, a series of indistinct dusky arrow-head markings pointing forward, but in *sociata* fairly clear *whitish* borders these interiorly, while in *rivata* the whitish is very ill-defined, except a *clear white* spot in the apex; in *rivata*, too, the segment-incisions are somewhat broadly orange-brown, more contrasted with the ground colour (dirty greenish-brown) than in *sociata*." On or about September 10th, the *sociata* entered their fourth and last skin, *rivata* following a day or two later. Compared on September 13th, they were still very similar, but *rivata* was the more richly coloured; the ground colour richer brown, and the pattern much more distinct, the white dorsal spots still large and conspicuous, and the dark external shading of the "arrow-heads" well pronounced, its hinder half quite black; in *sociata* the *prima vista* appearance being of an almost unicolorous dorsal surface, except the black dorsal lines on segs. 2–3 and 10–13. In *rivata* I also noticed a conspicuous black spot on the side of segs. 8 and 9 (?), which were generally absent in *sociata*, or very ill-defined. In their final skin, the *sociata* gained another day or two on *rivata*, the latter going to earth between September 21st and 22nd, about a day and a half after the most backward *sociata*. From these comparisons, it would appear that there is no period of the larval existence when the two larvæ show any differences of obvious specific value, though such differences could doubtless be made out from the eggs; I did not observe the difference between the structure of the dorsal "arrow-head" between the 4th and 5th segments of the larva, which Hellins emphasises. As for the imagines, though I have sometimes seen series mixed in good collections, yet this must be due to carelessness. I have never met with a good entomologist who could not discriminate the two with attention.—L. B. Prout, 12, Greenwood Road, Dalston, N.E. *Oct. 4th*, 1894.

NOTES ON COLLECTING, Etc.

Apamea ophiogramma in London.—The paper dealing with this species which was read by Mr. Battley before the City of London Entomological Society on Sept. 3rd, 1891 (*Ent. Rec.*, vol. ii., p. 191) in-

duced me to import several roots of striped ribbon grass; but although we kept careful watch both for larvæ and imagines, none were seen until this year, when three were taken—one on July 8th, another on July 24th, and the third on July 27th. The specimen taken on July 24th was perfectly fresh. It seems that this species is within the reach of any one, at any rate in London, who takes the trouble to import a few roots of the grass into his garden.—Ambrose Quail, Stamford Hill.

Laphygma exigua in the Isle of Wight.—It is my good fortune to again chronicle the capture by myself of this pretty and very distinct little Noctua at Freshwater, upon Sept. 25th. The specimen is unfortunately very faded, and in this respect contrasts very unfavourably with the previous capture (*ante* page 229) which however can hardly be wondered at, as it is more than three weeks later, and the weather has been most unsettled in the meantime. My experience is that *L. exigua* is most easy to distinguish, when upon the sugar, from *Caradrina cubicularis*, as the latter sits very flat with the wings overlapping, and has a remarkably level appearance, whilst *L. exigua* droops its wings, after the manner of *Plusia gamma* at rest.—Albert J. Hodges. *Sept. 26th*, 1894.

Noctua dahlii not at York.—The reference (*ante*, p. 256) to the occurrence of this species at York is an error. *N. dahlii* has never been taken here. It occurs at Shipley Glen, Bradford, where, in some seasons, it is common.—Wm. Hewett, Howard Street, York. *Oct. 23rd*, 1894.

Collecting at Cromer: a correction.—The sentence in my note (p. 252) referring to treacling on the cliff on *one* night only seems to indicate that this was the only treacling we did; this is misleading. I meant to imply that we only treacled *on the cliff* on *one* night; the remarks following the sentence referred to, relate to the whole of our experience at Cromer in the treacling way. We tried it in several localities rather more inland, and found that the flower-heads, when treacled, paid better than trees; of the latter, indeed, there were very few suitable for the purpose.—C. Nicholson, 202, Evering Road, N.E. *Nov. 2nd*, 1894.

Food-plants of Bombyx quercus.—The larvæ mentioned in my Cromer note last month are about 2 inches long, and seem disposed to feed up without hibernating. As bramble, rose, &c. (to which they are now reduced), are getting scarce, I shall be very glad if someone can recommend me any evergreen plant which they will eat. Owen Wilson gives "Ivy (in winter);" does anyone know if this is unfailing, or is it likely to be a matter of taste according to the brood? Mine are now, I think, in their fifth skin.—C. Nicholson, 202, Evering Road, N.E. *Nov. 2nd*, 1894.

NOTES OF THE SEASON 1894.

Short Notes from the Books of the Exchange Baskets.—Mr. H. Bickerton Jones (Liverpool) writes on September 4th:—"This season has been, I think, the worst I ever experienced. I believe matters are improving with the autumn, as many insects have been taken at Delamere lately."———Mr. J. E. Robson (Hartlepool) writes on September 5th:—"It has been a wretched season here. Sugar has been fairly attractive to common things, but the only decent insects which I have taken at it are one each of *Mamestra abjecta* and

Agrotis ravida. Ragwort has been fairly productive of common things, and *A. valligera*, which had been quite rare for a few years, was almost as common as *A. tritici*. Can anyone tell me how to distinguish the larvæ of these? I cannot separate them."———Dr. Corbett (Doncaster) writes on September 6th:—"The season here continues to be bad, but a few good things have turned up, among which are *Sciaphila sinuana* and *Scoparia basistrigalis*. The latter species was fairly common at Edlington in July. I have not seen one really good sugar night so far, but things are improving. Latterly, a few specimens of *Cosmia paleacea* have come to the sweets."———Mr. Vivian (Taibach) writes on September 8th:—"Here, at Sligo, I have taken a fair number of *Agrotis cursoria* and *A. tritici* on the ragwort flowers, with a few *A. præcox*. A few *Stilbia anomala* were captured flying over the heath at dusk and coming to light. At light also, on the heath, I captured *A. tritici*, *A. lucernea* and *Epunda lutulenta*."———Mr. Whittle (Southend) writes on September 10th:—"Sugar is just now fairly productive in this neighbourhood. *Noctua c-nigrum* is the insect most strongly represented. In my line of sugar there is a solitary ash, on which I took, last Thursday, a fine *Cirrhoedia xerampelina*. Under the same tree, on Friday, I found on a grass culm a beautiful example of the same species, evidently only recently emerged; also *Depressaria alstræmeriella*. *Nomophila noctuella* is absent apparently, although it swarmed here last year. I have seen two specimens of *Colias edusa*, one of which I captured. A good supply of *Phorodesma smaragdaria* larvæ have also been obtained by careful searching. My hunting ground for this species comprises about a mile of saltings. This year, the larvæ occurred on the same three clumps of *Artemisia maritima* on which I found them last year; one of these yielded five-sixths or more of the larvæ taken, the proportion of larvæ to each clump being much as last year. I should say, from my experience, that it is a truly conservative larva. The most striking species which I have taken since the 28th of July, are:—*Crambus selasellus*, *Myelophila cribrella*, *Pamphila lineola*, *Gonepteryx rhamni*, *Melanippe sociata*, *Catoptria tripoliana*, *C. candidulana*, *Lita obsoletella* (?), *Agdistis bennetii*, *Eupithecia oblongata*, *E. subfulvata*, *Aspilates ochrearia*, *Acidalia subsericeata* (very late.—Ed.), *Cataclysta lemnata*, *Conchylis francillana*, *Agrotis ypsilon*, *Depressaria yeatiana*. At light the following appeared:—*Luperina testacea* (very common), *E. oblongata*, *N. c-nigrum*, *Scopula ferrugalis*, *Endotricha flammealis*, *Notodonta dictæoides*, *Pionea forficalis*, *Aspilates ochrearia*, *Crambus geniculeus*, *E. subfulcata*. At sugar:—*Agrotis ypsilon*, *Plusia gamma*, *Phlogophora meticulosa*, *Calymnia diffinis*, *Noctua c-nigrum*, *Amphipyra tragopogonis*, *Acronycta rumicis*, *Depressaria applana*, *Agrotis puta*, *Ptcrophorus monodactylus* and *Metrocampa margaritaria*."——— Mr. N. M. Richardson (Weymouth) writes on September 11th:—"I am glad to say that I have not found the season so exceedingly bad as some of the members of this basket, though I have not been able to do a great deal of collecting. I think, however, that the season at Portland is not always influenced by the causes which affect it elsewhere, possibly from its isolated position. In some respects Portland has suffered this year; for instance, *Agrotis lunigera*, which is generally pretty common, has been almost absent. On the other hand it has been a good year for *A. pyrophila*, which varies exceedingly in its appearance, and an average one for *A. lucernea*."———Mr.

Mason (Clevedon) writes on September 13th:—"Collecting here is no more a success than it was two months ago. Sugar is almost a failure. I have scarcely missed an evening for the last three weeks; a couple of dozen *Amphipyra pyramidea*, with an odd specimen of *Noctua rubi*, *N. xanthographa*, and *Agrotis puta* are all that I have seen or taken. The ivy is just coming out, but I do not feel very sanguine as to autumn collecting. There has been a great scarcity of butterflies this autumn. *Pararge megaera* is the only species that has been plentiful. Whites are very scarce (much to the delight of the gardener), so also are *Pyrameis atalanta*, *P. cardui*, *Gonepteryx rhamni* and *Vanessa urticae*, though the last-named was abundant in the larval stage. *Lycaena icarus* has also been scarce, and the few seen were much smaller than usual. I have seen one or two specimens of *Vanessa polychloros*, but no *Grapta c-album*; both these species are, however, usually scarce with us."———Mr. Atmore (King's Lynn) writes on September 17th:—"The weather during August interfered much with collecting. *Agrotis agathina* occurs here, and I tried for it on one suitable night during August but got only one specimen, apparently just emerged."———Rev. C. F. Thornewill (Calverhall) writes on September 17th:—"*Procris geryon* was very scarce this year in the Bakewell district, where last year it positively swarmed, and its food-plant (the rock cistus) was very late in flowering. *Melanippe tristata* was equally scarce, and those that I did take were mostly boxed or netted whilst sitting on the stone walls, which form such a conspicuous feature in North Derbyshire scenery. *Eupithecia pygmaeata* I saw only on one day, when I caught two specimens and missed a third; it flies in the middle of the day in the hottest sunshine, but seems to be no wise abundant."———Capt. Robertson (Coxhorne) writes on September 20th:—"I have just returned from Tenby, where I spent the month of August. The insects I took there were:—*Epinephele tithonus*, abundant; *E. hyperanthus*, worn; *Pararge egeria*, in fine condition and moderately common; *Lycaena argiolus*, scarce; *Hipparchia semele*, common on the sandhills; *Aspilates ochrearia*, not common; *Melanippe galiata*, scarce; *Bombyx quercus*, scarce; *Bryophila muralis*, scarce, on old wall of pier; *Enbolia bipunctaria* and *Gnophos obscuraria*, fairly common on the sandhills; *Agrotis praecox*, just beginning to come out as I left, three or four were obtained by shaking roots of sand-rush; *A. cursoria*, *A. vestigialis*, and *A. tritici* were very common, especially the latter, taken by the same means as *A. praecox*; *Bryophila perla*, on stone walls everywhere; *Aglossa pinguinalis* was very large and common in an old stable; *Corcmia ferrugata*, *Agrotis nigricans*, *Argynnis paphia*, and *Pyrameis cardui*, one or two of each. Mr Graves went over to Sandersfoot about the 26th and took two dozen *Stilbia anomala*. I returned to Coxhorne on the 29th and worked light and sugar, but did not take a single insect at the latter, and nothing after the 5th inst. at the former, but during the week I took in the moth-trap about 40 *Neuronia popularis*, 6 *Luperina cespitis*, and a few *L. testacea*. I also found a very fine female *Cirrhoedia xerampelina* at rest on an ash trunk on August 30th, but have searched in vain for more."———Mr. J. E. R. Allen (Glasgow) writes on September 29th:—"I captured a good variety of *Vanessa urticae* in Phœnix Park, Dublin, in August. The two spots on the forewings are almost wanting, the blue border is very distinct, and the hind wings are almost black."———Mr. S. Walker

(York) writes on October 1st:—"I am sorry to join the chorus of lamentation over the badness of the season. On the 2nd July I had a day at Sledmere Woods on the Yorkshire Wolds, but everything seemed scarce. *Asthena blomeri* and *Venusia cambricaria*, generally so plentiful, were very scarce. I took a nice series of *Melanthia albicillata* and a few fine *Macaria liturata*, also some fine *Lycaena medon*, an insect new to me in that district. During the first fortnight in July I worked Scarborough and district with little success. Mr. Head of that town, and I sugared the trees and fences near the Castle, but, with the exception of a fine series of *Mamestra furva*, we boxed nothing. Day-work on the cliffs near Cayton Bay, to the south of Scarborough, yielded *Eubolia bipunctaria* in numbers, but little else. I found the local *Epione vespertaria* in fair numbers during the first days of August at Sandburn, the females putting in an appearance on one evening only; as a rule, the latter are very rarely met with at rest, and are still rarer on the wing, and a collector may not take a single one for nights yet get the males in plenty. Curiously the few larvæ I swept this year yielded female moths in every case! The autumn reports about larvæ appear very favourable. I have taken *Smerinthus ocellatus*, which, on isolated sallows on Strensall Common, were easily seen and picked off; *S. populi*, *Spilosoma fuliginosa*, *Dasychira pudibunda*, *Bombyx rubi*, *Engonia tiliaria*, *Amphidasys betularia* (common), *Dicranura furcula*, *Clostera reclusa* (in plenty), *Notodonta camelina*, *N. dictaea*, *N. dictaeoides*, *N. dromedarius*, *N. ziczac*, *Acronycta leporina*, *A. menyanthidis*, &c."———Mr. Fenn (Lee) writes on October 2nd:—"I have lately been staying at Deal, and although day-work was useless I had a fair amount of success at sugar. Except on one night, the wind blew hard from the north-east, but it was not particularly cold and the dew was usually very heavy. The most sheltered spots were the most productive, but there was so little on the wing that I soon discarded my net. I captured the following:—*Aporophyla australis*, common, but getting worn at the time I left; *Anchocelis lunosa*, common, but rather worn; *A. pistacina*, just out and not scarce; *Xanthia fulvago (cerago)*, just out, one or two only; *Mellinia circellaris*, common and very fine; *Agrotis tritici*, common but worn; *A. vestigialis*, a few in good condition; *A. puta*, a few fair; *A. segetum*, very fine; *A. ypsilon (suffusa)*, very fine; *Leucania pallens*, one or two only; *Hydroecia nictitans*, one just out; *Xylophasia monoglypha*, a few worn; *Caradrina cubicularis*, a few fine; *Noctua c-nigrum*, common and fine; *N. xanthographa*, common and very worn; *A. tragopogonis*, one; *Epunda lichenea*, one of the dark type form; *E. lutulenta*, a few, some fine pale forms; *Phlogophora meticulosa*, common and fine; *Calocampa vetusta*, a few fine; *Xylina socia*, one fine; *Plusia gamma*, very common at sugar, not merely flying round but imbibing freely; *Hypena rostralis*, one. Larvæ of *Bombyx rubi*, nearly full-fed, abundant; but it was too late for *Chaerocampa elpenor*."———Mr. N. M. Richardson (Weymouth) writes on October 11th:—"I have had some very bad nights at Portland lately. The autumn species, *Heliophobus hispidus*, *Epunda lichenea*, *Anchocelis lunosa*, *Luperina cespitis*, *L. testacea*, *Aporophyla australis*, &c. seem to be late in their appearance, and scarce."———Mr. Duncan (Linlithgow) writes on October 13th:—"The weather has been splendid here for two months, and autumn insects are pretty numerous. *Dasypolia templi* is appearing in moderate numbers at light."———Mr. J. Finlay (Morpeth)

writes on October 18th:—"Sugar in this neighbourhood is a complete failure this autumn; the last time that I tried it I did not get a single insect, although the night was very mild."———Mr. Beadle (Keswick) writes on October 22nd:—"*Lithomia solidaginis* has been very fine this year. I have also taken a very long series of *Celaena haworthii*, which, with *L. solidaginis*, took very kindly to sugar during August. First dates were:—*Dyschorista suspecta*, Aug. 10th; *Hadena oleracea*, Aug. 14th; *Noctua dahlii*, and *L. solidaginis*, Aug. 15th; *Hadena protea*, Aug. 16th. I have also taken *Agrotis agathina* for the first time. On Aug. 28th I took *Nonagria fulva* and *Noctua glareosa*. *Cidaria testata* was abundant and very fine. I could have taken hundreds on Skiddaw, many of which showed a great deal of brown colour on the forewings, those taken on Ullock Moss being larger and tinged with pink colour. Since September came in we have had grand weather, but the east winds have made collecting a failure."———Mr. Moberly (Southampton) writes on October 24th:—"In this neighbourhood the season has ended much as it began and has continued throughout. Neither sugar, light, nor larva-beating seems to produce any profitable results. Three or four hours work at Portland a fortnight ago resulted in two *Epunda lichenea* and two *Auchocelis lunosa*, and a sugaring night in the New Forest last Saturday week produced a considerable number of *Miselia oxyacanthae* and nothing else. I hear from Reading that not a single *Xanthia aurago* or *X. gilvago* has been taken there this season."

Forfarshire.—Having worked the neighbourhood of Montrose for the past fifteen months with my friend Mr Duncan (the curator of our museum), I wish to record the following captures of NOCTUÆ last year from July 27th to October 3rd:—*Leucania conigera*, *L. litharyyria*, *L. impura*, *L. pallens*, *L. comma* (I believe not taken in Aberdeen), *Hydroecia nictitans*, *H. micacea* (very common), *Xylophasia lithoxylea*, *X. polyodon* (var. *aethiops*, several), *Apamea didyma*, *Miana strigilis*, *M. literosa* (abundant), *Charaeas graminis* var. *rufa*, *Luperina testacea* var. *x-notata*, *Celaena haworthii*, *Mamestra brassicae*, *Caradrina quadripunctata*, *Rusina tenebrosa*, *Agrotis vestigialis*, *A. saucia*, *A. nigricans* var. *fuliginea*, *A. suffusa*, *A. praecox*, *A. cursoria* vars. *brunnea* and *sagitta*, *A. tritici* vars. *valligera* and *albilinea*, *Triphaena ianthina*, *T. fimbria*, *T. pronuba*, *T. orbona* var. *comes*, common, *Noctua castanea* (only one at sugar), *N. baia*, *N. glareosa* (dark grey varieties and about a dozen var. *suffusa*), *N. c-nigrum* (abundant), *N. augur*, *N. brunnea*, *N. festiva*, *N. conflua* (a few), *N. xanthographa*, *N. plecta* (first taken August 26th), *Orthosia lota* (three at sugar), *Anchocelis pistacina* (a few), *A. litura* (most abundant), *Xanthia flavago*, *X. fulvago* (var. *flavescens*), *Mellinia circellaris*, *Calymnia trapezina*, *Polia chi* (rather dark), *Epunda nigra* (fairly common), *Hadena oleracea*, *Calocampa vetusta* (thousands), *C. exoleta*, *Lithomia solidaginis* (one), *Plusia gamma*, *Amphipyra tragopogonis*, *Naenia typica*, and *Agriopis aprilina*.——This year the list has been increased by *Taeniocampa gothica* (and one var. *gothicina*) *Pachnobia rubricosa* (slate colour), *T. stabilis*, *T. instabilis*, *Panolis piniperda*, *Thyatyra batis*, *Cymatophora duplaris*, *Byrophila perla* (common on many of our walls), *Acronycta psi*, *Leucania littoralis*, *Tapinostola elymi* (fairly plentiful), *Chortodes arenosa*, *Miana bicoloria*, *Tapinostola fulva*, *Mamestra albicolon*, *Apamea basilinea*, *A. gemina*, *Xylophasia rurea*, *Agrotis exclamationis*, *A. corticea*, *A. strigula*, *Hadena adusta*, *H. dentina*, *H. thalassina*, *H. rectilinea*, *Miselia oxyacanthae*, *Aplecta prasina*, *Charielea umbra*, *Plusia interrogationis*, *Gonoptera liba-*

trix (two), *Orrhodia vaccinii* (one), *Scopelosoma satellitia* (two, one with white reniform and one with red). Sugar worked splendidly from June 9th until the beginning of August, when we turned our attention to searching ragwort and grasses. During September, the latter part of August, and this month, we have sugared 29 times, and caught 13 insects, including the one *O. vaccinii* and the two *S. satellitia* mentioned above. For many nights together we caught nothing, and in fact our best sugaring night since August, only yielded two insects. Last year, *C. retusta*, *A. litura* and *N. glareosa*, were seen in thousands; this year not one has been seen.—Montagu Gunning, M.D., The Mall, Montrose, N.B. *Oct.* 21*st*, 1894.

Wicken.—Mr. Hodges has already (*ante*, p. 180) given his experience of Wicken in June. During the same month I made my first visit for this year to that locality. I was, however, more limited as regards time than he was, and was neither so fortunate in my weather, nor so successful in my take. In the second week of June, *Apamea unanimis* and *A. gemina* were met with in considerable numbers and, with *A. basilinea* and *Mamestra sordida*, were the most usual occupants of our sugared knots. *Hadena adusta* was also common, some specimens being so fine and so well marked and coloured, as to raise hopes of *H. porphyrea* (*satura*), but I have not heard that the latter insect was actually taken. Sugar, in the lane leading to the Fen, was practically useless. On a fairly bright day at Tuddenham, we found *Heliothis dipsacea* and *Acidalia rubiginata* in some numbers, and occasional specimens of *Agrophila trabealis* and *Acontia luctuosa*. A few minutes' search for *Lithostege griseata* produced several specimens, and I think there must have been many more; but the area within which they occur is so limited (although the food-plant is abundant in all the cornfields), that they seem not to be freely taken. The capture of *Hydrilla palustris* was, no doubt, the chief feature of the early part of the season. *Macrogaster arundinis* is not scarcer at Wicken than it was a few years ago, and it is to be hoped that a little careful nursing will increase its numbers. One fine female has fallen to my share, and many males were taken. In the last week of July, I went to Wicken again, and then had rather more time at my disposal. I found the local entomologists very despondent. It had been a shocking season there, the rarities of the fen having, with the exception of *Agrotis obscura*, been almost entirely absent. One *Acronycta strigosa* and one *Hadena atriplicis* but no *Cymatophora octogesima* were reported, and I was fortunate enough to find Mr. Solomon Bailey with a fine ♀ *Cidaria sagittata* (the first that had been taken at Wicken for four years), which is now in my cabinet. On each day, during my visit in July, there was a thunderstorm, which made the fen very unpleasant going; moreover, the excessive damp made the nights cold, and white mist rose persistently. Under these circumstances, even partial success was more surprising than absolute failure would have been. Light and sugar in the lane were indeed useless; but at sugar in the fen we met with *Lithosia griseola*, *Apamea leucostigma* (abundant, some fine forms), *Leucania impudens*, *Cerigo matura*, *Agrotis* var. *aquilina*, *Cleoceris viminalis*, and an occasional *Calamia phragmitidis*. There were also good forms of *Apamea didyma* and *Agrotis nigricans*. I took one *A. obscura* each night, and *Hecatera chrysozona* (*dysodea*) was taken at rest during the day-time. The later part of the season appears to have been much

like the earlier. *Tapinostola hellmanni* has been comparatively scarce, and nothing else worth recording seems to have been taken. In this respect, Wicken seems to have shared the fate of the New Forest and South Hants, and in all those places larvæ have, since June, been even more scarce than they were last year. Mr. Albert Houghton, who has again taken *T. concolor* and *A. obscura*, has been a great help to me in many ways, and has always put himself and his apparatus at my disposal, with a readiness which is well known to most frequenters of Wicken. I also met with the most uniform kindness and attention at the hands of Mrs. Robert Aspland and Mr. John Bailey.—J. C. Moberly, 9, Rockstone Place, Southampton. *Oct. 29th*, 1894.

Tuddenham.—I was at Tuddenham for a day in August, and found a few *Spilodes sticticalis*, *Oxyptilus distans* (*laetus*), a nice lot of *Eupoecilia cirgerana*, and saw the beautiful *Acidalia rubiginata* in great plenty.—A. Thurnall, 144, Chobham Road, Stratford New Town, E. *Oct. 27th*, 1894.

Freshwater, Isle of Wight.—After having registered nothing but ghastly failures in the collecting line up to the end of August, and having these experiences corroborated by heart-rending letters from my correspondents, telling of how they went forth to catch insects and caught colds, how many insects they had captured to the £ sterling expended (usually three), and other painful particulars, it was indeed a pleasant shock to the system, after a ten hours' railway journey to the Isle of Wight, to be told by my old friend, Mr. Hodges, that things were coming to sugar splendidly. These words put new life into me, and already I felt that the sea air was having a beneficial effect upon my health. Mr. Hodges, with his usual kindness and forethought, knowing that I should not arrive until late, had sugared some trees for me. My wife and a young nephew, the latter suffering from a bad attack of entomological fever, opened the ball by taking amongst other things a pair of *Caradrina ambigua*, and the capture of this rare little Noctua put us in excellent spirits, and at the same time quite on the *qui vive* for other rarities. We were also stimulated to work single-handed, and try "fresh fields and pastures new," and with great success, for the following night Mr. Hodges captured a specimen of *Leucania albipuncta* and four *Tryphaena subsequa*, a few *Agrotis obelisca*, and, with *Aporophyla australis*, common insects in abundance. It seemed quite like old times to have to devote one's whole day to setting, and we blinked like owls when we stole half an hour from our arduous labour to sally forth and stretch our cramped limbs in the briny. I forgot to mention that on the first night a very worn specimen of *Tryphaena subsequa* was taken, and when about to be reprieved on account of its wretched plight, some one suggested keeping it for ova: that sealed its fate, and a long vista of bred *T. subsequa* danced before our eyes. However, as in three days time there were no signs of this pleasant vision being realised, the insect was closely examined, and it was found it wasn't "built that way," and alas! its condition was such that "the subsequent proceedings interested him no more." On Sept. 16th another *Leucania albipuncta* turned up; this time he fell to my sugar, and on the following evening I took my first *Caradrina ambigua*; the latter though small is a striking insect at sugar, and could not be mistaken for any other member of the genus excepting *C. superstes*. Whilst returning across the Downs one night, in company with Mr.

Hodges, from a late round, I noticed my friend hit out with closed fist at what to me seemed an imaginary object; however he persisted he had felled a moth, and after a little searching we picked up a quite unconscious specimen of *Luperina cespitis*. I don't know if this is the orthodox way of getting *L. cespitis*. Mr. Hodges said this was almost the first time he had taken the insect at Freshwater, and I inwardly thought, from the treatment this specimen received, it would be the last; but was agreeably surprised to take one at rest on the unsugared side of a fence the following night. My nephew distinguished himself by taking the first specimen of *Epunda lutulenta* in fine condition, and shortly after my wife took another; this also is new to Freshwater—in my experience. Mr. Tait, Jun. of Manchester joined us, therefore more fresh ground was tried by the enterprising and untirable members of the party, but without much success, the best record being a few worn *Tryphaena subsequa*; it has evidently been a *subsequa* year at Freshwater, judging from the number of worn specimens (30) captured between us in a week. Larva-beating, which was by no means neglected, yielded absolutely nothing, but searching by night with the lantern, we discovered some gorgeous larvæ feeding on the flowers of devil's-bit-scabious; their emergence next year in the imago state is looked forward to, as none of us could identify them. Larvæ of *Agrotis ripæ* were found on the sand hills, though not so abundantly as in former years. The week's work between us yielded 8 *C. ambigua*, 2 *L. albipuncta*, 2 *E. lutulenta*, and about 30 *T. subsequa*, besides a good series of *Agrotis obelisca* and of *Aporophyla australis*; this success, coupled with the fine weather which obtained throughout our stay, made this the most enjoyable entomological excursion of the season.—P. W. Abbott, Four Oaks, near Birmingham. *Oct.* 1894.

Sussex and Hants.—I have no cause to grumble at the past season, as will be seen from the following list of some of my captures. I began work in February by collecting stems of *Daucus carota* for *Argyrolepia zephyrana*. The moths began to come out in the first week in July (together with 4 *Conchylis francillonana*) the emergence continuing into August. *Taeniocampa instabilis*, *Hybernia rupicapraria*, and *Larentia multistrigaria* were fairly plentiful. On March 17th, I obtained five larvae of *Sesia sphegiformis* in alder stems, but only managed to breed one moth. I attribute my non-success to my having exposed the stems too freely to the sunshine before the larvæ had quite done feeding; the sap dries out and this renders the wood so extremely hard that the larva is unable to bite its way to the bark before pupating; the moth I bred was in pupa when I cut the stem. On the same day I took *Asphalia flavicornis*, *Xylocampa areola*, and *Semioscopus avellanella*. On March 23rd *Brephos parthenias* was fairly plentiful but flying high; larvae of *Depressaria assimilella* were found feeding in broom. On the 26th *Chrysophanus phlocas* and larvæ of *Arctia caia* and *A. villica* were obtained, and on the 31st *Phoxopteryx comptana* (very plentiful), *Herbula cespitalis*, and *Elachista rufocinerea*; towards the middle of April this latter insect was out in dozens, sitting about on the grass stems. Between April 1st and 6th *A. villica* spun up; on the 2nd *Biston hirtaria* was out, and I bred one *Coccyx scopariana*; on the 7th *Epigraphia steinkellneriana*, the eggs of which are of a beautiful bright scarlet colour, *Selenia bilunaria*, *Hemerophila abruptaria* and hybernated specimens of *Depressaria alstroemeriella* were taken, and

on the 14th larvæ of *A. villica* and *Tryphæna fimbria*. During May, captured *Roxana arcuana*, *Symaethis oxyacanthella (fabriciana)*, *Adela viridella*, *Asychna modestella* and a good many common things. In June I found a batch of larvæ of *Cucullia verbasci* on *Verbascum thapsus*; at the beginning of the month one *Agrotis cinerea*, *Grammesia trigrammica* (with two var. *bilinea*), *Noctua plecta*, *Hadena dentina* and other species came to sugar, and I bred *Noctua baia*, *Tryphæna ianthina*, *T. fimbria* and *Aplecta tincta*. On July 6th I bred a very fine female *Odonestis potatoria*, which was as dark as the males; on the 7th *Acronycta aceris*, *A. psi*, *Leucania comma* and a couple of fine *Aplecta advena* were taken at sugar; on the 10th I found another batch of *C. verbasci* larvæ; *Sesia ichneumoniformis*, *Aciptilia baliodactyla*, *Xanthosetia hamana*, and *Paucalia lewenhoekella* were out; between the 14th and the end of the month the following were taken at sugar:—*Thyatyra derasa*, *Acronycta aceris*, *A. tridens*, *Mamestra abjecta*, *M. persicariae*, *Caradrina taraxaci*, *Xylophasia rurea*, *Calymnia affinis*, *Hadena dissimilis*, *Pyralis costalis* (*fimbrialis*), etc.; during the same period, specimens of *Ebulea stachydalis*, *Tortrix dumetana*, *T. costana* and *Anesychia decemguttella* were caught. All the foregoing insects were captured in Sussex, but I spent the first week of August in Hampshire, where I obtained a long and variable series of *Agrotis tritici* and a few *A. vestigialis*, together with *Retinia sylvestrana*, *Harpipteryx xylostella* (*harpella*), *Lita maculea*, *L. marmorea*, *Oecophora lambdella*, *Oecophora lunaris*, *Gymnancycla canella*, *Nephopteryx genistella* and *Ephestia elutella*. Stray shots included *Teleia fugitivella*, *Retinia pinicolana*, *Scardia cloacella* and *Tinea tapetzella*; *Lyonetia clerckella* have been very plentiful in cherry and birch, and I found several larvæ still feeding while boxing the moths off some palings. The middle of August found me in good old Sussex once more. An odd specimen of *Leucania straminea* was followed by the appearance of two *L. albipuncta*, keeping one another company on adjoining posts; other species were *Hydroecia nictitans*, *Apamea leucostigma* (1), *Calymnia diffinis*, *C. affinis* (this species had been about for 12 weeks), *Hadena dissimilis*, *Catocala nupta* and *Depressaria yeatiella*. A week later, though it was blowing half a gale, I put the sugar on, but took nothing on the first round; on commencing the second round, however, I took another *L. albipuncta*, and two minutes afterwards, while looking at a crowd of moths very much inebriated by a special brand of sugar, another flew over my shoulder. This last was the best I had taken and was of a fine reddish-brown colour. September yielded *Calamia lutosa*, *Hydroecia micacea*, *Neuronia popularis*, *Anchoctis lunosa*, *Xanthia fulvago*, *X. flavago*, *X. gilvago*, *Agrotis saucia* and *Calocampa exoleta*. During July and August I took a series of *Tinea nigripunctella*, and one *Oenophila v-flava* in North Street, Brighton. —J. GILBERT JOHNSON, 24, Norfolk Square, Brighton. *Oct. 13th*, 1894.

PRACTICAL HINTS.

A NEW METHOD OF RELAXING INSECTS.—Rectified Wood Naphtha, obtainable from any chemist, containing a trace of White Shellac, say 10 grains to the ounce, applied to the underside of the extreme base of the wings by means of a very fine sable brush, within a few seconds renders the wings quite pliable; the insect is then placed on the setting board and set to the required position, braces being used if necessary. In from 12 to 24 hours the specimen is ready for the

cabinet, showing no trace of the manipulation it has undergone. The shellac is recommended to prevent any possible future springing or drooping, but the pure Naphtha produces an equally satisfactory effect so far as relaxing goes. The old tedious process of damping may thus be obviated, and the most delicate colours left uninjured.—J. P. Mutch, 359, Hornsey Road, N.

NOTICES AND REVIEWS.

Transactions of the Leicester Literary and Philosophical Society. Vol. iii., Pt. viii., July, 1894.—(Published by Geo. Gibbons & Co., 49, King Street, Leicester. Price 9d.)—From this we find that the Entomological section of this Society consists of 7 members and 18 Sectional Associates, and that five papers were read between Jan. 25th and May 23rd. Five periodicals, lent by various members, are circulated among the members, whilst a sixth, *The American Naturalist*, is subscribed for by the Council. Two interesting papers are printed *in extenso* (1), "A short paper on the British Micro-lepidoptera" by the Rev. C. T. A. Cruttwell, M.A., which shows a combination of keen observation with antiquated and obsolete notions as to the distribution of species and methods of work. Thus we read:—"Speaking generally, the Pyralites and Tineæ do not vary," a remark sufficiently wide of the mark in many genera of the Tineina; whilst, the remark that "Leicestershire shows a decided admixture of northern forms. It is sufficient to mention the occurrence of the melanic forms of *A. betularia*, *A. pilosaria* and *H. progemmaria*, hitherto scarcely recorded south of the Humber," shows a quaint clinging to the old notion that melanism is a northern phenomenon. We read too that "*N. hispidaria*, chiefly, though not exclusively northern," occurs in Leicestershire, another rather droll statement considering the general scarcity of the moth in really northern localities, and its local abundance in Surrey, Cheshire, Herefordshire, Essex, etc. The practical advice to collect and rear larvæ in large, closely-fitting tins is contrary to our experience. Close-fitting receptacles of any kind will make all but the smallest larvæ sweat, and few enough will be reared unless the larvæ are full-fed at the time of capture. But for all that there are a number of sound practical suggestions, which show that Mr. Cruttwell knows a great deal about capturing insects. A somewhat different paper is Mr. F. Bonskell's "Urtication in certain lepidopterous larvæ: its causes and effects," which is a very fair summary of the more recently recorded cases, together with the reasons which have been given by various authors to explain the irritation which is frequently produced. We were ourselves very badly stung by *Bombyx quercus* in August last, and until the whole of the epidermis, under which the tiny hairs were embedded, was worn off, the irritation under certain conditions (body temperature, &c.) remained. It is probable that the irritation is not always set up in the same way, but there can be little doubt that the urtication set up by *B. quercus* is to a large extent mechanical, and not due to poison. If it were due to poison, the irritation should be continuous, whereas, as a matter of fact, the irritation is spasmodic and recurrent. We strongly advise our readers to obtain the *Transactions*, and read these papers.

Social Progress.—(The Scientific Press, Limited, 428, Strand, W.C., 64 pp., Price 2s. 6d.)—This new scientific magazine appeals to

scientific naturalists rather from a general than from a special standpoint, and to those of our readers who are general naturalists first and specialists afterwards, we cannot recommend a more valuable or a more readable magazine. The Nos. already published contain many articles of the greatest interest to naturalists.

The International Journal of Microscopy and Natural Science. (Published by Bailliere, Tindall & Cox, 20, King William Street, Strand, W.C. Price 10s.)—We are inclined to think that the volume before us is, if anything, an advancement on its predecessors. It contains some very interesting papers on general science of which perhaps that entitled "Bacteria of the Sputa and Cryptogamic Flora of the mouth," by Flandro Vicentini, M.D., merits the first place. Of the articles specially interesting to us as specialists are "Predaceous and Parasitic enemies of the Aphides," by H. C. A. Vine, a first-class article, illustrated. "Heredity and its bearing on the Phenomena of Atavism," by Gustav Mann, M.B., C.M. "The Structure of Insect Tracheæ," by Dr. Alfred C. Stokes. Besides these there are a number of very interesting short notes. To entomologists who have microscopes we suppose that the magazine is well-known and needs no introduction. To those who have not, there are 443 pp. of highly interesting readable matter which would occupy the leisure of winter most profitably and combine pleasure with instruction.—Ed.

Societies.

The meeting of the Lancashire and Cheshire Entomological Society, on Nov. 12th, was signalized by the reading of a paper by Mr. Hewett, of York, on "*Arctia lubricipeda*, and its varieties, *radiata*, *fasciata* and *eboraci*, etc., in Yorkshire, Durham and Lincolnshire." After speaking of the older specimens of var. *radiata*, Mr. Hewett gave a complete history of the present brood, stated that he believed this form to be genuine, and congratulated Mr. Harrison on his success. Mr. Hewett also exhibited two olive-brown specimens (♂ & ♀) of *Bombyx quercus*, from Rhanbolds Moor, Yorkshire. Mr. Arkle, of Chester, exhibited a female *Erebia aethiops*, from Witherslack, with five ocelli on each fore-wing. Mr. Watson exhibited *Parnassius delius* and *P. sminthens*, with microscopic preparations of their palpi and antennæ, and stated that as the result of careful examination he had come to the conclusion that these so-called varieties were really distinct species.

The Secretary of the Entomological Section of the Yorkshire Naturalists' Union reports that entomologists in all parts of the county are agreed that the season of 1894 has been one of the worst known. One member, who has collected in a great number of Yorkshire localities for the last 17 years, has never before experienced such a uniform scarcity of Lepidoptera in all stages. A few species have, in one stage or another, been as common or perhaps commoner than usual; among these are the following:—Larvæ of *Agrotis agathina* at Scarborough. Imagines: *Aspilates sylvata*, abundant at Drewton Dale and Eglington Wood, but very scarce at Sledmere, where it is usually common; *Agrotis obscura*, more than 100 specimens taken at Hull, the highest number on any one night, 10; *Hadena dissimilis* also at Hull. The season up to the end of April was decidedly early; since then everything has been very late. Instances of melanism have been rare. Sallows and sugar were miserable failures, save at Hull, where the latter seems to have maintained its seductive powers.

REFERENCE SUMMARY TO PLATES
ON
Dr. Chapman's Paper "The Genus Acronycta and its Allies,"

IN VOLS. I., II, III. AND IV., *E.R. & J.V.*

In studying the above, I have found it necessary to classify the figures of the eggs, larvæ, and pupæ on the Plates, in order to refer more easily to them, as the Plates are scattered through four volumes, and the explanations of the same are in different parts of the volumes, I have found the accompanying table of use to me, and think that it might prove of use to others of your readers.—A QUAIL, Stamford Hill, N.

SPECIES.	EGGS.	LARVA, FIRST STAGE.	PUPA.
Viminia rumicis	Plate 7 ... Fig. 1-2	Plate 5 ... Fig. 7	Plate 1, Fig. 1 Enlarged. Plate 2, Fig. 4abc Enlarged
Viminia venosa	„ 7 ... „ 3-3a	„ 5 ... „ 6	„ 2, „ 3 Nat. size. „ 2, „ 3abc „
Viminia auriconia	„ 7 ... „ 4-4ab	„ 5 ... „ 1-2	„ 1, „ 5a „ „ 1, „ 5bcd „
Viminia myricæ	„ 7 ... „ 5-5a	„ 5 ... „ 5	„ 2, „ 1 „ „ 2, „ 1abc „
Viminia menyanthidis	„ 7 ... „ 6-6a	„ 5 ... „ 3-4	„ 2, „ 2 „ „ 2, „ 2abc „
Cuspidia psi	„ 8 ... „ 1	„ 6 ... „ 1	„ 3, „ 1 „ „ 3, „ 1ab „
Cuspidia tridens	„ 8 ... „ 2	„ 6 ... „ 2	„ 3, „ 2 „ „ 3, „ 2abd „
Cuspidia leporina	„ 8 ... „ 3	„ 6 ... „ 5	„ 4, „ 1a „ „ 4, „ 1bcd „
Cuspidia aceris	„ 8 ... „ 4	„ 5 ... „ 10	„ 4, „ 2a „ „ 4, „ 2bcd „
Cuspidia megacephala	„ 8 ... „ 5	„ 6 ... „ 4-4a	„ 3, „ 5 „ „ 3, „ 5bc „
Cuspidia alni	„ 8 ... „ 6	„ 6 ... „ 3-3a	„ 3, „ 4 „ „ 3, „ 4abc „
Cuspidia strigosa	„ 8 ... „ 7	„ 9 ... „ 1	„ 3, „ 3 „ „ 3, „ 3abc „
Bisulcia ligustri	„ 8 ... „ 8-8a	„ 5 ... „ 8-9	„ 4, „ 4 Enlarged. „ 1, „ 3 „
Demas coryli	„ 8 ... „ 9-9a	„ 9 ... „ 2	„ 9, „ 5 Nat. size. „ 9, „ 5-abc „
Moma orion	„ 8 ... „ 10-10a	„ 6 ... „ 6-6a	„ 4, „ 3abc Enlarged „ 1, „ 4-4a „
Diloba cæruleocephala	„ 8 ... „ 11-11ab	„ 9 ... „ 3-4	„ 4, „ 5 „
Bryophila perla	„ 9 ... „ 6-6a	„ 9 ... „ 7-7a	
Dasychira pudibunda	„ ... „	„ 9 ... „ 8	

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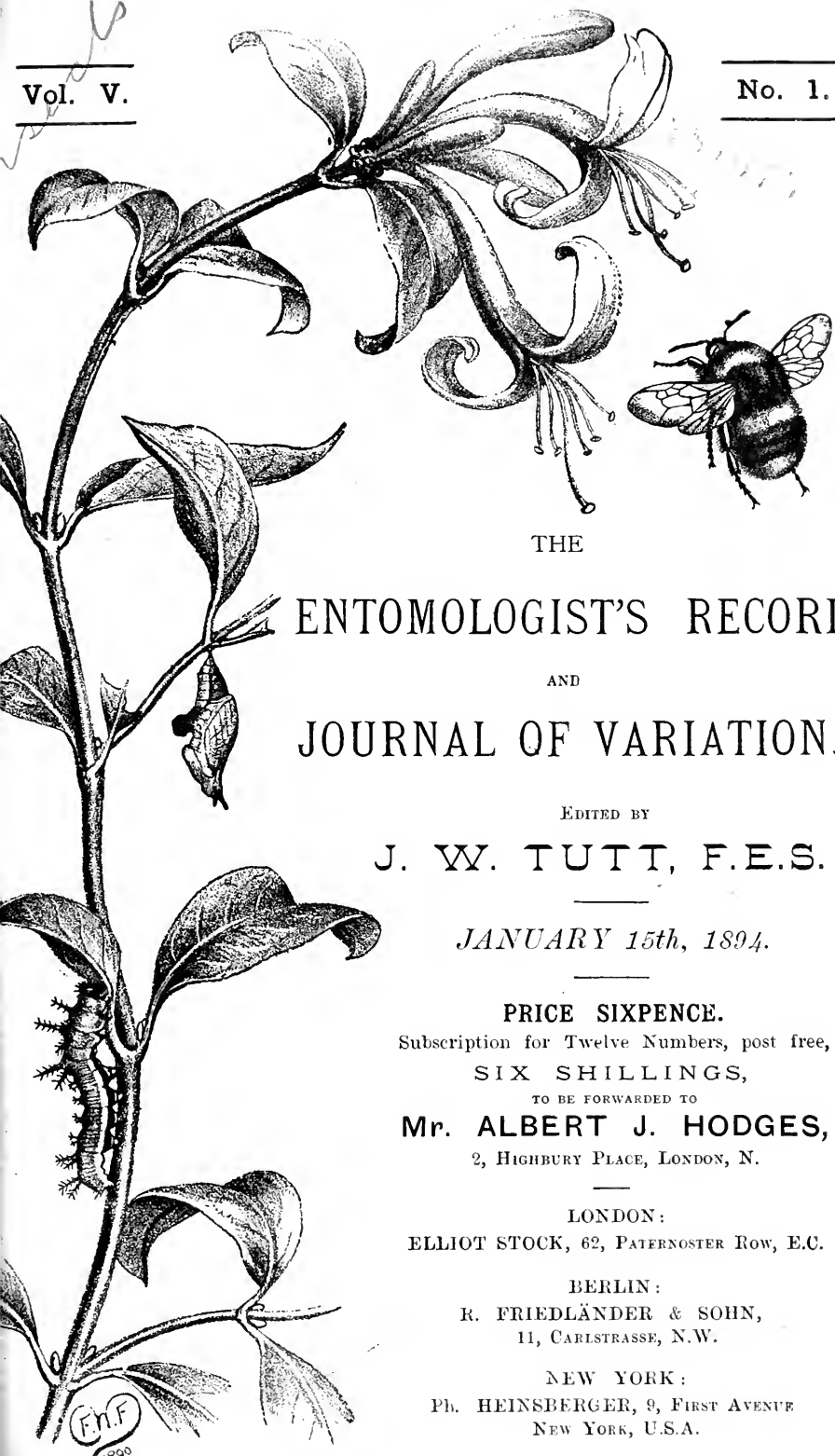

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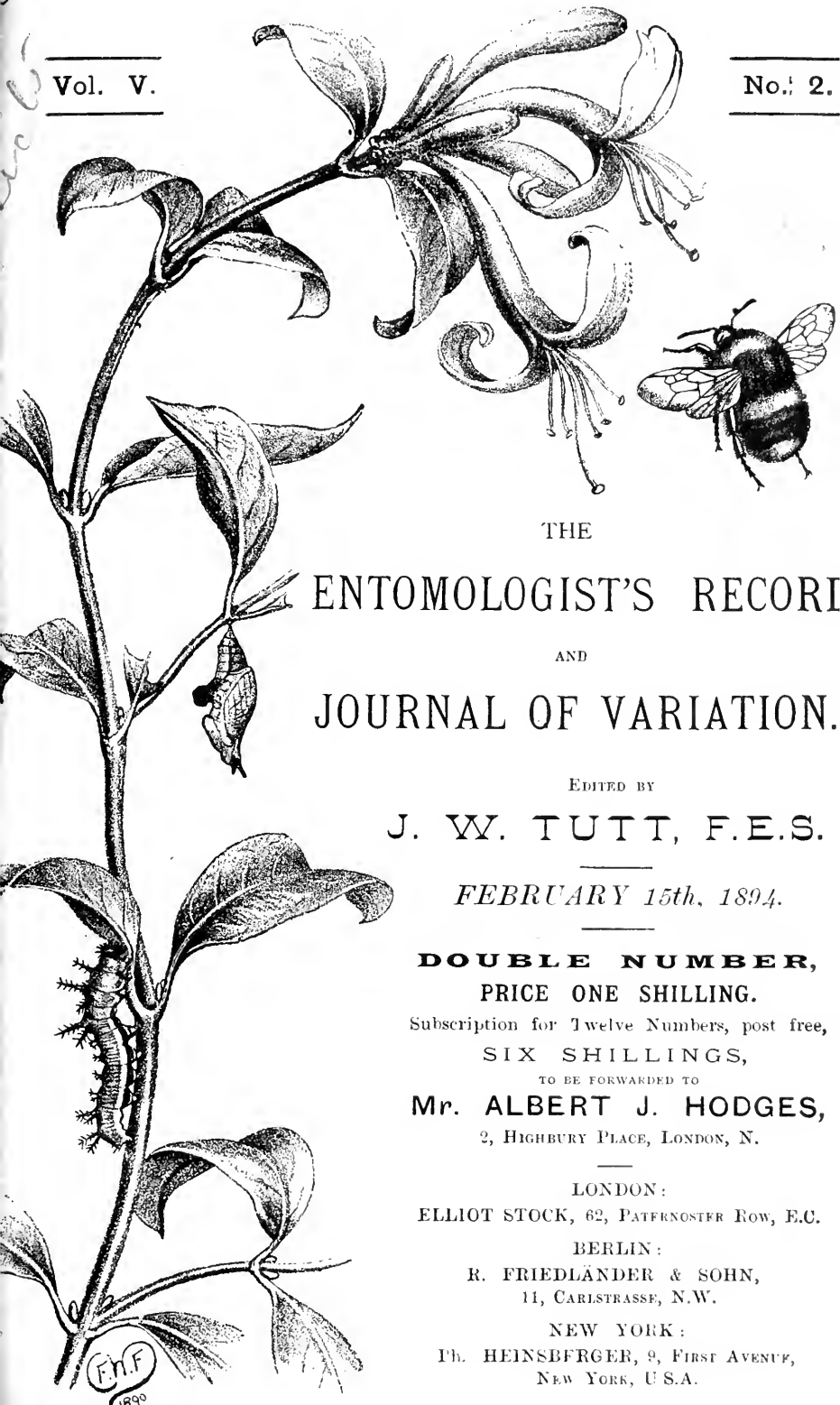

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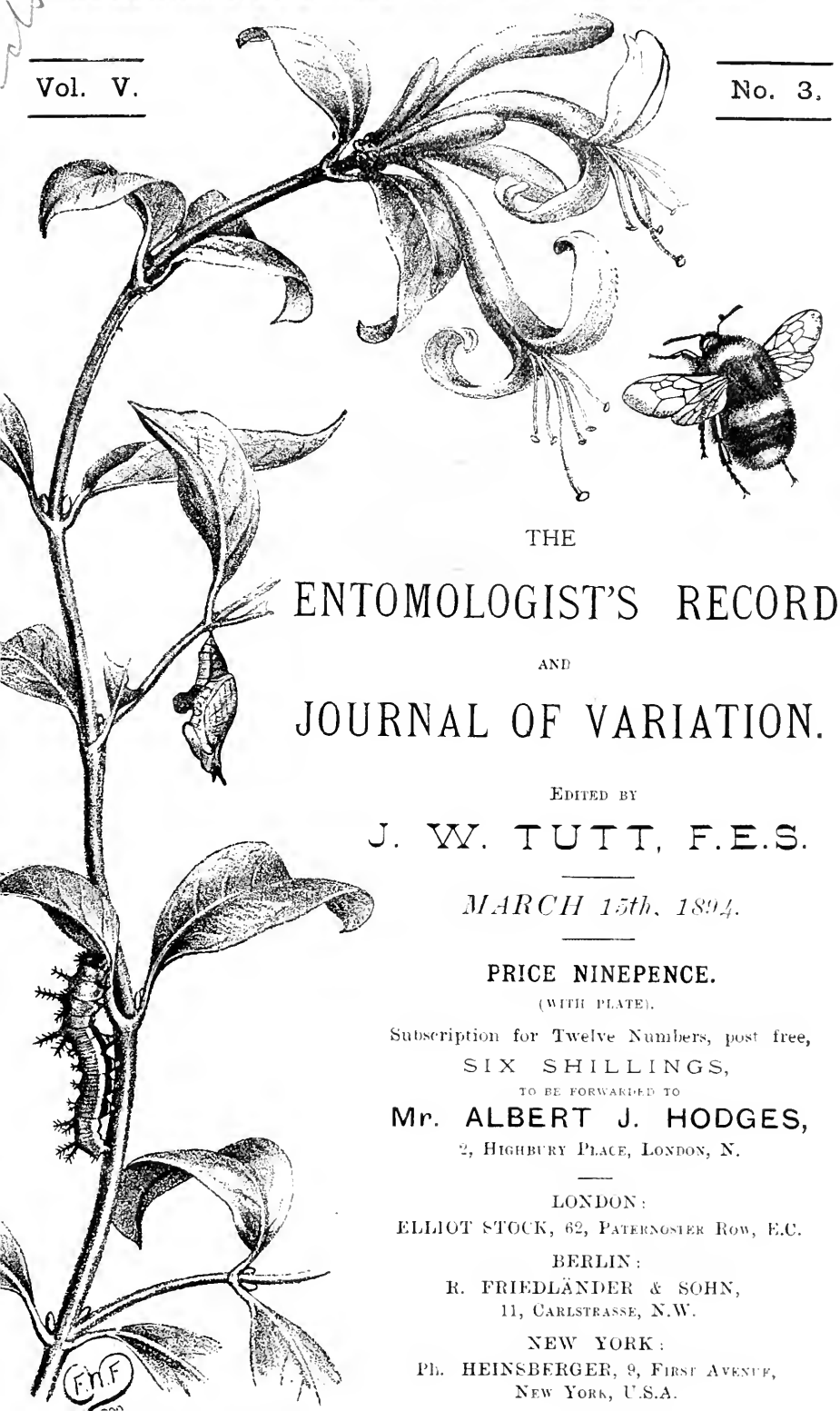

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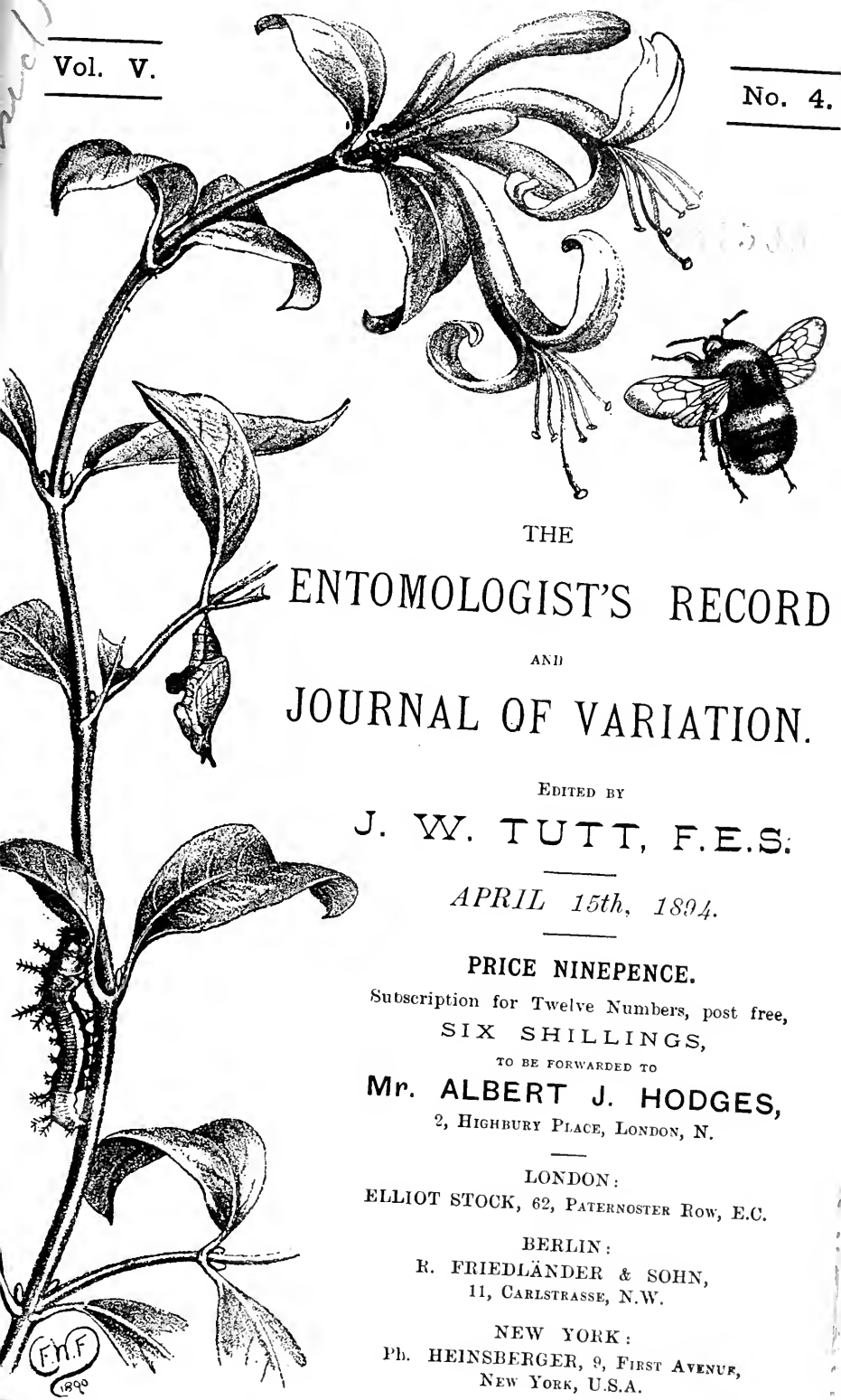

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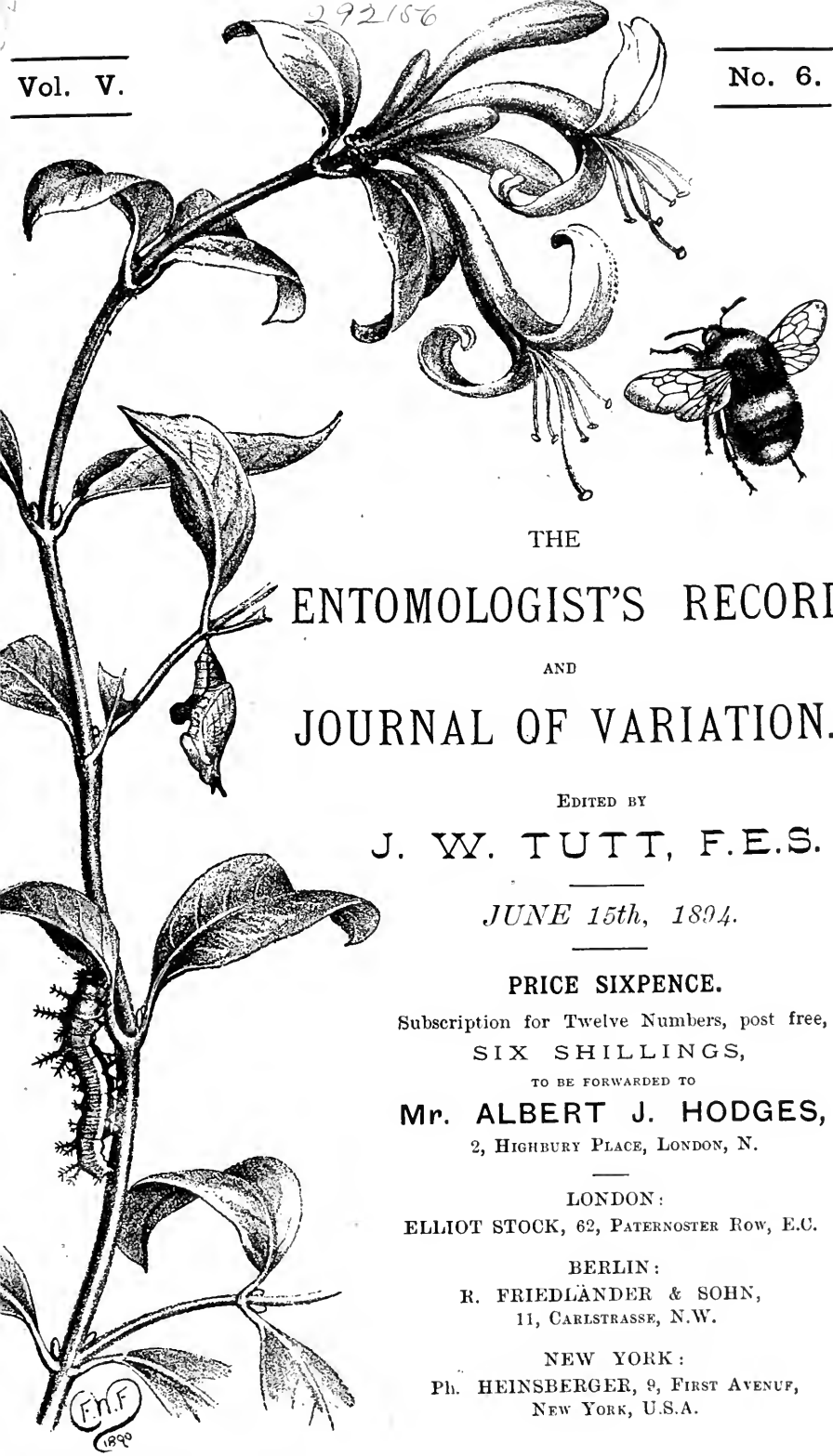

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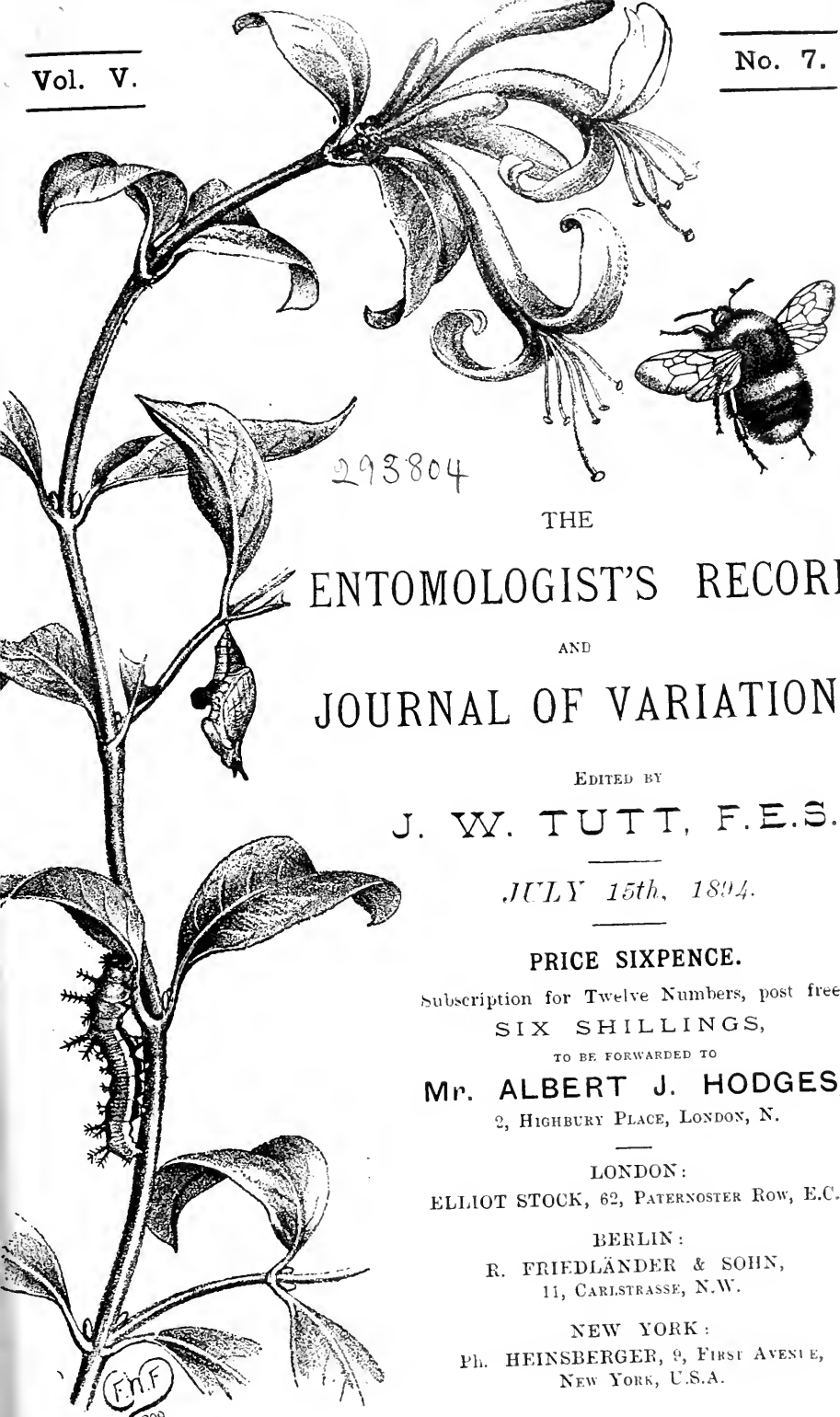

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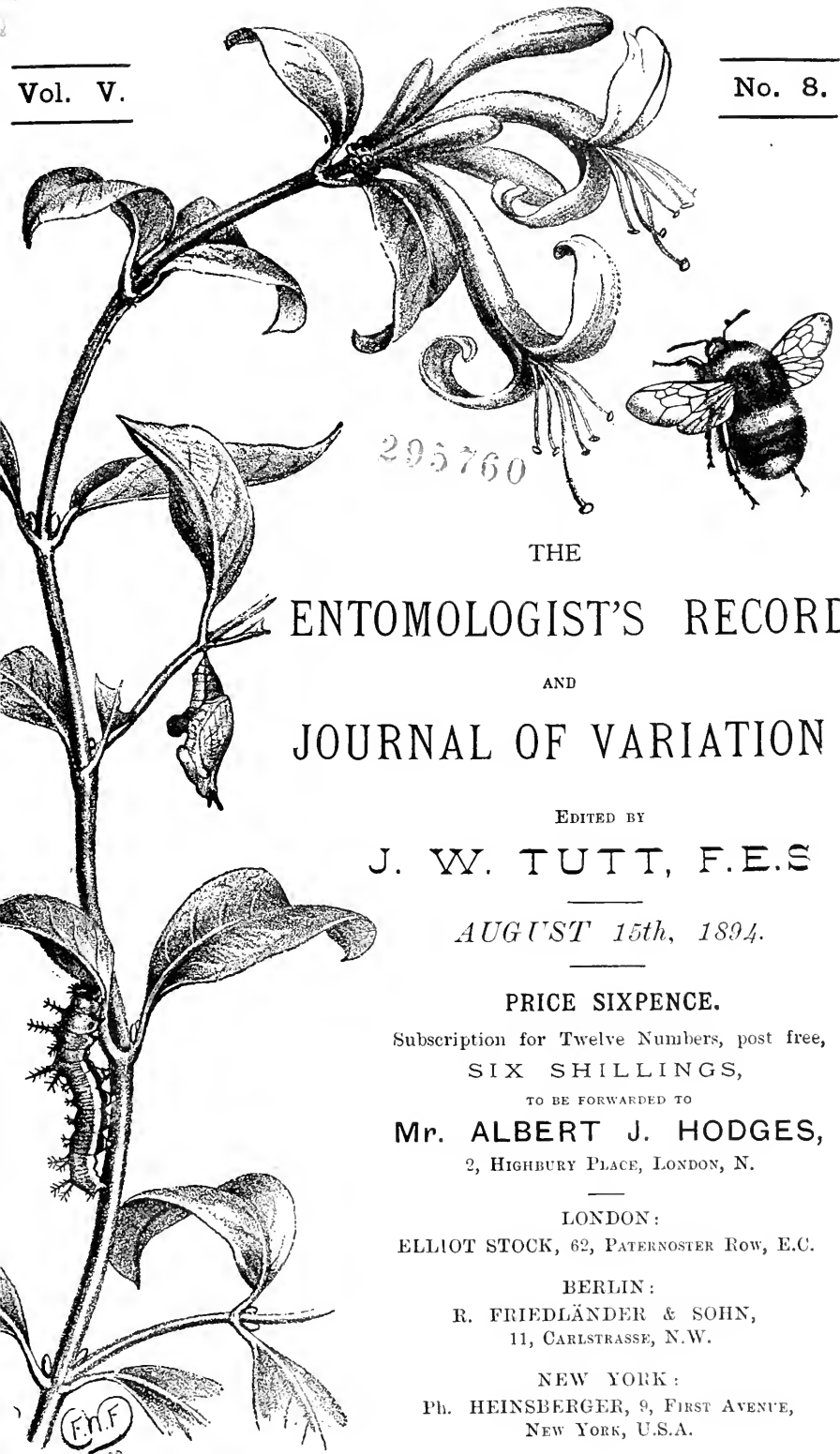

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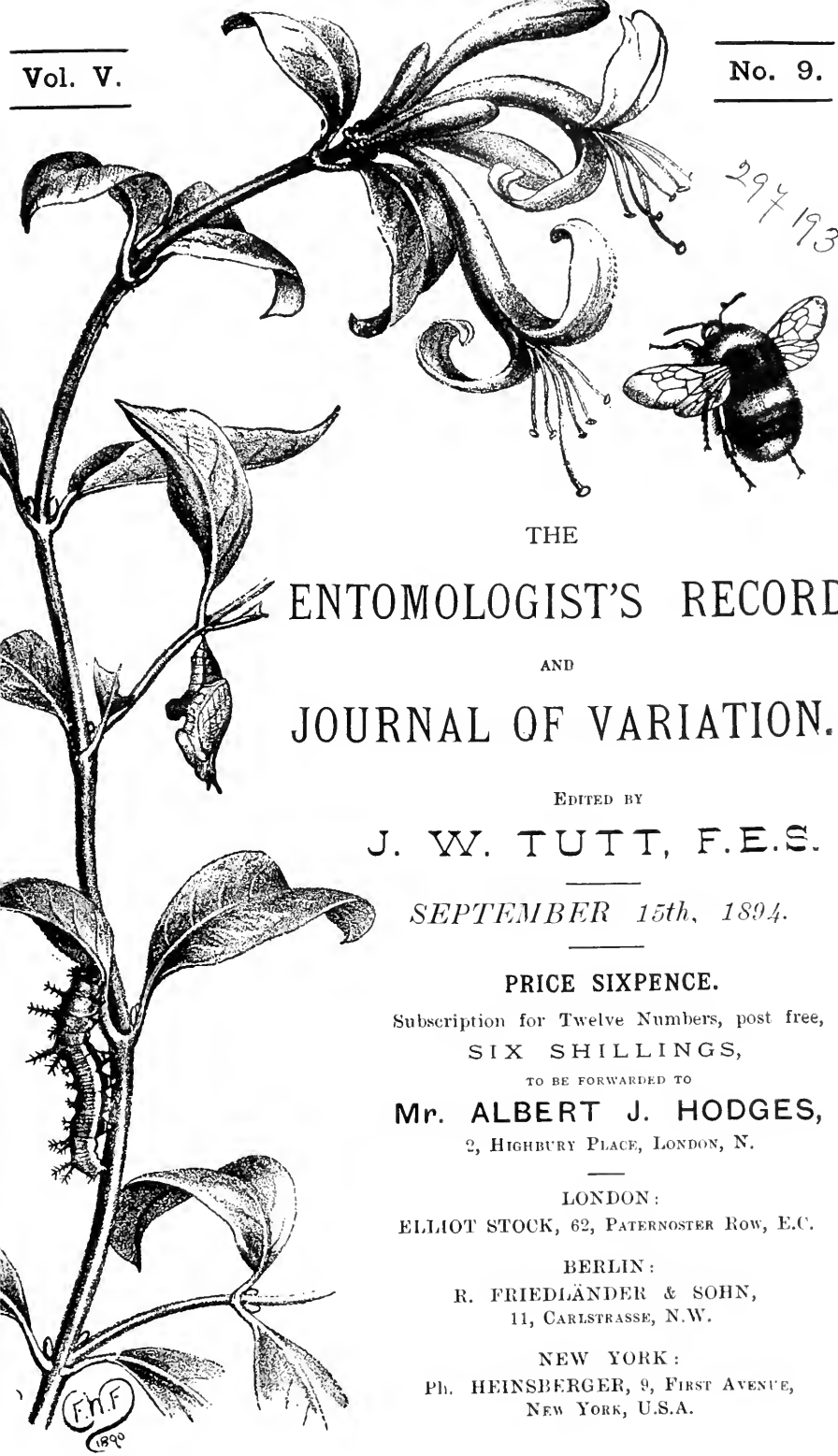

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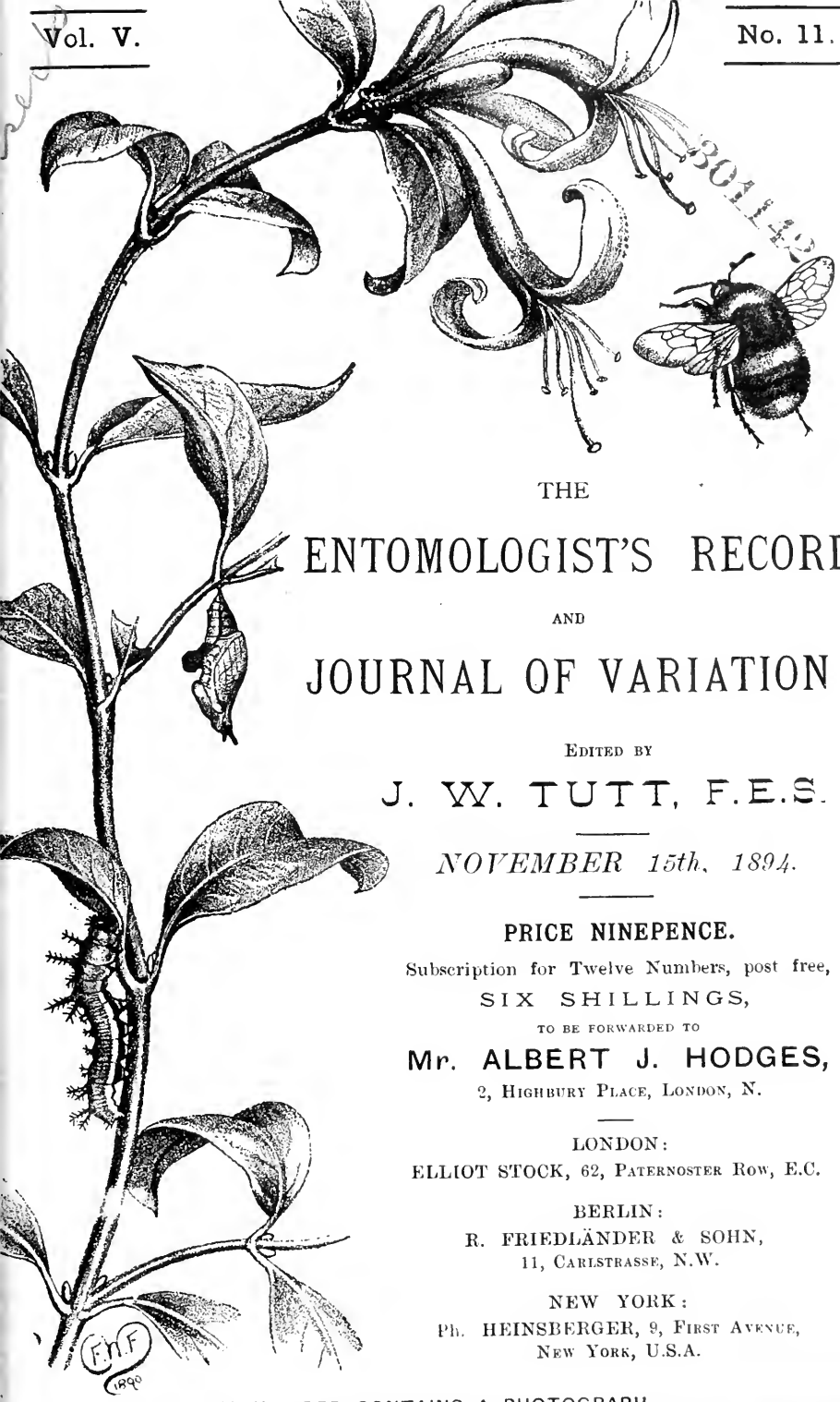

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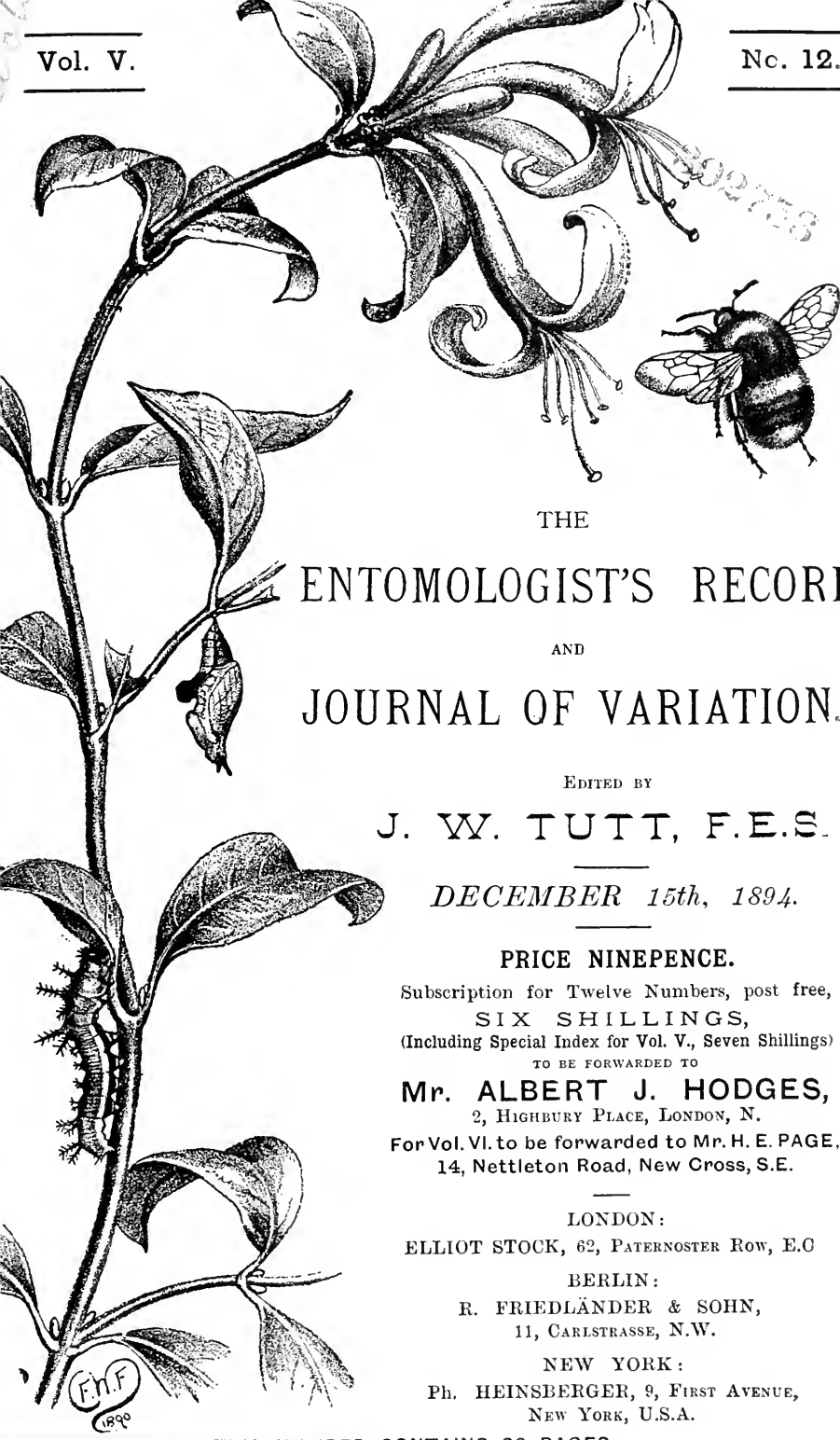

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EXCHANGE.

[Notices of Exchange, which should consist only of the specific names of Duplicates and Desiderata, AND MUST NOT BE WRITTEN ON POST CARDS, are inserted without charge. Entomological Books wanted may also be inserted in this column.]

[The Editor wishes to state that the publication of Exchanges, Advertisements, etc., in this Magazine, is in no way to be taken as a guarantee of the authenticity, good condition, &c., of the specimens. This Notice is not intended to throw doubt upon the *bona fides* of Advertisers, etc., but to free the Editor from responsibility, should the privilege be abused.] *Marked * are bred.* Exchange Lists addressed to J. W. TUTT, Westcombe Hill, S.E., must be received before the 8th for insertion in the current month.

EXCHANGE BASKETS.—Forwarded:—Dec. 10, No. 1.—Messrs. Maddison, Freer, Christy, Riding, Mason, Finlay, Mera, Cannon, Burrows. Oct.26, No. 5.—Messrs. King, McLean, Mason, Whittle, Fenn, Atmore, Turner, Corbett, Horne, Richardson, Finlay. Nov. 9th, No. 2.—Mr. Booth, Dr. Gunning, Messrs. Turner, Duncan, Robertson, Jones, Allen, Maddison, Buchan, Moberly. Dec. 7th, No. 3.—Messrs. King, Thornhill, Kane, Robertson, Bowles, Sinclair, Moberly, Burrows, Robinson, Riding, Finlay. Nov. 10th, No. 6.—Messrs. Vivian, McLean, Croker, Gunning Robertson, Thornewill, Walker, Maddison, Bowles, Beadle, Wylie. Oct. 15th, No. 7.—Messrs. Fox, Robertson, Mason, Dutton, Riding, Fenn, Robson, Jones, Richardson, Webb. Dec. 3, No. 8.—Messrs. Croker, Williamson, Fox, Dalglish, Whittle, Page, Webb, Horne, Atmore, Maddison, Finlay. [It is useless for members to write to me about delays. When a basket is delayed the member who should have it, should write to his predecessor, and so on until the offender is brought up to scratch. Members who wish to be left out for a round owing to absence from home, etc., must write to their predecessors in above lists.—*J. W. T.*]. Members should also acquaint themselves with changes of address for last month and this.

Desiderata.—Formicæformis, Asiliformis, Strigula, S. urticæ, Bifida, Caliginosa, Depuncta, Xerampelina, Retusa, Pyralina, Lutulenta, Empyrea, Genistæ, Contigua, Cassinea, Lychnitis, Asteris, Melanopa, Cordigera, Trigeminata, Degeneraria, Viridata. Good offers made for any of above, from this season's captures.—*Albert J. Hodges, 2, Highbury Place. N.*

Duplicates.—Anceps, Mendica, Perla, Furuncula, Glandifera, Affinitata, Temerata, Malvæ, Russata, Zonaria, Hispidaria (male), Abruptaria, Repandata, Absynthiata, Pyraliata, Fulvata.—*Arthur Lovell Keays, Upwood Tower, Caterham Valley.*

Duplicates.—Polychloros, Antiopa, and other species in papers. Pupæ of S. pinastri, Piniaria. Larvæ of Pini. *Desiderata.*—Almost any British species.—*Ludwig Endres, Nürnberg, Maxfeldstrasse 34; Germany.*

Duplicates.—Myellus, S. alpina, Alpinalis, Ochraceella, Irriguana, Palustrana, Magaritellus, Dubitalis. *Desiderata.*—Rare Pyralides (except Cilialis and Decrepitalis), and genus Scoparia.—*W. M. Christy, Watergate, Emsworth, Hants.*

Duplicates.—North American Lepidoptera—Papilio, Argynnis, Colias, Polyphemus, Cecropia, &c. *Desiderata.*—Exotics of all kinds, and European Noctuæ. Send list of duplicates or for list of desiderata.—*Chas. S. Westcott, Holmesbury, Philadelphia, Pa., U.S.A.*

Duplicates.—Exotic Lepidoptera, Heliconius rhea and melfomene, Mechanitis veritabilis, Tinetes marcella, Catopsilia heere. *Desiderata.*—Exotic Lepidoptera or Coleoptera.—*C. T. Jones, Sinclair House, by Sinclair Road, London, W.*

Duplicates.—Various Imagines and Pupæ. *Desiderata.*—Ova of Eugonia autumnaria, Ahniaria and Fuscantaria.—*W. M. Christy, Watergate, Emsworth, Hants.*

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Duplicates.—Bred specimens of Actias selene; hybrids from Selene et Luna, Cecropia et Gloveri, Cecropia et Ceanothi, and other rare moths; cocoons of Luna, Angulifera, and Phobetron pithecium. Lists exchanged.—*Emily L. Morton, Newburgh, New York (New Windsor delivery).*

Duplicates.—Punctulata, Petraria, Alveolus, Spartiata, Illustraria, Syringaria, Cerago, Silago, Citrago, Lucipara, Macilenta, Lota, Pinastri, Lithoriza, Dentina, L. comma, Thalassina, Typica, Basilinea, Pistacina, Suffusa, Zic-zac, Falcula, Curtula. *Desiderata.*—Numerous.—*H. Alderson, Hilda Vale, Farnboro', Kent.*

Duplicates.—Cicindela sylvicola, Chlæn. schrankii, Anch. albipes, Argutor interstinct, Catops rotundicollis, Morych. aeneus, Nitens, Epur. limbata, Copr. lunaris, Geotrup. mutator, Putritarius, Hopl. farinosa, Aphod. scrutator, Cryptohypn. pulchellus, Minutissimus, Ceutorrhynch. napi, Barid. chloris, Doreadion fuliginator, and numerous others. *Desiderata.*—British and other European Coleoptera.—*Eric Mory, Basel. Austr.* 112, *Switzerland.*

Duplicates.—Sibylla, Loniceræ,* B. quercus,* Pudibunda, Punctulata, Juniperata, Leucophearia, Spartiata,* Typhæ,* G. flavago,* Stabilis, Instabilis, Cerago,* and Silago.* *Desiderata.*—Very numerous.—*H. A. Auld,* 81, *Belmont Hill, Lee, London, S.E.*

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Duplicates.—Cassandra, Daplidice, Erysimi, Edusa, Ilicis, Adonis, Corydon, Argiolus, Minima, Arion, Lucina, Camilla, Antiopa, Cardui, Didyma, Phoebe, Lathonia, Cleodoxa, Paphia, Galathea, Hermione, Statilinus, Dryas, Achine, Sao, Tages, Thaumas, Palæmon, Fuciformis, Chrysidiformis, Geryon, Trifolii, Miniata, Striata, Hera, Pini, Pyri, Glaucata, Camelina, Maura, Lucida, Flexula, &c. *Desiderata.* —Any British Heterocera.—*C. Beaulieu, Rue de l'Archevêche, Tours (France).*

Duplicates.—Juniperata, Corydon, Puta, Suffusa, C-nigrum, Literosa, Upsilon,* Rivata,* Obscuraria, Unidentaria.* Ægon, Rhamni, Tithonus. *Desiderata.*—Scabiosata, Minutata, and many common species.—*Louis B. Prout,* 12, *Greenwood Road, Dalston, N.E.*

Duplicates.—Urticæ, Atalanta, Artaxerxes, Caja, Antiqua, Multistrigaria, Impluviata, Suffumata and var. Piceata, Batis, Adusta, Chi, Literosa, Tenebrosa, Meticulosa, Lucipara, Thalassina, Rectilinea, Solidaginis, Vetusta, Gemina and var., Dahlii, Perla, Furva, Rufina, Lucernea, Ferruginea, Litura, Rurea and var. Combusta, Pupæ of var. Callunæ. *Desiderata.*—Numerous.—*F. W. Buchan, Backhill, Rubislaw, Aberdeen.*

Duplicates.—Myricæ (pupæ). *Desiderata.*—Daplidice, Lathonia, Dia, Cinxia, Antiopa, Iris, W-album, Pruni, Betulæ, Hippothoë, Bœtica, Acis, Arion, Argiades (Continental).—*F. W. Buchan, Backhill, Rubislaw, Aberdeen.*

Duplicates. — Edusa, Cratægi, Adonis, Cinxia, Blandina, Lathonia, Apollo, Daplidice, Zyg. carnolica, Z. achilleæ, Munda. *Desiderata.*—Festucæ, Conspersa, Carpophaga, Serena, Viminalis, Oxyacanthæ, Glauca, Contigua, Exoleta, Solidaginis, Betulæ, Davus (Welsh), Cassiope, Stramentalis, Verbascalis, Octomaculalis, Alpinalis, Scop. alpina, and other Scopariæ.—*J. W. Tutt, Westcombe Hill, S.E.*

Duplicates.—Plantaginis,* Pudibunda,* Ulmata, Aprilina, Pyramidea, Festucæ* *Desiderata.*—Galiata, Porcellus, Testudo, Baiularia, Trigeminata, Debiliata, Cassinea, Cespitis, Agathina, Retusa, Pyralina, Genistæ, Putrescens, or local Tortrices on black pins.—*W. J. Cross, Waterside, Ely.*

Duplicates.—Euphorbiæ* (three, from foreign pupæ), Croceago,* Punctidactyla,* Acanthodactyla,* A. cuprella. *Desiderata.*—Very numerous—Ripæ and other imagines: Ova of Subtusa, Retusa, Aurago, Gilvago, Diffinis.—*Frank R. D. Onslow, The Woodhouse, 5, Upper Richmond Road, Putney, S.W.*

Duplicates.—Glareosa (red form), Flavicornis, Monacha* (New Forest), Fulva, Popularis, Dominula,* Augur,* Salicis,* Polychloros, Gothica, Rubi,* Umbrosa,* Ianthina,* Neglecta, Jacobææ,* Promissa, Cinctaria (few), Fasciaria, Papilionaria. *Desiderata.*—Hispidaria, Zonaria, Rubricosa, Opima, Gracilis, Munda, Saucia, Exoleta, and offers. Lists exchanged.—*Frank R. D. Onslow, The Woodhouse, 5, Upper Richmond Road, Putney, S.W.*

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Changes of Address.—J. E. R. Allen, from the Grammar School, Galway, to Egerton, Bolton. J. B. Williamson, to 3, Chesterfield Place, Hancroft Street, Slough.

NOTICE.—We have again to apologise to a very large number of contributors for holding over their communications, but they will be printed as soon as space permits.—ED.

MEETINGS OF SOCIETIES.

The City of London Entomological and Natural History Society, London Institution, Finsbury Circus, E.C.—The first and third Tuesdays in the month, at 7.30 p.m. Papers and Notes at every Meeting.

The South London Entomological and Natural History Society, Hibernia Chambers, London Bridge.—The second and fourth Thursdays in each month, at 8 p.m.

Mr. J. W. Tutt is reading a series of papers on the various species of the genus Zygæna.—Hy. J. Turner, *Hon. Report Sec.*

Entomological Society of London, 11, Chandos Street, Cavendish Square, W. Next Annual Meeting, January 16th, 1895. President's Address.

For Winter Reading and Study.

The British Noctuæ and their Varieties, by J. W. TUTT, F.E.S. 4 Vols. price 7/- per Vol. (may be had separately.)

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—*Daily News*. August 7th 1894.

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