

THE
YOUNG NATURALIST :

A MAGAZINE

OF

NATURAL HISTORY,

CONDUCTED BY

JOHN E. ROBSON, Hartlepool,

WITH THE ASSISTANCE IN VARIOUS DEPARTMENTS OF

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THE HESSIAN FLY AND SOME OF ITS CONGENERS.*

By BERRY KENDRICK.

HAVING my attention called to an announcement in the "Warrington Guardian," of Saturday, 27th August last, that the "Hessian Fly" (so called) had made its appearance at High Leigh near here, I decided to visit the locality and investigate for myself. A train for Lymm took me within easy and pleasant walking distance. The special subject in hand was one on which I had not bestowed much previous attention. I set out, therefore, with a very crude idea of what to look for and how to search. Fortune smiled, and near the head of Lymm Daw I met Mr. Gillanders, who kindly undertook to accompany me to the farm of Mr. Thomas Rigby, of Swineyard Hall Farm, the locality indicated in the newspaper. The house is an interesting old brick and timber building of the Tudor period, moated, and well wooded round. Here we were directed to a field where the labourers, under the supervision of Mr. Rigby's brother, were at work at the harvest. It was a large field, partly devoted to wheat, oats, and barley respectively. The wheat had been cut and mostly carted away, the oats were partly cut and standing in shocks, and the barley had been cleared off one part of the field, and partly off another, except from one patch which seemed to lie lowest, and to be of a moister nature than the rest. The barley here was still standing, but appeared in many places not only stunted in growth, but much overgrown, and in some parts quite choked out and obliterated by weeds. Whether this was due to the effects of the depredator in the early stages of the cereal, or to some defect in cultivation, or to the heavy nature of the soil (barley requiring a light, warm soil), I do not feel competent to say.

*Read before the Warrington Field Club, Nov. 4th, 1887.

When some of the affected stems had been pointed out, we had no difficulty in picking others out for ourselves. They were distinguished by the fact that whereas the healthy stalks held their heads aloft, the long beards waving in the breeze, those attacked seemed slightly stunted in growth, the ears remained wholly or partly enclosed in the haulm or sheath, and bore a distorted appearance; frequently the central part of the ear projected, but the two ends remained embedded. On carefully removing the ear from the haulm, a light brown or fulvous flattened pupa was found, sometimes two or more, but so loosely adhering, if at all, as to become dislodged by the most delicate movement, either falling lower down the plant, or being instantly carried away by the wind, which blew rather stiff at the time. Finding it impossible, in consequence of the breeze, to examine them satisfactorily on the spot, I obtained permission to bring away a few heads for closer inspection, and later on obtained a further supply. The ear was partly embedded in its waddling clothes, and the basal grains often appeared abortive. I may observe that in some such samples we examined on the spot we could find no pupæ, but a closer observation showed that by selecting those stalks which showed a slight external discolouration, extending from the base of the ear to about three inches down the stem, the percentage of finds was materially increased. On closer observation of some of the pupæ (which by the way were locally denominated "eggs"), they appeared to be of a boat-shape, about a quarter of an inch in length, semi-transparent (the fly had emerged in all I examined), and pointed at both ends, the lateral margins parallel for more than half the length. Two larvæ were sent with the supplementary samples received, but they were certainly not Dipterous. I made a rough sketch of one, but judging from their form I believe they were one of the Tortricina.

Kirby and Spence, in their "Introduction to Entomology," under the heading "Indirect injuries caused by Insects," give a tolerably full account of the injuries usually arising from the attack of *C. destructor*; and so also does Dallas in his "Elements." The Chamber of Agriculture has also issued a report on the subject, at which I have had but a passing glance. Our Secretary kindly sent me a notice on the subject, cut out of some periodical, but as it bears no indication whence it was extracted, I am unable to refer to it. A pamphlet, however, by Miss Ormerod, entitled "The Hessian Fly in Great Britain," and published by Simpkin, Marshall & Co., 1886, price 6d., contains the fullest and most reliable account of everything pertaining to this insect, and even to its parasites, and ought to be in the hands of every British farmer. I will not take up space now by entering into all the minutæ that Miss Ormerod's clever little pamphlet deals with, as it is within

the reach of all, but merely touch upon the salient points of interest as given in all the authorities I have quoted. I may here add parenthetically that the "Leisure Hour" for October, contained an article on the subject, mostly if not entirely derived from Miss Ormerod's work, the wood-cuts being identical.

The "Hessian Fly" (*Cecidomyia destructor*) was first observed in Long Island, United States, in 1776, and gradually extended its ravages inland till the whole country was overrun by it. It is related that the flies swarmed in the houses during the harvest, filling every utensil in use, so that 500 have been counted in one tumbler, left a few minutes with a little beer in it.

The first reliable observation of its appearance in Europe was in 1880, in Southern France and Italy, and since then it has found its way to South Russia, Hungary, Austria, and latterly even to the South of England and the North of Scotland, two localities singularly far apart.

The following is a literal quotation, from Kirby and Spence, of its habits in America, and since confirmed by other writers:—"It commences its depredation in autumn, as soon as the plant begins to appear above ground, when it devours the leaf and stem with equal voracity till stopped by the frost. When the return of spring brings a milder temperature the fly appears again, and deposits its eggs in the heart of the main stems, which it perforates, and so weakens, that when the ear begins to grow heavy, and is about to go into the milky state, it breaks down and perishes."

Miss Ormerod further says—"On examination in the fields near Hertford, on the 30th of July, I found the stems doubled sharply down a little above the joint, and between this double and the joint below there lay, closely pressed to the stem, and covered by the sheathing leaf, the flax-seed like chrysalis cases.. The injury is caused by the fly-maggots lying at the same spot sucking the juices from the stem, which is thus weakened, and presently, although both the stem and ear above are more or less stunted, yet the weak piece of stem cannot bear their weight, and it bends down at the injured part. Sometimes a gall or some amount of swelling of the stem occurs just above where the maggot fed, but in the specimens I examined this was rarely noticeable. There were from one up to sometimes three or four (pupæ) in number, usually only one or two; they were invariably set upright (not lengthwise across the stem), and sometimes, but not always, were fixed at the lower end by being a little embedded in the straw. The flax-seeds (as they are called from their resemblance) were for the most part the sixth of an inch long, of a spindle or long oval shape, some flattened on one side, and more so on the other; the two extremities bluntly pointed, one conical, the other, which is the anterior end, usually slightly bent forward, with a pinch across

the 'flax-seed' near the end, as if the flattened side had been bent in, almost against the other side, by a nail. The colour was at first of various shades of chestnut, from quite light to full brown, and both in colour and shape the cases had a strong resemblance to the flax-seeds from which they take their name, except in being narrower. This brown case is the hardened skin of the maggot, and in this *puparium*, or pupa-case, the maggot changes first to the *pupa*, and thence to the perfect fly; at the earliest part of the observation the transverse lines shewing the divisions of the segments of the maggot were still noticeable, but gradually, as the skin hardened, it contracted lengthwise, and the transverse lines wholly or almost entirely disappeared, and instead of these, the flax-seed was marked with parallel lines." I will not say more of the early stages of this insect, except to quote a short description of the maggot or larva, by Dr. Packard, as given in a footnote by Miss Ormerod:—"After remaining about four days in the egg-state, the larva or maggot of the Hessian Fly hatches. The body is soft, smooth, shining, oval, cylindrical, beneath a little flattened, and consists of twelve segments besides the head, the latter soft, fleshy, and but little separated from the body, with very rudimentary mouth-parts."

My first impression, on comparing my samples with these descriptions, was one of extreme doubt or scepticism. In no instance did we find the peculiar sharp bend, nor was there any perforation visible in the stems by which the young larva could have entered. The larva of the Hessian fly, as would appear, feeds upwards and interiorly, whereas ours feeds downwards and externally. The "flax-seeds" did not appear in any way attached, but blew away with the slightest breath; and the "Hessian" seems to attack mostly *wheat*, whereas these ignored the wheat close alongside and kept to the *barley* only. Conviction soon followed that we must be on the wrong tack, and must look elsewhere for the true solution of the mystery. I accordingly forwarded some samples of the barley to Miss Ormerod, who kindly pointed out their true nature. She says in her reply to my letter:—

"Of the fifteen barley stems which you send me for examination, twelve are quite unmistakeably suffering from having been attacked by the maggot of *Chlorops tæniopus*, sometimes known as the 'Ribbon-footed Cornfly,' and the attack is sometimes known as 'Gout,' from the swollen and deformed appearance caused, when (as you have observed) the ear is not able to leave the sheath properly. The three other stalks look thin and poor, from some not observable cause, I should conjecture poor growth, but the others have thoroughly marked features of the *Chlorops* attack, and especially the discoloured gnawed furrow, which has been gnawed by the maggot from the base of the ear or a little below down to the first knot. The situation, namely,

the lowest and rather swampy part of the field is also another point of similarity to *Chlorops* attack, which I have often found in such localities. As far as I can judge of the empty pupa cases, they are those of the *Chlorops*, but the state of the straw is quite absolute proof that the injury has been caused by the larva of this dipterous fly. It is a stout made little black and yellow dipteran about this length —, and you will find an account of it, with figure in my own 'Manual of Injurious Insects,' if you chance to have it at hand, or in Curtis' British Farm Insects."

Earlier on in the same letter, Miss Ormerod says: "I had been greatly desiring to obtain some authentic information about the attack, which I did not in the least believe *could* be of Hessian fly."

On turning up the article on *Chlorops tæniopus* in Miss Ormerod's book as above, I find the description tallies exactly with her letter, and with our experience. For instance, the following: "The fly attacks various kinds of corn, but in our own country appears to be most prevalent on barley. When barley is attacked by this insect the plants will be found stunted in growth, and later in ripening; with the stems somewhat distorted and swollen in the joints, whence the name of 'Gout.'"

"The ears, even at full growth, are generally still sheathed, or partly sheathed, in the leaves, and on opening them the stem will be found to have a long pitchy-brown furrow from the base of the ear down to the first knot in the stem. The ears are sometimes wholly abortive, sometimes with many grains absent, small or mis-shapen; this being especially the case on the side of the ear on which the stem is furrowed."

"The maggot is yellowish white, and legless, tapering to the head and blunt at the tail; it changes to a pupa in the sheathing leaves, and the very small and rusty ochre-coloured fly-case may often be found lying in the black furrow caused by the gnawing of the grub. From this case *Chlorops* or Gout Fly, comes out towards the the end of summer, as a small two-winged fly, about the eighth of an inch long thick and stumpy in shape, yellow, with three black stripes along the back between the wings, and the abdomen of a greenish black, with black cross-bands. The wings when at rest extend beyond the tip of the abdomen.

I think we have, so far as the "Hessian Fly" is concerned, sufficiently disposed of the scare in this neighbourhood, and for the present at least, two things lie before us, first to consider the best means of combating the present enemy, as no doubt it will re-appear next season, and second to recognize and be prepared for the true "Hessian" should it come.

Again, I quote Miss Ormerod: "When a crop is seen to be much attacked (by *Chlorops*), it is desirable to draw the injured plants by hand. This may

be easily done, as their stunted or distorted growth points them out plainly, and they are chiefly to be found along the water-furrows or in wetter parts of the field. By this means the risk of future attack is much lessened, but measures of prevention beforehand would be better." I fear the above plan would hardly suffice in cases similar to that we saw at High Leigh. It would be impossible to pluck all the visible heads affected without trampling down the good ones, and apart from this they would be difficult to find an account of the excessive growth of weeds. It is a question whether a better plan would not be to leave the worst parts standing, and when the rest of the crop is removed to burn off all that remains. This would effectually deal with any animal life, *Chlorops* included. "The injury is in consequence of the feeding of the maggot lessening the supply of food to the ear, a distorted growth being formed, and the date of development retarded; therefore, whatever manure or treatment of the ground will promote healthy growth will be of service. One means towards this is thorough drainage of the soil, as it is upon the wettest parts of the field (by the water furrows), and on the most retentive soils (stiff clays) that the greatest amount of damage is noted as being done. Drainage would also make the soil warmer (by enabling it to retain the heat otherwise given off by evaporation of the surplus water; the application of manure would be more effective, and consequently the healthier plant-growth promoted would give quick maturity, with increased quantity and quality of produce. Barley, being a shallow-rooted plant, feeds in the surface-soil, and comes quickly to maturity, therefore it needs that its food should be abundant and of a soluble kind; and it is for this reason that the application of any nitrogenous or ammoniacal manure, combined with phosphates, increases the yield to such an extent. This necessity is, of course, greatly increased when the stems are being injured by the maggot-attack,"

To these I would add as a private opinion, whilst admitting my thorough inexperience, the desirability of taking all practicable measures for the destruction of stubble and chaff, and preventing its dispersion by the wind. Where a steam thresher is used it ought to make a good fuel, if not too thickly heaped on the fire so as to smother the flame.

As regards the comparative danger of future depredation, I think the farmers of this district (if proper measures be taken), need not be under much apprehension from this species. The *Chlorops*, in contra-distinction from the "Hessian," is indigenous, or at least is no new importation, and I see no reason why it should be worse in the future than it has been in the past, whereas the *Cecidomyia* as its specific name *destructor* implies, when once it gets a footing overruns everything like a host of locusts. Prevention is better than cure, hence the desirability of our familiarising ourselves with it

beforehand, that we may stamp it out should it really appear.

I desire to devote myself more particularly in future to the study of farm pests, their habits, parasites, &c., with the best means of counteracting them. It is true much of the ground has been gone over already, particularly by the lady whose works I have so liberally quoted, and who has directly and indirectly furnished me with most of the material for this paper; still there is plenty of scope for us all, and plenty of work worth doing, as also plenty that we may do amongst us in our own particular district if we only kept our eyes open, and if spared, I intend to devote my special attention to it next season. I shall be glad of any facts, specimens, or information in any shape that any of my friends have to report, and shall make it my particular endeavour not to rob anyone of the honour due to him individually or as a member of the club for any useful information he may impart. Another thing I should like to see got up, under the auspices of the club, and in connection with the museum, a collection of specimens of insect pests, agricultural, horticultural, and even domestic, with samples of their effects, parasites, food, and general history, as is possible to preserve and exhibit; and also to endeavour to enlist farmers, country-people, and others having much opportunity of observation to assist us in the work.

By making an effort of this kind we might gain a triple result. It would be a public benefit, it would also be an object and enjoyment to ourselves, and a means of acquiring valuable information; whilst by enlisting the sympathies and co-operation of all interested in cultivation, instead of looking upon us as intruders, it would serve to shew in a practical manner the utility and objects of "them bug-hunters."

Warrington, Nov., 1887.

NATURE IN JANUARY.

By ALBERT H. WATERS, B.A.,

Nature is not at its best in January—far from it. The woods are either sodden with moisture and damp as damp can be, or they are buried deep beneath the drifted snow; the green lanes are either profoundly muddy, or frozen hard as adamant. Nevertheless, the naturalist will find some work to do even in mid-winter. When the landscape is "white without a speck," and the fields and meadows are covered up with a mantle of snow, the ornithologist finds plenty of occupation, for it is then a good time to make out a list of the resident birds of a district, and of such species as come to it in winter from more northerly parts. I find it very interesting at such times to pay a visit to the fens near Cambridge, and observe the birds which visit

them. Last winter, for instance, quite a long list of interesting species might have been made out by any one who had taken the trouble to observe them. Birds are at such times very easy to perceive, and with the help of a field-glass their species may be readily made out. There is, too, the chance of picking up dead specimens on which to exercise the taxidermist art: I have myself obtained some very good ones thus. I mean good as specimens: I have not been fortunate enough to meet with anything in this way of any great rarity, because I am under the disadvantage of not actually living in the fenland.

It will perhaps be of interest to my ornithological readers if I mention some of the feathered visitants to the the Cambridgeshire fens in the winter time. The list includes the great grey shrike, the waxwing, rock dove, greylag goose (rarely), common shieldrake, wild duck, shoveller, widgeon, pochard, golden eye (*Clangula glaucion*), long-tailed duck (*Harelda glacialis*) common scoter, great northern diver, and red-throated diver.

Gulls are also among the winter visitants to our fens. Besides the common gull, the black-headed gull, the great skua and Richardson's skua occur. About four or five years ago several of our rarer sea and aquatic birds were taken in the Cambridgeshire fenland, especially in the fens of Toleham and Burmell. They included two red-throated divers (*Colymbus septentrionalis*), several shearwaters (*Puffinus anglorum*), and one skua (*Lestris cataractes*), besides several guillemots (*Uria troile*). About the same time a beautiful little Auk (*Alca alle*) was picked up at Toleham. I mention these just to show that however inclement the weather may be, the ornithologist, at any rate, need not be idle. I will say something about the smaller birds of Cambridgeshire another month; the list is too long to give here now.

If January be mild the naturalist, whatever may be his favourite "ology," will find plenty to do. Several of the smaller birds commence their song this month, and the work of noting down when first heard furnishes occupation for the ornithologist. In southern districts the redbreast may be heard on fine sunny days as early as the beginning of the month, and we may hear the nuthatch chirp almost as early. If we take a country walk about the end of the first week in the year, we shall hear the missel thrush discoursing from the summit of a tall ash or elm tree. A day or two later on we may hear the hedge sparrow. Next the tits begin their merry chirping and at about the same time the song thrush strikes up. A week subsequently the blackbird begins his cheerful whistling, and the wren will sing from her perch in the hedgerow; nearer the end of the month the skylark and woodlark commence their songs.

In January, the rooks are very busy about their nest trees, pulling

the old nests about and repairing them; and any one who lives near a rookery will derive great amusement from watching their operations through a field-glass. In fact the ornithologist sees in many ways that the feathered tribes are waking up.

The conchologist will find January a good month for adding to his collection of land and freshwater shells. At any rate he has no excuse for being idle in mild weather. In order to prove my assertion, I find from my notebook that one afternoon in January of last year, I found upwards of thirty species and several varieties in a two hours ramble in the neighbourhood of Cambridge.

Although there is no reason why he should be idle, the entomologist does not find much to do in January, except it be among the coleoptera. The butterflies *V. cardui*, *atalanta*, *io*, *polychloros*, *urticæ*, *antiopa*, and *c-album* are hibernating in various sheltered nooks; and, by the way, it is wonderful what a predilection the Vanessas have for coming into houses at the end of autumn. Often on a sunny day in January we may see a tortoiseshell butterfly fluttering about the bedroom window as if impatient for the coming of spring.

Several moths are also passing the winter in a torpid state, as, for example, *T. satellitia*, *D. rubiginea*, *H. croceago*, *D. templi*, *C. vetusta*, *C. exoleta*, *G. libatrix*, and most of the family *Plutellidæ*, so fond of getting into thatch.

The moths of the genus *Hybernia*, and perhaps on a mild day at the end of the month, a stray brimstone butterfly, are the only species to be obtained in the active state in January.

Not much can be done in January by the botanist, unless he collects lichens, mosses, and such like. Very few flowering plants are in bloom, the daisies and white dead nettles are about the earliest to flower, and these with one or two others are all we see in January.

Cambridge.

SLUGS AND THEIR VARIETIES.

BY DR. J. W. WILLIAMS, M.A.

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Continued from Vol. VIII., page 191.

LIMAX FLAVUS.—Taking the slugs in their recognised order of place, we come now to speak of a large, flabby, and slimy creature known popularly as the "cellar-slug," and in scientific parlance as *Limax flavus*. Let us look at one and examine him closely so that we may get his specific characteristics.

We will place our observations in numbered order under one another, and the anticipated results would be some such as the following:—

1. Body fusiform (*i.e.* spindle-shaped) being pointed at both ends, and broad in the middle.
2. Body whitish or yellowish, marked, or tessellated with white, brown, and brown-black.
3. Mantle one-lobed and not bi-lobed as in *Amalia gagatis* and *A. marginata*, marked with wrinkles running around concentrically.
4. Head, neck, and tentacles slate-coloured.
5. Body somewhat keeled, or carinated on its dorsal part towards the tail.
6. Foot white and bordered externally with yellow.
7. Slime yellow, sticky in quality, and large in quantity.
8. Shell (the mantle will have to be lifted up to see this) quadrangular, thin, with a membranous margin, and with the nucleus projecting a little over one end.

Now if you will take notice of all these features when you get a cellar-slug, you will never miss telling, when you come to the examination of many slugs, whether this or that one is *Limax flavus* or not, no matter how much variation it may have undergone. In the majority of text books, *flavus* is put down as being universally distributed throughout the length and breadth of this country, but this is evidently wrong, for in many lists which I have examined there are two fatal words against it—"no record"! It is local, but for all that, if I may be excused the term—it is generally local. In America it has been introduced, and occurs near Portland, Maine, while in Australia a form has been described by a German observer named Lehmann, as *Limax Beckworthianus*, which, no doubt, is identical with *Limax flavus*. One archaic record of this slug tells that it has the faculty of spinning threads, and hanging down from branches of trees by them, somewhat after the manner of a looper caterpillar. Three varieties have been described as inhabiting these islands. One of them, which is greenish with indistinct spots (*v. virescens*) has also been found in France and Italy. The other two seem, so far as the records have been made up to the present, to be specially localised in this country. These were described by Mr. Denison Roebuck, of Leeds, and are called vars. *grisea* and *suffusa*:—the former having the markings of the type but the ground colour grey instead of yellow, and the latter having its body coloured with grey all over, without markings or spots at all.

LIMAX AERESTIS.—Who does not know this slug by its outward form and colour, if not by its specific name. It is *the* slug of the cabbages, and of the produce of our fields and gardens. Destroy it as fast as our gardeners can its numbers do not seem to be on the decrease. Bouchard-Chautereaux—

an old but accurate observer—watched two slugs of this species lay no less than 380 eggs at one time, and he tells us that they commence laying when at the age of sixty-six days although they do not arrive at adulthood until the ninety-second day; and they have three or four broods—perhaps more—in the year. Let a mathematical reader compute how many children and childrens' children one of these slugs would have in the course of a life-time of three years and he will be confounded at the numbers. But as with every other pest, nature holds a compensation in the ravenous appetites of moles, birds, and frogs which devour them in an astonishing quantity, and even these creatures do not seem enough keep to them within due bounds, for a Frenchman, M. Laurent, has shown that sometimes a fungus is developed within the eggs *before they are exuded from the body of their parent.*

The characteristics of *Limax agrestis* are the following:—

1. Body whitish, rufous-brown, or cream-coloured mottled with spots of a deeper hue (the type is greyish-white with an ashy mantle.)
2. Tentacles dusky-grey.
3. Mantle concentrically striated—best seen when the animal is resting—and rounded in front and behind.
4. Foot narrow, creamy-white or pale grey in colour.
5. Slime milk-white, copious in quantity, and when dry leaving a thick white film.
6. Shell (under the mantle) oval with a membranaceous margin and with nucleus placed slightly to one side or excentrically.
7. Length $\frac{1}{2}$ — $1\frac{1}{2}$ inches.

The varieties are many, but the commonest is the greyish-mottled one, which is called var. *sylvatica*. Others are v. *reticulata*, body reddish with black spots placed irregularly; v. *nigra*, entirely black; v. *albida*, greyish-white without spots; v. *lilacina*, lilac, spotless; v. *tristis*, brownish, with two lateral brown bands on the mantle; v. *punctata*, greyish or white in colour, spotted with small black points or dots, and a variety which came to me from the Midlands and which I have described under the name of v. *submaculata*. My original description of this last runs thus:—Body greyish-white, streaked with seal-brown on the back, which extends into the mantle and covers its posterior two-thirds; the sides of the body and anterior third of the mantle free from streaks and spotted with black.

Limax agrestis has a wide range of distribution extending all over the European continent, Siberia, the United States, Canada, and Northern Africa.

LIMAX LÆVIS.—This does not seem to be as common as *L. flavus* and *L. agrestis*, and it has no described varieties indigenous to this country. It is an active little creature, and although a slug is by no means sluggish in

its locomotion. According to a recent German observer this slug differs from all other slugs in being sexually distinct, but this needs very strongly to be confirmed, for it is a departure, if correct, from one of the special and acknowledged facts hitherto laid down as distinctive of the *Pulmonata*. If correct, perhaps, we have here in this species a living link between the *Heteropoda* and the *Pulmonata*. *Lævis* will be distinguished from all other Limaces by the following features, which are arranged as in the descriptions of the two preceding species.

1. Body dark brown bordered with violet, slender, very glossy, varying from $\frac{1}{2}$ to $\frac{3}{4}$ inch in length.
2. Mantle pale yellowish-brown, bluntly rounded before and behind, and swelling behind into a lump, due to the solid shell which is placed beneath this portion of it.
3. Slime transparent, thin.
4. Shell (under mantle) solid, unquiform or nail-shaped, very convex above, flat below, and without a membranaceous margin.

(To be continued.)

INSECT PHOTOGRAPHY.

By C. PHILLIPS, F.E.S.

Insect Photography is an exceedingly interesting study for the entomologist during the long evenings of winter, when he is prevented from doing much out-door entomology by the boisterous weather.

The few hints hereunder, I fear, are very elementary, but I have no doubt they will be useful to some of your readers,

I will now endeavour to show what little apparatus is required. A good microscope is indispensable, a photographic camera, a stock of plates and slides, and the necessary chemicals for finishing the photo, and all is in readiness.

The first thing to do is, to bend the microscope to a horizontal position and connect it to the camera. I find the following plan a very good one, and requires little time and labour, get a good sized bung or lump of cork and shape it down so as to fit tightly into the hole which was originally occupied by the lens of the camera. Having got this to fit so as to be perfectly light-tight, bore a hole in the middle of the cork just large enough to admit the eye-piece of the microscope (which must also fit tightly, so as to prevent any light getting in and destroying the plate.) After fixing in this way the camera to the microscope, the next thing to do is to get a strong light (for

the stronger the light the less time the sensitive plate will need to be exposed to its rays) thrown on to the slide on which is mounted the object to be photographed, this can be done directly, or indirectly, that is, the light may be thrown direct on to the object on the slide, or first on to a mirror and then by the reflective powers of the mirror thrown on to the slide. I find by putting a strong condenser between the lamp and the slide (that if the light is thrown on directly) it greatly improves the light and consequently lessens the exposure of the plate.

Having now got your camera and microscope connected together and the slide well lighted, the next operation is the focusing or the making of the object to be photographed clear to the naked eye. This can only be accomplished by turning the screw of the *microscope* and not that of the *camera*, which only enlarges the disk of light and object without focusing it.

After focusing the object clearly, the student has only to put in his sensitive plate and produce his photo—but how to take a photograph can be learned from any book on photography of which there are enough to stock a small library. I think I may safely leave the student now, to pursue his study of insect photography alone.

Castle House, Shooters Hill, Kent.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

December 7th, 1887.—Dr. David Sharp, F.Z.S., President, in the chair.

Mr. C. E. Stanley-Phillips, of Shooter's Hill; Mr. H. W. Barker, of Peckham; and Herr E. G. Honrath, of Berlin, were elected Fellows.

Mr. Jenner Weir exhibited, and made remarks on, twelve specimens of *Cicadetta hamatoides*, collected last summer in the New Forest, by Mr. Charles Gulliver. Only one of the specimens was a male, from which it was inferred that the males were more active than the females, and quickly retreated when disturbed.

Mr. M'Lachlan exhibited a specimen of *Pterostichus madidus*, F., which he had recently found in a potato. It seemed questionable whether the beetle had been bred in the cavity or had entered it for predaceous purposes. Mr. Theodore Wood, Mr. Kirby, and Mr. Herbert Cox took part in the discussion which ensued. Mr. M'Lachlan also exhibited two specimens of a species of Trichoptera—*Neuronia clathrata*, Kol.—which occurred rarely in Burnt Wood, Staffordshire, and elsewhere in the Midlands. On enquiry he was informed that the two specimens exhibited had been found in the Tottenham Marshes, by Mr. C. J. Boden.

Mr. Porritt exhibited a series of specimens of *Cidaria russata*, from Yorkshire, the Isle of Man, the Hebrides, and the South of England. The specimens from the two first-named localities were almost black.

Mr. Verrall exhibited a specimen of *Mycetæa hirta*, Marsh., which was found devouring a champagne cork. The Rev. Canon Fowler remarked that certain *Cryptophagi* had the same habit. The discussion was continued by Mr. M'Lachlan, Mr. Jenner Weir, Dr. Sharp, and others.

Canon Fowler exhibited specimens of *Acronycta alni* and *Leiocampa dictæa*, which came to the electric light on Lincoln Cathedral during the Jubilee illuminations. He also exhibited a specimen of *Harpalus melancholicus*, Dej., from Kingsgate.

Mr. Billups exhibited, for Mr. Bignell, an interesting collection of British oak-galls. He also exhibited the cocoon and pupa-case of a South American moth, from which he had bred 140 specimens of a species of Ichneumonidæ.

Mr. O. Janson exhibited for Mr. C. B. Mitford, a collection of Lepidoptera from Sierra Leone.

Mr. White exhibited a female specimen of *Composia olympia*, Butl., from Florida. He also exhibited a curious structure formed by white ants at Akyab, Burmah.

Mr. Waterhouse exhibited a series of diagrams of the wings of insects, and read "Notes of observations on the homologies of the veins"—a subject to which he had given especial attention for some time past. Mr. Champion, Mr. Verrall, Mr. M'Lachlan, Dr. Sharp, Mr. Poulton, and others took part in the discussion which ensued.

Mr. G. T. Baker contributed "Descriptions of new species of Lepidoptera from Algiers."

Mr. Gervase F. Mathew, R.N., communicated a paper entitled "Life-histories of Rhopalocera from the Australian Region." The paper was accompanied by elaborate coloured drawings of the perfect insects, their larvæ and pupæ.

Mr. Frederic Merrifield read a "Report of Progress in Pedigree Moth-breeding, with observations on incidental points." He also exhibited a large number of specimens of *Selenia illustraria*, showing the results of the experiments he had been making.

Mr. Francis Galton alluded to the close attention Mr. Merrifield had given to the subject, and complimented him on the neatness, ingenuity, and skill with which his experiments had been conducted, and on the results he had obtained therefrom. Mr. Poulton, Dr. Sharp, Prof. Meldola, and others continued the discussion.—H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL
HISTORY SOCIETY.

A very fair muster of members took place on the 1st December, 1887, and exhibits were numerous considering the time of year. The various species of the genus *Hibernia* occurring in the autumn, were shewn by several members and from all accounts appear to have been as numerous as ever in the vicinity of London. Some variations of the common Ermines (*A. lubricepeda* and *menthastris*), and also some of *A. grossulariata*, were in Mr. Thompson's box. Mr. Biggs shewed some interesting species captured in the vicinity of Monte Video, and a large Sphinx taken many hundred miles from land in the Pacific. Mr. Clark contributed some enormous specimens of the common house-spider, and Mr. Eedle shewed an albino specimen of the Siskin, captured at Brounne. Mr. Eedle further reported that a specimen of the Fork-tailed Petrel had been shot at Leigh, in Essex.

It being the annual meeting, the Vice-president, in the absence of the President, read a short address, after which the Treasurer and Secretaries read their reports, which were very satisfactory. The election of officers was then proceeded with, and all the officers were re-elected. A vote of thanks concluded the proceedings.

At the following meeting, Mr. Allbuary exhibited a nice series of *A. ulmata* captured in Kent. Mr. Cripps, on behalf of the coleopterists, excited much admiration by his beautiful exhibit of the brilliant little *Lema melanopa*, captured at the rather uninteresting locality of Rainham. Mr. Hillman made a very interesting exhibit with a selection of British shells, including the genus *Helix* with hybrids. A selection of these he presented to the Society, and in doing so made some remarks on the importance of the science of conchology, not only as collections of shells, but on account of the interesting habits of many of the species when alive. In the course of his remarks he also commented on the absence of true knowledge respecting the earlier stages of many of the *Phryganidæ*, and suggested making up a dredging party for the purpose of working out some of the problems of pond life.

With reference to the white siskin exhibited at the previous meeting, Mr. Hillman mentioned the capture of a white red-pole (*Linaria minor*), and a white skylark (*Alanda arvensis*), at the Wormwood Scrubs, and a speckled specimen of the blackbird (*Turdus verula*), the latter of which he promised to exhibit at a subsequent meeting.

Mr. Clark then read a paper on the leaf-cutting or upholsterer bee (*Megachile centuncularis*), giving the life-history of this very interesting species, together with a detailed account of their curious constructions. The paper was supplemented by examples of the cells, dissected and mounted in a very

painstaking manner, shewing each separate piece of leaf used in their formations, also a specimen of the pupa, a large number of living parasites found in one of the cells, a series of the perfect insect, together with specimens of other species of the same genus, and one of the finest specimens of a set of cells that can well be imagined. This was formed in a rotten branch of a plum tree and consisted of various sets of cells leading towards the various openings in the bark, and extending in both an upward and downward direction; in one row there were no less than nineteen cells and in another fifteen. Mr. Hillman, speaking after the paper had been read, said that he had observed them in an old wall forming their cells in the chinks between the bricks, so that he thought they would go wherever they found a suitable cavity, but he did not believe that they excavated galleries for themselves either in rotten wood or elsewhere, and the specimens exhibited by Mr. Clark were, in his opinion, formed in the old burrows of some wood-boring larvæ. Mr. Anderson commented on the fact of the cells being closely packed one behind another, and thought it curious that the insect produced from the last egg laid must arrive at maturity and emerge first, as otherwise the other bees could not get out. Mr. Clark said that as he hoped to rear the bees from the cells exhibited, he expected at a future meeting to be able to give some reliable information respecting the mode of emergence. A very animated discussion on this species was continued for some time.

The President made some remarks in reference to the sale of an egg of the Great Auk for 160 guineas. In the course of conversation on this subject, it was mentioned that five eggs of this species are in the Natural History Museum, though some of them are damaged. It was announced at the close of the meeting that papers would be read at each meeting in January and also the first meeting in February.—J. RUSSELL and E. ANDERSON, Hon. Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

November 24th, 1887.—R. Adkin, Esq., F.E.S., President, in the chair. Messrs. J. Reindorp and W. H. Wiffen were elected members. Mr. Adye exhibited *Sphinx convolvuli*, *Catacala promissa*, *C. sponsa*, *Xylina rhizolitha*, *X. semibrunnea*, and *X. petrificata* from the New Forest. Mr. Merr, species taken on Wanstead Flats. Mr. E. A. Briggs, a fine variety of *Arctia caja*. Mr. Billups, a cocoon of a South American moth, the pupa being about the size of *Chærocampa porcellus*, from which 139 perfect and 19 immature specimens, and 9 larvæ of a parasite of the genus *Smicra* had emerged. Mr. Billups also exhibited, on behalf of Mr.

Moseley, a case illustrating the life-history of the Hessian Fly (*Cecidomyia destructor*), with examples of infected straw; and on behalf of Mr. Bignell, a case of British galls with gall flies, and contributed notes. Mr. Fenn, on behalf of Mr. T. D. A. Cockerell, caddis cases (*Helicopsyche* sp. ?), a genus of Trichoptera, from Divide Creek, Garfield Co., Colorado, which very closely resemble the shells of the genus *Valvata*. Mr. R. Adkin exhibited series of *Spilosoma mendica*, including males varying in colour from creamy-white to smoky-brown, and females of the usual white form bred from ova from Co. Cork; males of the creamy-white shade, taken at light at Antrim; and bred males and females of the usual English type, for comparison; and remarked that the light-coloured males were the var. *rustica*, Hub., that it had been taken both in the north and extreme south of Ireland, but that he had no definite record of it from the central or western districts, and that it appeared to be very doubtful whether the usual smoky-black form of the male occurs at all in that country. Mr. West, of Streatham, exhibited specimens of *Locustidæ*, from Switzerland.

December 8th, 1887.—The President in the chair. Messrs. W. White, F.E.S., A. J. Hodges, T. H. Leach, F.L.S., F.Z.S., G. H. Verrall, F.E.S., F. Grut, F.L.S., F.E.S., F. J. Winkley, A. Waterhouse, H. A. Yardley, and G. B. Routledge, were elected members. Mr. Sheldon exhibited examples of the spring and summer broods of *Scoparia angustea*, and called attention to the larger size of the summer brood, which led to a considerable discussion, in which Messrs. Jenner Weir, Carrington, Tutt, and others took part. Mr. Ince, a comparative series of *Nepa cinerea*, and remarked on the colour of the abdomen ranging from red in some specimens to black in others. Mr. Tutt, examples of micro-lepidoptera, shewing the system of setting specimens unpinned, as advocated by Mr. G. Coverdale some time ago. Mr. Fenn read notes received from Mr. T. D. A. Cockerell on a case of mimicry between *Vanessa antiopa*, and a species of *Locustidæ*, observed by him in the Colorado Rocky Mountain region.—H. W. BARKER, Hon. Sec.

CLYDESDALE NATURALISTS' SOCIETY.

The usual monthly meeting of this society was held at 207, Bath Street, Glasgow, on Wednesday evening, 21st December, 1887. Mr. T. J. Henderson, president, in the chair. Mr. John Young, F.G.S., exhibited type specimens of a new fossil sponge, *Tholiasterella crassa* (Hinde), the spicules of which were first observed at Crawfield Quarry, near Beith, where they were brought to view by the softer stone surrounding them wearing away by the action of the weather. Since the remains of silicious spicules of carboniferous sponges were first discovered in Ayrshire some twelve years ago, no

less than eleven genera and seventeen species have been added. In other carboniferous districts of England and Ireland, only three genera and five species have as yet been determined, two of these being also found in Scotland. The exhibitor hoped that as other districts in our limestone strata were being opened up the search for sponge remains would be continued, and that other forms would be added to our list. Mr. Robert Dunlop exhibited specimens of fossil plants from the upper carboniferous formation, including a rare species, *Psilotites unilateralis* (Kidson), and *C. folivius*, *C. bivalvis*, *S. scutallatus*, &c., also a specimen of sphurs produced by gas. Mr. John Mackay exhibited two boxes containing British specimens of the fritillary butterflies (*Argynnidæ* and *Melitææ*), including fine series of the rare species *M. cinxia*, from Ventnor, Isle of Wight; *M. athalia*, from Plymouth; and *A. lathonia*, taken at Dover. Mr. Mackay also exhibited fine specimens of the variety *valezina* of *A. paphia*, variety *diniensis* of *L. sinapis*, and the black form of *A. betularia*, regarding which he made some interesting remarks, explaining the distribution of the various species and other facts concerning them. Mr. Robert Mason, F.L.S., exhibited a fine collection of plants from Switzerland, which, he remarked, bore a very close resemblance to our Scottish flora. Indeed, of the Switzerland flora only three genera have not been found in Britain, and representing the species *Rhododendron virugineum*, *R. intermedium*, *Solanella alpina*, and *Nigritella angustifolia*. In connection with this exhibit, Mr. Young said that it was remarkable that the plants which are found on the high grounds in Switzerland are here found on the seaboard. Mr. T. J. Henderson showed some specimens of microlepidoptera, including *Eupæcilia angustana*, and the variety *Thuliana*, which is peculiar to Shetland; also *Mixodia palustrana* and *Exapate gelatella*.—
JOHN MACKAY, Hon. Sec.

PASSING EVENTS.

The celebrated auction rooms in King Street, Covent Garden, on the 13th of December last, witnessed a gathering of naturalists such as is not often brought together. The fact of an egg of the Great Auk coming into the market, is of so rare occurrence that that alone would draw together the most prominent of our oologists, whilst the South African curiosities and specially selected heads and horns of various species of antelopes from the late Colonial Exhibition, and two collections of lepidoptera also had their respective admirers. The day was certainly a good one for the auctioneers, though any one wishing to obtain fine hall specimens might, with judgment, have secured

an assortment at an almost nominal price. The sale of the egg was not without its due share of excitement. Mr. Stevens mentioned that the bird is now rapidly becoming extinct, whilst only 66 specimens of the egg exist, of which 25 are in museums, the remainder in nineteen private collections. The biddings commenced at £50 and advanced rather languidly at first, but there were at least half-a-dozen bids at once when double that price was reached. At £120 the hammer seemed about to fall, when hurriedly along the passage leading to the auction room sounded footsteps, whilst a voice called out to stop an instant for an intending purchaser. Not too late he came, but although unsuccessful, the price was by this arrival advanced another £40, the specimen finally being knocked down amidst much applause for £168.

We may mention that the egg, which is undoubtedly genuine, is of small size and very slightly cracked, whilst it is somewhat discoloured, and the markings upon it very faint in comparison to some we have seen. The last specimen sold by auction in 1880 brought £105 only.

In one of the collections that were next submitted was an example of *P. podalirius*, said to have been formerly in Mr. Curtis's cabinet, and the only genuine British specimen: it did not, however, find favour with the company, and was withdrawn without an offer.

The Diurni and Geometrina of Mr. Blackall, of Folkestone, although not numerous attracted much attention, being nearly all bred specimens of unusual size. Of these, the examples of *cardamines*, *sinapis*, *phleas*, and *iris*, were very fine. Two varieties (one very much obscured in its markings) of *M. albicollata* brought £3; whilst a bred series of *A. prunaria*, 70 in number showed that with careful treatment insects need not deteriorate in size when interbred, the third consecutive year's specimens being much larger than the first, some of the males having an expanse of two inches, and the females two inches and a quarter, a size we have never known exceeded and but very seldom equalled. The collection had not many varieties in it beyond those mentioned, a yellow-tinted *helice*, suffused *glabraria* and *biuudularia*, being the most prominent.

NOTES AND OBSERVATIONS.

THE NEW BUTTERFLIES.—During the past year there have been no records of the capture of *Auosia plexippus*, either in this country or on the continent. It may be assumed, therefore, that either all that reached our shores were captured, or that they failed to find a suitable food-plant on which to deposit

their ova. In a country like ours, which, densely populated as it is, has yet large tracts of moorland and forest, it is difficult to imagine that all the butterflies reaching our shores were captured. At a place like Dover, where collectors will always be on the look out for blown over examples of *P. daphnidee* and *A. lathonia*, it is more likely that most of those that cross, fall to the net of the entomologist, but *plexippus* appeared over a wide range, and one both less populated and less searched by collectors. Certainly the large size of this butterfly would make it very conspicuous on the wing, still it appears extremely unlikely that all were captured before any of them had an opportunity of ovi-positing. We know that butterflies retain their ova for a considerable period when the weather is not fine, and it is probable they could retain them at other times also. It seems likely therefore that a suitable food-plant had not been found. Would it not be worth the while of entomologists about the South coast, to scatter seeds of one or other of the known food-plants of this species. They would probably become naturalized there as they have done in other places, and if we ever had a visit from this beautiful species again, it might be able to establish itself on our shores.

Polyommatus argiades does not appear to have been taken again either. It is not very likely that the specimens recorded were immigrants, but it may be a species discovered just as it was bordering on extinction, and now so rare that it is difficult to meet with. We shall look with some interest for the records of the coming season, and hope to hear of *Argiades* again.—JOHN E. ROBSON, Hartlepool.

ZYGÆNA MELILOTI.—My friend, Mr. Gregson, must excuse my entering into discussion with him regarding the identity or distinctness of the British *Z. meliloti* and *trifolii*. This was long ago threshed out from the point of view from which he argues, viz., the physical appearance of caught specimens. The Rev. Payne Smith observes that in reasoning we must assume nothing, and consider only as facts, things which cannot fairly be denied—this my friend is scarcely prepared to allow me, for he thinks my views are *mere opinions*, the older ones of Doubleday, &c., are quoted as *facts*, whereas these also really are but individual expressions of opinion, founded upon examination of captured specimens of the two reputed species. I cannot admit that these so-called facts are any proof of distinctness, and without being drawn into any premature disclosure of the experiments lately made with this genus, would simply reiterate *my opinion*, that not only do these insects constitute one species, but that our young readers who space out their cabinets otherwise will have again shortly to alter the arrangement of the drawer which contains the insect.—SYDNEY WEBB, Dover.

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EVOLUTION.—REPTILES AND BIRDS.*

By LINNÆUS GREENING.

IN considering the evidence in support of the evolutionary theory which is revealed to us by the study of reptiles and birds, the most obvious is the fact that all reproduce by eggs. As all vertebrates below reptiles reproduce by eggs, and of the higher ones, the monotremes (as *Platypus* and *Echidna*) also, we may fairly take this fact as a connecting link between the highest and the lowest vertebrates. The embryonic developments of the sauropsidans would be too abstruse a subject for a sketch of this kind, but I may mention one fact tending to show the common origin of these creatures, and that is, that in the earliest stages of development the tails of all birds are distinctly reptilian in character; that is to say, there is no coalescence of the last caudal vertebræ, as in the existing adult birds, but each vertebra is separate and distinct, as in the existing reptiles and in some fossil birds. It is difficult to realize any relationship between creatures apparently so unlike as the slow moving tortoise and the swift flying falcon, the ponderous crocodile and the nimble lizard. It is well to remember that all reptiles and birds are classed together as Sauropsida, for widely as they differ, all present certain striking anatomical and functional resemblances, which clearly separate them from the Ichthyopsida on the one side and the Mammals on the other.

Without going into minute anatomical details, it will suffice to point out two or three leading sauropsidan characteristics. In all, the skull articulates with the vertebral column by a single articulating surface or condyle; and each half or ramus of the lower jaw is composed of several pieces, and articulates with the skull, not directly, but by the intervention of a peculiar bone called the quadrate. A simple illustration of this similarity of structure may be obtained by any one who will be at the trouble of procuring and examin-

*Read before the Warrington Field Club, Nov. 12th, 1886.

ing the skeletons of a sparrow and a lizard ; such an examination will shew that the bones of the sparrow's wing are the same, bone for bone, as those of the lizard's fore-leg, but drawn backwards and upwards, so as to work in the air. The knee of the sparrow's leg seems to be bent the opposite way to that of the lizard's hind-leg ; but this is only apparent, as what seems at first sight the knee of the sparrow is really its ankle, for the bones of its foot have grown long and leg-like, and it always stands upon its toes, the rest of its foot forming a firm support to hold its body up in the air. The true knee, is, in birds, nearer the body ; and strange as it may seem, some birds occasionally rest the whole of their foot on the ground, presenting a most curious appearance.

Though perhaps the Archegosaurus and some other doubtful fossil forms may present closer links between batrachians and reptiles than any existing forms, yet we are not without links in the existing Chelonians, which of all reptiles are the lowest and the most closely allied to the batrachians.

The most interesting point to be observed, is the fact that some Chelonians possess delicate internal gills in the pharynx, homologous to the inner gills of tadpoles. Agassiz pointed out the existence of these pharyngeal processes, and careful experiments have borne out the inferences he drew therefrom. A soft-shelled turtle (*Aspidoonectes spinifer*) was confined in a glass aquarium, and completely immersed in the water, and it was noticed that the throat and the floor of the mouth became alternately swollen and collapsed, much like the respiratory motions of a frog in the air. As no air escaped from the turtle, the bulging of the throat and mouth must be caused by filling the mouth and pharynx with water and expelling it again, while the air must be forced from the lungs to the mouth and back again after being partially aerated. The gradual transformation of gill-breathing batrachians to true air-breathing reptiles, of which the Chelonians seem to give us some idea, is more definitely illustrated in the case of the Alpine black salamander (*Sal. atra*.) This animal, originally a batrachian, and as such laying its eggs in water, has been forced by altered circumstances (gradual elevation of land) to retain its young in its body till they become air-breathers ; yet, if the young be removed prematurely from the body of the mother and put into water they go through all their changes like the common newts.

Having traced the connection between gill and lung breathers, the next step will be to consider the respiratory and circulatory organs of reptiles and birds. The heart and lungs, in different orders of Sauropsidans present wide differences. In the Chelonians, as has been mentioned, the circulation and respiration are almost batrachian in character. Most reptiles possess a three-chambered heart, and in some, as *Ophidia*, one lung is merely rudimentary,

and the other of a simple structure. In the *Crocodylia* however, we find a distinctly higher organization; the heart is four-chambered, but as the walls of the two aortic arches are in contact where they cross one another, there is a mixture of venous and arterial blood, though this takes place outside the heart, not within it, as in the lower reptiles. In birds the heart is four-chambered as in mammals, there is no mixture of the pure and impure blood and therefore they are warm-blooded, more so in fact than any other animals. The respiration of birds is more active than that of any other vertebrates, that is, they consume more oxygen and form more carbonic acid in proportion to their size. Their lungs are not so minutely sub-divided as those of mammals, but the surface over which the air can act upon the blood is immensely extended, by a provision which is peculiar to this class. The air introduced by the windpipe, passes not only into the lungs, properly so-called, but into a series of large air-cells, which are placed in various parts of the body, and which even send prolongations into the bones, especially in birds of rapid flight, whose whole skeleton is thus traversed by air. Some lacertilians (as Chameleons and Geckos) also have air-tubes passing from the lungs into the bones, and some of the fossil pterosaurians possessed similar structures, surely a suggestive factor in evolution.

The curious lacertilian reptile *Hatteria punctata*, sole living representative of the very ancient and once numerous order Rhynchocephalia, possesses in its head a curious sense organ, which seems to point not merely to the existence of a common ancestor of all the vertebrates, but in the still more remote past to a common ancestor of vertebrates and molluscs. This sense-organ arises in the middle dorsal line, as a hollow outgrowth of the third ventricle of the brain; and in both batrachians and reptiles becomes divided into two parts, one of which retains connection with the brain, and the other in most cases becomes separated, and is developed into a highly organized invertebrate eye, lying under the parietal foramen; a depression of the skin of the head occurs immediately over this spot, but does not lead down into it. This organ is found in different stages of uselessness in different lizards, in some, as the slow-worm quite isolated from the brain, in others, as *Hatteria*, *Iguana*, *Chameleo vulgaris*, and *Lacerta ocellata*, a distinct nerve connection with the brain exists. The discovery of a molluscan eye in the head of an archaic lizard is most suggestive of a common origin of the invertebrates and vertebrates.

Before treating of the higher Sauropsidans, it will be very interesting to briefly examine the order OPHIDIA. We may be justified in regarding snakes as lizards, which have, through ages of disuse, gradually lost their limbs. Excepting in the Boas and Rock-snakes, they are absolutely wanting. No

snake possesses either a sternum or anterior extremities; and in the exceptional cases mentioned both pelvis and legs are rudimentary. This theory is strongly supported by the fact that no traces of ophidian remains have been found earlier than the older Tertiary strata. Nevertheless it must not be imagined that snakes are less perfectly fitted to sustain the struggle for existence than their compeers. The majority of snakes possess poison fangs, varying in complexity of structure, from the moveable maxillary tooth of the Viperine snakes, with its complete perforation, to the open grooved fixed fang of the poisonous Colubers, which also are homologous to the fangs of the poisonous lizards. The venom which gives these otherwise feeble creatures their deadly power, is merely an exceptional development of one of the elements of the saliva of the other vertebrates. It is only in the smaller snakes that this development takes place, the larger ones are able to carry on successfully the struggle for existence by means of their great constricting powers.

Again, we find snakes adopting themselves to marine life, and their tails developing an eel-like form; they are all comparatively small, and hence we find that all have acquired the poison apparatus, without which they would have been unable to maintain the battle of life. Though with the exception of one lizard these are the only existing marine reptiles, yet in the Secondary period, the seas were tyrannized over by gigantic lizards, such as the Plesiosaurus and the Ichthyosaurus, adaptations of reptilian type to marine life. Contemporary with these we find the Dinosaurians, an order which included the herbivorous Hylæosaurus and Iguanodon, and the carnivorous Megalosaurus. Some of these giants attained a length of 60 or 70 feet, and present most curious, and in fact almost incredible modifications of structure. The Iguanodon, with a body about 25 ft. long, habitually assumed an erect attitude. It is difficult to picture to ourselves the appearance of a creature, much heavier than a hippopotamus and longer than a crocodile, sitting and moving in kangaroo fashion. That such creatures have existed there is no doubt, for we find their remains, and can from them build up their skeletons, as certainly as those of existing reptiles. It may be asked—Why did these giants fail to keep their place, despite their power and size? There is only one answer to this question, viz., inability to find food, owing primarily to altered climatic conditions.

The most bird-like in structure of all fossil reptiles is the remarkable *Compsognathus longipes*, which undoubtedly presents a close approximation, if not an absolute resemblance, to the first flying reptile from which the birds were evolved. It would be extravagant to suppose that a reptile ever directly produced a bird, but it is obvious that all existing reptiles and birds are descended from a common reptilian ancestor. From this primitive Sauropsidan,

development took place on various lines. Some of its progeny possessing longer hind-legs and shorter fore-legs, assumed occasionally an erect attitude. These peculiarities proving advantageous were more marked in their successors, whose skeletons became more bird-like, till some, as *Compsognathus*, possessed a swan-like neck, a small bird-like head, and habitually assumed an erect position, with the fore-legs free, and were aided in balancing by the tail, which dragged along the ground. Some of these silvan Saurians, jumping from bough to bough, with outspread limbs, would naturally become possessed of a membranous support, as in the so-called flying squirrels. Of all the descendants of this primitive reptile, none are more remarkable than the Pterosauria, an order of flying lizards presenting some bird-like peculiarities of structure. This order, which includes the Pterodactyles, must be regarded as a reptilian development in the direction of flight, and not as the direct ancestors of birds which had already been evolved on more advantageous lines. Thus we see, then as now, the persistent and inscrutable law of variation silently working in all directions.

Having foreshadowed the perfect bird in its reptilian ancestors, and bearing in mind that even the wings, often regarded as exclusively avian structures, were possessed by many fossil reptiles, the only apparent distinction left to us, is, that birds possess feathers, which are an epidermic exo-skeleton and strictly homologous to the scales of reptiles. It will thus be seen that the boundary line between reptiles and birds is really non-existent from an evolutionary point of view, as feathers are simply a further development of scales. The more geology is studied, the more difficult does it become to find a definite dividing line between reptiles and birds; in this, as in other branches of science, classification is to a great extent arbitrary—order melting into order, and kingdom into kingdom, the more carefully they are studied; till we see from the lowliest plant to man himself, one harmonious whole, which by the operation of those laws, silently working now as they have been through untold æons, have produced from the simplest protoplasmic cell, the widely differing forms of life which now surround us. Assuming then, that feathers are the distinguishing character between reptiles and birds, we find in *Archæopteryx* the first feathered reptile or reptilian bird. The *Archæoptergidæ* were undoubtedly contemporaneous with, and in fact earlier than some species of Pterosaurians; the earliest *Archæopteryx* occurring early in the Jurassic period, while the largest Pterosaurians occurred about the middle of the Cretaceous period. These fossil birds differed from any of the existing species in the possession of teeth, and in the absence of the coccygean bone. The tail of *Archæopteryx* is reptilian in character, consisting of a number (20) of elongated vertebræ, each supporting a pair of quill feathers. Although

this bird could fly, its reptilian tail would not be so effective a rudder as that of any of our existing birds; and it is obvious that any tendency towards the coalescence of the last caudal vertebræ and the consequent development of a coccygean bone would give to its possessor an immense advantage in the struggle for existence, and on the principle of the survival of the fittest and the multiplication of those individuals possessing any special advantage, we can easily see why all existing birds possess this remarkable development, which furnishes them with such an effective steering apparatus.

Of the other extinct toothed birds, the genus *Ichthyornis* comprising two species, were small birds closely resembling the modern terns. The other order, *Hesperornis*, were incapable of flight, had large bones, a long neck, measured about 6 ft. over all and probably resembled our modern penguins.

When once the evolutionary forces, whose effects we have endeavoured to describe, had produced a true feathered bird, it is easy to see that the power of flight would be of immense advantage to its possessor in enabling it not only to escape its foes, but also to obtain a greater quantity and increased variety of food. The constant use of the wings would, in a few generations, tend to increase their size and their value to their owners. While land and sea were alike overrun by gigantic reptiles, any tendency towards development of increased walking and swimming powers would have been disadvantageous, and consequently we find no trace during the Secondary period of such birds as our present ostriches or their allies. The only direction in which persistent variation could take place, was that of increased power of flight, so that we can safely say that all existing birds are descended from flying ancestors. After the close of the Secondary period, and the disappearance of most of the great Saurians, there were in many parts of the world places where modifications which were previously impossible or disadvantageous might take place freely and persistently. We can well imagine the ancestors of the ostriches, for instance, settling in some parts of Africa, where as yet the Carnivora had not any sway. Being able to procure food without the exertion of flight, and having no enemies, disuse would rapidly diminish the size of the wings, whilst simultaneously the greater use of the legs would, in a few generations increase their size. When once the power of flight was lost and the struggle for existence became more severe, owing to the presence of the Carnivora, we find them gaining great strength and speed, so much so, that they are able to hold their own even against the king of beasts. Again, we see another line of adaptation to surroundings, in the auks and penguins, who in their island homes, have little fear of molestation, and so we find the wings absolutely useless for flight, but as fins very useful in their semi-aquatic life. These birds move very awkwardly on land, hobbling in an extremely ludicrous

manner, but in the water every movement is marked by grace and ease. The group of wading birds present another line of development, inasmuch as in seeking their food, it is to their advantage to possess long slender legs and toes, which while enabling them to secure their prey with ease, are yet not so heavy as to impede their flight. A familiar example of structure modified by altered circumstance, is that of the common duck. In the wild state, it possesses extraordinary powers of flight and comparatively weak legs, whilst in domesticated varieties we find these powers reversed, very small wings almost useless for flight but legs largely developed and very strong. Man for his own purposes, has by artificial selection, produced this astonishing change in a short time, are we not then justified in saying that natural selection, operating unceasingly through immense periods of time, has produced the still greater differences, which separate the ostrich from the humming-bird, or which distinguish both from their common ancestor.

Birds have been not inaptly described as reptiles with feathers. Widely different as the scales of a python and the feathers of a dove appear, yet they are strictly homologous, being in fact an epidermic development. It will be seen that the sloughing of reptiles and the moulting of birds are identical processes. Though in no bird is the moult so complete as in some reptiles, for instance the blind-worm, where the slough is cast in one piece; yet in some a very near approach to it is made, as in the wild duck, which is for a few days, at the moulting season, incapable of flight, and some of our song birds moult so rapidly as to appear almost naked for a short time. Reptiles are usually spoken of as cold-blooded, and this, though not strictly accurate is nearly so, as in the majority of them the temperature is little higher than that of the surrounding medium. In birds, however, which though structurally allied to reptiles, possess a heart similar to that of mammals, and are warm-blooded, exposure to low temperature would be fatal; and so we find their feathers developed into a protective covering infinitely more effective than the scales of reptiles. This is particularly noticeable in the more aquatic birds, and in those which inhabit high latitudes, in some of which the plumage protects not only against the weather but against their foes. This latter peculiarity is found however in every clime, and it is owing to the survival and multiplication of those individuals best fitted for their surroundings, and which is sometimes spoken of as protective mimicry. Striking instances are presented by the ptarmigan, which is white in winter and brownish in summer; perhaps a more familiar one is the grouse amongst the heather, where only a practised eye can detect its presence. Of further developments of organs for special purposes, we may refer to the beaks of the falcons, and contrast them with the delicate bills of the humming birds; in

each case the organ is perfect in its utility, and is but a modification of the same structure. Analogous cases occur amongst reptiles, as in the tongue of the chamæleon, which can be protruded to a distance equal to the length of the animal's body, and has at its free extremity, a clubbed and sticky protuberance, with which it secures its insect prey. Again, in geckos the feet have developed suckers, which enable them to walk upside down on overhanging rocks, and on the roofs of caverns or on ceilings in chase of insects.

The more highly organised the adult, the more helpless the young. This seems the universal law of nature. It is familiar to us in the mammals, so familiar as to be sometimes lost sight of: but it is startling to find the same law ruling amongst the Sauropsidans. Many of the birds whose powers of flight have been almost, if not quite lost, lay their eggs and leave them to be hatched by the heat of the sun, just as the reptiles do; and also as in the reptiles, the young when hatched out are able to fend for themselves. In the highest developed birds, the young, when hatched are almost helpless, and depend for existence on their parents' care, which also provides for them, in most cases, a comfortable nest. As we have shewn that in the great reptilian epoch, none but flying birds could maintain the struggle for existence; we must also assume, that owing to similar causes, they were compelled to be nest-builders, and to develop the hind toe for grasping, as in the passerine birds; and we must therefore take it, that, as the existing non-flying birds present reptilian characteristics in the more perfect development of their young, when newly hatched, so their ceasing to build nests (which at an earlier geological period were necessary for the preservation of the species), is but another proof, were that needed, that they are a reversion, in reptilian direction, from their flying ancestors.

Before concluding, we may briefly recapitulate the main points in this argument viz:—

Connecting link between batrachians and reptiles. Some Chelonians having internal gills, and the Alpine black salamander becoming viviparous.

Snakes undoubtedly are lizards which have lost their limbs through disuse.

Early in the Secondary period development amongst reptiles in the direction of flight seems to have been going on, on several divergent lines. This is evident from the fact, that *Pterosauria* are contemporary with earliest birds.

It is sometimes assumed that running birds are the ancestors of flying birds. This is certainly erroneous. No running birds which were not at the same time good flyers, could have maintained the struggle for existence against such foes as the *Pterosauria*.

The young of all reptiles are able to provide for themselves immediately at birth, so are also the young of our running birds—clearly pointing to the

retrogression of the latter towards the reptilian type.

All flying birds possess a keeled breast bone as did also the fossil flying reptiles.

All existing running birds have not a keeled breast bone, therefore such birds are a retrogression to the reptilian type.

Sloughing of reptiles and moulting of birds are identical processes.

Some fossil and existing reptiles have air prolongations into the bones, as in all birds.

Geological evidence so far as it goes supports the evolutionary theory, inasmuch as reptiles precede birds.

The deficiencies of the Geological record (where they exist) may be explained by the fact, that only a small portion of the earth has been examined by scientific geologists—for as Darwin says the earth's crust may be likened to a great museum of which only a few rooms have been examined.

Fossil birds have reptilian tails. HESPORORNIS which succeed ARCHÆOPTERYX, has cocygean bone, as have all subsequent birds.

From the foregoing considerations, it will be clear that even in existing forms the limits of zoological groups are difficult to define, and the study of extinct forms only renders the definition more difficult. As a matter of fact, a complete knowledge of all the living forms that have inhabited our earth, would shew one complete series, ranging from a simple cell of protoplasm to the highest vertebrate. It may perhaps never be possible to demonstrate this absolutely, for intermediate forms would necessarily not last long, and our knowledge of the geological record is after all very limited; many species having been developed, flourished for a time, then disappeared and left no sign, except in the existence of their descendants. But after a careful study of any single order, much less of the whole animal kingdom, no one can doubt the truth of the evolutionary hypothesis.

SLUGS AND THEIR VARIETIES.

BY DR. J. W. WILLIAMS, M.A.

Editor of "THE NATURALISTS' MONTHLY."

Continued from page 9.

LIMAX TENELLUS.—This slug is a "North Britisher." A slender little creature it is, never more than an inch in length. We will characterize his specific differences from the other slugs in the same manner as we did in our last paper.

1. Body greenish-white, mantle yellowish, glossy and nearly transparent.
2. Head and tentacles black; the tentacles are sometimes marked with a faintly visible whitish streak on each side.
3. Mantle wrinkled concentrically.
4. Slime yellowish.
5. Shell oval, moderately solid, and having a membranaceous margin.

The first specimen of this slug was taken near Allansford, in Northumberland, by Mr. Blacklock. No varieties have been recorded as British, and indeed, *tenellus* does not seem to undergo such variation as the other members of its group. Two very pretty foreign varieties occur, one is orange-green in colour (v. *xanthia*) and inhabits Germany, the other is Lusitanian and has its body colour of a golden green (v. *squammatina*).

I. ARBORUM.—This is the tree-slug, and of all trees perhaps the one tree which it has the most predilection for is the beech. You can see it sometimes, if you are a careful watcher, hanging down from one of the branches of these trees, by a thread which it has wrought out of its own mucus, and dangling first to this side and then to that. It is a pretty slug, and when once seen will not be forgotten in a short time. Tabulating its specific characteristics we get the following:—

1. Animal greenish or slaty-grey coloured with yellowish-white spots, and a dusky band on each side.
2. Mantle rounded in front, ending in an obtusely cut point behind, and concentrically wrinkled; tentacles short.
3. Foot with a white margin.
4. Back somewhat keeled towards the tail.
5. Slime colourless and sticky.
6. Shell (under the mantle) all but oval, very thin, flat, glossy with a broad and membranaceous margin. Nucleus nearly terminal.

A variety which was described by Sordelli as inhabiting Italy has been found to belong to our own country also. This observer named it var. *Bettonii*, and a translation of his description runs thus: Animal ornamented on the back with white and fuscous spots; median band white, with two accompanying fuscous bands; median band on mantle white, with two alternating white and fuscous bands: keel short. Mr. Roebuck has also described a variety as var. *maculata* which is as yet not recorded from any continental locality. The markings in this are reduced to small and sharply defined black spots, and has a thin continuous band running along each side which shows a tendency to break up into spots.

I. arborum is local but pretty freely distributed nevertheless.

L. MAXIMUS.—This slug sometimes attains to the length of half-a-foot or more, and consequently is one of the largest of our British species. Its distinctive features are these :—

1. Colour varying from ashy-grey to dusky-yellow and even black, sometimes spotted or streaked with white or black.
2. Mantle oblong, swollen, elongated to a point behind, with well developed striæ.
3. Tentacles long.
4. Body keeled near the tail.
5. Foot with a white border.
6. Slime whitish.
7. Shell (under the mantle) oblong, slightly convex above, concave below, with a membranaceous margin.

When you have made sure of your species irritate one, and notice how it shows its anger by dilating its mantle. I do not know any other slug which does this. But it is also infested by a parasite, and this parasite unbalked by its tenacious slime, runs over its body with an agility that is quite astonishing. You have noticed this no doubt. As *maximus* travels it forms the railway saloon for these little creatures, which enjoy themselves most thoroughly in their curious little antics. They scarcely ever leave the body of their host, the respiratory cavity of the slugs serving the purpose of their house, and the pulmonary aperture, the function of a door. The name of this parasite—if it be really a parasite in our present acceptation of the term—is *Philodromus limacum*.

The type is grey, banded with the same colour but of a darker tint, and the mantle covered over with black spots. Now for the varieties. There are a good many of these. Var. *fasciata* is grey like the type, but the bands are white, and generally five in number; var. *ciurea* is ashy, without spots, and with the mantle bluish-black; var. *obscura* is entirely brown; var. *rufescens* is entirely reddish; var. *Ferrusaci* is whitish with four rows of black spots on the mantle and body; var. *Johnstoni* is ashy with black spots and two bands of the same colour, and with the mantle also spotted with black; var. *maculata* is ashy, without bands, but with the mantle and body marked with irregularly-shaped black spots; var. *cellaria* is ashy with the mantle spotted with black, and with the back marked with interrupted bands of the same colour, and presenting lines and points which alternate with each other; and lastly, var. *marmorata* has a light greyish-brown colour with ill-marked grey bands and black spots scattered in their interstices, and with the mantle also marbled and spotted but lighter in its posterior than in its anterior portion.

L. CINEREO-NIGER.—This, until lately was included with the last species, from which it may be distinguished by having its mantle without spots or markings, its dorsal keel generally coloured of a different tint than the rest of the body, and its foot on the lower surface divided up longitudinally into a median white band and two dark lateral bands, one on each side. Another distinctive feature is in its having the pulmonary orifice of the same colour as the body, but of a darker hue. The type is blackish with a white line running the length of the back. One variety has been recorded as British (*var. nigra*), which is also found in France and Italy. This is a veritable negro-slug, for it is entirely black.

III. GENUS TESTACELLA.

TESTACELLA HALIOTIDEA.—As I said in the first part of this article the *Testacella* carry their shells not under their mantles as the other slugs, but on the tip of their tails. They differ, too, in not being phytophagous, but having for their food earthworms, and now and again a slug or two. The cannibals—and the gourmands! Mr. Lowe watched twenty-five specimens eat twenty-five earthworms and twenty-five *L. agrestis*—an earthworm and a slug apiece *for a slug!* They are mole-like too in living underground, and we might call them mole-slugs from this very circumstance. In the spring-time, and during the autumnal months they are to be found above ground, hunting no doubt after slugs to serve them as food. When laying the eggs—the ovipositing time is in May, June, and July—the animal draws in her tentacles, assumes a more or less globular form as if undergoing some pain, and exudes one at a time, reaching in all to the number of ten or fifteen. All this takes place in a subterranean gallery, and the eggs are placed separate from one another, and not *en masse* as in the other slugs.

The specific features of *T. haliotidea* are the following:—

1. Body yellow, spotted with brown, white, or black, with the margin of the foot yellow.
2. Lips flexible, and capable of being extended, and to thus simulate a third pair of tentacles.
3. Shell one and a half-whorled, oval, ear-shaped, with a moderately thick epidermis. Suture rather deep. Aperture large, rounded, and dilated in front. Shell covering the mantle. Length $\frac{1}{4}$ - $\frac{2}{5}$ ths inch.
4. Body marked with a double wavy line, which commences near the apex of the shell, and terminates near the head.

The variety *scutulum* is yellowish, spotted with brown, and has the shell more acuminate posteriorly.

T. MANGEL.—This slug differs from the last species in being dark brown, and in having its shell larger and more cylindrical.

One final word as to the preservation of slugs. They should be killed by drowning, and their mucus removed by careful rubbing with a cloth. They may then be transferred to glass tubes filled with some preservative medium. Several media for this purpose have been recommended. I used formerly a weak solution of chloride of zinc; but turpentine, or a mixture of equal parts of glycerine and methylated spirit may be used in the absence of this. Mr. Woodward employs a solution of calcium chloride, made by dissolving white marble in hydrochloric acid until all effervescence ceases, and a saturated solution is obtained. But by far the most preferable method—and it is the one I always pursue now—was described by M. Dubreuil in an article entitled “Procédé pour la préparation des Limaciens,” which appeared in “La Journal de Conchologie,” for 1864, p. 243-245. The animal is first killed and washed in pure water, to which, after the lapse of six or eight hours, some salt is added. A slit is then made along the *left* side, and the animal skinned. Thus by means of two more longitudinal slits three preparations can be made—one to show the back, one the foot, and the third the right side with the pulmonary orifice. These are then glued on cardboard, varnished with white shellac varnish to which a little corrosive sublimate has been added, and duly labelled with the scientific name—and when requisite the varietal name in addition—of the species, locality, and date of capture.

ACHETA DOMESTICUS (The House Cricket.)

By J. HILLMAN.

Of all the insects which inhabit our domestic sphere, perhaps none is so well known as the house cricket (*Acheta domesticus*.) Although its life history is less known than that of most insects, passing as it does most of its time in secretive places, and seldom appearing until the lights of the household have been extinguished. As soon as darkness reigns supreme, then begins in earnest the revels of these musical and frolicsome pests, flying, jumping, and running in all directions, in search of food, or on amatory visits intent. Now is the time for the naturalist to make his observations, and scientific enquiry into the habits and life history of this interesting and curious creature. Proceed quietly to the fire-place, and then what a sight one beholds, crickets of all sizes from the day-old baby to the full-grown male of about six months, for that seems to be the period of their existence. About February, or at the latest the second week in March, the female de-

posits her eggs in some suitable nook or corner, where they remain for sixteen days before the young crickets emerge, and then they are so minute that they seem scarcely able to shift for themselves, after about eight hours they become very active and voracious, and seek food, eagerly devouring anything that is moist with great avidity, and seemingly nothing comes amiss to them, old boots or shoes, clothing, blankets, meats, vegetables, soups, broths, the skimmings of pots, yeast, saccarine, in fact anything that comes in their way, and so voracious are they that they eat one another when other food fails. I remember when a boy catching fifteen large specimens of these creatures and placing them in a glass-topped case to watch their habits. I fed them some days with various foods, but falling ill myself I forgot them until my sister reminded me of my cruelty, when I requested her to bring the case to my bedside, but to my astonishment there were only three crickets in the case, I asked my sister if she had let them out, and her answer was "I should not like to have done so for I hate the creatures so much." Wondering in my mind the cause of the disappearance, by not finding the dead bodies, I resolved to watch them very minutely. I fed the three for some days on bread and milk, then deprived them of all food, their nature being so voracious I was not long in solving my problem, for I had the satisfaction of witnessing the full-grown male devour the female and the undeveloped male in the space of three hours. Wondering if the creature would eat any more of its family, I asked my father to catch me a few more, but being unable to do so he caught me four cockroaches of various sizes, two males and two females, I placed them in the case with the cannibal cricket (for such I christened him) and watched eagerly for the attack upon them. The cannibal was evidently not hungry, as he did not attempt to devour them that evening, the following evening my cannibal attacked one of the cockroaches, and after a fierce combat killed him and then coolly commenced to eat him without any hesitation. Owing to a relapse in my illness, I did not again see the case until the lapse of five days, which I found contained the cricket and one cockroach. I then released the cockroach and kept my prisoner for some days, feeding him upon various articles.

ITS LIFE-HISTORY.—Ten days after the young cricket emerges it changes its skin, then about fourteen days after that it has its second moult, which seems to be a more painful operation than its first moult, after completing its second change it remains about a month before undergoing any further change, then the embryo cricket begins to show its individuality by the female growing its ovipositor. The third change now takes place, and ten days later the fourth, after which the organs of male and female rapidly develop. About a month later the final change takes place, and then the wings of both sexes

gradually appear. As soon as the wings are developed the male migrate to fresh quarters and commence new colonies, choosing in preference new-built houses, because the mortar being fresh enables them to tunnel into it with ease, and affording good ground for the deposit of eggs. Bakehouses are likewise selected by the crickets on account of the warmth they afford, which seems to be essential to their livelihood, and causing them to chirp right merrily after dark and sometimes even during broad daylight.

The power and strength of the house cricket is enormous, if man could leap and lift in proportion to his size compared with the cricket, he would be able to jump three miles at one bound and lift two tons in weight. The strength of the jaw for cutting hard substances is wonderful, and comparing the power of this creature with the largest quadruped we shall have to yield the palm to the cricket, who can easily bite holes in hard leather, wood, and stout cloths.

Crickets, like all other insects, have their enemies, and are troubled with parasites. One parasite is a minute acarus, attacking the thighs and thorax, and soon destroying their vitality. Another curious pest is the intestinal worms, which are so frequently found on dissecting the bodies of crickets; they vary in length, from one line to two inches, I have heard of one three inches in length.

A natural enemy to the cricket is the small red ant, and so persecuting is it in its ways that the crickets soon desert their haunts if the ants make their appearance amongst them.

The utility of the cricket in nature seems to be their power of clearing away the various scraps that get dropped in our kitchens, and falling in the crevices of floors would soon prove a nuisance, and therefore in doing that they are securing for themselves their food, and at the same time rendering man a good service.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

Fifty-fifth Anniversary Meeting, January 18, 1888.—Dr. D. Sharp, President, in the chair.

An abstract of the Treasurer's Accounts, showing a balance in the Society's favour, was read by Mr. H. T. Stainton, F.R.S., one of the Auditors; and Mr. H. Goss, one of the Secretaries, read the Report of the Council.

It was announced that the following gentlemen had been elected as Officers and Council for 1888:—*President*, Dr. David Sharp, M.B., F.Z.S.; *Treasurer*, Mr. Edward Saunders, F.L.S.; *Secretaries*, Mr. Herbert Goss, F.L.S.,

and the Rev. Canon Fowler, M.A., F.L.S.; *Librarian*, Mr. Ferdinand Grut, F.L.S.; and as other members of Council, Mr. Henry J. Elwes, F.L.S.; Sir John Lubbock, Bart., M.P., F.R.S.; Mr. Robert M'Lachlan, F.R.S.; Mr. P. Brooke Mason, M.R.C.S., F.L.S.; Mr. Edward Poulton, M.A., F.L.S.; Mr. Osbert Salvin, M.A., F.R.S.; Mr. Henry T. Stainton, F.R.S.; and Lord Walsingham, M.A., F.R.S.

The President delivered an Address, and a vote of thanks to him was moved by Mr. M'Lachlan, seconded by Mr. F. Pascoe, and carried.

A vote of thanks to the Treasurer, Secretaries, and Librarian, was moved by Mr. Kirby, seconded by Mr. Waterhouse, and carried. Mr. E. Saunders, Mr. H. Goss, Canon Fowler, and Mr. F. Grut made some remarks in acknowledgment. Mr. Waterhouse proposed a vote of thanks to the Council, which was seconded by Mr. White, and carried.—H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

The opening meeting of the new year was very numerously attended, and exhibits of various orders were shewn. Amongst these may be noticed a long series of *Hybernia defoliaria*, captured by Mr. Hanes, the specimens being very bright but considerably smaller than the average of this species, this was attributed by some of the members to the very hot weather experienced during the time the larvæ of this species were feeding. Mr. Clark contributed a specimen of *C. davus* with a white streak in each of the posterior wings, also specimens of *A. mendica* var. *rustica*, and an intermediate form between that and the type. Mr. Hillman brought some specimens of the so-called "coal money" found in the Cambridge clay, and made some remarks on the same; while Mr. Cripps contributed a series of *Anchomenus atratus*, and also a specimen of the foreign *Telephorus flavilabris* imported amongst timber. The coleoptera were also largely exhibited by Mr. Lewcock in connection with his paper on "Collecting during 1887," which proved of much interest, he having worked in localities with which most of the members were unacquainted; but which, judging from the successful results, must be very prolific hunting grounds.

A very handsome donation of British birds' eggs was made by Mr. Rance.

At the following meeting held January 19th, Mr. Clark took the chair in the absence of the President. Mr. Russell made a very welcome addition to the collection of birds' eggs by a donation of nearly 50 species. Mr. Lewcock gave specimens of *Cionus scrophularia* and *Chrysomela polita*; and Mr. Hillman presented many specimens of *Acheta domesticus* varying in size, from the newly emerged specimen to the full-sized perfect winged insects,

together with examples of parasite worms, so frequently found attacking this species. These examples were brought up to illustrate Mr. Hillman's paper on "The Domestic Cricket" (printed on another page), which proved highly entertaining. The exceeding voracity of this species was dwelt upon at some length, and details of various experiments given. At the conclusion of the paper, the chairman drew attention to the stridulating powers of this insect, and several members made observations on this matter.

Among the exhibits were a fine light variety of *A. caja*, bred by Mr. Mera from a second brood. Mr. Clark had a very long row of *E. isogrammata* and also *E. Curzonii*. Mr. Sheldon exhibited *E. togata*, *E. kuhniella*, *P. bractæ*, and *P. orichalcea*. While Mr. Hillman, in addition to his exhibit of crickets, also contributed an example of an orange infested with *Coccus aurantii*, and a pigeon having two heads.—J. RUSSELL and E. ANDERSON, Hon. Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

December 22nd, 1887.—R. Adkin, Esq., F.E.S., President, in the chair. Messrs. H. Hayward, F. E. Pour, T. S. Pilkington, M.D., W. R. Hickling, H. J. Smith, C. Kedgley, F. Livesey, E. A. Fitch, F.L.S., F.E.S., G. F. Porritt, F.L.S., F.E.S., J. A. Smith, W. Turpin, S. Mosley, J. Butterfield, W. Farren, J. Eckersall, and the Rev. Canon Fowler, M.A., F.L.S., F.E.S., were elected members.

The only exhibits were a lilac coloured variety of *Lycæna icarus*, and a hermaphrodite specimen of *L. corydon*, by Mr. C. B. Smith, and a fine irradiated variety of the underside of *L. icarus*, by Mr. A. C. Smith.

The Secretary read the Council's report, from which it appeared that during the year 51 members had been elected, bringing the total membership to 148. The Treasurer read an abstract of the accounts, shewing a balance to the Society's credit of £9 8s. 6d. The election of officers for 1888 was then taken with the following results: Mr. T. R. Billups, F.E.S., President; Mr. John T. Carrington, F.L.S., Vice-President; Mr. E. Step, Hon. Treasurer; Mr. D. J. Rice, Hon. Librarian; Mr. W. West (Greenwich), Hon. Curator; Mr. H. W. Barker, Hon. Secretary; Mr. H. J. Turner, Hon. Assistant Secretary; Messrs. R. Adkin, F.E.S., T. W. Hall, F.E.S., R. South, F.E.S., W. H. Tugwell, J. W. Tutt, F.E.S., J. R. Wellman, and J. Jenner Weir, F.L.S., F.Z.S., F.E.S., Council.

January 12th, 1888.—T. R. Billups, Esq., F.E.S., President, in the chair.

Messrs. F. W. Hawes, C. E. Remnacles, and A. E. D. Gould, were elected members. Mr. J. Jenner Weir exhibited *Cicadetta hæmatodes*, and stated that Mr. C. Gulliver had taken a dozen during the past season in the New Forest, though he (Mr. Weir) had no recollection of more than two or three having ever been taken in any one year before; out of the twelve taken there was only one male, and Mr. Weir contributed notes as to this. Mr. Tugwell showed specimens of *Dianthæcia cæsia* from Germany and the dark variety from the Isle of Man; also continental examples of reputed and rare species of British lepidoptera, among which was a specimen of *Lythria purpuraria*. Mr. Tugwell stated that this was a species that had no right to be in the British list. Mr. Carrington said he knew of two undoubted English examples, both of which were taken in the neighbourhood of York, one of which he saw alive, but although he, Mr. Prest, and many other entomologists had worked the same district for years, no other captures of the species had been made. Mr. Dobson exhibited *Agriopis aprilina*, and a short discussion took place as to the reason of the colour in this species fading so quickly, when compared with the colour of *Dipthera orion* and *Geometra papilionaria*. Mr. Tutt contributed remarks on the reputed captures of *Acidalia strigaria* in Kent, and suggested that they might have been small specimens of *A. remutata*. Mr. Skinner exhibited an example of the beach rat *R. musrattus*. Mr. R. Adkin then read his Presidential address for 1887, for which a vote of thanks was moved by Mr. Billups, seconded by Mr. T. W. Hall, and carried unanimously.—H. W. BARKER, F.E.S., Hon. Secretary.

CLYDESDALE NATURALISTS' SOCIETY.

The usual monthly meeting of this society was held at 207, Bath Street, Glasgow, on Friday evening, 18th January, Mr. T. J. Henderson, President, in the chair. Mr. Alex. M. Stewart exhibited a case of lepidoptera, containing fine specimens of the family *Ennomidæ*, or thorn moths, consisting of 21 different species. He also showed specimens of the genus *Plusidæ*, of which *Bractea*, *Interigationis*, *V-aureum*, *Iota*, *Festucæ*, and *Gamma* were taken in the district. Mr. James Bennett Browne exhibited some very interesting specimens, among others a specimen of the Australian "Duckbill," or platypus, regarding which a very instructive paper was read, describing the habits and peculiarities of this strange creature. Mr. Browne also showed specimens of various species of the plover and cuckoo families, and several very beautiful foreign birds. Mr. John Mackay exhibited a number of specimens of coleoptera, representing some of the more interesting forms found in the neighbourhood, including various species of the burying, water, predacious, weevil, and skipjack beetles. He also showed a box containing several very

striking varieties of lepidoptera, illustrating the different forms peculiar to the district, as compared with the same species from England.—JOHN MACKAY, Hon. Sec.

NATURE IN FEBRUARY.

BY ALBERT H. WATERS, B.A.,

February is an uncertain month for the naturalist. Some days will be very unfavourable for out-door work, and little can be done; while now and then we get perhaps a very mild day, and the student of nature rejoices. One day the weather may be bleak and wintry, the temperature below zero, frost and snow reigning supreme, and natural history work generally at a stand still, with the exception perhaps of such kind as was indicated last month; another day will very likely be bright with sunshine, and genial as a spring day. We shall hear the lark's joyous song and the notes of the goldfinch and thrush, and observe the rooks busy about nest-building; the blue titmouse will make his appearance in our gardens, and as likely as not we shall see a brimstone butterfly fluttering along in the sunshine, and gladdening the heart of the entomologist with anticipating thoughts of the bright train of painted-winged beauties which will come later on, and of which *Gonepteryx rhamni* is the herald.

On every side, if February be mild, we shall see signs of nature's awakening from winter's sleep, and of the approach of spring. The daffodils will be coming up early in the month; snowdrops and crocuses will be in flower; the elder will begin to put forth its leaves, and in gardens the gooseberry and currant bushes will begin to do the same; while the buds on the lilac trees will turn green preparatory to their unfolding later on. Violets will be blooming in the latter half of the month, and dandelion, dead nettle, groundsel, coltsfoot, and possibly, at the very end of the month, also the marsh marigold will be observed on flower.

Not much is done by the feathered tribes in the way of nest-building so early in the year as this, but, nevertheless, a beginning is made. The raven is one of the very earliest to begin, and the sparrows too will be seen hard at work by the middle of the month, collecting materials for their nests. The rooks will be observed very busy about the trees, on which are their old nests, and vociferously cawing; later on they will be repairing the damages their structures have sustained from the winter storms. Missel thrushes will pair towards the end of the month, but will not commence building operations for some time yet.

A great deal of work may be done by the ornithologist in February, in the way of observing the birds which flock together in the fields and come round our gardens, but I touched upon this subject last month, and need not say more about it now. At the end of the month we may hear, in their haunts, the cry of the stone-curlews, and if we go through a wood at that time we shall, if the season be mild, hear the turtle doves cooing.

In the evening we shall hear the brown wood owls hooting, and see the dotted border moths (*Hybernia progemmaria*) fluttering along. The spring usher moth (*H. leucophearia*) may be seen in its company, and the females of both may be found by diligent search. Those of *leucophearia* being perfectly apterous are more difficult to discover than those of *progemmaria*. The existence of these wingless females is a problem, and I was much interested in the papers on the subject which appeared in the "Young Naturalist" some time ago, but the subject is still an obscure one with me. The difficulty is to suggest an explanation which will account not only for the existence of apterous female winter moths, but also apply to the Vapourer moths which appear in summer and autumn, and likewise have, as every entomologist knows, females devoid of wings.

Among the February moths is the small eggar (*Eriogaster lanestris*), a chocolate coloured moth we find on hedges in mild winters. It has the peculiarity of sometimes remaining in pupa more than one winter. Thus, if February be cold and unfavourable for its emergence, it will not come out a few weeks later on as other moths would, but will remain in pupa until the following February, and if this be unfavourable till the next. It has been said to remain in the pupa state in one instance as long as five years, when a succession of severe winters prevented it emerging earlier.

NOTES AND OBSERVATIONS.

EARLY MOVEMENTS OF MOLLUSCS.—During the mild spring-like weather which we had here on the second week in January, the mollusc *Planorbis cornea* in my aquarium has twice spawned, and *P. vivipara*, which had lain dormant since the beginning of November, started to its work, but went back to its winter quarters again when the frost came on January 17th. Will some brother aquariumist tell me whether this is a common occurrence, or whether it is owing to the mild weather.—R. PETTIGREW, Airdrie, Glasgow.

NUMERIA PULVERARIA.—I have reared broods of this insect for twenty or more years, but never except in the year 1883, did one emerge the same year as they were fed. In that year a few came out, of wonderful beauty and depth of colour. The next season the remainder of the brood appeared at their usual time, but they were exactly like the common type.—(Mrs.) E. S. HUTCHINSON, Grantsfield.

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NOTES ON THE EOCENE FORMATION.

BY GEO. E. EAST, JUNR.

THE Eocene Formation is divided into three divisions or sections, viz., the Upper, Middle and Lower. The Upper or Oligocene comprises the Hempstead, Bembridge, Headon, and Brockenhurst beds. The Middle the Barton, upper and lower Bagshot, and Bracklesham beds; while the Lower comprises the London Clay, Bognor, Woolwich and Reading beds, and Thanet Sands.

In these notes it is proposed to make a few brief remarks on the Upper or Oligocene beds.

The Hempstead Beds.

These beds occur at Hempstead, about $1\frac{1}{2}$ miles to the east of Yarmouth, Isle of Wight. They consist of a series of Clays and Marls, and are grouped into several distinct sections. At Hempstead, the highest strata is composed of a bed of sand grey or bluish grey weathering yellow, and containing concretionary portions consisting of fragments of shells, often enveloping the entire shells of *Ostrea callifera*, a very large species. This bed passes into a greenish clay, with numerous well preserved *Corbula*, and is followed by clay of a bluish hue, and more or less interrupted by a belt of large septaria, pale grey in the fracture weathering ferruginous, and often studded with finely preserved shells of *Corbula* and *Cerithium subcostellatum*; and at the base of this clay bed there is a variable thickness, more shaly, and very full of *Corbula* of a different species. These foregoing beds may be regarded as of marine or salt-water origin, and as constituting the uppermost division of the Hempstead series. The next bed is of brownish carbonaceous, more or less laminated clay, containing fresh-water shells, this is followed by a lead-coloured clay, then a fresh-water bed again recurs, containing pale blue and very tanacious clay, and in places carbonaceous bands. At the base of this

a black carbonaceous belt occurs, occupied by a band of *Unio*, dark blue and greenish clays follow, containing remains of turtle and fish, followed by a narrow strip of striped sandy clay, and which separates the above from a fresh-water bed containing *Limnæa*, *paludina* and *planorbis*, along with *Cyrena semistriata*, and with some feet of unfossiliferous strata terminates this portion of the section.

Fossiliferous beds follow. They consist of alternating blue green and ferruginous shaly clays, separated by a belt of almost reniform or potato-shaped concretions, of clay ironstone from three or four feet of similar clays, with carbonaceous zones and pyrififerous belts, containing *Paludina* seeds, fish scales, and in the shales impressions of plants.

The lower portion of these beds become obscured by the slips high up the cliff. A marked feature in the series succeeds, in the shape of a consolidated ferruginous band of broken and entire shells, called Whiteband, one exceedingly useful for the guidance of the fossil collector, it contains *Paludina lenta* and *Cerithium sedgurckii*, apparently peculiar to this zone, it varies in thickness from two feet to only a mere strip of ironstone. Following are about 40 feet of pale blue and yellow shaly marls with few fossils, containing at intervals bands of crushed shells, mostly *Cyrenæ semistriata*. These marls rest upon a thickness of about ten feet of dark blue shaly clay, with numerous bands of shells; they rest on a series of compact grey marls and greenish blue clays, with gritty and pyritiferous interrupted belts. About twelve feet of laminated and compact pale bluish marls, with seams of *Paludina lenta* and occasional specimens of *Rissoa cnastelii* (major) intervene, between the beds just described, and a singularly marked stratum called the Black Bed, which is the base bed of the series. It consists of nearly two feet of firm carbonaceous laminated clay, abounding in fossils. At its base is a seam of *Unio Gibbsii*, containing well preserved specimens. The black band before mentioned rises from the shore at an angle of five degrees, nearly under the fir wood on the eastern side of the synclinal on the western, its rise and outcrop are concealed, but fallen fragments are to met with on the shore, under the highest part of the crest of Hempstead Hill.

FOSSIL REMAINS OF THE HEMPSTEAD SERIES.—MOLLUSCA.

<i>Cerithium elegans</i>	„	<i>Sedgwickii</i>
„ <i>inornatum</i>	„	<i>subcostellatum</i>
„ <i>plicatum</i>	„	<i>trizonatum</i>
„ <i>pseudo-cinctum</i>	<i>Corbula</i>	<i>pisum</i>
„ <i>Lamarkii</i>	„	<i>Vectensis</i>
„ <i>mutabile</i>	<i>Cuma</i>	<i>Charlesworthii</i>

Cyclas Bristovii	Natica labellata
Cyrena semistriata	Neritina planulata
„ transversa	„ tristis
Fusus Edwardsii	Nematura parvula
Melania fasciata	Puludina lenta
„ Forbesii	Panopæo minor
„ inflata	Planorbis ellipticus
„ muricata or Forbesii	„ lens
„ turritissima	„ obtusus
Melanopsis carinata	„ platystoma
„ subcarinata	Unio Austenii
„ subulata	„ Gibbsii
Murex Forbesii	Voluta Rathieri
Modiola Prestwichii	

Bembridge Series.

Following the Hempstead Series are the Bembridge, taking their name from Bembridge, a parish on the eastern side (near Brading) of the Isle of Wight. They consist of a series of marls, clays, and limestones, and may be divided into four sub-divisions, viz. :—

- Upper Bembridge marl.
- Lower Bembridge marl.
- Bembridge Oyster bed.
- Bembridge Limestone.

The first of these sub-divisions consist of a considerable thickness of marls and liminated grey clays, the later prevailing westward. The best localities for examining them are in Whitecliff Bay, and on the shore at Thornes, west of Cowes.

The second sub-division consists of unfossiliferous mottled clays, alternate, with fossiliferous laminated clays, and marls, best seen by St. Helen's and Brading Harbour, near Bembridge.

The third group is of least extent of all four, forming a narrow but constant band between the marls and the limestones. Its importance depends on the evidence influx of salt water, during the deposition, as marked by marine shells of various genera. This bed is best seen at Whitecliff Bay and St. Helens.

The fourth group includes the limestones of the series, often confounded with the fresh-water limestones of the Headon series.

Taking the limestones first, we find them a well developed series, occurring

in many localities. Those of Whitecliff are perhaps the first to mention, and at that place are composed of the following elements:—

1. A yellow compact limestone weathering darker, exhibiting in the fracture minute confervoid ramifying cavities, and full casts of *Limnæa longiscata* and nucleolus of *Chara tuberculata*.
2. Compact creamy yellow limestones, abounding in casts of the before-mentioned shells. This bed is worked for building purposes.
3. Pale, often white, marly limestone, in some becoming very compact, remarkable for abounding in myriads of a small *Paludina globuloides*.
4. Greenish white limestones, very concretionary, and fossiliferous. The uppermost few inches are very conglomeratic, and weather pebbly.

At Bembridge and St. Helen's occur three distinct and well separated bands of limestone. The lowest is of a yellow colour, abounding in small concretions, and containing few fossils. The second band is a soft greenish-white stone, the prevailing shell is a *Planorbis* (*P. oligyratus*) with the test preserved. The third, or uppermost band, varies in character, the upper portion being conglomeratic and concretionary; while the middle, and lower, are crumbly and compact in texture respectively.

At Sconce, and Cliffend, the limestone is of a calcareous nature, and concretionary. The distinctive palæontological features are the abundance of land shells, and which in some places lie in irregular tufaceous bands, between harder strata. In a line of the tufaceous concretionary portions, is a curious layer in which the remarkable bodies regarded as turtles eggs, also vertebrata remains have been found in this locality.

At Headon, this important member plays but an inconspicuous part, and are here a series of concretionary and travertinous limestones. The fossils that have been found are almost invariably terrestrial forms.

Next come the Bembridge Marls, and to take them in the same order as the limestones, we commence at Whitecliff Bay and Forland Point section. Here they appear to be a series of sandy and marly beds, varying in colour from white to dark blue, mostly highly fossiliferous, and containing in some beds remains of turtle (*T. incrassatus*).

At St. Helens we have a similar section, the only peculiarity being the presence, in the brown clay above the oyster clay, of some marine shells, that have not been noticed elsewhere.

At Thorness point, west of Cowes, there is a good section of the middle beds occurring in the following order:—

1. Green clays, containing *Meanopsis carinata*.
2. Band of clay, with comminuted *Melanæ*.

3. Dark shaly marls, with ferruginous concretions.
4. Green marls, with *Paludina lenta*.
5. Pale yellow stony band.
6. Green clays, with *Melania muricata*.
7. Band of comminuted *Melania muricata*.
8. Green marly stone band.
9. Band of comminuted *Cyrenæ*.
10. Grey Septarian stony band.
11. Greenish marls, with *Cyrenæ obovata*.
12. Band of Septarian stone.
13. Greenish clays, full of *Melania muricata*, constituting the last bed exposed on the shore.

Near Yarmouth, the Bembridge Marls are only exposed to view along the shore, at low water mark, and in Colwell Bay the beds are again clearly exhibited, from the limestone down to the sands, forming the base of Headon Hill, and in Alum Bay from those sands to the bottom of the plastic clay.

FOSSIL REMAINS OF THE BEMBRIDGE SERIES.—MOLLUSCA.

Achantina costellata	„ labyrinthica
Arca Websteri	„ oclusa
Bulimus ellipticus	„ omphalus
„ heterostomus	„ tropifera
Cerithium Austenii	„ Vectiensis
„ elegans	Limnæa cincta
„ mutabile	„ longiscata
Clausilia striatula	„ mixta
Corbula pisum	„ pyramidata
Craspedopoma Elizabethæ	Lucina Thierensi
Cyclotoma mumia	Melania costata
Cyclotus cinctus	„ excavata
„ nudus	„ fasciata
Cytherea incrassata	„ Forbesii
Cyrena obovata	„ muricata
„ obtusus	„ turritissima
„ pulchra	Melanopsis brevis
„ semistriata	„ carinata
„ transversa	„ fusiformis
Helix D'Urbani	„ subulata
„ globosa	Mytilus affinus
„ Headonensis	Natica labellata

Nucula similis	„	oligyriatus
Ostrea Vectensis	„	platystoma
Paludina globuloides	„	rotundatus
„ lenta	„	Sowerbii
„ orbicularis	Pupa	oryza
Panopæa minor	„	perdentata
Planorbis discus	Succinea	Edwardsi
„ obtusus		

Headon Series.

These beds are about 170 feet thick, they are divided into the Upper—fresh-water and brackish beds; Middle—intermarine; and Lower—fresh and brackish water beds.

The Upper Headon Beds.

These form the greater part of what is usually termed the “Upper Fresh-water Formation.” The strongest masses of the freshwater limestone in Headon Hill belong to this section, but are only represented in Whitecliff Bay by a few thin and inconspicuous sandy concretionary bands. These beds consist in their highest part of brackish water bands, abounding in *Potamo-myæ*, and a large variety of *Cyrena obovata*. The shells of the freshwater limestones are the same as those of the Lower Headon beds, with the exception, perhaps, of a large *Paludina* and so-called *Bulimus politus*.

The Middle Headon Beds.

These consist of what are usually called the “Upper Marine Formation.” At Headon Hill, however, this division mainly indicates brackish water conditions. At Colwell, the same bed assumes a marine character, and presents large bands of oysters, with many other marine shells, and at Whitecliff is still more strongly marked, and the thickness of purely marine deposits much greater than westwards.

The Lower Headon Beds.

These consist of fresh and brackish-water beds, abounding in fossils, which for the most part, are identical with those of the upper division. At Headon Hill, and Colwell Bay, there are thick limestone bands in this part of the series, while at Whitecliff Bay all the beds are clays and marls. The lower bed of this series rest upon sands, equivalents of the Upper Bagshot beds, but are unfossiliferous in this locality.

FOSSIL REMAINS OF THE HEADON SERIES—MOLLUSCA.

Achantina costellata	„	gibbosula
Ancillaria subulata	„	longiscata
Borsonia sulcata	„	minima
Buccinum desertum	„	mixta
„ flexuosa	„	ovum
„ labiatum	„	pyramidalis
Bulimus ellipticus	„	recta
Bulla attenuata	„	sublata
Cancellaria elongata	„	subquadrata
„ muricata	„	sulcata
Cerithium concavum	„	tenuis
„ elegans	„	tumida
„ mutabile	Marginella	pusilla
„ plicatum	„	vittata
Corbula cuspidata	Melania	costataz
„ nitida	„	fasciata
Cyrena arenaria	„	minima
„ cycladiformis	„	muricata
„ deperdita	„	peracuminata
„ gibbosula	Melanopsis	brevis
„ obovata	„	carinata
„ pulchræ	„	fusiformis
„ Wrightii	„	sub-carinata
Cytherea incrassata	„	sub-fusiformis
Dreissena Brardii	„	subulata
Helix Headonensis	Murex	sexdentatus
„ labyrinthica	Mya	angustata
„ vectiensis	Mytilus	affinis
Hydrobia polita	Natica	depressa
Limnæa angusta	„	glaucinoides
„ arenularia	„	labellata
„ caudata	„	similis
„ cincta	Nematura	parvula
„ columellaris	Nerita	aptera
„ convexa	Neritina	concava
„ costellata	Nucula	deltoidea
„ fabula	„	Headonensis
„ fusiformis	Ostrea	cyathula

Ostrea flabellula	„ plebeia
„ gryphina	Potamides acutum
„ vectiensis	„ concavum
„ velata	„ duplex
Paludina angulosa	„ margaritaceum
„ concinna	„ pseudo-cinctum
„ lenta	„ trizonatum
Panopæa corrugata	Potamomya gregarea
Planorbis discus	„ plana
„ elegans	Psammobia compressa
„ enomphalus	„ rudis
„ lens	„ solida
„ obtusus	Tellina ambigua
„ rotuudatus	Voluta depauperata
„ playstoma	„ luctatrix
Pleurotoma Headonensis	„ spinosa
„ innex	

NOTES ON THE COLLECTING SEASON OF 1887.*

By G. A. LEWCOCK.

The season of 1887, though somewhat discouraging at the outset, was on the whole rather a successful one. Owing to the wet weather I was unable to start operations until May 30th, and the outlook even then was not at all promising. However, I started early, as is my usual custom, taking train from Waterloo *en route* for Subiton, in company with Mr. Cripps, proceeding through the fields to Claygate, Oxshott, and Esher. The foliage was much too wet for beating so we contented ourselves with searching, occasionally varying this by sweeping. While engaged in exploring the bark of a felled tree I captured two specimens of *Hypulus quercinus*—rather a good insect; Mr. Cripps in the meanwhile getting *Leistus spinibarbis* and *Anchomenus mæstus*. The captures in the sweeping net were useful but not numerous, and included *Tanymecus palliatus*, *Cneorrhinus exaratus*, *Lebia chlorocephala*, *Alophus triguttatus*, *Grypidius equiseti*, *Orobites cyanius* (a beetle one might well mistake for a black seed), *Balaninus tessellatus*, and several *Ceuthorhynchidius troglodytes*, which is generally a very common insect, though not

* Read at the City of London Entomological and Natural History Society, Jan. 5th, 1888.

so this year; I also netted one or two of the pretty but local *Ceuthorrhyncus campestris*. In the Claygate covers I obtained *Anthicus antherinus*. On our arrival at Oxshott, we were joined by Mr. Mewbery, we then proceeded to the heathy portion of the district, where the foliage was comparatively dry, when we obtained *Cæliodes quercus*, *C. rubicundis*, *Orchestes salicis*, *Rhynchites betulæ*, &c., by beating oak, birch, and pine. At the black pond we found *Elaphrus cupreus*, *Anchomenus gracilis*, and *Cyclonotum orbiculare*; late in the evening, by sweeping a marsh, *Pæderus littoralis* commonly, two or three *P. caligatus*, *Coccinella 19-punctata*, *Bryaxis sanguinea*, and a few other things.

On June 4th, I visited the same district. Despite the heavy rains of the previous day, and the swamped country, insects were abundant; and, warmed by the bright sunshine, the hawthorn was rapidly developing into blossom. By beating the hedges I obtained *Clytus mysticus*, *Polyopsa præusta*, *Rhynchites æquatus*, *Anthonomus pedicularius*, and *A. rubi*; at an old stump, *Rhizophagus ferrugineus*, and several *Cissidæ*. On arriving at the higher ground, the sweeping-net proved of great service, and I netted about twenty *Alophus triguttatus*, two *Tanymecus palliatus*, a few *Cneorhinus exartus*, *Barynotus obscurus*, *Hypera punctata*, *H. fuliginosus*, *Phyllobius calcaratus*, *Prasocuris aucta*, *Anisotoma calcarata*, several *Bruchidæ*, *Limonius minutus*, &c. In examining the net products, I found a number of larvæ of the Lepidopteron, *Ino statices*; and larvæ of *Porthesia auriflua* were also abundant in hawthorn; *Anthocaris cardamines* were flitting about freely during the afternoon, and *Emmelesia albulata* in the evening. I also noticed several *Silix spinula* drying their wings in hedges near the railway bank.

On June 11th, in beautiful sunny weather, I went to Loughton. *Bembidium 4-guttatum* and *flamulatum* were common at the margins of pools, and *B. articulatum* moderately so. At the same place I took *Phytobius Waltoni*. The hawthorn blossom was fully out, yielded *Rhynchites æquatus*, *pauvillus*, *germanicus*, *Adimonia sanguinea*, *Anthonomus pedicularius*, *Polyopsia præusta*, and one *Clytus mysticus*. From oak I obtained *Rhynchites æneovirens*; and *Apion genistæ* and *Strophosamus obesus* from *Genista anglica*.

June 18th was intensely hot, and after some hesitation, I decided to have a turn at Rainham, Essex, taking the 1.25 train from Fenchurch Street, and arrived on the collecting ground soon after two o'clock. *Bembidium concinnum* could be seen in hundreds on the river banks, and *Malachius viridis*, were obtained commonly by sweeping. I captured *M. æneus* for the first time in this district, mistaking it for a Burnet moth. By examining the heads of *Dactylis glomerata*, I secured several more of the same beetle. I likewise

swept *Leptura livida*, *Lema melanopa*, *Telephorus lateralis*, *T. litura*, and *Mordellistena pumilla*, from the railway bank.

On June 21st, I kept Jubilee at Woking. The special inducement for this visit was to obtain *Donaciæ*. This genus is best obtained by searching the sedges and other water plants. Commencing at 11 in the morning, by 3 o'clock in the afternoon I had obtained about 100 specimens, which included *D. linearis*, *thalassina*, *comari*, *hydrochæridis*, *sagittariæ*, and *sericea*. Other captures were *Gyrinus natator*, *Erihrinus nereis*, *Galeruca sagittariæ*, *Luperus betulinus*, *Cassida equestris*, *Lina populi*, *Phyllopertha horticola*, *Corymbites tessellatus*, &c.

On June 26th, I had a few hours at Esher, getting *Sericosomus brunneus*, three *Corymbites tessellatus*, several *Donicia menyanthidis* and *sericea*, *Cryptocephalus lineola*, and many others.

On July 2nd, I made a short trip to Wanstead Park. Here I found *Donacia semicuprea* abundantly, and also obtained *D. lemnae*, *linearis*, and *thalassina*. *Chrysomela polita* were also very common on the sides of the lake; and I netted a few *Telephorus hæmorrhoidalis*, one *Hydronomus alismatis*, and some *Aphthona cyanella*.

On July 9th, I took train to Woking, thence walking on to the Basingstoke Canal, being in search of the later species of *Donaciæ*. The weather was dull, but I swept several *Donacia thalassina* from the short rushes, and got a specimen or two of *D. sagittariæ*. At one o'clock the sun shone brightly, and the heat was intense. *Danacia bidens* and *dentata* were soon observable skimming over the water, and also at rest on the small floating leaves in the canal, but far out of my reach, and unobtainable by sweeping. I therefore selected the best spot, and entered the water to procure some of them. The catching business, however, was not so easy as one might imagine, and several times I just missed them, before I hit on the right method of proceeding, which was to take hold of the stem of the plant and drag the leaf under water, when the beetle, being out of its element, was readily picked off and transferred to the laurel bottle. In this manner I obtained about 60 specimens of *D. bidens* and *dentata*, and six *D. sagittariæ*, making a total of about 140 *Donaciæ* for the day's captures. Afterwards I found a good specimen of *Dytiscus circumcinctus*, clinging to the stem of a plant by the side of a pool, and I took a variety of common insects, including three *Tabanus bovinus* (the Bat fly), which evinced a strong partiality for my bare limbs, and accordingly paid the penalty for so doing.

At five o'clock I journeyed on to Farnham, a town some 39 miles distant from London, and associated in my mind with many pleasant memories. It was here that my father—Mr. James Lewcock—an ardent ornithologist

studied bird-life; and it was here, under his tuition, that I acquired a taste for entomology. Well I remember how many a time and oft we trudged out together, he shouldering the gun and I the net, searching the nooks and sheltered corners for birds and insects. He would remark the haunts of the woodpecker, the kingfisher, or the moorhen, and other things of special interest to the naturalist. Frequent references to Mr. James Lewcock's notes on ornithology will be found in the "Letters of Rusticus on Natural History." Our favourite walk was to the Old Park, which even then had partially degenerated into hop land, ploughed fields, and meadows. There was still, however, a patch of woodland to the north-west, and hozier-bed near the town end, and an expanse of heath at the extreme north, and at that the district was a choice entomological hunting-ground. Of the 44 species of butterflies taken at Farnham, the majority of them were obtainable at the Old Park, and I have no doubt that nearly as many species may still be got there. Exception, however, must be taken to *Aporia crataegi*, which has entirely disappeared from the district, though in 1847, the larvæ were tolerably abundant on whitethorn, at the west end of Farnham. *Vanessa antiopa* has been taken twice only, and *Melitea cinxia* by myself three or four times. *Colias edusa* and *C. hyale* appear at irregular intervals, the variety *C. helice* having been taken but once. *L. sinapis* is still located at the Old Park, in August, 1880, this species was very common, and I observed several specimens flying in the town. Four of the Hairstreaks, viz, *rubi*, *quercus*, *betula*, and *W-album*, were to be got by seeking for, being generally common. The other butterfly being generally common species need no comment. Among the moths, besides the common Sphinges, *S. convolvuli* has been captured occasionally; *A. atropus* is sometimes numerous in the potato fields; and several of the Clearwings are not uncommon. Other moths taken there are *P. populi*, *C. ridens*, *L. turca*, *T. interjecta*, *T. leucographa*, nearly all the Quakers, *D. rubiginea*, *C. exoleta* and *vetusta*, *P. monacha*, and a good supply of the common species.

The Little Park, or Farnham Deer Park as it is now called, is about 320 acres in extent, and stocked with deer, but not a good collecting ground for the lepidopterist, though some decent things may often be turned up by pupa-digging; *Lycena argiolus* occurs commonly in some seasons at the eastern end of the park. Growing near the Keep, are one or two oak trees of the peculiar variety which bears the acorn with a mossy cup. Respecting the coleoptera of this park I cannot give much information, but several species of *Lamellicornia* are tolerably abundant there.

Moor Park, the other district worthy of notice lies more to the south, and is a delightful spot for the botanist. It was to this part that I bent my steps on July 12. Starting from Downing Street, I made for the footpath

leading across Darvill's meadows towards Bourne Mills, sweeping by the way for *Malachius ruficollis*, and bagging, besides the latter, a couple of *Telephorus lateralis*; passing the mill on the left, I followed the winding road to Moor Park House, the residence of Mr. J. F. Bateman, and continued on until I reached the grotto or cave where the white witch (Mother Ludlam) is reputed to have taken up her abode. A considerable alteration has been made here during recent years, and the cave is now gated and locked against all intruders; and the mineral spring which formerly trickled through the entrance has been diverted from its usual course, and is collected in a reservoir for use in the mansion; even the initials, which in my youth, I traced on the sides of the cave are obliterated. Turning my back on the cave with its reminiscences, I descended the hill towards the River Wey, which runs at the bottom just here, disturbing a pheasant in my progress and getting a glimpse of some moorhens scuttling away among the thick herbage. But little change was to be observed here; huge brake ferns still grew on the slopes, large patches of yellow iris could be seen in the swamp, tall *Scrophularia aquatica* with lurid flowerets, a profusion of *Lythrium salicaria*, and a variety of other plants. Discarding the sweeping net, I at once commenced looking for beetles. *Cionus scrophularia* and *C. blatteria* were abundant, and I took 50 of each species, besides 6 *C. verbasci*, 30 *Nanophyes lythri*, 9 or 10 *Galeruca calvariensis*, and a female of *Phyllobrotica 4-maculata*. During the afternoon I amused myself by watching for *Crioceris asparagi* in Mr. John Nash's kitchen garden, and this finished up my summer excursion to Farnham.

On August Bank Holiday I went to Cliffe, and found *Calathus mollis* and *melanocephalus* abundantly; took a few *Coccinella 19-punctata*, *Dyschirius globosus*, and some species of *Heteroceras*.

My last collecting day was on August 13th, when I again visited that interesting locality Rainham, being this time in search of *Bembidium lunatum*, which I have taken at this district on previous occasions. After grubbing about at the old spot for some time, I again found specimens at the roots of *Aster tripolium*, but not commonly, as the ground was dry and full of cracks. Other captures were *Amara convexiuscula*, *Anchomenus atratus*, *Bembidium concinum*, a quantity of *Lema melanopa*, &c. At various times during the year I have obtained several species of indoor beetles, *Mezium affine*, *Gibbium scotius*, and a couple of fine *Sphodrus leucophthalmus*.

Taking the result of the of the year's collecting, and considering the limited time at my disposal, I think I am justified in saying I have found it a very good season indeed.

IS ZYGÆNA MELILOTI A GOOD SPECIES?

By W. H. TUGWELL.

Mr. S. Webb, in Vol. 8, page 224, of this Journal, and in Vol. 9, page 20, pretty clearly stated his opinion that *Zygæna meliloti* is only a stunted or dwarfed form of *Zygæna trifolii*, and suggests that this condition has probably been produced by the draining of the locality, by the cuttings of the South Western Railway passing through the New Forest, inferring, that by this drainage, the food-plant of *trifolii* had possibly become less luxuriant, and consequently had by time produced a smaller and weaker form of *Zygæna*, which we in error, had styled *Z. meliloti*, Esp. This at any rate is what I take Mr. Webb's two letters to mean. Not that there is no *L. meliloti*, Esp., but that our insect is only *L. trifolii* in a dwarfed state. The genus *Zygæna* is, I take it, a good instance of what I would call a Darwinian Genera. Our British list gives us four species that certainly run extremely close to each other, and it is no great strain on our belief to imagine that *Z. meliloti*, *trifolii*, *lonicera*, and *filipendulæ*, at no very distant epoch was one species. In a well selected and long series, it would not be difficult to so arrange these four so-called species, that he would be a bold man that would positively group them into four and only distinct species. They run so imperceptably one into the other, that to state positively where one species ended and the next commenced, would be a good puzzle to most if not to all of us. It is easy enough to select well defined forms and name them to our entire satisfaction. Yet so long as "what is a species," is not more clearly defined than it is at present. It appears to me convenient to still regard them as four distinct insects, and individually, I consider *L. meliloti* as distinct as any of them. *L. meliloti* is not only a much smaller insect than *trifolii*, but it is as my friend Mr. Gregson tersely puts it "as a race horse to a carriage horse." Its wing expanse may be and is quite equal to many small examples of *L. trifolii*, but the wings are narrower, thinner, and much less densely scaled. When in their very finest condition, they have a semidiaphanous appearance, and always deficient of that dense rich coloration seen on *L. trifolii*. In the New Forest, the two insects occur on the same ground, and I can quite believe that in many collections the small New Forest form of *trifolii* has been sent out by some collectors in error as *meliloti*, and that, perhaps may occasion the difficulty that Mr. Robson states has occurred to himself in not being able to distinguish between small *trifolii* and *meliloti*. I am certain that if Mr. Robson saw my series he would have that difficulty removed. I candidly admit that some of the New Forest *trifolii* taken on *meliloti* ground run fairly close, but I am disposed to believe that these may be

hybrids? Out of the number I have taken, I never had but two specimens that I could not satisfactorily determine at a glance. I cannot agree with my friend Mr. S. Webb, that the drainage of the ground by the cutting of railway through the New Forest may have produced this change of *trifolii* into *meliloti*; and there is no proof that *meliloti* had not existed here for years. It may well have been passed over as a small form of *trifolii*, and looked upon by collectors as too common to take any trouble with. See how many years *Nola centonalis* was passed over, until I discovered it at Deal, in 1878. Harding a good collector, and a resident at Deal, must have walked over it hundreds of times, and so do many other species get overlooked. I have had considerable experience in collecting in the locality, and cannot admit that any such change has occurred. The whole of the district has plenty of wet spots, and the food-plant is abundant and luxuriant on all sides. *Meliloti* occurs, or did occur, over a fairly wide locality, viz.: from the top ride (just outside Ramnor), through all the upper rides of Park-hill enclosure; the ride on the Denny side of Stubby Copses, Perrywood Heath; and by the rides running parallel to the railway, &c., &c. Most of the ground is high, and not at all likely to be influenced by the slight cutting of this line; plenty of wet spots exist, if such had been at all necessary for the welfare of the species, which I much doubt. My experience of *Z. trifolii*, is that it affects open meadows often in very arid spots, although I know a locality at Freshwater, in the Isle of Wight, where *Z. trifolii* occurs freely in a wet meadow with a boggy corner, and here it runs very large, deeply coloured and often has coalescent spots; curiously, here the insect was three weeks later than in the New Forest. Then the whole of this district is well wooded and plants luxuriant, it cannot be classed with the burnt-up herbage of the chalk downs, that produce the pigmy form of *Lycæna corydon*, at Dover, &c. It is in no way a parallel case, on the burnt-up chalk downs, one can easily believe that the plant life would be dried up and dwarfed, consequently likely to induce a stunted form of insect life feeding in such a locality. But to look round you in the New Forest, and see there nature in its most luxuriant growth, one cannot accept Mr. Webb's hypothesis, and if *meliloti* is only a var. the cause cannot be want of food from draining its haunts. Mr. Brigg has several times bred, or at anyrate attempted to breed, this insect from ova, from the Forest, and I know he has on one occasion bred imagines from these ova, in a heated greenhouse, of a form, nearly, if not quite like *trifolii*, but as I read him, he is not quite certain that the form *meliloti* had not previously copulated with *trifolii*, at anyrate he was not convinced that he had settled the doubt. Under any condition, the New Forest insect has such evident differences from normal *trifolii*, that it is desirable for it to be a named form,

and possibly is quite as good a species as any of the 4 *English* *Zygæna* (*English* in distinction from the Irish and Scotch insects.)

6, Lewisham Road, Greenwich.

REPORTS OF SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

February 2nd, 1888.—Mr. Cooke, President, in the chair. The meeting was very numerously attended. Mr. Clark exhibited *P. eupharidæ* and *C. glabraria* light and dark vars.; Mr. Hillman, *Melolontha vulgaris* &c. Mr. Paine was duly elected a member. Mr. Hillman then read a very lengthy paper on *Melolontha vulgaris*, giving a very graphic outline of life-history and habits, at the conclusion of which several members took part in the discussion, amongst which may be mentioned Mr. Lewcock, who thought the grubs attacked the weaker parts of the plants, and he had never found the insect in any great profusion, and thought that there was little doubt that we had literally clouds of them at times. Mr. Hillman stated that the larvæ stage lasted over five years and generally came out in the sixth year, and that the larvæ attacked not only the weaker parts but also anything weak or strong, even roots of trees if it could get nothing else. The President stated at the next meeting he would read a paper on "Extinct Animals."

February 16th.—Mr. Cooke, President, in the chair. The members made exhibits: Mr. Cooke, specimens of *C. alchymista*, captured at Rayston, Cambs, 1887. Mr. Anderson, series of *H. leucophearia*, taken this month. Mr. Albury, long series of *I. carnella*, *C. perlellus*, and *B. hirtaria*. Mr. Gurney, series of *N. hispidaria*, bred. Mr. Clark, *N. hispidaria*, bred this day. The Society acquired a new cabinet for birds' eggs and it was brought into the Society's Room during the meeting. Mr. Cooke then read a paper on "Extinct Animals and Extraneous Fossils," which dealt with the geological formation of the earth and the bones that had been found in the various formations, also the fossils found in the various strata, which was highly interesting. Mr. Clark stated that frequent discoveries of remains of the Mammoth and other extinct species are still being found in the valley of the Sea, and some where found quite recently at Herne Bay. Mr. Cripps drew attention to the fact that the rise and fall of the land was not always caused by volcanic action, and in fact was continually going on in various parts of the world even in some parts of England, by gradual degrees. Mr. Cooke stated that

he knew a spot, near Tunbridge Wells, where the ground had sunk to a great degree and was still sinking. A vote of thanks to the President closed this very interesting meeting.—J. RUSSELL AND E. ANDERSON, Hon. Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

January 26th, 1888.—T. R. Billups, Esq., F.F.S., President, in the chair. Mr. Tugwell exhibited for comparison, German and Welsh specimens of *Xylina furcifera*, Hufn. Mr. J. Stringer, a varied series of *Hybernia defoliaria*, Clark. Mr. Cooper remarked that while searching for *H. leucophearia* during the previous week, he had seen numbers of *H. defoliaria* at rest on the trees, and it seemed to be usual to meet with this species in the spring. Mr. Adkin, bred specimens of *Ptilophora plumigera*, Esp., which had recently emerged, and thought that the cold weather experienced at the time the species usually appeared had kept them back. Mr. Carrington, referring to Mr. Cooper's and Mr. Adkin's observations, contributed notes as to the effect of temperature on the emergence of lepidoptera. Mr. Tutt, on behalf of Mr. Alderson, varieties of *Aplecta tincta*, Brahm., *Scopelosoma satellitia*, L., *Anaitis plagiata*, L., a melanic specimen of *Phigalia pilosaria*, Fb., and a curious form of *Tæniocampa munda*, Esp., which he stated were all taken in the neighbourhood of Bromley. Mr. Carrington said that he had frequently taken this form of *T. munda*, and recommended sugaring in the earlier part of the year for the genus *Tæniocampa*, stating that on one occasion he captured numbers of *T. munda*, with commoner species of the genus, at the same time taking a considerable number of *Asphalia flavicornis*, L., an insect not generally supposed to come to sugar. Mr. Billups, on behalf of Mr. W. F. De V. Kane, *Rhopalomesites tardii*, Cort., from Killarney and Powerscourt, Ireland, and invited remarks upon the same as regards variation, the pale forms, however, were considered to be immature. Mr. Dobson read a paper on "Darwinism," which was followed by a discussion.

February 9th, 1888.—The President in the chair. Messrs. F. Warne, N. Warne, A. T. Mitchell, F. E. Strong, and P. C. C. Billups, M.D., were elected members. Mr. South exhibited, for comparison, forms of *Dianthæcia compta*, Fb., and *D. nana*, Rott., and contributed notes; also a long series of what he stated were known in this country as *Cerastis vaccinii*, L. and *C. spadicea*, Hb., he considered these to be two forms of one species, but at present was unable to bring forward any facts of sufficient weight in support of this, but thought he could establish the fact that British lepidopterists had for years been in error in associating Hubner's name of *Spadicea*

with the dark *Cerastis*, which by comparison with German species of the genus must be referred to *O. ligula*, Esp., but whether *ligula* is distinct from *vaccinii* is for future research. Mr. South illustrated his remarks with long series of British and German forms of the genus. Mr. South also exhibited, on behalf of Mr. Leach, examples of Coleoptera, mounted on small triangular pieces of glass, thus allowing the under surface to be examined. Mr. Tutt, *Xylophasia rurea*, Fb., shewing the different forms of variation. Mr. Hawes, a variety of *Epinephele janira*, L., one of the upper wings being completely bleached, and a variety of *Argynnis paphia*, L., the black spots having coalesced and formed bars; both these varieties were taken in the New Forest, 1885. Mr. Jager, an aberration of *Vanessa antiopa*, L., the white border of the upper wings being suffused with blue spots, the specimen having been bred in Germany, with another in which the aberration appeared also on the under wings. Mr. Adkin, life-history of *Ephestia kuhniella* in a living state, and called attention to a colony of larvæ just hatched, and making their way into the flour. Mr. Croker, a specimen of *Crioceris meridigera*. Mr. T. R. Billups, on behalf of the Rev. W. Johnson, of Armagh, a short series of *Bembidium Clarkii*, taken at Armagh.—H. W. BARKER, F.E.S., Hon. Sec.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.

The monthly meeting of this Society was held on 27th February, in the class room of the Free Library, William Brown Street, Liverpool, the President, Mr. S. J. Capper, F.L.S., occupying the chair. Messrs. W. E. Sharpe and N. Caine, jun., were elected members. Mr. H. H. Corbett, M.R.C.S., contributed some interesting notes on the habits of the larva of a coleophora, which he had discovered feeding upon birch, and which he brought to the meeting for identification. Mr. John E. Robson, of Hartlepool, read a lengthy and exhaustive paper on the vexed question of "Entomological Nomenclature." After dealing very fully with the subject, and showing the endless confusion and difficulty which had arisen, and still exists, owing to differences of opinion among entomologists, both here and abroad, he suggested that the Lancashire and Cheshire, as the leading Entomological Society in the provinces, should take the matter in hand, and, with the co-operation of other bodies, endeavour to formulate a system of nomenclature which would be likely to meet with general approval, and be considered a final settlement of the question. An interesting discussion followed. Mr. Moore kindly sent for exhibition four drawers from the Cooke collection, and there were other interesting exhibits by Messrs. Pierce, Gardner, Corbett, and Wilding.—*Liverpool Daily Post*.

CLYDESDALE NATURALISTS' SOCIETY.

The usual monthly meeting of this society was held at 207, Bath Street, Glasgow, on Wednesday evening, February 8th, Mr. T. J. Henderson, President, in the chair. Dr. Hugh Murray, F.R.C.S., 23, Royal Crescent, was elected an honorary member, and a large number of applications for membership were announced. Mr. J. A. Harvie Brown, F.R.S.E., F.Z.S., exhibited a specimen of a young snow-bunting, *Plectrophanes nivalis*, Linn., taken at a considerable elevation on the west coast of Sutherlandshire, and regarding which, a short paper was read. Mr. John Young, F.G.S., exhibited a series of mounted specimens of Scottish carboniferous *Entomostraca*, as well as examples of limestone, ironstone, and shale, showing these minute organisms, in their matrix. He stated that the Scottish *Entomostraca* during recent years had been ably investigated by Professor Rupert Jones and J. W. Kirby, by whom they were now figured and described. The specimens exhibited belonged to the lacustrine or fresh-water group, and embraced some six genera and thirteen species. Some of the species are very small, but so great is their abundance that in some instances they form a large portion of the rocks in which they are enclosed. Mr. Young, in concluding, remarked on the form and mode of occurrence of the several species, and the methods he employed in extracting them from the rock matrix, so as to be able to mount them for microscopical examination. Mr. George E. Paterson exhibited a pair of fine specimens of the short-toed eagle or serpent eagle, *Falco brachydactylus*, which had been shot in the large forest of the Department of Eure and Loire, to the south of Paris, in the month of June, 1869. Mr. Paterson also showed a very interesting series of the snow-bunting, *Plectrophanes nivalis*, from Russia, America, Scotland, and Shetland, and read a very instructive paper on the distribution of this species, particularly in the North of Scotland, and instanced many records of its occurrence there, where both nest and young have been found in some instances. A series of specimens of the bullfinch, *Pyrrhula vulgaris*, was exhibited, to illustrate the difference in plumage between English, Russian, and French specimens. A very fine collection of nests and eggs was also exhibited, including a rather picturesque nest of the peewitt, found on Mr. Harvie Brown's property at Dunipace, and which is figured in the recent work, "A Vertebrate Fauna of Sutherland, Caithness, and West Cromarty," by T. E. Buckley and J. A. Harvie Brown. Mr. James Lumsden, F.Z.S., read a most interesting and practical paper on the study of "Ornithology from Trains," in which he gave some illustrations of notes on bird life taken while travelling by rail. He pointed out the pleasure and information which might be derived by making observations of this kind, which contribute to making instructive and profit-

able a journey which otherwise might prove dull and uninteresting. Birds get accustomed to passing trains, and opportunities are often thus afforded the ornithologist for a closer examination of various species without their being disturbed than he could have by other means. It was also pointed out by Mr. Nathaniel Dunlop and others that students in other branches of natural history could also find a pleasant occupation during a long journey by examining, in like manner, the plants and insects life of the country through which they may be passing. After some further discussion, Mr. James Barclay Murdoch, F.R.Ph.S.E., read a paper on the "Long-tailed Field Mouse," in which he mentioned the destructive powers of this little creature, and showed specimens of branches of apple trees in various stages of growth, the barks of which had been attacked by these voracious little creatures and almost completely gnawed away. In one instance, of a hedgerow crab-apple tree, it had removed the bark from the thin twigs at a height over 10ft. from the ground. The destructive habits of this little pest were freely commented upon, and the partiality it shows for certain kinds of trees upon which to exercise its powers. Mr. T. J. Henderson read a short and interesting paper on "The Genus *Tortrix*," and exhibited specimens of the various species found in the West of Scotland. In the paper Mr. Henderson remarked upon the slight attention which was paid to the micro-lepidoptera by the entomologist members of the society as compared with the larger and more attractive species, and advised all those who studied that particular group to bring forward specimens to the meeting for the purpose of perhaps adding some new species to the already recorded list. He also gave localities for the ten species which have been recorded, and mentioned that other four are said to have been taken; but some of these, he thought, on doubtful evidence. The meeting concluded with the usual vote of thanks to the exhibitors and essayists.—JOHN MACKAY, Hon. Secretary.

NATURE IN MARCH.

ALBERT H. WATERS, B.A.

The present winter is so far from being a mild one, that I fear much of what I wrote last month will this year apply rather to March than to February. As I pen these lines in the middle of the last-named month, the snow is lying thickly on the ground, and nature generally is presenting an aspect more suited to December than February. Under these circumstances spring is sure to be late, and the leafing and flowering of plants and trees, the nidificating of the feathered tribes, the arrival of spring migratory

birds, the departure of winter ornithological visitors, and the appearance of vernal lepidoptera will all be retarded.

The fieldfares will, in all probability, remain with us until the second or third week in March, or even later if inclement weather prevails. In 1886 they were seen in Yorkshire as late as May 8th (see "Zoologist," vol. x., page 298). In mild winters they generally depart about the latter end of February or beginning of March. An interesting case of variation in the plumage of *Turdus pilaris* is described in the "Zoologist," for February, 1886. It was taken, I think, near York. The crown, sides of the head, and the neck were white, in some cases mixed with a few grey feathers. In one of the wings the first secondary feather, and one or two of the lesser wing coverts were white, while on the other wing one of the greater wing coverts only is white. The claws too were described as being peculiar, having pale bases; otherwise the general colouration was similar to that of the male bird.

Another of the migratory thrushes we may expect to stay late with us this year is the redwing (*Turdus iliacus*), a bird somewhat similar to well known song thrush, but smaller in size. The chief difference in the colour of the two birds lies in the sides beneath the wings, and the inner wing-coverts, which are reddish orange white in the song-thrush, in this are yellowish white. There is a line of yellowish white above each eye, starting from the bill and ending near the hind part of the head. The redwings are winter visitants to the British Islands, crossing over from the northern parts of the continent a few days before the fieldfares.

Mention of the fieldfare and the redwing leads me to speak of our resident thrushes, and their doings in March. In seasons when the weather is mild, the missel thrush, the song thrush, and the blackbird will all be at work nest making, and the last named will very likely have eggs laid before the end of the month. The blackbird too is one of the earliest to let us know that "the time of the singing of birds is come," and the weather must be very severe if we do not hear his melodious notes as we walk through the still leafless woods in March.

The rooks are pretty sure to be at work in earnest this month, either repairing their old nests or building new ones. Among the other birds which nest in March, if the weather be mild, are the starling, the robin redbreast, the raven, the magpie, and the carrion crow.

The wagtails (*Motacilla Yarrellii*, and *Rayii*) ought to be making their appearance in March, and we may also expect the willow wren and the chiff-chaff, and at the end of the month we may perhaps see the ring-ousel. In mild weather, and in seasons when spring puts in an early appearance, the

first swallows and martens will arrive at the latter end of the month.

Several species of lepidoptera will, if March be mild, make their appearance, at any rate in the latter part of the month. Among those the entomologist should be on the look-out for, are the Hebrew Character (*Tæniocampa gothica*), the Red Chestnut (*T. rubricosa*), the Clouded Drab *T. instabilis*, the rather local Northern Drab (*T. opima*), the Common Quaker (*T. stabilis*), the Blossom Underwing (*T. miniosa*), the Small Quaker (*T. cruda*), the local white-marked (*T. leucographa*), the hybernated Chestnut (*Cerastis vacinnii*), Dotted Chestnut (*Dasycompa rubiginea*), Orange Upperwing (*Hoporina croceago*), Red Sword-grass (*Calocampa vetusta*), the Sword-grass (*C. exolcta*), Gray Shoulder-knot (*Xylinu rhizolitha*), and Herald (*Gonoptera libatrix*), so partial to outhouses and similar places.

All the above may be expected at sallow bloom, or may be found at rest. Besides these we have in mild weather in March, the pale Pinion (*Xylinu petrificata*), the tawny Pinion (*X. semibrunnea*), to be looked for in the southern and midland counties, the autumn Green Carpet (*Cidaria miata*), the hybernated females of which may be found in sheds and outhouses; the Red Green Carpet (*C. psiticata*), of which only the females hibernate; the Shoulder Stripe (*Anticlea badiata*), which may probably be seen ovipositing on the dog roses; the Early Grey (*Anticlea derivata*), where honeysuckles abound; the Early Thorn (*Selena illunaria*), in gardens; the Small Brindled Beauty (*Nyssia hispiduria*), and the little *Depressaria applana*, which may be seen fitting along the still leafless hedges.

Several larvæ are feeding now and may be found in mild weather. Among them may be mentioned the lichenivorous marbled green (*Bryophila glandifera*), and the marbled beauty (*B. perla*.) Both these species pass the winter in little silken cocoons, in which are fastened tiny particles of mortar. They come out of their domiciles in early morning and at night or in mild wet weather, and feed on lichens growing on walls. *Glandifera* is a little smoke-coloured larvæ with ochreous yellow underside and black head—it is much less common than *perla*. The latter larva has the back slate coloured, with orange markings on each side of the dorsal stripe. These markings are narrow, coloured linear or somewhat crescentic; between them and the legs is a slender white line on the anterior segments, and there is a small white spot close to each of the markings. The underside is smoke coloured, tinged with green, and the legs and claspers are of the same colour.

Other larvæ feeding now are those of the Lesser Yellow-underwing Moth (*Tryphæna orbona*), on chickweed, which are dingy brown in colour, with black markings on the 11th and 12th segments, the yellowish-red *Aporophylla australis* (Feathered Brindle), on endive; the flesh coloured flounced-

rustic caterpillar (*Iupulina testacea*), on grass; the purplish brown or reddish drab *Caradria alsines* " (Uncertain moth)," on chickweed, and the pale reddish grey larva of the smoky Wainscot Moth (*Leucania impura*), which feeds on grass.

Some of the spring flowers will now be blooming, unless the weather should prove very severe. Among those which blossom in March are ground ivy, dead nettles, coltsfoot, celandine, dandelion, daisy, hearts ease, mallow, periwinkle, primrose, violet, and if the weather be mild daffodils, cowslips, wild strawberry, megareon, dog mercury, and wood anemone.

Cambridge.

NEWSPAPER ENTOMOLOGY.

F. N. PIERCE.

When will newspaper editors learn sufficient entomology to exclude such gross errors as the following, which appeared in one of our local papers:—

A BUTTERFLY IN JANUARY.

Mr. R. D. Hulme, of Queen's Park, Manchester, writes:—"On Thursday evening, the 12th inst., at 7.45, I was surprised to see flying about the room a beautiful full-grown butterfly. I caught it and put it into a glass with some crushed sugar. The following morning (the 13th) I looked at the little visitor and found it quite lively. Is this not a very surprising and strange visit at this time of the year, especially with such weather as we have had during the last few days?"

Nor are editors entirely to blame for the notice, there is so much they are expected to know, and it might have got in accidentally. But is there any excuse for a gentlemen, presumably of fair education, rushing into print to expose his barbarous ignorance on entomology. Forsooth! the gentleman imagines that the small Clothes moth feeds rapidly on his woollen garments, until it attains the size of an ordinary noctua, when it will leave the animal and turn its attention to the vegetable kingdom, that here the noctua or "Buzzard," feeds for some time in order that it may become a *full-grown butterfly*, and sport on the gentleman's cabbage as a Garden White, or feed on the crushed sugar so generously placed at its disposal. After this, no doubt, our excellent friend has a hazy idea that some how or other the Garden White, by some curious transformation, becomes a caterpillar, when it will proceed to lay eggs for future generations. This is not supposition only—I have met many who hold these curious ideas of the transformation of of lepidoptera.

Smithdown Lane, Liverpool.

LIPARIS DISPAR AND CLOSTERA ANACHORETA.

May I kindly ask Mr. Gregson for a little more information with regard to the above species. I should like to have the following points cleared up if he is at all certain as to the data:—

1. What year did he receive ova, larvæ, or pupæ of *L. dispar*, from Mr. Doubleday? How many years did he himself keep up the breed? Presuming that Mr. Doubleday's distribution took place at least thirty years ago, what proof has Mr. Gregson, that the specimens of *L. dispar* now in circulation, have anything to do with the original breed?

2. Is "Old Weaver" to whom Mr. Gregson refers as "the honoured first discoverer of *Clostera anachoreta* in Britain," the same dealer that caught "*Dia*," &c. in the Midlands some years ago. Mr. Gregson lays great stress on the astuteness of that gentleman, is he certain that he has never been a subject on which that gentleman practised his sharpness?

With regard to Mr. Gregson, I can assure him that some of the best London Lepidopterists have worked Folkestone closely for many years past, and I am only one among many who believe that the original specimens from which Mr. Gregson's and my own series were obtained, were imported. I do not believe in the "mealy whiteness" of *anachoreta*. Does not *anachoreta* differ in colour according to whether the specimens are a summer or autumn brood? I may certainly add that I quite agree with Mr. Gregson, that the "Lancashire men are entomologists, not collectors," or if they are not they ought to be.

May I kindly ask Mr. Gregson to give exact data to the above queries, because they are points well worthy the attention of lepidopterists, but the data should be to the point and not mere generalisations, and I need hardly refer to a comparison of the data given in "The Intelligencer," Vol. IV, page 134, and "The Entomologist," XVIII, page 52, as rather tending to demoralize our scientific work.—J. W. TUTT, F.E.S., Rayleigh Villa, Westcombe Park, Blackheath.

NOTES AND OBSERVATIONS.

PHIGALIA PILOSARIA IN JANUARY.—On the 22nd January my friend Mr. Beauland, brought in a fine example of *Phigalia pilosaria*, taken the same day at Shipley Glen. He also brought both staminate and pistillate

flowers of the hazel (*Corylus avellana*.) I need hardly say how heartily I welcomed the appearance of these two familiar pioneers of spring.—J. W. CARTER, Bradford.

WOOD WOOL.—I have been asked about this substance, which has been recently introduced for packing purposes. It is rather a misleading name, for it is not “wool” at all, being very narrow shavings of wood. Whether there is anything peculiar in the process of preparation or not, I do not know, but it seems much more elastic than ordinary shavings, and nearly as much so as curled hair. I have not tried it for packing insect boxes, but it appears to be a most suitable thing for the purpose. It is certainly better than cotton wool.—JOHN E. ROBSON, Hartlepool.

OCCURRENCE OF LIPARIS DISPAR IN HAMPSHIRE, 1887.—I am now in a position to confirm Mr. Gregson’s supposition that *L. dispar* is still to be taken in England, as an entomological friend of mine beat a female specimen of this species from the lower twigs of a young plantation (oak) in the New Forest, Hampshire, in the latter end of June, 1887, whilst beating for the larvæ of *Sponso* and *Promissa*.—A. E. HALL, Norbury, Pitsmoor, Sheffield.

MYRTILLI.

On Shirley, when the sun shines high,
And drowsy bees their matins sing;
What flies so swift as Myrtilli,
The little Yellow Underwing?

Just like a sudden flash of light
It darts out from its nest of heath;
One moment! and 'tis lost from sight,
And hides again the ling beneath.

If rain should come and cloud the skies,
The little reveller seeks its bower;
Snug in its safe retreat it lies,
And waits the passing of the shower.

Though there are gaudier insects far
That boldly roam the summer sky,
Spite of their beauties, I prefer
The wayward little Myrtilli.

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ENTOMOLOGICAL NOMENCLATURE.*

By JOHN E. ROBSON.

THE question of nomenclature is one of considerable importance, for though it may be fairly argued that anything will do for a name, it is very necessary that every one interested should know what is intended when the name is used. That which we call a rose, by any other name *might* smell as sweet, but if you called it a lily, and I called it a dahlia, and a third person called it a violet, we would have very little idea of what each understood the perfume to be, were we conversing about it. Nor is it enough that only the people of one nation, speaking one language should use the same word to express a particular species. Communication with other countries is so easy now, and so universal, that it is necessary a name should be adopted that distant correspondents can understand. We need to know the name used in France or Germany, in Canada or the United States, in India, or in Australia. Wherever, in short, there are naturalists, there is need for uniformity of nomenclature. Hence the necessity for names being framed in a language taught everywhere, and that being no longer used by a living race, ceases to be liable to change. Hence, too, the necessity of their being some well understood principle on which names should be applied.

Prior to the time of Linnæus, names were given somewhat indiscriminately, and not unfrequently were but a brief description of the animal. Thus Petiver, in 1717, called the Brimstone butterfly *Papilio sulphureus*, and Albin, in 1731, called the Black-veined White, *Papilio albus venis nigris*. So too, in —, a local writer called the Comma “The brown and gold butterfly with lacinated wings.” When Latin was used, all butterflies were *Papilio*, all moths *Phalæna*. Linnæus devised a system of nomenclature that

*Read before the Lancashire and Cheshire Entomological Society, Liverpool, Feb. 27th, 1888, and published by request.

needed but two words for each species. The second of these words was the individual name, while the first shewed to which group the particular species belonged. Both these words might be given at random, or might refer to some characteristic or peculiarity belonging to it. The chief thing was that the same name, or at any rate the same combination of names, should never be applied to different species. This binomial system is so perfectly natural, and we are now so well accustomed to it, that it seems difficult to imagine a time when any other method obtained, if indeed we can call the older way a method. The common or vulgar names have always been more or less binomial. As early as the time of Moses we read (Leviticus XI.) of the Eagle and the Gier Eagle, of the Hawk and the Night Hawk, of the Great Owl and the Little Owl. Just so we now speak of our butterflies as the Large White and the Small White, the Green-veined White and the Bath White. Our own names are doubled in the same way, but there is this to be observed, that in our names and the common names of animals, the distinctive names are placed first, and the family or generic name last, while in the Linnæan or scientific method the order was reversed. That this is the better way may be gathered from the fact that in any arrangement of our own names, or the common names of animals, it is followed as in science. Thus in indexing a ledger or a book, or arranging a directory, John Smith stands under "S" along with others of the Smith family, and the names follow that distinguish one from the other.

How came it then, that when a system of nomenclature, both natural and simple had been devised, there has ever been a doubt as to what species any particular name refers, or by what name any particular species should be called. It is not difficult to understand how it has happened that different names have been given to the same species, but it does seem strange, that a number of intelligent men, deeply interested in the study and collection of natural objects, should be unable to agree not only by what name each should be known, but even on what principal names already given should be settled. Lepidopterists have acquired a bad notoriety for continual differences of opinion as to the names by which certain species should be known, nor do they even now appear to draw towards a conclusion that is likely to be acceptable to every one. Over and over again the subject has been discussed. Everything that could be said has been said, but every one is so positive that his plan is the only way in which the question can be settled that no one will yield to another. Even the political differences between France and Germany appear to render it more difficult to arrive at any satisfactory conclusion. In this country we have confined our attention so much to our own fauna, that we have had less trouble than we might otherwise have had, but

the recent proposal to adopt the German nomenclature of Staudinger, in lieu of the French nomenclature of Guenee which was introduced by Doubleday, has brought all the difficulties home to us at last.

It may be worth while to consider for a moment how it is that more than one name has been given to one species, because a proper understanding of that point leads us at once to the difficulties of a settlement. The beauty of butterflies and moths, has doubtless been the chief cause of so many collectors turning their attention to lepidoptera. Their small size places a collection within the reach of every one, while this very minuteness, coupled with their wonderful variation, has rendered it exceedingly difficult to describe and figure them with absolute exactness. Writers in different countries have figured and described these beautiful creatures, sometimes carefully and correctly, sometimes carelessly and incorrectly, sometimes from imperfect or abnormal specimens, sometimes from a local form not occurring elsewhere. These writers too, were working in more or less ignorance of what others were doing or had done, naming species that had been named before, describing species in different words to those used in descriptions already published, figuring species with more or less variation, and altogether involving us in a maze of doubt and difficulty to which we may never find the complete clue. From time to time efforts have been made by one or another to explain some or all of these puzzles, or remove them out of the way, but it has generally happened that such well meant efforts have only served to make the matter more complicated. Differences of opinion as to method are fruitful sources of difficulty. One writer has more discrimination than another, or thinks he has, and satisfies himself he has solved a problem that still remains dark to his co-workers. Another is more easily satisfied and passes as correct, what to everyone else seems wrong or very doubtful. Every attempt to produce a perfect nomenclature of even a very limited fauna, has been more or less a failure. Imperfect knowledge is one great cause of this, and genuine differences of opinion as to the principles that ought to be adopted. It is perhaps presumptuous in one situated as I am to speak on such a subject. Possessing but a limited library myself, and without access to any better than my own, I have had but little opportunity for original investigation. But had I access to every entomological work issued, I could only expect the labour of years, to be received as the works of abler men have been received before. My desire is much greater to see a nomenclature adopted by every one, than to have any particular course followed, and I care little how it is done if uniformity could be had. In pointing out errors and difficulties, I suggest a course that others may think equally faulty, but if anything better can be suggested I am ready to follow.

Much of the labour that has been bestowed on the subject might have been saved had we arrived at proper conclusions as to the object of nomenclature. This I would define as a means by which naturalists can understand each other when any particular species is referred to. To accomplish this, two points are to be considered. First, we want each species called by a name that shall not refer to any other, that shall be used by every one, and that shall not be subject to alteration. Second, we require some means of knowing by what names each species has been called by previous writers. The second point, which involves the synonymy of the species, is of less importance than might be supposed. If we were all agreed upon the name by which a species should be known now, it would not matter so much what it had been called before. The first point is the difficult one as well as the most important. Could we but agree on one name, and relegate all others to the "infernal region" of synonymy, there would be an end of the trouble, but instead of accepting some proposal for a settlement, we blunder about in an extraordinary manner, settling perhaps an odd point, but raising half-a-dozen new puzzles for every one we solve.

In the earlier portion of the present century, British lepidopterists, then comparatively few in number, appear to have been content to use the names adopted by our own writers, without troubling much whether they were in harmony with those used elsewhere. As collectors increased and communication with other countries became easier, the want began to be experienced of a nomenclature in harmony with that of other people. The result was the *Synomyic Catalogue* of the late Henry Doubleday, a work of great importance, and the result of much painstaking investigation. So much care indeed had been bestowed upon it, and so sound was Mr. Doubleday's judgment, that few of his conclusions have been shown to be erroneous. The British Association adopted certain rules for zoological nomenclature, and I am not aware these have ever been set aside or modified by any authority or common consent, yet it is only by breach of these rules that much of the Doubledayan nomenclature can be altered. Individual opinion or action has been set up as superior to the conclusions of any association, and the agreement that resulted from the adoption of these rules is lost in the confusion of to-day.

The most important of these rules for settling our nomenclature was that the 12th Edition of the *Systema Naturæ* should be adopted as the starting point. That this decision was wise there should be no doubt. Linnæus was an exceptionally able man. The binomial system of nomenclature was but an adjunct to the great scheme of arrangement and order with which he replaced the chaos of an earlier time. In giving names he knew what he was about better than we can know, and when he thought it better to alter a

name he had adopted before, or that had been used by others, we may be quite sure he had good reasons for the alteration, though we may not be able now to discover what those reasons were. Can we not accept these changes, because he thought them necessary, without insisting on knowing why? Surely the carefully revised completion of a great work, is a safer starting point than an earlier and admittedly imperfect edition. What would we think of the historical student who preferred an erroneous statement rather than the correction of the error in a later edition? For these or other reasons, the 12th edition of the great work of Linnæus, was decided upon for the starting point of our nomenclature. Mr. Kirby's great Catalogue of Butterflies was based upon it in 1871, but when he published a supplement in 1878, he had apparently altered his opinion, and the nomenclature of the supplement is based on the 10th edition. Beyond this he declines to go at present, but when once an established rule is broken who shall say what will be the end. The change of date from 1767 to 1758 may not appear to be material. Perhaps not so far as the Linnæan nomenclature goes, but it unfortunately lets in all names given by other writers during that period, including for lepidopterists the works of Poda, Scopoli, &c.

A further rule adopted by the British Association gives us what is known as the Law of Priority, that is, that the name given first shall have preference over others given subsequently. I am not aware of any other authoritative pronouncement on this point, than that of the British Association, and it is quite clear that these rules must be read and interpreted as a whole. The law of priority then as adopted by the British Association, should be read in conjunction with the rule fixing the starting point at the 12th edition of the *Systema Naturæ*. If not where are we to stop. A writer a few years ago, desirous of showing the absurdity of this constant change, from the unearthing of old authors, said why not go back till we call the mole cricket *Gryllo-talpa*, Aristotle. But why stop there? We read in the second chapter of Genesis, that every beast of the field and every fowl of the air was "brought to Adam to see what he would call them, and whatsoever Adam called any living creature that was the name thereof." Here is a starting point that could not be got behind, and scripture authority for it too. I would not deprive any one of the smallest bit of honour to which they may be entitled, but I would seriously urge that the name of an animal is given to it that it may be recognized, and not that its first describer may be honoured to the injury of science. When a name is once thoroughly established and in general use, to alter it is detrimental to every one, and the digging up of an earlier name, given by an obscure writer, whose works are not forgotten, only because they were never known, is certainly considerably

worse than labour in vain. But even these "resurrection men," as they have been aptly termed, are far from infallible, and it is nothing unusual to find them digging up a name to be foisted upon us for a time until their blunder is detected, and the well-known name restored. To illustrate this point, I will give illustrations from the catalogues of Dr. Staudinger and Mr. Kirby, and if these really painstaking industrious men can err, we need not expect better from the smaller fry, who take their references at second-hand.

(To be concluded in our next.)

COLLECTING LEPIDOPTERA AT TANSY FLOWERS.

By WILLIAM REID.

During the month of August, 1887, I spent several nights working the flowers of the common tansy, and, as on that occasion, I was eminently successful, and as it is a flower which is very seldom worked by the young entomologist—especially those residing inland—I have appended a list of my captures, in the hope that others may try the sign of the tansy, as I am confident they will find it the best natural attraction they have ever tried.

My hunting ground was a long stretch of waste-land, extending from Pitcable to Pittodrie Wood, a distance of about a mile, and was bordered on one side by the railway, and on the other by cultivated fields, with woods in the immediate vicinity. Within this narrow stripe were hundreds of tansies, all in splendid flower, and on several nights their attractions proved to be quite irresistible to insects of every description, and I shall not soon forget the sight that was disclosed to view when the lantern was brought to bear upon the flower heads. There were not only moths and bees by dozens, but also spiders, caddis-flies, caterpillars, snails, earwigs, beetles, and flies of every description enjoying the banquet.

Very few require the net to capture them, the greater number sitting quietly enough until they are boxed. So that all that is required is a lantern, matches, and a plentiful supply of chip boxes, which can be carried to the field in a satchel, and put into the pocket as they are filled.

As it is rather a difficult operation to keep the rays of the lantern directed on the plant while boxing an insect, perhaps it may not be out of place to describe the way I have found best. A small pocket lantern should be got, say $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches and 2 inches deep, which should be placed upright in the palm of the left hand, and the bottom grasped between the root of the thumb and the tips of the third and fourth fingers, this leaves the

thumb and two first fingers free to hold the box while the right hand manipulates the lid. It will be seen that by this means it does not matter where, or in what position a moth is sitting, the lantern can always be held in such a way that its rays are directed full upon the insect, while it is undergoing the process of being boxed.

Below is the list of insects either seen or captured:—

The Rhopalocera were represented by one *P. rapæ* and one *V. urticae*, which had apparently been sleeping off the effect of the day's bebauch.

The Noctuæ were in great abundance, and the following were taken or seen. *Leucania lithargyria* and *L. pallens* were both common, but very much worn. *Hydræcia nietitans* abundant and variable, var. *erythro stigma* also common. *H. micacea* also very abundant; this species is not so rosy with us as in the South of England. *Xylophasia* was represented by one very dilapidated looking *polyodon*. *Charæas graminis* was common but not nearly so abundant as I have seen it; the female is most abundant on the flowers at night, and the male during the day time. *Mamestra furva*, only a very few. *Apamea oculea*, abundant, and as usual very variable. *Miana literosa*, common and in splendid condition. *Celæna Hawthorii*, fairly common and exceedingly variable; sometimes a few are attracted during the afternoon. *Caradrina cubicularis*, always a nuisance. *Agrotis nigricans*, abundant, all very dark, and very distinctly marked. *A. tritici*, also abundant, larger, and finer than any of the "Southerners" in my possession. *A. pyrophila*, fairly common, but some were rather worn, it is a variable species, and one I have only newly turned up hereabouts. *Triphaena ianthina* one, the only one I ever took in Aberdeenshire. *T. orbona*, very common, these were truly gorgeous, varying from cream colour, through every shade of brown, to purplish black. *T. pronuba*, rather common, the usual varieties. *Noctua glareosa*, very abundant; one I captured was suffused with red—a rather scarce variety I believe—as a general rule they do not differ much from English specimens. *N. augur*, a few ragged specimens. *N. festiva*, scarce. *N. dahlia*, in great abundance and excessively variable. *N. rubi*, only a few. *N. umbrosa*, common, but very much worn. *N. sobrina*, one; I have seen one other taken in Aberdeenshire. *N. baja*, a few, but worn. *N. xanthographa*, in extraordinary abundance, and also extremely variable; some were almost black, without a trace of any markings. *Orthosia suspecta*, fairly common, and in good condition; var. *congener*, not scarce. *Anchocelis rufina*, a few. *A. litura*, a few: these last two were only just coming out. *Xanthia cerago*, very common; var. *flavesceus*, not uncommon. *X. silago*, fairly common. *X. ferruginea*, a few. *Polia chi*, only a very few. *Miselia oxyacanthæ*, one. *Stilbia anomala*, two fine specimens.

Of Geometræ, the following were seen:—*Rumia cratægata*, a few (second brood). *Larentia didymata*, in extraordinary abundance, especially just before sunset. *L. olivata*, also very common, but rather worn. *Ypsipetes elutata*, common and variable; var. *infusata*, fairly common; var. *Neapolitana* (Miliere). *Melanippe fluctuata*, a few very dark. *Camptogramma bilineata*, abundant. *Cidaria russata* and *immanata*, literally in thousands. *C. populata*, only a few, spoiled. *Anaitis plagiata*, one.

The Micros were poorly represented. I noticed the following:—*Phycis betulæ*, one in fine condition. *Plutella Dalella*, swarmed, as also did *Depressaria applana*, *D. atomella*, *D. heraclæana*, and a few other common species.

I may just add that the flowers have very little attraction when wet. I tried one night, when they were saturated with moisture, and all I got was about half-a-dozen *N. xanthographa*, and a few common things.

Pitcairle, Aberdeen.

PASSING EVENTS.

Scarcely has the excitement subsided caused by the price realized for the Great Auk's egg, sold at Steven's Sale Rooms, King Street, Covent Garden, on 13th December last, than another specimen has come under the hammer at the same place. The last one, which was of small size, slightly cracked, not well marked, and rather discoloured, but undoubtedly genuine, brought the enormous price of £168 (see page 18). The present specimen, which was sold on 12th March, was a very fine and perfect one. Mr. Stevens said it was the finest out of the 11 or 12 that had passed through his hands. Naturally there was a great gathering of enthusiastic Oologists, some to bid, and many perhaps only to be present to witness the sale. The bidding for the last egg commenced at £50, and it was knocked down at £120. The first bid for this one was 100 guineas, from which it rose rapidly, until amid much cheering the former price was passed, and at last 200 guineas was reached. Then, as the guineas seemed somewhat to puzzle the bidders, the biddings were changed into pounds, and it was ultimately knocked down to Gardner, of Oxford Street, for £225. The name of his principal did not transpire, but it was reported to have been bought for America.

The sale of the collection of Mr. W. Warren took place at the same time. It was a collection of Macro-Lepidoptera in fine condition and containing many rare species, but with few varieties. Three lots of half-a-dozen each of *Minos* and *Erulans* brought an average of 25/- per lot, while 57 of the commoner Burnets including one yellow *Filipendulæ* only produced 9/-. Lot 38—*Nubeculosa*, 6; *Trepida*, 12; sold for 24/-. Lot 41—*Cænosa*, 13,

and 59 others realized £2 10s. Lot 48—*Pulchella*, 2, and *Hera*, 1 (Jersey), brought 21/-. Lots 61, 62, & 63—each containing 6 or 7 *Impar*, 2 yellow *Perla* and others, brought £5 for the three lots. Lot 79—2 *Sparganii* sold for £1 4s. Lot 97—a single specimen of *Hydrilla palustris* said to be the last capture, brought £1 17s. 6d. Lot 145—*Furcifera*, 6, brought £1 12s; while the next lot *Furcifera*, 3 and *Lambda*, 1, reached £1 14s. Lot 143—1 *Gnaphalii* brought 16/-. *Craccæ*, in sets of 9 each, produced 10/- per lot. Two *Reticulata* sold for 11/- and 13/-. These were the most notable lots. Prices appear to have ruled very low on the whole. One lot (131) containing 1 *Cæsia*, 17 *Albimacula*, and 19 *Conspersa*, including 3 dark Scotch forms, only brought 10/-; while the next lot of 18 *Irregularis*, 16 *Dysodea*, and 19 *Serena* realized no more.

NATURE IN APRIL.

By ALBERT H. WATERS, B.A.,

“Is there a heart that beats and lives,
To which no joy the spring-time gives?”

BISHOP MANT.

Nature is now beginning to wake up in earnest. We have passed the vernal equinox, and the re-vivifying influence of spring is beginning to make itself felt. The fast leafing woods resound with the melodious notes of thrushes, blackbirds, and other feathered songsters, all of which have been busy at work nest-building for some time past. If we take a country walk about the middle of the month, we may expect to hear the song of the tit-lark, and a week or ten days later if we ramble through the copse by the river-side, we shall very likely hear the willow wren. If April is as it should be, a ramble at that time is very enjoyable, and I would ask my readers to accompany me on an imaginary walk. The sombre aspect which nature has worn for some months past, when not white with snow, has given place to a bright cheerful tint of green, for the trees and hedgerows are fast leafing. The fields are no longer black with fresh ploughed soil, but verdant with the young blades of corn. The sunshine is pouring down in floods of golden light, and all nature seems to be rejoicing that winter's dreary reign is over and bright spring-time has come. As we walk along, we see the bright-coloured tortoiseshell butterflies enjoying the sunshine after their winter's sleep, and other of their kin the peacock, the red admiral, the comma, and

the painted lady may also be observed on a mild day a little later. Overhead, as we walk through the wood, we hear the rooks vociferously cawing and see that they are very busy about their nests, and if we come this way a few weeks later on we shall in all probability hear the young rooks. Up yonder we see a pair of starlings building their nest, and see as we walk along we have started a pretty brown bird with a red tail, we recognise it at once as a redstart (*Sylvia phœnicurus*.) It is the first we have seen this spring, and is evidently a fresh arrival. The redstarts come generally about the 18th of April and remain all summer. They build loosely constructed nests in holes in trees and lay pale bluish-green eggs. They are very pretty little birds, and their bright orange red tails make them rather conspicuous. There is another species of redstart known as the black redstart (*Sylvia titys*), it visits the southern coasts of England at the end of autumn, and contrary to the habits of the common redstart, remains all winter and leaves us about the beginning of April.

Hark at that blackbird loudly singing to his mate! How clear and delightfully rich are the notes of his song. Well may Graham term him

"Melodious bird,
Who hid behind the milk-white hawthorn spray;
Whose early flowers anticipate the leaf,
Welcomes the time of buds, the infant year."

In all probability the nest is close at hand: in that thick bush most likely out of which the hen bird has just flown. Let us look! Yes, here it is, composed of small twigs and fibrous roots, plastered inside with mud, and over the mud a lining of fine clay. There are four eggs, green in colour, freckled and spotted with reddish. The hen will doubtless very soon begin to sit, although the readiness with which she deserted the nest when we came near its locality shewed she has not yet begun to do so.

Here lies a dead shrew mouse, and it is a singular thing but you may often find these dead shrew mice lying about at this time of the year. The common shrew is one of the creatures I should like to know more about than I do. What I know of them is very little. I am familiar enough with their form and colour, but of their habits beyond the fact that they are insectivorous quadrupeds, I know next to nothing. I have never been able to keep them alive in captivity, and they are too shy to observe much in a wild state. The animal itself is common enough, and one may sometimes find its domicile with from five to seven tiny baby shrew mice in a warm bed or nest made of hay. This we generally find in a hole in a hedge bank, or sometimes in the open field. It is a creature well able to burrow, and it often makes somewhat lengthy, although very shallow runs. The dentition of the shrew exhibits a curious

and interesting feature: the two upper fore-teeth are provided with a singular barb, of course imperceptible to the naked eye, but readily seen with a lens. Besides the common shrew (*Sorex araneus*), there are two other British species, namely, the oared shrew and the water shrew (*S. remifer* and *S. podiens*). They are both rather larger than the common shrew, and differ in colour, the fur on the back of both species is black or nearly black, instead of reddish-mouse colour. The water shrew has the underside white, and the marked contrast between that and the back make it rather a pretty creature. The underside of the oared shrew is greyish black, with the throat yellowish ash colour.

Our ramble has brought us to a brook. Let us keep a sharp look out, perhaps we shall see one or other of the aquatic shrews; lying dead I mean, for they are nocturnal animals, and very seldom seen alive in the day-time. But look there at that black animal popping out of that hole close by the water's edge! Keep still! he is swimming this way. Ha! he has seen us, and instantly dived to the bottom of the brook, along which we can still see him making his way. It is a water vole, popularly called a water "rat," but there is nothing rat-like about it. See! there is a newt paddling along in the water. This is spawning time with them, and they live at present an entirely aquatic existence. The female newt takes great care of her eggs, neatly folding each one up in a leaf of a water-plant, so as to preserve it from the jaws of such fish as might regard it as a tit-bit.

Here is a moth resting on this willow tree. It is a rather pale greyish ochreous coloured moth, about the same size as *Teniocampa instabilis*, but evidently a different species. It belongs, however, to the same genus, and we recognise it as *T. gracilis*.

Now we will leave the brook and go across the meadow to yonder common. Look at that pretty black and white bird, with buff-orange breast, perched on that stone. It is a wheat-ear chat (*Saxicola cenanthe*), and is one of our summer migrants. Two other chats, the little whinchat (*Sylvia rubetra*) and the stone chat (*Sylvia rubicola*) also come at this time of the year, not but what many stone chats remain here the whole year round, nevertheless, the greater number leave us in autumn and return in April.

Mention of these reminds me that the migrating birds will be arriving in earnest this month. The swallows, house-martens, sand-martens, chiffchaffs, wagtails, and ring ousels, if they have not already come will arrive at the beginning of the month. The willow warbler will come in the course of the second week, and the sedge warbler about ten days later. Soon after we may expect to see the first swifts, and the grasshopper warbler will probably arrive by the end of the month.

Now our ramble must draw to its close, and as we wend our way homeward in the dusk of evening, we see the moths in numbers at the shallows. I need not, however, give a list of the names, nor those of the larvæ we might find if we searched with a lantern, as I have already done so in former volumes of the "Young Naturalist," and to them I must refer my readers.

If we stayed later we might perhaps be so fortunate as to hear the dulcet song of the nightingale, and truly that prince of songsters is worth listening to as he pours out his gush of harmony from the branch of some bush or tree, his melodious notes following one another so rapidly and in such quick time that it seems—as Coleridge says :

" As if he were fearful that an April night
Would be too short for him, to utter forth
His love chant, and disburthen his full soul
Of all its music."

Possibly by good fortune, we might hear two nightingales singing against one another, if so then

" Far and near,
In wood and thicket, over the wide grove
They answer and provoke each other's songs,
With skirmish and capricious passagings,
And murmurs musical and swift, jug, jug ;
And one low piping sound more sweet than all,
Stirring the air with such an harmony ;
That should you close your eyes you might almost
Forget it was not day."

I have said nothing about the botanical features of April, but the following trees are now leafing, or will be in the course of the first fortnight of the month : birch, willow, filbert, sycamore, and elm. Later on in the month, the apple, chestnut, poplar, oak, and mountain-ash leaf, and at the end of the month the lime, maple, and beech follow their example. Last of all, at the end of the month, comes the time of leafing of the ash. The plants I have found in flower in April include the following : *Vinca major*, *Anthiscus sylvestris*, *Petasites vulgaris*, *Muscari racemosum*, *Anemone pulsatilla*, *A. nemorosa*, *Ranunculus auricomus*, *Viola sylvatica*, *Cerastium triviale*, *Potentilla fragariastrum*, *Saxifraga tridactylites*, *Myosotis collina*, *Primula elatior*, *Arum maculatum*, *Vicia sativa*, *Lathyrus aphaca*, *Alchemilla vulgaris*, *Bryonia dioica*, and *Lamium amplexicaule* ; but some of these do not flower in backward seasons before May.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

March 7, 1888.—Dr. D. SHARP, President, in the chair

Mr. Frederic Pennington, jun., of Broome Hall, Holmwood, Surrey; Mr. W. Crush, of Westcombe Park, Blackheath, S.E.; and Mr. J. P. Cregoe, of Charleston, U.S.A., were elected Fellows.

Mr. J. H. Leech exhibited, and made remarks on, a number of butterflies forming part of the collection made for him during last summer by Mr. Pratt, at Kiukiang, Central China. The specimens exhibited included examples of *Papilio Macilentus* (hitherto only recorded from Japan), varieties of *P. Sarpedon*, and a supposed new species of *Papilio*; a series of *Sericinus telamon*; *Acræa vesta* (varieties); *Charaxes narceus*, and var. *mandarinus* (the latter being the common form at Kiukiang); *Palæonympha opalina*, Butl.; new or unknown species of *Lethe*, *Apatura*, and *Neptis*; and a series of *Argynnis paphia*, with the var. *valezina* of the female. Mr. Leech stated that all the females of *A. paphia* taken at Kiukiang belonged to the var. *valezina*, the typical form of the species being unknown there.

Mr. Poulton expressed his interest in Mr. Leech's statement that *valezina* was the only form of the female of *Argynnis paphia* known at Kiukiang, and said he considered this fact would probably throw a new light on the question of the dimorphism of the species.

Mr. Jenner Weir said he had in the course of some years obtained a series of forms intermediate between the typical female and the variety *valezina*. Mr. H. Goss, Mr. M'Lachlan, Dr. Sharp, and Mr. Leech continued the discussion.

Mr. Champion exhibited, for Mr. J. J. Walker, R.N., about 950 species of Coleoptera, recently collected by the latter near Gibraltar. Mr. M'Lachlan called attention to the large number of water-beetles included in Mr. Walker's collection. Mr. Kirby suggested that the attention of the Imperial Institute should be called to the interest attaching to the exhibition of local collections of insects from British Colonies and possessions.

Mr. Verrall exhibited living specimens of *Aspidomorpha sanctæ-crucis*, and another species unnamed, from the caves of Elephanta.

Mr. Slater exhibited specimens of a species of weevil which had been doing much damage to maize sent to the Colonial Exhibition.

Mr. W. White read a paper on "Experiments upon the Colour-relation between the pupæ of *Pieris rapæ*, and their immediate surroundings," which comprised a detailed account and discussion of a series of observations carried on at the author's instigation by Mr. G. C. Griffiths, of Bristol. The various

experiments were intended to act as a further test of the conclusions arrived at by Mr. E. B. Poulton in his paper on the subject in the Transactions of the Royal Society; and to effect this object different and additional influences had been brought to bear on these pupæ, so that an analogy might be drawn between the two sets of results.

Mr. Poulton, Lord Walsingham, Mr. Jacoby, Dr. Sharp, Mr. White, and others took part in the discussion which ensued.—H. Goss, *Hon. Secretary.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

The meeting of March 1st was numerously attended, and in the absence of both President and Vice-President until a late hour, Mr. Anderson took the chair. Owing to the inclement weather, there were but few entomological exhibits, but Mr. Clark showed a long and beautiful series of *Nyssia hispidaria*, which he had reared from ova. One very dark male was specially noticed among this lot, and it was also remarked that there appeared to be two distinct forms of the female, one being of a uniform black colour, the other being considerably larger and of a greyish hue, showing black markings down the body. The chairman exhibited specimens of *T. munda* which had emerged from pupa that day. Mr. Harper had fine specimens of *D. rubiginea*, *D. cæsia*, *Z. conformis*, and other rarities. Mr. Cooke had with him the skin from the feet of an albatross, which appeared to be wonderfully tough and flexible. Mr. Hillman mentioned that the very severe weather had caused many sea birds to come up the River Thames. On one afternoon more than 50 gulls were shot on Barnes Common, among them being two specimens of the black-backed gull; he further mentioned having seen large flocks of Fieldfares at Kensington, and upon examining them he found that they presented a most pitiable condition, there being hardly any flesh on them. Mr. Hockett had also observed specimens of this bird in the northern suburbs of London in a most wretched state. Mr. Lamplough presented the Society with large framed crayon portraits of the late Mr. Doubleday and Sir John Lubbock, one of the Patrons; and Mr. Cooke made a donation of four vols. on entomology by Rennie, and some of the early authors.

The paper of the evening was by Mr. Hillman, on "Wheat and its food value," and though a little out of the ordinary routine it proved to be of a most interesting character. After a brief outline of the earlier stages, the author concentrated his remarks to the description of the various elements and parts composing the grain, rendering his observations lucid by the free use of large diagrams which he had prepared for the occasion. The paper concluded with strong arguments in favour of the use of whole meal bread in

place of the white bread commonly consumed, and Mr. Hillman stated that a process had just been brought to perfection which would give a perfect and palatable form of whole meal bread which ought to meet with universal acceptance. Specimens of this, together with many other makes of bread were placed in considerable quantities on the table, and freely used by the author to illustrate his remarks; subsequently they were also freely experimented on by the gentlemen present. The appearance of the meeting being at one stage of the proceeding highly suggestive of the annual supper night.

At the meeting held March 15th, Mr. Goldthwaite exhibited a long row of *H. rupicapraria*, he having met with it in great abundance during the early part of the year. Mr. Lewcock's box contained the two species of the genus *Aureta*, the difference between the two, however, being only to be determined with the aid of a microscope, the size of both being so very minute. Mr. Hillman exhibited two almost black skylarks, a common bunting very much splashed with white, a fieldfare having a speckled head and neck, a curious drab-coloured starling and a specimen of White's thrush, shot by him at Twickenham in October 1887. Mr. Cooper had with him a *Noctua* captured in Scotland, which was unrecognised by the members, though thought to be in the genus *Hadena*. Mr. Cooke exhibited and presented to the Society a photograph of the great auk's egg; and also made some remarks on the correct way to bring home and preserve eggs. Mr. Lewcock referring to the discussion on *Melolontha vulgaris*, which took place on the 2nd February, with reference to the duration of the larval stage of this species, a point on which he was at variance with the author of the paper, he stated that he had since referred to all the authorities on the subject, and found them unanimous in stating three years to be the limit of the larval period.

It was arranged that a distribution of surplus specimens should take place on Thursday, 19th April.—J. RUSSELL and E. ANDERSON, Joint Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

February 23rd, 1888.—T. R. Billups, F.E.S., President, in the chair. Mr. Routledge exhibited a number of preserved lepidopterous larvæ.

The Secretary read a paper "Notes on the Geodephaga in Ireland," contributed by the Rev. W. F. Johnson, of Armagh. The author said that the number of species of Geodephaga at present known to occur in Ireland was only some 140, out of the 300 and odd species in the British list. This apparent disproportion of numbers arose from the fact that Ireland had never been properly worked for coleoptera. Consequently it might reasonably be supposed, that a more thorough investigation would raise the number in the

present list very considerably. That such an undertaking would be amply rewarded, might be gathered from the fact that he had, single handed, taken in the Armagh district, in the four years since he began to work at the coleoptera, upwards of 76 species of Geodephaga, many of which had not been previously recorded as Irish. A list of the species captured with observations thereon followed, and in conclusion, the author said he could not regard the list with anything like satisfaction. It was only a beginning, and would serve to shew where the gaps were, and what remained to be done. He, however, felt sure that if the south, and west, the sea-coasts, and the mountains were searched by earnest workers, not only would most of the gaps in the present list be filled, but probably many new species would be added to the coleoptera of the British Isles.

An exhibition of microscopical objects was then given. Messrs. Dodswell, Terry, Macer, Coombs, Shaw, Turner, Adkin, West, Tutt, and Medland exhibited.

March 8th.—President in the chair. Messrs. H. Robson and H. A. Auld, were elected members. Mr. R. Adkin, exhibited a variety of *Eubolia bipunctaria*. The whole of the ground colour of the fore-wings being black, the whitish-grey basal patch and central fascia, on which latter the usual central spots were very prominent, being the only markings visible, and having correspondingly dark hind-wings. The specimen was taken by Mr. O. Danneberg, at Box Hill, July, 1886. Mr. C. H. Watson, a var. of *Phibalapteryx tersata*, from the New Forest, 1887. A note was read by the Secretary from Mr. T. D. A. Cockerall, on the origin of *Gonepteryx cleopatra*, which in his opinion arose as a seasonal variation. *Colias eurhytheme*, of Boisduval, generally distributed throughout the States, had on the fore-wings an orange patch on a yellow ground, precisely similar to that of *G. cleopatra*, there was, however, a seasonal form *Keewaydin*, Edwards, which emerged from hibernated pupæ, and had the orange patch much reduced, in some specimens being almost or entirely suppressed. The seasons in America being very marked, the summer and winter types must necessarily alternate; but supposing the North States to become uniformly cold, the South States uniformly warm, what would happen? Was it not obvious that the winter form of *C. eurhytheme*, would be perpetuated in the north, while the summer form would be prevalent in the south, thus producing species (for so they would then be called), exactly analogous to *G. cleopatra* and *G. rhammi*. Many things pointed to the fact that the seasons were once extremely marked in Europe, and he had no hesitation in saying, that in those old days *G. rhammi* and *G. cleopatra* were but seasonal forms of one and the same species. A further note from Mr. Cockerell, was also read with regard to *Agrotis suffusa*,

Hb., which he said was abundant in America, and was generally known as *A. ypsilon*, it having been described under this name in 1776, by Von Rottenberg. This name, being prior to that of Hubner, unless sufficient reason could be given to the contrary, should be adopted in England. An additional synonym was *A. telifera*, Harris, 1841. Mr. Pearce exhibited a drawing of the common dace and Mr. Turner a number of fossils. Mr. J. T. Carrington read a paper 'British Salmonidæ and their culture.'—H. B. BARKER, Hon. Sec.

IS ZYGÆNA MELITOTI A GOOD SPECIES?

As my name has been introduced in this discussion, it is better I should express my own opinions upon it, and not have them uttered at second-hand. I have no personal acquaintance with *Meliloti* further than from my own series, and from those in other collections that I have examined. As seen in collections they are perhaps more constant to their characteristics than *Trifolii*, which is an excessively variable species, and in a long series of it great diversity may be found. Some years ago I bred several hundred, from pupæ from the Kentish coast. The largest and finest specimens emerged first, and the last to emerge were small, sometimes crippled, sometimes paler, and sometimes less densely scaled than the earlier ones. I concluded that the healthiest and best nourished larvæ made up and emerged first, the weaker ones, or those that had fared worse, had been longer before they spun up, and were less perfect than the others. From these there was little difficulty in selecting specimens that might have been mixed with *Meliloti* without detection. Besides deficiency of food or abnormal conditions, interbreeding is sometimes a source of deterioration, and it may be that some of these dwarfed and imperfect *Trifolii* were the production of closely related parents. If *Meliloti* be confined, as is generally understood, to a very limited area, this same interbreeding would result, and the semi-diaphanous wings, and smaller size might result. Mr. Tugwell has most liberally presented me with some of his *Exulans* from Bræmar, and I note with interest that they are much less densely scaled than my examples of the same species from the Swiss Alps, as though the restricted district of the Scotch specimens resulted in interbreeding, and the consequent deterioration of the species. Having no knowledge of the New Forest except from books, I cannot speak about it, but if I understand the arguments, they are that the railway temporarily changed the conditions of the locality, and that it is now reverting to its older condition. Did Mr. Tugwell know it before the railway, and did *Meliloti* occur then?

Since writing the above, I have had the opportunity of examining the ex-

tensive collection of Mr. Gregson. He called my attention to a difference in the antennæ of the two insects, and contended that those of *Meliloti* were shorter and blunter than in *Trifolii*. When I subsequently compared my own examples of *Meliloti* with the smaller specimens of *Trifolii* named above, I must confess they seem shorter in proportion, and perhaps more obtuse also. The question is, if this be so, is it sufficient to warrant us in believing them to be distinct? I scarcely think so, but I am content to suspend my judgment for the present, leaving the specimens in my cabinet as *Meliloti* separate from the others, as they will deserve a variety name in any case.—JOHN E. ROBSON, Hartlepool, 1st March.

THE NEW FOREST ZYGÆNA MELILOTI.

I had thought that the question of the specific identity of these insects with *Z. trifolii* was at rest, but as my friend Mr. Tugwell still seems to cling to the old idea; it would be as well to state the facts to which he alludes, somewhat more at length than he does.

In the "Entomological Monthly Magazine," Vol. X., p. 116, my brother—Mr. T. H. Briggs—alludes to an unsuccessful attempt to breed from eggs laid in 1872, and also mentions eggs given to him by Mr. W. A. Lewis, in 1873—these hatched, but the larvæ all eventually died. In July, 1874, however, he succeeded in taking four pairs of typical New Forest *Meliloti* in copula, in good condition, and from these he got eggs, which in 1875 produced eight equally typical and unmistakable *Trifolii*. One larva also that hibernated for a second time produced in 1876 *Trifolii*. This last specimen, as well as all the parents and six out of the eight specimens bred in 1875, my brother has still in his cabinet, the remaining two being in the respective cabinets of Mr. H. Vaughan and myself. No specimen in the slightest degree resembling *Meliloti* was bred.

A full account of these bred specimens will be found in the "Entomologist," Vol. 8., p. 211, and in the "Proceedings of the Entomological Society of London" for 1875. Until Mr. Tugwell, or some other reliable entomologist, from eggs laid by New Forest *Meliloti*, breeds *Meliloti*—if this be possible, I think that it must be taken as settled, that New Forest *Meliloti* are but a degenerate local form of *Trifolii*. Whether they are identical with *Meliloti*, Esper, I am inclined to doubt, but if they are not, I quite agree with Mr. Tugwell, that this form should have a name, and with my brother's consent have provisionally named it *Z. trifolii* var. *Ytenensis*, from Ytene the ancient name of the district in which the New Forest is situated.

As regards the question whether the parent moths of these specimens could have paired with typical *Trifolii* previously, I would point out that it is almost beyond the bounds of reasonable probability that this should have been the case with four pairs, and I have only met with one entomologist who even suggests the idea, but, as it had been suggested, it was alluded to in the paper referred to. It is very questionable whether any moths except those that have the power of "calling" very strongly developed, pair more than once.

The probable cause of this degenerate form of *Trifolii* I must defer till a future note.—C. A. BRIGGS, 55, Lincoln's Inn Fields.

NOTES AND OBSERVATIONS.

A MOUSE IN A HEDGE SPARROW'S NEST.—The other day, as I was walking along the leafless hedges, I saw an old hedge sparrow's nest. Thinking there was nothing in it, I put my stick through it, when, much to my surprise, out jumped a mouse, and sat on one of the larger branches watching me, its little breast heaving with excitement. It remained motionless, till, thinking I could catch it, I made a step forward, but before I could stretch out my hand it ran down the branches, and disappeared among the grass and herbage at the bottom of the hedge. I then examined the nest, and found it had covered the top over, and evidently had intended using it as a dwelling place. I repaired the damage I had done as well as I could, hoping it would return to its rather curious resting place. The nest would be about five feet from the ground. Is it at all a common occurrence for a mouse to utilize a bird's nest in this way?—A. ADIE DALGLISH, Glasgow.

STURGEON AT HARTLEPOOL.—A fine Sturgeon was brought to the Fish Quay, Hartlepool, on Wednesday, Feb. 29th. It measured 7ft. 4in. in length, and weighed over 8 stone. It was bought for £3 5s. by a local fishmonger and sent to Darlington.—JOHN E. ROBSON, Hartlepool.

DISPAR IN THE NEW FOREST.—Referring to Mr. A. E. Hall's communication in the current issue of the *Young Naturalist*, I may state that whilst staying in the New Forest, during the summer of 1886, I liberated a considerable number of *Liparis dispar*, all perfect insects, male and female. It would be unwise to positively affirm that this circumstance and the capture recorded by Mr. Hall has the relationship of cause and effect, but very naturally I suspect this to be the case. I may add that in 1887, I again released the greater portion of a large brood of both sexes, and in due time I hope to hear something of their progeny. I am informed that *Dispar* is

frequently found in market gardens, the ova having been imported with shrubs from the continent.—C. H. WATSON, 4, Auckland Villas, Gipsy Road, West Norwood, S.E.

BRITISH (?) SPECIES.—Latterly, very large quantities of foreign pupæ have been imported to this country. I hear that from a German source *Alchemista* and others were sent over a year ago, and of course the species was soon found in several localities. *Conspicularis* also has been crossing the channel; we hear that 13 fine specimens were taken last Saturday, in the neighbourhood of Richmond. Poor things! they only came out a couple of months too soon, no doubt the genial climate of a greenhouse had something to do with it.—JOHN HENDERSON, Herne Hill, S.E.

CAPTURES AT RICHMOND PARK.—On the 4th March, I took half-a-dozen *Leucophearia* and one male *Pilosaria* on trunks of trees in Richmond Park. The day was intensely cold.—J. HENDERSON, Herne Hill.

HYBERNIA PROGEMMARIA IN SCOTLAND.—On 25th February, I took two specimens of *Hybernia progemmaria* on an oak tree, and another on a wall at Cathcart. Then the weather was fine, and the daisy and coltsfoot were in full bloom; now the weather has taken a turn for the worse.—A. ADIE DAGLISH, Glasgow, 3rd March.

GNATS AND FLIES.—Among the many annoyances that beset the path of the entomologist, the plague of flies that so persistently follow him in woods and shady places in the hotter days of summer, and the gnats and midges that bite so persistently as the shades of evening fall. The flies will alight on his hat and coat, failing to find rest on his face or neck, and annoy more by their perpetual buzzing and flying about his eyes than by any actual biting. Of course, there are some bloodthirsty demons that insert their lancets into the flesh whenever and wherever they have a chance, but these are few in number, and meet with their fate at once, and do not bother the collector as do the swarms of flies constantly swarming about his face. Gnats like the back of the neck or the forehead, and will raise large lumps on some unfortunate victims. Entomologists have always desired to adopt the rule obtaining in some establishments—"followers not allowed," and various means have been tried to keep them off. Tobacco smoke is partly effective, but the collector cannot bother with his pipe constantly in his mouth, and may not smoke. The late John Sang was in the habit of using oil of cloves, largely diluted with water, and rubbed over the exposed portions. Mr. Gregson recommends albo-carbon finely powdered, and rubbed in freely. If any of our readers have other remedies, we shall be glad to hear of them and give them publicity.

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ENTOMOLOGICAL NOMENCLATURE.*

By JOHN E. ROBSON.

(Concluded from page 70.)

The larger catalogue of Dr. Staudinger was published in January, 1871, and is the most complete list of the lepidoptera of Europe that has yet been issued. The species standing first in this important work is

Papilio Sinon, Poda, 1761,

a then newly unearthed name for our old friend *Podalirius*. This insect stood in our lists by its well known name on the authority of Linnæus, who named this species and its-brother *Machaon* from the two sons of Æsculapius. It appears to have been assumed that the name was given first in the 12th edition of the *Systema Naturæ*. But it had been called *Podalirius* in the second edition of the Fauna of Sweden also by Linnæus, and published in 1764. Nicole Poda in 1761 had named it *Sinon*, and Dr. Staudinger appears to have been satisfied with this discovery, and altered the name without more enquiry. It, therefore, stands conspicuously first as an illustration of errors of this class. In the first edition of the Fauna of Sweden, published in 1761 (the same date as the work of Poda) it was called *Podalirius* and this ought to have been sufficient reason for not altering the name. But in the more important 10th edition of the *Systema Naturæ* (the first in which lepidoptera were included), published in 1758, the well known name was given, so that it had three years precedence of the *Sinon* of Poda. To make the blunder less excusable, both these works are quoted by Staudinger over and over again, and are marked in his list of authorities as being in his own library.

Mr. Kirby's Catalogue of the "Butterflies of the World" was also published in 1871, with supplements at later dates. In the first portion, we find the commoner of our Clouded yellows, called

Croceus, Fourcroy, 1785.

*Read before the Lancashire and Cheshire Entomological Society, Liverpool, Feb. 27th, 1888, and published by request.

This had always been known as the *Edusa* of Fabricius. In all the lists I have seen, the name has been given as taken from the *Mantissa Insectorum* of that author, published in 1787. Mr. Kirby, in his investigations, found the work of Fourcroy on "The Entomology of Paris," and in it this butterfly was called *Croceus*. Believing this to have priority, he adopted it in his work as the name by which the insect ought to be known. The work of Fourcroy is so little known that Dr. Staudinger had not heard of it, and it is not enumerated in the lengthy list of entomological books given in his larger catalogue. No writer during the hundred years that have passed since it was published appears to have heard of it, for it is never quoted or referred to. Yet it was seriously proposed to abandon the name of *Edusa* which was in universal use, for one given by an utterly obscure author, to whose work no one could have the opportunity to refer. Could such a change be made in the interests of science? Ought the law of priority to apply in such a case? And after all Kirby made a mistake, and the name given by Fabricius stands. Fourcroy's work might have precedence over the *Mantissa Insectorum* of 1787, but in the *Genera Insectorum* of the same author, published in 1776, the insect was described for the first time and named *Edusa*. This error of Mr. Kirby's was not known till recently, and the correct nomenclature was first pointed out by Mr. C. W. Dale, of Glanvilles Wootton, who has a copy of the *Genera Insectorum* of Fabricius of 1776, formerly belonging to Dr. Solander, and in which he found it described and named. The correction of the synonymy therefore should not be from

Edusa, Fab., 1787, to
Croceus, Fourcroy, 1785,

but to

Edusa, Fab., 1776,
Croceus, Fourcroy, 1785.

The point to be made by these errors is that even the most careful investigators err from incomplete knowledge, and that we may yet find many others of the proposed alterations of nomenclature are equally incorrect when we know more about them.

I have spoken as though the priority rule of the British Association ought not to be too strictly interpreted. Do not think I am thus setting up my own opinion against the collective wisdom of which I have expressed approval. It has been held before now that the rule was only intended to apply where common consent was wanting. When there was universal agreement as to name, no rule was needed. Only when difference of opinion obtained, was an authority required to settle the matter; then the rule would apply. But another decision of the British Association shows that the priority rule was not

always to be insisted on, for it was agreed that when the sexes of a species had been separately described, the name of the male should be adopted. This has been very generally adhered to, but Mr. Kirby is not always guided by it. It is well known that the sexes of the common Meadow Brown were described by Linnæus as distinct species, and in his work on the Swedish Fauna the female is numbered 1052 and called *Jurtina*, while the male is 1053 *Janira*. Apart from the rule giving precedence to the name of the male, it is surely going too far to propose to alter a well established name like *Janira*, for that of opposite sex, merely because it stands above it in the arrangement, both being even on the same page. If the law of priority is to lead to such as this, it is time to abandon it.

Another fertile source of error is the practice some authors have, of giving what is known as a manuscript name, as being of equal authority to one published with a description. There is so very much copying from one to another without any attempt to verify the extracts, that after such a name has passed through a few works it is most difficult to trace it to its source. In Dr. Staudinger's catalogue of the Pyralidina you will find

"No. 699, *Cinerosella*, Zeller.

Artemisiella, Stainton's Manual, Vol. 2, p. 173."

Now, Stainton's Manual does not profess to give descriptions of new species, it is clear therefore the reference to this work is an error. In Doubleday's list the name stands

"*Artemisiella*, Stephens."

A reference to the work of Stephens makes matters no clearer, for the insect was not known when it was published. When I was working at the synonymy of this group for the second part of my list I was greatly bewildered over this, and for a long time could get no light. At last I wrote Mr. Stainton and he was able to clear it up. Staudinger's reference of course was a mistake, and in my opinion the reference to Stephens was equally wrong. The facts are these. Stephens appear to have been the first to have the insect in this country, and believed it to have been undescribed. In communicating it to Mr. Stainton he suggested the name *Artemisiella* as an appropriate one. Mr. Stainton described the insect in the "Transactions of the Entomological Society," and in doing so, being desirous to recognize his friend's claims, he called it

"*Myelois Artemisiella*, Steph., MSS."

Mr. Stephens prepared a catalogue of the Crambidae and Knothorns for the British Museum, and the species stands as "*Myelois Artemisiella*, Steph., MSS., Stainton, Proc. Ent. Soc., 1850, p. 6, and Cat. Tin. Sup. 2, 1851." A full reference like this is intelligible enough even with an authority in

MSS., but while there may be some propriety in honouring the first discoverer of a new species, I can see none in giving such honour to one who merely suggested a name for it. In any case the interest of Science should have the prior consideration. It was subsequently found that Zellers name had priority and *Artemisiella* falls into the second place, but the puzzle remains as before. A hundred years hence, the resurrection men of that time will have a nice little riddle to solve.

Copying without verification leads to many an error, and they pass from one to another till it is hard to say where the mistake arose. In Mr. South's list, the hybrid between *S. populi* and *ocellatus* is called

“*Hybridus*, Westwood.”

I am not aware that Westwood ever suggested such a name. It is certainly not to be found in his well known work, though a figure of the hybrid is given there. The error has apparently been caused in this way. When Dr. Staudinger gives a name in his catalogue that has not been given before, he does not add any initials or contraction, leaving it to be understood that when these are wanting it is then named for the first time, and there generally follows a brief description. In this case while he is naming the hybrid himself, he gives a reference to the figure in Westwood's work. Mr. South would appear to have copied this reference to the figure, as though it were an authority for the name. It ought to be

Hybridus, Staud. Cat.

Having pointed out errors in the leading catalogues, I will leave my own more humble list for others to pick holes in. It only pretended to be a list of names in use here, with the authority for those preferred by others. From it any one can form their own opinion as to which should be adopted.

But I must not conclude without making some suggestions as to how we might to obtain that uniformity in nomenclature we all pretend to desire. This cannot be had without every one making some concessions to others, and for my part I care little what is conceded if only uniformity can be attained. I have already given reasons why the revised work of Linnæus should be taken as the starting point, rather than the earlier and less perfect edition. The fact that fixing the date at 1767 rather than 1758 excludes the works of Poda, Scopoli, &c., which Mr. Kirby appears to think an argument in favour of the earlier date, is from my standpoint just the reverse. The more we can exclude the better. The earlier works on entomology are very imperfect both in description and figures, and whatever value they doubtless were then, their total rejection would not be of serious consequence now. A very bad figure of *Papilio machaon* would readily be recognized in a work on British butterflies, but more careful drawing would be needed before we

could distinguish the three Common Whites, and among the Wainscots and Quakers a much more accurate figure might be mistaken for a species it was not intended for. Among smaller species the need for accuracy is still greater, while for some of those still more minute, absolute perfection would be required. Even now this can only be attained at a cost that places such works beyond the reach of any but the wealthiest. A hundred years ago the difficulties attending their production was so much greater that the wonder is —not that they are no better, but that they are so good. But of even the best works of an earlier period some figures are quite unrecognizable, and of the others only the more conspicuous can be known with certainty. So with verbal descriptions. Word painting is much better now than then; colours are now carefully named, and the markings are better understood. Again, there is very little or no scientific gain by knowing that such and such an insect was first described in 1761 or 1751. The facts of their life history have generally been discovered since, or, if known before, they have been observed over and over again. Indeed, there is little in any of the older works that has not been better said since. But if we commence with the nomenclature of Linnæus, I do not see any objection to recognize those authors of an earlier date whose names were adopted by Linnæus. If the Linnæan name were taken from Scopoli, or Albin, or old Mouffet, or even Aristotle, or Adam, there is some propriety in acknowledging the fact. Or, if any species not named by Linnæus, but introduced by a subsequent writer by a name given by a pre-Linnæan author the rule might obtain, and thus full honour be given to those pioneers of our science. But it is of less importance that this be done, or that the 12th or 10th edition of the *Systema Naturæ* be our starting point, than that we come to some decision and that no more changes be made. Is it possible for this to be accomplished? I think so, and were I twenty years younger, I would not despair of bringing it about. How should it be set a going? The Entomological Society does not care to move, yet they above all others could give a movement of the sort the impetus it requires. Why should this Society not take the matter in hand? Greater movements than this have commenced in the larger provincial cities. A start once made, others would soon join. Many provincial societies are ready, and the City of London Society would probably be an active auxiliary. Communication with the Colonies and other countries is now so easy that in a very short time some progress might be made. Except with the European entomologists little difficulty would be experienced, and if these were approached in a spirit of mutual concession, and with a determination to agree and not to differ, difficulties would vanish as darkness vanishes before the dawn of a brighter day.

NATURE IN MAY.

By ALBERT H. WATERS, B.A.,

"The spring-time breaks all round about
 Waking from winter's night,
 The sunshine, like God's love pours down
 In floods of golden light.

"The flowers are strewn in field and copse,
 On the hill and on the plain,
 The soft air stirs in the tender leaves
 That clothe the trees again."

FRANCES JANE DOUGLAS.

The "Merry month of May" has come, and we feel now that nature has awakened fully from her winter's sleep; the trees are now no longer bare, but clothed once more with verdure. We see on every hand signs that spring is really here.

I will beg leave to take my readers with me on another imaginary country ramble; this time on a bright May morning. Even before we get away from the haunts of men we see how lovely the aspect of nature is at this time of the year. In suburban gardens are blooming pansies, wallflowers, and many others, which we have not time to notice with more than a passing glance. The daffodils which were so conspicuous last month with their yellow perianths have now gone off, but here and there we may see a white narcissus; the honeysuckle trained around yonder porch is beginning to bloom, and soon will be beautiful with its fragrant flowers.

Ha! we have started a bird as we walk along. We see at once it is a chaffinch, and doubtless has a nest in this hedge, out of which it has just flown. We will look. Yes, there it is right in the centre of the hedge, and we can see two or three greenish-blue eggs with reddish-brown dapplings and purple spots and blotches. The normal number of eggs is five, so it is evident they are not all laid. Notice how beautifully round and compact the nest is, and what a great variety of material is used in its construction, hay, moss, lichens, etc., while the inside is lined with horsehair.

But now we will turn into the wood. No need to ask what bird it is we hear singing so loudly, perched on yonder branch, it is the well known thrush or mavis, and who can listen unmoved to his inspiring notes. On a fine spring day, such as this one we are imagining, we hear him at his best; well might Sir Walter Scott's Forester, in "The Lady of the Lake," sing

"Merry it is in the good greenwood
 When the Mavis and the Merle are singing."

The song of the thrush is a perfect musical composition, but the range of

notes is less than that which the blackbird can accomplish. Nevertheless, its familiar melody is the most cheerful and exhilarating of all the woodland chantings; while the notes are so clear and flute-like that the woods positively resound with his song, as perched on one of the higher branches of a tree, he pours forth his varied and sonorous melody. Stop and look at him if you like for he is not a timid bird, and provided you move gently will let you get very near him, near enough at any rate to see what he is like. You will notice first his yellowish-brown breast, and flanks and sides of his neck of the same colour, and his greyish-white abdomen, and you see all his underparts thickly spotted with dark brown, and the sides of his face also spotted with smaller spots on a ground of the same colour as his breast; and then as he turns himself about you will see the very top of his head, his back and upper surface generally are of a brown hue.

Now he abruptly stops his song and turns his head sideways and away he goes in a slanting direction down to the ground. Has he become suspicious of your intentions? Wait a moment! No, he has caught sight of a big snail. See! he takes it in his beak and batters it on a stone and then flies up into the tree and disappears for a moment in the foliage. Now he begins his song again but soon stops, once more he is down on the ground, and now he is digging with his bill and tugging up a worm. Once more he ascends with the worm in his beak. Doubtless he has a nest close by. Let us watch him. Yes, there it is on that forked branch yonder—a large substantial affair. We will climb the tree and look at it, it is not far up. See! it is made of roots and mosses, and lined with dried cow-dung and sawdust. The eggs of the thrush you know are five in number, but in this particular nest they are hatched, and instead of eggs we see four gaping yellow beaks on little callow bodies, and one addled egg which we take the liberty of appropriating. No Mr. Throstle, and you Mrs. Throstle, who we see in the distance anxiously watching our proceedings, we will not hurt your darlings or deprive you of them. We have too much love for all creation, and especially for the feathered portion thereof, to occasion needless pain, mental or bodily, so we will leave you and your young brood in peace, and pray that you may escape the notice of mischievous urchins who will perhaps take your laboriously built nest and young ones and do as I once saw a young rascal do—stone the callow innocents to death in wanton cruelty.

I have never been able to satisfactorily ascertain, in what way the birds plaster the inside of the nest so very neatly and smoothly. Is it smoothed by the movements of the hen bird as she sits in the nest? If it be done with the beak, as some naturalists assert, it is truly wonderful. In whatever way it is done, the perfect way in which the inside of the nest is finished is really

marvellous, and we cannot but admire the instinct by which the work is accomplished. Some naturalists say the hen bird turns round and round in the nest when it is fresh plastered, and smooths the inside with her breast. This seems more credible than that the work should be accomplished by, apparently, so inefficient an implement as the birds beak.

The varieties I know of the eggs are (1) cærulean blue, with purplish black spots; (2) light blue, unspotted, or with very few spots; (3) bluish green, unspotted; (4) with a pinkish shade and black spots; (5) very rarely entirely white.

The thrush is a very restless and active bird, and is about from early morn to dewy eve. He is a very early riser; he is up and after the worms as soon as dawn begins, so Browne rightly surmises it must have been exceedingly early in the morning, if

"The Thristle had not been
Gathering worms upon the green,"

and yet he retires late to roost, for Burn's sings—

"The Mavis wild wi' many a note
Sings drowsy day to rest."

But we have not time to linger any longer, but must walk on.

"Cuckoo!" "Cuckoo!" we hear repeated at intervals from somewhere among the trees, and, although we cannot see him, yet the familiar sound of his voice informs us our old friend is back again from the warm southern region where he has spent the winter. Mrs. *Cuculus canoris* as you know, neither constructs a nest nor brings up her own progeny herself, but, having laid her egg, takes it in her beak and flies to the nearest hedge-sparrow's nest and deposits it, while the rightful owner of the nest is temporarily away. If no hedge-sparrow's nest happens just then to be available, she will not hesitate to place her egg in one belonging to a tit-lark or some other insectivorous bird. It seems curious that the bird thus imposed upon, should never throw the egg out again, but suffers it to remain and be hatched with her own, yet such is the case. The young cuckoo, however, soon after it is hatched, as if fearing lest the care of itself and her own progeny in addition, may prove too heavy a burden for its foster parent, considerably ejects the rightful occupants, every one, from the nest.

We like to hear the cuckoo, as it tells us summer is nigh at hand, nevertheless, we are bound to admit, it has its bad qualities. It is very fond of other bird's eggs, and I fear destroys no small numbers. Allusion to this is made in the well known rhyme—

"The cuckoo's a fine bird.
She sings as she flies;

She brings us good tidings,
 She tells us no lies.
 She sucks little birds' eggs
 To make her voice clear,
 And when she sings 'cuckoo'
 The summer is near."

Our ramble now has brought us to the river, and we notice that young moor-hens are hatched and swimming about with their mother. They are very amusing to watch, but we must pass on. There is a reed-warbler's nest in course of construction, we may easily recognize it by its pocket-like appearance. It is composed principally, we see, of dried grass.

Here is a rather large whitish moth with grey V-like markings across the wings resting on this willow tree. We recognize it as the puss moth (*Cerura vinula*), and it has evidently not long emerged from the chrysalis. Several other moths may be expected to appear now, as for instance *Cerura bicuspis* the rarest of the "Kitten" moths, the pebble prominent (*Notodonta ziczac*), the uncommon *N. chaonia*, and the *dodonæa* variety of *Notodonta trimacula*, the lesser swallow prominent moth (*N. dictæoides*), the rare and local *N. cucullina*, and the much sought after *N. trepida*; besides these, there are the chocolate tip moths *Clostera reclusa* and *curtula*.

These are only a very few of the moths appearing in May; many additional names will be found in the "Young Naturalist," Vol. VI., p. 99, and also in the number for May, 1886. See, here is a very pretty moth on another willow tree, its fore-wings are beautifully marked with variegated shades of brown, red; and grey, and there is a large black spot on each wing inside a buff coloured circle, outside of which, on the side nearest the base of the wing, is a crimson border, and next to this a crescent of a delicate violet colour. The hind-wings are orange, also with a similar ocellated spot on each. Well may such a beautiful insect be termed the Emperor moth.

You have noticed I have been collecting a large number of flowers as we walked along. Among the species I have found are *Polygonum avicula*, *Anthriscus vulgaris*, *Tamus communis*, *Symphytum officinale*, *Hieracium pilosella*, *Ranunculus heterophyllus*, *Stellaria uliginosa*, *Euonymus europæus*, *Medicago lupulina*, *Hippuris vulgaris*, *Veronica serpyllifolia*, *Malva rotundifolia*, *Geranium dissectum*, *Ononis arvensis*, and *Anthyllis vulneraria*. I have found many others in May besides these.

The ash will be pretty sure to be leafing by the end of the first week in the month. At the end of the month the horse-chestnut and lilac will be flowering, and about the same time we may expect to see the wild roses in bloom. The maple will flower somewhat earlier than this.

If we take a country ramble about the middle of the month, or a few days

subsequently, we shall, in all probability, see some pretty birds with delicate brown backs and white breasts longitudinally streaked with dark brown and with a patch of light brown across the upper parts. We should have no difficulty in recognizing them as Spotted Flycatchers. At the end of the month the Red-backed Shrike or butcher bird appears and immediately commences nest building.

Cambridge.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

April 4th, 1888.—Dr. DAVID SHARP, F.L.S., President, in the chair.

The Rev. J. H. Hodson, B.A., of Torquay, Devon; Mr. A. J. Croker, of New Cross, S.E.; Mr. G. C. Griffith, of Cotham, Bristol; and Mr. Albert H. Jones, of Eltham, Kent, were elected Fellows.

Mr. H. Goss exhibited a large number of insects lately received from Baron Ferdinand von Mueller, K.C.M.G., F.R.S., of Melbourne, which had been collected by Mr. Sayer on Mount Obree and the adjoining ranges in New Guinea, during Mr. Cuthbertson's recent expedition there under the direction of the Royal Geographical Society of Australia. The collection comprised about 240 species of Coleoptera, 150 species of Lepidoptera, 48 species of Hemiptera, and a few species of Diptera, Hymenoptera, and Orthoptera. The Lepidoptera included twenty species of butterflies belonging to the genera *Calliplæa*, *Chanapa*, *Hamadryas*, *Melanitis*, *Mycalesis*, *Hypocysta*, *Tenaris*, *Hypolimnas*, *Cyrestis*, *Neptis*, *Acræa*, *Danais*, *Pithicops*, *Appias*, *Ornithoptera*, *Eurycus*, &c.

Mr. Osbert Salvin, F.R.S., exhibited, and made remarks on, about sixty specimens—no two of which were alike—of a species of butterfly belonging to the genus *Hypolimnas*, all of which had been caught by Mr. Woodford near Suva, Viti-Levu, Fiji, on one patch of Zinnias.

Mr. H. T. Stainton, F.R.S., exhibited, on behalf of Mr. G. C. Bignell, cases of *Thyridopteryx ephemeraformis*, Haworth, collected near Charleston, U.S.A. Mr. Stainton said he hoped Mr. Bignell would not introduce this pest into England.

Mr. W. F. Kirby exhibited, and read notes on, about twenty species of South African dragonflies lately received from Mr. Roland Trimen, F.R.S., of Cape Town. Mr. Kirby said the collection included some new species.

Mr. A. Sich exhibited a bred specimen of a variety of *Plusia gamma*.

Mr. Goss read a letter from Mr. Bignell, correcting a statement made by

Mr Poulton at the March meeting of the Society, to the effect that the variety *Valezina* of the female of *Argynnis paphia* did not occur in Devonshire. Mr. Bignell said that the var. *Valezina* was included in Mr. Reading's 'Catalogue of Devonshire Lepidoptera'; and further that he had himself taken specimens of this variety in Bickleigh Vale, Devon.

Mr. Waterhouse read a paper entitled "Additional Observations on the Tea-bugs (*Helopeltis*) of Java," and exhibited a number of specimens of these insects. He said that the species infesting the Cinchona in Java was supposed to have been introduced from Ceylon in tea, but that he had discovered that the species on the Tea and on Cinchona in Java were distinct, and that both species were distinct from *Helopeltis Antonii* of Ceylon.

Herr Jacoby read a paper entitled "New, or little known, species of Phytophagous Coleoptera from Africa and Madagascar."

A letter was read from Mr. E. C. Cotes, of the Indian Museum, Calcutta, asking for the assistance of British Entomologists in working out certain groups of Coleoptera, Neuroptera, Orthoptera, Diptera, and Hymenoptera in the Indian Museum. A discussion ensued, in which Mr. M'Lachlan, F.R.S., Dr. Sharp, Mr. Waterhouse, Herr Jacoby, and Mr. Distant took part.—
H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

Before going further we must rectify a mistake made in the last report sent, regarding the donation of crayon drawings of Sir J. Lubbock and Mr. Doubleday. These were drawn and presented by Mr. Fordham, not as stated in error by Mr. Lamplough. Having put this matter straight with apologies for the error, we can proceed with the ordinary report of our meetings for the past month; both have been well attended and many interesting exhibits have been on view.

April 5th, 1888.—The Vice-President in the chair. Mr. Hillman exhibited and presented to the Society an extraordinary large specimen of the ten-spined stickleback, which was the only occupant of a small pond dredged by him on one of his expeditions. Mr. Clark showed a melanic form of *P. phlaeus*. Mr. Hanes brought small living larvæ of *C. dominula* from the coast, and mentioned taking *B. parthenias* and *C. flavicornis* on Good Friday, at Tilgate. Mr. Lewcock had found the coleoptera plentiful at Rainham, chiefly *Bembidii* and *Anchomenus atratus*. Mr. Hillman gave a highly interesting paper, entitled "Two hours collecting of pond life," and illustrated his remarks with well preserved specimens of the species mentioned, some of which were very rare. At the close of the meeting several papers were announced.

April 19th.—The meeting was very numerously attended, it being the annual distribution night. A very large number of specimens were brought up for this purpose, and most of the members acquired some useful specimens. Among the exhibits must be mentioned a set of four eggs, three small ones of various sizes being contained in the larger one; also abnormal forms of the ordinary hazel nut and specimens of the gall of the ground ivy, these were both exhibited by Mr. Hillman, who kindly presented them to the Society, together with various shells and a skeleton of the head of the dormouse. Mr. Rance also gave a good selection of shells. Mr. Hollis exhibited a long series each of *S. illustraria* and *S. illunaria*, the latter being very fine.—J. RUSSELL and E. ANDERSON, Joint Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

March 22nd, 1888.—T. R. Billups, Esq., F.E.S., President, in the chair. Messrs. E. Knight, C. J. Montague, J. E. Lloyd, W. Roots, and R. Pierpoint were elected members.

Mr. R. South exhibited a specimen of *Polyommatus phlæas*, with ocellus on under surface of left wing, similar in character to the marginal ocelli on the under surface of anterior wings, and an example of *Papilio bianos*, with a patch of the colour and ornamentation proper to under surface of hind-wings on the under surface of the right fore-wing. The *Polyommatus* was captured by Mr. South in North Devon, in 1881, and the *Papilio* by Mr. Leach's collector in China, in 1887. Mr. Tutt, specimens of *Leucania pudorina*, taken by Mr. W. Farren, of Cambridge, one closely resembling Hubner's gray type, one the variety *striata* of Staudinger, one resembling Hubner's figure of *pudorina*, the others being intermediate forms. Mr. White, preserved larvæ; also imagines of the genus *Acronycta*, for the purpose of exhibiting the difference of character in the larvæ and the close resemblance of the moths, which he stated was so strong in the well known instance of *A. tridens* and *A. psi*. Mr. White said he should be pleased to receive ova of any species of this genus, for the purpose of studying the affinity of the group, it would be interesting to ascertain if the larvæ varied in the different stages, and whether there was a much closer resemblance in the final stage. Mr. South remarked that in the earlier stages the larva of *A. psi* could not be separated from the larvæ of *A. tridens*. Mr J. Jenner Weir exhibited British and continental specimens *Anthocaris cardamines*, and remarked that he had observed for some years a difference between the latter so far as he had been able to examine them, and those captured by himself in Kent, Surrey, Sussex, and Hants, which had the orange spot on the upper wings reaching but

slightly beyond the discoidal black spot, the inner edge curving outwards, not extending beyond the first median nervule, thus leaving the hinder angle white; this disposition of marking he found perfectly constant in those captured. In the Continental specimens the orange spot extended considerably beyond the discoidal spot, and was continued to the inner edge of the wing, causing the hinder angle to be orange. The distinction pointed out was very small, but if it were constant our *A. cardamines* was an insular variety easily separable from continental specimens. Mr. B. Wadham exhibited a robin (*Erithacus rubecula*), having the plumage on the head a dull white; the specimen was found dead in his garden at Lewisham, in 1878, and a similar specimen was noticed two years later, and asked whether this was caused by age or variation. Mr. Weir said it was undoubtedly a variety, and Mr. Frohawk thought the bird was a young one. Mr. Tutt read a paper "The Morphology and Physiology of an Insect," which was followed by discussion.

April 12th.—The President in the chair. Mr. Slater exhibited a *Bombyx* from Zululand, which he said approached nearest to *Bombyx oubie* taken by M. Guerin in South Abyssinia, and might be a local variety of that insect, if not it was a new species. Mr. J. Lee varieties of *Teniocampa munda*, light specimens without the twin black spots. Mr. Henderson, forms of *Satyrus semele* and *Cucullia verbasci* from various localities with a view of illustrating the local variation of the species. Mr. Adkin, bred specimens of *Clostera anachoreta*, from Saltwood. Mr. J. T. Carrington thought that the species was no doubt introduced to this country with the balsam poplar, and gave many instances which he had met with of various species being introduced by the importation of plants. Mr. Tugwell, grey and black forms of both sexes of *Nyssia hispidaria*, which he stated were all bred from one batch of eggs, there was, however, very little variation in the larvæ. Mr. J. Jenner Weir, specimens of *Pieris brassicæ* from St. Petersburg (lat. 60°), Lewes and Blackheath (between lat. 50° and 52°), Hyres (lat. 43°), and remarked that the species did not differ from places so remote either in marking or in size. Mr. T. R. Billups, a living specimen of the genus *Aspidimorpha*, which he said was an apparently new species, and was brought from Upper Burmah, amongst the roots of an orchid *Denbrobium brymeriarum*. The Secretary read a note from Mr. T. D. A. Cockerell, with reference to an exhibit of a new rose gall from Custer, Co. Colerado, which had been pronounced by Mr. L. O. Howard of the U.S. Department of Agriculture to be the product of an undescribed species (*Rhodites tuberculator*, Riley), specimens of which were contained in the collection of the Department. Mr. Jenner Weir exhibited a bloom of *Narcissus cyclaminous*, produced by a bulb collected in Spain, and remarked that the species had been described by Parkinson, in his "Paradi-

sus terrestris," in 1629, since which time it had been almost lost sight of, until Mr. Tait discovered it in Portugal, from which country Mr. Weir had also received it. Mr. Billups referred to the large number of hawfinches seen in the Forest of Dean, and read notes thereon.—H. W. BARKER, Hon. Sec.

CLYDESDALE NATURALISTS' SOCIETY.

The monthly meeting of this society was held on Wednesday, 18th April, in the society's rooms, 207, Bath Street, Glasgow. Mr. T. J. Henderson, President, in the chair. Mr. John Young, F.G.S., exhibited specimens of a New Zealand land shell (*Helix Busbyii*) and its eggs. Mr. Young stated that the specimens exhibited formed part of a collection of land and fresh-water shells collected in Australia and New Zealand by Mr. Thomas Steel, formerly of Greenock, and presented by him to the Hunterian Museum, along with other natural history objects. One of the specimens exhibited was found in a cave deposit, along with the remains of the now extinct Moa, or *Dinornis*. Mr. Robert Dunlop exhibited specimens of fossil plants, including *Sphenoptera*, and also a very fine specimen of a fresh-water crustacean (*Antrapaleamon Grossarti*) which he had found in the Airdrie district, in one of what he believed to be the finest collecting fields in the upper coal measures. Mr. Dunlop also showed a sample of saccharine which he had extracted from coal-tar, and which he stated was 320 times sweeter than ordinary sugar, although he doubted if it was soluble in the human system. Mr. T. J. Henderson exhibited a box containing some very fine specimens of the genus *Phoxopteryx*, regarding which he read a short paper giving the distribution, and describing the habits of each species, as well as noting the localities for such species as occurred in the district. He also showed some interesting lepidoptera, including a specimen of *T. subtusa*, taken by him at Titwood, in September, 1866, but which he finds is not recorded in either the "Scottish Naturalist" list, or "The Fauna of the West of Scotland," as being taken in the district. Mr. George Paterson showed a spiders nest which a friend had sent him from Australia, and which was of an unusually large size. Mr. John M. Campbell, F.R.S.G.S., exhibited a model of the egg of the great auk, *Alca impennis*, L., and also plates and maps illustrating the range within which this extinct bird was at one time found. Mr. C. B. Cross showed a large and well-preserved specimen of the death's head hawk moth (*A. atropos*), found in a church at Campsie in 1882. Mr. W. Hannan Watson exhibited a specimen of the palmate newt (*Palmatus molge*). Mr. Robert Mason, F.L.S., F.R.S.G.S., exhibited specimens of the two species of maple trees indigenous to this country, *Acer campestre* and *A. pseudo-platanus*,

showing an unusual and abnormal arrangement of the fruit. Mr. Mason also showed specimens of the leaves and flowers of the handsome maple tree which stood several years ago in Gilmorehill policies, and which, at the opening of University Avenue, was cut down as it stood in the middle of the roadway. It was known as the Corstorphine maple, and was removed in 1873. Mr. R. J. Bennett showed a piece of wood which formed part of a bookcase in a lawyer's office in town, and which, on being removed lately, was found to be completely riddled with the borings of some coleoptera, probably that species known as the death watch. The veneering outside seemed quite fresh, while the wood inside was almost destroyed. Strange to say, a third layer of wood which was inside the case was left untouched, probably owing to its being of another kind.—JOHN MACKAY, Hon. Sec.

THE NEW FOREST ZYGÆNA MELILOTI.

By W. H. TUGWELL.

I fear my friend, Mr. Briggs, will think I am hard to convince after his statements in the *Young Naturalist*, p.p. 82-3, because I still cling to the opinion that *Z. meliloti* is a good species; and by that I mean that in a state of nature it reproduces, *inter se*, fertile offspring like the parents, having characters sufficiently developed to differentiate from any other of the same genus.

In the first place, no one will doubt but that *Meliloti* in the New Forest does, or at least did, produce, year after year, succeeding generations of what the most eminent of British lepidopterists (the late Mr. H. Doubleday) most emphatically pronounced a good species. In a letter of his now before me, dated July 31st, 1873, Mr. Doubleday says "This species is *very distinct* from *trifolii*, being so much slenderer, and the wings more transparent," &c. This opinion has been universally accepted by English lepidopterists.

I will now refer to what Mr. T. H. Briggs himself remarks (as published in the "Extract of Proceedings of the Entomological Society, 1875"). "In 1872 and 1873 I reared young larvæ of *Z. meliloti* from the New Forest, up to and through hybernation, but they died in the spring; and *these larvæ, from the minuteness of the markings on the ground colour, showed a great distinction from the young larvæ of Z. trifolii* of the same age"; and then Mr. Briggs goes on to state "In 1874, I captured four typical pairs of *Z. meliloti* in copûla, and the eggs were (in all cases) *larger than the egg of Z. trifolii*—a peculiarity I had remarked in previous years." From these ova Mr. Briggs had over 300 larvæ, and from which he ultimately obtained nine

pupæ, and reared nine moths "of the full coloured specimens of the small *trifolii*, found in company with *meliloti*." From these facts Mr. Briggs says, "the following questions suggest themselves:—First, Is the New Forest a separate species or a dwarfed form of *Z. trifolii*? Secondly, If a dwarfed form, did the additional heat of the greenhouse aid in developing it? Third, If a separate species, can these specimens have paired with *Z. trifolii* previously?"

The questions Mr. Briggs does not answer, so that evidently he was not quite certain of having settled the business at that time, and so far as I know he has not continued his experiments. Now is it not very curious—first, that the ova are in all cases larger; second, that the young larvæ are different; third, that the wild moth is abundantly distinct from *trifolii*. And do not these facts point to a possible error or flaw in Mr. Briggs' breeding pedigree? Nothing is more easy than to accidentally introduce ova of other species, or even young larvæ, with the food provided for our foster children; it has occurred to every one who has done much breeding. I am quite certain that Mr. Briggs was careful on this point, but the best scientist may draw an erroneous conclusion from a slight oversight; possibly Mr. Briggs may have had *Trifolii* larvæ at the same time for comparison. It does seem to me more than strange that not one of Mr. Briggs' bred *Zygæne* should have resembled the typical parents, as in nature it was abundantly proved that *Meliloti* produced *Meliloti*, not in twenties, but by thousands that were captured in 1872,-3,-4,-5,-6, and it has been this continual working that has exhausted the locality, as it was a sluggish insect and most easily taken, and not from the district changing, that it is not found there now. Mr. Robson asks if I knew the Forest before the making of the railway, No, I did not, and I much doubt if any collecting was done there prior to that: it was this railway that opened up the New Forest to naturalists. But it must be apparent to any one that has travelled along this railway, and walked through the country, that the very slight cuttings—and these only for short distances—of this railway have made no appreciable difference to the plant life of the place. From Lyndhurst Road to Brockenhurst the country is for the most part flat, with heathy boggy places for miles, the cotton grass *Eriophorus angustifolium* and *vaginatum*, with *Myrica gale*, in profusion, clearly showing that it is not a drained district; for on all sides vegetation is varied and luxuriant, nothing to induce a starved condition of either plant or animal life; and no one believes in the voluntary starvation of an insect. They do not go under Banting, or take Anti-fat.

I may mention in conclusion that only on one occasion did I find a larvæ of *Meliloti*, it was full-fed, but unfortunately ichneumoned. It was very

markedly different to any of the genus I had seen before, and another striking fact was that although I spent hours searching for a pupa of *Meliloti* I have never seen one. I have found the insect with wings unexpanded, but never could find a cocoon. On this point I wrote Mr. Doubleday, and his answer now before me, is "I think the larvæ of *Meliloti* probably spin their cocoons close to the surface of the ground like those of *Minos*." Be this as it may, I have never yet seen a cocoon of this species, although I could find any number of the cocoons of *Z. trifolii* in the Isle of Wight. With such marked difference of ova, young larvæ, pupation, and perfect insect, I still hold that *Z. meliloti* of the New Forest is a good species. I have submitted the antennæ of *Meliloti* and *Trifolii* to a microscopic examination— $\frac{2}{3}$ object glass and B eye-piece—I find there is a considerable difference. *Meliloti* antennæ of male is one-fifth shorter than the smallest *Trifolii* male I have, and the thickening of the club is less sharp, and the end or tip more blunt: *i.e.* *Trifolii* is more decidedly clubbed, with the extreme tip more produced or pointed.

A VISIT TO LIVERPOOL.

By JOHN E. ROBSON.

I had long promised myself a visit to Liverpool, and an examination of some of the collections there, and after numerous postponements from the difficulty I find in leaving home, it was definitely fixed at last, as I had undertaken to read a paper on "Nomenclature," before the Lancashire and Cheshire Entomological Society," at the request of its president, S. J. Capper, Esq., of Huyton Park. Leaving here on Saturday morning, February 25th, I reached Mr. Gregson's abode about five o'clock, and after partaking of refreshment, I went to work at once to examine his collection. As great interest is manifested in varieties, in which Mr. Gregson is particularly rich, I propose to give a brief account of some of those in his collection. Mr. Gregson, however, has not confined himself to lepidoptera. He has a good collection of British birds, all preserved and mostly shot by himself, a good collection of birds' eggs, another of shells, another of seaweeds, and I don't know how many more. A telescope stood in his window in a favourable position for observation. A short-tailed eagle in fine plumage, croaked its welcome as we came up the garden. Other birds made themselves heard from the aviary, while indoors, corals, shells, and the thousand and one knick-nacks about, all spoke of it being the home of a naturalist, and one of considerable taste.

Mr. Gregson's collection of lepidoptera is very much the largest I have had opportunity to examine, and is wonderfully rich in varieties. Mr. Gregson has studied the question of variation from a standpoint of his own. He believes that variation depends not so much upon latitude or altitude as upon the food, but he is of opinion that the effect produced by the food depends upon the geological formation from which the plant draws its nutriment. Mr. Gregson himself, though over 70 years of age, is younger in appearance than many a man of 50, and looks as though he had a good score of years before him yet. He knows every insect in his cabinet without referring to the label on the pin, and many an interesting story was told in connection with one or other of the specimens.

His series of some species fills an entire drawer, *Caja* for instance, of which he has some wonderful forms, impossible to be described in words. Mr. Capper, however, whose large and very complete collection I also had the pleasure to examine, contains the grandest variety of this species I have yet seen. With the exception of a black spot at the discoidal cell, this splendid tiger is entirely cream-coloured. Of *Grossulariata*, Mr. Gregson has two drawers containing many hundreds of specimens, and including nearly every conceivable variation. But it is not of these variable species I desire to speak, but rather of such as are generally constant to the type, and in which well marked departures are of greater interest, though perhaps of less value than these protean forms. To the Noctuæ he appears to have given most attention. He breeds nearly every year such species as *Agrotis Ashworthii*, *Dianthacia casia*, *Polia flavicincta*, and *Luperina Barrettii*, of all of which he has long rows. To many of his varieties he has given names, and if he will excuse me saying so, he has got into a bad habit of using his variety names in his notes for publication, as though they had been described and named already. He has suggested a solution of the difficulty of naming a variety that is not constant, by using the plural termination to the name, that is perhaps as good a way of meeting the difficulty as any. In the following notes therefore, when any of Mr. Gregson's names are used, terminates in a diphthong, it is to be understood that the variety itself varies, but is still sufficiently distinct to be named. I cannot say I agreed with all his conclusions, nor does his theory as to variation depending upon the geological formation on which the food plant had grown appear sound at first sight, but I must acknowledge I have not studied the question. Mr. Gregson's fine and very variable series of *Teniocampa opima* for instance, taken on the Cheshire sand hills are variable enough without change either of food or station, but do not differ materially except in extent with my own series, which are partly bred from the egg and partly captured here. But if my

notes are to be of any value, they must be given in some sort of order. I will therefore begin with his favourite group the Noctuæ.

CYMATOPHORA DUPLARIS.—He has the var. *Nubilata* with four bands as well as three, a lovely and striking form.

C. FLAVICORNIS.—Six very dark specimens with black bodies are marked var. *Scotica*?

C. RIDENS.—He has all the forms named by Mr. Tutt, but not one like the figure in Newman.

BRYOPHILA.—He has grand series of all the species, including all those named by Mr. Tutt, and several others, some even more distinct. He has not named any of these forms as they all run into each other without a break.

DIPHTHERA ARION.—Those of his series of this species is very fine, there was no specimen sufficiently distinct to be called *Runica*, nor have I ever seen one to warrant Newman's suggestion of there being two species.

ACRONYCTA PSI and TRIDENS.—Mr. Gregson pays great attention to the hind-wings of Noctuæ, and professes to distinguish closely allied species by these alone. *Psi* he points out, has the nervures of the hind-wing much more distinct than *Tridens*.

LUPERINA GUENIL.—I cannot believe this to be anything but a pale form of *Testacea*. I marked in my catalogue that only three were known. Mr. Gregson possesses six, that seem to be as good as any. I certainly have never taken it so pale here, but our specimens run dark, sometimes very dark.

MAMESTRA BRASSICA.—Two specimens in this collection are the finest I have seen. Large in size, very dark, with the outline of the stigmata and a very broad subterminal line perfectly white. They are grand.

APAMEA BASILINEA.—An unusually pale specimen of this not very variable insect is noticeable.

(To be continued.)

NOTES AND OBSERVATIONS.

LEPIDOPTERA IN MARCH.—On Saturday afternoon, March 10th, a glorious day, I went to Ecclesall Wood near here, to try and take *Hispidaria* which used formerly to occur there abundantly, but I never saw a specimen. I took however, 5 *C. flavicornis*, 20 *P. pilosaria*, 3 *H. progemmaria*, 7 *H. leucopharia*, 5 *A. æscularia*, and 10 micrós (as yet undetermined), 50 specimens in all, which I considered to be good work in an hour and a half at this time

of the year and so near dirty Sheffield.—A. E. HALL, Norbury, Pitsmoor, Sheffield.

NOTE ON A SEEMINGLY PERMANENT VARIETY OF *EUPITHECIA TÆNIATA*, H, VAR. *CINERÆ*, MIHE.—In September, 1887, Mr. CURZON shewed me a series of an *Eupithecia* he had taken in Morayshire, so unlike any *Eupithecia* I recollected at the moment that I asked him to let me see them again when my mind was at peace (the sight of all his season's captures of interesting and variably forms not tending that way), in response to my request, he gave me two from the seven (?) specimens taken, and these I have since carefully examined and find they are very large cinereous specimens of *E. tæniata*, H. As all the specimens were large and cinereous in colour, the usual striæ hardly perceptible as compared with the bright slightly rufous-ochry colour and markings of our more southern specimen, I have named them var. *Cineræ*.—C. S. GREGSON.

BIGAMY IN BIRDS.—Now is the great time for studying the breeding habits of birds, and I should like to call the attention of the readers of the *Young Naturalist* to the question—Which of our birds are habitually bigamous? All ornithologists are agreed that many species, especially in the Gallinacei, are polygamous in a state of nature; but few persons seem to have taken note of the bigamous habits of many species. I have seen it stoutly denied that any birds are in the habit of having two mates at once, but with this statement I would join issue. My attention was called to the subject this morning, by seeing three jackdaws flying round the spire of one of the churches in this town. Each bird had building material in its mouth, and all entered the same hole in the spire. I watched for some time and they all came out and flew off together. Now jackdaws are far from common in the middle of Bolton, it seems to me that these three form one household. Some years ago when I was living at Cheadle Hulme, Cheshire, I could see from my bed-room window a hole under the eaves of a stable, where every spring there was a starling's nest, and to this nest there were always two hens and one cock. I have noticed the same thing among swallows and martins; and among the lapwings it seems to be quite the general rule to have two hens to a nest. The cry of the lapwing in the breeding season, is quite different from that of females, being longer, and consisting of the syllables, "pee-oo-weet-a-weet, pee-oo-weet"; and I think that if any one will take the trouble to notice these birds they will see that they go in threes, one of the three having this long cry. I believe the reed-bunting is also bigamous, and the rook sometimes. I should be glad to hear the opinion of others on this matter.—H. H. CORBETT, Derby Street, Bolton.

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ENTOMOLOGICAL NOMENCLATURE.

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

I DARE say there are many lepidopterists who, like myself, have lately been obliged, so to speak, to become interested in nomenclature. Until lepidopterists were rudely lifted from the depths of their previous security by the publication of Mr. South's list, many of the younger school were in a great measure, I suppose, hardly aware what the mazes of synonymy were like. Just previous to the publication of this list, I had, however, commenced exchanging with Continental lepidopterists, and it was marvellous to me, how, whilst we were continually hearing of the fact that the Doubleday list had brought us years before into unison with Continental nomenclature, so many of our names were entirely different to those in common use on the Continent. I found myself thrown on Drs. Staudinger and Wocke's Catalogue, and I soon became involved in a mass of work which it was impossible to cast aside. I was too English not to be dissatisfied with the book at first, but I very soon found myself using it continually for my own work. When Mr. South's list appeared I was greatly interested in the matter, and was so far satisfied that he had adopted Staudinger and Wocke's magnificent work as a basis for his list, but wondered why, if we were to have an innovation in this direction, we did not "go the whole hog or none" in the matter. All our synonymists are agreed on one point, and that is, that uniformity is the great requisite, and yet each and every one aims at obtaining uniformity by producing a list different to every previously published one, and so the matter goes on, and I leave the readers of this journal to work out the following problem: When and how shall we get uniformity under existing circumstances?

I believe every one is agreed that Staudinger and Wocke's Catalogue is the finest thing of the kind ever published. Errors, of course, there are, but what are they as a rule, compared with those of the French system, on which our previous lists were based? To return a little. Our previous lists were

based on, and followed the arrangement and nomenclature of Guenée, but Guenée's nomenclature is open to most serious objections. Take for example one instance, the principle of which is repeated throughout his works again and again. *Leucania impura*.—Guenée states that the nomenclator of *L. impura* is Albin. Now how does the matter really stand? The figuring and descriptions of Albin's works are without names. How then can any name stand on his authority? Albin figured in 1720 a moth without a name, giving its life history and a description of the moth. Some fifty years afterwards Hübner figured the same moth under the name of *impura*. Yet, Guenée says the species is *impura*, Albin. I suppose Albin never had such a name pass through his mind; yet the French system based on Guenée's work is full of such synonymy. Dr. Staudinger had all the work of previous synonymists to begin with and to profit by, and as a result produced a magnificent work which we all know, and the more I compare the two systems, the more certain do I feel, that Dr. Staudinger's arrangement is far ahead of any other. Advancement is apt to be looked upon—especially by older men—as unnecessary innovation, and as such is sure to be treated, until they become accustomed to the change. The great point to my mind, and the only one in favour of Mr. South's list is, that by following Staudinger and Wocke's Catalogue in its chief points, he has brought us one step nearer the desired uniformity we all pretend to desire. The great fault is that he has not followed it in detail and brought about the desired result at once. Why do we want to keep on in our narrow insular fashion, perpetuating an old list, which has served its turn well, and which is different to that used by scientific men in almost every other country? The fact is that all our advanced lepidopterists use Staudinger's list for their Continental work, and then with characteristic English prejudice have a separate one for their British collections.

Why should we not use this list as the basis of arriving at some satisfactory conclusion? What comparison can be made between our own miserable, little, synonymic (so-called) lists, and this work; and yet one has correspondents writing "Please use 'The Entomologist' list!" "Please use the Doubleday list!" and so on. Is this multiplication of little lists bringing about uniformity? And yet the compilers of all our lists plume themselves on their wish to bring about this much desired result. If we want uniformity we can get it. Let the responsible editors of our journals sink their personality, accept the generally used Staudinger Catalogue as their basis, and where there is a vital error in this list, strive to get it altered. Would the editors do this? In other words—Would it pay to do this? That is the rub! If the journals adopted a uniform system of synonymy the matter

would be ended. When all is said and done they lead public opinion. Flooding the market with individual opinions in the form of lists, will produce immense uniformity, at least this is the opinion of the list manufacturers. How this list mania is extending is well illustrated by the following fact. I was in a well-known dealer's shop in London, a very short time ago, when a new *synonymic* (?) list was offered me, which had been got up by the proprietor. The list was a slight mixture of most existing lists; but I thought it rather a serious joke, when turning to the Coleophoræ, I found the genus *Coleophora* arranged with all the latest additions to the fauna at the end, and with no regard to their affinity. Yet such a a list, will, in turn, take its stand as a literary production, with the other varieties of the same species now in existence.

I would now ask Mr. Robson if Staudinger's Catalogue, as far as synonymy is concerned, is much the best publication of its kind—and I think he will grant me that—why not adopt it? I know there are errors, but so there will be in the best list made. Reject the errors when it is proved satisfactorily to every one that they are errors, but adapt the list as it stands to our needs. We shall then be in touch at one bound with the lepidopterists of almost the whole of Europe. Mr. Robson has pointed out errors in Dr. Staudinger's list, but, I believe, I can put my finger on two or three of the same kind in his own list as far as it is published. If all the efforts of our list makers were directed to the production of one good list, and the best of its kind now in existence was taken as a basis, we should soon get uniformity, but all the while individuals with more or less limited means at their disposal, try their hands at the work, so long will the result be worse than failure, for they are creating such a chaos that all lepidopterists will be, like most of themselves already are, overwhelmed in the result of their labour.

Mr. Robson seriously proposes that some of the Societies are to take in hand the herculean task of seeing that no more changes are made, and refers to many provincial societies as ready to start. May I ask what seems to me a fundamental necessity—Where is the start to be made, and what is the start to be based on? And then in the last sentence of his article he says, "Except with the European entomologists, little difficulty would be experienced." Is this not a rather large exception list? To me it seems so. The European lepidopterists are men of wider and broader knowledge than English lepidopterists (always excepting those few grand entomologists, who are happily still among us, and who are revered as much or more abroad than at home), and is it likely they will pander to our insular prejudices? We must begin by *giving* almost everything, and at this price the English lepidopterist would in a few years be the gainer in every possible respect. We should

cease to be the narrow collectors we are now, and become naturalists in the true sense of the word. Perhaps, however, Mr. Robson has some such idea as that of mine revolving in his own mind. If so, I wish him every success in trying to bring about a better condition of things, and trust he will be supported in, what is undoubtedly, a growing evil, which cannot be put on a sounder basis too early. But, if his idea is to get out a new list, not based on Staudinger, and contrary to the accepted condition of things on the Continent, he has, I fear, set himself a task which will never be carried out, and which ought never to come to a head; and which, in the attempt to carry out, will isolate us still more from Continental scientists, and leave the Continental lepidopterists wondering more than ever "why a nation, with the broadest views in almost everything, and the leaders of every other nation in every enterprize, shows such a prejudice, and narrow-mindedness in this one branch of science, that is totally inexplicable." This is the opinion of one of the best Continental lepidopterists, who has had much to do with British collectors for many years. Perhaps if we were

"To see ourselves as others see us,
It wad frae monie a blunder free us
And foolish notion."

And if we could look at ourselves from a Continental standpoint, I think we should pause before we took another step which would isolate us, and prove another stumbling block to our poorer friends, who would thus have one chance less of becoming scientific lepidopterists, and one chance more of remaining mere collectors.

Rayleigh Villa, Westcombe Park, S.E.

THE NEW FOREST MELITOTI.

By C. A. BRIGGS.

Pending the settlement of the question whether *Z. trifolii* var. *ytensis* is identical with *Z. meliloti*, Esp. or not, it will be convenient for the purposes of the present discussion to continue to use the name *Meliloti*.

The specific identity of these *Meliloti* with *Trifolii* being proved, the next question that arises is the cause of its degeneration, and this, I think, is not far to seek, namely, the alteration of its surroundings, and the consequent deterioration in either the quantity or quality of its food-plant. I cannot help thinking that, while clearly right in attributing the result to drainage and exposure to the sun, Mr. Webb attaches too much importance to the railway, which was I believe made about 1847. It seems to me that a more probable cause might be found in the history of the locality itself.

Meliloti in the New Forest seems to have been confined to a very limited area, consisting, speaking roughly, of some of the rides in Park Hill, Denny Lodge, Perry Wood, and Stubby Copse enclosures, and by the adjacent railway. So far as I have been able to learn, these enclosures are all, comparatively speaking, modern ones, made in pursuance of the Deer Removal Act, of 1851, and having of course taken some years to make. *Trifolii* no doubt existed here when the Forest was in its original state, previous to the making of these plantations, as it still does elsewhere in the Forest, if not here. For the purpose of these plantations, the whole place underwent a thorough system of drainage by deep gullies, the old swamps and shade being gradually done away with, while the land being planted with young dwarf trees was fully exposed to the sun. If *Meliloti* could have lingered on till these plantations grew up to maturity we might perhaps have hoped to see it revert to its original type. How long it took for the degeneration to develop itself is not known, as the first of the recorded specimens was that of Mr. Ramsey Cox taken in 1869, eighteen years after the formation of the railway. It was not recorded for 1870, but after then it seems to have been taken more and more freely until 1875, when it was common. For the next few years I know of no record, and cannot say when it began to die out. Mr. Tate, of Lyndhurst, writing in May, 1885, says, "they have been very scarce the last three or four seasons." In July, 1885, he writes, that he and two other collectors had failed to take a single specimen. Mr. C. Gulliver, of Ramnor, in July, 1887, writes, "for the last two or three years it has not been taken." In August, 1887, he writes, "I have not taken any and I do not believe any one else has, for I have seen a lot of collectors and asked them—I believe it to be quite extinct in the Forest." When I took it last in 1875, the nearer we got towards the railway the more was *Meliloti* mixed with *Trifolii*, until at last, just by the railway itself, *Trifolii* was as common or commoner than *Meliloti*: specimens also occurred which were intermediate between the two forms. It would be interesting to know whether and to what extent *Trifolii* still occurs there.

In addition to the cause of degeneration suggested above, it is very probable that—as suggested by Mr. Robson—it was helped by interbreeding, as *Meliloti* was still more restricted in its locality by its habit of preferring the rides themselves to the intermediate land. One fact remains to be mentioned, and that is, that whether in the new Forest or with those specimens recorded by Mr. Robson from Kent, by Mr. Jenner Weir from Tilgate Forest or those more recently taken near Folkestone, no single instance is recorded of *Meliloti* being taken except in those places where, or immediately adjacent to which *Trifolii* occurs or has occurred.

By the courtesy of the Editor I am enabled to reply to Mr. Tugwell's remarks in the last number, although I had previously trespassed upon his space by the deferred conclusion of my previous paper.

After a silence of thirteen years, Mr. Tugwell now for the first time expresses doubts as to whether—to put it plainly—my brother's larvæ did not get mixed up. To this he himself must reply, but it is much to be regretted that Mr. Tugwell did not satisfy his doubts at the time, by himself breeding from *Meliloti*, or at least express them while *Meliloti* was still to be found there, so that further observations might have been made. To his suggestions I need only point out that even if other larvæ had been introduced with the food, which, from the habits of *Zygæna* larvæ in the young stage is impossible, as they invariably fall off the food-plant at the slightest disturbance—that would not dispose of the original larvæ. To ask us to suppose that as *Trifolii* larvæ were introduced, *Meliloti* died off to balance the account, is surely going too far in support of any theory. The fact of *Meliloti* locally reproducing, is common ground with both of us, as that result would follow, at all events for a time, whether *Meliloti* was a species or only a degenerate form.

Mr. Tugwell is in error in saying that Doubleday's opinion on the matter was universally accepted by English lepidopterists. There was always a strong minority against the view, a minority whose numbers steadily increased with our knowledge of the insect, and as the value of *Meliloti* for exchange purposes went down. Mr. Doubleday's opinion, it should be remembered, was formed from the appearance of the perfect insect alone, without any knowledge of the egg, larva, or pupation of our New Forest specimens.

On page 54 of the present volume of the "Young Naturalist, Mr. Tugwell mentions *in italics* that the bred specimens were bred in a heated greenhouse. Why the italics? Does he attach any importance to the fact? Heat may change a form, but surely he does not contend that it could change a species in one generation?

As regards the difference in manner of pupation, Mr. Tugwell again is not quite correct. He is right so far as the large late form of *Trifolii* found in marshes is concerned, but wrong as regards the small earlier form of *Trifolii* found in dry places. In the former the cocoon is as the latter, and *Meliloti* it is difficult to find.

To sum up the facts then we have the imagines, taken at the same time and place, with every intermediate gradation from *Meliloti* at one extreme to *Trifolii* at the other. The manner of pupation of *Meliloti* identical with that of one form of *Trifolii*, the larvæ differing only in the greater or lesser size of the spots, particularly in the younger stages, and lastly we have *Trifolii*

bred from *Meliloti*. The egg, I admit, is larger, but this alone is not sufficient to prove distinction. The burden lies on those who set up a new species to prove their case. In this instance it has not been and I am sure cannot be done.

55, *Lincoln's Inn Fields*, 15th May, 1888.

[The first portion of this paper was unavoidably left over last month, for want of space.]

My brother has called my attention to Mr. Tugwell's note in the May number of the "Young Naturalist." I have no wish at the present time to enter into the controversy further than by saying.

1. That in the extract from the Proceedings of the Entomological Society, from which Mr. Tugwell quotes, I distinctly stated that I had a hundred larvæ of *Trifolii* at the time. There is no need therefore for conjecture on the matter.

2. That all my larvæ were from the first, carefully kept apart in labelled glass cylinders.

3. That the food was obtained from time to time from a spot where no *Zygæna* whatever occurs. There is no possibility of any mistake having been made in the experiment, at the result of which I was, I confess, at first surprised.

4. The difference in the markings of the larvæ of the two forms is merely one of degree. The markings themselves are identical (E. M. M., Vol. X., p. 117), but in the young *Meliloti* that I had in 1872 and 1873, the spots were so minute as to be practically obsolete, while in *Trifolii* they are strong. In the *Meliloti* I bred in 1875, the markings (Ent. Vol. 8., 212) were much more developed, possibly because I had kept them in previous years in a greenhouse in the shade and facing north, while in 1875 from the first I kept them in one fully exposed to the sun.—THOS. M. BRIGGS, Surrey House, Leatherhead.

NATURE IN JUNE.

By ALBERT H. WATERS, B.A.

"Thy summer woods

Are lovely, O my mother Isle! the birch
Light bending on thy banks, thy elmy vales,
Thy venerable oaks!"

It is the latter part of the afternoon of a bright warm June day, as we set off for a ramble. The aspect of nature is indeed cheerful and exhilarating,

and the number of living objects on all hands is so great that we hardly know where to begin to describe them. Flowers are conspicuous everywhere, the hedges are gay with wild roses, the privet hedges are covered with white clusters, the streams are adorned with the pretty blue flowers of the forget-me-not, the fields are gay with red poppies and corn cockles. Later on in the month the beautiful and sweet-scented water lilies will be blooming as they float on the surface of river and lake, and among other flowers we shall observe the wild angelica (*Angelica sylvestris*), and more than one kind of bedstraw in blossom. Truly June is a month of flowers, and the blossoms we see on all sides of us are not the least of the charms of a country walk at midsummer.

" Oh, they look beautiful in every place,
Through this beautiful world of ours;
And dear as a smile on an old friend's face,
Is the smile of the bright bright flowers."

If the flowers are plentiful on all sides in June so are the butterflies. The swallow tail (*Papilio machaon*), the local black-veined white (*Pieris crataegi*), the small heath (*Chortobius pamphilus*), the white admiral (*Limenitis sibilla*), the tortoiseshell (*Vanessa urticae*), the pearl bordered fritillary (*Argynnis Euphrosyne*), and several others are all out now.

Our ramble shall be this time to the woods. As we walk along we see a flock of dark coloured birds in a field where the hay makers have been at work. They are starlings, as we can easily perceive through our field glass. There is nothing very peculiar in their flocking together thus, as they are very fond of congregating at all times. Those birds darting about high up in the air are swifts. I often think we owe our comparative immunity from such blood-sucking diptera, as occur in many other countries, to the abundance of swallows, martens, and swifts, among us in summer time. However that may be, it is a pretty sight to see the hirundines skimming along after gnats and other insects, and their confiding ways and fondness for man's society, make them universal favourites.

Here are some beetles, enjoying the rays of the fast sinking sun, as they sit on these cowparsnip flowers. They are known as *Strangalia amata*. Their elytra you see are yellow, with violet markings at the end; the head and thorax are violet. Many species of coleoptera may be found now, and if we sweep the herbage we shall obtain many species such as *Chrysomela polita*, *C. staphylaea*, *Phyllobius oblongus*, and other of the genus, together with numbers of others which I cannot stay to mention now.

Hawthorn blossoms shelter a large number of minute species. The most numerous of these is *Homalium florale*, and other kinds will be found men-

tioned in the sixth volume of the "Young Naturalist," p.p. 113, 114, together with several larger kinds.

Here is a grey moth at rest on this gate-post, with a dark red streak across each wing, giving it a very pretty appearance. It is the blood-vein moth *Bradypetes amataria*. Several of its relatives known as "wave" moths are out now, as the common small four-footed wave (*Acidalia bisetata*), the northern smoky wave (*A. fumata*), the ribband wave (*A. aversata*), and the small scallop (*A. emarginata*.)

Notice that brown bird sitting on the end of that branch looking intently about him. See! he has caught sight of a fly; instantly he darts after it, catches it dexterously and returns to his perch. Let us look at him through our field-glass, and see if we can make him out. We see his head and back are brown in colour, with darker spots on the crown of his head. His under-side we notice is dingy white, rather yellowish on the sides of the throat, breast, and abdomen, with a few dark brown streaks extending interruptedly from the chin to the lower part of the breast. We at once recognize it as a spotted fly-catcher (*Musicapa grisola*), one of our summer visitants. These birds arrive in England about the latter end of May, sometimes in the third week of that month, and they remain here until about the 20th of September, or a day or two later.

Now we will cross this ditch. As we do so we see numbers of small white moths flying about just above the water. They are known as China-mark moths, and the larvæ live an aquatic existence inside cases, much like caddis worms, with which they are often confounded.

There is our old friend the song thrush merrily singing away. The young thrushes in that nest, which we can just see among the foliage in yonder tree, are doubtless getting a good size now if they are not fledged. I can never see a thrush without thinking of the poet Clare's lines :

" Within a thick and spreading hawthorn bush,
That overhung a mole-hill large and round,
I heard from morn to morn a merry thrush
Sing hymns to sunrise, while I drank the sound
With joy—and often an intruding guest
I watch'd her secret toils from day to day,
How true she warp'd the moss to form her nest,
And model'd it within with wood and clay;
And by and by, like heath bells gilt with dew,
There lay her shining eggs as bright as flowers,
Inkspotted over shells of green and blue;
And there I witness'd in the summer hours
A brood of Nature's minstrels chirp and fly,
Glad as the sunshine and the laughing sky.

I have noticed that the song thrush varies to some extent in depth of tint.

The individuals we see in woods are generally much paler than those inhabiting open ground, and are besides of a fuller make and larger size. The thrushes we see on commons and such places are much slenderer than the sylvan mavis, and their colours are fuller and richer.

There is rather an uncommon bird in yonder hedge. Its general colour seems to be reddish chesnut, but it has a pearly grey head. Examining it through a field-glass we see the underside of the bird is pale rusty red, and its back a reddish chesnut, the wings seem to be composed of black feathers edged with red. The feathers of the tail are half white and the other half black; the head, neck, and upper part of the shoulders are pearly grey with a black stripe running from the base of the beak to the eye. It is a red-backed shrike (*Euneoctonus collurio*), and has probably not been long here. They come at the end of May, and at once commence nest building.

Here is a moth at rest on a tree trunk. You passed it without noticing it, and no wonder, perhaps, for it so much resembles a piece of grey lichen that one needs sharp eyes to see it. It is the sycamore moth (*Acronycta aceris*), and is developed from a very pretty reddish caterpillar, with yellowish or reddish hairs down the sides, and a row of white lozenge-shaped markings bordered with black down the back. It may be found occasionally on sycamore trees at the end of summer. Here on this lime tree we have another of the genus. It is the grey dagger moth (*Acronycta tridens*), and like the sycamore moth has a very lichen-like appearance. Others of the genus are out now, one of which known as the dagger moth (*A. psi*) is very much like the preceding, and with difficulty distinguished from it. The other species are the miller moth (*A. leporina*), which we may look out for on palings near where birch trees are growing; *A. megacephala*, to be found at rest on poplar trees; *A. menyanthides*, to be looked for on heaths in the north; *A. ligustri*, on palings and gate posts near privet hedges; *A. alni*, on willow, lime or other trees; and the common *A. rumicis*, and its smaller and darker variety *salicis*. Besides these there is the rare and local *A. myricæ*, to obtain which it will be necessary to take a journey to Rannoch.

That pretty greenish golden little moth flying about those buttercups is one of the Micropterygidæ, a family of the Tineina. It may be either *Micropteryx calthella* or *seppella*, but most likely it is the former. Upon capturing it we see the base of the wing is purple in colour from the costa to the inner margin. This at once identifies it as the first of these two species. In *seppella* the base is only purple at the costa.

There is another little moth of a bright bronzy green colour, with extraordinarily long antennæ. This is *Adela viridella*. Others of the genus are found now as *degeerella*, *sulzella*, and *fibulella*.

We will put some treacle and rum on these trees in order to attract the moths later on in the evening.

Look at that pretty brown and white bird sitting on the top of that hedge ! He is facing us, and we easily perceive all his under parts from his beak to his tail, are pure white, and there is also a white patch on his forehead just above his beak. Now he has turned himself slightly, and we see the crown of his head and back are black, and his wings and tail are dark brown, not, however, uniform in tint, for the former have a white patch in the middle, and the medial portion of the outside feathers of the tail are likewise white. This bird is another of the flycatchers, and is known as the pied flycatcher (*Muscicapa atricapilla*.) Like the spotted flycatcher it is a summer migrant, and comes and goes about the same time as that species. It is partial to human society, and builds in gardens and orchards. A hollow apple tree is a favourite place for its nest, which it fabricates of grass, hair, and feathers. The eggs are four or five and white.

But now the shades of eve are falling and the moths begin to come out. First, we notice some little yellow moths flying about the wild roses ; these are known to entomologists as *Dictyopteryx Bergmanniana*, and they are very common in every garden. This little brown moth with one half the wing brownish orange, which I have just captured as it flew along by the side of the hawthorn hedge, is another member of the Tortricina, to which group *Bergmanniana* belongs, and is known as *Pyrodes rhediana*. Here is another moth also on the wild roses, but rather different to *Bergmanniana*. It is dark orange in colour, suffused with lead colour towards the hind margin and has a triangular white spot on the costal margin just beyond the middle. Another one of the genus may be found also at the end of June or beginning of July. Its larvæ feeds in June, inside folded maple leaves ; it is known as *Dictyopteryx forskaleana*. Many more of these little tortrices are out now, as the common and variable *Pædisca corticana*, the uncommon but widely distributed *Olindia ulmana*, *Eupæcilia maculosana*, and the thistle-hunting lemon-coloured *Xanthosetia hamana*, which last may be looked for throughout the summer.

Here is a pretty little bronzy green moth with wings very different in shape to a tortrix, and we see at once it must belong to a different group. The wings are narrow and rounded at the ends instead of being truncated. It is evidently one of the Tineina and we recognize it as *Butalis fusco-ænea*. Many others are out now, as the local *B. chenopodiella*, *B. variella*, *Atemelia torquatella*, *Pancalia Leuwenhoekella*, and *Glyphipteryz cladiella*, which last we look for in Wicken fen.

Now we see a moth darting about just above the tops of the long grass,

and as we try to capture it, it suddenly vanishes from sight. It is a swift moth (*Hepialus lupulinus*), and has a trick of falling down suddenly and resting half-way down the grass stems. There goes another one! Here it is you see resting on the grass stem just as I said, I marked where it went to as you struck at it with your net. Now we will walk on towards the wood. Here are some more swift moths, but I think not the common ones. There! I have caught one, and, as I suspected, it is the golden swift moth (*Hepialus hectus*). You observe both have pale bands on the fore-wings. In this last one these bands are parallel, but in the common swift moth they are not so.

As the darkness deepens, the moths come out in increased numbers, and it is time to look at the trees we have been treacling. Here we have a perfect beauty revealed by the light of our lantern. It is the peach blossom moth (*Thyatira batis*), and we have made a good beginning. A large yellow looking moth is the next to make its appearance, and we discover it is the common yellow underwing (*Tryphæna pronuba*), and wish it was its rarer brother the broad bordered yellow underwing (*T. fimbria*). Then comes a little pale grey noctua, with wings delicately tinged with rosy. It is a certainly a *Miana*, and pretty certainly *M. literosa*. Many other moths continue to come out, as the blackish brown *Miana strigilis*, the ochreous and brown *Mamestra anceps*, the blackish *brassicæ* and *persicariæ*, the last very conspicuous with its white reniform stigma, but both so common as not to be worth capturing.

As we return homeward we see other moths flying about. One reddish ochreous moth which we capture at a bed of dead nettles turns out to be *Leucania conigera*. We are not in the locality for *turca*, or we might look after that species too. There are others of the genus out now, as the local reed-haunting *obsoleta*, the pale ochreous *comma*, the rare marsh-loving *straminea*, and the common *impura* and *pallens*.

Cambridge.

THE SYNONYMY OF CÆNOBIA RUFÆ, HAW.

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

Messrs. Robson and Gardner in their List of Lepidoptera with regard to *Cænobia rufa*, Haw, use the following synonymy:—

despecta, Tr., 1825.

rufa, Haw., p 1810.

Haworth's description is as follows:—"alis oblongis ciliisque rufis unicolori-

bus posticis ciliisque pallidis striga medio macularum obscurarum." I consider this a good description of the insect we get. Haworth then goes on, "Caput inter antennis album." I have a long series (about eighty) and this statement of Haworth's is very noticeable if one tilts the drawer; turns it round with the insect towards you, and looks down the series from top to bottom. The "head" is "between the antennæ" decidedly "white." Haworth then goes on, "Lingua et palpi Noctuarum potius quam Bombycum," of which, I suppose, its position in our classification is a sufficient proof. Comparing it with *lutescens*, a variety of *Acosmetia caliginosa*, Haworth goes on to say:—"Corpus paulo gracilius quam in ultimo (*lutescens*) et alæ magis oblongæ." Both *lutescens* and *rufa* are slender bodied Noctuæ, and were formerly, by Stephens and other old British authors, classified near each other, and in Humphrey and Westwood's "British Moths" are figured on the same plate. Is not *rufa* rather more slender bodied than *lutescens*, and are the wings not more lengthened?

I would ask Messrs. Robson and Gardner why they write *rufa*, Haw. ? What does the "?" mean, and why is Treitschke's much later name adopted by them rather than Haworth's earlier one? The above description is taken from Haworth's "Lepidoptera Brittanica," p. 260. The name "*rufa*" is a British name, has been in constant use since 1803 (the date of publication of Lep. Brit.) by British authors; Why should we change it for a German name published twenty years later?

All our early British authors Stephens, Wood, &c., grouped *Caenobia rufa* in the same genus (*Acosmetia*) as *Acosmetia ealigosma*, the genus now containing only the latter species. In Humphrey and Westwood's "British Moths," plate 54., *lutescens*, *caliginosa*, *rufa*, and its var. *lineola*, and *arcuosa* are figured as the species in the genus *Acosmetia*. I think this is pretty strong *prima facie* evidence that there is something tangible in the arrangement, and that the authors succeeding Haworth and who followed him in his arrangement, had no doubt, and I really fail to see how they could have, about what Haworth meant by *rufa*. I know Guenée writes *rufa*, Haw. ? as a synonym of Treitschke's *despecta*, but then, he constantly in his works confesses his ignorance of British species.

Westcombe Park, S.E.

[Mr. Tutt must not have read the introduction to the list put forth by Mr. Gardner and myself. It professes to contain—

"1st. The name of each species in ordinary use in Britain, and the authority for it."

The *Entomologist* list notwithstanding, I expect nine out of ten of British entomologists still call the species *Nonagria despecta*. It is so called in "Stainton's Manual," the best book for a beginner ever published. In Doubleday's list it is called *Despecta*, and though Staudinger's catalogue, calling it *Rufa*, Haw., was published in 1871, Mr. Doubleday, in his Supplement of 1873, did not accept the change. Not

having opportunity for full investigation ourselves, we had to accept the balance of evidence, and finding that Hubner, Duponchel, Herrick-Schaffer, and Guenée, used the name of *Despecta*, as well as Stainton and Doubleday, whilst only Lederer used *Rufa*, there could be no question as to how it should stand in our list. I am afraid I must plead guilty to the fault I found with others, of accepting a reference without examination for the "?" after Haworth. But from our standpoint, I do not see what else could have been done than was done. The name given by Haworth was rejected by the almost unanimous agreement of investigators, and had we been of opinion Haworth's name ought to have been adopted, yet for the purposes of our list, *Despecta* as that in general use must still have had precedence. Let me ask Mr. Tutt what entomological gain there can be in changing a name, that will make difficult, references, to all these writers, and make nothing clear except that Haworth possibly meant this species?—JOHN E. ROBSON.]

REPORTS OF SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

The meeting of May 3rd was well attended. Mr. Clark exhibited a bred series of *O. filigrammaria*, and Mr. Hanes a series each of *C. flavicornis* and *B. parthenias*. Mr. Hillman brought a specimen of the greyheaded wagtail, and various stones taken from the gizzards of the various British birds. Mr. Gates exhibited a nice selection of micro-lepidoptera. A skull of an extinct species of kangaroo, and other objects, were presented by Mr. Hillman to the Society's collection. Several members mentioned that there appeared to be an abundance of the common *Taniocampa* round London, and coleoptera were also fairly numerous. Mr. Hillman read a paper on "Meteors and Meteorites," which was of an interesting nature.

On May 17th, a paper on "Burying Beetles," was read by Mr. Lewcock, and was very instructive. Mr. Lewcock gave a complete life-history of the different species, together with the *modus operandi* of their proceedings, and also hints as to the best way of collecting them. In connection with the paper, he exhibited six species of the genus *Necrophorus*, ten species of the genus *Silpha*, and several species of the genus *Choleva*. At the conclusion of the paper an interesting discussion took place, in the course of which the habit of some species to feed on fungi, in the absence of carrion, was dwelt upon. Among the other exhibits were various species of wagtails, shewn by Mr. Gates; series of *L. multistrigaria* and *A. badiata*, by Mr. Hanes; *P. orichalcea*, *E. venustula*, *A. cordigera*, *A. melanopa*, *B. argentula*, and other rare species by Mr. Harper; a series of *L. argiolus*, by Mr. J. Clark; and a selection of large coleoptera, &c., from South America, by Mr. Hockett. The President presented to the Society a framed letter from the late Mr. H. Doubleday, shewing the autograph; and Mr. Dawes, of Nottingham, pre-

sented nests and eggs of the hedge sparrow, song thrush, chaffinch, and blackbird.—J. RUSSELL and E. ANDERSON, Joint Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

April 26th, 1888.—T. R. Billups, Esq., F.E.S., President, in the chair. Messrs. J. E. Pearce and J. Pearce were elected members. Mr. Adye exhibited *Cymatophora ridens*, and varieties of *Teniocampa munda*. Mr. Lea, small specimens of *Hybernia leucophæaria*, from Richmond Park, and commented on their size. Mr. Dobson, a specimen of *Smerinthus tilia* with the lower part of the central band of the superior wings absent. Mr. Dennis, three streaked varieties of *Spilosoma lubricipeda*, and a similar variety of *S. menthastri* taken in his garden at Kingsland. Mr. T. R. Billups, a living specimen of the genus *Plopaeus*, or sandwasps, from Honduras; also a species of Blattidæ, *Paratrpes elegans*, from South America. Mr. J. Jenner Weir read a communication from Mr. T. D. A. Cockerell, referring to his note on the origin of *Gonepteryx cleopatra* and *G. rhamni*, read at the meeting on the 8th of March last. Mr. Cockerell being of opinion that *G. cleopatra* and *G. rhamni* are climatic forms of one species. Mr. Weir said that seeing that *C. rhamni* and *G. cleopatra* existed over a large part of Europe in the same districts, and had synchronous appearances in the latter end of the summer and again after hibernation in the spring, he was unable to accept Mr. Cockerell's ingenious theory of the origin of the two species. Mr. J. W. Slater read a paper: "Sanitary and Anti-sanitary services of Nature."

May 10th.—The President in the chair. Mr. W. Martin was elected a member. Mr. R. Adkin exhibited full-fed larvæ of *Ephestia Kuhniella*. Mr. Cooper said he had taken this moth very freely in a bakery at Leytonstone, and had found the larvæ feeding in great numbers; there was very little flour stored in the bakery, but the larvæ fed on the dust collected on the beams. He had taken odd specimens of the species for the last four years. Mr. Billups, living examples of *Hydraticus seminiger*. The remainder of the evening was devoted to the exhibition of microscopical objects, many members of the South London Microscopical Society assisting. H. W. BARKER, Hon. Sec.

CLYDESDALE NATURALISTS' SOCIETY.

The usual monthly meeting of this society was held on Wednesday evening, May 16th, in the Society's rooms, 207, Bath Street, Glasgow. Mr. T. J. Henderson, President, in the chair. The following gentlemen were admitted as ordinary members of the society: Mr. Alfred Brown, Mr. Archibald

Robertson, and Mr. Robert Henderson. Mr. Robert Kidston, F.R.S.E., F.G.S., delivered a very interesting lecture on "The Generic Relationship of Carboniferous Ferns to those of existing genera, with special reference to British species." Mr. Kidston, in the introduction to his lecture, gave a short and succinct account of the researches made by the early workers in palæontology, and the importance of their discoveries when viewed in the light of our more complete knowledge of the subject at the present day. It is a study which demands patient collecting and research, for it is quite the exception to find a specimen showing the complete structure of the organism; its life history and organisation have therefore to be made out, bit by bit, and pieced together, from specimens often brought from the four quarters of the globe. For the better appreciation of the points of agreement and difference between recent and fossil genera. Mr. Kidston gave a most instructive description of the structure and classification of those existing forms to which the fossils he intended referring to were most closely related. Ferns are classified in accordance with the manner in which the *sporangia* are developed. Looked at from this structural point ferns fall naturally into two divisions, *Lepto-sporangiate filicaceæ* and *Eu-sporangiate filicaceæ*, which are further divided in lesser groups, according to the structure of the *sporangia*. The development and arrangement of the parts of the fern also present many interesting sources of investigation. The fern found may be simple, as in the common Hart's Tongue (*Scolopendrium vulgare*), or variously divided. In regard to the ramification of the frond, we find that the same laws which regulate the development of the fronds of existing species also controlled the growth of those of carboniferous times. A dichotomous ramification of the frond appears to have been much more frequent then than at present. The latter part of Mr. Kidston's lecture was mainly occupied with a description of the fructification of carboniferous ferns, which he divided into three groups, according to the structure of the *sporangia*. The genus *Cyclothea* (Kidston, 1888) was founded on a single specimen, collected by Mr. Peter Jack, at Ellismuir, Baillieston, from shales above the Kiltongue coal, and it is believed that this district is perhaps as fine as any in Britain as a collecting field for these interesting forms. Mr. John Trotter, of Messrs. Geo. Mason & Co., Sauchiehall Street, very kindly provided a large number of powerful microscopes, which proved most serviceable in examining the fine specimens exhibited. Mr. Kidston also expresses his indebtedness to the following gentlemen for services rendered him in connection with his lecture: Mr. Wm. Cosh, Halifax; Mr. Alex. Somerville, B.Sc., 34, Granby Terrace, Hillhead; and Mr. A. D. Richardson, Botanic Gardens, Edinburgh.—JOHN MACKAY, Hon. Sec.

A VISIT TO LIVERPOOL.

By JOHN E. ROBSON.

(Continued from 103.)

MIANA.—Mr. Gregson has all the named forms of all the species, and connecting links as well. Some of the pale *Strigilis* are very fine and light.

AGROTIS NIGRICANS.—A grand series of this variable species, including v. *Marshallana*, Westwood, a large light brown form from the Fens. There are also some specimens smaller than *Nigricans* generally runs, dark brown in colour and very indistinctly marked. These, Mr. Gregson has named *Dubice*, being dubious I suppose whether they really were *Nigricans* or something else.

A. SPINIFERA.—A single specimen taken in the Isle of Man, and named by Doubleday. It is a very light coloured insect with pure white hind-wings and a white body.

A. ASHWORTHII.—Among a long row of this rare and beautiful insect are three suffused forms. The variation appears to tend to a central fascia across the wing.

NOCTUA GLAREOSA.—Var. *Hebraicaoides* of this collection has a dark cold brown ground colour, making the costal spots appear less distinctly defined, and the margins of the stigmata more so. I did not note from what locality this distinct form was obtained.

TRIPHENA ORBONA.—Var. *Curtisii* with as much variation as can well be imagined, splendid dark red-brown, red-brown, brown, cold dark grey-brown, and cold light grey brown ground, all very distinct from each other, yet true *Curtisii*. There is also a type var. with very pale yellow hind-wings, without lunule, and another with the dark marginal band much broken.

TENIOCAMPA GOTHICA.—Var. *Gothicina* very fine and varied. There are also some dark smoky brown forms, with the black "Hebrew character" very distinct. This form Mr. Gregson calls *Nigra*. There are also some very pale forms, one remarkably so, with small distinct stigmata and small black streak between.

T. INSTABILIS.—Of this variable species he has a grand series, var. *Nebulosus*, Haw., light ochreous brown, to dark bluish grey; v. *Collinita*, Esp., the ordinary form; var. *Fuscata*, Haw., lines and margins of stigmata very distinctly light. He has also a pale cinereous unicolorous form that does not appear to have a name as yet.

T. OPIMA.—Of this equally variable insect he has a fine series, and has

named the more distinct forms as follows, *Distinctæ*, light ground with dark central band; *Fuscata*, smoky ground with dark band; *Cinerea*, ash coloured ground with the central band only slightly indicated; *Fuscus*, unicolorous dark brown with no band.

T. POPULETI.—This species appears tolerably constant to the type. The most striking of Mr. Gregson's are three with a row of dark triangular dashes, between the subterminal line and the hind margin.

T. MUNDA, v. *Immaculata*, Staud. Cat., without spots at anal angle.

T. CRUDA.—A form of this insect that Mr. Gregson calls *Irrorata* may be described as grey, not reddish, with the surface of the wing distinctly speckled with dark scales.

ORTHOZIA SUSPECTA.—A pale grey form of this insect has been called *Iners* by Treitschke. Mr. Gregson has a dark form, nearly unicolorous which he calls *Congener*.

ANCHOCELIS RUFINA.—A fine and varied series of this species, some with a distinct reddish band across the paler ground colour. A straw coloured form, with the markings dark grey, he calls v. *Pallæ*.

A. LUNOSA.—Mr. Gregson distinguishes as v. *Lunæ* a reddish form with veins not so distinctly paler as in the type, which is a cold dark brown.

A. PISTACINA.—Fine specimens of all the named forms, which it is not necessary to recapitulate.

A. LITURA, chiefly v. *Polluta*, Esp., which is larger, and with larger costal spots than the type.

CERASTIS VACCINIL.—A varied series, including the ferruginous-red form (v. *Polita*, W.V.). The type varies also, and some are darker and nearly unicolorous, approaching *Spadicea*.

XANTHIA CERAGO.—A good set of v. *Flavescens*, Esp., with every gradation between it and the type.

X. AURAGO, v. *Fuscata*, Esp., with the centre of the wing reddish orange.

CIRRHEDIA XERAMPHELINA.—A fine set, including two of the dark variety (*Unicolor*, of Staud. Cat.), and also one nearly all yellow, there only being a trace of the darker central band.

DICYCLA Oo, v. *Renago*, Haw. In this pretty form the wings are entirely suffused with the darker colour of the markings, except the stigmata and the hind-margins. It is a striking variety.

HADENA PISI.—The northern form of this common insect is cold dark brown, the southern form is warmer in tone and redder. A very richly coloured and well marked specimen of the red form is called *Spendida* by

Mr. Gregson. I do not know what my classical friends will think of the name.

APLECTA NEBULOSA.—Mr. Gregson has some very dark examples of this insect that he tells me were taken at Sheffield. I had not seen the form before.

A. OCCULTA.—A fine series of this species including the usual dark or nearly black forms. One dark specimen taken by Mr. Carrington in Perthshire, is without the white lines on the wing on the right side. Noctuae with odd wings must be very rare, this is the only instance I remember.

HADENA ADUSTA.—Examples of this insect from Shetland are much paler in ground colour, and have the markings more distinct.

H. SUASA.—Mr. Gregson has a specimen of this species of a very warm dark brown, differing considerably from the rest of his series and from others I have seen.

CUCULIA CHAMOMILÆ.—I do not know the varieties of this insect. Besides the type, Mr. Gregson has a grey form which he calls *Chrysanthemi*, Hb., and a dark form which he calls *Fissina*, Haw. Is not the grey variety the *Calendulæ* of Treitschke, and *Chrysanthemi* of Hubner, a synonym of the *Fissina* of Haworth?

ANARTA MELANOPE.—A browner form with four dark bands, showing the veins lighter, Mr. Gregson calls *Brunnea*.

A. CORDIGERA.—Of this species Mr. Gregson has two with the whole of the fore-wing (except the white stigmata) as dark as the central band.

Such are the more noticeable of this group in this collection. I will next refer to the butterflies, and will add a note or two on specimens I saw in other collections than that of Mr. Gregson.

PUBLICATIONS RECEIVED.

“The Westmoreland Note Book and Natural History Record.”

This new quarterly journal is in two distinct portions, as indeed the title implies. But they are kept distinct in the magazine and each part is paged separately. The Note Book is intended to contain “interesting notes and jottings from all quarters,” “to comprise everything that may add to our information on local history, local dialect, local superstitions, and local relics of antiquity,” with the object of amassing material for the future historian of the county. Though this portion of the work “is not in our line” it appears

to fulfil the intentions of the promoters exceedingly well. The second part of the work, The Natural History Record is to be conducted by "several prominent naturalists of the district, Mr. J. A. Martindale, of Staveley (one of the highest authorities in the North of England on lichens and general botany), being editor in chief." A Flora of the county is promised as being in an advanced stage of preparation, and lists of other of the Natural productions of the county are also in hand. The current number in fact contains a "Contribution towards a list of the larger Fungi," and the commencement of a list of the Sedges of the county. The work is well printed, on good paper, and is worth the attention of any one interested in the important question of locality.

NOTES AND OBSERVATIONS.

CYMATOPHORA OCULARIS.—Have any readers of the "Young Naturalist" a specimen of *Cymatophora ocularis*, L.,=*octogesima*, Hb., in their collections with only one of the stigmata present, *i.e.* with the reniform or with the orbicular, but not with both? The Linnæan description of *ocularis* (*Systema Naturæ*) is, I feel certain our species, but Linnæus mentions only "one small whitish ocellus with a darker centre." If such a specimen exists I should be pleased to have information regarding it. I believe from the Linnæan description that the orbicular was absent in his type specimen, and that it is the reniform that is referred to in his description.—J. W. TUTT, Westcombe Park, S.E.

STIGMONOTA PERLEPIDANA, &c.—I have been down to Chattenden to-day. *Stig. perlepidana* was in full force, but nothing else was abundant. *Cardamines*, *Euphrosyne*, and *Alveolus* were well out, but everything else was backward. The hot weather has apparently brought out the exposed pupæ, but the insects that have to feed up in the spring had such a dreadful start that they are all behind. I found *Galeodactylus* larvæ half grown, and some *P. betulella* also, but I gave up at 6 p.m., it was too slow altogether.—J. W. TUTT, Westcombe Park.

ERRATA.

"Young Naturalist," April, 1888.

Page 72, line 4, "var. *Neapoliata*, Milliere," should follow "*Melanippe fluctuata*."

" 84, " 5, read "*Alchymista*."

" 84, " 7, " "*Conspicillaris*."

May, 1888.

Page 103, line 12, read "*Diphthera orion*."

" 103, " 19, " "*Luperina Gueneei*."

" 104, " 3 & 10, read "*Eupithecia tenuiata*."

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SILK AND SILK PRODUCERS.*

By JOSEPH CHAPPELL, MANCHESTER.

THE Chinese are said to have been the first people who applied themselves to sericulture, and written documents are said to be preserved tending to prove that silkworms were reared there 2700 years before the Christian era. Silkworms passed insensibly into Persia, India, and various parts of Asia. They were then conveyed to the Isle of C^os, and in the sixth century they were introduced into Constantinople. They were successively cultivated in Greece, Arabia, Spain, Italy, France, and in all places where any hope could be entertained of their succeeding.

In Russia, the cultivation of the silkworm was established about 1820, in a latitude as far north as 54°, and with such success as to warrant the establishment of manufactories for working the silk. In Germany and Bavaria it has been cultivated, also in America and Australia. In the early part of 1825, certain individuals, after a careful investigation of the subject, came to the conclusion that the culture of the silkworm might be carried on successfully in climates of as high northern latitude as that of Great Britain. Consequently, these individuals laid before several persons, distinguished for rank and talent, the arguments upon which their conclusions were founded, and, having met with a favourable reception, presented a petition to His Majesty, praying that a charter might be granted them for the purpose of incorporating a company with the power of raising such capital as might be deemed necessary for carrying into execution the cultivation of silk in Great Britain, Ireland, and colonies. Great numbers of young mulberry trees were planted in various localities in Great Britain, of which the bulk were destroyed by frost in the course of a few years. At Edgerton,

*Read before the Lancashire and Cheshire Entomological Society, Liverpool, April, 1888.

near Bolton, several plantations were laid out by Mr. Bodmer, of Manchester, the well known Engineer, with a view to aid sericulture, which, however, proved a failure.

There are a few large trees in the neighbourhood of Manchester yet, and several are known to be about sixty years old; all of them are, I think, *Morus nigra*, and are grown principally for their fruit, which is very sweet. If sericulture were successfully carried on in this country, it would be essential to grow *Morus alba*, of which the fruit is very insipid. The first silkworms reared in Europe were fed on the black mulberry leaves, the only species then cultivated in England, although it was well known that the white mulberry was cultivated in Greece. The white mulberry was then introduced into all the temperate regions of Europe. This mulberry tree offers several advantages, the leaf is earlier, it also gives a much greater abundance of leaves in a shorter period, and the quality of the leaf produces that sort of silk most approved of by the manufacturers. The quality of the silk does not solely depend on the food, but also on the degree of temperature in which the silkworm has been reared. *Morus alba* is indigenous to China, and was introduced into England in 1796. *Morus nigra* is indigenous to Italy, and was introduced into England in 1596. Silkworms may be fed on rose tree leaves when mulberry leaves are not obtainable, and this is preferable to feeding them on lettuce. I have been informed that they will feed on willow and dandelion.

The success of rearing silkworms depends on the healthy state of the insect, and it is essential they should have a sufficient supply of food of a good quality, and cleanliness. These insects are often reared successfully on a small scale, and to what fatality can we attribute such an apparent paradox as that a few hundred worms shall succeed, while a few thousand shall as constantly fail. Silk produced in northern climes is finer and firmer than silk produced in temperate climes; it is only a question whether a sufficient supply of good food can be procured in the northern climes. During the last century, some French refugees in the south of Ireland, laid out considerable plantations of *Morus alba*, and had begun the cultivation of silk with every appearance of the most perfect success; their subsequent removal caused the important opportunity to be neglected, and though the trees are said to have been very flourishing, they have since been entirely cut down. This fact, however, leaves no doubt that the climate is congenial to the cultivation of the white mulberry, if cultivated with moderate attention. It is very probable that sericulture would be a success on the south and western coasts of Ireland, or perhaps the Isle of Man, and the western coast of Wales.

A leaf market is necessary for people in towns to rear silkworms, and such

markets are common in Europe and Asia. At Broasa, great numbers of mules, camels and asses, are freighted with mulberry leaves for the leaf market.

At the close of the thirteenth century, the celebrated traveller, Marco Polo, in his narrative of travels in the Celestial Empire, says: "No fewer than one thousand carriages and pack horses, loaded with raw silk, make their daily entry into Cambula, where silks of various textures are manufactured to an immense extent.

In 1761, Savannah, in the United States of America, had a filature and exported to England 8829 pounds of raw silk. In 1775, Mrs. Pinckney, of South Carolina, conveyed enough of American silk to England to make three dresses. In 1790 the last parcel was brought for sale. There has, however, been a revival of sericulture in the United States of America, and a society exists in Philadelphia, which is managed by ladies, who render valuable assistance by giving instructions in the rearing of silkworms, and in the reeling of cocoons, as well as distributing young mulberry trees to such persons as are desirous of aspiring to sericulture. Mulberry trees are extensively cultivated in California, where millions of trees have been planted, and in some instances have realised a profit of £200 per acre. In the report on the Colonial and Indian exhibition, by Mr. Thomas Wardle, of Leek, Staffordshire, is the following: "As an example of the profit to be realised, a Californian fact may be cited, according to which £700 was the clear gain from $3\frac{1}{2}$ acres, the working expenses having been £93."

There are many varieties, or perhaps species, of silkworms, which are known under the name of *Bombyx mori*. Some silkworms are described as black, and others as tiger spotted. The cocoons of the various races differ in structure, and the races, or species, differ in fecundity. *B. mori* and *B. textor* produce one brood annually; *B. fortunatus*, *B. sinensis*, and *B. arracanensis* produce several broods annually, while *B. crasi* produces seven or eight.

All species of silkworms have two stores of fluid silk on each side of the alimentary canal, and below their mouths they have two seripositors, through which the silk issues simultaneously in pairs of fine filaments, or fibres, forming, in fact, a double thread which is coated with gum, and unites both fibres. The structure of the double fibres of the silkworm of *Bombyx mori*, when cut transversely, is that of two circular discs; the fibre on the cocoon is uninterrupted, except in those which are formed by two silkworms, which are called double cocoons: the latter are unreelable.

The cocoons are softened with boiling water, soap, &c., and are then reeled six or eight threads together; double cocoons and floss, or waste silken fibre, is carded and spun;

I have only alluded to those species which feed on the mulberry, of which there are so many species, that there is some doubt as to whether we really know what *Bombyx mori* means, or whether it exists at all.

The Indian Tussur silk (the name is probably derived from the Hindostani word Tusuṛn, or Tasare, which signifies a shuttle), is called Tussur, or silk of the shuttle, in consequence of being used only in the shuttle with a cotton warp: it is the product of the larva of *Antheræa mylitta*. The fibre is thicker and stronger than that of any other known silk-producing larva. The structure of a single fibre is elliptical, and that of a double fibre, when cut transversely, and put under the microscope, is that of two ellipses placed longitudinally with their greatest diameters in contact. The larvæ suspend very curiously their cocoons from the branches of trees, by constructing a thick hard pedicle which is made to grasp the branch. This pedicle is constructed previous to forming the cocoon, which is elliptical, hard, and compact, with the pedicle near the end, but sufficiently out of the centre to allow the moth to emerge without detaching the cocoon. The moth does not always emerge from the end of the cocoon to which the pedicle is attached, but probably from the end which is the highest according to the position in which it is fastened to the branch. Silk was reeled from these cocoons in the Royal Jubilee Exhibition, Manchester.

The Chinese Tussur, *Antheræa peryni*, is a native of Northern China. The cocoon is elliptical, and not so hard and compact as that of the Indian Tussur, and without pedicle. The cocoons of this species were sent to Europe to supply the demand for Indian Tussur, previous to the Paris Exhibition of 1878. The silk is said to be reeled by the Chinese at Chefoo. It is represented as strong, with very little lustre, but of very good quality. The larva feeds on oak (*Quercus mongolica*.)

Antheræa yama-mai produces the Yama-mai silkworm of Japan. Formerly its silk is said to have been reserved for Royalty. The cocoon is of a pale green colour. The fibre is oval, and one-third finer than that of the Indian Tussur, and twice as coarse as that of the ordinary silk of commerce; its colour is of a greenish white and very glossy. The ova of this species were secretly conveyed from Japan in 1862, which is coincident almost with that of *Bombyx mori*, eggs of which were secretly conveyed about the middle of the sixth century by two monks, in two hollow canes, for which, it is said, the penalty was death if caught in the act. The silkworm of *Yama-mai* feeds on the evergreen oak.

The following is extracted from "Cassell's Technical Educator," and is the translation of a notice published by M. Pompe van Meedervoort, relative to the introduction of the *Yama-mai* into Europe:—

"In 1862, I had the honour to make the acquaintance of M. Eugene Simon. He informed me of the great value of the *Bombyx yama-mai*, and together we made every effort, but in vain, to procure eggs of this species; we were told it was absolutely impossible to obtain them. M. Simon being obliged to return, he made me promise before he left to continue my efforts, and in case of success to offer the eggs to the French Government. But the more I tried the more I saw how difficult, if not impossible, was the attempt. I applied in vain to the Japanese merchants, the silk growers, to many native naturalists, with whom I was on friendly terms, lastly to the Government, but all in vain. The reply was, 'The penalty of death is inflicted on anyone who may export these eggs.' Another idea then possessed me; to apply to one of my pupils. As the Principal of the Imperial School of Medicine at Nagasaki, I was surrounded with students from the different provinces of Japan, and, amongst others, from the Echizen and Vigo, or Hiogo, where alone the Yama-mai silkworms are reared. One of these youths, who had on several occasions given me proofs of his extraordinary devotion, was selected by me for the purpose; to him I explained the whole affair, and proposed that he should go to Vigo at my expense, in order to collect and send me as many eggs as possible. This brave young man, whose name I promised never to divulge, started on the morrow, and after an absence of fifteen days secretly sent me the eggs, which he had collected with much difficulty and danger to himself. He told me that no one suspected the object of his journey; that was in October, 1862. My mission to Japan was finished November 1st, 1862. I started for Europe by the English mail packet, and undertook the charge of conveying these eggs to Europe. This was by no means an easy matter on board a steamship in the Tropics. If the eggs were kept in the cabin, a great risk of their premature hatching was incurred, for the temperature there in the month of November is above 95 degrees Fahrenheit, and in the Red Sea 105 degrees and more. I followed the advice of M. Simon, and placed the eggs in an ice box on board ship, though often but very little ice was therein. To this precaution is due, in a great measure, their safe arrival in Europe in good condition. I arrived at the Hague early in January 1863, and at once sent out the eggs. The greater part were sent to the French Government, and to the Imperial Society of Acclimatisation, according to the promise I had made to my friend M. Simon."

The Muga silk is produced by the larvæ of *Antheræa assama*, which is indigenous to Assam. The cocoon is about two inches in length and seven-eighths of an inch in diameter, rather pointed at each end, and loose and flossy. The fibre is about the same as that of *Antheræa yama-mai* in strength and thickness, and in structure like that of the Indian Tussur. The silk varies in colour according to what the larvæ have been fed on; it is generally fawn coloured, sometimes whitish. There are five broods annually. The silk was successfully reeled in the Royal Jubilee Exhibition. Mr. Thomas Wardle has frequently had fertile cocoons forwarded to this country, but unfortunately the moths have emerged during transit; in one instance, fertilization had taken place *en route*, and the larvæ were emerging from the ova when they arrived at Leek in mid-winter, and food of course was not obtainable. The silk forms an article of export from Assam.

The Eria silk is produced by the larvæ of *Attacus ricini*. It is indigenous to Assam and Bachar, and feeds on *Ricinus communis*, producing seven or

eight broods annually. The cocoons are cylindrical, pointed at both ends, and loose and flossy, orange or white. The larvæ are of two different colours; the green larva producing white cocoons, and the cream coloured, orange-red cocoons. The fibre is one-half finer than that of the Indian Tussur, and one-third coarser than that of the ordinary silk of commerce. Mr. Michael Atkinson describes the cloth made from this silk to be very durable, a garment made of this material lasting considerably longer than an ordinary person's lifetime. This silk is extensively used for carding and spinning.

The Ailanthus silkworm is produced by *Attacus cynthia*, which is indigenous to, and came originally from, the north of China. The larvæ feed on *Ailanthus glandulosa*, and the cocoons are pale brown, cylindrical, tapering obliquely to a point at the end where the moth emerges, sometime at both ends, with an impression of the leaves of the tree on which the larvæ have fed, and often with a leaf or leaflet imbedded on the surface of the cocoon, and with a very slight trace of a pedicle. The cocoons were first brought to Europe in November, 1856, and very great efforts have been made in France and elsewhere to utilise this silk, but without success. The fibre is three-eighths coarser than that of the ordinary silk of commerce, and one-fourth finer than that of the Indian Tussur. This species produces one brood annually. It is acclimatised in France. Varieties exist in many collections under the name of *Attacus ricini*.

The Atlas moth (*Attacus atlas*) is indigenous to India, Burmah, Java, Ceylon, and China. It is one of the largest of known moths, the wings being frequently ten inches in expanse, and one in the collection of Mr. Thomas Hague, of Stalybridge, measured thirteen inches in expanse. The larvæ feed on the barberry and many other plants. The cocoon is a light umber or drab, with an impress of the leaves of the plant on which the larva fed, and very often with a leaf embedded, roughly granular, scarcely at all silky or floccose, except at the mouth, which, being left un gummed, forms a natural orifice, and is soft and flossy; thus the cocoon is not closed, and the exit of the moth does not leave any disturbance or disarrangement of the fibres. The outside fibre is coarser than that of the ordinary silk of commerce by a little over one-third, and the inner fibre is one-third finer than that of the Indian Tussur. A small quantity of the silk was reeled in the Royal Jubilee Exhibition.

The Emperor moth (*Saturnia carpini*) is found on all our moors and mosses where heather abounds. It constructs a very beautiful cocoon; the fibres are round, except where they come in contact with each other, when they become flat, no doubt from pressure whilst in their soft state, and owing to

this peculiar structure of the fibre, it is very probable that it will never become commercially valuable.

Cricula trifenestrata belongs to the family Drepanulidæ. It occurs in Assam and Burmah. The larvæ are gregarious and feed on the soom tree, and in one district are said to feed on the cashew-nut tree (*Anacardium orientale*), constructing silken bags, in which their cocoons are found in colonies, which cocoons are of a beautiful yellow colour and of a rich lustre, generally opaque, but frequently reticulated, or like net-work. They are very abundant in British Burmah, where they rot in the jungles for want of gathering. The fibre is strong, rich, and glossy, and is spun in Assam in the same way as the Eria silk. The cocoons are of a rich golden yellow after they are prepared for manufacturing. There are several other kinds of cocoons which are reelable, and several hundreds which could be carded and spun; in fact, almost any silken fibre produced by insects if collected in sufficient quantities could be used for manufacturing purposes.

Spider silk has been utilised and made into garments. A British species, *Meta menardi*, constructs a very compact and beautiful cocoon which is generally found in caves.

Pinnæ silk which is made from the byssus of mollusca (such as the mussels), and the Pinna by which they attach themselves to rocks and other bodies, has been utilised. The Rev. H. H. Higgins, M.A., informed me that he had a very beautiful pair of gloves made of Pinna silk.

ZYGÆNA MELILOTI, ESP.

By W. H. TUGWELL, Esq.

In concluding my remarks on this subject, I reply to the Messrs. Briggs' letters in the June number of Y.N. I fully accept Mr. C. A. Briggs' postulate "that the burden lies on those who set up a new species to prove their case." Unfortunately this cannot now be done, for two good reasons. In the first place, the species was added to our British list on the high authority of the late Mr. H. Doubleday, and I take it that no English entomologist would lightly and without well founded reasons controvert his sound ripe judgment in differentiating our macro-lepidoptera. And secondly, as it appears from reported evidence, that the insect under discussion is no longer to be obtained in the New Forest, it is not possible to continue the investigations. I can only regret that Mr. T. M. Briggs, if he was quite certain in 1875, that he had fully proved by his breeding experiments that *Meliloti* was only a dwarf form of *Trifolii*, then I repeat, it is to be regretted

that he did not state that, without his own expressed *three possible doubts*. Surely if he doubted, knowing (as no one else could know) what steps he had taken to avoid any (accidental) error, others, like myself, fully believing in the distinctness of *Meliloti*, and that idea or notion being based on a pretty considerable experience of the insect in its Forest haunt, it was only natural perhaps that we too should doubt, and await a more positive information, that has never been given, so that possibly in nearly every collection of lepidoptera in England, the insect stands as *Z. meliloti*. If Mr. T. M. Briggs had stated as a proved fact that *Meliloti* of the New Forest was only stunted *Trifolii*, none knowing him would have doubted his statement. But if he was not certain in 1875, by what process of reasoning is he positive now? as I do not gather that he has any fresh experience on the subject.

I tried to breed the species in 1872-3, but all my larvæ died in the spring. Mr. Briggs living in the country was more favoured in atmosphere, &c., but even his loss was very considerable, only breeding 3 per cent.

But, admitting that Mr. T. M. Briggs' breeding experiments were conclusive (that was not claimed by Mr. Briggs at the time) and that our *Meliloti* was only a dwarf or stunted form of *Z. trifolii*, still we have it on the great authority of Mr. H. Doubleday that *this form was Z. meliloti*, Esp. (vide "Entomologist," Vol. 6, p. 185.) There Mr. Doubleday states, "*This most certainly is Z. meliloti*, Esp., &c., &c. Up to this present time I have seen no proof whatever, that our New Forest insect is not *Meliloti*, Esp. If Mr. Briggs has proved (?) that, it must fall from its position as a species to a variety only. Even then, I take it, that it would stand on our list as *Z. trifolii*, var. *meliloti*, Esp., and that it would be quite unnecessary to create a new name *ytensis*, Briggs.

It comes as a surprise to me to learn that the *Zygænidæ* require shade? In my experience the whole genus are sun lovers, such as upland dry meadows, hills, *open rides* in woods, &c., even the larger marsh form of *Trifolii*, although found in wet spots, it is always in the open full sunshine one meets with it. *Zygæna exulans* has little chance of covering shade, save the stunted crisp heather that crackles under your feet as you walk over its bare hill-side habitat, or the little trailing azalea a few inches high. It is no alteration of district that has destroyed the haunt for *Meliloti*, it is rather the fact of its only frequenting the open rides, where, by its sluggish habits it is so easily captured by so many too eager collectors. It is quite needless to seek other and at best very problematical causes for its disappearance. The self-same agency has destroyed *Aporia crategi* in the Forest, for the same reason, viz., over zeal in collecting an easily captured species.

6, Lewisham Road, Greenwich, June 4th, 1888.

NATURE IN JULY.

By ALBERT H. WATERS, B.A.

DRAGONFLIES.

There is such an infinity of insects on the wing in July, and so many flowers are blossoming all around

“Now sunshine floods with golden light,
Mountain and mead and moorland stream,”

that it seems a hopeless task to attempt anything like a complete picture of the aspect of nature in July. Butterflies are conspicuously plentiful, the brown “gatekeepers” (*S. tithonus*) are fluttering about every hedgerow, in company with meadow browns, blues, and others.

But for the butterflies and moths occurring in July, I must refer you to previous articles in the *Young Naturalist*. I propose to devote this present paper to a consideration of another order of insects, namely, the dragonflies, we see so abundant at this time of the year, and give some hints for their identification.

In order to identify dragonflies, notice should be taken in the first place of the eyes, and of the form of the wings. Our British species fall naturally into two groups. In the first of these the eyes are more or less contiguous: notice the common brown dragonflies, you will observe they have large eyes nearly touching one another. Another feature you may notice in these common brown dragonflies is that the hind-wings are not of the same shape as the fore-wings. Look at this specimen we have just captured, you see the hind-wings are dilated at the base. Now let us capture one of those pretty little blue demoiselle dragonflies we see darting about. We see its eyes are prominent and wide apart, and its wings are all similar in shape; the hind-wings you see are exactly the same shape as the fore-wings. Notice, too, how extremely slender the abdomen is. Now if we capture a dragonfly with similar wings, eyes widely separated, and a very slender abdomen, we may feel sure it belongs to either the family Calopterygidae or the family Agriornidae; while on the other hand if the wings are dissimilar in shape, and the eyes more or less contiguous, it belongs to one of the four families, Libellulidae, Cordulidae, Gomphidae, or Aeschnidae. Before we can decide to which of these a doubtful specimen is to be assigned, we must observe whether the labium or lower lip is larger or smaller than the palpi. If the latter, it belongs to either the family Libellulidae or the family Cordulidae; both of which have the palpi larger than the labium. Which it is to be referred to may be readily ascertained by noticing the shape of the abdomen: in the family Cordulidae this last is club-shaped.

But we will suppose our specimen has a rather thin and slender abdomen. We know then it must be referred to the family Libellulidæ, but there are over a dozen species belonging to this family; how are we to decide which it is? Before I answer that question allow me to call your attention to the wing of this dragonfly. You will notice there is a slight depression between the middle of what, in a lepidopterous insect, we should call the costal margin, and the base of the wing, and just at this point you see there is a short dark perpendicular line. Now, this particular part of the wing is called the cubital point. All the way along what, in a butterfly, we should call the costa are a series of short perpendicular nervures. Those which come between the cubital point and the base of the wing are called the ante-cubital nervures. Now, in five of the British species of Libellulidæ, the ante-cubital nervures are ten to sixteen in number, in the remaining eight species there are not more than from six to eight. The species with from ten to sixteen ante-cubital nervures are *Libellula quadrimaculata*, *L. depressa*, *L. fulva*, *L. cancellata*, and *L. cærulescens*. The first of these is generally distributed, the others are more or less local.

Libellula quadrimaculata has a body about an inch and four lines in length, and the wings expand about two inches eight lines. The abdomen is brown, rather broad and conical with a black tip. The wings all have a brown spot in the middle of the costal margin, and there is also a brown patch of a triangular shape at the base of the hind-wings. They each have a broad abdomen; the first named a very broad one much depressed. In both species its colour is brown in the female, and powdered with cobalt-blue in the male. Both species are exactly alike in size. The body is the same length as *L. quadrimaculata*, viz., one inch and seven lines, and the expanse of wings similar; that is about two inches eight lines. In *L. depressa* the abdomen is spotted with yellow.

L. cancellata and *L. cærulescens* both have clear wings. In the former they expand the same size as the preceding mentioned species; in the latter they are half-inch less. They are thus easily distinguished from one another; moreover, *L. cancellata* has the abdomen broad, in *cærulescens* it is narrow, flattened, and keeled in the middle. In both species it is covered with a blue bloom in the male. The female is brown, and in *L. cancellata* there are two longitudinal black bands, and in *cærulescens* two longitudinal lighter stripes. They are both local species, but the latter is the most widely distributed.

All the species of Libellulidæ with from six to eight ante-cubital nervures have black legs, but in five of these, viz., *L. flaveola*, *L. Fonscolombii*, *S. meridionalis*, *L. striolata*, and *L. vulgata*, the external part of the legs is

yellow. They all have clear wings and the first three have reddish yellow bodies. In *L. striolata* the thorax is blackish with three oblique black streaks on the sides. The abdomen of the male is reddish, that of the female is yellow brown with two small yellow dots on each segment. *L. flavola* and *L. meridionalis* are alike in size. In length each is an inch and a third, and the expanse of wings two inches and two lines, both have the base of the wings tinged with yellow, in *flavola* this yellow colour extends in the hind-wings to quite a third of their length. In both species the pterostigma or spot towards the tip of the wing is yellow, *flavola* has the nervures of the wings blackish.

In the scarce *Libellula Fonscolombii*, the nervures of the wings are for the most part reddish, the pterostigma is large and yellow, and the base of the wings is tinged with yellow. It is rather larger than *L. flavola*, and has a body of the same length as *L. striolata*, that is an inch and five lines. The expanse of wings in both species is two inches and a third. It must be remarked that in *L. Fonscolombii* the hinder tibiæ of the male insect are black on the outside. *L. vulgata* is the same size and colour as *L. striolata*, but the abdomen is without yellow dots.

The species with legs entirely black are *L. sanguinea*, *L. scotica*, and *L. dubia*. The first-named has the wings tinged with yellow at the base in both sexes in *L. scotica*, those of the male are entirely clear, and only those of the female have the yellow tinge at the base. *L. sanguinea* and *L. dubia* are about the same size in expanse of wing, viz., two inches two lines, but *L. sanguinea* has a somewhat longer body, being sixteen lines in length, while the rare *L. dubia* is only fifteen lines. *Dubia* is easily recognised by the blackish spot at the base of the wings, both have the pterostigma reddish; in *L. sanguinea* the thorax is olive brown, red above, but with this exception the colour of the body is red in the male, yellow brown in the female. In *L. scotica* the thorax is blackish, or olive brown with three yellow spots on the underside behind the legs. The abdomen is short, the entire body measuring only an inch and two lines, and there are generally two yellow streaks on each segment, but specimens of the male occur nearly entirely black. The pterostigma of the wings are square and black.

All the dragonflies in the genus *Cordulia* are bronze green in colour. *C. arctica* occurs in Perthshire in July. It has a yellow spot before each eye, and the face is spotted with yellow. In the English *C. ænea* the face is unspotted. *C. Curtisii* has the face bronze green, the abdomen has yellow spots on the back, in shape it is cylindrical in the male, compressed in the female. All three have clear wings, and the pterostigma is black. In size they are

an inch and eight lines long and expand two inches and a half. *C. arctica* has a body slightly longer than the other two.

In the generally distributed *Cordulegaster annulatus* the labium is cleft at the top. The head is yellow at the back and so also is the upper lip, the thorax is black with eight yellow stripes, the abdomen is black with a yellow band at the middle of each segment. It has a body two inches and eight lines long, and an expanse of wing of three inches and a half. The male has a decidedly club-shaped abdomen.

We have seven British species of the genus *Aschna*. All have the eyes quite contiguous, and the anal angle of the hind-wings of the male acute (rounded in the female.) *Æ. pretensis*, *Æ. juncea*, *Æ. cyanea*, and *Æ. grandis* are all generally distributed. The last three are among our largest dragonflies, expanding very nearly four inches. They all have clear wings, but the last named has them tinted a transparent red brown. In this specimen we have just captured, you see the thorax is reddish brown with two yellow bands at the sides, and you will notice there are four blue spots at the base of the wings, and two oblique yellow stripes and two blue spots immediately following them. You also see the remaining segments are likewise marked at intervals with blue, this shews our specimen is a male, as these markings are absent in the female. But time will not permit us to stay any longer hunting dragonflies, so we must defer the examination of the remaining species until our next ramble.

Cambridge.

ENTOMOLOGICAL NOMENCLATURE.

By JOHN E. ROBSON.

I can quite understand the position taken up by Mr. Tutt on this subject, but venture to think his views will alter before long. On one important point we agree—the desirability of uniformity—but we seek this in different, may I say opposite, directions. I advocate the acceptance of the suggestions or decisions of the British Association, and would take the 12th edition of the “*Systema Naturæ*” as a starting point. Mr. Tutt proposes that we take instead the 2nd edition of the Catalogue of Drs. Staudinger and Wocke. But he only suggests this with the understanding that we are to “reject the errors when it is proved to the satisfaction of every one that they are errors.” I may be permitted to point out that if we reject the errors (I say nothing about the difficulty of satisfying every one), we are not making it our starting point at all, but are going behind it and correcting it by something that has preceded it. Does not this involve the whole controversy? If we are to

correct the Catalogue, what shall we correct it by, and how far shall we go back? Shall we use our own judgment as to the authors whose works are admitted as authorities, or by what shall we be guided? Would Mr. Tutt advise that we accept the nomenclature of an author whose work is poor and imperfect on the whole, but of whose figures and descriptions a few may possibly be recognizable, but whose collection is still in existence and accessible for reference? If another author described and figured a species in a perfectly satisfactory manner, but did not name it, would Mr. Tutt connect his name with the species, or would he reserve that honour for an author who subsequently gave it a name? Many other points might be raised but I do not wish to enlarge. Guenée writes "*Impura*, Albin," because Albin first described and figured the species. Staudinger writes "*Impura*, Hubner," because Hubner gave that name to the insect Albin had introduced to the entomological world half-a-century before. Has the point here involved ever been settled? Mr. Tutt settles it against Guenée and Albin. Why? But another difficulty in the way of taking the Catalogue of Drs. Staudinger and Wocke as a starting point and working from it, lies in the very partial character of the work. It is but a catalogue of the lepidoptera of Europe, or at most of the north-eastern hemisphere. Could we accept it for other reasons, this objection would be fatal. True the "*Systema Naturæ*" does not contain a title of the species known to-day, but it is universal in its application as far as it goes. The "*Synonymic Catalogue of Diurnal Lepidoptera*," by Mr. Kirby, which was published in the same year as the work of Dr. Staudinger and Wocke, is a work of universal application, and might be taken as a starting point on Mr. Tutt's lines, for the butterflies, though I confess I cannot understand a "starting point" based on the works of others. For the other groups we would have to wait. Mr. Kirby's work is certainly of equal merit with that of Dr. Staudinger, though it is not faultless. But should a proposal be made, to accept this and the promised catalogues of other groups, as our starting point, it should be accepted as it stands, and no resurrection men be permitted to alter, on pretence of amending what would then be a settled nomenclature. This is the opposite of Mr. Tutt's proposal to alter Staudinger when there are errors. The best thing of this kind that could be done would be to take the British Museum catalogues, with reference to the Museum collection, but I adhere to the former proposition as really the more satisfactory.

But is Staudinger's work deserving the high praise Mr. Tutt bestows upon it. It is no doubt of great merit. It has been compiled with considerable care, but it has always been noted by British entomologists for ignorance of British species and British authors. I am no authority on no-

nomenclature, and have made but little original investigation, but I can at least compare easily accessible works. There are only 64 British butterflies on the most liberal computation. I find the following discrepancies in their nomenclature between the work in question, and Mr. Kirby's catalogue :

<i>Staudinger.</i>	<i>Kirby.</i>
<i>Argyrotoæxus</i> , Bgstr., 1779.	<i>Argus</i> , Linn., 1761.
<i>Astrarche</i> , Bgstr., 1779.	<i>Alexis</i> , Scop., 1763.
<i>Bellargus</i> , Rot., 1775.	<i>Thetis</i> , Rot., 1775.
<i>Coridon</i> , Poda., 1761.	<i>Corydon</i> , Scop., 1763.
<i>Minima</i> , Fuessl., 1775.	<i>Alsus</i> , W.V., 1776.
<i>Æthiops</i> , Esp., 1777.	<i>Medea</i> , W.V., 1776.

It is not for me to decide between the two, but it is fair to both if I assume that all the references are correct. On this supposition Dr. Staudinger has not given the earliest name in three instances. In one—*Thetis*=*Bellargus*, it appears open to doubt, and in two cases Kirby appears to have erred. But if this proportion of errors (3 in 64, or 1 in every 21) be maintained throughout the work what an appalling total there must be, and when would universal agreement be arrived at if we commenced to correct them.

But it is not for nomenclature alone that Mr. Tutt admires the work of Drs. Staudinger and Wocke. He thinks Mr. South ought "to have gone the whole hog," and followed the arrangement as well as the nomenclature. No doubt some of the arrangement in Staudinger is better than that of South, the position of the LYCÆNIDÆ for instance; but Mr. South has placed some of his species in a more natural position than has Dr. Staudinger, *Miana exopolita* (*Photedes captiuncula*) for one. It would not be fitting that I should here discuss Mr. South's arrangement, but my opinion is that while he adopted too much of that of Dr. Staudinger, he exercised a wise discretion in not following it throughout if he wished his catalogue to sell. There are many points on which we may with perfect propriety, differ, in our present state of knowledge. Thus we may doubt whether the Geometers or Deltoides follow the Noctuæ most naturally, or which is the most appropriate place for the Plumes. But the generic arrangement of Staudinger, and the extraordinary mixture of species in some of the genera, is indeed difficult to understand. Small and easily defined genera, arranged with regard to natural affinity, are most helpful to the young student, but in Staudinger's catalogue we find some of even the largest genera, swollen by the addition of others till they are beyond knowledge. Thus his genus *Agrotis* contains 171 European species, of which about 50 are British, and generally divided into the five genera, *Agrotis*, *Triphæna*, *Noctua*, *Pachnobia*, and *Advena*. Nor are the species of each of these five genera kept together,

and placed in such sequence as has elsewhere been considered natural. They are mixed up almost as though their names had been written on cards, well shuffled up, and then taken down as they came. Thus we have the three yellow underwings: *Ianthina*, *Fimbria*, and *Interjecta*, separated from *Pro-nuba*, *Subsequa*, and *Orbona*, by the interpolation of *Sobrina* and *Augur*; while *Ashworthii* stands between *Baja* and *C. nigrum*. His genus MAMESTRA contains 44 species, 19 of which are British, and generally placed in the following genera: *Pachetra*, *Aplecta*, *Hadena*, *Mamestra*, and *Hecatera*. His HADENA contains 54 species, 20 British, and of the following genera: *Hadena*, *Eremobia*, *Crymodes*, *Mamestra*, *Xylophasia*, *Apamea*, and *Miana*. I cannot go through the catalogue in this way, nor can I comment upon the "mixtures as before," but I must mention his CIDARIA. In this genus he includes 152 species, about half of them being British, and generally placed in the following genera: *Cidaria*, *Melanthia*, *Thera*, *Emmelesia*, *Coremia*, *Larentia*, *Venusia*, *Melanippe*, *Camptogramma*, *Phibalapteryx*, *Oporabia*, *Asthena*, *Eupisteria*, *Ypsipetes*, and *Pelurga*. The species are equally mixed, and some generally included in one or other of these are moved elsewhere. I do not think I need say more on this subject, and hope the discussion on nomenclature, if continued, will not be mixed up with that of arrangement, which is quite another question.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

June 6th, 1888.—Dr. D. SHARP, F.L.S., President, in the chair.

Mr. George Meyer Darcis, of 32, Central Hill, Upper Norwood, was elected a fellow of the Society.

Mr. Pascoe brought for exhibition a book of fine plates of *Mantidæ*, drawn by Prof. Westwood, which it had been hoped would have been published by the Ray Society.

Mr. E. Saunders exhibited a species of Hemiptera, *Monanthia angustata*, H.S., new to Britain, which he had captured, near Cisbury, Worthing. The insect is rather closely allied to the common *Monanthia cardui*, L.

Mr. M'Lachlan exhibited a species of *Halticidæ*, which had been sent him by Mr. D. Morris, Assistant Director of the Royal Gardens, Kew, who had received them from Mr. J. H. Hart, of the Botanic Gardens, Trinidad, with a note to the effect that they had attacked young tobacco and egg-plants badly in that island. Mr. Jacoby had, with some reserve, given as his

opinion that it might possibly turn out to be *Epitrix Fuscata*, Duv., a species which had been described from Cuba.

The Rev. H. S. Gorham exhibited a collection of beetles lately captured by him in Brittany, including *Diachromus germanus*, L., *Onthophagus taurus*, L., *Hister sinuatus*, Ill., and other species which are exceedingly rare, or altogether wanting in Britain, and yet occur very commonly in the North of France.

Mr. Enock exhibited specimens of the Hessian Fly bred by himself, mounted for the microscope.

Mr. White exhibited living larvæ of *Endromis versicolora*, from near Bristol, and remarked that when quite young they are nearly black, owing to being very thickly spotted with that colour; the body-colour is green, and after two or three changes of skin the spots disappear. Mr. White also exhibited two preserved larva of *Phorodesma smaragdaria*, which he had recently taken, and made some remarks concerning the so-called "case" which this insect is said to construct from the leaves of its food-plant, *Artemisia maritima*. This he did not consider to be really the case, but he had discovered that the larva possessed on its segments certain secretory glands, at the apex of each of which there is a bristly hair; this appears to retain pieces of plant, which are probably fixed firmly afterwards by means of the secreted fluid. These pieces are very irregularly distributed, and their purpose does not seem quite evident.

Mr. Lewis exhibited about three hundred specimens of the genera *Heterius*, Er., and *Eretmotus*, Mars. The most remarkable of these was *Heterius acutangulus*, Lewis, discovered last year by Mr. J. J. Walker near Tangier, and were recently taken by him at S. Roche, in Spain. The names of the other species exhibited are:—*Heterius Bedeli*, Lewis, *H. punctulatus*, Lucas, *H. cosmosellus*, Fairmaire, *H. pluristriatus*, Fairmaire, *H. setulotus*, Reitter, *Eretmotus sociator*, Fairmaire, from Algeria. *Heterius acutangulus*, Lewis, *H. arachnoides*, Fairmaire, *H. —*, n. sp., *Eretmotus tangerianus*, Marseul, from Morocco. *Heterius hispanicus*, Rosenb., *H. marseuli*, Brisont, *Eretmotus ibericus*, Brisont, from Spain, *Heterius ferrugineus*, Oliv., from France.—
W. W. FOWLER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

The meeting of June 7th was largely attended, on account of Mr. J. A. Clark's paper on "*Cossus ligniperda*," which in no way disappointed those who had come to hear it. Mr. Clark, commencing with the ova, gave a most exhaustive account of the very wonderful economy of this destructive species, tracing every stage and illustrating every point either by living speci-

mens, or from the series of preserved specimens he brought with him, which comprised some two dozen cases, so beautifully prepared, and giving such practical illustration of everything, that, as was observed at the conclusion, "the paper was so exhaustive as to be plain enough without the illustrations," and the preserved larvæ, &c. "almost told their own life-history without the aid of a paper." At the conclusion a very interesting discussion ensued, during which some amusing anecdotes, respecting the larvæ, were told, one member mentioned one having been placed on the kitchen table under a glass, and needless to say, next morning the larva had disappeared, and the table was somewhat damaged. Another instance of a full-fed larva being found in the interior of a loaf of bread was also mentioned; and the parasite infesting the species also occupied the members. A very hearty vote of thanks to Mr. Clark terminated the proceedings. Among the exhibits may be mentioned, a fine series of *C. ridens* and living larvæ of *L. sybilla*, by Mr. Hanes. A series each of *P. hamula*, *N. pulveraria*, *A. mendica*, and *N. hispidaria*, all bred from ova, by Mr. Hockett. Irish forms of *A. mendica*, by Mr. Anderson, and *A. cardamines* and *P. statices*, by Mr. Gates. Mr. Russell brought up a large number of larvæ of *B. neustria* and distributed them among the members—and some discussion as to the enormous number of larvæ round London took place. Mr. Lewcock gave the members the result of a trip to Brockenhurst, where he found coleoptera fairly numerous, including *Orchesia undulata*, *Athonus vittatus*, etc.

At the following meeting, Mr. Sheldon exhibited bred *Y. impluviata*, *S. culiciformis* with red and yellow belts, *A. alni*, &c. Mr. Hanes had in his box a series of *L. argiolus* and four *N. chaonia*, two from Epping and two from Brockenhurst, there was a very perceptible difference between the two pairs. Mr. Hockett showed larvæ of *E. autumnaria*, and Mr. Clark brought a selection of insects bred that day including *S. tilæ*, *E. pygmæata*, *arbutana*, &c., while Mr. Jarvis brought a large selection of coleoptera chiefly from the Lea Valley.—J. RUSSELL AND E. ANDERSON, Joint Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

May 24th, 1888.—T. R. Billups, Esq., F.E.S., President in the chair. Messrs. A. H. Japp, L. Stevens, and J. C. Matthews, were elected members. Mr. Jäger exhibited a larva of *Nemeophila plantaginis*, which he had found dying, partially covered with mould; on examination he had noticed a small larva (also exhibited) emerging from the caterpillar. Mr. West stated that the larva which Mr. Jäger had found emerging from the *plantaginis* larva was that of the hair worm, the ovum of which had probably been swallowed by

the larva of *plantaginis* while feeding. Mr. Helps shewed *Dianthæcia capsicola*, bred from larvæ obtained in Norfolk. Mr. Adkin, a fine series of *Cymatophora ridens*, bred from pupæ received from the New Forest; the specimens shewed a considerable amount of variation, some of the females being very white. Mr. T. R. Billups, specimens of *Bracon brevicornis*, parasitic upon *Ephestia kuhniella*, and said that Mr. Marshall once reared the female from the galls of *Andricus terminalis*. Mr. W. F. Kirby had bred six males and one female from *Ephestia elutella*. Herr Brischke obtained a male from *Diaryctia abietella*, while Mr. S. Webb, of Dover, had bred a male from *Myelois ceratonia*. Mr. Fenn read a paper on "British Land and Fresh-water Mollusca," which was followed by a discussion. Messrs. Tugwell, Rice, Carrington, Step, Tutt, South, and others taking part.

June 14th, 1888.—J. T. Carrington, Esq., F.L.S., Vice-President, in the chair. Mr. Robinson exhibited ringed forms of the larvæ of *Trichiura cratægi*, from Monkswood, and asked whether it was a common var. of the larva. Mr. Tugwell said he had never met with this peculiar form, although in his experience the larva of this species varied considerable. Mr. Lowery, a male *Teniocampa stabilis*, taken in copulâ with a female *T. gothica*, and remarked that ova were obtained of which only a few hatched, but the larvæ had eventually died. Mr. West, of Streatham, a specimen of a moth reared from a larva found in Switzerland, and which was thought to be *Acronycta leporina*, also a larva obtained on breaking up some tea chests from China, with pieces of the wood shewing the way the chests had been riddled by these larvæ. Mr. Slater said the larva in question was probably that of a species of Buprestidæ. Mr. R. Adkin, specimens of *Cnephasia musculana*, *Eriopsela fractifasciana*, *Phoxopteryx comptana*, *Eupacilia ciliella*, taken at the Society's excursion to Horsley, on May 29th, and remarked that in his experience the present season was even later than in 1887. The Secretary read a communication from Mr. T. D. A. Cockerell referring to a note by Mr. Frohawk in the "Field" (1887, p. 828), as to his having taken a white banded-example of *Sesia culiciformis*, at West Wickham. Mr. Cockerell writes that he had hitherto always classed the bands of the *Sesidæ* with the hind-wings, &c. of *Arctia*, *Zygæna*, &c., as exhibiting a pigment common to all, which was dimorphic, the two forms being yellow and red; some species of *Sesia* have yellow and some red bands, and occasionally a normally a red-banded species would have the bands yellow, but that it should vary to white was quite unexpected and unknown to him, he would therefore ask whether white-banded *Sesia* were known to any of the members, and was the specimen referred to by Mr. Frohawk known anything of. Mr. Frohawk said he had never met with any white-banded forms of this species. Messrs. Hall, Tutt, Williams,

and others said that their experience was the same and a discussion ensued. Mr. Tutt read an article, by Mr. Cockerall, from the "Canadian Entomologist," for May, on "The Nature of Seasonal Dimorphism in Rhopalocera." Mr. J. T. Williams mentioned that in the neighbourhood of Foots Cray, Kent, the larvæ of *Bombyx neustria* was unusually abundant, also that he had noticed a number of hibernated specimens of *Vanessa cardui*. Mr. Carrington and Mr. Tutt also recorded the appearance of *V. cardui*, and referred to large number of *Plusia gamma* noticed in different districts.

NOTES AND OBSERVATIONS.

THE STURGEON AT HARTLEPOOL.—A Sturgeon was brought to the fish quay here, to-day, by a trawler. It was a fine fish, measuring six feet in length, and was still alive when I saw it about mid-day. This is the third that has been brought here to my knowledge within a twelvemonth.—JOHN E. ROBSON, Hartlepool, 1st June.

ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA.—*Vanessa cardui* has appeared this season in enormous numbers. Here in the North of England, they have swarmed even in our streets. The weather has been cold, dull, and unpropitious, but they have been everywhere. It is curious, too, that they are accompanied by *Plusia gamma*, as has happened before. When they first appeared, both species were exceedingly fine, and had not the appearance of hibernated specimens. From almost every correspondent I have the same particulars—the sudden appearance of both species, and the fine condition they were in. No doubt we will hear more about them later on. One correspondent writes that *Cardui* was abundant last spring, but that he found few larvæ on the thistles.

Another butterfly, *Anthrocaris cardamines*, has also appeared in very unusual numbers in many places. At Redhill, Surrey, it is reported as a common garden insect. At Dover, Mr. Webb writes, it is most abundant, and that a specimen has been taken with the wing tips yellow instead of orange. At Leatherhead it is also common, and elsewhere. In this district it is more abundant than I ever saw it. Sometimes we scarcely meet with it for years. Last year I saw one only, now it is almost as common as the whites. Mr. Barron, of Hutton Henry, saw five on a small flower bed at once. I would be pleased to know if the abundance of this species has extended to the West of the Island and to Scotland. The female is rarer than the male at all times.

Doubting whether this was because its resemblance to the common whites caused it to be passed by, I took every white that came in my way, for an hour the other day. I obtained no female *Cardamines*, but captured six males, and saw many others.—J. E. ROBSON, Hartlepool.

AN OLD ZYGÆNA MELILOTI.—I have a specimen of *Zygæna meliloti* taken by my father forty or fifty years ago.—C. W. DALE, Glanvilles Wootton.

THE SYNONYMY OF CÆNOBIA RUFÆ.—I would ask Mr. Tutt why, in correcting Messrs. Robson and Gardner, he did not also correct the error of Dr. Staudinger and Mr. South who write *Cænobia*, Haw. ? Haworth included *rufa* in his genus *Phytometra*. Mr. Kirby, in the "European Butterflies and Moths," writes *Cænobia*, Steph. Stephens, in his "Illustrations," included it in his genus *Ancometia*. In the "British Museum Catalogue," Part V.—Lepidoptera, printed in 1856, the genus is given thus: *Cænobia*, Steph. M.S.S. In referring to the specific name, Mr. Tutt writes, "The name *rufa* has been in constant use since 1803 (the date of publication of Lep. Brit.) by British authors." Unfortunately for Mr. Tutt, Haworth described it in the second, not the first part of Lep. Brit., and this was published in 1810. The genus appears to have been first characterized by Kirby and the proper synonymy ought to stand thus:

Cænobia, Kirby, 1882.

rufa, Haw., 1810.

despecta, Tr., 1825.

C. W. DALE, Glanvilles Wootton, 7th June.

[A further rejoinder by Mr. Tutt is to hand, and will appear.]

AN INSECT WITH SIX WINGS.—Five weeks this morning, while walking in Bywell Wood, I caught a moth which I do not know. It is about the size of *Salicata*, but do I not recognise it as such. It has four ordinary wings, and two wing-like appendages about the sixth of an inch long, white, fringed like the other wings. As I have not seen one like it before I think it must be an unusual occurrence, and would be glad to hear something about it.—J. BATES, Wellingborough, 18th June.

HELIOTHUS PELTIGERA.—I had the pleasure of taking a fine specimen of this insect here on 15th June. It is a female, and appears to have deposited all its eggs. This makes the third taken here that have found a place in my cabinet, though it is the first that has fallen to my own net—JOHN E. ROBSON, Hartlepool.

EPHIPPIPHORA REGIANA.—I took some pupa under sycamore bark this year that have produced this species. I am not aware that it has been found here before, though I believe it occurs in upper Teesdale.—JOHN E. ROBSON.

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BRITISH FROGS AND TOADS.

By LINNÆUS GREENING.

(A Paper read before the Warrington Field Club November 18th, 1887.)

I TRUST there need be no apology for bringing to your notice, to-night, our British Frogs and Toads; this will complete the survey of our British Batrachians, which we commenced last winter, when we considered the Caudata, or tailed members of this group, viz., the Newts.

Those we are about to consider belong to the division of the sub-kingdom Batrachia, known as Anoura, or Ecaudata—tailless.

The majority of people regard both frogs and toads with feelings of disgust, and would probably like to annihilate them, but if their cruel wish were gratified, I think they would be in as unpleasant a fix as was a certain monarch whose name is familiar to most of us. We read in a book of extreme antiquity that a certain Pharaoh was so disgusted at the number of frogs in his dominions, that he resorted to extraordinary means to get rid of them. The result was, as might have been expected, that the plague of frogs ceased, but a plague of insects followed. As frogs prey on insects, both in the larval and adult forms, the removal of the natural check on their multiplication, produced the unpleasant results recorded.

That which was true some 3,000 years ago is true to-day, and any interference with the balance of nature, in the direction of wholesale slaughter of Batrachians, is to be deprecated now, as then, and for similar reasons.

But though from the book above referred to we have learnt, if we rightly apprehend the meaning of the anecdote just quoted, a not unimportant lesson; yet we must go to the book of nature itself and study it carefully, if we wish to form accurate ideas of how existing forms have come to be. The development and life history of any one of our British Batrachians can be easily observed in captivity, and will shew the student one of the most im-

portant steps in the evolution of the higher animals, by exhibiting the transition, in the life-time of an individual, from the fish to the reptile.

Of natural history it has been well said, that in its shallows a child may wade, but in its depths a giant must swim. Whether, however, we wade or swim in the sea of knowledge, we shall be the better and not the worse for our experience. We shall be led on silently, in wondering admiration to higher and juster conceptions of the governing mind of the Universe, whose operations are as obvious in the organization of a worm as in the immensity of the heavens.

Perhaps no creatures have suffered more than frogs and toads from cruel oppression, the child of ignorance, nursed in the cradle of superstition: Before the penetrating light of science the dark image of oppression is receding, and with the spread of knowledge, we may hope to see a corresponding growth of wisdom, and the consequent extinction of those prejudices on which oppression rests.

No British Batrachian can harm man in any way; in fact it would be difficult to find in the whole scale of creation more harmless animals than our frogs and toads. The general repugnance with which they are regarded is probably a legacy inherited from our superstitious ancestors, who either feared or worshipped all which they did not understand, and, as the most superstitious could scarcely worship a frog or toad, they have been regarded as incarnations of evil.

It will be well to emphasise the fact that the word reptile is incorrectly used when applied to frogs and toads, although it was so employed by the earlier naturalists, whose classifications were based on the external form rather than on structural affinities. This mode of classification is most misleading, for according to it, a whale would be classed as a fish, whereas it is a mammal, suckling its young; and again, our common blind-worm would undoubtedly be classed as a snake, whereas it is really a lizard. The most obvious external character by which our British Batrachians can be distinguished from reptiles, is the absence of scales, which are present in all our reptiles. No reptile undergoes any metamorphosis after leaving the egg, whilst all Batrachians do so: starting life as fishes, and never leaving the water until they have developed the lungs of terrestrial animals. In watching the tadpole of a frog or toad, we notice, soon after birth, the presence of the external gills, in which the blood is aerated. In a few days these are absorbed, and, in the meantime, internal gills have been developed, which suffice for the aeration of the blood, until the lungs have been developed, when the animal becomes terrestrial in its habits, only returning to its native element for the reproduction of its species.

Whilst the respiratory apparatus is becoming reptilian, the heart is also passing from its primitive fish-like simplicity, possessing only an auricle and a ventricle, and containing only venous blood, to a higher and more complex form, possessing two auricles and a ventricle, in which, though a partial mixture of pure and impure blood takes place, yet we can see traces of the subsequent perfection of this organ.

The result of this mixture of arterial and venous blood is that frogs and toads are cold-blooded.

An absolutely distinctive character of the Batrachian as compared with the reptilian skeleton is, that in the former, the skull articulates with the vertebral column by means of two condyles, while in the latter only one occipital condyle is present.

Another character of the Batrachian skeleton is the absence of ribs, which play so important a part in facilitating the respiration in all higher animals, in which the breast bone and ribs are capable of moving in such a manner as to alternately increase and diminish the size of the thorax, so giving rise to an inspiratory and expiratory flow of air.

Frogs and Toads being destitute of ribs can only breathe by swallowing the air. In this process the throat is alternately distended and contracted, this curious action having no doubt given rise to the idea that the animal was just getting ready to spit upon its foe the venomous fire of ancient fable. The real cause of this movement is the alternate contraction and relaxation of the muscles, which first depress the tongue, thus enlarging the cavity of the mouth, into which the air rushes through the nostrils; these are then closed by the tongue, and the contraction of the muscles, diminishing the cavity, forces the air into the lungs; for when the muscles of the throat contract, appropriate muscles simultaneously close the entrance to the stomach, and as the tongue prevents the air from escaping by the nostrils, it can only go to the lungs. It follows that to prop open the mouth of a Batrachian is sufficient to cause death by suffocation.

The bones of the fore legs are short, but those of the hind legs are greatly developed; forming long levers for the muscles, which give to these animals their great swimming, and to the frogs, their great leaping powers. Anyone who has seen a frog or toad swimming, cannot fail to have noticed the ludicrous resemblance which it presents to a man.

Near the hinder part of the back of a frog or toad are two protuberances, behind which the back falls suddenly, and presents a somewhat triangular form, the apex of the triangle being the extremity of the body. This appearance is due to the peculiar shape of the pelvis, as anyone who has seen a frog's skeleton will know. The iliac bones which form the sides of the pelvis are

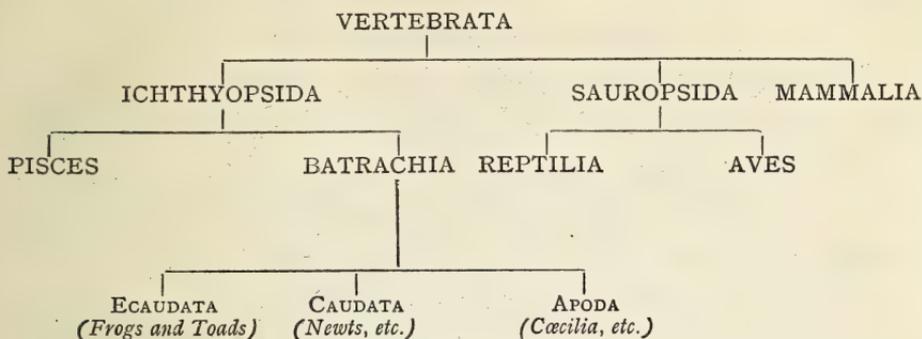
extremely elongated, and articulate with the two large transverse processes of the sacral vertebra. These articulations cause the two protuberances externally visible, and give the creature the appearance of having had its back broken. The vertebræ behind the sacrum coalesce and form the urostyle, the skeletal representative of the tail of the tadpole. Frogs and toads have four digits on each of the forehands, the thumbs being rudimentary, on each hind-leg there are five digits, all without nails. Our toads are destitute of teeth, whilst the frogs possess teeth, both on the upper jaw and vomers, thus enabling them to feed with more rapidity and greater certainty. In these creatures the tongue is of great importance in catching food. It is soft and fleshy, and of peculiar construction; instead of being free in front, as in the higher animals, it is fixed in front and free behind. When at rest the tongue lies on the floor of the mouth, but when extended in use, the point comes upwards and forward, and reaches some $1\frac{1}{2}$ inches beyond the mouth; the movement being exceedingly rapid. The tongue of the toad is rounded at the tip, whilst that of the frog has at either side a small fleshy protuberance, and in both species the tip is supplied with a viscid fluid to which their food adheres.

The covering of the ear is visible, and is represented by a circular patch, differing in colour from the surrounding skin. Both frogs and toads are quick of hearing, perceiving the faintest sound, even that made by a caterpillar moving on the ground behind them, and I have also noticed that they can locate the sound with great accuracy. The most beautiful organ possessed by these creatures is undoubtedly the eye, which has an intense lustre, the pupil being black, surrounded with a gold ring.

To see a frog swallow its food, is to be highly amused, or equally disgusted, as the remarkable manner in which the eyes seem to disappear into the head gives it a most extraordinary appearance. This power of withdrawing the eyes is of great value, as their ordinary elevated position, which enables them to see in almost any direction, at the same time exposes them to considerable danger, more especially when crawling into crevices for shelter, or to evade a passing foe.

Of the 800 species of tailless Batrachians (Ecaudata) we in Britain possess four; and these belong to two families viz., Ranidæ and Bufonidæ.

Before giving a detailed description of these four species, it will be as well to put in as concise a form as possible, their most striking characteristics.



RANA TEMPORARIA (*Common Frog.*)

Skin—smooth. Length of body, $2\frac{3}{4}$ in. to 3 in. Fore legs $1\frac{1}{2}$ in. long. Hind legs 4 in. long. Fore feet not palmated. Hind feet much palmated. Legs formed for jumping and swimming. Head triangular, snout pointed.

Dorsal ground colour very variable—from light yellow to dark green—from pale rufous to brick red—from light to dark brown.

Ventral surface pale yellow to light green, irregularly marked with brown. Upper surface of legs persistently barred and spotted with brown.

Dark brown patch running from eye to shoulder; this is a constant feature in this species. Two well-marked dorsal ridges.

RANA ESCULENTA (*Edible Frog.*)

Skin—smooth, or slightly tuberculated on back. Length of body 3 in. to $3\frac{1}{4}$ in. Fore legs $1\frac{1}{4}$ in. long. Hind legs $3\frac{3}{4}$ in. long. Fore feet not palmated. Hind feet much palmated. Legs formed for jumping and swimming. Head triangular, snout pointed.

Dorsal ground colour generally green, variable to brown, with irregular black splashes along the dorsal ridges; well-marked median dorsal line.

Ventral surface, milk white, spotted or marbled with greenish brown.

Upper surface of legs splashed with black, and sometimes barred.

BUFO VULGARIS (*Common Toad.*)

Skin—warty, densely covered with tubercles. Length of body 3 in. to $3\frac{1}{4}$ in. Fore legs $1\frac{1}{2}$ in. long. Hind legs 3 in. long. Fore feet not palmated. Hind feet palmated. Legs formed for running and swimming. Head rounded, snout blunt.

Dorsal ground colour, ashen grey to dark brown, or from dull olive green to dirty yellow; irregularly spotted over back and legs with darker markings, sometimes forming irregular bands.

Ventral surface, greyish green, speckled with brown.

BUFO CALAMITA (*Natterjack Toad.*)

Skin—warty, densely covered with tubercles. Length of body $2\frac{1}{4}$ in. to $2\frac{1}{2}$ in. Fore legs $1\frac{1}{8}$ in. long. Hind legs $2\frac{1}{2}$ in. long. Fore feet not palmated. Hind feet palmated.

Legs formed for running and swimming. Head rounded, snout blunt.

Dorsal ground colour, yellowish brown, suffused with olive, and marbled with black; well-marked dorsal line of brimstone yellow colour.

Ventral surface, greenish white, marbled with black.

A frog can at once be distinguished from a toad by its smooth skin, and jumping powers. The common, can be distinguished from the edible frog, by the presence of the brown patch running from the eye to the shoulder, and by the absence of the dorsal line.

The common toad can be distinguished from the natterjack, by the absence of the yellow dorsal line, which is a constant feature in the natterjack, and also by its sluggish movements.

In the larval form, the common frog may be distinguished by its being speckled all over with gold coloured spots. The edible frog larva differs from that of the common frog, in being free from gold coloured spots, and in having its ground colour greenish (instead of brown), marbled with olive. The toads are of a uniform blackish brown. The natterjack tadpole can be distinguished from that of the common toad, by its denser black colour, and smaller size.

(To be continued.)

NOTES ON ZYGÆNA LONICERÆ AND Z. TRIFOLII.

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

I am not in a position to throw any light on the discussion of the specific identity of *Zygæna meliloti* with *Z. trifolii*, but to those who are interested in this remarkable genus the following may be interesting, relating as it does to one of the forms under discussion (*trifolii*), and another closely allied species (?) *loniceræ*. But before relating a strange experience, it may be advisable to point out that with regard to the former of these species (*trifolii*), there seems to be at least two distinct forms. *Zygæna loniceræ* is most constant in its markings, the spots rarely coalescing, and being of a fairly large size. Of *Zygæna trifolii*, there are, as mentioned above, two (at least) very distinct forms occurring at different times. One, a large strongly marked form, inhabiting marshy districts, the two central spots on the anterior wings

frequently coalescing, and often all five more or less joined together. This large form occurs with us in July; last year (1887) I bred several between July 7th and 16th. Another, a small dwarfed form, exhibiting the same depth of colouring, the same peculiar characteristics relative to the coalescing of the spots, but occurring generally three or four weeks earlier than the large form, and in more exposed situations. These are facts well known to our older lepidopterists,* but I am not certain that they are to the younger ones. I have collected nearly a large cabinet drawer full of these species from different localities, and have found that in some localities the two forms of *trifolii* occur side by side at the same time, whilst in others the forms are distinctly separate, and only one is found in the same locality at the same time. In the first week of July last year, I had a number of specimens sent me from Carmarthen by Capt. Robinson, the largest being quite characteristic of our large form, the smallest quite characteristic of our small form, whilst there were others intermediate, some of which were not distinguishable from *loniceræ*. I have also some captured near Tenby, on June 26th, 1887, presenting the same characteristics. I do not know that any one has ever had the courage, (perhaps temerity would be nearer the mark,) to question the specific difference between *trifolii* and *loniceræ*, but the following has led me to the conclusion that *trifolii* in all its forms, large or small, are only isolated and local modifications of *loniceræ*, and that *loniceræ* and *trifolii* are specifically identical, the latter modified by its environment and food-plant.

In North Kent, in an open part of a wood, in 1871-1873, I met with a large number of *loniceræ* in all its stages. It was exceedingly abundant and of the normal size, and although I looked over an immense number, I never saw, and never yet have seen, a blotched *loniceræ* in that or any other locality. I worked the locality thoroughly and never saw *trifolii*, but was astonished to find, in 1875 and 1877, numerous specimens of *Z. trifolii*—the small form—in an open field, with only a narrow belt of brushwood, some 30 or 40 feet through, between the field and the *loniceræ* ground. This was the first week in July, about the same time that *loniceræ* appeared, and with

* These assumed facts must not be always depended on. In some places the *dry* hill-side *trifolii* are larger and more confluent in their markings, and much earlier than the marsh, small and not often confluent specimens, which spin up like *Filipendulæ* on the grass stems.—Ed. Y.N.

+ I know that many of my friends have blotched *loniceræ* in their cabinets, but when the spots are joined it is almost impossible to determine their specific identity, unless the captor takes such specimens among a number of typical ones. As a rule, I find those who possess blotched *loniceræ* did not capture them, and know but little about them.—J.W.T.

the exception of the specimens being very small, and the central spots tending to become confluent, they were simply small *loniceræ*. In 1881, when I next visited the ground, they were still abundant, and were now real, undoubted *trifolii*, smaller than in 1877, many with their spots completely coalesced, and among them one variety, *lutescens*, with yellow spots. The pupæ were characteristic *trifolii*, and did not, as in the case of *loniceræ*, spin their cocoons on the stalks of their food-plant grass, &c. I could not find, moreover, a single point of difference between the larvæ of the form in the field and those of *loniceræ* in the wood. But the most remarkable thing was, that in 1881 they appeared earlier, and in 1882 they appeared on June 14th, but in greatly diminished numbers. In 1883 they again appeared in the middle of June, but there were very few, and since then they have been absent altogether. I remember once an old collector saying to me: "You can get both the five spots down there, but one of them only occurs sometimes, after the wood is cut down. They will occur for a few years and then you must wait." I believe this statement contains the whole secret of the matter. When the narrow belt of brushwood is cut down, I am of opinion that *loniceræ* spreads into the field, and instead of feeding on the tall succulent vetches which are so abundant in the wood, it has to content itself with the low-growing vetches in the field where the tall *Vicias* do not occur. The first element, therefore, in this probable development is phytophagic, then the more exposed nature of the field as compared with the wood, and the drier nature of the soil, naturally does its share of the work, and a form is produced very different to *loniceræ* type. Why it should become extinct, I am, of course, unable to say. Certain it is that a process of deterioration gradually goes on owing probably to phytophagic or altered conditions of environment, until the miserable little specimens which are produced die out. I believe there is no genus which is more directly influenced by its surroundings than this. The *loniceræ*, which occur in the wood I have before referred to, are always smaller the two years succeeding the cutting down of the wood, but soon attain their normal size. I do not, however, think it wise in the present indefinite state of our knowledge, that the above supposition should be taken for granted. I assume that specimens of *loniceræ* do pass from the wood to the field, and that then certain changes go on. I cannot prove this, and I trust no one will yet suggest, unless something much more definite is known by other lepidopterists, that any change in the treatment of *trifolii* and *loniceræ* as distinct species should take place. The idea of treating *trifolii* as a variety of *loniceræ* on the above evidence would be absurd, whilst the breeding of *trifolii* from ova of *meliloti*, or var. *ytensis*, Briggs, is most conclusive.

Another remarkable instance relative to this genus is that of *filipendulæ*, var. *ochsenheimeri*. We all, I suppose, generally couple *filipendulæ* with bleak hill sides and exposed situations, and not with woods and marshes. But a form of *filipendulæ* occurs in these latter places, which is sometimes developed to an enormous size, and has a minor but constant character, which has led many to suppose it to be distinct, viz., a green nervure passing through the lower of the outside pair of spots. I took a remarkable aberration of this variety, with five spots on one anterior wing and four on the other, not larger than an ordinary *filipendulæ*, but in copulation with a very large characteristic specimen of var. *ochsenheimeri*, in June, 1888. This variety occurs during the first three weeks of June, before *filipendulæ*, as a rule, is full-fed or ready to pupate.

That modifications in environment produce great changes in this genus is certain, and that many of our European species are only local forms of other species, seems equally certain, but I find the study of the imagines of this group leads to misleading results, and one wants to study the insects in nature to get any practical result. As far as study of the imagines go, I doubt very much whether our *meliloti* is identical with the variety or species known as *meliloti* on the continent. It is a lighter made, narrower-winged insect, and there is a difference in the arrangement of the scales, but my continental *meliloti* from different localities also vary, and it is premature to make any statement as to this matter.

THE NEW FOREST MELILOTI.

By C. A. BRIGGS.

Although it may be, as Mr. Tugwell says, too late now for any further investigations as to our New Forest insect, yet in 1875, when the fact of typical *Trifolii* being bred from typical New Forest *Meliloti* was published, there was abundant opportunity for further investigation by any one who still felt unconvinced of their specific identity.

Why Mr. Doubleday's opinion that our insect is *Meliloti* should be, as Mr. Tugwell says it is (p. 131), one of the two obstacles to its being proved to be so, I cannot see, but, up to the present time I have seen no proof whatever, that our insect is *Meliloti*, Esper. Mr. Tugwell unfortunately mis-quotes Mr. Doubleday's words in a very important particular. Mr. Doubleday does *not* say (Ent. 6, p. 186) that our insect is certainly *Meliloti*,

Esper., but only that it is certainly *Meliloti*. The importance of the insertion of the name "Esper" by Mr. Tugwell will at once be seen.

Mr. Doubleday then proceeds to give almost word for word the description of the larva which Boisduval gives as Esper's, but which really is different from Esper's own description.

Doubleday also says of our insect, "*wings more pointed than Trifolii*," and speaking of the upper of the two intermediate spots says, "*always oval or oblong*," thus flatly contradicting Esper's description, (maculis 5 rotundatus) but following Boisduval's so closely as to make it evident, that *he all the time was merely quoting from Boisduval, and was neither acquainted with Esper's description, nor was describing our Meliloti*, for as Mr. Gregson (Y.N. Vol. 8, p. 229) very truly says of our insect, the wing has a *rounder point than Trifolii*, which is plainly the fact, and although, as he so well puts it, the general appearance of the two is like that of "a race horse to a carriage horse," yet we must not forget that a race horse and a carriage horse, are after all but forms of one species.

Again, Esper's description of the larva is utterly different from anything ever recorded from the New Forest. Will not Mr. Tugwell, even at this late period, tell us whether the description of his larvæ of 1872-3, or that of the solitary unknown larva found by him (Y.N. p. 100), accords with that of Esper (not Boisduval) or not, and whether his eggs were perceptibly larger than those of *Trifolii*.

At page 54 of the present volume Mr. Tugwell says. "Under any condition, the New Forest *Trifolii* has such settled differences from normal *Trifolii* that it is desirable for it to be a named form." Accepting his suggestion, and provisionally on its being distinct from *Meliloti* Esper, I named it *Ytenensis* (p. 82), yet now (p. 132) Mr. Tugwell says, that even if proved to be distinct from *Meliloti* Esper, it should still stand as var. *Meliloti* Esper. I confess I fail to follow his argument. *Exulis* is beyond the discussion and no one has contended that the imagines of the Zygænidæ require shade; the question is the difference produced in the larvæ of *Trifolii* that feed upon plants growing in exposed dry places from those feeding in sheltered moist places.

One word more. Mr. Tugwell is doubtless speaking within his own knowledge in saying that over zeal in collecting has *destroyed* our New Forest *Meliloti*. But that is *not* the question under discussion, which is—What is our New Forest *Meliloti* and, if a form of *Trifolii*, what *produced* it in the New Forest?

NATURE IN AUGUST.

By ALBERT H. WATERS, B.A.

" Summer suns are glowing
 Over land and sea,
 Happy light is flowing
 Beautiful and free !

BISHOP WALSHAM HOW.

With a hot summer sun shining overhead, we start on a bright August morning on a naturalising ramble. Nature now is very cheerful in aspect, although withal a trifle dusty.

Butterflies of every hue
 Purple, yellow, crimson, blue,

are conspicuous features, and we see many fluttering about the road-side hedges. We will, however, leave the dusty road as soon as we possibly can, and take a ramble by the banks of the clear stream we see flowing through the meadows, on its way to the sea.

We will again turn our attention to the dragonflies we see in such numbers.

There goes a very fine one. Ha ! we have him. We see at once it is an *Æschna*, and from the red brown tint of the clear semi-transparent wings, and the two yellow bands we notice on the sides of the red brown thorax, and the absence of markings in front, we feel sure it is the generally distributed *Æschna grandis*. Besides the yellow bands on the sides of the thorax, we see there are two oblique yellow stripes and two blue spots, immediately following four blue spots at the base of the wings.

Here is a larger specimen, and we see it differs in several respects from *Æ. grandis*. The wings in the first place are perfectly clear, and the pterostigma black instead of red as in the other. We see blue spots on the sides of the abdomen and other blue dorsal spots near the apex, while every segment as far as the seventh has two green spots on the back. From the just mentioned blue spots we infer our specimen is a male, as in the female all the spots are yellow green. Besides these spots we see two large oval shaped ones of a yellow green colour, on the front of the brown thorax, and we also notice that the sides of the body are yellow green, divided by dark lines. From these characters we recognise our specimen as *Æschna cyanea*.

Another large species of *Æschna* is *Æ. juncea*, but it is less common than the ones just mentioned, although I believe it is pretty generally distributed. Like *cyanea* it has clear wings, the pterostigma in the male is black, but inclined to ochreous in the female. The male has the thorax blacker than the female ; in the latter it is inclined to brown, and in both sexes there are two straight, or nearly straight yellow stripes in front. In the male insect

these stripes are interrupted, but continuous in the female. The colour of the slender cylindrical abdomen varies with the sex; in the male it is black, with two blue spots on each segment, and yellow markings at the joints; in the female it is brown with yellow spots instead of blue.

Both *Æ. juncea* and *Æ. cyanea* have wings measuring three inches ten lines from tip to tip, and a body two inches eight lines in length. *Æ. grandis* expands about a sixth of an inch less, but the length of the body is the same. These are the largest of the genus and our finest dragonflies, but there are some others of the genus not nearly so large. *Æ. pratensis*, for instance, only expands two inches ten lines, and has a length of body only two lines over two inches. It has the abdomen spotted with blue in the male and with yellow in the female, and two yellow bands on the thorax at the shoulders: the wings are generally clear, but rather tinged with yellow at the base in the female; the nervures are reddish, as is also the long narrow pterostigma.

In the local *Æ. mita* the wings expand two lines more than *Æ. pratensis*, and the length of the body is two inches and a third. The brownish black thorax has two yellow spots in front, and two bands of the same colour at the sides, the abdomen is similar in colour to the thorax, and spotted with dark blue in the male and with yellow in the female. The male has the wings clear, in the female they are light brown; both sexes have the pterostigma dark. Another local species (*Æ. rufescens*) occurring in the south of England has a brown abdomen with only one yellow spot on the dorsal part near the base. There are two yellow bands on the brown thorax, and these are all the markings there are on the body. The wings are clear but rather reddish brown, the pterostigma is ochreous. The length of the body is two inches and a half, the expanse of wings three inches and a third.

In the south of England, at this time of the year, one of the finest of the British dragonflies *Anax formosus*, occurs: I believe Bournemouth is one of its localities. The genus to which it belongs differs from *Æschna* in having the anal angle of the hind-wings rounded in both sexes instead of being so in the female only, as is the case in the dragonflies just mentioned. They are clear and broad, with the accessory membrane dark at the narrow part and white at the base; the very narrow pterostigma differs in colour in the sexes being dark in the male, and ochreous in the female. The bright blue abdomen is rather broad and depressed and in the male is narrowed near the base; it has a black pattern on the back. The thorax is bright green, in size it about the same as *Æschna grandis*, but the expanse of wings is greater, equalling that of *Æ. juncea* and *Æ. cyanea*.

But numbers of small demoiselle dragonflies are darting about above the stream or resting on the water lily leaves. We will capture some of them. This specimen we have here, you see has the eyes wide apart from each other, and both fore and hind-wings are alike in shape. You may also see there are numerous ante-cubital nervures from whence we infer our specimen belongs to the family Calopterygidae and to the genus *Calopteryx*. We notice further that the wings are broad and deep blue, and the body also blue in colour, this specimen is therefore a male. This other one we see has the body metallic green and the wings a clear brown; it belongs to the same species as the other: one is the male and the other is the female of *Calopteryx virgo*. There is a variety known as *C. vesta*, lighter in colour than the type.

Another of these demoiselle dragonflies has narrow wings, deep blue or black in the centre only, from whence it can be at once distinguished from *C. virgo*. It is known as *C. splendens*; the colour of the body is the same as in *C. virgo*.

This other specimen is much smaller than *Calopteryx virgo*, and we see the thorax is yellow and the abdomen green. It is the female of *Platynemis pennipes*; the male is blue with a black band across the head between the eyes, and two longitudinal black bands and two lateral ones on the thorax. We see that the anti-cubital nervures of the wings of this species are two in number, and it is the same in the genera *Lestes*, *Agrion*, &c., but all these have legs with cylindrical instead of dilated tibiae as is the case in the genus *Platynemis*. *Lestes nymphæ*, and *L. sponsa* are both metallic green and have the back of the head bronzed, wherein they differ from *L. virens*, which has the head yellow. It occurs in the New Forest.

Here is another little dragonfly which we recognise as *Agrion puella*. It is the same size as *Platynemis pennipes*, that is it expands an inch and four lines. It has a dark thorax with blue lines, and the prothorax is divided into three lobes, the abdomen is blue with bronze coloured spots, and we see a forked-shaped one on the second segment. Our specimen is a male; the female has the abdomen bronze coloured with lighter spots at the joints. There are several others belonging to this and the allied genera, but want of time forbids their mention. A deep red coloured species is known as *Pyrrhosoma minium*, it is rather larger than *Agrion puella*; the thorax is dark bronze with a red stripe on each side. *Ischnura elegans* has the thorax and abdomen black, excepting the eighth segment of the latter, which is blue, and the incisions which are yellow.

But, however, we must now give up hunting dragonflies. Leaving the stream behind us we cross a meadow, and then go through a wood, and perhaps we may meet with *Leucophasia sinapis* or *Arge galathea*. Here is a

moth a rest on a tree trunk, which we recognise as *Selina illustraria*; and this pale grey noctua we find asleep on an oak tree is *Cymatophora diluta*. Now leaving the wood we will go through this meadow, and ascending a gently sloping hill, we behold not a great way off—"The sea! the sea! the glorious sea!" lying placid as a lake in the hot August sun. Half-an-hour's walk across meadows and a sandy dune, where butterflies are fluttering about in the hot sunshine, brings us down to the beach. Numbers of green shore crabs (*Carcinus menas*) are running about on the wet sands from which the tide has just receded. We secure one or two for the aquarium, where they make very amusing pets, and are readily tamed, soon becoming on familiar terms with their owner. I feed them on fresh scraped meat or a small earthworm or two, and they soon get to look for food from my hands. They require very shallow water, and like the aquarium so arranged that they can leave the water altogether when they choose. Like all crustacea they exuviate their shells at intervals until they are full-grown. For some days before this takes place they refuse all food and are then extremely irritable. When a number are kept together it is advisable to separate from their companions those which are evidently about to moult, or they will run the greatest risk of being killed when soft and helpless. It is a singular circumstance that a crab, which before its moult is deficient in a claw or a leg, will afterwards be found to possess the normal number. I had a crab once which came off second best in a combat with another of his species, and in the fight lost both his claws and three of his legs. Until the time of his moult he lived a miserable cripple with only five legs, but he used two of them to put food into his mouth. When he had exuviated, lo and behold! he had his full complement of limbs! It seems marvellous that they should be so suddenly renewed; had they budded and gradually grown again in the manner they are popularly supposed to do when lost, it would not have been so surprising.*

This little pool left by the retiring tide seems full of life. We can see the shrimps settling themselves down in the sand, and there seems any number of the familiar crustaceans. Shrimps will do very well in captivity fed on scraped beef, but they do not thrive in a vase; they are best kept in a broad shallow pan half filled with sea sand, and with just sufficient water to cover them. I keep mine in very shallow water, not more than an inch deep in the deepest part, and shallowing towards one end where the sand is only just covered. Arranged thus they live for many months; I believe the natural

* My experience of crabs, &c., losing and renewing their limbs, is that after the first moult the new claw is not so large as before, but after another moult or so it attains its full size. I have also noticed them in a state of nature with a small claw.—J.E.R.

length of their lives, for I have had them while they grew from tiny individuals to immense large ones, which they did in rather over twelve months. I fancy their length of life is from eighteen months to two years at the outside. But although we would fain linger and investigate marine life in August, we must now terminate our ramble for the present.

Cambridge.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

July 4th, 1888.—Dr. David Sharp, F.L.S., President, in the chair. Mr. Walter de Rothschild, of Tring Park, Tring, Hertfordshire, was elected a Fellow of the society.

Mr. Enock exhibited male and female specimens of a spider received from Colonel Le Grice, R.A., who had captured them at Folkestone on the 27th May last. They had been submitted to the Rev. O. Pickard-Cambridge, F.R.S., who identified them as *Pellenes tripunctatus*, a species new to Britain. Mr. Enock also exhibited specimens of *Merisus destructor* (Riley), an American parasite of the Hessian Fly, bred from British specimens of that insect.

Mr. Wallis-Kew exhibited a number of larvæ of *Adimonia tanacetii* (Fab.), found in Lincolnshire, feeding on Scabious.

Mr. Porritt exhibited a number of variable specimens of *Arctia mendica*, bred from a batch of eggs found last year on a species of *Rumex* at Huddersfield. Mr. Porritt said that this species, in the neighbourhood of Huddersfield, was often more spotted than the typical form, but he had never before seen anything approaching in extent the variation exhibited in these bred specimens. Out of forty-four specimens (twenty-five males and nineteen females) not more than eight were like the ordinary type of the species.

Mr. M'Lachlan exhibited a quantity of *Palingenia longicauda* (in alcohol) from Holland—the largest of the European *Ephemeridæ* (May-flies), and at the same time one of the most local.

Mr. Jacoby exhibited the following species of Phytophagous Coleoptera from Africa and Madagascar, recently described by him in the Transactions' of the Society, viz.:—*Lema laticollis*, *Cladocera nigripennis*, *Oedionychis madagascariensis*, *Blepharida intermeda*, *B. nigromaculata*, *Chrysomela madagascariensis*, *Sagra apaca*, *Blepharida ornaticollis*, *B. laterimaculata*, *Mesodonta submetallica*, *Schematizella viridis*, *Spilocephalus viridipennis*, *Apophyllia smaragdipennis*, *Aethonea variabilis*.

Mons. Alfred Wailly exhibited a large number of species of Lepidoptera and Coleoptera, recently received by him from Assam, from the West Coast of Africa, and from South Africa. He also exhibited eggs and living larvæ of *Bombyx cytheræa*, and made remarks on the life-history of the species.—H. Goss, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

The exhibits at this Society meeting on July 6th, were fairly numerous in spite of the bad weather. Mr. Hockett brought up a series of *A. grossulariata*, some of them being very dark and one semi-transparent. Mr. J. A. Clark shewed *Arbutana*, *Vacciniana*, *Mygindana*, &c. Mr. Hanes brought a series of bred *T. piniperda*, *P. hamulæ*, and a specimen of *A. alni* taken at Reigate. Mr. Allbuary exhibited some nice *Villica*, and Mr. Thompson's box had quite an assortment of noctuæ. The coleoptera were well represented in Mr. Lewcock's box containing *Balaninus nucum*, *Phyllobius calcaratus*, *Tanymecus palliatus*, and a series of *Clytus mysticus* from Esher. Mr. Dawes sent up from Manfield, eight nests and eggs of British birds for the Society's collection, being the second donation from him of a similar character, he also communicated the observance of specimens of the Barnacle Goose, Crossbill, and other birds of interest, in the vicinity of Nottingham. Mr. Hanes mentioned having seen large quantities of the larvæ of *C. verbasci* on the Mullein at Rickmansworth, and Mr. Sheldon made an interesting communication respecting the influence of the long continued wet weather on the *Sesidæ*.

At the following meeting the attendance was rather poor owing to the absence of members in various parts, three being at Brockenhurst, from whence they sent a telegram saying that many species were plentiful. Mr. Battley made an interesting exhibit of a series of the cells of the Queen Bee larva, from the first enlargement of the ordinary cell to the large complete oval, something like the cocoon of *S. carpini*. Mr. Lewcock, who presided, gave the results of his recent collecting, and stated that though the weather was most unfavourable, on the whole he had fair success, and had succeeded in taking over a dozen *Bembidium lunatum*, a species which was not supposed to occur in the south of England. Mr. Cripps had also been at work and had been rewarded with several good species of *Balaninus*, he mentioned having seen specimens of *Lucanus servus* in the roadways quite overpowered by the continued rain. It was stated by Mr. Hanes that noctuæ were very common at sugar this year, especially the root and grass feeders.—J. RUSSELL AND E. ANDERSON, Joint Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY
SOCIETY.

June 28th, 1888.—John T. Carrington, Esq., F.L.S., Vice-President in the chair. Miss M. Kimber and Mr. A. E. Hall, were elected members. Mr. Hawes exhibited pupæ of *Argynnis paphia* and *A. adippe*, from South Suffolk. Mr. Slater, a specimen of *Cherocampa nerii* from Zululand, and remarked on the difference in colour between the insect shewn and European examples of the species. Mr. Tugwell raised a question as to whether the specimen was an example of *C. nerii*, Mr. South suggested that it was probably a very closely allied African species. Mr. West, of Streatham, specimens of *Heliothis marginata* (*C. umbra*, Hufn.), bred from larvæ found at Folkstone. Mr. Tugwell, examples of *Spilosoma menthastri*, and var. *ochracea*, bred from ova received from Dundee, the larvæ having been fed upon stinging nettle. Mr. Tugwell mentioned that he had recently bred several specimens of *Sesia sphegiformis*, the larvæ having been found at Tilgate Forest, and remarked that from his experience he was of opinion that the insect was three years in the larval stage, the ova being laid in July, the larvæ feeding through that year were to be found feeding close to the bark the second year, and feeding during the third year they pupated about the 2nd week in May, the perfect insect appearing the first or second week in June, usually about 9 or 10 o'clock on a sunny morning. Some observations were made by members on capturing the rarer species of *Sesidæ*.

July 12th.—J. T. Carrington, Esq., Vice-President, in the chair. Messrs. A. L. Clarke, W. B. Farr, and R. Atherton, were elected members. Mr. Weir exhibited a male specimen of *Lycana icarus*, which he had taken at Lewes in June last. It was remarkable as shewing a slight tendency to hermaphroditism; there were on the upperside of the under-wings two well defined and several smaller submarginal spots, while the colour of all the wings in other respects was that of the ordinary male of the species. His attention had been drawn to the insect by a male of the same species, evidently by its actions, mistaking the specimen exhibited for a female; some discussion followed, Messrs. Tutt, Tugwell, South, Weir, and Carrington taking part. Mr. Jäger, two specimens of *Arctia villica*, with dark hind-wings, forms of *Eupithecia rectangulata* and an example of the larvæ of *Callimorpha hera*. Mr. R. Adkin, *Eupithecia togata*, bred from Perthshire larvæ which varied much as to colour. Mr. Robinson, an example of *Miana strigilis*, from Monkswood, which was pinker than usual. Mr. South remarked that he had taken very large and red forms in North Devon. Mr. Dobson, *Cymatophora ridens* and *Notodonta chaonia*, bred from larvæ beaten in the New Forest.

Mr. Turner, a var. of *Vanessa cardui*, an example of the female *Fidonia atomaria* with a pale fringe, and specimens of *Pieris napi*, and asked whether the absence of spots in this species was unusual. Mr. Weir in reply said, it was not at all unusual in the spring emergence. Mr. West, of Greenwich, examples of *Colymbetes notatris*, *Cercyon aquaticus*, *Heterocerus obsoletus*, taken on the Salt Marshes, Milton, near Gravesend. The Secretary exhibited on behalf of Mr. T. D. A. Cockerell, a sketch of a *Thomisid* spider on the flowers of *Ligustricum montanum*, observed by him in Custer, Co. Colorado, and read notes on the deceptive likeness of the spider to the flower. Mr. Weir said it was not at all uncommon in England, there were several species of spider closely resembling the flowers on which they were in the habit of sitting for the purpose of obtaining their food. The Secretary also read a further note from Mr. Cockerell on the white pigment in the Sesiidæ, but as the specimen of *S. culiciformis* referred to, had not yet been exhibited, it was decided to read the note at a subsequent meeting.—H. W. BARKER, Hon. Sec.

NOTES AND OBSERVATIONS.

THE OAK AS A WINDOW PLANT.—I thought the following might interest some of your readers. Four years last autumn we brought in an acorn. It was moist, and just ready to sprout. It was put into a bottle filled with water, the acorn just filling the neck of the bottle but not touching the water. It put down roots through the winter, and in the spring put out a few leaves. This it has done every year, this, of course, being the fifth it has done so. It has two now branches from the main stem, and is seven and a half inches high at the highest.—ISABEL ROBSON, Stockton-on-Tees.

ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA DURING THE MONTH OF JUNE.—Both *Vanessa cardui* and *Plusia gamma* have been very abundant in Dorsetshire. By far the greater number of the former were worn and tattered and evidently had the appearance of hibernated specimens. Strange to say, I saw but one specimen of *V. cardui* during the whole of last year, although *V. urticæ* swarmed in July.

Anthocaris cardamines has also been very abundant and later than usual. I captured a female on the 14th of July. In Dorsetshire the females have been almost as common as the males. In fact, almost every white butterfly I have seen this year has been a female Orange Tip or a Wood White. The latter (*L. sinapis*) has certainly appeared in very unusual numbers, not only in woods but by the road sides. On the other hand, the species of the genus *Pieris* have been very scarce.

Four other butterflies viz.—*A. euphrosyne*, *A. selene*, *S. alveolus*, and *T. tages*, and three moths *P. statices*, *Z. trifolii*, and *E. glyphica* have been very abundant. Indeed, it has been a beautiful sight to see the swarms of *statices* and *trifolii* rise in the meadows. *G. rhamni* also has been fairly common.

June has certainly been a most capital month for insect life, proving a marked contrast to the previous months. Owing to the ungenial spring, several of the hibernated species did not emerge from their winter quarters till then.—C. W. DALE.

ABUNDANCE OF *V. CARDUI*, &c.—With reference to your remarks on the above (p. 143, Vol. IX.), I beg to say that all the three species there named have been very abundant here also. *V. cardui* appeared on June 3rd, and was especially abundant along the edge of the cliff of boulder clay between Rhos Point and the Little Orme's Head. I saw four playing together at once. It would be interesting to know the dates when this species was first observed this year in different localities. *Cardamines* is usually a scarce species here, but it has been very abundant this season.—ALFRED O. WALKER, Nant-y-Glyn, North Wales.

DEILEPHILA GALII AT HARTLEPOOL.—A nice specimen of this rare hawk was brought me alive on the 18th July. I did not see the person who left it, so did not learn particular of the capture. A second was taken a day or two later, on some pit props on the dock side, and is now in Mr. Gardner's cabinet.—J. E. ROBSON, Hartlepool.

ISLE OF MAN VARIETIES.—I send for your acceptance, and for special notice, *Dianthæcia cæsia* var. *Mannani* alive, taken here last night, that you may see they are lead coloured or blue. The ordinary unicolorous specimens are dull and faded (see Robson and Gardner's List.) I send it alive to show the colour of fine specimens. I also send *D. capsophila* to show you that they are larger and darker than those from any other locality. The food of these grows on trap rock. *D. conspersa* sent does not give a fair idea of of this generally black and white insect; It is quite a striking variety, and if I did not think our books are being overdone with variety names I would give it one. Lastly, I send you *A. lucerneæ* that you may see how much darker it is than from other places. After taking these and other specimens I lighted up and took one *Meticulosa*, one *Nigra*, and six *Nigrocincta* larvæ. The latter are very small; they were gathered in a cold exposed hollow of the rocks. C. S. GREGSON, Douglas, Isle of Man, June 23rd.

I was already aware that I had given a rather misleading description of the var. *Mannani*, having in my collection then, only some captured specimens sent me many years ago by the late Edward Birchall. If ever the list reaches

a second edition it will be differently described. The *Capsophila* are darker brown than the Irish examples in my collection, and also a little larger. *Conspersa* is prettily marbled, but I think would be difficult to differentiate from darker specimens from the south. It is neither so large nor so dark as the few specimens of this insect I have taken here. *Lucernea* is the darkest I remember seeing, but it is not so large as some I have from other localities. They are a very interesting lot, and a welcome addition to my collection.—JOHN E. ROBSON, Hartlepool.

SUGARING AT DEAL.—I went to Deal on the 7th July and stayed a few days. *Ochrata* was only just coming out, and will be very rare (end of June is the ordinary time.) *Littoralis*, only just out. *Cacana* I made a special journey for and never saw. I did nothing up to the Tuesday, when I made a final rush for the sandhills. *Gel. distinctella* and *desertella* were the only insects in abundance, and they did not care to fly. About eight, the wind dropped and I got my little fellow to put on the treacle. He had hardly finished when (about nine) the wind increased almost to a gale. I could scarcely keep the lantern alight, and to make matters worse, rain came on in torrents. There was no shelter, but we were provided with mackintoshes, so I looked at the sugar. The posts were alive with insects: *Exclamationis*, *segetum*, *polyodon*, *pronuba*, &c., fought in crowds for room, until they were blown off by the wind. How they managed to stand at all was a mystery. I filled up all my boxes in about 20 minutes, with fine vars. of *Corticea*, *littoralis*, *sublustris*, and such like sandhill specialities, and after they were all filled I looked and longed. I could have filled 500 boxes with really useful insects, had I had them. I found *Aceris tridens* (a splendid form) *triangulum*, *putris*, and such like species that probably had never been seen on the sandhills before, for there are no woods for miles around. *Aceris* was on a gate post facing the sea, and clinging like grim death. It is a puzzle where he came from. I took all I could box and returned. I do not care for too many in one box, but some of them had three in, and I found my night's work was about a gross and a half of insects. The greater mass were good *Noctua* varieties. Such a night does not happen often, and I would put up with a drenching every night for a long time under similar conditions. The most marvellous part of the matter relating to the grandest and most exciting night's collecting I have mentioned above, is that on Saturday and Sunday nights, my total at sugar on the same ground were 14 all told, and two of these were brown varieties of *Polyodon*. Where do they get to on these unproductive nights? They do not fly, but must be present in thousands. If they will not come to sugar it is rarely of use working the marram flowers, but when it is a good night at sugar, it is generally good at flowers also.—T. W. TUTT, Westcombe Park, London.

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NATURE IN SEPTEMBER.

BY ALBERT H. WATERS, B.A.

THE aspect of nature in September is one of transition. It is not exactly summer nor yet is it autumn, but there is something of both seasons in it. Butterflies are still abundant: Tortoiseshells, Red Admirals, Peacocks, Common Blues, and small Coppers, may all be seen fluttering about in the sunshine, and at night numerous moths make their appearance, among which are several autumn species; caterpillars are a conspicuous feature in the aspect of nature in September, and we are constantly meeting with them everywhere. It is in this month more especially that the larvæ of the Great White butterfly and the cabbage moth devastate our cabbages. We find caterpillars at this time of the year feeding on almost every plant, tree, and shrub. We cannot stay to give a detailed list of them, but must refer the reader to former volumes of "The Young Naturalist," Vols. V. p. 227, VI. p. 194, VII. p. 174.

Our ramble this month shall be to the sea coast, where we can study the aspect of marine life in September.

Here is a dead oyster shell with some living serpulæ on it, we will take it home in a jar of sea water, and anon we shall see the beautifully plumed head of the annelid projected like a tiny flower. Serpulæ live a long time in my aquaria and give me very little trouble. A very common annelid, *Spio ceticornis*, also does extremely well in confinement, and it is interesting to watch with a lens the movements of its long filamentary arms. The serpula which thrives best with me is *Serpula triquetra*, and it is not uninteresting when examined with a lens, although its small size makes it less attractive than some species. I have often asked myself the question: Do serpulæ secrete their tubes, or do they pick up the tiny atoms of lime in the water and really build them up? I am as yet unable to give a positive answer to

the question, but I am endeavouring to work it out. The tubes do not seem to be in close contact enough with the annelids to be secreted, and there appears to be nothing analogous to the mantle of the mollusca. I am of opinion they do build their tubes up and do not secrete them, we always find them where there is abundance of carbonate of lime about, as on oyster shells, calcareous rocks, and such like, and even when they are on other substances not calcareous, there is sure to be plenty of carbonate of lime in the immediate neighbourhood.

Look at the extraordinarily rapid way in which that whelk shell is moving along, quite different from the normally slow manner in which *Buccinum undatum* progresses. It is, however, easy to explain the mystery. Let us pick it up. We see it is no whelk at all, but only the dead shell of that well-known mollusc, tenanted by the, to all keepers of an aquarium, familiar crustacean *Pagurus Bernhardi*. The hinder part of this creature is soft, and unprotected by the coat of mail with which the limbs and fore part of the body is guarded, it is compelled therefore to ensconce its tail in some empty shell or other. Large individuals like this one take possession of a dead whelk shell, smaller ones may be found occupying *Nerita*, winkle, or *Trochus* shells.

Hermit crabs are very amusing pets in the aquarium, and I have had numbers of them. I feed them on scraped beef, which they readily take from a quill. They soon get on familiar terms with me, and when I have them in a vase will often tap on the glass with their claws as if to attract my attention, and sometimes they will follow the movements of my finger outside the glass. They see best upwards however, and if the quill is moved about above them they will stretch out their claws to reach it even if it has no meat on it. I had one for over two years. When I first captured it, it was a tiny individual, and was domiciled in a small shell of *Trochus zizyphinus*. After it had exuviated for the first time in my aquarium, it changed into a yellow periwinkle shell and in this it remained many weeks. At first it was very shy, and retreated into its domicile on the instant it caught sight of me, and only by remaining perfectly motionless could I observe it move about, which it did in a very comical way, generally carrying its domicile sideways in rather an awkward manner as if it were too heavy for it. After I had had it a week or two it got more accustomed to me and would accept a morsel of scraped meat if offered on a quill. In time it got so tame and familiar as to beg for food, and would permit me to watch its movements, and even examine it with a lens without exhibiting the slightest fear. In common with other hermit crabs it had a very curious way of beating the water with its antennæ, which was very interesting to watch. It loved very

shallow water, and would often come up to the top of the aquarium, and remain for a long time in water barely more than half sufficient to cover it. I had it for a year or two, when it was accidentally killed. I once kept one for a few months longer than this one, and *mirabile dictu!* my aquarium in this case was only a common earthenware basin. This individual came eventually to an untimely end by means of a shore crab, who lived with him contentedly for many months, but at last treacherously murdered his companion.

How beautiful is this pellucid pool which the tide has left. Look at the abundance of life it contains. Shrimps in numbers, freckled gobies (*Gobius minutus*), excellent pets for an aquarium and very tameable. And look there at those curious fish swimming about perpendicularly in the water. They are the pipe fish (*Syngnathus acus*), and very curious creatures. I find a difficulty in keeping them alive for any great length of time. The reason seems chiefly to be I find it far from easy to feed them. In the summer time when I can take day trips to the sea side and bring home abundance of sand from below the level of ebb tide, and seaweed with plenty of minute crustaceans on it, they do very well. They scoop the sand up with their noses, and search out the minute creatures in it and on the algæ, and so find sufficient food to support life; but when the excursion season is over a journey to the sea side is very expensive, and I cannot get the Syngnathi to eat scraped meat like the other fish, and so they die of inanition.

I collect algæ in some quantity for the sake of such creatures as feed upon it, but I think an aquarium flourishes best with a minimum quantity of it. This I know is contrary to the popular opinion, for it is generally supposed that abundance of *Ulva latissima* and other seaweeds is of benefit to the creatures in a marine aquarium, but I have some doubt of this. Certainly they improve its appearance, and I like to see them; moreover, they afford shelter to the fish, prawns, &c., and it is impossible to keep the herbivorous mollusca and alga-loving species of crustacea without a supply of them. We constantly read that they oxygenate the water, and thus supply the needful quantity of the life-giving gas. So they do in bright sunshine certainly. When the sun shines on the aquarium they give off oxygen most profusely, but on a cloudy day they give off none at all, but I find on the contrary, a small quantity of carbonic acid gas. Given therefore a superabundance of seaweed, and a succession of cloudy days, and there may be—it is easy to conceive—together with that produced by the respiration of the inmates, a quantity of carbonic acid gas generated sufficient to suffocate every one of the creatures.

I had at one time in my aquaria, and this be it remarked is but a small

one, containing less than a pint and a half of sea water, seven freckled gobies (*Gobius minutus*), of which two were about full grown three others about half-grown and two were small ones. Besides these there were a quantity of shrimps, the exact number of which I do not know, but two were of large size and one very large. They lived in this aquarium, a very shallow one and so with a comparatively large surface of water, a long time without any seaweed at all excepting a very small portion of rock joint-wort (*Conferva rupestris*), and the only casualty I had during the first months was the loss of one shrimp, which the gobies killed when it had changed its skin and was consequently soft and helpless.

We see numbers of shore crabs (*Carcinas mænas*) running about both little and big. The life-history of these crabs and indeed of all the crab kind is very interesting. In its earliest stage it is of course an egg, and is carried about by the mother crab (I think very nearly a month but am not quite sure, as the female crabs are of a very tender constitution at the breeding season and it is not easy to keep them alive then in an ordinary aquarium.) When the young crab first emerges from the egg it is of a very singular form and totally unlike a crab. It swims about actively while in this larval stage, but, after a time, another change takes place, and the immature crustacean is still microscopic and very unlike a crab, but not much unlike a lobster. The zoëa or larval stage of the crab was possessed of a long and prominent beak and a singularly shaped ridge on the beak, both these have vanished and the embryo crab is furnished with a symmetrical carapace and a straight jointed tail. The limbs are a pair of hairy claws in the anterior part of the body and eight swimming legs set very backward. A long sharp beak, but different to that possessed by the crab in its previous stage, projects between the eyes, which latter are set on footstalks. On each side of the beak are the antennæ. The size of the embryo crab in this stage is somewhat less than one of the capital letters on this page.

At length the young *Carcinas mænas* assumes a crab-like form although it is at first very small, more like a little spider than anything else. It is now very active, constantly running about after food and spending a good deal of its time out of the water. These tiny crabs are very fond of concealing themselves among seaweeds and carefully avoid their larger companions who would not hesitate to make a meal of them.

I have had crabs in my aquaria throughout the whole of their lives. These tiny crabs are very voracious after food, and I feed them on tiny pieces of scraped meat. If fed regularly every day they moult again in about a month (in summer time that is). For some days before they exuviate they refuse food and hide up. If there be sand in the aquarium they bury themselves

deep down in it. The interval between each moult varies according to the time of year, and also differs in individual crabs. In summer time the average is about five weeks. From October to April they do not generally exuviate at all, and they bury themselves up in the sand at the bottom of the aquarium at that time of year, and feed but seldom, in cloudy weather not at all. They are three years or more attaining their full growth. How long they live in the sea I do not know, but I have not been able to keep them alive longer than five years.

BRITISH FROGS AND TOADS.

By LINNÆUS GREENING.

(*A Paper read before the Warrington Field Club November 18th, 1887.*)

Continued from page 150.

RANA TEMPORARIA (*Common Frog.*)

In dealing with the life history of these Batrachians, we will start with that of the common frog, which we will follow from the egg to the adult. The number of eggs laid by one female is very large, ranging from 1,500 to over 2,000. I have counted the eggs of those which paired in a state of nature, and those I paired in captivity, and I found the number of eggs the same under natural as under artificial conditions. Judging by my own observations, I should say the average is 2,000; the highest number I ever counted was 2,500. The fertilization is effected as the eggs leave the body of the female, there being no true sexual contact. The male, some 14 days before the laying takes place, has taken up his position on the back of the female, clasping her firmly just behind and under her forelegs, and assisted in retaining his hold by the suckers on his forelegs, pours out the fertilizing fluid simultaneously with the laying of the eggs. As soon as the eggs are deposited, the sexes separate, and do not breed again till the following year, generally about the end of March. The newly laid mass of eggs is as large as the body of the mother, and within an hour or so the mass has increased tenfold. This remarkable increase in size is owing to the gelatinous envelope of each egg becoming distended by absorbed water, though even after this increase the specific gravity of the mass is slightly greater than that of water. It will not float but has sufficient cohesion to retain its cylindrical form, when its base rests on the bottom of the pond; hence in shallow water it sometimes appears to be floating, though as a matter of fact it never does so. It is curious to note that the embryos near the top of the mass, and consequently in a warmer stratum of water, develop first; their tadpoles

escape from the capsules at least 24 hours sooner than those from the bottom layer. You will see by the specimens on the table, which were taken out of water an hour after deposition, that frog spawn consists of small gelatinous spheres $\frac{1}{2}$ in. diameter, colourless, and containing each in its centre a small opaque speck $\frac{1}{16}$ in. diameter. Owing to the transparency of the enveloping membrane, the development can be watched through all its stages. At first the embryo appears spherical, dark brown on one side and white on the other. In about three days it elongates, and about the sixth day the head and tail may plainly be seen, as can also the gills and holders, which latter are two small organs near the mouth, enabling the animal to attach itself to the egg case, or to a plant as soon as it leaves the egg sac, which it does about the twelfth day. For two days after its escape the tadpole remains at rest. During this time it breathes by means of the external gills, which subsequently diminish, whilst on either side an operculum or gill cover is formed by a fold of the skin, and internal gills are simultaneously developed.

The external gills cease to be visible on the eighth day, and the respiration is effected in the capillaries of the internal gills, by the water being taken in through the mouth and expelled through the minute orifices which represent the remnants of the opercular openings.

The food of these young beings is at first vegetable, though they also eat the remains of the old egg cases; when older, they eat flesh, and sometimes one another. The development of the limbs is most variable, all depending upon favourable situations and food, so much so, that to-day I have some still in the tadpole state which were hatched on the 7th April, 1887, although their congeners out of doors are now, and have been for some time, in the happy possession of their limbs. The normal time for the first appearance of the hind legs is the fiftieth day, the fore legs appearing seven days later. Three days later the tail is totally absorbed, and the animal has passed from the larval to the adult form: of course it increases in size, being at first only $\frac{5}{8}$ in. long, but it undergoes no further metamorphosis. These statistics as to the periods of development have been obtained by repeatedly examining a number of ponds and carefully noting the progress made day by day. I have been surprised at the difference in the dates of development, between those bred in aquaria and those in a state of nature; and this difference I attribute to the difficulty of getting suitable food for those in captivity. As an instance of the unreliability of dates obtained by observing animals under artificial circumstances, I may say that some of the tadpoles which hatched out in my room on the 7th April, 1887, were not in possession of their hind-legs until the 31st July, 116 days, or more than twice the length of time required under normal conditions.

The more rapid development of the limbs in the wild state could not be owing to higher temperature, for the temperature of my room was always higher than the surrounding air, and it must therefore be due to the quantity of suitable food. I have brought several specimens, showing the various stages of larval development, some with gills, some with hind legs only, some with all four legs, and some with the tail about to be absorbed.

Having traced *Rana temporaria* from the egg to the adult form, it will be as well to give a full description of the animal, before entering upon the consideration of its habits.

The ground colour of the dorsal surface is very variable, yet the markings are surprisingly constant. I have specimens of many colours, yellow, green, brown, and even brick red. The ventral surface is always yellow, with chocolate coloured spots, which are denser on either side of the throat. The colours are always much brighter during the breeding season, and we will describe a pair which has just bred.

The female is larger than the male, and is 3 inches long in the body, the hind leg when extended measures 4 inches; the fore leg is $1\frac{1}{2}$ inches long, the toes being, unlike those of the hind foot, free and devoid of web. The upper surface of the body, head and legs, is olive green with two light but well marked dorsal ridges, between which the colour is paler; outside these ridges run narrow blotches of dark brown. On the dorsal surface are round black spots which usually run in pairs; similar spots occur on the sides, though they are less numerous. The upper surface of the legs is barred and spotted with dark brown.

There is a dark brown patch from the eye to the shoulder, which also covers the ear; this mark is unvarying in, and is characteristic of, this species. There is an oblong dark brown patch immediately in front of and below the fore leg, running towards the throat. There is also a band of brown running the whole length of the hind leg down to the feet, forming, as it were, a barrier between the colourings of the upper and lower surfaces of the animal. The eye has a horizontal black pupil, with gold rim.

The general markings of the male are similar to those of the female, but the ground colour is darker. The throat, however, is bluish white, quite free from spots; and this is characteristic of the males in the breeding season, after which period it gradually resumes the normal colour and markings of the ventral surface. The fore leg of the male is shorter and thicker than that of the female; and on the first toe there is a muscular sucker of black velvety appearance, which is developed in five days, and at the close of the breeding season is lost as rapidly. The length of the body is $2\frac{1}{2}$ inches, fore leg

1½ inches, hind leg 3¾ inches long. The hind foot is much palmated, whilst the fore foot is free.

In this species, markings other than those already described occur, but are so erratic as to be of no descriptive value.

The habits of the common frog are most interesting, and are less generally known than should be the case with so common an animal. Who has not believed in the wonderful showers of frogs which are reported from time to time? After a shower, some one sees a great number of frogs, they were not visible before the rain, therefore there must have been a shower of frogs; such is the logical inference drawn by a lover of the marvellous and promptly communicated to the local press. The real explanation of this phenomenon is much more simple and less romantic. The rain falling on the meadow or the field, causes the worms to come out; and the frogs through inherited instinct, come after the worms, as well as to enjoy the humidity which is so refreshing to them.

The food of this creature consists of worms, insects, and larvæ (except the hairy caterpillars.) Sometimes I have seen them take their own tadpoles, and much to my surprise, one day, a frog actually caught and ate a full-grown tree frog (*Hyla viridis*.) From this I should infer, that at times, the young of their own species would come into their bill of fare. The manner of taking their insect food is varied; usually they protrude their tongue at least an inch from the mouth, and the viscid secretion with which it is supplied, causes the insect to stick to it, and it is taken into the mouth with such remarkable swiftness that it requires a practised eye to see the operation.

When taking worms, they usually seize them in the middle, and with their fore legs turn the ends of the worm straight out, so that it may be easily taken and swallowed; whilst swallowing, the eyes of the frogs are drawn down into the interior of the head. When I give my frogs moths or flies, they are able to jump at least 14 inches high and never miss their aim. They are remarkably quick sighted; no matter how slight the movement of their prey, it is noticed; even the movement of the leg of a fly is sufficient. Frogs never eat dead food, or insects at rest, at least so far as my experience goes, and I have kept great numbers. I may add that frogs become tame, and feed readily from the hand; especially if the bait is a nice red worm in a lively condition. Generally speaking frogs are not nearly so nocturnal in their habits as their cousins the toads, feeding both during the day and in the dusk of the evening.

A frog can leap 20 inches, or seven times the length of its body. This great leaping power opens up a subject of much interest. How came it into its possession? It may be regarded as a protective development, whose

efficacy has been subsequently augmented, since it enables its possessor to obtain a greater variety of food. I call it protective development, because it is a fact that frogs are eagerly sought as food by snakes, birds, and other animals.

The frog is decidedly more aquatic than the toad, and is frequently found in the water, in other than the breeding season ; in this respect, also differing from the newts, their allies.

Frogs are never found far from water, and here again the extraordinary muscular developments which give them their great leaping power come into play, in their protective capacity, enabling them to swim and dive with remarkable facility, and so escape many of their foes ; and being of further advantage, in enabling them to capture their aquatic prey, such as the larvæ of the dragon-fly. Frogs are never seen in the winter months ; at the commencement of hard weather, usually in October, they bury themselves in the mud at the bottom of the ponds ; and any one who will take the trouble to slouch a pit, during the month of January, may demonstrate this. It may be a cold and somewhat dirty task, but who would allow personal discomfort to interfere with his pursuit of truth ? Assisted by another member of our society, Mr. F. W. Monks, I undertook this task in February of the present year. Ice was still on the pond, but after considerable exertion, we succeeded in taking several frogs, which were buried some six inches deep in the mud. When placed in aquaria, they immediately buried themselves amongst the small gravel at the bottom. I have often found them hybernating in the mud in the bottom of ditches or cuttings in brickyards. As spring advances, these sleepy creatures emerge, and may be seen in considerable numbers in the vicinity of ponds and ditches ; and towards evening, when it is too dusk to see them, their presence is made known by the sonorous croakings of the males, who at this period are extremely amorous. Frogs usually breed in the fourth year, and though their vocal efforts are scarcely so enchanting as those of the nightingale, yet no doubt they are appreciated by the female, who herself possesses only the power of emitting a faint squeak.

Frogs live to be about 15 years old ; and cast their skin several times each summer. It is always cast in the water, and comes off piecemeal, apparently giving the animal little or no trouble during the operation. When handling a frog, we notice how cold and clammy it is, and if we use it roughly, we find that it ejects what at first we might think urine, but is really limpid water. If the skin becomes dry, the animal speedily dies ; for its pulmonary respiration is not sufficient to maintain life, and this deficient power of the lungs is supplemented by cutaneous respiration. As a fish dies when its gills become dry, so a frog dies if its skin becomes dry. When a frog is in the

water, it takes up, through the pores of the skin, a considerable quantity of it; when on land, in a dry place, the absorbed water serves to keep the skin moist for a considerable time; for the skin is so thin, that, on exposure to a to a dry atmosphere, rapid evaporation takes place; and since aëration can can only be affected through a moist medium, too long exposure to dry air will kill a frog.

This cutaneous respiration also enables a frog to remain under water longer than any other lung-breathing vertebrate. I have seen them under water for two hours, and there is no doubt that they can remain under for a very much longer time; and as they hibernate at the bottom of ponds, it is solely through the skin that respiration can be effected during their winter slumber.

(To be continued.)

THE NEW FOREST ZYGÆNA MELILOTI.

By W. H. TUGWELL.

I had no intention of again intruding this subject in the pages of this journal, but as Mr. C. A. Briggs states that I misquoted Mr. Doubleday's words in what he calls an important particular, when I quoted from *Entomologist*, Vol VI. page 185, "This most certainly is *meliloti* Esp.," and states that I had added the word Esp., "the importance of which will be at once seen," I feel bound to reply.

I deny *in toto* that the addition of the word "Esp." in any way affects the question. From beginning to end of this discussion the only insect intended when *meliloti* has been mentioned, has been *meliloti*, Esper, and no other; so how the addition becomes here important I fail to see. It is well known that in 1872, when specimens of the New Forest *Zygæna* were first sent to the late H. Doubleday, he at once diagnosed it as *Z. meliloti*, Esper, *i.e.* as the species known under the name of *meliloti* on the continent. This opinion I have never seen challenged until now. Mr. Doubleday told me so with his own lips, and also in his letters to me on the subject in 1872-3. That this opinion has been generally accepted, I should say almost universally so, is proved by all the writers on British lepidoptera since 1872, who always quote our New Forest *Zygæna* as *meliloti*, Esp., *vide* South's Synon. list, Robson and Gardner's list, the reprint of Berg by W. F. Kirby, &c., &c., and I do not think Mr. Briggs can show an instance since 1872, where, when *meliloti* has been named, that the small Burnet with the particularly oval 1st, 2nd, and 3rd spot has not been intended. Of course if Mr. Briggs is going to

argue that the insect known and illustrated in continental works with oval spots is not true *Esper* at all, and that his form had *all round spots*. If Mr. Briggs can prove this, then evidently we have all for years gone astray. But did any one ever see a Burnet with *five round spots*: I never saw one in my life so spotted. The two first spots are always in my experience more or less oval, and often so the third spot. Possibly in looking over thousands of specimens you might find one with *five round spots*; but I have not one in my fine series of all our British *Zygænidæ*.

In paragraph 7 of Mr. Briggs letter, page 154 of this journal, a most illogical construction is put on my remarks (ante page 132). Mr. Briggs there states that I say: "that even if proved distinct from *meliloti*, Esp., it should still stand (on our lists) as var. *meliloti*." That would be simply absurd, and is not my statement at all. What I do say and still believe is: "that up to this present time I have seen no proof that our New Forest *meliloti* is not *meliloti*, Esp.," (*i.e.* what is figured for such in continental works, and sent as that insect by continental dealers), the part in brackets now added. I then continue "If Mr. Briggs has proved (?) that, it (*i.e.* *meliloti*) must fall from its position of a species to be a variety only, even then I take it, that it would stand on our lists as *trifolii*, var. *meliloti*." These remarks are to my mind abundantly clear, and imply that even if Mr. Briggs' breeding experiment proves (which he did not at that time claim, and which was so doubtful, according to his own words not mine), that our insect was simply a variety of *trifolii*, and not a species. *Even then, if our insect was identical with the continental so-called Meliloti, Esp., it would stand as Trifolii, var. meliloti.*

We have enough and more than enough of new names and varieties *miki*. What with the synonymy man and varietal name manufacturers we poor lepidopterists get pretty well befogged.

Mr. Briggs agrees with me that Mr. Gregson's simile "a race horse to a carriage horse" is well put, and goes on to say: "yet we must not forget that a race horse and a carriage horse are but forms of one species" (and so I am inclined to think are all our *Zygæna*). Quite so, but let us carry the simile one stage farther, and does Mr. Briggs think he could produce a carriage horse from the foal of race horse parents in a single individual, by a by a simple change of stable food! A race or strong local form in the animal kingdom is the result of very many years interbreeding under special circumstances, and one hardly expects to reverse all this in one single brood.

At Mr. Briggs' request, I give now *my impression* of the one full-fed larva of *Zygæna* I found in the *Meliloti* locality in 1873. I did not at the time write

the description. To me it appeared of a whiter green ground *not* yellow, and the spotting more developed, *i.e.* a whiter and blacker larva than any I ever saw alive before or since.

My answer to Mr. Briggs' last remark is that I have not visited the New Forest since 1873. The insect was common in 1874 and 1875, and possibly later, but it is common knowledge that it was incessantly worked.

Personally, I shall not continue this discussion further; if Mr. Briggs can prove me wrong in my deductions, and that *meliloti*, Esp., has five *round spots*, by getting continental specimens so spotted; not in a *façon de parler* mais *tout-à-fait* rondes, alors je lui cederai ma plume.

6, Lewisham Road, Greenwich.

In view of the recent controversy as to this insect, I have great pleasure in recording its rediscovery in the New Forest last month, by Mr. E. G. Meek. The locality is at a little distance from its old one, and as is always the case with these isolated colonies of *Zygæna*, there is a slight difference to be noticed in the specimens. The difference is in two particulars: 1st, that the border to the hind wings is broader; and 2nd, that the upper middle spot is long instead of round in a larger number of specimens than was the case in the specimens from the old locality, these differences not necessarily occurring in the same specimens. Typical *trifolii* and intermediate specimens were flying with them. I may add that Mr. Meek also took *A. caliginosa* and a nice series of *E. cribrum*.—C. A. BRIGGS, 55, Lincoln's Inn Fields, 13th August, 1888.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

August 1st, 1888.—Dr. D. SHARP, F.L.S., President, in the chair.

The Rev. R. Walton-Lewis, B.A., of Cape Colony, was elected a Fellow of the Society.

Mr. F. Du Cane Godman, F.R.S., exhibited a large number of species of Lepidoptera and Diptera recently collected for him in Mexico by Mr. Herbert Smith.

Mr. White exhibited a specimen of *Osmylus maculatus*, taken by him on the Snort, near Sawbridgeworth, in July last. He also exhibited parasites bred from *Bombyx neustria*, and a living example of *Heterodes Guyoni*, found at Dartford, and believed to have been introduced with Esparto grass from Tunis.

Mr. Enock exhibited a stem of barley showing the appearance of the plant under an attack of Hessian Fly.

Mr. Stevens exhibited a number of galls collected at Byfleet, Surrey, in July last, by Mr. Leonard Stevens; also a specimen of *Coleophora solitariella*, with ichneumons bred from it.

Mr. Edward Saunders exhibited a specimen of *Catephia alchymista*, captured by his son at St. Leonards, in June last. He also exhibited specimens of a rare Ant (*Anochetus ghiliani*), which were taken at Tangier by Mr. G. Lewis. One of these he had submitted to Dr. Emery, of Bologna, who thought that, although ocelli were present, the specimen was probably intermediate between a worker and a female, and that possibly the true female did not exist.

Mr. Pascoe exhibited a number of species of Coleoptera recently collected in Germany and the Jurar Mountains, and read a note correcting the synonymy of certain species of *Brachycerus* recently described by him in the "Transactions" of the Society. He stated that the corrections had been suggested by Mons. Peringuey and Mons. Aurivillius.

Prof. Westwood communicated a paper entitled "A List of the Diurnal Lepidoptera collected in Northern Celebes by Dr. Sidney Hickson, with descriptions of new Species."—H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

August 2, 1888.—Mr. Hockett, Vice-President, in the chair. The meeting was numerously attended and the exhibits were of interest. Amongst others Mr. Hanes exhibited *D. furcula*, *H. chlorana*, *Lychnitis*, and a fine variety of *Glabraria*, the fore-wings being very dark, these were all bred, and some nice specimens of *D. Oo* taken at sugar in Epping Forest. Mr. J. A. Clark had been to the New Forest, and exhibited *L. sybilla* and *T. subsequa*. Mr. Cripps, *Balininus nucum*, *Clytus mysticus*, *Tanymecus palliatus*, &c. Mr. Lusby, a series of *A. villica*, two specimens having smoky hind-wings. Mr. Hillman made a handsome donation of 40 species of preserved larvæ to the cabinet. Mr. S. A. R. Skertchley was balloted for and elected a member. Mr. J. A. Clark read an interesting account of his visit to the New Forest, giving a list of the lepidoptera, birds, &c., either seen or captured during his stay. Mr. Sheldon had paid a visit to Deal, and whilst in a room with a lamp burning, a female *D. galii* had flown in and was captured by him. Mr. Anderson read a paper called "Random notes on a common species." This paper dealt in a very amusing way with the keepers and owners of the various properties in and around London, stating their various peculiarities,

and was very much enjoyed by the meeting. At the close a hearty vote of thanks was given to Mr. Anderson. Messrs. Sheldon, J. A. Clark, Gates, and Hanes continued the discussion.

August 16.—Mr. Cooke, President, in the chair. The exhibitions were very extensive considering the weather: the President, a large box containing various species of *Mantis*, from Ceylon, some of the species at present unknown, also a specimen of the Emerald Bird of Paradise in very fine plumage, this he presented to the Society's collections. Mr. Skertchley, species of locusts from the West Indies. Mr. May, *C. promissa*, *L. sybilla*, *A. paphia*, and var. *Valezina*, *T. quercus*, &c., from the New Forest. Mr. Hanes, a fine bred series of *M. fuciformis*. Mr. Hockett presented 4 eggs of the Common Pheasant to the egg collection. The President read a letter from Mr. Anderson, stating that he was reluctantly obliged to resign his office of Secretary on account of going to Australia in a few weeks time, the matter was adjourned until the next meeting.—J. RUSSELL AND E. ANDERSON, Joint Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

July 26th, 1888.—T. Carrington, Esq., F.L.S., Vice-President, in the chair. Mr. T. Stanton Hillman, of Lewes, was elected a member. Mr. Frohawk exhibited the white banded variety of *Sesia culiciformis*, L., taken by him at West Wickham, June, 1887, shortly afterwards recorded in the "Field," and which had been referred to by Mr. Cockerell in two communications read before the Society on the 14th June and 12th July, 1888. Mr. Tugwell remarked that it was the first white banded specimen of this species he had seen. Mr. West (Streatham), *Dianthæcia capsicola*, bred from larvæ found on sweet-williams, in his garden. Mr. R. Adkin, short series of *Ephyra orbicularia*, inbred from New Forest larvæ; the specimens showing a good deal of variation, also living larvæ of *Thera firmata*, remarking on their close resemblance to the pine needles, and of *Tephrosia punctularia*, the larvæ, when first hatched, being all of a green colour and after moulting several had become of a mottled brownish colour while others were green. Mr. E. Toy, *Leucania pudorina*, from Wicken Fen. Mr. Robson, a variety of *Argynnis euprosyne*, the silver markings on the under surfaces being very prettily distributed. Mr. Tugwell, two specimens of *Eupithecia extensaria*, from King's Lynn, and made observations thereon, also specimens of *Melanippe fluctuata*, and the var. *costovata*, which he thought had no claim to be a named variety. Mr. Carrington, a specimen of *Sirex gygas*; Mr. West stated that he had several times taken this species on willow trees drying

their wings. Mr. Rice, nest and eggs of chaffinch (*Fringilla cœlebs*) showing variation. The eggs were very like those of the bullfinch. It was suggested by Mr. Frohawk that it was possible the eggs were those of the brambling, but nothing definite was arrived at.

August 9th.—The new President in the chair. Mr. R. Waller, of Clapham, and Mr. J. N. Young, of Rotherham, were elected members. Mr. Cook exhibited a variety of *Smerinthus tilia*, the lower part of the central band on the superior wings being absent. Mr. Wellman bred examples of *Plusia orichalcea* and *Ennomos autumnaria*, and said he had bred nine females and only two males of the latter. Mr. Toy bred specimens of *Geometra vernaria* and *Pseudoterpna cytisaria*. Mr. C. A. Briggs, *Zygæna meliloti*, taken this year by Mr. Meek in the New Forest. Mr. Robson; living larvæ of *Trachea piniperda*. Mr. Carrington, specimens of *Boarmia repandata*, sent him by Mr. Batty, and called attention to the melanic appearance of the specimens; this exhibit gave rise to a discussion on melanism, Messrs. Weir, West (Greenwich), Step, Carrington, and others taking part. Mr. West (Streatham), a short series of *Homœsoma sinuella*, taken near Brighton. Mr. Weir, an example of the imago of *Myrmeleon Europæus*, bred by him from larvæ taken at Fontainebleau in 1887. Mr. Carrington made some observations on "A fortnight's collecting on the Chiltern hills," as to late appearance of various species of lepidoptera. M. Weir read an extract from a letter he had received from Mr. Cockerell, dated 21st May, 1888, referring to Mr. Cockerell's theory that *Gonepteryx rhamni* and *G. cleopatra* originated as seasonal races or as Mr. Weir said he should term it, horèomorphic races.

—H. W. BARKER, Hon. Sec.

A VISIT TO LIVERPOOL.

By JOHN E. ROBSON.

(Continued from page 123.)

Among the Butterflies, Mr. Gregson possesses some very grand varieties, I also saw some very good ones in Mr. Capper's collection and others. With few exceptions these are rather aberrations than local forms or races. Special interest, however, appears to attach to Butterfly varieties.

PAPILIO MACHAON.—Varieties of this grand insect are rare. Mr. Pierce has a very pretty one. It is small, without veins on the hind wings, which have the dark marginal band very narrow, and without any of the usual blue markings.

PIERIS BRASSICÆ.—Mr. Gregson has a very curious example of this species with the veins in the middle of the hind wing distinctly green, making it appear to be streaked with that colour. This is believed to be caused by a rupture of the veins ere they have stiffened. I have a specimen in bad condition, with the margins of the hind wings blotched with green and doubtless from the same cause.

PIERIS RAPÆ.—No varieties of note, but Mr. Gregson has one expanding just over an inch.

PIERIS NAPI.—Of this species he has a still smaller specimen, and Mr. Capper has a very extraordinary example, in which the ground colour, instead of being greenish white as usual, is ochreous yellow, not unlike the hue sometimes assumed by *Rapæ*, but of a deeper shade.

ANTHOCARIS CARDAMINES.—Besides a hermaphrodite, with the orange patch on one side only, and a female with a streak of orange on the right forewing, Mr. Gregson has one a rather bright yellow over all the wings, like the continental *Eupheno* or *Euphenoïdes*. Mr. Capper also has a male, with the patch on forewing, a pale yellow instead of orange, another without the black disc spot, and a third with the disc spot very large.

LEUCOPHASIA SINAPIS.—Mr. Gregson has some very fine examples of the var., *Diniensis*, in which the tip blotch does not reach the margin of the wing; also var. *Erysimi* entirely without the blotch.

GONEPTERYX RHAMNI.—A very curious aberration with a bright carmine streak on the wing is in Mr. Gregson's collection.

COLIAS EDUSA.—The best variety of this species Mr. Gregson has, is one with an unusually broad black border, the inner edge of which gives a tolerably correct outline of the face of King George the Third, Mr. Gregson, therefore, calls it "Le Roi." Mr. Capper has a specimen intermediate between the well-known variety *Helice*, and the type.

COLIAS HYALÆ.—This is a very constant species. Mr. Gregson's collection has one with the black at the tip of the fore-wing much less extensive than usual.

THECLA RUBI.—The genus *Thecla* does not afford much scope for variation. Mr. Gregson has the only example I have seen, a specimen of *Rubi* with pale blotches on the wing. These are not alike on both sides, and probably result from the same cause, whatever it may be, as the well known pale blotches on *Janira*.

POLYOMMATUS PHLÆAS.—Half-a-dozen var. *Schmidtii* grace this collection. Two others with fore-wings silvery, and one with only one wing white are still more interesting. These he calls var. *Semi-Schmidtii*. Dark suffused

forms are called *Fusca*. Another variety, of which he has several specimens, he calls *Posti-striata*. In this form the coppery band to the hind-wing is wanting, or represented only by a streak or two on the wing veins. Mr. Capper has two var. *Schmidti*, and one pale yellow instead of coppery. Mr. Pierce has some with a row of blue spots on the hind-wing, within the coppery band, and also one of var. *Posti-striata*.

LYCÆNA ARION.—Among a fine series I noticed three of the var. *Alcon* of Stephens, which has only the black disc spot, the others being absent. There were some lightly spotted specimens that might be considered intermediate.

LYCÆNA CORYDON.—Mr. Capper has a drawer exclusively devoted to this species and *Adonis*. It contains many interesting varieties of the underside, some having no spots but that at the centre, and others with the spots coalescing. One specimen has streaks at one side, but on the other they do not coalesce.

LYCÆNA ARGIOLUS.—Mr. Capper's collection contains two curiously coloured *Argiolus*, one being of a purple hue, and the other more like the brilliant blue of *Adonis*.

LYCÆNA ICARUS.—Mr. Gregson has a hermaphrodite specimen of this insect, the right side being male, and the left female. He has another with one fore-wing male, and the other three female. Some examples of the female with light streaks on the fore-wing are called var. *Simplonia*.

NEMEOBIUS LUCINA.—This insect is very constant, but Mr. Gregson has one with the right fore-wing very pale, nearly white.

LIMENITES SIBYLLA.—The specimen with the bands much suffused, and from which the var. *Obliteræ* was named in my list is in this collection. Another is in Mr. Capper's.

ARGYNNIS AGLAIA.—An example of the rare var. *Charlotta*, which was taken on Liverpool Sand Hills, is the most notable variety in the series of this species.

ARGYNNIS PAHPHA.—Besides the var. *Valezina* Mr. Gregson has a male with the spots running into streaks, and Mr. Capper has a hermaphrodite.

VANESSA IO.—Varieties of this beautiful insect are very rare. Mr. Gregson has three with the eyed spot on the hind-wing entirely black, and another with only two small black spots on the paler ground.

VANESSA ATALANTA.—Another species of which varieties are uncommon. Mr. Gregson has one remarkably dwarfed; one with one wing pale; and another, with the usual brilliant red replaced by dull brownish.

VANESSA CARDUI.—Mr. Gregson has a dwarf of this species also, two pale varieties, and one without the black spots that cross from the base to the inner margin of the fore-wing.

VANESSA POLYCHLOROS.—The only variety I saw of this species is in Mr. Capper's collection. It is dark brown in colour, with the usual spots.

(To be continued.)

REVIEW.

The Westmoreland Note Book and Natural History Record.

The Second part of this quarterly has reached us, and fully maintains the character of its predecessor. The list of Sedges is now completed, and is followed by an interesting account of the origin and progress of the "Kendal Natural History Societies." We do not propose to go into this, but would call attention to one fact. The first of the Kendal Natural History Societies was formed early in the century, but in the year 1818, *a contested election roused such strong party spirit that it, "not only inflicted a fatal blow on the Natural History Society, but produced great social differences which long survived the event."* A well arranged list of the Cambrian and Silurian fossils of the district in the Kendal Museum follows; and then "A List of the Birds of the Lake District," by Mr. John Watson, of Kendal. An account of four birds only, the Golden, White-Tailed, and Spotted Eagles, and the Osprey, is given in the present part.

NOTES AND OBSERVATIONS.

BIGAMY AND POLYGAMY AMONG STARLINGS.—It is over fifty years since my attention was drawn, during the early days of my bird-nesting career, to the subject, viz., three and four adult birds to a nest.

In one of my father's fields was an apple tree, in which, about four feet from the ground, was a hole about fifteen or eighteen inches deep, and sufficiently large to readily admit starlings, which annually availed themselves of it, in which to construct their nest. I was a boy of a bird-nesting disposition, and very anxious to capture the adult birds on the nest, which afterwards I gave their liberty, after a careful examination. I was often frustrated by the watchful starlings, and when I succeeded in capturing an adult, there was very quickly more than one starling in the tree, creating a

disturbance until I released my captive. I have since that time seen many starlings nests, which had three or four adults.

A starling's nest was built under the eaves of a house at Didsbury, near Manchester, eventually the young birds were hatched, and in consequence of the noise which they created, which was a nuisance to the occupier of the house, he decided to destroy the pair of adult birds, and two of them were shot, and to his astonishment two other starlings fed the supposed orphan birds. Is it not probable that the two latter were partners in the nest previously?

Sometimes two and three eggs are laid in a nest in one morning. How is it to be accounted for unless there are more than two adults. Mr. John and James Thorpe, of Altringham, can verify my statements as they have frequently taken two, and several times three eggs, out of a nest, all of which had been deposited in the nest the same morning.

A starling's nest was built in the gable end of a house at Middleton, near Manchester. In the house resided three brothers who had a dispute as to whether there were two or more adult birds to the nest. The two elder brothers declared there were only two, the youngest brother that there were more than two: consequently the younger brother put it to a test. He captured two of the adults and tied coloured flannel to them, and then gave them their liberty. These birds afterwards regularly frequented the nest along with others which were not decorated with the coloured flannel, the result was the elder brothers admitted they were mistaken and evidently defeated.

This season three jackdaws built a nest on one of the columns which support the gasometer, at the Medlock Street gas works, Manchester; they were observed night and morning by a friend of mine (Mr. T. Gee).—JOSEPH CHAPPEL, Manchester.

PANCALIA LEWENHOEKELLA.—I took a few of this pretty little species in July, but could get no clue to the food-plant. It is strange how this little fellow baffles our search. It is not rare where it occurs, but easily overlooked. It only flies in the sun, and can apparently only be got in any number by sweeping. I was rather early for it.—T. W. TURT, Westcombe Park, London, S.E.

D. GALII AT MANCHESTER.—A friend of mine brought me a specimen of *Deilephila galii*, which he had captured on the 21st July, hovering round some yellow flowers at dusk, at Hest Bank, near Morecombe; it is very slightly rubbed.—JOSEPH CHAPPEL, Manchester.

CAPTURES AT LOCHGORLHEAD, &c.—I was at Lockgorlhead for a few days at the beginning of July, and had very good weather. I took the following insects: *L. icarus* and *C. pamphilus* were very common, *Velleda, hectus, russula* (2), *menthastri, plantaginis, cæsiata, L. marginata, albulata, alche millata, ocellata, propugnata, pusaria, exanthemaria, margaritata, subtristata, tristata, chærophyllata, satyrata, pectinitaria, montanata, bilineata, silacea* (2), *dentina, ænea, rurea, and lacertula*, along with a great many micros.

I have now returned from a short stay at Irmellan, but it was so very wet that little collecting was done. *B. pinivorana* was very common on the heather, *plantaginis* (1), *nanata* common, and one specimen of *Tæniata* (?) I send you a drawing of this last, as I am not sure of its name.—A. ADIE DALGLISH, Pollokshields, Glasgow, July 1888.

[I fear the *Emmelesia* is only *ericetata*.—J.E.R.]

ABNORMAL FLOWERS.—I enclose two curious specimens of flowers. The primrose I found in a glen at Roseneath, about the end of May; it had thirteen petals, ten sepals, and two stamens. The other is a horse-daisy or "Margaret" as it is called here, it has two flowers on one stalk. Your explanation might interest other readers than myself.—A. ADIE DALGLISH Glasgow.

TO CORRESPONDENTS.

A. ADIE DALGLISH.—Your horse-daisy *Chrysanthemum Leucanthemum* is an illustration of the abnormal form of development known as "fasciation," which results from the union of two or more stems or branches which are normally separate, and is attributed to luxuriant growth induced by super-abundance of food supplies and possibly to some injury of the primal bud causing the formation of several supernumerary buds which then coalesce together. Such stems or branches have generally a flattened appearance, and often produce a number of small twigs or flower buds. It is frequently found in pine trees, when the branches assume the most fantastic contorted appearance, resembling elk's horns, stag's antlers, &c. It is common amongst the *Compositæ*, such as the daisy, dandelion, &c.

Your primrose illustrates a different type of malformation known as *polyphyly* of the flower in general. It is frequently met with in one or other of the floral whorls, producing an increased number of, it may be the sepals of the calyx, or the petals of the corolla. But your specimen is a beautiful illustration of a duplication of every part of the flower, of the calyx, corolla, stamens, and pistil. This abnormal state has often been noted in *Primula* but there is diversity of opinion as to its cause. Some hold it is a regular multiplication or repetition of parts, a result of over development. Others that it is due to *Chorisis* or a splitting up of each individual organ, such as one sepal splitting into two, &c. This illustrates one of the modes of the origination of double flowers, although the most common and best marked is by the transformation of stamens into petals as in our double roses, cherries, ranunculus, &c.—J.P.S.

The Editor apologizes for the delay in the appearance of the "Young Naturalist" this month and last, caused by a break-down of the machinery in the printing office. He trusts it will not occur again.

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NATURE IN OCTOBER.

BY ALBERT H. WATERS, B.A.

ANOTHER moon has brought us to October, and a great change is fast coming over the aspect of nature. Gladsome summer with its profusion of flowers has passed away, and in its stead we have the more sober autumnal season, with its berries, fruits, and seeds.

The time for our typical ramble shall be a fine day in the early part of the month. The brightly shining sun gives such a cheerful look to things that we might almost fancy ourselves still in summer, but the fading leaves negative the supposition. As we walk along we see several gaily coloured butterflies. Most of them are the common Small Tortoiseshells, but we also see the beautiful Peacock butterflies, named after the ill-fated *Io*; and there, on the michælmass daisies in front of that cabbage, we see the scarlet and sable *Atalanta*.

The leaves on the hawthorn hedges are fast fading, although the wild plum and crab bushes we see growing in them seem but little changed. Here on this hedge we have found a young larva of the Gold-tailed moth. A little straw-coloured tortrix flies out of the hedge: it is *Dictyopteryx contaminana*. There are other tortrices out in October: as the variable *Sarothripa revayana*, whose larvæ feed in the early summer between willow leaves; the glossy reddish brown *Padisca piceana*; the silvery grey heath-loving *Cheimatophila mixtana*; the pale green Scotch *Oxygrapha literana*; the grey *Oxygrapha scabrana*, the larva of which was feeding in August between united elm leaves; the very variable *Peronea hastiana*; the variable *Peronea tristana*; the ochreous *Peronea rufana*; the common *Peronea favillaceana*; the local *Peronea maceana*; and the pale brown *Peronea umbrana*.

But we must pass on towards yonder wood. As we near it we see the trees all round are putting on their autumn tints, and are resplendent in

colour. Truly early autumn has its charms, and not the least of these is the gorgeous appearance put on by the leaves before they fall off the trees. We notice birds are very plentiful. They begin to flock together about this time, and the number of our resident birds is increased by others of the same species, which begin now to move down from the north. The migratory birds which have been staying with us during the summer, have now for the most part taken their departure, and their places are being filled with a number of species which retreat from the more northerly regions, as winter comes on in those parts. The cuckoo has long left us, as has also the nightingale, the willow warbler, the wagtails, and the tree pipit. We miss the flycatchers from the gardens, where we have been accustomed to see them all the summer. The hirundines are fast departing to the sunny south, where they will find insect food in greater plenty than here. The swifts left us about the end of August, and the swallows have either departed already or are preparing to leave us, and it will not be long before we see, for the present, the last of the martins. The redstart, the goatsucker, and the butcher bird, have also by this time left us. The chiffchaff left us at the end of September, and we no longer hear its nearly monotonous chant. The great bulk of the whinchats are also moving off to southern climes, although a few will continue with us all the year round. Many of the stonechats also will be leaving us now, although considerable numbers will stay behind. There are other birds too which take their departure as autumn comes on, such as the wryneck, the ruffs and reeves, the land-rails, and the terns, which latter will be absent from the British coasts for some time.

On the other hand, autumn and winter brings us a number of visitors from the north, many of which are identical with our resident species, as, for instance, the chaffinch, large flocks of which arrive on the east coast in the autumn. The curlews and snipes also have their ranks greatly swelled by migrants from the north. But besides these there are some birds which we only see in the colder months of the year, as, for instance, the fieldfare, the redwing, the long-legged plover, the brambling, and the snow bunting. Woodcocks, too, as is well known, visit our comparatively mild climate in order to escape the rigour of a northern winter.

We shall do well, perhaps, to try a little pupa digging before we go any further. Probably these trees on the outskirt of the wood will prove productive. Let us try this oak, perhaps we shall find something worth having. We may hope for *Boarmia consortaria*, *Nyssia hispidaria*, *Notodonta camelina*, *trepida*, *chaonia*, or *odonea*, also *Tæniocampa stabilis* and *munda*, all of which occur at the foot of oak trees. However, we are unfortunate, and none of the expected rarities turn up, so we will go to another tree and if that

proves unproductive try another. We have found one brown, rather dumpy, pupa, which is, doubtless, the chrysalis of the not uncommon peppered moth (*Amphydasis betularia*), and soon afterwards in the loose sods we find *Tæniocampa stablis*. Before leaving the wood we will try these beech trees for *Demas coryli*. The pupa is to be found in a slight web under moss at the foot of the trees. However, luck is against us, and we search for it in vain. Leaving the wood we will try these willow trees. Here we find several chrysalides. They are mostly *Tæniocampa instabilis*, but we find a large red-brown and glossy pupa, which we recognise as that of the Eyed-hawk moth (*Smerinthus ocellatus*).

Now we will go across yonder sandy common, where we see several butterflies moving about in the sunshine. What was that? Oh, I see! a lizard, and you have captured it with your butterfly net as it was running swiftly away. It is the species known as *Zootica vivipara*, and its specific name is given it because the female brings forth her young alive. Rather remarkable this in a cold-blooded animal is it not? I account for the phenomenon in this way: *Zootica vivipara* is extremely fond of basking in the sun, and it will lay for hours on the hot sands if not disturbed. The females, when they are full of eggs, are especially prone to this, and I very much suspect they do so instinctively, and instead of burying their eggs in a dunghill as the viper does, incubate them themselves (if the expression may be allowed) by lying in the sun in the manner just alluded to.

Among the very few plants which flower in October, mention must not be omitted of the ivy, whose nectiferous blossoms are such a source of attraction to the moths—a fact of which every lepidopterist is cognisant. If we visit the bloom at dusk with a lantern, we shall find that a large proportion of the macros consist of noctuina and our captures will very likely be such species as the yellowish ochreous *Orthosia macilenta*, the grey *O. lota*, the reddish grey *Anchocelis pistacina*, the reddish brown *A. litura*, *Cerastis vacinii*, and *spadicea*, the reddish ochreous *Scopelosoma satellitia*, *Phlogophora meticulosa*, *Hadena protea*, and the ubiquitous *Plusia gamma*. If we live in its localities we may also perhaps see the pale orange or fulvous *Horporina croceago*.

Such geometrina as we see may include *Himera pennaria*, although we are more likely to obtain it on the gas lamps, or at rest on oak trees.

Cambridge.

THE NEW FOREST ZYGÆNA MELILOTI.

By C. A. BRIGGS.

I trust that I may be excused for a few further remarks in closing this discussion.

I cannot agree with Mr. Tugwell as to the unimportance of his mistake. Quotations should always be accurate, but more particularly so when they involve one of the points under discussion.

Whatever Mr. Doubleday may have said or done privately can only be partly ascertained now, but it is perfectly clear from his *published* note that at that time he was entirely unaware how greatly Boisduval's description differed from Esper's, and, being solely guided by the former; he was led into assuming that our insect was *Meliloti*, Esp., and his assumption has been followed by most English entomologists without any further investigation. Probably the real solution of the difficulty is that all the various so-called *Meliloti* are, like our own insect, merely forms of *Trifolii*.

The name *Meliloti* was first introduced into our lists on the authority of Mr. J. F. Stephens, on the strength of the specimens taken by him in West Horsley Park, Surrey, in 1826. These specimens he, in the "Illustrations," Vol. I. page 107, calls *Meliloti*, OCHS.; and, as we find from Westwood's "British Moths and their Transformations," Vol. I, page 31, they were found to be so on comparison with German specimens brought over by Dr. Becker, of Wiesbaden. Mr. Stephens' types are in the British Museum, and not only are clearly *Trifolii*, but have each pair of spots confluent.

Meliloti, Hubner, we learn from "The Annual," 1873, p. 41, is a variety of *Z. carniolica*, and one of his figures (Table 17, fig. 82) which Boisduval and Staudinger refer to *Meliloti*, Esp., shews a very richly coloured, almost black *Zygæna*, with a narrow border to the hind-wings, and the middle pair of spots small and wide apart, the upper middle spot on one wing being round, and on the other long.

Meliloti, Boisduval, as he tells us in "Monographie," p. 51, can easily be distinguished by the cut of its wings, which are much more pointed (than *Trifolii*), and by the middle spot next the costa, which is always long and separate.

Our own insect has very round wings, and the upper middle spot sometimes round, sometimes oval, and the border sometimes broad and sometimes narrow.

Meliloti, Esper, is described as having five round spots. He figures three specimens, male and female, and a variety. The male and female are a much

larger insect than ours, with wings very slightly rounded, with the upper middle spot round on the upper surface and long on the under side. In the male there is a sixth spot on the underside—a peculiarity occasionally noticeable in our own insect as well as in *Trifolii*. I do not, of course, know to what Continental authors Mr. Tugwell alludes, but they cannot be these, as Stephens (Ochs), Boisduval, Hubner, and Esper, all differ so much in their ideas of what *Meliloti* is; while our own insect agrees with none of these authors descriptions and figures, and as Mr. Doubleday was clearly quoting from Boisduval alone, I think that if any author's name is appended to the name *Meliloti* in connection with Doubleday's remarks, it should be Boisduval's, not Esper's, even though Doubleday never seems to have noticed that the description he quoted did not describe our insect.

With the exception of the different appearance, resulting from its being more thinly scaled and its smaller size, the chief distinguishing point that Esper gives is that the two middle spots (which elsewhere he has described as round) stand nearer together than in *Lonicerae*, while one of the main characteristics as laid down by Boisduval and followed by Doubleday, is their distance from each other, and the oval shape of the upper one. Mr. Tugwell by his concluding remarks seems to demand mathematical accuracy in outline, but I think that few, if any, other entomologists would fail to understand what is usually meant by "round" and "oval," and to allow some little latitude in interpreting them.

Mr. Tugwell tries to get out of the difficulty caused by the fact that our insect does not sufficiently agree with Esper's description and plates, by challenging me to produce an insect that does agree with them, but this is surely putting the saddle on the wrong horse. My contention is that our insect has not been shewn to be *Meliloti*, Esp., and that until this is done it has no claim to be so-called; and that it is for Mr. Tugwell and those who agree with him to give some better reason for calling it so, than a statement of Mr. Doubleday's, based upon the entirely erroneous idea that Boisduval's description agreed with Esper's. What Esper's insect really was, unless his types are labelled and still preserved at Erlangen, can now only be gleaned from his plates and description, which do not agree with our New Forest insect.

With regard to that which Mr. Tugwell somewhat warmly calls my most illogical construction, I need only say that so far from placing any construction, logical or otherwise, upon his remark, I distinctly stated that I failed to follow his argument. From the explanation he now gives we see what he intended to yet did not say, but any one reading his words on page 132, un-

illuminated by the explanation now given, will see that "it" must and can only refer to our New Forest insect, and that the passage *as written* will not bear the meaning he now places upon it. I much regret this unfortunate circumstance, as it has imparted an unnecessary warmth to an otherwise pleasant and friendly discussion.

With regard to the solitary larva, a comparison of Mr. Tugwell's description with Esper's plate and description, shows conclusively that whatever it was it was *not* the larva of *Meliloti*, Esper.

55, *Lincoln's Inn Fields*, 24th September.

BRITISH FROGS AND TOADS.

By LINNÆUS GREENING.

(A Paper read before the Warrington Field Club November 18th, 1887.)

Continued from page 174.

RANA ESCULENTA (*Edible Frog*).

In the "Zoologist," July, 1884, appeared an article by Mr. Boulenger, of the British Museum, referring to this species, and demonstrating that there is not sufficient evidence to prove that it is indigenous to these islands. He points out that the species is common throughout Europe, and there are several local varieties sufficiently marked to be classed as sub-species. It is known that edible frogs have been introduced into this country from France and Belgium, within the last 40 years; and they have thriven in their new homes. But it is certain that *Rana esculenta* occurred in the fen district at an earlier period, and fortunately, a few specimens taken during the breeding season have been preserved in the Norwich Museum. A distinguishing character of some of the sub-species is the shape of the tubercle developed by the male during the breeding season. Now it is remarkable that all the more ancient specimens which have been preserved belong to the Italian sub-species, and not to the French form, recently imported. This seems to render it highly probable that this species was introduced into England by Italian priests during the period when the influence of the Church of Rome was greatest.

However, since it has resided amongst us for at least 400 years, no further apology is necessary for including it amongst British Batrachians. If I may be excused a little repetition, I will again say, that the two absolutely distinctive features by which this frog may be at once distinguished from the common one, are: first, the absence of the dark patch running from the eye

to the shoulder, which is always present in *Rana temporaria*; secondly, the presence of a well-marked dorsal line. Though the edible frog is usually larger than the common one, and generally of a bright pea-green colour, yet these are not absolutely distinctive characteristics.

I never had the pleasure of seeing this handsome species in its native haunts. I am indebted for the specimens on which my observations have been based, to the kindness of Mr. B. Corcoran, of London, who procured them from a friend in Paris. They arrived from Paris on the 1st June, 1887, having stood their long journey well; they were evidently not quite ready for breeding, as the males had not yet developed their suckers, and had not begun to croak. On the 5th June, my wife was startled by an unusual sound, coming from the room in which these creatures were. I guessed the cause, and found the males indulging in their love song, whose remarkable power, so much louder than that of the common frog, is owing to the vocal sacs, situated one at either side of the mouth, and which, during the emission of the sound are distended to the size of a cherry, and are of a milk white colour. The distention is only temporary, ceasing with the sound. The appearance of the head, whilst the sacs are distended, is very curious. As in the common frog, the males only croak during the breeding season.

On the 13th June, the males had developed suckers, and the frogs paired as in the other species already described. The spawn was deposited on the 20th of June. The eggs were smaller than those of the common frog, being only $\frac{3}{16}$ in. diameter; and the embryos are of a lighter colour than those of *Rana temporaria*.

On the 24th June, the young tadpoles appeared, and five days later lost their external gills. The young tadpoles are quite green when hatched, but on the 3rd day change to a darker marbled green; unlike the common tadpole, the posterior half of the ventral surface is of pale yellow. Knowing from experience the unreliability of statistics of development obtained under artificial conditions, I cannot venture to give the periods for the development of the legs, not having had any opportunities of observing them in a state of nature. Those I had in captivity were as slow, if not slower, than the tadpoles of *Rana temporaria*; and therefore I conclude that the growth of the young Esculenta is on parallel lines.

The cutaneous respiration described at length under *Rana temporaria*, is as important and as effective in this species; and it is unnecessary to do more than refer to it here.

In this species the ground colour is generally pea green, though some specimens are dark brown, and others again of various intermediate shades. The markings are black spots irregularly distributed over the dorsal surface.

The ventral surface is milk white, spotted or marbled with dark brown.

We will describe, as in the species, a pair which have just bred, and are consequently in their full summer dress.

The female is larger than the male, and is 3 inches long in the body, the hind leg when extended measures $3\frac{3}{4}$ inches long; the fore-leg is $1\frac{1}{4}$ inches long, the toes being, unlike those of the hind feet, free and devoid of web. The upper surface of the body, head, and legs, is pea green; and there is a well marked median dorsal line of a lighter colour than the back, and quite free from spots; the markings on the back are generally circular, and seem to run in pairs. As in the common frog, there are two light brown dorsal ridges, along the outer side of which run a series of black blotches, which tend to form a broken line on either side. The upper parts of the hind legs are spotted and barred; the fore legs are spotted slightly with black. The ventral surface is milk white, with dark brown spots, which are usually larger and more numerous in the abdominal region.

There is a broken line of black spots, running from the fore to the hind leg, forming a band between the green lateral and the white ventral surfaces. Eye the same as common frog.

The general ground colour of the male is as that of the female, but darker. The spots on the throat are fewer and very faint, the dorsal black spots not so numerous and more confined to the hind quarters, and the dorsal surfaces of the legs are browner. The male is smaller than the female, measuring in the body $2\frac{1}{2}$ inches. He develops on his fore feet the usual suckers during the breeding season. The body is $2\frac{1}{2}$ inches long, hind foot $3\frac{1}{4}$ inches long and much palmated, fore leg $1\frac{1}{2}$ inches long, with toes free.

In captivity this is decidedly more tamable, more intelligent, and much more active than the other species. It is a sun-loving creature: is more active in the day time, and is a day feeder, taking flies with extraordinary skill. I have placed in the case live flies, and have watched the frogs jump at least 13 inches high, and catch with unerring aim. When taking flies they always thrust out the tongue with amazing rapidity.

Another interesting mode of feeding them is by placing a batch of worms on the wire cover of the case. The worms begin to make their way through the meshes, which the frogs perceive, and sit, usually in a ring, waiting eventualities; as soon as the worm is sufficiently far through the mesh a frog jumps up and secures the delicate morsel; the height of the cover being 14 inches it is a good feat to jump so high and always succeed.

I have repeatedly seen an edible frog dive into the water after beetles or other water-loving insects, which it captures with great skill. These frogs, as already stated, are very tame, taking food, especially worms, readily from

the fingers. They are enormous eaters, taking six or seven good sized worms at a meal. Maggots also form an important part of their diet, and I would advise any one keeping frogs to use this class of food as most economical. Those which the frogs miss in the grub state are secured by them when they re-appear in the perfect form.

This creature is much more aquatic than *Rana temporaria*, spending most of its life either in the water or upon the leaves of water plants, on which it may be seen at rest on a warm summer's day.

I must not omit to mention that it casts its skin after the manner of the other species; and its winter's repose is also amongst the mud at the bottom of ponds or similar places.

BUFO VULGARIS (*Common Toad*).

Perhaps no animal has been more ruthlessly treated than the common toad. Ignorance has been the cause of this cruel oppression. I shall attempt to put this animal in a more favourable position by exhibiting its good qualities. Bad ones it has none, for without exception it is the best friend of man, so far as insects, slugs, &c., are concerned.

The life history of the toad is much the same as that of the frog; however, it will be best to watch its development from the embryo to the mature form. The spawn is deposited in long strings, and not in mass, as in the frog's. The spawn presents the appearance of gelatinous strings, which, after being laid an hour, are about $\frac{1}{4}$ inch diam., this size being due to the absorption of water, as it is only $\frac{1}{8}$ inch diam., when newly laid.

The embryos are in pairs, but placed diagonally, giving the appearance of a zig-zag line; and the strings of spawn are festooned amongst water-plants. You will see it is an easy matter to distinguish between this and the spawn of a frog. The fertilization takes place exactly as in frogs, and the remarks about the males apply with equal force to this species. It is generally asserted that toads are more prolific than frogs; but so far as my observations extend, they contradict this statement. The largest number of eggs which I have seen one female deposit is 1,300; whilst in one case the number was only 900 eggs. Taking the average of those which I have observed, I find it to be 1,100. I am inclined to think that the commonly received opinion of the authors referred to is erroneous, not merely because my figures do not agree with their statements, but also because we all know that toads are decidedly less common than frogs, although the latter are very much more preyed upon than the former.

The development of the embryo is similar to that of the frog. The tadpoles, when hatched out, are $\frac{1}{16}$ ths of an inch long, are uniform dark brown, and differ in shape from those of the frog. The head is more distinctly

differentiated from the body, and the gills, which are very minute, instead of projecting laterally, seem to be behind the head, rather than at the sides. The appearance of the neck is distinctive of the toad tadpole during the first week of its existence, but about the ninth day the external gills disappear, and the form approximates to that of the frog, from which it can only be subsequently distinguished by its uniform colour, without any markings whatever. Its habits and food are similar to those of the frog. The spawn is usually deposited about the middle of April, and where I found tadpoles with hind legs fully developed on the 9th July, 1887, the fore legs appeared six days afterwards. The remarks about the less rapid development of the frog tadpoles in captivity, owing to the deficiency of appropriate food, apply equally to those of the toad.

Those tadpoles with all the legs developed before the end of June had probably been laid a fortnight later than those, which, in captivity, had only developed their fore legs three weeks later.

As soon as the fore legs are sufficiently developed for use, the tadpoles begin to leave the water; in three days the tail is absorbed, and the animal has assumed its adult form, and is $\frac{5}{8}$ inch long.

It arrives at maturity in the fourth or fifth year, and lives to the age of about 15 years.

Before considering the general habits of *Bufo vulgaris*, we will describe its colours and markings.

The ground colour is generally dark brown, varying to grey; but sometimes dark greenish grey or yellowish brown, marked with dark brown spots; these sometimes run in broken bands down the back, and the body is covered with reddish brown tubercles, which are larger on the back, but more numerous on the ventral surfaces, which is greyish green, speckled all over with brown. As in frogs, we will describe a typical pair which have just bred.

The female is dark brown, with black spots distributed all over the dorsal surface. The body covered with reddish brown tubercles, larger on the head, with two large glands behind the eyes. The ventral surface is greyish green, spotted with brown; more so on the hind legs and feet. The length of the body is $3\frac{1}{4}$ inches; the hind leg 3 inches when extended, the hind feet being palmated. The fore leg $1\frac{1}{2}$ inches long, with toes free of web. The eyes are very prominent, the horizontal pupils being black with gold coloured rims.

The ground colour of the male is dirty olive yellow, the markings being similar to those of the female. The length of the body is $2\frac{1}{2}$ inches, the hind leg 3 inches, the fore leg $1\frac{1}{2}$ inches. The fore feet are free, whilst the hind feet are palmated. It possesses a sucker on the first three fingers of each

hand. Its fore arms are very strong, and being short, the three suckers are necessary for breeding purposes.

As might be inferred from its warty skin and more terrestrial habits, the cutaneous respiration of the adult toad is less efficient than that of the frog. This animal is always found in places where it can get a sufficiency of moisture and air, which are necessary to its existence. Professor Bell, in his work on "British Reptiles," gives an instance of a toad which attained the ripe old age of 30 years; truly, a respectable age, which, however, might have been exceeded, for it met its death by misadventure. Yet extraordinary as this age may appear, it is totally eclipsed, if we may credit the assertions of those who have been so fortunate as to find, in breaking a piece of coal, a toad, which had obviously been accidentally entombed, when the vegetation (at once its home and grave) was deposited in the Carboniferous epoch, or those still more fortunate observers who have occasionally found, on breaking a lump of granite, a toad, which subsequently hopped away in quite a lively manner, though the stratum in which it was found had formed the bed of a Silurian ocean hundreds of thousands of years before the Carboniferous period, and millions of ages before our own. Anyone who doubts the accuracy of these statements upon the longevity of the toad, should do like the old lady, who, at the age of 80 years, thought she would replace her deceased parrot, with a young raven. On inquiring from the dealer the age the bird might attain, he said 120 years; she at once decided to buy one, and see for herself whether his statement was in accordance with facts.

Without attributing deliberate falsehood to those who, in good faith, have recorded these extraordinary occurrences, we must make allowance for the fact (however unreasonable) that the toad is popularly regarded as the embodiment of evil, and consequently endowed with supernatural power. Thus the sudden appearance of a toad occasions to almost any one a feeling of alarm and disgust, which entirely prevents accurate observation. As a matter of fact, it is absolutely impossible for a toad to exist without food for two years, as the following experiments, made in 1825-6-7, by the then Dr. Buckland, proved.

Twenty-four toads, of various sizes, were placed in twenty-four cavities; twelve in a block of compact sandstone, and twelve in a block of Oolitic limestone. The tops of the cavities were carefully grooved, and glass covers luted to them so as to prevent the access of insects. The two blocks were subsequently buried under 3 ft. of earth, and 13 months later both were uncovered; it was found that all the twelve buried in the sandstone were dead; and, as the bodies were much decomposed, they had evidently been dead several months. Of the twelve buried in the limestone, which was of a

porous nature, the smaller ones were dead, but two of the larger ones had absolutely increased in size. This was evidently owing to the fact that the glass covers had been cracked, and minute insects had entered, and formed the food of the prisoners. The cracked glasses were replaced with sound ones, and the block again buried for twelve months; at the end of that exhumed, and all the toads were dead. A parallel experiment was conducted as follows: In an apple tree, three holes were cut; in the largest, two toads were placed, and one in each of the small cells. These holes were then plugged up with wood, so as to exclude insects, and, apparently, air.

At the end of twelve months every toad was dead, and the bodies very much decayed. The results of these experiments seem to render it certain that no toad, confined in a small cell, to which air has not access, can survive 12 months. They also prove that no toad can live two years without food.

These experiments have been confirmed by competent observers, from time to time, and their accuracy having been established, it would be the merest cruelty to repeat them, just for the sake of refuting unsupported assertions, that toads or frogs are ever found alive in materials deposited millions of ages ago.

The toad is not quite free from responsibility for its evil reputation, for there are at the back of the head two large glands, and smaller ones on the back, which secrete an acrid milky fluid, harmless in its character, though if rubbed on a wound it would produce local irritation; this slight offensive property is the sole basis for attributing to the toad any venomous power. Another factor in producing the disgust so generally felt for this animal, is its power of inflating itself to nearly double its size, thus giving itself a rather "uncanny" appearance. The acrid secretion referred to is undoubtedly a protective development, since no dog will attack a toad a second time. If he has once mouthed one, and tasted the secretion, which burns his tongue, he will profit by the lesson and never seek for a repetition of it. The same remarks apply to the ring snake, whose principle food is the common frog. For it never touches a toad under any circumstances. This I have repeatedly demonstrated, by attempting to starve these snakes into eating toads; giving them no other food, but always with the same result. During August of last year (1887), I observed a curious fact, illustrating the above statements. A toad was crawling along, when suddenly a ring snake came across the path, sufficiently near to alarm the toad which distinctly raised itself on its legs, inflated its body, and turning half round, faced the snake, which promptly beat a retreat, evidently profiting by the wisdom inherited from its forefathers.

The skin is cast several times during the summer, splitting down the back

and belly and gradually worked off in two pieces, and subsequently eaten. The sloughing is preceded by several days of semi-torpidity; the respiration is almost arrested, and the animals sometimes die during this period. The mythical toadstone of magical curative power, supposed to be in the head of the toad, probably originated in the marvellous beauty of the toad's eye, which may not inaptly be compared to a jewel.

The toad is decidedly a nocturnal feeder, hiding during the day in out of the way places, as crevices in rockeries, under stones, and in hedge cops; its food comprises woodlice, slugs, worms, caterpillars, and insects generally. This is so well known to gardeners, that they treat this usually despised animal with much kindness; protecting and encouraging its presence in greenhouses, where it renders them the greatest service by keeping down those insect pests. A friend of mine wishing to know the best means by which to lessen the woodlice in his greenhouse, which was over-run with these pests, I gave him three toads. In less than a week they had freed his greenhouse from the woodlice, and now as a matter of course he regards the toads with a considerable amount of affection. This simple illustration of the services rendered to man by the toad, should lead us to protect rather than to destroy this animal, the victim of so much superstitious persecution: and should enable us to see clearly that man cannot destroy the balance of nature without subsequent inconvenience. In captivity the toad is the most tamable of our British Batrachians; becoming in fact so tame, that one of mine will allow itself to be carried on the hand to the window, whence it will take flies with the greatest coolness. Toads will take none but living food. I feed mine principally on worms and maggots, of which they consume large quantities. When a toad is at rest, it squats on the ground, and appears to take little notice of its surroundings; but if a worm approaches or comes within the range of vision (which, by-the-bye is extensive, owing to the position of the eyes) the whole aspect of the animal changes, and its attitude indicates intense watchfulness. Elevating its head, it keenly scrutinizes each movement of the worm and appears to enjoy the anticipation of the morsel more than the actual swallowing of it. When the worm is near enough it moves its head forward and protrudes its tongue with the utmost swiftness, and having seized the worm, it proceeds to swallow it, though more slowly than the frog does, like which it also uses its fore legs or hands, if the worm be large. As previously mentioned, toads are decidedly more terrestrial than frogs, and hibernate in holes in hedgebanks, and similar situations, thus offering a marked contrast to the mud-hibernation of the frogs.

I must not omit to mention that even so uncanny a creature as the toad can, and does, become possessed of musical powers, though his love-song is

nothing more than a faint quack, quack, like that of a duckling, but not nearly so loud.

Though toads are less agile than frogs, yet they sometimes reach positions inaccessible to the latter, as they can climb with ease, even a perpendicular surface. When sugaring for moths, I have more than once seen a toad up a tree taking moths from the sugar, and later on I have seen this toad lying at the foot of the tree hopelessly "tight," having taken too freely of the alcoholic beverage.

(To be continued.)

DEILEPHILA GALII IN 1888.

By J. E. ROBSON.

This beautiful insect has always received great attention from collectors. Rare enough to be highly valued, it has still been sufficiently abundant to keep every one on the look out for it, in the hope of filling up the blank above the name of the species in their cabinets. Almost every year we are roused up by the occurrence in unusual numbers of one insect or another, and we talk of the great *Edusa* year (1877), the great *Antiopa* year (1872), the great *Convolvuli* year (1846), and so on; while *Cardui* and *Gamma* appear more frequently, and being common do not attract much special attention. There can be little doubt but these visitors are part of large migratory swarms that reach our shores from the Continent. Sometimes only a stray specimen or two from a swarm reaches our shores, such species as *Batica* and *Nerii* having visited us in such small numbers that there has always been doubt as to retaining them in our lists. This migratory tendency in certain species and genera is now being better understood, and the "blown over theory," once rejected with contempt, is now accepted as a scientific fact that has explained many difficulties previously unsolved. The present year may be known at the great *Galii* year, for though this species has occurred in large numbers once or twice before, the swarm that has visited us in 1888 has been unprecedentedly large. It appears to have reached our shores on or about the 16th July, only a stray specimen, the advanced guard, being recorded previously. From that date to the first week in August, we have notices of its occurrence in every part of the kingdom, from Aberdeenshire in the north of Scotland, to the various counties on the south coast of England. From Durham and Yorkshire on the east, to Cumberland and Cheshire on the west. Thence it has crossed the Irish Sea, and is recorded as occurring near Dublin. The number of actual records probably does not include a tithe of the specimens caught, and there is no

doubt many hundreds of the imago were obtained in all. These have mostly been found on the coast, as the food-plant, *Galium verum*, is usually abundant on coast sand hills, but odd specimens have been taken inland also.

Collectors were naturally on the look out for larvæ, and had an early search been made, beginning about the middle of August, the large number that have been found would have been greatly exceeded. But it does not appear that they were looked for much before September. My friend Mr. Porritt tells me he found them on the 30th and 31st August, "of all sizes, from about three-quarters of an inch to full growth, some of them being grand, big spotted fellows." Mr. Porritt also calls attention to another matter of some importance: "We found them on both white and yellow bedstraw, but most on the former, contrary to general supposition as to the food, I believe, and most were found on the poor, short, sparse patches—only three or four, I think, being found on big patches, and they were nearly all quite exposed on the upper stems of the plants." This corresponds in every respect with my own experience with larvæ of *M. stellatarum*, and the only larva of *C. porcellus* I ever found was on a little patch that hardly seemed enough for one meal. Mr. Porritt's larvæ were taken at Deal, and I learn from other correspondents that a very large number were taken after he left. From other places I have similar records, so far as I can judge the Cheshire sand hills, and those about Deal, producing the greatest number. The only place not on the coast where I have reports of it being common is at Cambridge. Possibly records from other inland districts may be given in the other magazines, but when we hear of one gentleman, who must be nameless till he speaks himself, having taken over 150 larvæ in one locality, there can be no doubt that the captures this year very far exceed any previous year, and 1888 must in future be known as the great *Galii* year.

REPORTS OF SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

September 6th, 1888.—Mr. Cooke, President, in the chair. The exhibitions of lepidoptera and coleoptera were very numerous, and comprised the following:—Mr. Hanes, a nice yellow variety of *Dominula* and a fine bred series of *Scolopacina*. Mr. Fordham, various species of grasshoppers. Mr. Bellany, a number of Indian silk-producing moths. Mr. Pearson, bred *Ridens*, *Piniperda*, *Prodromaria*, and *Lychnitis*. Mr. J. A. Clark, long series of *L. agestis* and a very fine variety of *Bipunctaria* with a black band and

black bar, also living Ichneumon from *Filipendula*, and a bred specimen of the Upholsterer Bee. Mr. Allbuury, *Leporina* and other species from the coast. Mr. Sampson, *Nictitans* and *Oo*.

Mr. Jarvis, exhibited a series of *Dolichosoma nobile*, from Isle of Wight. Mr. Lewcock, four specimens of *Leptura fulva*, taken by Mr. Newberry at the New Forest. Mr. Cripps, a series of *Phyllobius calcaratus* and *Athous vittatus*. Mr. Thompson, a living specimen of *Sphodrus leucophthalmus*. Mr. Allbuury, *Cetonia aurata*, *Chrysomela lamina*, *C. distinguenda*, *Silpha laevigata*, *S. tristis*, &c., from Dover.

A letter was read from Mr. Anderson, announcing his resignation as Hon. Secretary of the Society. For some time past Mr. A's health has been failing, and he is about to proceed to Australia in the hope of deriving benefit from the milder climate of that country. Several members gave expression to the deep regret felt by the Society generally at the prospect of parting with Mr. Anderson, who will, however, still retain his connection by becoming a corresponding member of the Society. It was then proposed and unanimously agreed to, that Mr. Lewcock be elected to the post vacated by Mr. Anderson.—J. RUSSELL, AND G. A. LEWCOCK, Joint Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

August 23rd, 1888.—T. R. Billups, F.E.S., President, in the chair. Mr. H. A. Cruttwell, of Asaba, River Niger, West coast of Africa, was elected a member. Mr. J. T. Williams exhibited nine specimens of *Deilephila galii*, taken by him at St. Margaret's Bay, and mentioned that Mr. Felix Oswald had taken eight specimens in the same district. Mr. Wellman, bred examples of *Heliaca tenebrata*, *Eupithecia togata*, *Emmelesia unifasciata*, *Rodophæa formosa*, *R. suavella*, *R. avernella*, *Sesia ichneumoniformis*, among which were three specimens having yellow bands; and he stated that he had bred these three only from five dozen, while last year, out of three dozen, he bred sixteen of this variety, and he also shewed a melanic specimen of *Venusia cambrica*, from Sheffield. Mr. South, many species and varieties taken in Sussex, among which was a variety of *Arctia villica*, and an example of a *Plusia*, and called attention to the curiously serrated line on the hind-margin of the primaries which formed a distinct metallic W. He said the specimen so far as he knew did not agree with any species hitherto described, but it might possibly be a variety of *Plusia gamma*. Mr. Joy, *Coremia designata*. Mr. Helps, *Acontia luctuosa*. Mr. T. D. Cockerell, *Trichodes ornatus*, *Chrysis pacifica* and *Cantharis nuttali*, from Colorado, and notes were read relative to his exhibit. The Secretary read the following communications from Mr.

Cockerell: a note on the genus *Euchloë*, and a short paper entitled "Can insects distinguish between red and yellow?" in which he asked the members to assist him with information as to whether yellow insects shewed a fondness or otherwise for pink flowers, and whether the insects seemed aware of the difference between red and yellow.

Sept. 13th, 1888.—J. T. Carrington, Esq., F.L.S., Vice-President, in the chair. Mr. J. H. Keys, of Plymouth, was elected a member. Mr. H. A. Auld exhibited a large number of *Dicycla oo*, taken at sugar on August 10th, near Hayes. Mr. Bouttell, a fine variety of *Melanippe sociata*, and also many other species. Mr. Turner, a melanic specimen of *Boarmia gemmaria*, var. *perfumaria*, taken near Askdown Forest, Sussex. Mr. Stringer, species of lepidoptera from Shenly, and remarked on the unusual abundance of *Ino statices*, and *Zygæna filipendulæ*. Mr. Croker, imagines and preserved larvæ of *Smerinthus populi* and *Panolis piniperda*. Mr. Elisha, fine bred series of the following Tortrices: *Argyrolepis aneana*, *A. zephyrana*, *Eupæcilia atricapitana*, *E. amandana*, *Retinia turionana*, *Catoptria juliana*, *Phoxopteryx derasmonæ*, *Ephippiphora trigeminana*, and *Carpocapsa pomonella*, the last named bred from berries of the white beam tree; also the following Tineæ: *Nematois fasciellus*, *Cerostoma horridella*, *C. alpella*, *Æcophora unitella*, *Coleophora therinella*, *Gelechia semicandrella*, the last named bred from *Cerastium tetrandrum*. Mr. Wellman, bred examples of *Noctua sobrina*, *Plusia interrogationis*, both from Perth, *Dianthæcia irregularis*, from Cambridge, and many other species. Mr. South, a short series of *Lycæna icarus*, from Durham, which he said might be regarded as a fair sample of *L. icarus*, occurring at Bishop Auckland and Castle Eden, one specimen, a male, having distinct black patches in the fringes, while several of the females were remarkably for having all the under surface markings of the primaries reproduced on the upper surface. He also shewed fourteen specimens of the male of *L. icarus* having traces of black dots or spots on the hind-margins of the secondaries, picked from about sixty or seventy examples from Rannock. Mr. South remarked that he was aware that this form of *L. icarus* occurred in Scotland and Ireland, he had taken an example at Ventnor but he did not know that it occurred in other parts of England, and would be glad of information as to this. Mr. Tutt said it occurred at Deal. Mr. Weir read an extract from a letter he had received from Mr. Merrifield in which he stated that in carrying out his experiments with *Selenia tetralunaria* for Mr. Galton, he had obtained some interesting results in colour, and to prosecute these he would be glad of ova and larva of the species in question from Scotland, Ireland, Wales, North of England, or any continental country. Mr. Tutt mentioned that the larvæ of *Deilephila*

galii, had been occurring very freely at Deal, and some remarks were made by other members with reference thereto. An interesting discussion took place on the probable influence of humidity in causing variation among lepidoptera.—H. W. BARKER, Hon. Sec.

[The Annual Exhibition of this flourishing Society will be held on 17th and 18th October, as per announcement on cover.—Ed.]

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.

ENTOMOLOGICAL CONVERSAZIONE IN LIVERPOOL.—The second annual *conversazione* of this Society took place in the Royal Institute, Colquitt Street, on September 24th. Despite somewhat unfavourable atmospheric conditions, there was a numerous attendance of members and friends, whose manifestations of enthusiasm in the society's proceedings augured well for the future of the Society. Two commodious rooms of the institution upstairs were replete with a very large and beautiful array of entomological specimens and water-colour drawings illustrative of the same. The exhibits in the first-named class were those of Mr. S. J. Capper, the genial president, and may be said to be the result of his life-work in entomological research. The collection consists of some fifty to sixty drawers or cases of lepidoptera. The other collection represents the artistic industry of Mr. S. L. Mosley, of Huddersfield, who has faithfully portrayed British and foreign butterflies, &c., in upwards of 1,000 sketches. The respective collections of both Mr. Capper and Mr. Mosley were very much admired. These collections were also enriched by the exhibits of other contributors, which included preserved larva, and preserving apparatus by Mr. Pierce, the vice-president; a collection of British coleoptera by Mr. R. Wilding, the hon. secretary; a specimen of *Morpho ganymede*, by Mr. C. H. Walker; apparatus used in collecting and preserving insects by Mr. Cooke; a new design in breeding cages by Mr. Young, of Rotherham; and microscopes by Messrs. Isaac Thompson, J. Wall, Pierce, Harker, and Webb.

The President, in his opening remarks, stated that the society had been in existence twelve years. Commencing with only about a dozen members, it now numbered fifty and sixty. One of the objects of the present entertainment was to attract new members, and he hoped that during the evening many now present would give their names to the Secretary (Mr. Wilding), to be proposed as members. After briefly explaining the privileges attached to membership, he said he should like to make a few remarks respecting the description of his own exhibit on the programme distributed, which pronounced it "one of the finest collections of British lepidoptera in the country." Whilst this might be truly said of it, he should be sorry for anyone to go

away with the impression that there were not other collections that could be described in the same terms. Indeed there were many very excellent collections in London and the provinces, whilst in our own city that of Mr. C. S. Gregson, had an almost world-wide reputation for its extent, number of species, and most remarkable varieties. The Cooke collection, bequeathed to the city by his late friend Mr. Nicholas Cooke, contained a long series of very rare insects. Each collection had its peculiar charms for its possessor. As regarded himself, he valued his own the more because a considerable number of the specimens had been captured by himself. The object of a public exhibition was not to invite comparison with other collections, but to interest young beginners and others, and show them what could be accomplished.

The proceedings of the evening included a lecture by Mr. Councillor John Thorpe, of Middleton, in which he dealt with the subject of silk practically and exhaustively, giving much information on the subject in all its branches. Mr. C. H. Walker (hon. librarian) afterwards read a paper, in which he painted a very glowing picture of the pleasures to be derived from rural researches among the insect tribes, and described graphically the habits of some typical forms, including the hawk-fly, the humble-bee, the scarlet admiral butterfly, and the grasshopper.

NOTES AND OBSERVATIONS.

LARVÆ OF GALII ON WILLOW HERB AT RISLEY MOSS, NEAR WARRINGTON.

—On Sept. 22nd, while my father and I were beating a birch bush, for the larvæ of *L. dictæoides*, under which the rose willow herb (*E. angustifolium*) was growing, he caught sight of a larva feeding thereon, which at first we thought to be *C. elpenor*. On examination there proved to be too many spots, and and differently situated for it to be *C. elpenor*. We hunted the plants to our left for over an hour, but obtained no more. On September 23rd, I tried the opposite direction to the one we hunted the day before, and took fourteen larvæ all at the same spot. On Sept. 26th, I went again and took seven more larvæ; they were more scattered than on the last occasion. I may mention that the willow-herb extends in one continual bed; although I hunted the whole of it, I got them all in about 50 yards. They evidently belong to one brood, all of them when taken being nearly full-grown. The larvæ is said to feed on bedstraw, fuchia, and vine: I have not read of its being taken on the willow-herb before. The larvæ when obtained were black, with ten pale spots near the top of the back, profusely sprinkled with minute yellowish dots, reaching from the spiracles as far as the pale spots. Head brown, anal

horn red, spiracles yellow. When about to pupate the larvæ assumed a greenish hue, the black round the pale spots retaining its colour and giving the spots the appearance of having a black ring round them, having a distinct dorsal line, and inclining to rosy underneath. I have shown them to most of the Warrington entomologists, and they say there is no doubt about its being *D. galii*.—JOSEPH COLLINS, Warrington.

MIANA STRIGILIS.—I have never taken any *Miana strigilis* here except the black form (*Abthiops*, Haw.) till this year, when I have taken two or three with white markings.—JOHN T. ROGERS, Oldham.

COLLECTING ON THE SEVERN.—I spent a fortnight on the banks of the Severn in Staffordshire, but took nothing worth special note. *Adippe* was plentiful when we had any sun. *T. w-album* and *guercus* scarce. I took one *Retusa* and *Tumidella* at treacle, but for such a fine spot and the time of the year, July or August, I was very much disappointed at my fortnights captures. Scarcely anything came to sugar except *Maura* and it was rather fine to see a dozen or more of this large handsome moth on one patch of sugar. The scales of this species seem more delicately attached than in most moths, or at all events they spoil themselves very much.—F. W. PIERCE, Liverpool.

FATAL RESULTS OF AN ADDER'S BITE.—The following particulars regarding the fatal results of an adder's bite should prove interesting to those of your readers who have given this vexed question any attention. This case has the recommendation of being recent, so that every enquiry can be at once made by those specially interested in the subject, the fact duly authenticated. This is the first case of the kind that has come under my notice, and I have made enquires among the natives in many parts of the Highlands, where large vipers abound but always without success. The paragraph appears in to-day's "N.B. Daily Mail" and "Glasgow Herald," and I feel sure that Mr. MacGregor, Inspector of Poor, Bunessan, Mull, will be glad to supply any information on the subject to any enquirers.

"SAD DEATH FROM BLOOD POISONING.—About half-past eleven yesterday forenoon, on the arrival of the steamer 'Dunara Castle,' at Berth, 40, north side of the harbour, Alexander M'Pherson, resident at Pennyghael, near Bunessan, Mull, who was a passenger on board, died from blood poisoning. The deceased was accompanied by Mr. Alexander M'Gregor, inspector of poor, Bunessan, who at the earnest request of Lady Victoria Campbell, daughter of the Duke of Argyll, and at present in the island, consented to take the unfortunate man to the Western Infirmary of Glasgow. Shortly before the death occurred, Dr. Robertson, Washington Street, was sent for, but his services were of no avail, as he died immediately after the doctor's arrival. It appears that M'Pherson's father died at Mull on the 20th instant from blood poisoning, caused by being stung by an adder, and his son, who was dressing the body, had a cut on the thumb of his right hand, through which the poison was absorbed into his system. The deceased was married, 46 years of age, and has left a widow and seven children.

JOHN MACKAY, 93, Dundas Street, Kingston, Glasgow, Sept. 27th, 1888.

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A LITTLE KNOWN COLLECTING GROUND.

By A. F. GRIFFITH, M.A.

HAVING spent a few days in North Wales at the end of July and the beginning of August, a few notes of what I saw there may perhaps be interesting. The circumstances under which my visit was made prevented any systematic collecting; and, as a matter of fact, I did very little, while on the two occasions on which I gave myself up to collecting, lepidoptera appeared to be remarkably scarce.

My first stopping place was Harlech, where an exceedingly heavy and continuous rain prevented any collecting; but here, as elsewhere, the curious transparent-looking green larva of *C. festabiella* was abundant. At Tan-y-Bwlch, where I had hoped to have made great discoveries, but few insects appeared. *A. paphia* and *adippe* were common, *L. olivata* fairly so, *H. elutata* abundant. *Scoparia frequentella* was abundant with many varieties, *C. pascuellus* was common on marshy spots, and *solandriana* was to be found in the woods, but did not appear to be common. On bilberry, the larvæ of *C. vacciniana* was locally abundant, sewing the terminal leaves together, and turning them brown by eating off the upper skins. The larvæ of *Peronea rufana* was not uncommon on *Myrica gale*; but I was too early for that of *A. dimidiana*, the curious balloon-like nests of which I found there on the same plants some years ago in September, when *rufana* was on the wing. The varieties of the latter species from North Wales are very beautiful and interesting, ranging from the normal form, with its almost unicolorous ochreous forewings on the one hand, to a form closely resembling *lipsiana* in all except the shape of the wings, and on the other to rich ochreous forms, either unicolorous or with the usual grey clouds, or with two longitudinal claret coloured streaks, one median, and the other along the

inner margin; or again, deep reddish ochreous forms, and occasionally pale ochreous specimens shading to whitish toward the costa, with or without a longitudinal dark grey streak. The larva of *A. ulmata* is abundant on the elms in Mr. Oakley's park, in September, in which month too, I found the beautiful larva of *C. asteris* fairly common on the golden rod, in the woods towards Tan-y-Grisian in 1877 (though I have never succeeded in finding it there since); while *O. literana* occurred among the oaks, and *P. caledoniana* and *aspersana* on the heathy glades.

On Moelwyn I could find no moths more interesting than *C. culmellus* and *inquinatellus*, but a weird caw from the rocks near the summit drew my attention to three choughs, to which I repeatedly got near enough to distinguish their bright red legs and beaks clearly. These were the only specimens of this interesting bird seen on this visit, though in former years I have seen considerable flocks of twenty or thirty together in the wild country round Pen-y-Gwrid.

A walk on the hills toward Portmadoc produced nothing but *E. palumbaria*, *M. galiata*, *P. palumbella*, and a few even commoner species, but I delighted to make the acquaintance of a stag "in velvet." It appears that a few red deer have been turned down on these hills, and live there in a semi-wild state. When I first saw my friend he was lying down, and my attention was drawn to him by a movement of his horns, which in the bright sunshine (it was a fine day for a wonder) looked like dead and weathered heather stems. After a patch of heather has been fired or otherwise killed, the sun and rain soon make the bark peel off leaving a peculiar, greyish white, smooth surface to the branched stems, which glistens in the sun, and can be distinguished at a considerable distance, and if he had not moved, I should certainly have failed to distinguish his antlers from such stems. On seeing him, I got well above him, and to leeward, and creeping over a brow not 150 yards above him, was able clearly to note the soft covering to his horns, before two hinds, which were feeding in a hollow just behind him, caught sight of me, and trotting past him, roused him, and off he went too.

A day's excursion to the slate mine at Tan-y-Grisian was spoilt for collecting by a pitiless downpour of rain, which lasted all day. On one of the slate fences, close to the entrance of the mine, I found a nondescript, unicolorous, bone-coloured kind of moth, which has puzzled everyone who has yet seen it, one well-known authority being even doubtful whether to refer it to the Noctuæ or Tortrices. In appearance it is as uninteresting as possible, the most striking feature being an outrageously long abdomen.

Near the "Oakley Arms Hotel," where as usual they made me most comfortable with a real home-like welcome, I caught several specimens of *O.*

fuscescentella, one specimen each of two species of *Gelechia*, which I have not been able to name, and a fine female of *antiquana*, with swarms of *Scoparia frequentella*. I also had the mortification of finding a wing of *D. capreoletta* in a spider's web, but no further evidence of this species was forthcoming.

The paucity of species found at Tan-y-Bwlch was no doubt chiefly attributable to the persistent rain, and I feel convinced that the locality would well repay careful collecting. There are splendid oak and birch woods all round, with plenty of other trees intermixed, and varied undergrowth, as well as open moors and bogs, all within easy reach.

At Bedd Gelert, *S. truncicolella* occurred with *C. pinetellus*, and a very worn *E. rectangulata*. A walk up Snowdon, on a fairly fine day, produced nothing more interesting than one *A. lucerneæ*, but he was a very fine dark one. I was too late for *C. furcatellus*, which has been taken there in some abundance.

Pen-y-Gwrid looks like a rich locality, but, like Tan-y-Bwlch, I cannot vouch for it from experience. Larvæ of *N. ziczac*, *C. reclusa*, and *P. hastiana* were common on the shallows, *reclusa* being still very small. *Casiata* was abundant on the heathy slopes of Glydyr with a few *olivata* and *didymata*; but an afternoon given up to collecting produced no micros but *S. lacunana* and *micana*, and *G. ericetella*, which was decidedly disappointing. But the glorious mountain walks and climbs in this neighbourhood make me always feel envious of those who have an opportunity of spending some length of time there. Many times have I stayed a night or two at that delightful inn where Owen and his wife, as hearty, homely a couple as you can wish to see, always give you that comfortable welcome you never get at the showy tourists' hotels. I shall never forget one of my first visits there, when coming up Nant Gwynant with my knapsack on my back, and having just reached the bend in the road, from which perhaps the most beautiful view in North Wales is obtained, with Llyn Gwynant and the lovely, well wooded and watered valley lying at your feet, and stretching down to Bedd Gelert, beyond which it seems to be hemmed in by Moel Hebog, while the bare slopes of Aran and Cynicht rise to your right and left. As I began almost regretfully to leave the soft beauties of the valley for the rocky desolation into which the road suddenly plunges at that point, I looked up to see two magnificent kites, with their long forked tails, circling without an effort in mid-air, and watched them for over half-an-hour sailing in huge circles one after the other the whole time, with the slightest motion of tail or wing that I could perceive, each circle being, as near as I could judge, half-a-mile in diameter. Kites are very rarely seen now in Wales, and even buzzards are becoming scarce. This last visit I only saw two, one on a

Sunday evening above the crags to the left of Nant-aber-Glasllyn, and the other close to the top of Carnedd Llewelyn, where its wild cry harmonised perfectly with the solitude and desolate grandeur of that strange plateau. The ravens too appear to be getting scarcer for I only saw one, near Tan-y-Bwlch. However, I did not on this occasion visit the district where I had seen them most commonly, the wild ridges of the Llawllech between Bar-mouth and Dolgelly on the on the south, and Maentwrog on the north.

Talking about birds, I must not forget to mention that on the first Sunday in August I was sitting on a rock just above the bridge so well known to all tourists in North Wales as Pont-aber-Glasllyn, at the point where the tumbling river, chafed and broken in its rapid descent by its rocky bed, pours itself under the ivy-clad arch into the quiet pool below, in which the stream suddenly loses its strife in placid delight, and musing happily on certain resemblances therein to human life, I noticed a wren feeding its young ones, which were still only half-fledged and unable to leave their nest, beautifully hidden away among a clump of ferns growing on the old bridge. I do not remember to have ever before seen young wrens in their nest so late in the year, though I have seen swallows and martins feeding their nestlings late in September. There too, in his old black coat and white waiscoat, with the usual self-confident flirt of his short tail, was my old friend the dipper, with his companion the grey wagtail, two birds, which from their love for burns and mountain steams, will always be associated in my mind with my happiest holidays.

But this paper is intended to deal with moths, so with an apology to those of my readers who object to digressions, I return to Pen-y-Gwrid, and thence proceed to Capel Curig, where I took one *S. anomala*, and found *L. olivata* abundant, with the larvæ of *P. hastiana* and *rufana*, while *paykulliana* and *goedartella* were only fairly common among the birch trees. From this hotel I started off one rainy morning, for a walk over the moor towards Trefriw, and then, the rain ceasing, turned to the left, going along a succession of wild ridges and summits, among endless beech and parsley fern, and with abundance of *A. pratana* on the most exposed places, and at last found myself on the summit of Carnedd Llewelyn, which forms the highest point, and nearly the middle of a ridge, a good three miles long, and all of it standing more than 3000 feet above the sea level, which rises abruptly out of Llyn Ogwen as Carnedd Davyd, and runs northward to be continued at a lower level till it reaches the sea as the well-known head of Penmaenmawr. This ridge I followed southward as far as the descent to Llyn Ogwen, which is very steep, and would be exceedingly dangerous in a mist. Fortunately it kept clear, and I thoroughly enjoyed picking my way down among great

boulders, in the crannies of which grew oak, beech, bladder, and filmy ferns, while between them were great patches of bilberry, covered with ripe fruit, the haunt of many a ring-ousel, whose cheery note sounded often and loud in the complete solitude as I disturbed him at his feast. On these boulders *S. muralis* was sitting in some numbers, waiting in an unsophisticated and most un-*Scoparia*-like way to be boxed, the white spot on the thorax, close to the abdomen, shewing up very distinctly as they sat. Here, too, I caught a few *E. nigrella*, the only species of tineæ met with that day, with the exception of *G. ericetella*, and even this last was not common. Such a meagre result as this might be disappointing to any one who had visited the district only for the purpose of collecting, but though probably not so prolific as some, the land of *Scoliaeformis* and *Ashworthii* is not to be despised even by such, while to the lover of nature it affords a greater and more delightful variety in a small compass, than any district at home or abroad with which I am acquainted. So I look forward to paying another visit soon to my ancestral wilds, with all the eagerness of a naturalist, doomed to live cooped up in a big town, and anxious to escape to breezy solitudes whenever a chance occurs.

NATURE IN NOVEMBER.

By ALBERT H. WATERS, B.A.

The aspect of nature in November is, generally speaking, far from being a cheerful one. Certainly there is one thing to be said in favour of our English climate, and that is that at no time of the year does natural history work become quite an impossibility. There are always observations to be made, no matter what the season. There is life, and life even in many forms to be watched and annotated upon even in the most ungenial periods of the year. Yet November is certainly a depressing month to the naturalist. There is not much to observe in the damp and sodden woods, where the fog hangs about among the dank trees and withered undergrowth. You may, if you feel so disposed, turn over logs of wood, and pull the bark off fallen trees, and perhaps a few of the smaller shells will reward your exertions, but the *Pupa clausilia*, &c., you may happen to find you might easily have obtained a month and more ago, and with less risk of bronchitis and rheumatism.

There may be days in the early part of the month which remind us of October, and on one of these days there will in all probability be many things to be observed by the naturalist as he takes a country walk. We will imagine ourselves setting out for a ramble on a November afternoon, not indeed on

such a one as those just alluded to, but on one more typical of the month. The sky is cloudy, but there is an absence of rain, for which we are thankful, although there seems every prospect of us having some before very long. As we walk along we notice the leaves have all disappeared from off the lime trees, and but very few are left on the others. Yonder lilac, too, has lost all its verdure, and stretches upward its leafless twigs as if supplicating our pity. A few flowers may still be observed in the suburban gardens as we pass them. In the mild autumn of 1884, we had tropæolum, African marigolds, pelargoniums, camomile, periwinkle (*Vinca major*), dahlias, campanulas, mignonette, heartsease, michæmas daisy, snapdragon, chrysanthemums, and pansies, all in flower in the early part of the month, and there was even a stray rose or two. The following autumn I had in my garden pelargoniums, snapdragons, roses, michæmas daisies, chrysanthemums, and pansies in flower very much later than this.

There in yonder field we see a flock of field-fares. They come over to England about the middle of November, and remain with us all winter. There is a skylark, and soon after noting it we see another and another. They seem to be getting much more numerous now than they were in the summer, and such is indeed the fact, that our resident larks being augmented in number in winter time by migrants from more northerly countries. Buttoning close our coats, for the breeze blows cold this afternoon, we cross over a sandy common to a small wood. We see one or two stonechats (*Sylvia rubicola*) as we walk along, but they are plainly very much diminished in numbers, as many of them have now migrated to the south. We do not see any whinchats (*Sylvia rubetra*), and the reason for this is similar: the bulk of these pretty little birds have moved off to a warmer climate. A few perhaps stay behind, but compared with *Sylvia rubicola* the number is very small, many stonechats remaining with us throughout the year.

The only lepidopteron we see is a small, dark coloured moth, which we arouse from its resting place in a large furze bush. Upon capturing it we see it is a specimen of *Depressaria applana*, which has not yet hibernated. Lepidoptera, however, have not entirely disappeared in November. In the early part of the month especially, some stragglers of the autumn moths may be met with, notably on shop windows and gas lamps. I often think civilisation may have much influence in preserving certain species from destruction during the rigour of winter. Certainly a town furnishes many places of shelter to butterflies and moths, which would otherwise perish of cold. Every one must have remarked how fond the Vanessidæ are of wintering in houses, and some moths, such as the herald moth (*Gonoptera libatrix*) have the same propensity in a less degree.

But we must walk on to the wood. Arrived there we see how sad the change which has come over it. Instead of summer beauty we see autumn desolateness. However, we are in no mood for fretting, but proceed to dig for chrysalides, and search for coleoptera, several specimens of which we secure and consign to our bottle. Here on this piece of wet bark are a number of white spots, which look very much as if they were drops of spilt cream. This is a species of micro-fungus known as *Trichia chryosperma*, and we notice many others about of both this and kindred species; in fact autumn is a good time for collecting both the larger and the smaller fungi. We find these micro-fungi on various substances, such as dead twigs, dead stems of wild carrot and other umbelliferæ, dead fern stems, wet bark, &c., &c. Here is a white species of *Stilbum* on this piece of decayed wood, and being a common kind it is known as *Stilbum vulgare*. In this genus the stem is lengthened and composed of long threads, which are compacted together most of the way up, but looser at the top so that the fungus has a club-shaped appearance. Another species of *Stilbum*, known as *Stilbum tormentosum*, is parasitic on certain species of *Trichia*, a genus just alluded to.

It would be very interesting to collect some specimens of micro-fungi for examination, but the falling rain warns us to make the best of our way homeward, and we must therefore leave the micro-fungi till our next ramble. As we return homewards we notice that gnats are flying about in numbers among the falling drops. How curious it is they escape harm in the midst of the descending rain, one drop of which we might suppose would be sufficient to cripple a gnat, if not to kill it outright, but they play about quite merrily amidst the showers.

Cambridge.

THE SYNONYMY OF CÆNOBIA RUFÆ, HAW.*

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

I perfectly understood the reason of publication of Messrs. Robson and Gardner's list, and that it professes simply to contain "the name of each species in ordinary use in Britain," &c., but I do not forget that Newman, in his "British Moths," uses *rufa*, and that for many years I have known it by that name, and I did not suppose that they wished to perpetuate a blunder simply by taking other people's references, and I thought it advisable to point the mistake out. I did not challenge Mr. Robson with the idea that most people used *despecta*, and in spite of the fear of wounding their suscep-

* See *Young Naturalist* for June, page 117.

tibilities, would have *rufa* take its place. I care nothing whether they use one or the other, but one name is wrong and the other right, and they may as well use the right as the wrong.

By reference to my note, ante p.p. 116, 117, it will be seen that I first gave Haworth's description, and, I believe, proved beyond doubt, that Haworth's *rufa*=Treitschke's *despecta*.

The second paragraph contains the gist of the matter. Why copy Guenée's doubtful quotation "*rufa*, Haw.?" instead of simply writing *rufa*, Haw. I think I have proved that the "?" existed only in Guenée's mind, probably owing to his ignorance of British insects, and Mr. Robson owns that he accepted the "?" without reference. Had he referred, there is no doubt that he would have left out the "?" the same as I should do. Of course, if the law of priority is not to be a dead letter altogether, *rufa* must take priority of *despecta*. A.D. 1803 is not near the boundary line of the Linneæan X. or XII. edition question. As far as I am concerned personally, it matters not whether lepidopterists use *rufa*, Haw., or *despecta*, Tr., as I understand what is meant by either, but there should be no question about *rufa* being the prior name; and as for not altering the name because our entomological grandfathers made a mistake, and because the unscientific lepidopterists, who find it too much trouble to learn a new name when they are convinced of error, simply because they are used to it, cry out against it. Well, to say the least of it, it is not science. I simply wished to show that there was no doubt Haworth's *rufa* was our insect, *i.e.* Newman's *rufa*. Mr. Robson practically admits this in his reply, and, as far as I am concerned, there is an end of the matter. I may add that it is more than probable that Haworth's book never was investigated by either Treitschke, Geyer, or Herrich-Schaffer, and by Guenée only through Doubleday. I fail to see any agreement of rejection by these investigators, as they probably played the usual game of "follow my leader," accepting the German, *i.e.* the only name known to them.

But Mr. Robson opens up other points. He states that "Hübner, Duponchel, Herrich-Schaffer, and Guenée used *despecta*, whilst only Lederer used *rufa*." Does that prove that the first four were right, simply because they outnumbered the other side? If so, it is a case of "might is right" with a vengeance.

Again, Mr. Robson is in error. Hübner never used the name *despecta* at all. It is in his "Europaischer Schmet." I know (figures 751 and 752), but it is in that part of the work added as a supplement by Geyer, after Hübner's death. It is quoted, incorrectly of course, by synonymists as Hübner's work. I think Guenée's practice in this matter is to be com-

mended. He quotes it as "Hübner-Geyer," at anyrate a very understandable arrangement. But Geyer and Treitschke worked on identical lines, and Duponchel followed the latter, as far as specific nomenclature was concerned, as did Herrich-Schaffer to a great extent later. Guenée had the figures of these authors before him, and his statement that "*lineola*, H." does not seem to constitute a distinct variety," when *lineola* is now well known to be a common form of *rufa* does not say a great deal for the "? " he thought fit to add to Haworth's *rufa*. Against these names we can put Haworth, Stephens, Wood, Humphrey and Westwood, in fact all British authors except Doubleday. Then again, Newman, in his "British Moths," uses *rufa*; and, whilst seconding everything that Mr. Robson can say in praise of "Stainton's Manual," I doubt whether it is so widely used among beginners as Newman's "British Moths."

The last sentence of Mr. Robson's is hardly fair. If I have proved my point so well as to make it worth an editorial of several lines in explanation, it is hardly right to say that "Haworth possibly meant" this species. If there is still a doubt in Mr. Robson's mind, there was no need of him to "plead guilty to using" the "?"—the "? " was his own if he doubted it. Will Mr. Robson read my first paragraph, and tell me candidly that the description does *not* mean *rufa*. If it does the word "possibly" is superfluous. Into the "entomological gain" I shall not enter, but there is such a thing as the "law of priority" which is admitted by everybody to be in operation as to names given in A.D. 1803. The thing is therefore right or wrong, and does not want much argument. If Haworth's description applies to our *rufa*, there is no doubt that *rufa* is the correct name, and that *despecta* is incorrect, even if backed up by all the lepidopterists in creation.

Rayleigh Villa, Westcombe Park, S.E.

[Mr. Tutt and I have agreed that these discussions shall not be continued, and we hope we have found a more profitable mode of settling our differences, of which more will be said ere long. It would, however, be unfair that Mr. Tutt's reply should be suppressed, it is therefore published now. My own opinion as to *rufa* may be gathered from the fact that when I proposed to re-print Doubleday's Catalogue I gave precedence to Haworth's name. The last Catalogue was a different matter, and I am still of opinion that precedence was rightly given there to *despecta*, as the name in ordinary use. I expect Mr. Tutt will be satisfied with this, and that the matter may drop for the present, though I still hold that the Law of Priority should only apply in cases of doubt or dispute.—J.E.R.]

BRITISH FROGS AND TOADS.

By LINNÆUS GREENING.

*(A Paper read before the Warrington Field Club November 18th, 1887.)**Concluded from page 198.*BUFO CALAMITA (*Natterjack Toad*).

This is decidedly rarer and more local than our other English toad. I am indebted to my friend Mr. C. S. Gregson, not only for giving me the nearest locality where Natterjacks breed, but also for his kindness in accompanying me to its haunts. I intend to give you our experience as I wrote it at the time of our visit. On the 2nd April, 1887, Mr. Gregson, Mr. A. Jolley, and myself paid a visit to the Wallasey sandhills, where this toad abounds. Having arrived on the ground, the veteran naturalist (Mr. Gregson) soon pointed out the outward and visible sign of the den of this creature. This distinguishing sign is the shape of the holes in which the Natterjacks hibernate, and to which they return during the day time, even after hibernation, being exclusively nocturnal feeders. The entrance to each hole is semi-circular, just large enough to admit its tenants, of which there are usually two, male and female. It is not very pleasant to put your hand down a hole 20 inches deep, and feel something cold, which is, or should be, the nose of the toad. After Mr. Gregson had fetched a pair out, without suffering death, we set to work and found considerable numbers. It is a very curious fact, that when first taken from their holes, they are small, but seem to expand or fill up to their normal size. The cause of this, I take it, is the inflation of the lungs and skin, as referred to in the description of the common toad. As a matter of course respiration is almost arrested during hibernation. Another curious fact is that although they enter their holes head foremost, yet, when found, their noses always point outwards. The reason is obvious, for among the ever-changing faces of the sandhills, the mouth of the hole may be filled up; when this happens, the toad has only to follow his nose, and then can work his way out with little difficulty.

The fertilization, disposition, and quantity of spawn are as in the common species, though the pools in which the spawn is laid are usually devoid of water plants, and consequently the spawn sinks to the bottom. The development of the embryo and larva is more rapid than in the common species. I repeatedly visited the pools amongst the sandhills at Wallasey, and found that the adult form was attained 39 days after the hatching of the egg. The spawn is usually laid at the end of May, or early part in June. The young tadpoles lost their gills on the fourth day; the hind legs appeared first, and

six days later the fore legs were developed. Of the pools which I was observing, several dried up before the spawn had fully developed, and from this we may learn the reason of the more rapid development of the young of this species.

Those individuals possessing an inherited tendency to mature more rapidly than the average, could alone survive and reproduce their species, in the peculiar situations which the Natterjacks affect. As a proof that this tendency to a more rapid development is hereditary, and not merely dependent on the temperature or depth of the water in which they are laid, I may mention that the development was equally rapid in the deepest and consequently coolest pool.

As an illustration of the enormous destruction of embryonic and larval life in the circumstances under which Natterjacks exists, owing to the great tendency of the smaller pools, in sandy places, to dry up in the summer months, I found that one small pool, which had shrunk to about 6 feet by 4 feet, by 6 inches deep in the middle, was positively black with tadpoles. Having counted a few square inches, we estimated that the pool contained at least 30,000 tadpoles; a few days later, this pool was completely dried up, and all the tadpoles had perished.

The ground colour of the Natterjack is usually light yellowish brown, clouded with olive, and having a bright yellow line along the middle of the back. The body is covered with tubercles, which are larger on the back, but are smaller and more numerous on the other parts of the body. The ventral surface is greenish white, marbled with black or dark grey.

We will describe a pair of these toads as they appear in the breeding season.

The female is light yellowish brown, suffused with olive and speckled with black spots or irregular bands, on the dorsal surface. The body is covered with tubercles, those on the dorsal surface having a reddish tinge. The dorsal line is of a bright sulphur colour. As in *Bufo vulgaris*, there are two large glands behind the eyes, which are prominent, having a black horizontal pupil, with a gold rim. The ventral surface is covered with minute tubercles, and is of a greenish-white colour, marked with black spots, which are less numerous on the throat; the markings on the sides of the abdomen are larger and more of the nature of blotches. The legs are short, and formed more for aquatic life; the hind feet are palmated. The body is $2\frac{1}{2}$ inches long; the hind leg $2\frac{1}{4}$ inches long; the fore leg is $1\frac{1}{8}$ inches long, and the feet not palmated.

The markings of the male are like those of the female, but the ground colour is darker. He is also much smaller; the body being two inches long;

the hind leg two inches long; the fore leg one inch long; with suckers developed on the fore fingers. The fore feet are free, whilst the hind feet are palmated. The bright sulphur-coloured dorsal line, though sometimes broken in the middle, is always present, and renders it easy to distinguish the Natterjack from the common toad.

The Natterjack's movements are quicker, and it is decidedly a more active animal than *Bufo vulgaris*. While the latter crawls along somewhat like a tortoise, with its belly touching the ground, the Natterjack runs at a comparatively rapid rate, with its body elevated from the ground, somewhat like a spider. This habit of running has led to its being called, in the south of England, the running toad. Those which I keep in captivity, bury themselves during the day, in the sand in their case; but during the night, they are on the alert with their splendid eyes opened to the fullest extent, and present a really attractive appearance. They feed upon various insects, smooth caterpillars being their favourite dish: they will also eat small earth worms.

I should say, that in their wild state, worms don't form much of their diet, as they will only take them when nothing else is forthcoming. They take none but living food, whose faintest movement is quite sufficient to catch the quick eye of the Natterjack. These toads are wild, and almost untamable; mine not at all reciprocating the kindly feeling shewn to them. Out of some 18 specimens, only 4 would feed from the hand; although, occasionally, if a particularly tempting morsel is held in the fingers, a wild one will rush at it, seize it, and then be lost amongst the sand. If any one wishes to see this toad in all its activity, let him take a lamp and visit the sandhills in the evening, more especially in the neighbourhood of some pool (in the early summer in the breeding season, the locality may easily be found by the croaking of the males), and he will be astonished at the numbers round about him. In the daytime he may search in vain, unless he happens to know something of the habits of this creature. It is sometimes called the sand-toad, an appropriate name, as it is generally found in sandy localities, and its colour is so much like that of the sand, that, when seen at rest, it is difficult to detect it. It might seem probable that the dorsal line would make it conspicuous; this is not so, however, for the yellow line may be easily mistaken for a bit of dry grass which is so common amongst the sandhills. On July 23rd last, when our club was at Formby, I found the Natterjacks in their holes amongst the sandhills; they are abundant there, and owing to their loud croaking are locally known as Formby organs. Mr. J. A. Jackson has also sent me some from Garstang, amongst which were two small ones, in their second year, as well as some born this year.

As soon as they attain the adult form the dorsal stripe is visible, so that this distinguishing feature is present in the youngest as in the oldest Natterjack. This toad seems to be widely distributed: and, where it occurs, is generally found in considerable numbers; being local rather than rare. It casts its skin like the common toad, and also possesses the power of secreting from its glands a slightly acrid fluid. It is, if possible, more terrestrial in its habits, being able to withstand drought longer than *Bufo vulgaris*, and only returns to the water for breeding purposes.

When we consider the great fecundity of frogs and toads, we may well ask what becomes of the millions of millions of young frogs and toads hatched every season. All have a fair start in life, but are preyed upon by an immense number of enemies, both in their aquatic and terrestrial states; the odds are so much against them that probably not more than one in a thousand arrive at maturity. It was very different in the Permian era, when the Batrachians were not a small and feeble folk, but were the lords and masters of the earth, protected by dermal armour of considerable thickness. They subsequently fell victims to the still more ferocious Sauropsidans of the Secondary Epoch. Their armour was not so complete as that of their rivals and conquerors, and of all the once great Batrachian family only the smaller ones, which could easily hide themselves from the fury of their enemies, have survived and multiplied, and left us in their descendants, the representatives of that ancient race, whose history has taught us so much, and which, if we study it carefully, may teach us still more of the manner in which the highest living forms have come into existence and may lead us to speculate on the possible advent of still higher forms of life

RE-DISCOVERY OF TORTRIX PICEANA.

By JOHN E. ROBSON.

We are indebted to our friend Mr. S. J. Capper, of Liverpool, for the knowledge that this insect, of which two British specimens only were known, had been again met with. A month or so ago Mr. Capper (see his note p. 224), called on Mr. Charles Gulliver, Rannor Enclosure, Brockenhurst, a collector who disposes of his captures, and whom Mr. Capper had often urged to work at the Tortrices and Tineina. Looking over his odds and ends, Mr. Capper detected these specimens as unknown to him, Mr. Gulliver gave him three of them, and on reaching home they were carefully examined and thought to be *Tortrix piceana*, but as he had not seen that rarity, they were sent to Mr. C. G. Barrett, who at once pronounced them such.

Tortrix piceana, Linn., is to be found in the second edition of Doubleday's synonymic list. It is not in Stainton's Manual and is only mentioned incidentally in Wilkinson's Tortrices (p. 65.) Up to the present time the only known British specimens were as follows: One taken by the late Mr. Stone, in the New Forest, which is in Mr. E. Shepherd's collection; a second beaten from a fir tree in a wood on the borders of Hants, on July 11th, 1868, by Mr. C. Barrett. Not being able to find any further specimens, Mr. Barrett concluded it must be an extraordinary variety of *Tortrix pyrostrana*, and as such it remained in his collection till he undertook an investigation of our native Tortricidæ in 1872, when it was submitted to Professor Zeller and pronounced *Tortrix piceana*. This as well as the former capture were females. In 1873, Mr. Barrett described both sexes in his "Notes on British Tortrices," as they had not been previously described in any English work. We take the liberty of quoting these descriptions which were made from foreign specimens from Professor Zeller, which are probably not within the reach of many of our readers.

"Head, antennæ, and palpi brown. Thorax purplish brown.

"Male. Forewings pale pinkish brown, with a rich purple flush; markings chocolate-brown. Basal patch distinct on the dorsal margin, but interrupted in the middle of the wing by a patch of raised pale fuscous scales, which occupies all the basal portion of the costal margin for one-third of its length. Central fascia oblique, narrowest at the costa, and emitting from its external margin a narrow crooked streak towards the apex of the wing. Above this is a slight cloud on the costa. Parallel with the hind margin is a second fascia, dilated at its upper extremity; but not attaining the costal margin. Near the anal angle is a narrow oblique streak. Cilia and hindwings pale fuscous, with a golden flush.

"Female. Altogether paler, the purple flush very faint. Markings similar to those of the male, but much broken up, and confused by streaks and dots emitted from their margins. The streak from the central fascia towards the apex is nearly obsolete, but the costal blotch above it is distinct, forming a flat triangle. The streak from near the anal angle is perpendicular, and as well as a parallel one given off from the base of the central fascia, nearly crosses the wings, which has altogether a curious reticulated appearance from the number of faint perpendicular lines crossing the nervures. Hindwings yellowish-fuscous, yellower towards the apex."

According to Zeller, it feeds on *Pinus sylvestris*, but other authors say *P. abies* and *picea*.

The re-discovery of the insect after 20 years is very interesting, and Mr.

Capper must be congratulated on his shrewdness in picking it out among the "odds and ends" of a collector's duplicates.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

October 3rd, 1888.—Dr. D. SHARP, F.L.S., President, in the chair.

Mr. F. P. Pascoe exhibited a number of new species of *Longicornia* from Sumatra, Madagascar, and South Africa.

Dr. P. B. Mason exhibited, for Mr. Harris, a specimen of *Charocampa Neri*, recently captured at Burton-on-Trent.

Mr. S. Stephens exhibited a specimen of *Vanessa Antiopa*, which he caught in the Isle of Wight in August last. Mr. Stephens asked whether Mr. Poulton or any one else present could inform him why, in British specimens of this species, the border of the wings was almost invariably a pale straw-colour. A discussion ensued, in which Mr. F. D. Godman, Mr. M'Lachlan, Mr. Kirby, and Dr. Mason took part.

Mr. E. B. Poulton exhibited a living larva of *Smerinthus ocellatus* in the last stage, fourteen larvæ of *Boarmia roboraria* and some cocoons of *Rumia cratægata*. The object of the exhibition was to show the influence of special food-plants and surroundings on the colour of the larvæ and cocoons.

Mr. M. Jacoby exhibited a varied series of *Titubæa sanguinipennis*, Lac., from Central America. He stated that many of the varieties exhibited had been described as distinct species.

Mr. Billups exhibited specimens of *Bracon brevicornis*, Wesm., bred from larvæ of *Ephestia Kühniella*. He remarked that this rare species had only been recorded as bred on two or three occasions—viz., by the Rev. T. A. Marshall, Mr. W. F. Kirby, Herr Brischke, and Mr. Sidney Webb.

Mr. W. Warren exhibited specimens of *Antithesia ustulanta* and *A. fuligana*; also bred series of the following species:—*Eupæcilia Degreyana*, *Stigmonota pallifrontana*, *Cacæcia decretana*, and *Gelechia peliella*.

Lord Walsingham exhibited specimens of several species of the genus *Cryptophasa* belonging to the family *Cryptolechidæ* of the Tineina, some of the most remarkable being males and female of *Zitua balteata*, Walker, bred by Mr. Sidney Olliff from pupæ found in January last, at Newcastle, New South Wales, in burrows in branches of a species of Acacia. Lord Walsingham also exhibited a male of *Zelotyphia stacyi*, received from Mr. Olliff.

Mr. F. D. Godman exhibited a larva of a *Cicada*, from Mexico, having a fungoid growth on the head.

Captain Elwes exhibited a large number of Butterflies, representing about

180 species, recently collected by himself and Mr. Godman in California and Yellowstone Park. The collection included many species of great interest, amongst others a species described by Mr. W. H. Edwards as *Erebia Hadenii*, but which he considered would prove to be a *Cænonympha*; a very rare species of *Thecla*; and a remarkable series of species of the genus *Colias*.

Mr. H. Goss exhibited, for Mr. W. J. Cross, an extraordinary melanic variety of *Agrotis segetum*, caught by the latter near Ely in July last.

Mr. W. L. Distant read a paper entitled "An enumeration of the *Rhynchota*, received from Baron von Müller, and collected by Mr. Sayer in New Guinea during Mr. Cuthbertson's expedition."

Mr. Poulton read a paper entitled "Notes in 1887 upon Lepidopterous larvæ, including a complete account of the life-history of *Sphinx convolvuli* and *Agria tau*"; and Mr. White exhibited specimens of preserved larvæ of *S. convolvuli*, *A. tau*, and other species referred to in Mr. Poulton's paper. Mr. Jenner Weir, Mr. Kirby, Mr. White, Dr. Sharp, and others took part in the discussion which ensued.—H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

September 20th.—Mr. E. Cooke, President, in the chair. There was a numerous company present on this occasion, and the exhibits were of a highly interesting character. Mr. Newbery, who has recently been collecting in the New Forest, exhibited among other coleoptera, series of *Rhinosomus planirostris*, *Bembidium tibiale*, and *B. decorum*—the latter species being recorded for the first time from the South of England. Mr. Jarvit's box contained a male *Drilus flavescens* from the Isle of Wight, and several aquatic beetles. Messrs. Cripps and Lewcock also exhibited coleoptera. The exhibits of lepidoptera were as follows: Mr. Hanes, bred specimens of *Thecla betule*; Mr. J. A. Clarke, series of *S. regiana* and *P. interpunctella*; Mr. Fordham, series of *A. aglaia*; Mr. Bartlett, a bred series of *P. genestella*; Mr. Barker, some excellent varieties of *Hyperanthus*; Mr. Sheldon, a fine series of *dubitata*, several varieties of *N. neglecta* and imago and living larva of *D. galii*. Mr. Anderson presented to the Society two drawings in water-colours of views near Shirley. Considerable interest was taken in the discussion which ensued on *D. galii*. Mr. Sheldon stating that the abdomen of the moth exhibited had accidentally been broken in the process of capture, and that he had extracted the ova therefrom with the hope of obtaining larvæ; but his efforts in this direction had not been successful, and the ova gradually shrivelled; further he was of opinion that it was the ovipositor of the insect which was fertilised by the male, and not the ova, and that the ova that did not pass

through the ovipositor were barren. Mr. Barker, whose experience with a female of *S. populi* had been somewhat similar, rather confirmed Mr. Sheldon's opinion, and said that in his case an ovum had been passed through the ovipositor after the bursting of the abdomen, and in due course a larva had emerged. Mr. Sheldon announced that several larvæ of *D. galii* had been taken near Shoeburyness. Mr. Hanes observed *V. antiopa* in Epping Forest, but failed to capture. Mr. Barker also stated that a specimen had been captured in Folkestone Warren by the gamekeeper's son, and was now in his possession. Mr. E. Charnock and Mr. Pearce were elected members of the Society.

The business was then formally adjourned for the purpose of presenting a testimonial to Mr. E. Anderson, prior to his departure from England. The testimonial consisted of a gold lever watch and an address engrossed on parchment, and the presentation was made by the President. Mr. Anderson, who was visibly agitated, thanked the members for their kind present to him, and said that he was indebted to this Society for his entomological knowledge, and he had spent many happy hours with the members; he also hoped that he would not be forgotten when thousands of miles away, as he certainly should not forget the many kind friends he left in England.

October 4th.—Mr. J. A. Clarke in the chair. Mr. Albuary exhibited *B. glandifera*, series of *L. adonis*, *E. edusa*, and *S. semele*; Mr. Battley, a splendid dark variety of *V. urticae*, and living specimens of *A. grisella*, in box with portions of the honeycomb attacked; Mr. Clarke, long series of *L. agestis*; Mr. Bellamy, *A. leporina*, bred specimens of *D. cæruleocephala* and series of *E. tiliaria*; Mr. Hanes, series of *H. popularis* and *E. erosaria*.

Mr. Lewcock's exhibit comprised several species of coleoptera, received from Mr. Keys, of Plymouth, and included *Pentarthrum Huttoni*, *Dianous cærulescens*, *Cillenus laterialis*, *Tachyusa uvida* and *sulcata*, *Corymbites æneus*, and numerous others; Mr. Jarvis' box contained a large quantity of coleoptera; Mr. Gurney, two undetermined larvæ taken from a celery bed, probably *Melolontha vulgaris*. Mr. J. A. Cooper gave some very interesting particulars respecting the larvæ of *D. galii*, of which he had captured upwards of fifty, on the sand hills on the Suffolk coast. He mentioned that the larvæ seemed attached to the short stunted plants of *Galium verum*, growing nearest the sea, and fully confirmed Mr. Arkle's account of the habits of *Galii* larvæ. Among his captures he had found one very beautiful variety, which he fully described to the Society. Mr. W. P. Ellis was elected a member of the Society.—G. A. LEWCOCK and J. RUSSELL, Joint Hon. Secretaries.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

September 27th.—T. R. Billups, Esq., F.E.S., President, in the chair. Mr. G. Elisha exhibited *Eupithecia extensaria* and other species. Mr. Auld, an example of *Callimorpha hera*, which he stated he took in South Devon, flying in the sunshine, also two examples of *Vanessa io*, with additional ocelli. Mr. R. Adkin, *Thera simulata* bred from larvæ taken in Ireland; *Thera firmata*, bred from larvæ taken in the New Forest; and a living larva of *Deilephila galii*. Mr. Jäger, three specimens of *Callimorpha hera*, bred from ova obtained from a specimen taken in 1887, also a fine series of *Stilbia anomala*. Mr. Tugwell, living larvæ of *D. galii*, and called attention to the variation in colour of the larvæ shown: he remarked that this year the larvæ of this species had been exceedingly plentiful, Mr. Gibb and himself having taken 196 in a district extending from St. Margaret's Bay to within a mile or so of Ramsgate.

October 11th.—The President in the chair. Messrs. H. Bennett, of Hastings, and E. D. Y. Pode, of Ivybridge, South Devon, were elected members. Mr. T. R. Billups exhibited species of British Fossorial-Hymenoptera: *Ceratophorus morio*, and its rare var. *anthracinus*, taken in his garden at Peckham, and *Nysson dimidiatus*, from Chobham. Mr. R. Adkin, larva of *Retinia resinella*, and contributed notes. Mr. Jäger, two examples of *Vanessa io*, with additional ocelli; *Argynnis paphia*, with white blotches on the wings; a variety of *Satyrus semele*, with types of many other species, and contributed notes. Mr. Carpenter, varieties of *Vanessa atalanta* and *Ampyphyra pyramidea*. Mr. Elisha, bred examples of *Cidaria reticulata*. Mr. Tugwell, *Callimorpha hera*, bred from the same batch of ova as those of Mr. Jäger's; also *Crambus alpinellus* and *Anerastia farrella*, from King's Lynn.
—H. W. BARKER, Hon. Sec.

The Annual Exhibition of this Society was held at "The Bridge House," London Bridge, S.E., on Wednesday and Thursday, 17th and 18th October last. The first evening being considered a private view, not more than eight hundred visitors attended, but on the second evening, when the exhibition was open free by complimentary ticket, there was an attendance of over seventeen hundred visitors.

The exhibits were very numerous and more varied than in former years. Among the principal exhibitors were Mr. R. McLachlan with British Caddis Flies, also European Neuroptera, chiefly Ascalaphidæ and Nemopteridæ, and specimens of plants infested by the Chinese wax insect. Mr. T. R. Billups, British Coleoptera, Hemiptera-Heteroptera and Hemiptera-Homoptera,

Fossorial Hymenoptera, a fine collection of Ichneumonidæ, and a nest of *Vespa vulgaris* in three stages. British Diptera was also included in Mr. Billups' exhibit, and this order was also shown by Messrs. Brunnetti and G. H. Verral, the latter showing rare and unique forms of the family Tipulidæ. Mr. West, of Greenwich, showed a large selection from his fine collection of British Coleoptera, and Mr. Leech six cases of Palæartic species, including many rare and unique forms.

The Lepidoptera was well represented, the principal exhibitors being Messrs. J. Jenner Weir, S. Edwards, W. Dannatt, O. E. Janson, and E. G. Meek, Exotic species. Mr. A. H. Jones, European Erebiæ. The British lepidoptera was represented by the exhibits of Mr. C. A. Briggs, Nocturni, including fine series of *Deiopeia pulchella*, varieties of *Arctia caia*, *Spilosoma menthastri*, also a specimen of *Chærocampa nerii*, taken at Poplar, September 1888. Mr. Vaughan, his collection of Colias, including hermaphrodite *edusa*, and four yellow female *hyale*; also the *Dianthæcia*, with long series of *D. carpophaga* and *D. conspersa* from various localities. Mr. A. B. Farn, the genus *Triphæna*, including a magnificent series of *T. orbona*, from the Isle of Lewes and other northern localities. Mr. J. E. Robson, five varieties of *Zygæna loniceræ* and var. *eboracæ*, from one field near York. Mr. R. Adkin, Sphingæ and Bombycæ, also a case of *Spilosoma mendica* and var. *rustica*, bred during 1887-8, together with species collected in Morayshire and the Shetlands, 1888. Mr. C. S. Gregson, the nine best varieties bred this year from 4,000 larvæ of *Abraaxas grossulariata*. Mr. E. A. Atmore, a long series of *Cabera pusaria*, showing the gradual approximation of the first and second lines; fine series of *Eupithecia extensaria*, *Anerastia farrella*, *Tortrix decretana*, &c. Mr. Tugwell, the genus *Smerinthus*, all the *Zygænidæ*, including the unique specimen of *Syntomis phegea*, and the genus *Nola*. Mr. R. South, *Pieridæ* and *Argynnidæ* from various localities; an extensive series of *Boarmia repandata*, and many other species. Mr. J. H. Leech, *Acherontia atropos* from various parts of Europe, including many aberrations; *Gonepteryx rhamnii*, with the forms *cleopatra*, *cleobule*, &c.; *Colias hyale* and *C. erate*, with intermediate forms, and *Colias eogene* from Cashmere. Mr. J. A. Cooper, many forms and varieties from different localities, including dark banded forms of *Eugonia angularia*, and fine series of *Tephrosia crepuscularia* and *T. biundularia*. Mr. Elisha, varieties of *Abraaxas grossulariata*, bred specimens of *Geometra smaragdaria* and *Cidaria reticulata*, also a fine lot of *Eupithecia*, mostly bred. Mr. J. R. Wellman, six drawers, including the *Acidalia*, which are too well known to need comment. Mr. W. White, preserved larvæ. Mr. J. Smith, a large collection of Rhopalocera. Mr. T. W. Hawes, variations and aberrations from the type among the butterflies.

Mr. Barren, a collection taken at Weymouth. Mr. Percy Russ, long series of varieties of *Agrotis tritici*, *A. cursoria*, *Aporophyla lutulenta*, and *Thera simulata*. Mr. Tutt, the *Agrotidae*, a long series of the *Lita* group, and a drawer showing the different forms of *Mimaseoptilus bipunctidactyla* and *serotinus*. Mr. A. Marshall, comparative specimens from Rannoch, Isle of Lewis, and South of England localities. Mr. S. Stevens, four drawers, including British specimens of *Pieris daphnidice*, hermaphrodite *Colias edusa*, *Thecla quercus*, &c., and the specimen of *Vanessa antiopa* taken by him this year. Mr. Machin, a fine display of the genus *Lithocolletis*, &c. Some very beautiful drawings of lepidoptera were shewn by Messrs. C. S. Gregson and S. Mosley.

Birds, Birds' Eggs and Nests, Fish, Reptiles, &c., were shown by Messrs. B. W. Adkin, A. E. Cook, E. Cooke, W. E. Dawes, Dr. Sequeira, W. Turpin, J. A. Cooper, J. and W. Davis, C. A. Briggs, H. J. Burton and Son, T. W. Hall, H. T. Dobson, P. J. Sowerey, F. D. Power, and D. J. Rice.

Mollusca were exhibited by Mr. Fenn. Corals and Sponges by Mr. Manger. A collection of Fish-hooks, &c., made by the natives of Alaska, Greenland, Fiji, &c., by Mr. E. Lovett. Polished Pebbles and Choanites by Mr. G. Day. Madrepores by Mr. Oldham. Mr. T. Leighton, Rocks and Fossils illustrating the geology of the South-Eastern counties.

The botanical exhibits were those of Mr. Cooper and Miss M. E. Adkin, British plants; Mr. Pearce, plants collected *en route* San Diego to Sonora Pass, California; Miss F. Billups, British Ferns. One of the features of the exhibition was a large table of Fungi, the species being named, and the whole having been collected by Messrs. Step, Carrington, and Billups, at Esher.

On each evening there were over fifty microscopists present. During the evening of the 17th, Mr. W. R. May delivered two short lectures, "The Wonders of Minute Vegetable, and Animal Life," and "Curious Houses and Queer Tenants," both being illustrated with the Oxy-hydrogen light. On the 18th, Mr. G. Day, F.R.M.S., and the Sciopicon Company gave exhibitions of photo-micrographic slides, with descriptive notes.

NOTES AND OBSERVATIONS.

TORTRIX PICEANA RE-DISCOVERED.—Your readers will I am sure be pleased to hear that the very beautiful *Tortrix piceana* has been re-discovered in the New Forest by Mr. Charles Gulliver, Rannor Enclosure, Brockenhurst. When visiting him a month or so ago, I noticed amongst his odds and ends this tortrix, and pointed it out to him as remarkable, and he kindly gave me three specimens. On arriving home I could not make them anything but the above species, and on sending them to Mr. C. G. Barrett, he at once pronounced them so.—S. J. CAPPER, Huyton Park, Liverpool.

D. GALII BRED.—I have much pleasure in recording a fine specimen of *D. galii* emerged this morning in my breeding cage, from a larva taken a few weeks ago at Wallasey, Cheshire. I kept the pupa in a warm kitchen.—S. J. CAPPER, Liverpool, October 29th, 1888.

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BREEDING REMINISCENCES, 1888.

By A. E. HALL.

MY first results were not satisfactory, some *kind* friend advised me to keep my pupæ during the winter in Calais sand, to keep them nice and cool (?). It may keep them cool, but it certainly keeps them dry, very dry in fact, as I subsequently found to my cost. I had some 200 pupæ undergoing this cooling system, and bred about 60 perfect specimens, 50 cripples, and from the remainder, nil, as they were completely dried up. Since then, I have adopted a very simple and successful plan. I rarely disturb the pupæ from the retreat they have chosen, and use cocoa-nut fibre in place of the sand, which keeps nicely moist for a long while, if you take a little trouble to occasionally damp it. Some entomologists do not believe in damping pupæ, neither do I to a certain extent, but some require it, or else produce crippled specimens or none at all.

After this somewhat discouraging failure, I turned my attention to breeding a tolerably large number of moths from ova, mostly common species, for the purpose of learning their life-histories, and perhaps in the hopes of breeding a variety or two afterwards. I cannot let this opportunity slip without thanking my friend, Dr. T. A. Chapman, of Hereford, for his great kindness in so plentifully supplying me with ova of various kinds, and without whose aid I should have done very little breeding, comparatively speaking, this year, and should have missed many pleasant hours in watching the habits of the various larvæ.

The first eggs to hatch were some *Crocallis elinguarina*, which took place on April 17th. These larvæ while young remain during the night suspended by threads from their food-plant, but after the third moult rest in the usual geometer fashion. I have heard that these larvæ are cannibals in confinement, but were not so with me. They pupated on June 6th and 7th, and the flies emerged the first week in August.

Some of the next lots to hatch were *Taniocampa gothica*, *leucographa*, *rubricosa*, *instabilis*, *stabilis*, *miniosa*, *munda*, and *cruda*.

Gothica hatched on May 4th. When young they feed altogether on a leaf until eaten, and then remove to another, and are very lively. They fed up very well on whitethorn, and pupated about June 30th. When full-fed they have a very slight resemblance to *instabilis*, but may readily be distinguished by the absence of the white dorsal line, so conspicuous on the latter. They are an unpleasant larva to handle, though by no means the worst of the genus, as they leave an unpleasant green stain with their mouth which is difficult to remove.

Leucographa. I had six ova of this species, which hatched on May 5th. I fed them on dock, and am doubtful whether I was right or not in so doing, as they died after completing their fourth moult. When resting they resemble an Ionic volute, and are sluggish when disturbed. Of course I could not tell what they would be when full-fed, but they did not appear at all striking in appearance up to their fourth change, being of a dull green colour, and walking somewhat in a geometer fashion.

Rubricosa hatched on May 15th, from ova deposited on April 28th. The young larvæ resemble *leucographa*, especially in their way of resting, but soon develop a marked difference, being a chocolate brown hue, and after their final change are a very handsome larva; but, unfortunately, all mine died when about full-fed, from a kind of damp rot, I think occasioned by putting the food (dock) into the cage too wet, which was not a very difficult thing to do this summer. They rest in the same position whilst young as *leucographa* above mentioned, which is unlike any of the genus I am yet acquainted with. They do not feed gregariously whilst young, and I do not consider them very easily reared, but I may be incorrect.

Instabilis. I had a very large batch of this species, which hatched from May 5th to 10th. They feed very closely together until about half-grown, and then appear to be fond of clustering in groups of six or eight. They are an extremely variable larvæ, scarcely two having the same shade of colour. Some were a very dark green, while others were very light, in fact almost every conceivable shade of green occurs; but they all have the one distinguishing feature, viz., the white dorsal line, which always remained unchanged so far as my experience goes. I examined upwards of 400 larvæ, which was an objectionable thing to do, as every larva you handle leaves an unpleasant green stain on your hand with its mouth, and by the time you have examined a score, your hands, if you touch the larva with them, look as if they had been dyed green, and this stain is not easy to remove. I often think the larvæ might be made into an article of commerce, as most kinds

have a green stain, often very pretty in colour, and it is most probable that a strong irremovable dye might be manufactured from "squashed larvæ." These larvæ seem subject to a very infectious disease, so highly so that if one larva touches another that is suffering from it, it takes it and dies. Perhaps some of your readers can tell me the disease; it affects the larva as follows: It eats no food, looks sickly, frass very watery (not often the case when healthy and fed on whitethorn; as arboreal food very rarely causes watery frass, whereas low plants generally do), rests in a straight position, turns a yellow colour before death, which occurs about a couple of days after being seized, and smells terribly after death, in fact the larvæ appear to be quite putrid and rotten almost before death. I lost upwards of 80 by this complaint, and the remainder pupated from July 9th to 15th.

Stabilis hatched on May 5th, and another batch on May 12th, found by Dr. Chapman deposited in a crevice of a fir tree, together with the female, a dark well-marked specimen. I have kept this brood separate in order to see if they produce any differently marked specimens than the other batch, which were laid by a light female. This larva is exceedingly similar to that of *H. proteus*, but may be distinguished by being speckled all over with minute black dots. They cling tenaciously to the food-plant, and hang suspended by a thread when disturbed. The first lot began to pupate on July 2nd, and the second lot on July 9th. It is an easy species to rear and a pretty larva.

Miniosa hatched on May 7th. They are very nice larvæ to feed until about half-grown, and then are very fond of turning cannibals, and preferring their fellow creatures to arboreal food, as I found to my cost. I had about 50 larvæ which began mysteriously to disappear, and occasionally I found one mutilated and half-eaten, but until I caught one in the act I did not think they were to blame, as I assigned it to a *C. trapezina* or *S. satellitia* that was lurking somewhere in the cage, though I could never find it. However, I found out who were the culprits, and immediately separated them, but only succeeded in saving 21. They pupated on June 12th.

Munda hatched on May 1st. While young they are gregarious, feeding all together on a leaf, and are very lively. They are easy to rear, and are very fond of clustering together when full-fed, but especially so when moulting, when about a dozen of them spin a common web to undergo their change of skin. The larva took readily to oak, and pupated about June 28th.

Cruda hatched on May 7th. They are savage looking larvæ, with a very conspicuous shining jet black head. They are fearful cannibals, worse than *miniosa*, almost equal to *S. satellitia*, but not quite so bad as *trapezina*.

They are very objectionable to handle, dirtying your hands in the same way as *gothica* and *instabilis*. They pupated on June 12th.

These are all of the genus *Taniocampa* that I reared from ova, and I yet require *leucographa*, *rubricosa*, *gracilis*, *opima*, and *populeti*, as I am describing the varieties of the larvæ, and also take notes on all items of interest connected with their life-history. The above notes are the merest outline, but it would take up too much space in a paper like this to go into minute details.

I also bred the following from ova, amongst many others.

C. vaccinii hatched on May 9th, from about 28 ova. I was very anxious indeed to get ova of *C. spadicea* to breed side by side with it, but was disappointed. It is a delightful species to rear, so nice and clean and well-behaved. Their frass is not watery, and they do not dye your hands with green every time you handle them, as many others do. The larva reminds one of *X. cerago*, being of a very similar form and colouration. Twenty-three larvæ went down on June 28th, and during the last week in September I bred twenty-three splendid imagines, all of the same tint and markings, and showing no variation whatsoever.

A. prodromaria hatched on May 5th, and another batch on the 13th, from ova deposited on April 18th. The ova are excessively tender, the least touch rendering them unfertile, and they are also small for the size of the moth. There was no oak out when the first lot hatched, and the young larvæ would not look at anything else, though I tried them with various foods, so I wrote for some oak from the south, which arrived just in time to save about half of them, the remainder dying, I expect from starvation. These larvæ have about the strongest threads by which they hang suspended of any larvæ I know, and can extend it to a tremendous length; they also grasp very firmly to their food-plant until full-grown, when they relinquish their hold with more readiness. In fact it is rather dangerous to remove these larvæ by hand, as often they cling so tightly that they are more easily pulled asunder than removed. The best plan is to shake the food-plant with them on, when they drop readily, and hang suspended by their strong threads, and are then easily placed where required. The first batch pupated about July 18th, and the second on August 1st.

Amphydasis betularia hatched on July 19th, from typical female and black male, and another batch on August 20th, from black female and typical male. I am keeping them distinct, to see whether they produce any different results. Their habits closely resemble *prodromaria*, and the half-grown larva is very like that species, resembling rusty reddish twigs. The first brood pupated the beginning of October, and the second one at the time of writing is nearly full-fed.

Notodonta trepida hatched on June 24th. I have not had much experience with them, but should say they are difficult larvæ to rear, as the greater part of mine died while young, and others when nearly full-fed, from some unknown cause, as I took every precaution to ensure their welfare, which perhaps may explain my not succeeding, as you can easily be too careful in one sense, viz., constantly removing all the old food, as some larvæ appear to prefer it when withered, and others to eat first fresh food, then withered, as a kind of digestive, therefore keep your larvæ boxes clean and sweet, but not entirely destitute of a few withered leaves of their food-plant. But whether too careful or too careless all my larvæ but one died, much to my disappointment. This went down on October 18th.

Liparis dispar hatched on May 13th, from all the ova deposited from females bred last summer, which I retained for myself. I have given a history of this race in a previous volume of this magazine (vide Y.N., Vol. viii., p. 230). This year has been the most remarkable one for this species. On October 21st, I had eight larvæ still feeding on withered food, there being no fresh procurable, which has since proved fatal to them. These were little more than half-grown, though the greater percentage of the same brood pupated about the end of August which was very late; but imagine larvæ of a July insect, which emerged the second week in May, feeding at the end of October! I have only had one male out, and that was on September 24th. I am in a dilemma with the others, as I cannot believe they will remain all the winter in pupa, though they are alive now, and turn about in their slender cocoons in the very peculiar manner that this species has, and which is noticed by Kirby and Spence, in their "Introduction to Entomology," Vol. II., p. 295. I have placed them in a warm room to try and force them, and will report the result in due course, but am afraid it will be *nil*.

Dasychira pudibunda hatched on July 19th. They are imperceptible growers. They certainly have grown considerably since hatched, but if you look at them every day or two they never seem to exhibit the slightest difference, it is such a gradual growth that you never perceive it. Mine have fed up on plum, and are now (November 3rd) just spinning their cocoons, and only just in time, as not a leaf is left on the trees. Dr. Chapman writes me that if you wish to pair this species you must place the female and male out of doors, and trust to find them in copula, which I expect will not be very hard to do, as the female is very sluggish and very seldom flies.

Clostera curtula hatched on July 6th, and fed between united leaves during the whole of their existence, they do not eat the leaves they have joined but use them as a retreat in which to hide. These larvæ are very quick growers as a rule, but I had only one brood with mine this year, so they

did not grow and gormandize so rapidly as usual. It is a flabby larvæ, I mean if you get hold of it, it appears to have been starved to death, nothing inside it, and also clings unpleasantly tightly to the food-plant. They pupated about July 14th, and are remaining over the winter in that state.

Demas coryli hatched about July 1st. They feed very like *C. curtula* and appear to be very fond of withered food. I fed them on birch, which in this immediate neighbourhood is very much affected by the smoke and soon withers; but often going into the country I generally brought some clean fresh food which these larvæ in particular would not look at, infinitely preferring the withered leaves in the garden here. They pupated during the early part of October.

I think I have written enough for one month, but I have enumerated only a very small number of the species I have been breeding this year. I have had upwards of three thousand larvæ comprising over a hundred species, so I think I can safely say I have worked hard this year so far as breeding is concerned. But I do not wish my readers to think I breed merely for the accumulation of specimens, it is to learn their life-histories, and to observe the many curious habits that different species exhibit. I could fill a small volume with descriptions of curious species, their ways, habits, larva varieties, and other items of interest, but they would take up too much space to introduce into random notes like these, and to tell the truth I do not yet feel competent enough to do so, as one cannot learn anything like the history of a species with only one season's acquaintance with it, unless you pay particular attention to each one individually, and that is often an impossibility to do as very few entomologists have sufficient leisure to devote very much time to observing larvæ, often only just enough to feed them. During the summer I generally used to spend four or five hours every day in my breeding house and then used to feel how much longer I should have to remain if I wished to thoroughly learn their habits, but of course I had rather an unusual number to look after and they took a lot of feeding, apart from observation.

In conclusion might I ask your readers how glad I should be of help with any surplus ova or larvæ, and how gladly I will make any return in my power. I am anxious to breed so many species that almost anything is very acceptable.

Norbury, Sheffield, November 3rd, 1888.

NATURE IN DECEMBER.

BY ALBERT H. WATERS, B.A.

Although, to most people, December may appear a month wherein the naturalist has nothing to do in the way of out-door work, such is not exactly the fact, for even in mid-winter there is more to do in the way of collecting and observing, than the uninitiated would suspect.

The day on which we take our imaginary typical ramble is a bright and cheerful one, although withal somewhat cold. There has been a slight frost in the night, and the ground, early in the morning, was white with rime, but this has now disappeared and the aspect of nature is far from being a cheerless one as the rays of the noon-tide sun light up the rural landscape.

The birds we see as we walk along are for the most part collected together in flocks. Besides the common species, we observe one or two sea gulls. These birds, as we remarked last winter, often fly inland at this time of the year.

We shall do well now to collect micro fungi as this will give us plenty of employment. It is impossible here to give anything like a list of the species to be found, but there are several excellent works on the subject, such as Cooke's "Micro-fungi," and Brittain's "Introduction to the Micro-fungi when and where to find them," and to these the would-be student must be referred.

One or two kinds may, however, be briefly noticed. The golden yellow branched fungus we see so often on fir trees, after they have been cut down and have lain for some time is known as *Calocera viscosa* and it gets this name from its viscid nature; it is one of the division *Myxomycetes*. A species of *Sphaeria* may be found on dead bramble stems. It is known as *Sphaeria rostellata* and the genus to which it belongs is a very large one, including between one and two hundred different species occurring in the British Isles. These minute fungi are in the form of tiny black globular bodies, often growing quite inside the substance of the branch or leaf on which it occurs.

A very beautiful micro fungus, when magnified, is the bright pink or coral-red *Neclria cirinabarina*, occurring on dead branches. I have not time to describe it more particularly, and the only others I have room to mention here are *Agaricus septicus* found on dead twigs, &c., and white in colour; another of the genus (*A. applicatus*) is ashy grey. Besides these may be mentioned the white *Pistillaria quisquillaris*, often found on dead fern stems and the minute *Typhula filiformis* and *T. erythropus* growing on dead leaves and stems.

Winter is a good time for observing and collecting lichens as well as micro fungi. Among the species we may find are the grey *Parmelia saxatilis*, the underside of which is black; the grey bordered with black *Tecanore alia*, another species of Teeanore, the grey *Tecanore subfusca*, is common on old palings and trees in limestone districts; we have a species of lichen known as *Aspicilia calcarea*, it occurs on stones. It is a very interesting species inasmuch as its spores are polygonal in shape instead of being oval as the spores of lichens usually are. One species of *Aspicilia* is remarkable for the large size of its spores. This is *Aspicilia cervinata*. Another species has also spores of unusually large size and has the generic name of *Megalospora* from this circumstance. Other lichens are the greenish grey *Everine prunastri* and *Squamaria lentigera*. The last named species is greenish white when wet but becomes white when dry.

We have here found a curious little caterpillar living in a tiny case on these lichens on the palings we have stopped to look at. It is the larva of *Talæophora pseudo-bombycella*. Other species of lepidoptera may be found in December, for which see Y.N. Vol. VI., p. 266.

In mild Decembers *Pæcilocampa populi* makes its appearance. As every entomologist knows it is a thick bodied moth belonging to the Bombycina and family Bombycidæ. The type form of this species has the fore-wings smoky brown in colour inclined to mahogany at the base. The middle part of the wing is bounded by two pale waved lines, the outermost one is continued across the hind-wings after the manner of the Geometrine. This moth has the peculiarity of sometimes in severe winters remaining in the pupa state until the following winter, and if that likewise be a severe one until the winter following and so on until a mild one arrives. It will remain in the pupa state as long as five years if circumstances are unfavourable for its development earlier.

Cambridge.

TORTRIX PICEANA.

By ROBERT ADKIN.

The re-discovery of a *Tortrix* in this country is an event to be received with satisfaction; the known members of that group are by no means so numerous that we can afford to lose any of them, but it too often happens, that a species admitted to our fauna on the authority of one or two specimens, remains in one lists for a few years, until another generation of entomologists arise, when its right to be there is questioned and it is then dropped, or

placed under that unsatisfactory heading "Reputed British Species," a sort of Hades to which the names of species that we have great hope but little expectation of getting are relegated.

It may therefore be interesting to supplement the record of the re-discovery of *Tortrix piceana* in Hampshire, given by Mr. Capper (ante 217, 224), by captures that have come under my observation during the past few years.

So long ago as 1885, while spending a sunny afternoon among the Surrey pine woods, a single specimen was netted, in the following year another was bred from a larva found in a shoot of fir, the needles of which were spun together, and since that time two others have been noted from the same locality, one being captured and the other bred.

The two localities where it has been taken being some miles apart we may hope that we have so far tapped only the outskirts of its habitat, and that by working suitable country between the two we may strike its head-quarters and find it firmly established, and in considerably larger numbers than have been thus far recorded.

November 16th, 1888.

REPORTS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

November 7th, 1888.—Dr. D. Sharp, F.L.S., President, in the chair.

Mr. H. Stuart Fremlin, M.R.C.S., of Mereworth, Maidstone, and Mr. G. V. Hudson, of Wellington, New Zealand, were elected Fellows.

Mons. A. Wailly exhibited a large and interesting collection of Butterflies recently received from the Gold Coast and other parts of West Africa. The collection included about forty-seven species belonging to the genera *Papilio*, *Diadema*, *Salamis*, *Romalæosoma*, *Charaxes*, *Harma*, *Eurypheme*, *Junonia*, *Aterica*, *Hypanis*, *Eurytela*, *Mycalæsis*, *Cyrestis*, *Nepheronia*, *Mylothris*, *Belenois*, &c. Mons. Wailly stated that several of the species were undescribed, and were not represented in the British Museum Collections.

Mr. Jenner Weir exhibited four bred specimens of Ant-lions, two of which were from Saxon Switzerland, and the other two from Fontainebleau. He stated that he believed the specimens belonged to two distinct species. Mr. M'Lachan said that the specimens all belonged to one species, viz. *Myrmeleon formicarius*, Auct. = *europæus*, M'Lach.

Mr. W. C. Boyd exhibited an example of *Pterophorus zetterstedtii*, taken at Sydenham. He remarked that this species had hitherto only been recorded from Lynmouth and Folkestone.

Mr. Enock exhibited specimens of *Cecidomyia destructor* (Hessian Fly), illustrating the life-history of the species, and made remarks on them.

Mr. Wallis Kew exhibited a specimen of *Dytiscus marginalis* having a small bivalve shell attached to one of its legs. The bivalve had apparently attacked the *Dytiscus* and refused to relax its grasp. A discussion ensued, in which Dr. Sharp, Mr. Stainton, and Mr. Kew took part.

Mr. W. E. Nicholson exhibited several specimens of *Acidalia immorata*, Linn., caught by him near Lewes. Mr. Jenner Weir remarked that the species had only recently been added to the British list, and it was remarkable how so comparatively large a species could have been hitherto overlooked. It was also remarked that a specimen of this species from the collection of the late Mr. Desvignes had been exhibited by Mr. Stevens at the meeting of the Society in November, 1887.

Dr. Sharp exhibited a large number of species of Rhynchophora, collected by Mr. George Lewis in Japan.

Mr. F. P. Pascoe read a paper entitled "Descriptions of new Longicorn Coleoptera."

Dr. Sharp read a paper entitled "The Rhynchophorous Coleoptera of Japan."—H. Goss, *Hon. Secretary*.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

October 18th.—The Vice-President in the chair. Mr. J. A. Clarke exhibited a quantity of melanic forms of lepidoptera from For and Rannock, which included series of *Noctua glareosa*, *N. depuncta*, a black var. of *X. polyodon*, a fine series of *E. togata*, *cordigera*, *orbona*, *H. humuli*, and many other handsome species; also a splendid series of *H. exulis*, *E. versicolora*, and *P. alpina*.

Mr. Hockett exhibited several species of humming birds from Trinidad; the most conspicuous being Ruby, Topaz, and Buonaparte.

Coleoptera: Mr. Cripps exhibited species from Esher; *Onthophagus cænobita*, *Anomala frischei*, *Clytus mysticus*, &c.

Mr. Lewcock's box contained several species of Aphodii from Hackney Marshes, among which were *A. erraticus*, and *A. nitidulus*; also *Chrysomela fastuosa*, *Onthophagus nutans* (received from Mr. Gillo, of Bath), and *Bolitobius atricapilis* taken from fungi at Esher.

An interesting discussion took place respecting an egg of the common tortoise, exhibited by Mr. Battley. The animal had been purchased at the door by the latter gentleman, and shortly afterwards it laid an egg on three consecutive days, the exhibit being one of them; but he had experienced great difficulty in drilling a hole in the egg, owing to the toughness and

thickness of the shell. Mr. Battley also gave a short account of the life-history of the tortoise.

November 1st.—In the absence of both President and Vice-President, Mr. Goldthwaite was elected in the chair.

Mr. Hanes exhibited a very long and fine series of *L. testacea*. Mr. Clark had a very interesting box containing four bred specimens of *Reticulata*, also two specimens of the Lewis form of *D. conspersa* and a very fine variety of *Carpophaga*. Mr. Goldthwaite a very fine variety of *A. grossulariata*, being suffused with cream colour, and having very few dark markings, also *A. paphia* and var. *Valezina*, and a female *A. paphia* having the right fore-wing of a light colour.

Mr. Hanes had been to the New Forest and had found species in the day-time very scarce, but at sugar had taken about 13 species, he had also noticed a very large number of robins, in fact they seemed all over the forest. He had also been collecting in the North of London and had taken several *Pen-naria*, but exceedingly few *Defoliaria*. Mr. Ellis also informed the members that he had seen a very large number of robins.—J. RUSSELL AND G. A. LEWCOCK, Hon. Secs.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

October 25th, 1888.—John T. Carrington, Esq., F.L.S., Vice-President in the chair. Mr. E. A. Atmore, of King's Lynn, was elected a member. Mr. C. A. Briggs exhibited banded and other forms of *Gnophos obscuraria*. Mr. Wellman on behalf of Mr. A. E. Hall, interesting forms of *Lycæna icarus*. Mr. Goldthwaite, a pretty form of *Triphæna orbona* (*subsequa*), streaked and spotted forms of *Argynnis paphia* and the variety *Valezina*. Mr. Oldham a pale form of *Charocampa porcellus*, a fine variety of *Argynnis euphrosyne*, also species of Neuroptera, Hymenoptera, Diptera, and Coleoptera, among the latter being a fine series of *Calosoma inquisitor*, from Epping Forest. Mr. J. M. Adye, bleached varieties of *Epinephele janira*, a specimen of *E. hyperanthas*, the underside having no rings, a melanic form of *Fidonia atomaria*, and a fine varied series of *Anchocelis lunosa*. Mr. Hawes, living larvæ of *Polyommatus phlæas*. Mr. Tutt on behalf of Mr. P. Russ, of Sligo, a number of species of Agrotidæ: a fine series of *Epunda lutulenta*, showing two very characteristic phases of variation; one of a steely grey colour covered with white scales with a distinct band, the females being darker than the males; the other very black in ground colour with the hind-wings white, the females being darker with the anterior and posterior wings quite black. Mr. Tutt remarked that the pale Continental form did not seem to occur in

Britain. Mr. West, of Greenwich, *Sericea*, from West Wickham. Mr. J. Jenner Weir, bred specimens of *Myrmeleon europæus*, with cocoons, and contributed notes.

November 8th, 1888.—John T. Carrington, Esq., Vice-President, in the chair. Messrs. H. W. J. Vaughan, F.E.S., W. Warren, M.A., F.E.S., W. D. Cansdale, F.E.S., C. Fenn, F. Oswald, E. Brunetti, H. A. Sauzé, A. Short, H. E. Hopkins, D. Chiltenden, and Sydney Webb, were elected members. Mr. Wellnan exhibited three bred series of *Acidalia aversata*. Mr. R. Adkin, *Crymodes exulis*, and *Pachnobia hyperborea*, from Shetland. Mr. Carrington made some remarks on the last named species which led to a discussion as to whether many of the so called varieties among the lepidoptera were really scarce or whether the method of working for them had not yet been discovered. Mr. Tutt, on behalf of Dr. Chapman, of Hereford, showed among other species long series of *Acronycta tridens*, and for comparison *A. psi*, both from Hereford; the specimens of *A. tridens* were very interesting, some having a beautiful rosy tinge; and others varying to a large extent in the character of the discoidal spots and the base mark. Mr. Tutt stated that Dr. Chapman had informed him that throughout the whole of the larval stages the two species were quite distinct. Mr. Step read a note from Mr. T. D. A. Cockerell on the protective resemblance of a species of *Aphis* occurring near West Cliff, Custer County, Colorado, about 8000 ft. alt., to a parasitic fungus (*Puccinia bigeloviae*) very abundant on the *Bigelovia* in the same locality. Mr. Clark exhibited specimens of *Nartheicum ossifragum*, from Ashdown Forest, and of *Potentilla tormentilla*, from Tunbridge Wells. Mr. Turner read an article from "The Evening Mercury," St. Johns, Newfoundland, published 8th October last, on Funk Island, the head quarters of the now extinct Great Auk, and a discussion ensued on the probable extinction of many other species through man's agency. Messrs. J. A. Cooper, Step, Jenner Weir, Carrington, Frohawk, Tutt, and others took part. It was recorded that Mr. Billups had noticed a flight of wild ducks passing over the Borough Market on the 16th inst. Mr. Frohawk mentioned having seen three gulls on Balhan Common, and Mr. J. A. Cooper said gulls had been plentiful on Wansted Flats.—H. W. BARKER, Hon. Sec.

NOTES AND OBSERVATIONS.

NOTE ON *DEILEPHILA GALII* LARVÆ.—This varied and beautiful larva has been this autumn, not only widely distributed over the British Isles, but in some of its more favoured haunts it has been found in some plenty.

Along the Kentish coast, and notably on the Deal sandhills, this grand larva has occurred in most unusual numbers, any suitable place all over the district *i.e.*: where its food-plant *Galium verum* or *G. mollugo* grew there, a careful search revealed the larvæ, not only close to the sea, as some collectors seem to think, but also miles inland by road sides, as well as open ground, even basking on exposed footways. Another idea is that they were only to be found on small or isolated patches of the plant, but this by no means hold good, especially in their younger stages. Then they were generally, in my experience, to be obtained on luxuriant patches of the plant. I found most of my smaller larvæ under such conditions. Afterwards, and when nearly full grown, they certainly do seem to prefer more open places, where by exposure the plants get dwarfed, and they can enjoy fully the direct ray of the sun. When quite full-grown they are very fond of extending themselves on the bare and warm sand, in fact their polished backs get quite hot, which they evidently enjoyed. Anyone would imagine that so large and strongly marked a larva could not be overlooked, and that one could clear them all off by one good search, but such was by no means the case, as evidently when not feeding or basking they hide away most effectually, I always thought they possibly buried themselves and this we found was the case, for two or three were discovered almost covered with sand, a few seconds more and they would have been quite lost to view. During my stay at Deal (three weeks) our take of this grand larvæ amounted to nearly 200, which fortunately we were enabled to feed up there, and thus obtain a daily fresh supply of *Galium*. The quantity required being very considerable, certainly in all my experience I never met with larvæ that ate more ravenously, or fed up so rapidly as these, but it was no joke to keep them supplied with food. Many of the visitors at Deal doubtless gave me credit for very poor taste in culling a wild flower bouquet, for we daily came home armed with huge bunches of *Galium*, not certainly particularly beautiful to look at, but very necessary for the numerous hungry larvæ we had to cater for. This daily supply of fresh *Galium verum* enabled me to get most of the larvæ safely into pupæ, and provided only that I can as successfully get them into the imago state, many a blank will be filled in my friends cabinets with this beautiful insect.—W. H. TUGWELL, Greenwich, 22nd October, 1888.

D. GALII BRED.—I have been fortunate in breeding ten *D. galii* from the larvæ taken at New Brighton. Seven are splendid specimens, but three are cripples. As I mentioned in my last communication I have kept them in a warm kitchen.—SAMUEL J. CAPPER, Huyton Park, Huyton, Liverpool, Nov. 25th, 1888.

ON A VARIETY OF AN AGROTIS.—Whilst reading the interesting reports of the "Entomological Society of London," in the "Young Naturalist," for November, I was struck with the following: "Mr. H. Goss exhibited for Mr. W. J. Cross an extraordinary melanic variety of *Agrotis segetum*," &c. Why I note this, was the fact that Mr. Cross had sent his wonderful capture for my inspection after it had been returned him as a "melanic form of *Agrotis segetum*," with a request that I would examine it and tell him what it was a variety of. On seeing it, I was at first dazzled by its splendour, rich dark and darker mouse colour; silk hardly expresses the bright gloss upon it, satin does better; but I saw at a glance it could not be "*A. segetum*," that species belongs to a group of *Agrotidæ* having light and sometimes somewhat hyaline under-wings on the males, a group that is without any discoidal lunule on the inferior wings, see *Exclamationis*, *Lunigera*, *Saucia*, *Suffusa*, *Ripæ*, *Segetum*, &c., amongst our British species, whilst the specimen said to be *Segetum* in the report above, has not light under-wings and has a lunule thereon, and the form of the insect is broader and squarer than any *Segetum* I ever saw. In fact it is the exact form of *Agrotis corticea*, which species I had no hesitation in naming it when returning it. Under ordinary circumstances it might not be worth noting, but this is a most wonderful insect and will no doubt cause more interest to be felt in it in the future, when variation is better understood than it seems to be at present, and having been named and noted at the Entomological Society of London, it will be hard to correct the error later, I have therefore thought it best to set it right now.—C. S. GREGSON, Rose Bank, Fletcher Grove, Liverpool.

CAPTURES NEAR MANCHESTER.—In August I devoted a little time at Dunham, near Manchester, to collecting larvæ of *Cherocampa porcellus*, which were feeding on *Galium saxatile*, and of which I secured a few; but my greatest pleasure was derived in capturing a specimen of *Staphylinus stercorarius* in the afternoon, running in the sunshine through a tuft of *Festuca duriunscula*; it is the first capture probably near Manchester of this species. I also found *Luperina cespitis* just stretching in the same locality. A specimen of *Dermestes frischi* paid a visit to our kitchen but as one of my family caught a glance of it, its progress was soon arrested, it is now filling a gap in my collection. Two of my sons, John and Herbert, succeeded in getting some very nice specimens of *Aphodius fetidus* on the moors about Stalybridge. I was rather late in the field for the larvæ of *D. galii*, but however I found two at Wallasey, and my son Herbert found two. We also found several dead ones at Blackpool, some of my friends were more fortunate and found a few living ones.—JOSEPH CHAPPELL, 29, Welbeck Street, C-on-M, Manchester, Oct. 16th, 1888.

VARIATION IN SIZE AND COLOUR.—In looking over late captures I have noticed several insects in the past season that are much larger and brighter in colouring than usual, although the captures have been few in number. *N. lucina* on the Surrey Hills, are finer than in previous years, two females being especially large. *Euclidia glyphica* also very fine from the same localities, and *Fidonia atomaria*, the Wickham specimens this year were very bright. Has anyone else noticed this?—J. HENDERSON, Streatham, S.W.

EDITOR'S CHAT.

“THE YOUNG NATURALIST.”

In closing the Ninth Volume of *The Young Naturalist*, I may be allowed to thank my contributors, who have done so much to render the contents of the volume varied and interesting. No matter how able may be the editor of a Natural History magazine, or how well qualified to write on the subjects discussed, it is the contributors who make such a magazine a success. It is by the variety of minds brought to bear on the questions discussed, that old subjects are made interesting, and new light thrown upon them; that new subjects are introduced, and progress is made in knowledge. Labouring under the difficulties that obtain with a provincial editor, shut up in a small town, where a naturalist is as seldom seen as a specimen of *Deilephila Nerii*, I have felt grateful to my many friends for their kind and unwearied support of the *Young Naturalist*. Some of those whose names appear in the index to this volume, have been contributors from the very first, while new friends have always been coming to the Editor's assistance. Thanks to them all, I am able to offer a bill of fare for the next volume, that will, I venture to think, be received by my readers with satisfaction.

First, the Monthly Supplement. Mr. Dales's "History of British Butterflies" is drawing near to its conclusion. When it is completed, there will be commenced a "Natural History of British Spiders," by F. O. Pickard-Cambridge, Esq. It will contain a full description of every British Spider, with notices of their habits, localities, &c. It will be fully illustrated by Mr. C. H. H. Walker, of Liverpool, from drawings by the author, and will form a complete Manual of this most interesting group. It will be paged, so that it may be bound separately if desired. Later in the year will be commenced a "History of the British Hawk Moths," by Mr. Dale. This will be written in the same style as the Butterflies, and will contain the same full bibliography of the group, which has never been attempted before. When this is com-

menced, it will alternate monthly with the supplement on "Spiders," or if the anticipated increase in circulation will warrant it, both may appear together.

In the Magazine itself, the contents will be of the usual kind. Mr. Walker's long promised paper on "Wings," will appear early in the year. It will be illustrated by drawings from nature by the author, engraved by himself. Mr. Gregson, freed from the care of his collection, has intimated that he will not part with his knowledge of insects along with his cabinet, and hopes, notwithstanding his failing eye-sight, to render considerable aid during the progress of the next volume. A paper from his pen on *Deilephila galii*, in opposition to the "blown-over" theory, will appear in January. Mr. Tutt has kindly promised to assist me in endeavouring to interest collectors in the study of the smaller species, and will contribute a few practical hints on the subject from time to time. He proposes to commence with the Plumes, a small group, readily mastered. An interesting paper on the classification of Coleoptera, by Mr. Sharp, of Liverpool, read at a recent meeting of the Lancashire and Cheshire Entomological Society, will shortly appear; and Mr. Lewcock, with the assistance of several leading coleopterists, will contribute a series of papers on the work done in this order during recent years, with particulars of discoveries of new species, and the occurrence of varieties. Mr. Soutter has promised articles on "The Honey-suckle," "The Wall-flower," and "The Ragweed." Those who remember his botanical papers in the early volumes will welcome this announcement.

In one department only, do I find difficulty in obtaining satisfactory help from my friends. Short notes of observations, captures, insects reared, &c., are especially welcome, and space will always be found for these. Letters frequently reach me asking why I do not give more of these items. Yet those who complain, rarely if ever contribute such notes. The idea undoubtedly is that the items my friends could send me are not worth publication. Will they allow me to be the judge on that subject?

One word more with respect to the "get-up" of the Magazine. Some small alterations will be made in the arrangement of the pages that will improve its appearance. The monthly heading will be discontinued; and articles will not be divided except when very lengthy, but the portion printed in one part will be continued in the next without a break. The dark blue of the cover will be changed for the colour formerly used, which will show the printing more clearly. All these changes will, I trust, be deemed improvements, and with the interesting papers announced I hope the readers of the "Young Naturalist" will consider the next volume the best of the series.

Polydama and *Typhon* on being taken in the county of Yorkshire, and sent to him by P. W. Watson. Both *Polydama* and *Typhon* were taken on the 21st July, 1809, by the Rev. W. T. Bree, on the moors between Bald and Festiniog in North Wales; and Curtis records *Typhon* as being taken plentifully by himself and Mr. Dale in July, 1825, in the Isle of Arran.

CÆNONYMPHA PAMPHILUS.

Small Heath.

PAMPHILUS, Linn. Pamphilus, an Athenian, who robbed the public treasury.

The wings of this, our smallest British representative of the family, expand from the width of from a little more than one inch to nearly an inch and a half. On the upperside they are of a fulvous, or pale tawny colour, with brown margins, and a black spot near the tip of the fore-wings. In the males, the dusty edging of the wings is more decided than in the females. On the underside the fore-wing resembles the upperside, but the spot is much more distinct, being white centred, and in a yellowish ring; the hind-wings resemble those of *Typhon* without the ocelli, having in their place minute white dots. Varieties occur in which the ocelli on the underside are bipupilled, and others in which they are entirely wanting, sometimes also the upperside is without the spot. One in my collection, taken by Mr. Paul, at Langport, in Somersetshire, is of a whitish yellow tint, which makes the dark border appear very distinct. Another I have, has the ground colour very much darker than the type, similar to *Philoxenus*. In the large South European variety *Lyllus*, Esper, there are faint traces of marginal eyed spots.

The egg is somewhat bucket shaped, with flattish base and top, and upright sides, broader at the base than above; the sides with nearly fifty small irregular ribs, and faint transverse reticulation, the top thimble-pitted all over, the shell glossy, pale green at first, turning in a day or two to whitish, freckled and ringed with pale yellowish brown. (Rev. J. Hellins, in Appendix to "Buckler's Larvæ.")

The caterpillar is of a bright green colour, with dorsal line of a darker and spiracular line of a lighter shade, and pink anal points. It feeds on *Poa annua*, *Cynosurus cristatus*, and other kinds of grasses.

The chrysalis is suspended by the tail to a blade of grass. It is of a bright green colour, with minute white spots, rather broad and blunt at the head. At the end of the tail is a short, stout, rather flattened and curved spike, the tip of which is thickly set with curled spines, well adapted for holding on to the silk-pad.

There appears to be two broods of this butterfly, the one appearing in May and the other in August. Possibly there are three broods, as the butterflies may be found from the end of April to the beginning of October. The caterpillars seem to hibernate in various stages of growth, and might probably be found all the year round. The Rev. J. Hellins had some eggs laid by captured females on May 28th, 1874. On August 11th one caterpillar had become a chrysalis. On August 22nd the butterfly appeared, whilst the rest of the brood were still caterpillars, and just then passing through a moult; and these hibernated in the caterpillar state.

Cænonympha pamphilus frequents all sorts of grassy places, heaths, railway banks, dry pastures, grassy lanes, &c., and is distributed all over Europe, except in the extreme north, and is found also in Asia and Northern Africa. It is distributed all over the British Isles, except the Orkneys and Shetlands, and is as yet the only species of butterfly reported from the small and far away Isle of St. Kilda,—

" Whose lonely race
Resign the setting sun to Indian worlds."

St. Kilda is the most westerly of the Hebrides, being 80 miles west of the Butt of Lewis.

Pamphilus was described as British as long ago as 1667, in the "Pinax" of Dr. Merrett.

It is recorded in Ray's "Historia Insectorum," 1710, as being very frequent in meadows through nearly the whole season.

GENUS XIV.—EREBIA.

Dalman.

EREB'IA, from Erebus, the region of darkness: in allusion to the dark colours of the butterflies contained in the genus.

The name generally adopted for the present genus was proposed by Dalman for the whole of the Swedish species of Satyridæ; it is consequently a synonym of *Hipparchia* and *Satyrus*; as such it was rejected by Professor Westwood, who proposed the name of *Oreina* in its stead, in allusion to the mountainous habits of the genus.

The species are very numerous, and are subject to great variations. They are distinguished by having the principal veins of the fore-wings either not swollen, or the costal vein alone slightly dilated at the base. The hind-wings are generally entire in the smaller species, and slightly dentated in the larger. The palpi are covered with long bristly hairs, and the antennæ are slender, with a rather long club. The caterpillars are covered with fine scattered hairs, and in shape are pisciform, like the rest of the family. The genus con-

tains about 60 species, of which about half are European. They are found almost exclusively in mountainous regions, and are rarely found on the plain, except where the vegetation has an Alpine character. They do not occur on the more northerly mountains of Europe, where they are replaced by the species of *Chionobas*; nor in the mountains of the southern parts of Spain, Italy, and the Mediterranean islands. Boisduval enumerates no less than seventeen species occurring on the Alps, and three species from Lapland. The extra-European species inhabit the mountains of Asia, North America, Chili, and South Africa; though, strange to say, none are recorded from the mountains of North Africa. Two species only occur in Britain, although another, *Ligea*, was recorded as being taken by Sir Patrick Walker, in the Isle of Arran, as long ago as 1804. Mr. Stainton, in 1857, gave as his opinion in his "Manual" "that new species of British butterflies are more likely to occur in this genus than in any other," so many parts of the Welsh, Scottish, and Irish mountains having been unexplored. However it is in the southern counties of England, and not in the northern parts of our island, where new species have been turned up, and in the genus *Polyommatus*, not *Erebia*. The species of *Erebia* constitute Duponchels' ninth and last group, named, from their lofty habitations, *Alpicicules*; and may as that author suggests, be divided into two groups, from the entire and denticulated hind-wings, forming Stephen's divisions C and D of *Hipparchia*, and Hubner's sections of *Epigea* and *Melampias*.

SUB-GENUS EPIGEA.

Hubner.

The denticulated hind-wings distinguishes the species of this sub-genus from those of the next.

EREBIA MEDEA.

Scotch Ringlet.

MEDEA, W.V., Me'dea, a wicked sorceress who married Jason.

Fabricius, in 1794, named this species *Blandina*, but it is the same as the *Medea* of the Vienna Catalogue, published in 1776. Dr. Staudinger calls it *Æthiops*, Esp., and states that *Medea*, W.V. is another butterfly. If so it will be best to adopt the name of *Blandina*, Fab., for *Æthiops* is a bad name, being neither the name of a historical personage, nor yet of a food-plant; besides it has been given to two or three different species of butterflies; and according to Jung, the *Æthiops* of Esper is identical with the *Ligea* of Lin-næus. The wings expand from an inch and three-quarters to a couple of

inches. They are of a rich dark brown, with a fulvous band, containing several eye-like spot near the hind-margins. The female is paler in colour, and has generally more and larger spots than the male. The underside is paler in colour than the upper, and the fulvous band on the hind-wings is replaced by a white one. *Medea* varies in the extent of the fulvous band, and in the number and size of the eyed spots.

Stephens, in his "Illustrations," gives the following varieties:—

Var. *b.* Both sexes with the third ocellus from the apex of the anterior wing, blind.

Var. *c.* Both sexes with the third ocellus obliterated.

Var. *d.* Female with five ocelli on the band of the anterior wing.

Var. *e.* Both sexes with the third ocellus from the apex of the anterior wings blind, but the posterior wings with two ocelli only above.

Var. *f.* Posterior wings with only two ocelli.

Var. *g.* Ocelli very small, the third one being obliterated; the posterior wings beneath with five very distinct bands. The first at the base, pale dusky; the second, broad, bent, deep reddish brown; the next attenuated at each end, bluish-ash sprinkled with white, with three minute ocelli, and terminating at the anal angle of the wing; the hinder one occupying the posterior margin, and bright rufous brown. This is the form most frequently met with in Durham.

Var. *h.* With white dots instead of ocelli.

The Swiss specimens are generally larger than British, and their females have an extra eyed spot on the fore-wings. A named variety *Mensina*, H.S., has the fulvous band on the wings rather obscured.

The egg may be called large for the size of the butterfly, and is nearly globular, though somewhat ovate in shape and laid on end; the shell is glistening, and ribbed, but not deeply, with about thirty longitudinal ribs, and with very shallow transverse reticulations. At first, it is of a pale greenish yellow colour, afterwards of a pale pinkish grey sprinkled with claret brown. (Buckler's Larvæ.)

The caterpillar is of a pale stone colour, the warts being pale whitish brown; the dorsal stripe is blackish brown, most intense on the hinder segments, and enclosed by two lines of a paler shade than the ground colour, and a broad sub-dorsal stripe. The skin is covered, though not very closely, with short, stout, curved pellucid bristles.

The chrysalis is of a pale stone colour almost without markings, and very stumpy. It is not suspended by the tail, but the caterpillar goes down amongst the grass stems, and there changes. Before the butterfly emerges

the entire chrysalis becomes of a deep brown hue, the eyes being the first portion to change in colour.

The butterfly emerges about the last week in July, and continues about a month on the wing, but is soon worn. The eggs are attached singly to the blades of grass. They hatch in about ten or eleven days, and the caterpillar feeds a few weeks before hybernation; it then creeps down the blades of grass, which is generally *Aira præcox*, and hides in the thickest part of the tufts. About May it begins to feed again, and is full-fed by the middle or end of June.

Erebia medea inhabits the greater part of Central and Southern Europe, and Northern and Western Asia, but is wanting in the northern plains of Europe and in Silesia.

It appears to be generally distributed in Scotland, extending as far north as Ross-shire. It is only known in five northern counties of England, viz.: Durham, Westmoreland, Cumberland, Lancashire, and Yorkshire; and not at all in Ireland.

It is not so much a mountain species as others of the genus. In Scotland it has been noticed that it does not range more than 800 or 1000 feet above the sea level, while in Castle Eden Dene, Co. Durham, it is abundant at the sea level, and within a few hundred yards of high water mark. It frequents open grassy places among trees, but is sometimes extremely local. In one wood near Castle Eden it is abundant close up to the turnpike road, which passes through the wood, but it never occurs on the other side of the road: At Strathglass, in Invernesshire, it sometimes occurs in all the open weedy places in the woods, even coming into the gardens. From observation made there, it appears that *Erebia medea* was scarcely seen above 800 feet, while *Cænonympha typhon* attained an elevation of upwards of 2000 feet; the two species being found together from 200 feet up to 800 feet above the level of the sea.

It was first discovered to be a British species by Walker, who met with it in the Isle of Arran, in the beginning of August, 1804.

Sowerby, in his "British Miscellany," published in 1806, informs us that "This newly discovered species of *Papilio*, as a native of Britain, was caught in the Isle of Arran, one of the Western Isles of Scotland."

Donovan, in his "Natural History of British Insects," Vol. xii., published in 1807, writes: "This very rare species of *Papilio* has been recently discovered to be a native of the British Isles. About three or four specimens of it were taken in the Isle of Arran by Major Walker, to whose politeness we have an individual example at this time in our Museum. Another is preserved in the collection of our friend A. M'Leay, Esq., and these, we have reason to

apprehend are the only specimens at present in any of the London cabinets. Though but lately introduced to our attention as a native of Great Britain, this interesting insect is by no means unknown to the Continental naturalists as an inhabitant of Germany. It is the true *Papilio blandina* of the Fabrician system. This author likewise describes another *Papilio* under the same name, but it is an East Indian species, and belongs to the Nymphales tribe, and cannot be confounded with ours. He likewise describes another *Papilio* under the specific name of *Ligea*. This latter is, however, sufficiently distinguished by having four ocellated black spots in the rufous band on the upper wings instead of three, as in *Blandina*, and a white spot at the end of the band on the underside of the posterior wings, which the other has not. *Papilio ligea* was discovered in the Isle of Arran, by Major Walker, at the time as *Blandina*."

Stephen's, in his "Illustrations," writes of *Blandina*: "Discovered many years since in the Isle of Arran by Dr. Walker, and subsequently taken there by Sir Patrick Walker and Dr. Leach, and in profusion, in July, 1825, by Messrs. Curtis and Dale, the latter of whom supplied me with a fine series of both sexes. It has recently been found not uncommonly at Castle Eden, Durham: but the English specimens appear to differ considerably from the Scotch."

SUB-GENUS MELAMPIAS.

Hubner.

The species of this Sub-genus differ from those of the preceding in having the wings much more elongated, the hind pair being also entire and not denticulated. All are essentially Alpine or mountain species.

EREBIA EPIPHRON.

Mountain Ringlet.

EPIPHRON, Knoch. Epi'phron, perhaps a grammatical error for Ephron, a Hittite, who sold to Abraham a plot of land to bury his wife in. Ephron is a Hebrew word signifying dust.

The wings expand from an inch and a quarter to an inch and a third. On the upperside they are of a rich dark brown colour, with a silky gloss; the fore-wings having an irregular transverse bar, or rather a band-like series of ferruginous markings running parallel to the outer margin of the wing, these markings are five or six in number, of which the second, third, and fifth always include a white pupilled black spot, the fourth rarely has the spot of equal size with the rest, it is generally reduced to a mere point and is often

entirely wanting. The hind-wings have three roundish ferruginous markings, equidistant from the outer margin, and each of these have usually a black central point, there is sometimes the trace of a fourth marking, but this is without the central point. On the underside the forewings are of a redder brown, with the red band marked with four black spots, whilst the hind ones are ashy or coppery brown, with three black spots, each surrounded by a slender red ring. Variations occur in the number and size of the spots as well as of the band. The female appears to differ but slightly from the male, it is, however, almost uniformly of larger size, and of less intense and rich colour, a difference often observable among the Satyridæ: the markings on the hind-wings are also more distinct. This is the form described by Mr. Newman, in the second volume of the "Zoologist," under the name of *Erebia melampus*, Boisduval, and is the one most frequently met with on the mountains of Scotland.

Var. CASSIOPE, Fab. Cas'siopé, the mother of Andromeda.

On the upperside the wings are of a rich dark brown, with a silky gloss, the fore-wings with a red fascia behind, in which are usually four obsolete sub-ocellated black spots. On the underside, the fore-wings are of a pale metallic brown, with an irregular red band near the hind-margin attenuated in the middle, and having four black spots; the hind-wings are of a pale coppery brown, with three black spots, obsolete cinctured with fulvous, placed opposite to the ocelli of the upperside. The cilia are brown above, white beneath; the body and antennæ are dusky, the latter nearly white underneath. This is the form most frequently met with on the mountains of Cumberland.

Mr. J. F. Stephen's, in his "Illustrations," gives the following varieties:

Var. *b*. The fascia on the anterior wings, above and below, with three ocelli-form spots, the third being obliterated.

Var. *c*. The fascia on the anterior wings on both sides with two ocelli-form spots, the third and fourth being obliterated.

Var. *d*. The fascia on the anterior wings with the apical ocellæ spot only.

Var. *e*. The fascia on the anterior wings unspotted; the posterior wings with three circular red spots, the one at the anal angle with a black dot.

Var. *f*. Anterior wings with four round red spots, with a black dot in each; the posterior with three, in lieu of the fascia.

Var. *g*. Anterior wings with four minute red spots, posterior with two. This is the *Papilio mnemon* of the Entomological Transactions, in which it was described by Mr. Haworth, about 76 years ago.

Var. *h*. Anterior wings with three very obsolete minute red spots, slightly pupillated; posterior with two.

Var. *i*. With the fascia of the anterior wings spreading towards the base, and forming an irregular patch occupying the greater portion of the disc of the wing; posterior wings with three round red spots in lieu of the fascia.

I have a variety from Scotland, in which the fulvous band is entirely wanting; and the fore-wings, in lieu of the red markings, have four black spots in white rings.

Epiphron is supposed to be distinguished from *Cassiope* by the black spots having white centres, but the Scotch specimens are as often without them as with these white centres, which, according to Dr. Staudinger, are found in the female. The Scotch specimens are larger than the English, and darker in colour. The fulvous markings are not so much of a band, but would be better described as a series of fulvous spots, divided by the wing rays, and having black middles, sometimes with white centres. Sometimes, however, these marks do form a band, while English specimens occasionally have it divided into spots. There are two other named varieties: *Melampus*, occurring on the Alps, which has scarcely any black spots; and *Pyrenaria*, occurring on the Pyrenees, which is larger than type, and has larger ocelli.

The egg is laid singly, standing on end, on grass stems, and is in shape cylindrical, being twice as long as it is wide, the sides with delicate and regular transverse reticulations, and the shell is slightly glossy. When first laid, it is of a bright yellow colour, but afterwards becomes duller, and is afterwards blotched pretty evenly all over with circular patches of small pale brown dots. (Rev. J. Hellins).

The newly-hatched caterpillars are flesh coloured, with ochreous flesh coloured heads, a faint purplish-grey tinge showing through the skin of their bodies. When older, they become of a grass-green colour, with numerous darker green longitudinal lines shading into the ground colour, and with a well-defined white line along each side in the region of the spiracles, which are brown. It is short and stout, with the swelling in a curve; the head is globular, and the tail as two short spines. It feeds on *Nardus stricta* and other grasses.

The chrysalis is little more than three-eighths of an inch in length, rather thick in proportion, being less dumpy in form than *Hyperanthus*, but more so than *Blandina*. The colour of the back of the thorax and wing cases is of a light green, rather glaucous; the rest of it is of a pale drab.

The butterfly is met with in June and July in swampy places at a considerable height, varying with the locality, and the particular variety of the species. The caterpillars, like those of the rest of the family, hibernate, when small, at the roots of grasses, and feed up in the following spring.

It inhabits many of the mountain ranges of Central Europe, including

some of those in Scotland, the lake district of the North of England, Crough Patrick in Ireland, and the Pyrenees; but from other ranges, such as the Riesenebrige, Black Forest, and Jura, it is entirely absent; and it does not occur at all beyond Europe.

The first notice of the occurrence of this Alpine butterfly in England is from the pen of Mr. Haworth, and is published in the first volume of the "Transactions of the Entomological Society of London," in a brief account of some rare insects announced at various times to the Society, or new to Britain, and read on June 2nd, 1812. After describing it under the name of *Mnemon* (the Small Ringlet), Mr. Haworth goes on to say, "In Musæo Dom. Francillon, a captura Dom. Stoddart," and also informs us that it inhabits Scotland.

Although it has, since Mr. Haworth's time been found in Scotland, yet the specimens he alludes to, were taken, not in Scotland, but in the North of England, on the mountains round Ambleside, by Thomas Stothard, Royal Academician, on the 11th of June, 1809.

In his "British Entomology," Vol. V., published in 1828, John Curtis writes, "The males in froward seasons have appeared as early as the 11th of June; but last year, when Mr. Dale and myself visited Ambleside, they were later, the first being taken the 18th of June, and they did not become plentiful till the 25th. They are found amongst the coarse grass, that cover considerable spaces abounding with springs, on the sides of mountains; they fly when the sun shines, and their flight is neither swift nor continued, for they frequently alight amongst the grass, and falling down to the roots, their sombre colour perfectly conceals them. The females are lighter, and have even been taken in August. We found the males on Red Skrees, a mountain near Ambleside; and Mr. Marshall took them at Gable Hill and Styehed, between Wastwater and Borrowdale."

As it was formerly considered to be a very rare butterfly, the following passage in Stephen's "Illustrations of British Insects," published in 1828, will be read with considerable interest, as showing how long this insect was, from its rarity, but a reputed British species. "It was described by Mr. Haworth, about fifteen years ago, from specimens in the collection of the late Mr. Francillon, to whom they were presented by T. Stothard, Esq., R.A., their captor and the reputed discoverer of the insect in Britain. From the circumstance of so many years having rolled on without other specimens of the insect occurring, its native origin began to be questioned; but the past season has undeniably set the question at rest, through the instrumentality and industry of Mr. Dale, who was furnished with its locality from Mr. Stothard, and accompanied by Mr. Curtis, procured many specimens of the male

from the grassy sides of the mountains in the vicinity of Ambleside. The discovery, of the female is, however, due to an indefatigable collector—and one who disposes of the insects he collects—Mr. Weaver, of Birmingham, who found several of each sex, in different localities in the counties of Westmoreland and Cumberland, during the month of July.”

It was next turned up by Mr. Weaver, in 1844, on one of the Scottish mountains near Rannoch, in Perthshire. The butterflies appeared confined to a spot of level and rather marshy ground, about 150 yards in length and 50 yards in breadth; it was grassy but without heath, and although there was heath all round the neighbourhood, Mr. Weaver did not see a single specimen settle on it. The locality is among rocky mountains, some of which attain an altitude of 4000 feet above the sea, and the spot where the butterflies were found is at least 3000 feet.—“Zoologist.” It also occurs on Ben Nevis and on Ben Lomond, but is not found at a less elevation than 1600 feet.

Mr. Birchall captured a fine series in June, 1854, on Croagh Patrick, near Westport, in Ireland. The locality is about half-way up the mountain on the Westport side, in a grassy hollow, where a little hut is erected for the shelter of pilgrims.

Family DANAIIDÆ.

This cannot, strictly speaking, be called a British family at all, as only a few wanderers of a single species, and that an American one, have been taken in England. One other species, *Danaïs chrysippus*, occurs in the extreme South-east of Europe.

The front pair of legs are rudimentary in both sexes; and the caterpillars possess one or more pairs of long, slender, fleshy filaments.

Although representatives of the family are found on all the Continents, the islands of the Indian Archipelago, and the Pacific Ocean, are most productive of the species.

GENUS XV.—DANAIS.

Boisduval.

DANAIS, a King of the Argives, and brother of Ægyptus; who sailed into Greece, and having expelled King Sthenelus, fixed his habitation at Argos, whence the Grecians were called Danai.—Virg. *Æn.* 2, 5.

All the species of this genus are large, and are generally of pale colours (often fulvous), with black borders, which are often spotted with white. The fore-wings are longer than the hind-wing, and the costa is arched. These

butterflies are distasteful to birds, their tissues being exceedingly tough and elastic, and they are generally abundant wherever they occur. The Australian variety of *Danais Limniace*, was found by Captain King in countless myriads, and is probably the same species as Captain Cook saw in far greater profusion in the neighbourhood of Thirsty Sound, on the 29th of May, 1770, when he found a space of three or four acres covered with millions of them on the wing, and every twig and branch loaded with almost equal numbers at rest. Herrera states "that on one day in June, 1494, there came to the ships of Columbus, then off the coast of Cuba, innumerable butterflies, so numerous that they obscured the sky, and continued passing until night, when a sudden storm of rain destroyed them." These were probably *Danais plexippus*, one of the commonest butterflies in North America, and known to possess immense powers of flight. In the evening and in cloudy weather they are found resting on the stems of herbaceous plants. They are never to be found in the thick parts of the woods and forests, but are common in the open spaces, and prefer meadows and plantations.

DANAIS PLEXIPPUS.

Anosia archippus.

PLEXIPPUS, Linn. Plexip'pus, one of the two uncles of Meleager, put to death by him, for disputing with Atalanta the possession of the boar's skin, which had been given to her.

All the wings have broad black margins, in which are situated two rows of white spots; and very conspicuous black veinings. The ground colour is fulvous, with a rather brilliant reflection. The underside is very similar. It may at once be known from any of our native butterflies by its superior size, being four and a half inches across the wings; and by the yellowish-white spots on the thorax.

The egg is laid singly on the underside of the leaves of various species of *Asclepias*. It is of a pale greenish yellow colour, and its form is compared by Mr. J. J. Walter to one of the projectiles for modern rifled guns, known as Palliser shot.

The full-grown caterpillar is about two inches in length, rather stout, and nearly cylindrical in form. The body is regularly annulated with black, opaque white, and bright gamboge yellow. On the dorsal surface of the third segment is a pair of slender, fleshy, slightly mobile filaments, nearly half-an-inch long, and a similar but somewhat smaller pair on the twelfth segment. It is a handsome and conspicuous creature, feeding quite exposed, and often stripping the *Asclepias* to the bare stalks.

The chrysalis is suspended by the tail among the leaves of its food-plant. It is of a bright translucent emerald green, with minute tubercles of the brightest golden hue. It is very short and dumpy, and abruptly truncate at either end.

Both the caterpillar and the perfect insect emit a faint and peculiar odour, which becomes strong and disagreeable when several caterpillars are shut up in a close box. Like all the *Danaidæ*, the insect in all its stages appears to be distasteful to every living creature, and is very tenacious of life, being known to exist in the butterfly state for fifteen months. In the United States, however, the caterpillar is subject to the attack of a dipterous parasite, *Maxicera archippivora*, Riley.

The original home of *Danais plexippus*, as Mr. J. J. Walker, R.N., informs us in the "Entomologists' Monthly Magazine," for March, 1886, is the American Continent, where it enjoys a very wide range, extending from Moose Fort, in Canada (lat. 50 20 N.), where snow lies on the ground for eight months of the year, to the Amazon region and Bolivia, or (if we regard *Eriippus*, Cram., as a geographical variety merely), to the estuary of the Rio de la Plata. Nearly everywhere throughout this vast region it appears to be abundant, and in Missouri the air is sometimes filled with the butterflies to a height of 300 or 400 feet. These vast swarms usually appear in the autumn, and some of them migrate southwards on the approach of winter.

Of late years this range, great as it is, has extended in a wonderfully steady and rapid manner across the whole breadth of the Pacific Ocean, and far into the Malay Archipelago. It is most abundant and firmly established in the Sandwich Islands, where it was unobserved by the early voyagers. In the Marquesas Islands, the first specimens appear to have been observed about the year 1860. It is found throughout the Samoan, Friendly, and Fiji Islands, being specially abundant in the latter group. It appears also to have reached the North Island of New Zealand, as well as Norfolk Island. In New Caledonia, where it has been long established, it became very abundant some years ago, but is now comparatively scarce, owing perhaps to the destruction of nearly all the food-plant by the caterpillars. We first hear of its occurrence in Australia in 1870, when Mr. Miskin ("Entomologists' Monthly Magazine") recorded its appearance in Queensland in numbers. It also now appears to be firmly established and common in the New Hebrides, Soloman Islands, and New Guinea; and has also been recorded from Celebes and Java. Starting from the eastern coast of America, we find *Danais plexippus* throughout the West Indies, in company with some curious local forms of the genus; and it has long been established in the Bermudas, 650 miles from the coast of the United States.

The first record of the occurrence of *Danais plexippus* in Britain is in 1876 (E. M. M., Vol. xiii. page 107), a specimen having been taken by Mr. Llewelyn, at Neath, in South Wales, on September 6th, of that year. Another was taken at Hayward's Heath, Sussex, on October 17th, of the same year. The recorder, the Rev. T. Crallan, in the "Entomologist" (Vol. ix., p. 264), states that for some two or three years there have been rumours of the appearance of an unusual butterfly in his neighbourhood.

Possibly these were not the first specimens taken in Britain, as probably those recorded by Newman, on the last page of his "British Butterflies," under the name of *Doritis apollo*, belonged to this species, viz., Sir C. Lemon wrote "that he had taken a specimen of *Apollo* in Cornwall, but suggested that it might have been imported with plants in his hothouse." "I beg to inform you that I yesterday met a gentleman who assured me that he saw *Apollo* at Hanwell, about six years ago."—Henry Austin, in "Zoologist," for 1856. "I have been to-day to see the person who took *Apollo*. He was lying on the cliff at Dover, in August or September, 1847 or 1848, when the butterfly settled close to him, and not having his net, he captured it by putting his hat over it. He had not the slightest idea what it was till he saw it figured in some work afterwards."—G. B. Wollaston, in "Zoologist," for 1856, page 5001.

A specimen of *Danais plexippus* is recorded by Mr. Jenner Weir ("Entomologist, vol. xix, p. 12), as having been taken near Snodland, Kent, on September 21st, 1881; but the number seen and caught in 1885 far exceeds all that have been previously noted. A round dozen, at least, have been recorded from our southern counties, Cornwall contributing quite half the number, though Devon, Dorset, and the Isle of Wight have also been favoured with the visits of the imposing stranger.

In 1886, a specimen of *Plexippus* was taken at the end of September in Pembrokeshire, about two miles from the coast; one at the Lizard; one near Swanage, in Dorsetshire; and another at Bournemouth. One was also taken on the 2nd of October in Guernsey.

Although upwards of twenty specimens of this butterfly are recorded as having been captured in South Wales, Cornwall, Devonshire, Dorsetshire, Hampshire, the Isle of Wight, Sussex, Kent, and Guernsey; only three have been reported from the Continent of Europe, viz., one in La Vendee, France, by Mons. Grassal, in September, 1877; one at Gibraltar, in October, 1886; and the other at Oporto, in Portugal, on September 29th, 1886; and some appear to have been observed in the Madeira or Canary group of islands.

It is wonderful to what great distances butterflies and moths are blown out to sea. *Plexippus* has often been seen flying at a great height more than

200 miles from the nearest land; and *Danais chrysippus* has been seen by Mr. Walker, strong on the wing, 700 miles from the nearest land, the coast of Africa. Mr. Jones records the arrival of a vast swarm of the small and and feeble *Terias lisa* at Bermuda, which had evidently crossed more than 650 miles of stormy ocean, from the American coast; and a swarm of *Deiopeia pulchella* has been observed in Mid Atlantic, 960 miles from the Cape Verde Islands, the nearest land from which the moths could have come. Many American birds, not so strong on the wing as *Danais plexippus*, find their way from America to England, resting perhaps, crossing on one of the numerous vessels crossing the Atlantic.

Family APATURIDÆ.

This family has been erected for the reception of a few genera, which have been separated from the Nymphalidæ, to some of which the perfect insects are closely allied, by the peculiar shape of the caterpillar, which are without spines and from their great resemblance to a slug are called *Limaciform*.

It was an Indian species of this family of which Lord Byron sings:—

“As rising on its purple wing,
The insect given of Eastern spring,
O'er emerald meadows of Kashmere,
Invites the young pursurer near,
And leads him on from flower to flower
A weary chase and wasted hour;
Then leaves him, as it soars on high,
With panting heart and tearful eye.”

* * * *

“The lovely toy so fiercely sought
Has lost its charm by being caught,
For every touch that wooed its stay
Has brushed its brightest hues away.”

These lines may recall to our minds other lines also by Byron:—

“Maid of Athens, ere we part,
Give, oh give, me back my heart.”

Moore, also, has introduced these insects amid the splendour of “The Light of the Harem.”—

“And they, before whose sleepy eyes,
In their own bright Kathair bowers,
Sparkle such rainbow butterflies;
That they might fancy the rich flowers
That round them in the sun lay sighing,
Had been by magic all set flying.”

GENUS XVI.—APATURA.

Fabricius.

APA'TURA, a surname of Venus, which she obtained from a trick she played on some giants.—Strabo. xi. 757.

This is a genus of about some forty species, most of which are remarkable for the splendid blue, or rather purple, gloss on the wings of the male. The greatest number of species are South American, but some are found in Asia and in the Malay Archipelago. Only two occur in Europe, and but one in England. The tropical species rarely surpass our own either in size or beauty, and are often much inferior to it in both respects. One other of the family, *Charaxes jasius*, occurs in the South of Europe. The caterpillar differs from that of *Apatura*, by having four horns on the head instead of two; and the hind-wings of the butterfly are furnished with two rather long tails.

The body and antennæ of *Apatura* are thick, the eyes smooth, and the hind-margin of the fore-wings concave.

APATURA IRIS.

Purple Emperor.

IRIS, Linn. Iris, the Rainbow, personified in Greek Mythology, into the messenger of Juno, a young woman dressed in a robe of many colours, so admirably beautiful that she has been justly called the daughter of Thaomas, a poetical personage, whose name is derived from a Greek word that imports to admire, and what is more admirable than that Bow, which is formed by drops of water in a cloud opposite to the sun.

The male butterfly above has that splendid glow of changing purple, which gives him his name of the Purple Emperor. Both sexes are of a blackish-brown on the upperside, and have a white band commencing at the middle of the fore-wings, and crossing the hind-wings, at the inner margin. There is also a curved row of white spots from the costa of the fore-wing to the anal angle, and three smaller ones near the tip. Both wings have a few paler mottlings, especially at the hind-margin, where they form a narrow irregular band. There is a black eye-like spot in an orange ring near the anal angle of the hind-wings. The underside is varied with different shades of grey, brown, black, and tawny, the white markings the same as on the upperside; near the hinder angle of each wing is a black eye-like spot with a large blue pupil in a tawny ring. The width across the wings varies from two inches in the male, to three and a quarter inches in the female. This species varies

by having the white band more or less suffused and hidden by black scales. When the band is altogether wanting the variety is called *Iole*.

The egg is of great size, its shape cylindrical, of about equal height and diameter, adhesively fixed in an upright position on its flat base, domed on the top, its surface strongly ribbed, the ribs varying in number from twelve to fourteen. When laid it is of a yellowish olive green, having near the base a zone of purplish black, the green portion semi-transparent, the surface glistening. Afterwards the lower portion changes to a paler green, and the upper to a black.—Buckler.

The caterpillar when just hatched has a large rounded head, and two distinctly separated anal points; its colour is a light dirty greenish-yellow, with three faint darker lines down the back, the head of a dark chocolate brown. When full-grown and stretched out, the caterpillar attains the length of two inches, is rounded, and tapering towards both head and tail, the anal segment being prolonged into two points, instead of the usual claspers, and two horn-like processes (not retractile) spring from the crown of the head. It is covered with warts, and is of a pale green colour, with a yellow spiracular line, and oblique yellow lines on the sides. It is totally different from any other caterpillar we have, and its shape is very much like that of the common black slug (*Arion ater*), but not so large. When full-fed, the caterpillar spins a large quantity of silk on the underside of a leaf of willow or poplar, on which it feeds, and then attaches itself to it by the anal pro-legs, and slightly with the anterior pair of ventral ones, and remains motionless for about four days, it then relaxes its hold by the ventral pro-legs and hangs down, suspended only by the anal pair, and within an hour the transformation to a chrysalis is complete.

The chrysalis is of a very pale whitish-green, with whitish oblique lines on the sides, also with nervures on the wing-cases and dorsal ridge. The form of it is broad and flattened on the sides, the outline of the abdomen and wing-cases nearly straight, while that of the back forms a very obtuse angle, having a thin and rather sharp ridge, projecting to a point about half-way, from which it slopes off to the anal point and to the head, which has a short, pointed, flattened, forked pair of appendages.—Buckler's "Larvæ of British Butterflies."

The Purple Emperor is to be found on the wing in July, and the eggs are laid the same month. They hatch in about ten days, and the caterpillars feed slowly until they retire for the winter. They do not conceal themselves, but remain exposed. In May or June they are full-fed, and remain about a month in the chrysalis state. It is found in Central Europe, in France, Italy, and Southern Russia, but does not seem to extend further. It is unknown

in Ireland, Scotland, and the Isle of Man, and its range in England is restricted to the oak woods of the midland, eastern, and southern counties, coming up on the east coast as far as Lincolnshire, and extending as far west as Torrington, in North Devon, and the Forest of Dean, in Monmouthshire. In the counties of Dorsetshire, Wiltshire, Bedfordshire, Berkshire, and Middlesex, none have been seen for a great many years. This beautiful butterfly is said to be only found in oak woods. Why this should be so, when the caterpillar feeds on poplar and willow, has not been explained. It is fond of disporting itself on the tops of the loftiest trees, and the old mode of capturing him was by a ring net, fixed at the end of a pole some twenty or thirty feet long, and so sweeping him off as he sat on his leafy throne, or in one of his evolutions, when he quitted his seat for a turn in the air. As this method of capture proved rather unsuccessful, the length of the implement making it rather an unwieldy one, both in use and for carriage to the place of action; other means have been tried with more or less success, to induce the monarch to descend from his lofty throne. A sod, or something similar flung into the air, has sometimes brought him down, whether from curiosity or indignation at the intrusion. Another plan is to take advantage of his royal taste for game, and so potent is the attraction of the *haut-goût* for the royal palate, that if any animal, or part of one, not too recently slaughtered, be suspended near the well-known haunts of his majesty, ten to one but its savour will bring him down to earth to taste the luxurious morsel, and so engrossed does he become, that he may be swept off with the net without difficulty. Cowardice is not one of his attributes, and if he has formed a preference for any special spot, he will risk loss of liberty and life rather than forsake it.

The first account we have of the Purple Emperor being a British species is in John Ray's "*Historia Insectorum*," published in 1710. He informs us that it was taken in the month of July, in the neighbourhood of Heveningham Castle, Essex, in the year 1695, by D. Courtman.

In his "*English Moths and Butterflies*," published in 1773, Benjamin Wilkes writes, "The Purple Emperor, or Emperor of the Woods. Neither the caterpillar nor chrysalis of this charming fly has yet been discovered, although sought for with the utmost diligence several years past. The butterfly appears at the end of June and beginning of July, and may be taken in Coomb Wood in Surrey, about Westram in Kent, and in other places. It flies like a hawk, delighting to soar aloft and skim in the air. When it settles it is usually on some extreme part of the oak, hazel, or ash tree; and what is very singular, I myself have seen twenty of them taken on the same branch, one after another, for although the fly seems to be extremely wild

whilst on the wing, yet, when settled, you may lay your net over it with little trouble."

Moses Harris, in his "Aurelian," published in 1775, writes "On the 26th of May, in the year 1758, Mr. Drury, an ingenious Aurelian, in searching for caterpillars, beat four off the sallow near Brentwood, in Essex; which in their shape and motion differed from any hitherto discovered, being furnished with two horns, of the same hard substance as their heads, resembling the telescopes of a snail, and in their progressive motion seeming rather to glide along like that animal, than crawl as most caterpillars do. Struck with the oddity of their appearance, and knowing I was about a work of this kind, he was so obliging to give me one of them, which I fed on sallow, and found, that excepting the above-mentioned particularities, it greatly resembled the hawk tribe, having a point or horn in its tail, its body being green, beautifully frosted with minute yellow specks, having likewise seven diagonal lines of a pale yellow on its sides, and when at rest generally sitting in the posture these caterpillars do. On the sixth of June, at night, it changed into a chrysalis of a beautiful pea green, with a bloom of pearl colour on it, and what is more remarkable, the diagonal lines, which crossed the sides of the caterpillar, are seen in this state, though the colour is fainter. This being the chrysalis of one of the finest flies in this part of the world, Providence seems to have taken peculiar care for its preservation in this defenceless and tender state, by making its colour so like the leaf it hangs on to, that it might escape the search of a very nice eye. In examining that part of the chrysalis which contains the wings of the fly, I was confirmed in my opinion of its being the Purple Emperor, by observing that the square points of the under wings projected beyond the rounded extremity of the upper ones; this conformation of the under wing being peculiar to that fly. On the 22nd, at night, a few dark spots were visible on the wings, and the next day I found more on different parts of the body, which spread gradually till the whole fly appeared black through the transparent chrysalis, and about eight in the evening, to my unspeakable pleasure, it produced the male Purple Emperor. Here I hope I may be indulged in expressing my gratitude to my generous and worthy friend Mr. Drury, for the discovery of the caterpillar of one of the most beautiful flies in the Universe, and which had hitherto eluded the search of the most skilful and industrious Aurelians. The colour of this fly is changeable, according to the different lights it is viewed in. For in one it appears of a sooty black, and in another the eye is suddenly dazzled with a resplendent glow of fine purple; so that by frequently turning the fly into different positions, the colours play and shift through all the gradations, from a sooty black to a bright purple, in such a

manner as to entertain the eye with a delightful and amazing variety. The female differs little from the male; being of a sooty black, but without the least tint of purple. Mr. Nixon took a female, which laid five eggs on the 21st July, three of which produced caterpillars the 6th of August. This gentleman endeavoured to raise them, and tried them with several sorts of growths, but the sallow being omitted, they all perished. From this we may be certain, that they are in the caterpillar state during the winter. It is a very difficult matter to catch them in their flight, for they generally hover like a kite about very high oak and ash trees; and though when they remove from one high tree to another, they skim lower than at other times, they do it with such rapidity, that the eye can scarce follow them. They delight to settle on the oak and ash, creeping from one leaf to another to sip the dew, at which time they may be easily caught. For this purpose you must be provided with a pole fifteen feet long, with a net at its upper end, the mouth of which, when you have covered the fly, is drawn together by a string, as a purse is. These flies are found in the greatest plenty at Coomb Wood, near Kingston-upon-Thames."

In the first volume of his "Natural History of British Insects," published in 1792, Donovan writes, "The *Papilio iris* is esteemed among the beautiful, and placed with the rare, of the English Lepidoptera. It derives the title of Purple High-flyer, as it very rarely descends to the ground; except in some few instances, and even those instances have been after a strong wind or heavy rain. The tops of the loftiest forest trees afford it an asylum, and in the caterpillar and chrysalis state, it is preserved from the wanton cruelty of man, by the almost inaccessible height of its habitation. They feed on the sallow (*Salix caprea*), and the caterpillars are obtained by beating the branches of the tree with a pole twenty or thirty feet in length; it is then, but a necessary precaution to cover the ground beneath with large sheets to a certain distance, or the insects which fall, will be lost amongst the herbage. The great difficulty and trouble to rear the caterpillars when found, and greater difficulty to take the fly, has stamped a valuable consideration on it, and particularly so when fine, and a high price is but esteemed an adequate compensation for it, in good preservation."

Haworth, in his "Lepidoptera Britannica," 1803, gives a very interesting account. "This Purple Emperor of the British oaks is not undeservedly the greatest favourite of our English Aurelians. In his manner likewise, as well as in the varying lustre of his purple plumes, he possesses the strongest claims to their particular attention. In the month of July he makes his appearance in the winged state, and invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which, on sunny days, he per-

form his aërial excursions ; and in these, ascends to a much greater elevation than any other insect I have ever seen, sometimes mounting higher than the eye can follow, especially if he happens to quarrel with another Emperor, the monarch of some neighbouring oak : they never meet without a battle, flying upwards all the while, and combating with each other as much as possible ; after which they will frequently return again to the identical sprigs from whence they ascended. The wings of this fine species are of a stronger texture than those of any other in Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists. The Purple Emperor commences his aërial movements from ten to twelve o'clock in the morning, but does not perform his loftiest flights till noon, decreasing them after this hour, until he quite ceases to fly, about four in the afternoon : thus emulating the motions of that source of all his strength—the sun. The females, like those of many other species, are very rarely seen on the wing : the reason of which is both interesting and but little known. It is their being destitute of a certain spiral socket, which the males possess near the base of the main tendon of their upper wings ; which socket receives and works a strong elastic spring, arising from the base of the underwings, thereby enabling them to perform a stronger, longer, and more easy flight than it is possible for the females to do. Moses Harris, I believe, was the first who discovered and published figures of this socket and spring, in an ingenious but little known work, called “An Essay preceding a Supplement to the “Aurelian,” wherein he tells us ‘the females are not met with on the wing so often as the males, some of which are very plentiful, but the females rare to be seen, of which the Purple Emperor is one capital instance. I have been informed Mr. Whitworth caught thirteen in one day, and but one female amongst them.’ Harris, in the above essay, has divided the genus *Papilio* ingeniously enough into sections or families, from the number and position of the tendons in the wings, in a manner somewhat like that of my friend Jones in the first volume of Linn. Transactions. In the same volume is a further and fuller account of the socket and spring, by Esprit Giorna, of Turin.

In the first volume of the “Entomologist,” published in 1842, Mr. Hewitson writes, “During the months of June and July, 1839, which, though at home very wet and unfavourable to Entomology, were on the Continent dry, hot, and sunny ; I spent most of my time in the forests, which border the town of Kissingen in Bavaria, and had an excellent opportunity of observing the habits of the butterflies, with which the woods abound. Amongst them none were more conspicuous, and few more abundant than the Purple Emperor. At the end of a long and very rapid flight, at the outskirts of the wood, the

Emperors would enter its more shaded recesses, and settling wherever moisture was to be met with, would protrude into it their long trunks, and were soon heedless of my approach. I found a flat bagless net by far the best when their wings were thus expanded, allowing them no room for motion. Instead of employing their sunny hours in sipping sweets, and

"Gathering honey all the day
From every opening flower,"

their delight was to extract the juices of each swamp-hole, and the filthier the puddle the more it seemed adapted to their taste. Seating myself near one of these, I selected the finest specimens as they settled down, and watched them till they closed their wings; so intent were they on their occupation that they would usually permit me to take them between my finger and thumb. They were so numerous that I had no less than seven under a small net at one time, and even showed but little anxiety to get away. Amongst them were several with more of red than purple on their upper-wings, but I believe these were only varieties. I was surprised to meet with so few butterflies that were not well-known friends; ten species only. The White Admiral, so justly noted for its graceful flight, was there in great beauty and abundance; the Queen of Spain and Arion Blue were not uncommon. Upon a grassy bank of very limited extent in the centre of the forests, I saw thirty fine species of our British butterflies. I again spent the same months of 1841 at Kissingen, and was sadly disappointed, when the weather would permit me to visit my former haunts, to find them deserted by most of the more brilliant butterflies; indeed, so wet was the season, that the Purple Emperor, the White Admiral, and many others never appeared at all."

In the second volume of the "Entomologists' Weekly Intelligencer," Mr. Sturgess writes thus, "You may judge how agreeably surprised I was to learn, one scorching day in July, that the Purple Emperor had been caught regaling himself upon the imperial delicacies of dead stoats, weasels, &c., laying upon some low bushes. I had the satisfaction of seeing within the space of an hour three Emperors descend from their thrones to breakfast upon the delicious viands." A few pages further on in the same journal Mr. Sturgess again reports progress thus: "On the 11th July three specimens, on the 13th, six; on the 14th, seventeen; on the 15th, twenty; on the 16th, eight; on the 17th, six; on the 18th, fourteen; on the 23rd, three; and on the 24th, three; thus making a total of eighty specimens in nine days. The experiment was not tried in the same place as last year, but in a wood of some thirteen acres, where the Emperor appeared to be more plentiful: the keeper kindly consented to nail a portion of rabbit skin and wing of a bird to the end of a house, a similar bait was also placed on a lime heap about a dozen

yards distant. Here, Mr. Newman observers in his "British Butterflies," is sufficient evidence of the kind of delicacies best adapted to the imperial palate; an adaption which, however, I may regret, I am unable to dispute. I would gladly have depicted the Emperor of our insect world as banqueting on ambrosia, an esculent of which, by the way, I have no clearly defined idea, or quaffing the nectar of flowers, but this would not be truthful: in this, and other cases of depraved appetite, we can only lament a fact as incontrovertible as it is unsatisfactory, repeating the somewhat trite, but once sapient axiom, *de gustibus not est disputandum*. I am able, however, to assign his imperial majesty one instance of more refined taste—Dr. Knaggs records in the fourth volume of the "Entomologists' Weekly 'Intelligencer,'" that he succeeded in decoying an Emperor by painting the trunk of a tree with sugar, and thus secured him."

In the "Zoologist," for the year 1852, the Rev. W. Bree writes, "Early in the morning, and on dark, gloomy days, I have several times seen to the greatest advantage, the most splendid of all our butterflies at Barnwell and Ashton Wolds, sailing along the ridings, and settling upon the ruts and other moist and shady spots, often assailed by the impudent attack of *Janira* and *Galathea*, which appear to be the foremost in attacking him, when he thus condescends for a while to leave his lofty oak to visit the regions inhabited by his less honourable kindred. The partiality which this insect exhibits for individual sprigs of particular trees has often been remarked upon by entomologists, and is certainly confirmed by the Emperor of this neighbourhood. And it should seem as if this partiality were, if I may use the expression, hereditary; for upon a certain sprig of a small ash tree, by the side of one of the ridings in Barwell Wold, Northamptonshire, I have each year since 1847 succeeded in capturing the Purple Emperor; and in all instances, upon the capture of one, the identical sprig has in the course of a few days been invariably occupied by another Emperor."

In the "Entomologist" for 1882, Mr. Anderson, writing from Chichester, records a singular habit of this butterfly, thus: "It seems to be the invariable habit of *Apatura iris*, upon first emerging from the chrysalis, to cling to the empty case with the head uppermost for five or six hours, and then to reverse the position, and still clinging to the case remain with head down and wings upwards for a similar time. For the first attitude it is easy to account, for the wings could not well be developed in any other way, but why the insect should turn round and continue so long in the second position I cannot understand."

The Purple Emperor does not seem to be the only one of the genus which has a fondness for puddles, for Mr. Goss, in the "Entomologist" for 1880,

records *Apatura agathina*, Craner, sent from Coerientes, and also from Paraguay, in South America, as being accredited with a proclivity for stagnant puddles and wet mud, like its imperial relative here in England.

In the same volume, *Apatura iris* is reputed as being less rare than usual in the New Forest, and also in Sussex, the var. *Iola* being amongst the number taken.

In the "Entomologist" for 1881, Mr. Sabine writes, "I have taken this season, numerous specimens of *Apatura iris* in our county of Kent. Amongst them is a large and beautiful example of the black variety *Iola*. I captured another on the same ground four years ago."

It was figured by Petiner in 1702, under the name of *Oculatus* or Mr. Dale's Purple eye.

Perhaps I cannot conclude this prolonged account of the most noble of our British butterflies, better than by quoting some of the verses written on Sir Joseph Banks, President of the Royal Society. Peter Pindar, the ingenious author of the poem, introduces Sir Joseph Banks as in pursuit of butterflies in the following manner:—

SIR JOSEPH BANKS AND THE EMPEROR OF MOROCCO.

A President, in butterflies profound,
Of whom all Insectmongers sing the praises,
Went on a day to catch the game renown'd,
On violets, dunghills, nettletops, and daisies.

But first (so pious is Sir Joseph's nature),
He thus address'd the butterfly's Creator:

"O Thou, whose wisdom plann'd the skies,
And formed the wings of butterflies,
Attend my humble prayer!"

* * * *

In rush'd Sir Joseph at the garden door,
Knock'd down the gard'ner, what could man do more,
And not content with feats like these,
He stumbl'd o'er a hive of bees,
Out came the swarm, wondering what
Had brought destruction to their very doors,

* * * *

"He's gone! he's gone!" Sir Joseph cried,
"Whose gone?" the gard'ner enquired,
"The Emperor, I see him no more!"

Family NYMPHALIDÆ.

Their wings with azure, green, and purple gloss'd,
Studded with colour'd, with gems embossed,
Inlaid with pearl, and marked with various stains
Of lively crimson through their dusky veins.

MRS. BARBAULD.

GENUS XVII.—LIMENITIS.

Fabricius.

LIMENITIS, a Greek word signifying harbour keeping, an epithet applied to several divinities, but especially to Diana.

A genus of about thirty species, some of which are of considerable size. They are natives of Europe, Asia, the Indian Islands, and North America. Three only occur in Europe, and but one in Britain.

Limenitis somewhat resembles *Apatura* in appearance, but may be discriminated by the rotundity of the hinder margin of the fore-wings, and pubescence of the eyes and palpi; the club of the antennæ is more slender than in *Apatura*, and not arcuate and sub-compressed, as in *Hipparchia*; and the males are without that beautiful purple gloss so characteristic of those of *Apatura*. The caterpillars are totally different, being elongate, with obtuse spines on the back, and bundles of hair on the sides. The chrysalids are sub-angular, with beaked head cases.

LIMENITIS SIBYLLA.

White Admiral.

SIBYLLA, Fab. Sibylla, one of the Sibylls, divinely inspired women, who composed the Sibylline verses, offered to Tarquin the Proud, King of Rome.

This elegant butterfly is one of those in which the choicest ornamentation is bestowed upon the under surface. Above a dark black brown tint, banded and spotted with white, is all that meets the eye; but beneath there is a piece of the most exquisitely harmonious colouring, though the hues that compose it are still of a subdued and secondary nature—silvery blue, and golden brown blended with a lighter brown and black, are placed in vavacious contrast with bands and spots of pure silvery white.

The width across the wings varies from two inches in the male to two and a half inches in the female.

This species has no named varieties, and is tolerably constant to the type, except that the central band, like that of the variety *Iole* of *Apatura iris*, is more or less broken by the darker ground colour. A figure of this variety, by the Rev. W. Bree, is in the fifth volume of "Loudon's Natural History."

Mr. Bree observes, "The peculiarity consists in the wings above being entirely of a sooty black; and, consequently, destitute of the white markings, and the elegant white band, which form so striking a character in the ordinary specimens of *Sibylla*. A few lighter spots, however, are visible here and there, both on the anterior and posterior wings; just serving to trace out, very faintly and obscurely, the mere rudiments, as it were, of the usual white marks and fascia. The cilia are white, as in other specimens. On the under surface of the wings the white fascia is also wanting, and the spots and markings are far less numerous and distinct than usual. The colouring, likewise, is less brilliant, the tints being blended together and softened into each other, in a way which it is not very easy to describe in words.

In Mr. Bond's cabinet is a variety in which not a trace of the usual markings is to be found on the upperside, an uniform sooty black being diffused over the whole surface. The underside is equally abnormal.

The egg is something the shape of an orange, only flatter at the poles, and has been compared to those sea-urchins or sea-hedgehogs which are found on the sea beach, and are to be seen in the window of every shell shop.

The caterpillar is of a pale delicate green, with numerous white dots, and branched purplish red spines, two on each segment, except the second and thirteenth; on the third, fourth, sixth, eleventh, and twelfth segments these spines are long: on the fifth, seventh, eighth, ninth, and tenth they are short; there are also four very short spines or bundles of hair on the thirteenth. The colour of the caterpillar becomes lighter as it approaches the spiracles, which are white encircled with black, and are placed just above a white spiracular line, in which, beneath each spiracle, is a bright yellow blotch; above the spiracles is a broad purple stripe; the head is pink, marked with brown, covered with white dots, and surrounded with spines; the legs are of an obscure brownish green, with claspers of a paler shade, and pink tips.—Wilson's "Larvæ of British Lepidoptera."

The chrysalis is very angular, and its wing cases very projecting, the dorsal surface of the thorax rises to a prominent ridge, and a little beyond it is a flat, round, and very projecting process on the back, and from thence to the anal tip the abdomen is slightly sinuous, and therefore hangs a little on one side; two flat-forked processes project from the head. Its colour at first is a greenish white, but it gradually darkens, and in a few days the thorax and wing-cases are deep olive green, the centre of the back of the abdomen bright apple green, its tip and underside being dark brown, which forms on the back a broad band, including the flat circular prominence at its termination. The hare's ear-like projections at the head are also dark brown, the nervures of the wings can be seen distinctly; the portions that appeared

at first quite white have now been transmuted into metallic adornments; a brilliant golden streak divides the brown colour from the green of the wings, commencing on each side of the back of the thorax, and a golden spot is seen on each side of the tip of the tail, these silvery spots decorate the underside of the abdomen, and its prominences are embellished with similar spots and streaks both above and beneath.—“Buckler’s Larvæ.”

The butterfly emerges from the chrysalis at the end of June, and continues on the wing during July. Mr. Newman, in his “British Butterflies,” observes: “In July the female is seen hovering over the thickest parts of our tallest copses, wherever the stems of the honeysuckle are imbedded, like petrified snakes, in the upright stems of the hazels, and the foliage of that sweet climber which has surmounted the hazel spray, and whose blossoms are gaping wide in the sunshine diffusing their delicious fragrance through the summer breezes. The actions and movements of a female butterfly when engaged in the maternal duty of oviposition, are very different from her ordinary gait when sailing over the opening blossoms of the bramble in company with friends, lovers, and kinsfolk. It is evident to the eye of the naturalist that she is now on weighty affairs of business; there is no time lost, none of those flirtations and love-chases so much admired and so glowingly described by our predecessors in the study of entomology. Her flight is slow, flagging, flapping, and only from leaf to leaf. She selects with unerring discrimination the leaves of the honeysuckle, even when surrounded and apparently half-smothered, with the foliage of the hazel, and lays a single egg on the upper surface of a leaf; she then flutters off to another, then to another, never tiring, never hesitating which leaf to choose, but always directed by an unfailing instinct to the honeysuckle, and always avoids those leaves on which an egg has been deposited.”

“The little caterpillar comes out of the egg in about fourteen days after it is laid, and toddles to the very tip of the leaf before it begins eating, and then it nibbles away day after day, eating the green part, and leaving only the mid rib sticking out like a bristle, and always after a good meal of leaf it goes to the very point of this bristle, and there rests while its meal digests and while it acquires strength for future attack on the same leaf. Day after day the alternate processes of eating the leaf and resting on the tip of the bristle-like mid rib continue, until three-quarters or more of the leaf has been eaten, and then it knows that its devouring duties for the year are over. We all know that the leaves of the honeysuckle are deciduous, and in the course of nature would fall off before winter; this, however, would not suit the requirements of the juvenile caterpillar, which, having once fallen to the ground with the fallen leaf, would inevitably perish. To prevent this falling is

absolutely necessary to the existence of the caterpillar, and therefore to the preservation of the species; how then is this to be accomplished? The caterpillar, by spinning a number of silken threads wound round and round the twig, and round and round the leaf stalk, fastens the leaf stalk to the twig to which it is still attached. The next process is to make a winter habitation of that portion of leaf that still remains uneaten, the corners of this uneaten portion are fastened tightly together, and then the edges are united, these operations being effected by means of silk spun from the mouth; the work is then finished, and the little caterpillar is laid up for winter quarters inside his hammock, the bristle-like mid rib of the leaf curling over it like a tail. Now the process of fastening the leaf to the twig by silken cables has done nothing to prevent the natural dehiscence of the leaf stalk at its base, so that this inevitable process takes place at the appointed time, and then the little cot, instead of standing erect falls as far as the cables will permit, always less than half-an-inch, and rocks to and fro all the winter, lulling the infant caterpillar to sleep, and keeping him asleep for six consecutive months; rain, snow, ice, wind, and all the vicissitudes of our winter, have no power to injure or even to awaken him; hung aloft in his little cradle he rocks in comfort and security, and rides out the roughest storm without a thought of harm. In April he wakes up. The same increase of temperature which poets tell us rouses 'the torpid sap detrued to the roots'—a very apocryphal doctrine, by the way, as the change of temperature is more likely to be felt in the air than on the earth: however, the same change of temperature which compels the leaf buds to burst, also resuscitates the little caterpillar; he wakes up, crawls out of his hammock, but goes no further than to the upper side of the twig immediately above the aperture he has just quitted." At this time he is about three lines long. His first proceeding, Mr Buckler tells us, is to cast off his winter's coat, and accordingly he attaches himself to a spinning of silk on a twig, and by degrees crawls out of his old skin, which is left adhering to the silk, not shrivelled up, but looking still much like a caterpillar. He now no longer confines himself to the tip of the leaf, but feeds away, with all the voracity which a winter's fast may be supposed to have engendered, during nearly the whole of April and May, and by the beginning of June is full fed. When full fed he spins a silken web over the under surface of a leaf of the honeysuckle, thickened into the form of a pad on the mid rib, and attaching himself to this by the anal claspers, suspends himself in a curved position waiting for the change to a chrysalis. He remains motionless for three days, rapidly becoming paler. In the course of the third day the creature seems to wake up, unbends his head, swings himself to and fro a few times, then stretches himself downwards in a

long and attenuated line, which causes a rupture of the skin close to the head; the skin then is seen slowly to ascend, exposing the bare and soft shining parts below, from which a flat and forked pair of horns grow out perceptibly as one beholds this wonderful process; the skin continues to glide slowly upwards; and as the soft parts become exposed they are seen to swell out laterally, and assume the very singular projections of the chrysalis, the skin of the old head, gliding up the body, marks the progress of the disclosure, as the colour of the old and new surfaces are at this time alike, but the new is rather more shining and semi-transparent; occasionally, during the bulging out of the soft parts, a kind of convulsive heave or two occurs, but otherwise it remains still, until the creature is uncovered as far as the ninth or tenth segment; it then curves its anal extremity by a sudden twist laterally, and in a moment dexterously withdraws the tip of the anal segment from the claspers by an opening on the back of the skin at that part. At this critical moment one has time to see that the naked, shining point, is furnished with black hooks, and to expect its fall, but in another moment it has forcibly pressed the curved tip with its hooks against the stem, close to its previous attachment of the anal claspers, which have proved strong enough for the occasion. The creature now seems endowed with wonderful power and vigour; it swings boldly to and fro, and undulates itself as if to gain longer swings, when presently the old skin that remains is seen to burst away and fall off, the chrysalis gradually becoming quiescent. The entire metamorphosis, from the first waking to the last movement, occupies nearly seven minutes.

The White Admiral occurs throughout Central Europe, and is also found in Northern Asia, but as it frequents woods is always local. It is unknown in Ireland, Scotland, and the Isle of Man, and its range is restricted to the woods of the Eastern and Southern counties, coming up on the east coast as far as Lincolnshire, but is not found west of Dorsetshire, and scarcely extends to the Midlands. It is distinguished for its exceedingly graceful flight, which is only excelled by that of the Purple Emperor.

The first account we have of the White Admiral, being a British species, is in John Ray's "*Historia Insectorum*," published in 1710. He informs us that it was taken in Essex, not far from the town of Tolesbury, by D. Morton, and sent to him on July 11th, 1695.

In Petiver's "*Papilionum Britannicæ Icones*," 1695, we read "White Admiral. Found about Dullidge and Wickham, near Croyden, as also at Henly-upon-Thames."

Wilkes, in his "*Aureleian*," informs us "That the White Admirable Butterfly is to be taken about the 20th of June, in Coomb Wood."

Lewin, in his "British Insects," 1795, writes "This insect appears on the wing about the 24th of June, and is not uncommon. It frequents the south sides of woods and lanes near them; and may be readily taken as it is feeding on the various flowers then in bloom, before nine o'clock in the morning, after which time, as the sun grows hot, it sports and flies about with great swiftness, frequently settling on the tops and sides of high trees. It is very extraordinary, that, though this fly is an inhabitant of almost every patch of wood in England, neither the greatest pains taken, nor accident, have yet discovered the caterpillar. A friend of mine once found two chrysalides, suspended by the tail on different parts of a low honeysuckle bush, in a retired part of a wood; both of which produced fine specimens of this butterfly the latter end of June. The chrysalis, as he described it, was hog-backed, with the resemblance of two rows of knobs on the back, and of a reddish brown colour."

Donovan, in his "Natural History," vol. 8., published in 1799, writes "The White Admirable Butterfly feeds upon the honeysuckle, and is found in the months of June and July, in the skirts of woods; its habits is much the same as that of the Red Admirable, but it is by no means common. This has hitherto been deemed the *Papilio Camilla* of Linnæus, though it differs in a slight degree from the descriptions and figures of authors who describe only German or Swedish specimen of it. In the late editions of the *Systema Naturæ*. *Camilla* is described with *Sibylla*, a *Papilio* nearly allied to it, but which Linnæus considered as a distinct species; his description of *Camilla* expressly saying 'angulis ani rubro.' The angulis ani of *Sibylla* not being of a real colour, removes it from the English species. Fabricius is of a different opinion. We consider the English Admirable as the true *Camilla*, and that *Sibylla* not *Camilla* is the Austrian species; it is much darker on the upper surface, and has a row of shining blue spots all round the wings: the base of the posterior wings, beneath silvery and without spots, as Fabricius describes his *Camilla*. Our insect on the contrary has a row of blue spots on the upper surface, but a red spot at the inner angle of posterior wings; the base of the lower wings are also silvery beneath, but has black spots upon it. They differ in many other respects: these alone determine them to be two species, and ours to be the *Camilla* of Linnæus. We have inspected the drawings of Mr. Jones, from which Fabricius describes most of his *Papiliones*, and are confirmed in our opinion."

In his "Lepidoptera Britannica," published in 1803, Harworth writes, "The graceful elegance displayed by this charming species when sailing on the wing, is greater perhaps than can be found in any other we have in Britain. There was an old Aurelian of London, so highly delighted at the

inimitable flight of *Camillia*, that long after he was unable to pursue her, he used to go to the woods, and sit down on a stile, for the sole purpose of feasting his eyes with her fascinating evolutions."

Mr. Haworth goes on to say "The following admirable lines of Pope, Virgil, and Dryden, although not all of them exactly necessary, to elucidate this subject, I cannot refrain from transcribing in this place":—

"These equal syllables alone require,
Tho' oft the ear the open vowels tire,
While expletives their feeble aid do join,
And ten low words oft creep in one dull line,
Soft is the strain when zephyr gently blows,
And the smooth stream in smoother numbers flows ;
But when loud billows lash the sounding shore,
The hoarse rough verse should like the torrent roar ;
When Ajax strives some rock's vast weight to throw,
The line too labours, and the words move slow ;
Not so when swift Camilla scours the plain,
Flies o'er the unbending corn, and skims along main."

POPE.

"Vel mare per medium fluctu suspensa tumentis,
Ferret iter, celeres nec tingeret æquare plantas."

VIRGIL.

"She swept the seas, and, as she skimm'd along,
Her flying feet unbathed on billows hung."

DRYDEN.

"In its beautiful flight," observes the Rev. Revett Sheppard, M.A. (of Wrabness, in Essex, a most intelligent and scientific naturalist, in Miss Jermyn's "Butterfly Collectors' Vade Mecum," second edition, published in 1837), "when it skims aloft it rivals the Purple Emperor, which it strongly resembles in appearance. It seems, however, unlike the latter, to avoid the sunbeams, for it frequents the glades of woods, where it rapidly insinuates itself by the most beautiful evolutions and placid flight through the tall underwood on each side the glades, appearing and disappearing like so many little fairies."

Mr. Newman, in his "British Butterflies," 1871, observes that we are indebted to Mr. Hunter for the first description of the caterpillar and chrysalis of the White Admiral from English specimens; it was published in the "Zoologist," for 1851. The descriptions by Curtis and other British authors, copied from Hubner, refer to another species (*Camilla*) not yet found in Britain; the error originated in the fact that Haworth applied the name *Camilla* by mistake to our English insect. A second and much more detailed description of the caterpillar, by M. de la Chaumettee, is published in the same volume, and a description of the caterpillar of *Camilla* is given to show

the difference between the two species ; but both descriptions are from Swiss specimens.

Limenitis camilla is, in Switzerland, by far the commoner species of the two, and generally frequents gardens ; whilst *L. sibylla* confines itself to open places in woods and forests.

GENUS XVIII.—VANESSA.

Fabricius.

VANESSA, probably from Swift's poem "Cadmus and Vanessa," in which the Dean (Decanus) tells the story of his love for Esther (Essa) Vanhombrugh. Sodoffsky proposes Phanessa, from Phanees, a Neo-platonic name for the God of Love.

This genus contains the most vigorous and active of the British butterflies, which are no less distinguished by their boldness than by their superior size, and by the gaiety of their colour. Indeed one species, *Antiopa*, with its rich chocolate coloured wings, bordered with white or yellow, offers a character almost unique in the Diurnal Lepidoptera ; and the same may almost be said of *Io*, which, its richly coloured wings, so aptly described by the poet Spenser—

"The velvet nap which on his wings doth lie,
The silken down with which his backe is dight,
His broad outstretched horns, his hayris thies,
His glorious colours and his glistening eies,"

renders one of the most beautiful butterflies of the northern zone. Not far behind, again, is *Atalanta*, in her scarlet robes of aldermanic dignity. It also contains that singularly shaped species *C-album*, which the rugged and jagged appearance of its wings sufficiently distinguishes from every other British species : indeed wings indentated in this remarkable manner are rarely seen in any insects, those from foreign countries not excepted.

Their geographical range is extensive, and the species of the Old World are, to a certain extent, represented in the New World ; and three species *Cardui*, *Atalanta*, and *Antiopa* seem to be common to both hemispheres. *Antiopa*, generally so rare in Britain, though it has sometimes appeared in numbers is common almost throughout Europe, and, in America extends from Hudson's Bay to the Rocky Mountains ; and southwards to the mountains of Mexico. *Cardui* has, perhaps, a wider geographical range than any other butterfly, being found throughout the whole of Europe, Asia, and Africa ; and in the New World has been met with from Hudson's Bay to within ten or twelve degrees north of the Equator. It is also found in the

Polynesian Islands, Australia, and New Zealand, and apparently all over the world, except in South America.

All the species hibernate, some in a dark corner of a house, others in hollow trees, and imagines of *Urtica* have been found in the crevices of chalk, nearly a foot below the surface. It is curious to observe some of those which appear in September, at once hiding themselves, and remaining motionless until the spring, when they appear as perfect as though they had just emerged from the chrysalis. Others fly much in the autumn, and then reappear in the spring, worn and ragged. Most of them are very common; and as they are generally double-brooded, and the second brood passes the winter in the perfect state, they may be found almost, if not entirely, throughout the year. They are found in gardens, fields, and woods, and are very fond of sucking the honey from thistles and other tall flowers, and also from ivy blossoms. They may also be observed sucking the sap oozing from the trunks of trees, or on fruit; *Atalanta* specially being fond of an over ripe plum.

The species of this genus may be distinguished generally from the rest of the family by having the eyes pubescent and the wings angulated, by which latter character, as well as by the more sudden formation of the club, they are separated from the terminal genera of the family. The antennæ are rather long, and terminated by an abruptly formed, short, somewhat cylindrical club. The body is very robust, and well formed for sustaining the powerful flight of these butterflies.

The caterpillars are long, cylindrical, and covered with numerous bristly spines, arranged in whorls round the body, each segment, except that immediately following the head, having a whorl of these spines. They feed principally on plants of the natural order *Urticaceæ* as formerly constituted, containing the stinging nettles, hop, elms, &c.

The chrysalis is considerably angulated, with the head bi-tuberculated, and is adorned with silvery and golden hues, hence the name *Aurelia* formerly used for chrysalis, and *Aurelians* for entomologists.

The insects of the present genus may be regarded as the pre-eminent type of that great division of butterflies in which the chrysalis is simply suspended by the tail, and not girt round the middle of the body by a slender skein of silken thread, the forelegs also of the perfect insects being imperfect and unfitted for walking.

Vanessa has been divided into three sub-genera, namely, *Pyrameis* containing *Cardui* and *Atalanta*; *Vanessa* containing *Antiopa*, *Io*, *Polychloros*, and *Urtica*; and *Grapta* containing *C-album*.

SUB-GENUS.—PYRAMEIS.

Hubner.

PYRAMEIS differs from *Vanessa*, in having the wings less angular, the palpi less hairy and of somewhat different form, and in the club of the antennæ being rather more pointed. The caterpillars differ in a striking manner in their habits, those of *Pyrameis* being solitary, and often, as in *Atalanta*, concealing themselves by drawing the edges of a leaf together. On the other hand those of *Vanessa* are gregarious, the eggs being laid in batches, and the whole of the caterpillars from one batch remaining together throughout their existence as such.

This sub-genus numbers only about a dozen species, divisible into two sections of half-a-dozen species each. One of these sections containing *Atalanta*, Professor Rennie formed into a genus, giving it the name of *Ammiralis*. Mr. Doubleday, in "Doubleday and Westwood's Diurnal Lepidoptera" writes, "I have dwelt particularly on the geographical distribution of this genus, so poor in species, yet so universally distributed, presenting two distinct sections, species of which are known to co-exist in almost every part of the world except the southern parts of Africa and America, never, except in Australia, presenting more than two species in the same district, and those generally of different sections. Thus *Cardui* has for its compatriot in Europe and North America, *Atalanta*; further south, in the Old World, *Callirrhoe*; in Java, *Dejeanii*; in Australia, *Itea*, and an undescribed species; in New Zealand, *Itea* and the beautiful *Gonerilla*; in the Sandwich Islands, *Tammeamea*. At the Cape of Good Hope and Sierra Leone it seems to be the only species of the genus. As it dies out, if I may use the expression, in the equatorial and southern parts of America, it is replaced first by one species, then by another, and if these species co-exist, one is sure to be rare, for the co-existence is only found on the very limits of their respective territories."

VANESSA CARDUI.

Painted Lady.

CARDUI, Linn. Car'dui, named from the thistle *Carduus*, on which the caterpillars feed.

This is a highly elegant butterfly, well named, in France "la Belle Dame."

The colouring of the upper surface is composed of black and very dark brown, with irregular markings of an orange red, tinged partially with a rosy hue; those on the right fore-wings bear a tolerably good resemblance to a map of England and Ireland, so writes Professor Westwood in "Humphrey and

Westwood's British Butterflies." Near the tip of the fore-wings are some pure white spots, and the hind-wings have a row of blue-centred black spots. On the underside the hind-wings are beautifully mottled with pale olive-brown, yellowish-buff, and white, the veins being white; near the hind-margin is a row of slender blackish-blue marks, above which are four eye-like spots, the two middle ones being smaller than the outer ones, which are circled with black.

The width across the wings varies from two to three inches.

Varieties are rare. A very beautiful one in Mr. Vaughan's cabinet is figured in Mosley's "Illustrations of varieties of British Lepidoptera." A similar one from Mr. Ingall's collection is figured in Newman's "British Butterflies." Another in Mr. Steven's collection is figured in the "Entomologist," Vol. 6. In these, the black is confined to the costa and tip of the fore-wing, and a row of paler rings appear on the hind-margin of the hind-wings. A variety without the apical spots was in the collection of the late Mr. Alfred Owen. A remarkable variety is figured in the "Entomologist," Vol. 13. In this specimen, the whole of the hind-margin of the fore-wings is suffused with dark umber, almost black, in which the usual row of small white circular spots near the apex, and the two white costal spots are replaced by white fusiform blotches, and two white spots near the anal angle; the two large dark spots, which are usually on the disk, are wanting altogether. The hind-wings are dark umber towards the base, and rust coloured, while between each of the nervures, which are broad streaks of black, are large white spots, forming a row parallel to the hind-margin. The markings are perfectly symmetrical on all the wings. It was bred on September 3rd, 1879, from a caterpillar taken in Clapton Park. Pale and dwarf specimens often occur, and a variety, in which the spots are confluent, has been named *Elymi*; an Australian variety is also named *Kershawii*.

The egg is stout, and barrel shaped, with sixteen sharp edged longitudinal ribs coming over the edge of the top, in the centre of which is a large circular plain spot; the transverse reticulation crosses the ribs and knobs them; the colour of the shell is dark green, the ribs are pellucid.—(Rev. J. Hellins.)

The caterpillar varies from dark grey to black, young individuals being generally the darkest. The spines are paler, but the tips and branches are black. There are a number of warty spots of greyish-yellow, and scattered hairs all over it. The head is black and the legs and claspers generally a dull red. It feeds solitarily beneath a silken tissue on various kinds of thistles, and also on the nettle, millfoil, mallow, and artichoke. The Rev. J. Hellins describes two varieties of the caterpillar in "Larvæ of British Butterflies": "the darker having the ground colour black, slightly freckled on the

back with yellow; the dorsal line, which is interrupted by the dorsal spines, is of a velvety black edged with sulphur yellow; below the spiracles, which are black ringed with yellow, is a clear broad yellow line; the spines on the third segment are black, all the others pale yellow, set with black bristles, the other hairs pale; legs reddish-brown. The paler variety had the ground colour of a dull greyish-drab, the dorsal line of the ground colour on a more yellowish band, the lateral lines more distinct, the spines pink with white tips." In the same work, Mr. Buckler describes a more remarkable variety sent him by the Rev. E. Horton, on the 25th September, 1868, and which he found feeding on *Malva sylvestris*. Mr. Horton's attention was arrested by the mixed-up appearance of certain of the leaves. On examination, he found the edges of some were drawn together by threads into a kind of purse, each containing a caterpillar; and he noticed that in every case but one, the caterpillar was eating away the upper surface of the leaf within the purse. The youngest was an inch long, with seven rows of spines, all black in colour, except those in the dorsal and sub-dorsal rows on the sixth, eighth, and tenth segments, which were pale primrose yellow; the head and upper surface of the body black, with a double dorsal stripe of pale yellow, and a stripe of the same colour above the legs: the underside and fore-legs deep olive-brown. After moulting the change in appearance was very great, and growth very rapid, the primrose yellow and black spines being replaced by others of a dirty greenish-yellow tint; but the extraordinary and puzzling feature now assumed was a dense covering of pale grey hairs, nearly as long as the spines, and almost hiding them. The spiracles were greenish-grey with black centres, the head black, and like the body covered with grey hairs. Now arises the question, writes Mr. Buckler, as to the how and why of the caterpillar's hairy coat. Had these mallow eaters become hairy through eating the downy mallows, whilst those feeding on thistles are clothed with spines alone? Or were they a second brood, thus clothed with hair for protection against possible cold weather in late autumn? On the 10th October, the caterpillar above described, after first suspending itself to the top of its dwelling, left its case and crawled to the gauze cover of its cage, and on the 11th suspended itself there, and became a chrysalis on the 13th.

The chrysalis is about an inch in length, and moderately stout; the head has a pair of very short blunt horns, and the anal spike is like a short curved leaf stalk ending abruptly, and set round with a ring of hooked spines. The Rev. J. Hellins had two varieties of coloration, the darker variety having the back pale dusky brown, finely dotted with black, and an interrupted stripe of pale pinkish grey glossed with gold down the middle, the sub-dorsal knobs golden, and outside them on the abdomen a stripe of pinkish grey; on the

underside the wing cases brownish, somewhat marked with the pinkish grey tint; the paler variety had all these same markings, but the dusky portions much less extensive, and the general colouring green with a golden gloss or lustre.—Extracted from “Larvæ of British Butterflies.”

Four different species of parasites, all belonging to the order Hymenoptera, have been bred from this butterfly, namely, *Limneria exareolata*, *Pimpla diluta*, *Bracon variata*, and *Apanteles emarginatus*.

Vanessa cardui is most uncertain in its appearance. Sometimes it will be scarcely seen at all, or will disappear from a locality for many years. Then it will come in such countless swarms that no satisfactory method of accounting for them has yet been discovered. In an ordinary way the butterfly emerges in August or September, retires for the winter in October, to appear again in the spring, when it pairs and deposits its eggs singly on the food-plant. Occasionally there is an earlier brood in June, which mixes freely with the hibernated specimens, and Mr. Buckler once bred a specimen in February, and Mr. Wilkinson one on the 20th of November. It may be seen on the wing at any time of year, even being enticed from winter quarters on Christmas Day by an unusual warmth of the sun. Some lepidoptera remain more than one winter in the chrysalis state, only a portion of a brood emerging, or the whole remaining over. When this occurs the insect does not appear at an unusual time, but remains until its regular period of emergence the following year. Some species, such as the Small Eggar (*Eriogaster lanestris*), have been known to pass as many as ten years in the chrysalis state. The cause of this curious habit is not known, but in species which emerge in February, as does *Eriogaster lanestris*, it is easy to see that it is necessary for the protection of the race. Mr. McLachlan (see Entomologists' Monthly Magazine for July, 1879), records living chrysalides of the Clouded Yellow (*Cotias edusa*), the produce of eggs laid by the butterflies of 1877, and thinks that its life in that state can be prolonged over several years. The Goat Moth (*Cossus ligniperda*), again, passes three years, and sometimes more, in the caterpillar state. A most wonderful instance of the instinct of self-preservation is shown by *Oeneis bore*, Schu., a true hyperborean butterfly, which has never been found outside of the Arctic circle, and even there only occurs in places which bear a truly Arctic stamp. The caterpillar of *Oenis bore* hibernates below the surface of the ground, feeds and grows all through the following summer, but does not succeed in attaining its full size, it then hibernates a second time, and does not assume the chrysalis state till the spring of the following year. It is also probable that *Vanessa cardui* and other species, when the summers are unsuitable, or whatever other adverse causes there may be, pass a longer time in the chrysalis or some other

state, and then, when the circumstances are favourable, they appear in large numbers.

The caterpillars of the Painted Lady are almost as uncertain in their appearance as the butterflies. They have been found freely in July, and one observer, Mr. West (see "Entomologist," Vol. III., page 303), noticed that none were to be seen between July 26th and September 16th, when they again appeared freely. Another observer, Mr. Wilkinson (see "Entomologists' Monthly Magazine", Vol. XVII), records unusual numbers of the caterpillars in the end of July, 1879, and again the beginning of October. Most of the latter changed into chrysalides between the 18th and 20th of October, and one of them emerged as a perfect butterfly on November 20th, as fine in every respect as those bred in August. The rest failed in the attempt to come to maturity. Mr. Gervais F. Matthew (see "Entomologists' Monthly Magazine," Vol. XVIII., page 93), records the caterpillars as being very plentiful in Turkey, throughout September, October, and November, 1878, between united leaves of mallow; and also at Malta, in March, 1879. Albin, in 1749, records the finding of a caterpillar on the 22nd of June.

Vanessa cardui is a most cosmopolitan species. It occurs all over the British Isles, inclusive of the Shetlands; and Mr. W. F. Kirby, in his Diurnal Catalogue, gives the World as its range. Specimens from India and South America can scarcely be distinguished from those occurring in this country. On the American continent it enjoys a very wide range, extending from the Hudson's Bay territory to Venezuela. In the Old World its range extends from Norway to the Cape of Good Hope; and it has also been recorded from such far distant lands as Australia, New Zealand, and the Sandwich islands. It appears to be little affected by climate, as it occurs both at Sierra Leone (the hottest part of Africa), and at Moose Fort (lat. 50 20 N) in North America, where snow lies on the ground for eight months of the year, and during five months of which the thermometer does not rise above freezing point, and sometimes sinks as low as 52° F. As it is a strong flyer, and of a roving disposition, it may, like *Danaus plexippus*, have extended its area in comparatively recent times.

Nearly everywhere it appears to be common, and in many places, especially in the South of Europe, it is one of the most abundant butterflies. Here it is sometimes observed in countless swarms, and the air is sometimes filled with the butterflies. These vast swarms apparently appear in early summer, and generally travel in a north-easterly direction. The year most remarkable for these swarms was the wet, sunless, and ungenial year of 1879. In this year, a winter of exceptional severity was followed by a sunless and chilly

spring, and then by a summer and early autumn remarkable for excess of rain and deficiency of heat.

The first published notice in England of the extraordinary numbers on the continent was that which appeared in the "Times," of the 13th June, 1879, to the following effect:—"A strange occurrence is reported from the Wet-zikon, Canton Zurich. On Saturday, the Commune was invaded by an immense swarm of butterflies, a kilometre (five-eighths of an English mile) wide, and so long that the procession took two hours to pass. They were of the kind known in Switzerland as *Distelfalter*, which feed on nettles and thistles. They flew from two to ten mètres above the ground, and went off in a north-westerly direction."

A swarm, starting from North Africa, was observed at Algiers as early as 15th to 20th of April, travelling in a north-easterly direction; it reached the neighbourhoods of Valencia and Barcelona by April 26th to 30th; spread over Spain, touching the Balearic Isles from May 1st to 3rd, and crossed the Eastern Pyrenees on May 26th and 27th. Another column crossed the Mediterranean to Sicily, and spread itself northwards over Italy in June; it then spread over south-eastern France, Switzerland, and Austria, and on the morning of June 5th, thousands of living specimens were found on the snow at the Hospice of St. Gothard. It then spread over France, Germany, and Belgium, reaching Strasburgh as early as June 3rd to 9th, Bisheim in Alsace on June 8th, Angers and Rennes on June 10. Paris and its environs were not apparently reached till June 15th. In "Le Naturaliste," for July 1st, we read that at Sevres, near Paris, on June 15th, all day long, great swarms appeared flying from S.S.E. towards N.N.W., the wind being S.S.W. At Strasbourg, from the 3rd to the 9th of June, a similar occurrence was observed, the insect flying rapidly in innumerable quantities towards the north, and even in rainy weather. At Bisheim, on June 7th, and also at Kehl, on the same day, myriads flew in the afternoon, at the former place from the S.W., at the latter from the S.E., so that it is considered the columns were not identical. At Angers a similar thing was observed on June 10th, the direction being from E. to W., against the wind, which was not of much force. It was estimated that the number passing along a single street in one hour was from 40,000 to 50,000. From Montpellier, Albi, and other places in the south, analogous cases are recorded. Near Geneva, the swarm is said to have obscured the sun for several minutes. At Rennes, on June 10th, incalculable numbers flew from S. to N. with great rapidity; at 2 p.m. on that day the wind changed, and the direction of flight was altered towards the W. Sometimes from 20 to 30 passed in a minute, continuing for some time at the same rate.

The "Entomologische Nachrichten," of July 15th, relates that "in Württemberg, from the 1st to the 8th of June, an incessant migration from S. and W. towards N.E. and E. was remarked. At Wetzikon, Canton Zurich, on June 7th, an immense swarm moved from S.W. to N.E., principally from 3 to 5 p.m.; their flight was persistently in one direction, only changing temporarily to avoid houses and trees. At Wetswell, on the same day, from 2 to 5 p.m., a swarm flew from W. to E., and it is calculated there were 1000 in the space of 10 mètres, and that at least 11,000 flew past the observer." The editor adds that no such swarms had occurred in the North of Germany, but information had been received from Steyer, in Upper Austria, "that on June 11th, surprising numbers flew from S.W. to N.E. ceaselessly, between 1 and 2 p.m., 90 to 110 per minute were counted in a breadth of about 100 paces, and the swarm is estimated at above, rather than under, 1,000,000." In England, during May and June, the number of apparently hibernated examples was unusually large, and these were probably re-enforced in the middle of June by emigrants from the Continent. At Torquay, in South Devon, *Vanessa cardui* and *Plusia gamma* occurred simultaneously on June 10th, in the greatest profusion; and at Bournemouth, Hants, in August, *V. cardui* was swarming in thousands and *P. gamma* in tens of thousands. The former is even recorded as plentifully through the streets of Liverpool, and the latter as being very abundant as far north as Pitlochrey in Perthshire.

Both species were most abundant during August at Ostend in Belgium, Saxony, Switzerland, and other parts of Europe. *Vanessa cardui*, singularly enough, appeared the same year, in considerable abundance, in the Sandwich Islands (see "Entomologists' Monthly Magazine," Vol. XVI., p. 161.), the season being, probably, as much cloudier and more showery than usual, as in Great Britain. An earlier flight is recorded in Loudon's "Magazine of Natural History," Vol. I., p. 387, thus: "On the 8th or 10th of June, 1829, Madame Wolff and her family, established during the summer in the district of Grandson, Canton de Vaud, Switzerland, perceived with surprise an immense flight of butterflies traversing the garden with great rapidity. All these butterflies were of the species called the Painted Lady, the *Belle Dame* of the French, the *Papilio cardui* of Linnæus, and *Vanessa cardui* of the present system. They were all flying closely together in the same direction, from south to north, and were so little afraid when any one approached, that they turned not to the right or left. The flight continued for two hours without interruption, and the column was about ten or twelve feet broad. They did not stop to alight on flowers but flew onwards, low and equally." The editor goes on to say "This fact is exceedingly singular, when it is considered that the caterpillars are not gregarious, but are solitary from the

moment they are hatched. Professor Bonelli, of Turin, however, observed a similar flight of the same species in the March preceding their appearance at Grandson. Their flight was also directed from south to north, and their numbers immense. At night the flowers were literally covered with them. Towards the 29th of March their numbers diminished, but even in June a few still continued. They have been traced from Coni, Raconni, Suse, &c. A similar flight is recorded, as having taken place in the year 1741, in Italy, by Mr. Locke, in the "Memoirs of the Academy of Turin." During the whole season, those butterflies, as well as their caterpillars, were very abundant, and more beautiful than usual." A similar flight was observed in 1836, in the Canton of Vaud, Switzerland. Another flight was witnessed by Colonel Drummond Hay (see "Entomologists' Monthly Magazine," Vol. IX., p. 149.) and recorded thus: "It was, as far as I can recollect, in the early part of the summer of 1842, while stationed in Video, a small island in the harbour of Corfu, that an extraordinary flight of the Painted Lady butterfly took place. The first part of the column reached the island about 9 o'clock in the morning, and continued steadily to advance in rolling masses of many thousands for upwards of three hours. Though the density of the column was at no time very great, yet it appeared to extend in breadth as far as one could see, having the appearance of black drifting snow, if I may so call it. By one o'clock, the flight had completely passed: the wind at the time was blowing from the south-east. In the afternoon, on sailing up the channel of Corfu, the traces of the passage of the flight were very evident, from the quantities of dead butterflies which floated on the surface of the water; and for days afterwards, they were to be seen drifting into the various bays in the island of Corfu. I did not hear whether this flight had been observed on the Continent, but, as they appeared to be taking the direction of the coast of Italy, they would, in all probability, strike the land in the vicinity of Otranto."

The first in England to figure and describe it was old Mouffet, in 1633.

In Ray's "Historia Insectorum," 1710, we are informed that the Painted Lady occurs very frequently about Braintree, in Essex, and in other places.

Petiver in 1717, informs us that *Bella Donna*, or Painted Lady, usually settles on banks or dry ground.

Benjamin Wilkes, in his "English Moths and Butterflies," 1773, informs us that it spends fourteen days in the chrysalis state, and that it is not so common as the Peacock butterfly.

Eleazer Albin, in his "Natural History of English Insects," 1749, informs us that he found a caterpillar spun up in nettle leaves on the 22nd of June, from which, on the 15th of July, he bred a most beautiful Painted Lady butterfly.

In Harris' "Aurelian," 1775, we read "These flies are not very common, the reason of which is, all weathers do not agree with them, yet there are particular seasons when they are very plentiful, which happens once in about ten or twelve years. They are then often seen in town flying in the streets. There are various colours of the caterpillars, some appearing dark or nearly black, and others brighter and more of a yellowish cast. They are found covered with a thin spinning web on the upperside of the leaves, to secure themselves from the weather and other accidents. Within this web the caterpillar feeds, leaving the thin membranous part to support it in its habitation; so that the leaf appears to be eaten but half-way through. It forsakes its web when fit for its transformation, which happens about the middle of July, and finding a convenient place in the shade, fastens itself by the tail with a small but very strong web, and changes into a chrysalis, in which state the male and female may be easily distinguished from each other. The male is of a dark brown, embellished with gold. The female is rather brighter and ornamented with silver. The fly appears in about fourteen days."

Lewin, in his "Insects of Great Britain," 1795, informs us "that the female lays her eggs about the middle of June, carefully depositing them singly on a leaf, so that the stock of eggs the parent lays is sufficient for a number of plants in various places."

Donovan, in his "Natural History of British Insects," Vol. IX., writes, "The Painted Lady Butterflies, in some seasons, appear in considerable numbers, and then again are not seen for several years. They were taken in abundance in the summer of 1795, in many parts of the kingdom, and particularly in Manchester; but since that time, few if any, have been met with."

Mr. J. F. Stephen's, in his "Illustrations of British Entomology," 1828, writes, "*Cardui* is eminently conspicuous for the irregularity of its appearance in particular districts of the country: in the metropolitan district it occurs about every third or fourth year most copiously, breeding even in the metropolis itself; during the season of 1826 it was very abundant, and a few appeared last spring. Dr. Leach informed me that he used constantly to see it in Devonshire, and Mr. Dale that he took it in the Isle of Bute, and on Arthur's Seat near Edinburgh."

The author of the "Journal of a Naturalist," published 1829, mentions some interesting instances of its irregular appearance, "owing to causes infinitely beyond the comprehension of the entomologist, seeming to require a succession and variety of seasons, and their change, and their springing into life we know not how. This was particularly obvious in the summer of 1815, and the two following, which were almost unceasingly cold and rainy, scarcely a moth or butterfly appeared. And in the early part of 1818, the season was

not less uncongenial; a few half-animated creatures alone struggled into being: yet this Painted Lady was fostered into life, and became the commonest butterfly of the year. Some years ago, perhaps 1808, a year in which both the Painted Lady and the Clouded Yellow occurred plentifully, he noticed that a quantity of earth was raised in cutting a canal, and in the ensuing summer, on the herbage that sprang up from this new soil on the bank, this butterfly was found in abundance, where it had not been observed for many years before."

A correspondent of the "Entomological Magazine" (see Vol. II., p. 114), states "that on the 8th of October, 1833, the numbers of this butterfly, in the neighbourhood of Tooting, Surrey, surpassed everything of the kind he had ever witnessed. It was highly delightful to see those lovely insects sporting from flower to flower—but the dahlia seemed to be their favourite. I cannot but suspect that they migrated from some part of the country; for, previous to that day, I had not seen a single specimen in the neighbourhood, and but very few since: again it was evident, they must have been winging their way for some time, as most of them were in a faded condition." The same circumstances are more strongly confirmed in a communication from Mr. Blyth, to the "Field Naturalist" (Vol. I., p. 470), who asserts that, "for a single day the species appeared everywhere in abundance, and the day after not one was anywhere to be seen."

The Rev. F. O. Morris informs us in his "British Butterflies," published in 1853, that the "Painted Lady was plentiful near Falmouth in 1849, but scarce in 1850 and 1851; in 1850 not one was seen near Stoke-by-Nayland, while in 1851 it was to be seen in extreme abundance there." In the same year it was common in Norfolk, Cambridgeshire, Dorsetshire, and other parts of England.

The Rev. J. Hellins (see "Entomologists' Monthly Magazine," Vol. II., p. 84), calls attention to the fact that *Vanessa cardui* was not only excessively abundant in 1865, but also varied much in size. "The smallest specimens," he goes on to say, "we took at Exeter, expanded less than 1" 11", whilst the largest measured very nearly 3" in expanse. One of these giants is remarkable, also, for a small white ocellus, edged with black, placed in the largest yellowish blotch of the fore-wings." In the same volume, Mr. F. Smith writes, "At the western extremity of Ilfracombe stands a parish church, passing behind which you enter a Devonshire lane; its beauty will be appreciated by every one who has visited Devon, and he will know how it winds, and turns, and winds again, until you arrive at a gate at its extremity that opens on to the breezy downs. The last fifty yards of the hedge, on the right hand of the lane, is covered by a mantle of ivy, which on the 9th of

October, 1865, was in full blossom; but the flowers were about hidden from sight by a countless multitude of butterflies and moths; it was one of the most beautiful sights I ever beheld. The multitudinous host only comprised two species of butterfly, *Vanessa atalanta* and *cardui*; scores of the former, but hundreds of the latter. The majority of them appeared to be overpowered by imbibing the nectar of the ivy blossom, and I had no difficulty in taking specimens between my fingers."

Vanessa Cardui was common all over England in 1868, and most abundant in 1879, and was also very common in 1884. In referring to the last mentioned year, Miss Hinchcliff (see "Young Naturalist," Vol. V., p. 263), writes, "At Instow in North Devon, three insects have appeared this autumn, in most uncommon proportions, viz.: *V. atalanta*, *cardui*, and *P. gamma*, they swarm everywhere. *V. cardui* and *P. gamma* appeared together in 1879, in similar profusion and neither have been seen in any quantity since, *Cardui* especially, has hardly appeared at all. Now what can be the reason for two insects, apparently so dissimilar, suddenly re-appearing in large numbers, again in company, after a lapse of five years! The two seasons have certainly not been alike, 1879 was very wet and this as dry. They are all freshly hatched and very fine specimens." Another correspondent records *Atalanta* as appearing in unprecedented abundance in the neighbourhood of Glasgow, and *Cardui* as being also very plentiful. On reviewing the preceding pages we find that *Vanessa cardui* was common in England in 1795 and 1808, abundant in 1818, a cold and rainy season; common in 1826, 1833, 1849, 1851, and 1865, a fine hot year, most abundant in 1879, a cold wet year, and common in 1884, a fine dry season. In certain years it is very scarce, in 1887 for instance, I never saw a single specimen, and only half-a-dozen of *Atalanta*, whilst *V. urticae* occurred in profusion.

An allied species, *Virginienensis*, Drury, is sometimes included among the British butterflies under the name of *Huntera*, Fabricius, or the Scarce Painted Lady. It is very like *Cardui*, but the black markings are less extensive, and the underside of the hind-wings is reticulated with brown or green, with yellow lateral line and two dorsal lines formed alternately of white and red points. It is a common species in North America and the Sandwich Islands, appearing about once in five or six years in very great abundance, and has become naturalised in the Azores and Madeira.

An instance of the capture of this butterfly in England is recorded in Loudon's "Magazine of Natural History," Vol. III., p. 332, thus, "I beg to announce the capture of *Vanessa Huntera*, for the first time in Britain, by Captain Blower, at Withybush, near Haverfordwest, South Wales, about ten miles from a seaport, in July or August, 1828; which was, till very lately,

considered by him as a small and very odd variety of *V. cardui*, and which he has very handsomely added to my cabinet."—J. C. Dale.

Another example is recorded in the "Entomologist," Vol. IX., p. 255, as being taken by Miss Carew, on the 20th September, 1876, at Antony, near Torpoint, South Devon. The editor adds, "The above notice is interesting, as showing how insects from far distant localities frequently occur as foreign visitors to this country. There are several previous records of the occurrence of this butterfly in Britain, chiefly from our southern coast."

VANESSA ATALANTA.

Red Admiral.

ATALANTA, Linn. Atalan'ta, a celebrated beauty, native of Arcadia, who made all her lovers race with her, on the penalty of death if they could not catch her. Ovid, Met. X., 598.

In grand simplicity and vividness of colour, the Red Admiral perhaps surpasses every other British butterfly, and reminds one forcibly of some of the gorgeous denizens of the tropics. Intense black and brilliant scarlet in bands and borders are the two chief elements of this splendour, relieved delightfully by the pure white spots at the outer and upper corners, and by the pretty blue spots at the inner and lower angles and near the margins. On the underside the hind-wings are brown and beautifully mottled with black and grey, with a large triangular pale spot in the middle of the costal margin, and two transverse and wedge shaped discoidal black marks. Near the margin of the wing is a row of four obscure eye-like patches. In some specimens the red bar of the fore-wings bears a small white dot near its hinder extremity: these are apparently the females. The width across the wings varies from two and a half to three inches.

Varieties are scarce. Two are figured in Mosley's "Varieties of British Lepidoptera." One, bred by Mr. Eedle, has the scarlet bands replaced by pale yellow shading to orange. The other, bred by Mr. Vaughan, has the bands much paler than usual and abruptly shortened at the anal angle. One in Mr. Robson's collection has deep orange bands, that on the hind margin of the lower wings being without the usual black spots. The underside varies still more than the upper, but is not easily described; however, the red band is much larger, and more of a blotch, the blue is more suffused, and the hind-wings are without the usual mottling, and with the pale shade at the hind margin much wider. In a specimen bred in 1867, and figured in the "Entomologist," Vol. XI., the scarlet markings of the upperside of the anterior wings are partially suffused with yellow, and the white spots towards

the apex are very large. It is difficult, say the editors, to describe the variation of the underside, but the two conspicuous blue spots are very remarkable.

The egg is oblong, with six sharp edged longitudinal ribs coming over the edge of the top, in the centre of which lies a large circular plain spot; the colour of the shell is a dark green, the ribs being pellucid.

The caterpillar is variable in colour, sometimes being almost black, and at other times soft grey with buff coloured spines; the general colour, however, is grey freckled with yellowish green. The head and legs are black, and claspers red. The body is set with seven rows of branched spines, longer than those of *Cardui*, but not so long as those of *Io*. It feeds solitarily on the leaves of the common sting-nettle, and also the pellitory of the wall (*Parietaria officinalis*). The young caterpillar, after selecting a suitable leaf draws it together by the edges, and lives within the retreat thus formed. When it requires a larger domicile it leaves the old one and forms another, but is never to be found feeding exposed; when removed from its retreat it feigns death, bending its extremities together; all its movements are slow and lethargic, and its only object, when exposed, appear to be again to con-
itself.

The chrysalis is long and stout, but somewhat rounded and much angulated; the colour is reddish grey, delicately reticulated and marbled with black: it appears covered with bloom, like that on a ripe plum, and is adorned with very beautiful golden spots. Albin, in 1731, says he found some of these chrysalides gilded all over, and that they produced a brood of small but very beautiful Ichneumons. No less than half-a-dozen parasites, belonging to the order Hymenoptera, have been bred from *Vanassa Atalanta*, viz.: *Amblyteles armatorius*, *Hemiteles fulvipes*, *Limneria cursitans*, *Mesochorus sylvarum*, *Microgaster subcompletus*, and *Pteromalus puparum* figured by Albin; *Mesochorus sylvarum* being a hyper-parasite on *Microgaster subcompletus*.

The butterfly rarely emerges from the chrysalis before September, being thus later in its appearance than its congeners. It remains on the wing till the beginning of November, so long as the ivy is in bloom and the frosts not too severe, when it hibernates. It does not emerge from its winter quarters so early as other hibernating species, and is very seldom seen. The sexes do not pair much before June, and then the female deposits her eggs singly on the leaves of the common nettle. The caterpillars are to be found in June and July; the chrysalides in August.

Vanessa Atalanta has a very wide range. It occurs all over Europe except in the extreme north. It is found in Asia Minor, in North Africa, and in the Mauritius, and also in America from Hudson's Bay to Mexico. In more

southern latitudes it is replaced by *Callirhoë*, which has a range from Teneriffe to China. In New Zealand it is represented by the beautiful *Gonerilla*, and in the Sandwich Islands by *Tammeamea*. *Dejeanii* supplies its place in Java, as *Itea* does in Australia. It is common all over the British Isles, inclusive of the Shetlands. Nettles are very much weeds of cultivated ground, and especially are apt to be close to a farmhouse or the out-buildings. It is in such places, therefore, that we should look for the caterpillar or chrysalis, but the butterfly itself is so strong on the wing that distance is little object to it. Indeed the name *Atalanta* is said to have been selected for it by Linnæus on account of its great speed on the wing and powers of flight.

The first in England to figure and describe it was old Mouffet in 1633.

In Ray's "Historia Insectorum," 1710, we are informed that the Admiral is frequently to be seen in Warwickshire among pear trees, and about Braintree in Essex.

Petiver in 1717, records it as being often seen in fields and gardens.

Albin, in his "Natural History of English Insects," published in 1749, gives the following account: "The caterpillars feed on nettles, I found them on the 17th of July in the leaves, folded or spun together; they shelter themselves after this manner that they may be secured from the too great heat of the sun, rain, birds, and a small Ichneumon fly, which often hinder their coming to perfection. I fed them on nettles till the 24th of the same month, at which time the caterpillar hanging itself up by the tail within the folded leaves, changed into a chrysalis, out of which, on the 6th of August, came a most beautiful fly called *Papilio major nigricans, alis maculis rubris and albis pulchræ illustratis*, the Admirable Butterfly. Some of the chrysalides seemed as if gilded with burnished gold; out of these came a brood of small, but very beautiful Ichneumons."

Wilkes, in his "English Moths and Butterflies," 1773, calls it the Admirable Butterfly, and informs us "that the caterpillar turns in August to a chrysalis, hanging perpendicularly downwards by the tail. Fourteen days after the chrysalis is formed, the fly appears. A small Ichneumon fly often hinders their coming to perfection, by laying its eggs therein, which eggs are of such a glutenous nature, that they stick fast as soon as laid."

In Harris' "Aurelian," 1775, we read, "The female Admirable is seen to lay her eggs about the latter end of June, disposing of her eggs singly one on a leaf, and at such a distance from each other that sometimes her store of eggs will be extended or distributed over two or three fields. This she does for the more certain security of some of them; and so careful is she for the safety of her young brood, that I have often perceived her, when about to

lay an egg, creep in among the nettles, which I imagine is not only to place the egg from the heat of the sun, but likewise to see if any of those nettles are frequented by ants, these creatures being very destructive to caterpillars. When the caterpillars are full-fed, they generally fasten themselves up by the tail within their spinnings, and change to the chrysalis, though they may sometimes be found in that state hanging openly under a leaf or any other place they find convenient. Why they change, thus naked and exposed, contrary to their nature of concealing themselves in this state as well as that of the caterpillar, is what, with any certainty, cannot be accounted for: but the reason that appears most likely to me is, the earwigs, which often, in great numbers, get into their inclosures, oblige them to retire, and, being near the time of their transformation, are too weak to make a fresh spinning; for I have often found, when in search of the caterpillar, their spinnings crowded with these vermin. They lay in chrysalis twenty one days. The female is larger than the male, and may be known by an additional white spot which is situated in the red part of the upper wing."

Lewin, in his "Insects of Great Britain," 1795, writes, "The latter end of May a few of these butterflies make their appearance on the wing. In June the female lays her eggs. As soon as the caterpillar comes from the egg, he encloses himself in a leaf of the nettle, by drawing the edges together with a fine silken thread, to protect him from the injuries of the weather, and also from the Ichneumon fly; which by injecting its eggs into the caterpillar, prevents his coming to perfection, and most grievously torments the living animal, as the caterpillars of the Ichneumon feed in him. The caterpillars are full-grown the end of July, when they fasten themselves up by the tail, within their webs, and change to chrysalides. Sometimes they may be found hanging under the leaf, or any other convenient place. Why they change thus exposed, in contradiction to their habit of concealing themselves, as well in this state as that of the caterpillar, is what cannot be easily accounted for. The reason that appears most likely to me is, that the earwigs and ants get into their enclosures, and oblige them to retire, when they are near the time of their transformation, and they are too weak to make a fresh spinning. They lie in the chrysalis state near twenty days, when the butterfly comes forth. What a change! from a crawling caterpillar on the earth, to the elegant and beautiful butterfly, sporting in the air, and feeding on the honey juice of every fragrant flower."

Stephens, in his "Illustrations," 1828, writes, "This common species is one of the most splendid of the British butterflies; the intense black of the upper surface of the wings being beautifully relieved by the red fascia and pure white spots, and beneath, the marmoration of the posterior wings defies

the efforts of the finest pencil. It frequents lanes where nettles abound, throughout the southern part of Britain, appearing about the middle of August. It is said to be very destructive to cherries and other fruits. Mr. Haworth informs me that he once met with them so abundant, that above a dozen might be taken within the compass of two or three square yards."

Mr. Lukis, in recording familiarities effected with butterflies in Loudon's "Magazine of Natural History," Vol. VI., writes, "I approached a plum tree, where several individuals of *Vanessa atalanta* were busily employed in feeding on the rich juice of the ripest fruit. Whilst watching their motions, I perceived several wasps and flies hovering about the fruit, and attempting to light on it. This was no sooner done than they were driven away by the butterfly: any resistance manifested by the wasp exasperated the butterfly, which would boldly approach the intruder, flap its wings at it, and again become the sole possessor of the fruit: the action of the butterfly was very similar to the flapping of the pigeon's wing when feeding in company with others of its kind."

In 1845, *Atalanta* was recorded by Doubleday and others as being absent.

In the "Entomologists' Monthly Magazine," Vol. II., Mr. Frederick Smith records a multitudinous host of butterflies, on the flowers of the ivy, in a Devonshire lane, near Ifracombe, on the 9th of October, 1865. The host consisted of only two species, *Atalanta* and *Cardui*, scores of the former but hundreds of the latter.

Miss Hinchcliffe, in recording a similar instance at Instow, North Devon, in the "Young Naturalist," for 1884, adds "*Atalanta*, though always considered common, is not an insect that as a rule appears in any great abundance; one sees a few specimens every spring and autumn, but that is all, now it is everywhere,—gardens, fields, hedgerows, &c., and not in twos and threes, but in dozens, and all specimens just hatched. I caught ten in a few minutes in one corner of our garden, where some rotten apples seemed rather an attraction, and could have taken nearly double that number every day, sometimes there were five or six waiting to be taken—a truly lovely sight." In the same magazine, Mr. McKay writes, "In this neighbourhood, *Atalanta* has occurred in unprecedented abundance, and *Cardui* has also been very plentiful. The appearance of *Atalanta* is looked upon in this locality as something very unusual, but this year (1884) one collector alone has taken as many as thirty specimens. I believe it is two or three years since *Atalanta* was last seen near Glasgow."

It may be observing that although the three species, *Atalanta*, *Cardui*, and *Gamma* were very common in 1884, still *Atalanta* was not abundant in 1879, the year in which the two latter appeared in their greatest abundance.

SUB-GENUS VANESSA.

This differs from the last in having the wings more angulated, palpi more hairy, in the club of the antennæ being rather less pointed, and in the caterpillars having no spines on the head. There is also a difference in the habits, the caterpillars of *Vanessa* being gregarious, those of *Pyrameis* being solitary. The perfect insects differ from one another in some points of structure; for example, *Vanessa Io* has the anterior tarsus of the male nearly cylindric, whilst that of *Urtica* is, as it were, strangulated near the middle, and that of *Antiopa* offers two strangulations. Again, the anterior tarsi of the females differ in some slight degree: the articulations in *Io* being much more distinct than they are in *Polychloros* or *Urtica*, and the proportions of the joints are slightly different.

In Martin Lister's edition of "Goedart's Insects," published at London, in 1685, we find the following account of the chrysalis of one of this genus: "Sine Larva Papilionis, Gracie Chrysalis appellatur, sine res deaurata, ut ex notatione Nominis patet. Latinè non datur nomen (quod sciam), quo exprimitur: Ego transluli Aurelian. Ut cunque Latini Bruchum vocant Erucam: Quod quidem vocabulum (ut ex loco quodam in vitruvio conjectæ) veteri Tuscorum Lingua viride æris significans, inde transfertur ad Bruchum designandum. Sunt enim Brucha quidam, quos ipse Languedociæ agens compexi, qui communi quodam Tithymalli genere pasti; colore cœruleo sine cyaneo insignitur pinguntur. Adeoque sicut pancarum Chrysalidum deauratio, uniuersis nomenclacionem dedit, pari etiam ratione unius cujuspiam Erucæ color cœrulens, curitas eodem nomine insigniuit. Quod ad deaurationem ipsam, nil aliud esse autumo, quam succi cujusdam, inter Erucæ pelluculam, et Chrysalidis restulam, quam regit, evaporati, spumam sine recrementum."

This sub-genus contains about two dozen species, which are inhabitants of the northern temperate zone, extending probably round the world. Their geographical range is extensive, and the species of the Old World are, to a certain extent, represented in the New World; and one species, *Antiopa*, seems to be common to both. *Vanessa Urticæ* of Europe, is represented in America by *Milberti*; and the *V. album* of Eastern Europe has its exact counterpart in *F. album* of the Northern States of America. Six species are European, four of them occurring in the British Isles.

Another species, *Velleda*, Fab., now referred to the genus *Junonia*, was recorded as British by James Petiver, in his "Papilionum Brittanniæ, Icones, Nomina, &c.," published in 1717, as follows: "Papilio Oculatus Hampstediensis, ex aureo fuscus. Albin's Hampstead Eye, where it was caught by this curious person, and is the only one I have ever seen."

The Rev. F. O. Morris, in his "History of British Butterflies," published in 1853, writes, "The only specimen of this insect that has ever been recorded, was captured at Hampstead, near London, by Albin, and then first described and figured by Petiver. It has since been continuously figured and described by succeeding entomologists, who have faithfully copied the original picture." Just after the publication of Mr. Morris' work, the following skit appeared in a newspaper: "TOM.—'Jack! whereabouts is Amstid-am.' JACK.—'Well, I can't say exackerly, but I know its somewhere near Ampstid-Eath.'" Specimens of *Velleda* are in the British Museum, and other collections, from the Isle of Amsterdam *alias* Australia, where it was taken by Sir Joseph Banks, President of the Royal Society, who sailed round the world with Captain Cook.

VANESSA IO.

The Peacock Butterfly.

IO, Linn. I'o, a Grecian heroine, famous for her beauty and misfortunes.—Ovid Met. i. 588.

The ground colour of this beautiful butterfly is a dull deep red on the upper side, and the hind margins are brown. On each fore-wing is one small and one large black costal mark, beyond which is a large eye-like spot, variously coloured with yellow, black, red, bluish lilac, rosy, and white: on each of the hindwings also is a large black eye-like spot shaded with bluish lilac, placed in a pale brown ring near the outer angle. The colour of the underside is totally different, being composed of shades of funeral blacks and browns; thus exhibiting a strange effect when the butterfly, sitting on a flower head, alternately opens and shuts its wings with a fanning motion, according to its custom.

The width across the wings varies from two inches to three inches and a half, the females, as is generally the rule, being the largest.

Varieties are rare, and hundreds of specimens may be examined without any difference being perceived except in size. I have a specimen, taken at Hull in 1837, in which the eye-like spot on the hindwings is replaced by a white blotch. A more curious one is figured in "Mosley's Varieties of British Lepidoptera." In this the eyed-spots are wanting on all the wings: the hind-wings being of a dark stone colour, with only a black spot on a lighter shade, where the eyed spot should be. Similar specimens exist in collections, and the variety has been called the "Blind Peacock." There is a splendid variety in Mr. Bond's collection; it has the costa, half down the hind-margin, and a dash inside of the eyed-spot on hind-wing pure white. Sometimes the

wings are very thinly scaled, and the dull red changed into chocolate. Two varieties have been named, *Ioides*, Ochs., and *Sardoa*, Staud., Cat. The first is smaller, and the latter, which occurs in Sardinia, larger than the type.

The egg, admirably figured by Sep., is oblong, with eight highly elevated ribs, and is of a grass green colour with a black cover at the top.

The caterpillar is black and velvety, long, rather slender, and with well marked segments; the body is covered with long black branched spines, and numerous white warts; the head is large, black, and shining, having warts sprinkled over it; the legs are black, and the claspers flesh coloured. It feeds on the common stinging nettle (*Urtica dioica*), in June and July. Mr. Hellins says the caterpillars are irritable when disturbed, both walking quickly and flinging about their heads, and ejecting from their mouths a dark greenish fluid. They feed together in families.

The chrysalis is long, stout, and mostly cylindrical, though a little angulated, the skin wrinkled. The head has two triangular diverging horns, the back of the thorax rises in an abrupt curve, and has in the middle a short spike, it falls in at the waist, whence the abdomen goes in a long curve to the tail and is set with sub-dorsal rows of spines, and the abdomen ends in a long stem-like spike. There are two varieties of colour, one pale greenish yellow, the other pale grey, but freckled all over with smoky black. There is a metallic lustre, and the wing cases and antennæ cases are marked out by lines of freckles. According to Albin, it is subject to the attack of a Hymenopterous parasite, which appears to be *Pteromalus puparum*.

The butterfly emerges in August, and appears to hibernate earlier than the Red Admiral. It re-appears in spring.

Vanessa Io is common throughout the year in Central and Southern Europe, and Western and Northern Asia as far as Japan. It is said to be absent from Andalusia and Sicily, and is rare in Northern Europe, including Scotland. It is generally distributed in England and Ireland, but most common in the South. In Scotland it is rare, and does not occur beyond the Caledonian Canal.

It was figured by Thomas Moufet, in 1633, accompanied with the following description: "Omnium Regina dici potest; nam extremis abi, veluti adamantes quatuor in pala Hyacinthina radiantes, miras opulentias ostendunt, imo fere adamanti Hyacintho oculum effodiunt. Lucent enim pulcherrime (ut Stellæ) Scintillasque iricolores circumfundunt: his notis ita dignoscitur, ut reliquum corpus describere (licet varius pictum coloribus) supervacaneum esset."

It is also figured and described in Martin Lister's edition of Goedart, 1685.

Petiver in his "Papilionum Britannicæ, Icones, Nomina, &c," published in 1717, informs us that the Peacock's Eye often appears early and continues long, and that it is pretty common both in gardens and fields.

Albin, in his "Natural History of English Insects," 1749, informs us that the caterpillar, when touched, lets fall from his mouth a drop or two of dark green liquor, but for what reason he could not judge; as it is not hurtful to to any part of the shin where it falls; and that it is subject to the same production of Ichneumons as that of *Atalanta*.

Harris, in his "Aurelian," 1770, writes, "The female Peacock layeth her eggs the latter end of April or the beginning of May, on the top part of the nettle, placing them generally on the stalk close under the young budding leaves, to preserve them from the too violent heat of the sun, where they are hatched in a few days. The young caterpillars inclose themselves in a very fine tender web, drawing at the same time the leaves to cover them as much as they can, that they may receive the benefit of their shade: in the first skin they are of a greenish-white, and appear naked and shining, which appearance continues till they are in their fourth skin, at which time they become quite black. After the shifting of each skin they extend their web further, and will sometimes divide themselves into two or three separate colonies. When they are in their last skin they quite forsake their web, and feed separate. When full-fed they hang themselves up by the tail, and in about twenty four hours, the skin slips off as the chrysalis appears, which at first is green and tender; but one hour is sufficient to harden the shell against the injuries it might receive by the plants being shaken by the wind. In about nineteen days the fly appears. They continue in the fly state during the winter, and I have seen them flying in February, when the snow has been on the ground."

Lewin, in his "Insects of Great Britain," 1795, adds "The insects of this species are very plentiful, and spread themselves everywhere."

Newman, in his "British Butterflies," 1871, states that he once found more than 40 Peacock butterflies inside of an old hollow oak; and that it is a common species in England and Ireland, but scarce in Scotland.

In the "Entomologist," Vol. VI., it is recorded as being very common in 1873 and scarce in 1872, by Mr. Stevens, who goes on to say, "of *Atalanta* and *Cardui* I have not seen a specimen, and I have not heard of anyone taking *Antiopa*."

In the "Young Naturalist," for 1885, Mr. Robson writes, "When I commenced to collect, the caterpillars of *Vanessa Io* might be found on every patch of nettles. I have not seen them for many years, and rarely observe the perfect insect. The same remark applies to many other places."

It was fairly common in Dorsetshire in 1886.

VANESSA ANTIOPA.

The Camberwell Beauty.

ANTIOPA, Linn. Antio'pa, the mother of Amphion, who is said to have built the walls of Thebes.

The arrangement of colours in this butterfly is most remarkable and unusual, by reason of the sudden contrast between the whitish border, and the velvet depth of the colours it encloses. The inner portion of all the wings is of a rich purplish chocolate, then comes a band of black, containing six or seven blue spots on each wing, and on the outside is a broad white or yellowish white border: the forewings have two whitish costal spots beyond the middle. On the underside, the wings are ash brown, with a great many slender transverse black lines, and white margins and spots on the upperside. The width across the wings varies from a little under three inches to three inches and a half. The form of this butterfly that usually occurs in Britain has a whitish border to the wings. This is the variety *Hygiæa*, Hdrch., the type having an ochre yellow border. M. Wurzburger, however, writing to the "Entomologist," Vol. XX., p. 136, states that when the butterfly leaves the chrysalis, in July, it has a yellow border; in spring, after hybernation, its border is paler, sometimes light yellow, often quite white: and that the specimens of *Antiopa* which have sometimes been caught in England have come from the Continent, and are hybernated specimens having white borders. It may be remarked that the borders of *Io* also occasionally fade white after hybernation. The American variety, *Lintneri*, Fisch., differs only from the European in the buff border being more irrorated with black dots.

The egg appears to be undescribed.

The caterpillar is black, with a brick red spot on each segment, from the fourth to the eleventh, and black spines. The head and legs are black, claspers dull red. It feeds on birch, poplar, and more commonly on willow, especially the white willow (*Salix alba*), in June and July, but has very seldom been seen in England.

The chrysalis hangs suspended by the tail. It is of a dark and dingy blackish brown colour, speckled with blue and spotted with tawny; in form it closely resembles that of *Polychloros*, except that the spiky points are longer and sharper.

The butterfly makes its appearance at the latter end of summer, and there is more difficulty perhaps in understanding its irregularities than with any other British species. Sometimes it shows itself in very large numbers as in the years of 1789, 1846, 1872, and 1880, and occurs all over the country; far inland as well as on the coast. Then it will disappear altogether for years,

or appear only singly. It is powerful enough on the wing to cross the North Sea with a fair wind from almost any part of the Continent. It is seldom seen in England in the spring, but a specimen in the collection of Mr. J. E. Robson was taken on the 8th February, 1869, crawling out of some burning underwood near Castle Eden Dene, County of Durham.

Vanessa Antiopa is common during most of the year in the greater part of Europe, North Africa, Northern and Western Asia, and North America from the Hudson Bay Territory to Venezuela. It is absent from the Steppes of South Russia, and is very uncertain in its appearance in Britain, and in some of the adjacent parts of Europe.

The first account of its occurrence in England is given by Benjamin Wilkes in his "English Moths and Butterflies," published in 1773, thus, "The Willow Butterfly—about the middle of August, 1748, two of this species of butterfly were taken near Camberwell, in Surrey. But in all my practice I have never seen any of them in the fields; so they must be looked upon as very great rarities. They are very common in Germany, and Mr. Rosel tells us, the caterpillar feeds on willow, and may be found all the summer."

Moses Harris, in his "Aurelian," 1766, writes, "The Grand Surprise or Camberwell Beauty.—This is one of the scarcest flies of any kind known in England, nor do we know of above three or four that were ever found here, the first two were taken in the month of August, 1748, in Cool Arbour Lane, near Camberwell, the last in St. George's Fields, near Newington, the beginning of that month; but as these appeared very much faded and otherwise abused, I conclude they appear from the chrysalis, with the Peacock, about the middle of July, and being of that class it is reasonable to suppose they live through the winter in the fly state, and lay their eggs in spring that produce flies the July following; for in the same manner do all the flies of this class, and as all that have been taken were found flying about willow trees, it is the common opinion of Aurelians that their caterpillars feed thereon, but their caterpillar and chrysalis, is to us entirely unknown, and the food a mere conjecture. I intend to make a strict search concerning them, and should I make any discoveries worthy note, I shall find a proper place and repeat it. The fly in the plate was drawn and coloured from a beautiful large female in the cabinet of Charles Belliard, Esq., which is the finest we have in England."

Lewin, in his "Insects of Great Britain," 1795, writes, "Three of these beautiful and rare insects were taken in the year 1748, near Camberwell, in Surrey; from which time until the year 1789, we have no account of any being seen in England. The middle of August, 1789, I was surprised with

the sight of two of these elegant flies, near Faversham, in Kent; one of which I thought it great good fortune to take, but in the course of that week I was more agreeably surprised with seeing and taking numbers of them in the most perfect condition. One of my sons found an old decoy pond of large extent, surrounded with willow and sallow trees, and a great number of these butterflies flying about and at rest on the trees, many of which appearing to be just out of the chrysalis, left no room to doubt that this was a place where they bred. In March, 1790, a number of these insects were flying and soaring about for the space of twelve or fourteen days; and then as if with one consent, they migrated from us and were no more seen."

Donovan, in his "Natural History of British Insects," Vol. III., published in 1794, writes, "The *Papilio antiopa* is found in every part of Europe; in Germany particularly it is very common, and is as frequent in America as in Europe, and is esteemed as a rarity only in this country; it is indeed, sometimes found in abundance with us, but as its appearance is neither annual nor periodical, it is generally valued by English collectors. There have been several instances of its being found in different parts of this country in mild seasons, as plenty as the Peacock, or Admiral Butterflies; in the summer of 1793, particularly, they were as numerous in some places as the Common Garden White Butterfly is usually near London. But as a proof that its appearance does not altogether depend on the temperature of the weather, we need only adduce, that not a single specimen has been taken this season, although it has been one of the most favourable for all kinds of insects that can be recollected; and many species of moths and butterflies, which have not been seen for many years before, have been taken at Coombe Wood, Darn Wood, and similar adjacent parts, during summer, in plenty. The English specimens differ from those of other countries in the colour of the bright exterior border of the wings; in the former, that part is of a very pale yellow brown, inclining to a dirty white; in the latter, it is of a deep yellow, marked and spotted with brown, Fabricius notices this difference, and says they are varieties."

Haworth, in his "Lepidoptera Britannica," 1803, writes:—There is something very extraordinary in the periodical but irregular appearance of this species, *Edusa* and *Cardui*. They are plentiful all over the kingdom in some years; after which, *Antiopa* in particular, they will not be seen for eight, ten, or more years, by any one, and then appear again as plentiful as before. To suppose they come from the Continent is an idle conjecture, because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs, in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not

hatch, until some extraordinary but undiscovered coincidences awake them to active life."

John Curtis, in his "British Entomology," 1825, writes: "Until four or five years since, *Antiopa* had not been seen for nearly forty years, when it was exceedingly abundant in different parts of the kingdom. In the year 1819, a few were taken in Suffolk, and Mr. Samouelle captured one the following spring that had lived through the winter, since which period it has not been seen."

Stephens, in his "Illustrations," 1828, writes: "No insect is more remarkable for the irregularity of its appearance than this. Till about the middle of the last century, few specimens had been observed; but about 60 years since it appeared in such prodigious numbers throughout the kingdom, that the Entomologists of that day gave it the appellation of the 'Grand Surprise.' Of late it has again become unfrequent; the last times that it appeared in plenty being 1789 and 1793, a few only having been captured subsequently. At the present day it still appears to occur occasionally throughout England, as Mr. Backhouse informs me that, about the year 1820, he saw vast numbers strewing the sea shore at Seaton Carew, Durham, both in a dead and living state, and also floating on the River Tees—and it has also been taken in the counties of Suffolk, Worcestershire, Surrey, Norfolk, Essex, Berkshire, Oxford, Kent, and Cambridgeshire, and I once saw one on a willow near Hertford."

Mr. George Wailes, in his "Catalogue of the Lepidoptera of Northumberland and Durham," published in 1858, writes, "About twenty years ago, I enquired of a very intelligent friend, who had passed his early life at Stockton, whether he had any recollection of ever having seen any such butterfly in his vicinity, and his reply was, 'that he knew it well, and that it went by the name of the "White Petticoat."' Mr. Wailes goes on to say 'No one who knows the insect can question the appropriateness of the name, or its application to this species,' and adds 'It would seem that the South Eastern corner of Durham has been rich in this fine insect.'

The Rev. F. O. Morris, in his "History of British Butterflies," published in 1853, writes, "The neighbourhood of Rawmarsh, near Rotherham, Yorkshire, is one of the most uniform localities for this rare insect I am aware of," and goes on to say "The year 1846 has been unusually productive of the species."

Mr. Stainton, in his "Manual," published in 1857, writes, "This insect is extremely irregular in its appearance, and has hardly been seen since 1847."

Mr. Barrett, in his "Lepidoptera of Norfolk," published in 1874, writes it *Antiopa*, "Usually a great rarity; but in August, 1872, it appeared in

all parts of the county, and was almost common in the North Eastern corner."

Vanessa antiopa was first taken in England in the year 1748, and was not noticed again till 1789, when numbers were seen in Kent during the month of August, and also in the spring of the following year after hibernation.

According to Donovan, it was very abundant in 1793, but curiously enough the fact is ignored by Lewin. Donovan also mentions that not one was to be seen in 1794, although it was a most favourable year for insect life generally, nor does any appear to have been met with again till 1819, when it was common, especially in Durham and Suffolk.

A few were taken in 1820 and 1821, and one was recorded as being taken in Hampshire in 1828, by the Rev. F. W. Hope; for 1833 there is one record, and two for 1834, two were recorded in 1835, one in 1837, and two in 1845. The year 1846 was unusually productive of the species, several being taken in the counties of Yorkshire, Norfolk, Suffolk, Essex, Kent, Surrey, Hampshire, Sussex, Middlesex, Hertfordshire, Lincolnshire, Bedfordshire, Nottingham, and Ayrshire. 1846 was a remarkable year with a mild winter. All the rare Hawk Moths were unusually common, and so was the Queen of Spain Fritillary. There was also a migration of Locusts and the White Butterflies; but very few Clouded Yellows.

It was scarce in 1847, and none appear to have been seen again till 1855, when one was taken in North Wales; scarce in 1856, one record in 1857, scarce in 1858—one being taken at Rannoch in April: several were taken in 1859 and 1860, one in 1862, and one in 1864; a few were taken in 1865 including one at Killarney, in Ireland, one in 1867, and one in 1869; it was scarce in 1870, and but one was taken in 1871.

Now comes its great year—1872, in which it appeared in greater numbers than it has ever been known to do before or since, especially in the North Eastern counties of England; and it was also abundant in Holland, from which direction the migration probably took place. In 1872, we had a cold backward spring and a rough stormy summer until the middle of August, when three weeks of glorious weather, with continuous easterly winds, supervened, during which the best part of the year's work was effected. At this period, so writes Dr. Knaggs, "the grand surprise" of the season was in store for us; three of our rarest butterflies—*Daptidice*, *Lathonia*, and *Antiopa* turned up in such numbers as had never previously been heard of in Britain,—at any rate in the present century. *Antiopa* especially, eclipsing all former displays within the memory of living man, and throwing into the shade the so-called "Great *Antiopa* Years" of 1789 and 1846, for in those years the captures were recorded by tens only, whilst in 1872 they were reckoned by hundreds, mostly on the eastern coast from Dover, in Kent, to Forres, in

Morayshire; thus apparently upholding Mr. Stainton's theory—that the flight of *Antiopa* most probably came from Norway, especially as it was most plentiful between the Humber and the Tyne.

Several were captured in 1873, mostly hibernated specimens, one being taken in the month of January: a few only occurred in the autumn, the yellow borders to the wings suggesting that they were bred in England, and were the produce of the hibernated specimens of the previous autumn. In 1872, a single specimen only was taken in the spring—another proof that the numerous specimens recorded in the autumn were invaders.

In 1874, only a single specimen was seen, and that at Newcastle: in 1875, a few were recorded; in 1876, four specimens; in 1877, three only; and a few in 1878.

In the wet season of 1879, the great year for *Cardui*, not a specimen of *Antiopa* was recorded, although curiously enough it was common again in 1880. It was scarce again in 1881; in 1882, there is only one record, and none in 1883; it was also scarce in 1884, 1885, 1886, and 1887.

In the "Entomologist," Vol. XX, p. 156, Mr. Dingwell writes, "M. Wurzburger, who stated that *Antiopa* was never found in England in the caterpillar stage is wrong. I have an imago bred from one of the twenty seven caterpillars found on a willow, and of course with the yellow border. As the person who sent them gave them without even being asked, he would have no object in deceiving me." Mr. Capper also writes in the same magazine, "I have three British specimens with borders quite as yellow as three bred continental, which I have placed beside them for comparison."

VANESSA URTICÆ.

Small Tortoise-shell.

URTICÆ, Linn. Urticæ, from the generic name of its food-plant, the Stinging Nettle.

This is one of our most common butterflies, and therefore but little thought of in comparison with others of greater rarity. It is, however, a handsome species, and forces itself upon our attention by coming into our houses to hibernate. In its general markings it much resembles the Large Tortoise-shell, but the colouring is by far the richer and brighter.

It varies in the expanse of its wings from one inch and three-quarters to two inches and a quarter, the female being the largest, but specimens have been found which expand no more than one and a quarter inches across the wings. The prevailing colour is bright reddish orange, there being at the hind margins a dark band in which are situated semi-circular blue

spots. There are three large black spots along the costa of the fore-wings, and between the third and the tip of the wing is a white spot—one character which distinguishes it from *Polychloros*. The basal portion of the hind-wings is black, with tawny hairs. The underside is of an ash colour, with a large cream-coloured patch on the fore-wings, and a broad waved band on the hind-wings. Several varieties of this species are named. One, *Ichnusa*, Bon., is a very striking form, occurring in the isles of Corsica and Sardinia. The ground colour is much brighter in tone, the black spot on the inner margin of the fore-wing is nearer the base, and the two central spots are wanting. On the hind-wings, the dark basal patch does not extend so far across. Some consider it to be a distinct species. Mr. Newman figures a specimen taken at Hawkeshead, in Lancashire, and said by Mr. Gregson to be this variety, but the specimen is like *Ichnusa* only in the absence of the central spots, the other characteristics being absent. Mr. Newman's variety (3) is also without the central spots, but the two outer black costal blotches are conjoined, and the whole of the hind-wings are dark coloured. Mr. Robson has a specimen with fore-wings exactly the same as this figure, but the hind-wings are of the usual form. Mr. Newman's variety (2) has the middle costal spot united with that on the hind margin. A dark form with the spots united is named *Polaris*, and an intermediate form is called *Turcica*; the former inhabits the polar regions, the latter Turkey and Asia Minor. This is believed to be the variety *Ichnusoides*, De Selys. Mr. Kirby mentions another variety *Raschmirensis*, Violl., an inhabitant of Northern India. Two very extraordinary varieties are figured in "Les Feuilles des Jeunes Naturalists," for January, 1881. One of them was taken in Ireland, and is called *Osborni*, Donc. The other is in the collection of M. Donchier, of Donceel, Liege, but it is not known where it was taken. It is named *Seljsi*, Donc. Where one specimen only is known it does not seem worth while to give it a distinctive name. Mr. Mosley, in his "Illustrations," figures a specimen from the Rev. Harper Crewe's collection, in which the ground colour is a deep mahogany brown, and another showing a strong tendency to yellow. Specimens with a perfectly yellow ground colour are in Mr. Gregson's and other collections. In Mr. Robson's collection are some with the ground salmon colour, and another of a very rich bright hue. This last he picked out from a number flying to thistle heads, its richer hue being very conspicuous on the wing; the costal spots also are extra large and the yellow between them paler than usual. Very many other forms might be described from other collections if necessary.

The egg is somewhat pouch-shaped, being oblong and fuller at the base than above; the base is not flattened, but rounded and smooth, and just

where it slopes into the sides, the ribs (seven, eight, or nine in number) commence; these continue over the top for about half its diameter and increase in prominence as the egg itself diminishes, until at last, they quite stand out like clear glass beading; the space between the ribs is boldly fluted; the colour is a pale yellowish green.—Rev. J. Hellins, in “Entomological Monthly Magazine,” Vol. VIII. p. 53.

The caterpillar is yellowish grey, with a black dorsal blue, and spines branched, and of a greenish colour. The general appearance of the skin is velvety, the head has a shining skin, but is so studded with whitish grey bulbous based bristles that it looks greyish. The caterpillars at first are strictly gregarious, feeding on the leaves of the common stinging nettle (*Urtica dioica*), but, as they grow larger they wander away from each other, and do not return to close company, though remaining on the same clump of nettles.

The chrysalis is of a brownish colour, mottled with black and spotted with gold, particularly on the most prominent parts. It is much humped and angulated; and occasionally is very brilliant and apparently gilded all over, but this appearance appears to be caused by the presence of parasites. It is generally, but not always suspended from the underside of the stalks of the food-plant.

The following Hymenopterous parasites have been bred from it, viz. *Limneria uncinata*, *Apanteles spurius*, and *Pteromalus puparum*; and, also a Dipterus one, viz. *Exorista vulgaris*. *Ichneumon luctaterins* also has been reared from it on the continent.

There are two broods of the butterfly in the year. The first appears on the wing in June; and the second in July or August, which hibernates to reappear in spring, and then mingles freely with the freshly emerged specimens of early summer. Caterpillars also have been found both in May and July. A third brood has occasionally appeared.

Vanessa Urtica is common everywhere throughout Europe, Western and Northern Asia, and North Africa. It is common in all parts of the British Isles, except the Orkneys, Shetlands, and the Outer Hebrides, but, as the food-plant is rather a weed of cultivated ground, than of waste or barren land, the butterfly is more abundant among the habitations of men, than in the wilder and more desolate parts of our islands. It is also a fearless and sociable species, frequently coming into inhabited rooms for hibernation, and has even been known to fly to lamp light at Christmas, when a room has been made unusually hot. Three specimens which took up their quarters on the ceiling of my staircase in August, 1886, with their wings folded and hanging downwards; remained perfectly stationary till Good Friday, the 8th of April, 1887, when they awoke from their winter's sleep, and took their

departure. In 1887, the June brood was unusually numerous, and individuals came into my house as early as July, to enter into their long rest, and were not even awakened by the hot weather of August. The summer brood was particularly scarce, and after August was well in, I never saw a specimen on the wing. Specimens, moreover, have been found hibernating in the crevices of chalk, more than a foot below the surface.

The first author in Britain to figure and describe it was Thomas Mouffett, in 1633.

Ray, in 1710, and Petiver in 1717, records it as being very common all through the summer, and also in houses throughout the winter.

Albin, in 1749, writes: "The caterpillar was taken on the 26th of May, feeding on the nettle, and on the 7th June some of them tied themselves up by the tail, and changed into a chrysalis; out of which came in fourteen days a fly called the lesser Tortoise Shell, from its wings representing the shell of that animal. This butterfly lives all the winter, and hides himself in cottages, old trees, and other places of refuge. The chrysalides are often found gilded, from whence it was called aurelia or chrysalis, which is now become the common name of the cases in which flies live while in this state. These produced a brood of small Ichneumons."

Wilkes, in 1773, writes: "The Small Tortoise Shell is very common and breeds twice in the year. The first brood is towards the end of June, the second about the end of August. The caterpillar may be taken full-fed about the middle of June and the middle of August."

The following interesting notice of a swarm of these butterflies in mid-winter is recorded by Mr. Banning, in the Isle of Man, see "Zoologist," Vol. XIV.: "Whilst standing in my farmyard on the day following Christmas Day, 1855, it being unusually fine and warm, I was suddenly astonished by the fall of more than a hundred *Vanessa urticae*. I commenced at once collecting them, and succeeded in securing more than sixty. These I fed on sugar spread over cabbage leaves and bran until now, and, to all appearances, those which still survive (more than forty in number) are thriving well, and in good condition.

VANESSA POLYCHLOROS.

Large Tortoise-shell.

POLYCHLOROS, Linn. Polychloros. Linnæus took this name from Aldrovandus, who says (Ins. III., 245), "Septimus Polychloros dici queat, propter colorem diversitatem." (The seventh may be called Polychloros on account of its varied colours). He seems to have confounded the Latin color with with the Greek chloros, pale. A.L.

This butterfly resembles the Small Tortoise-shell in its general markings, but the colouring is much darker and duller, and it is a much rarer and more local species. It varies in the expanse of its wings from two inches and a quarter to three inches. Sometimes an unusually small individual may be met with smaller than an unusually large one of *Urtica*. The prevailing colour is a rusty brown, there being at the hind margins a dark band in which are situated semi-circular blue spots. There are three large black spots along the costa of the fore-wings. Near the lower corner of the front wings is an extra black spot—one character which distinguishes it from *Urtica*,—and on the basal portion of the hind-wings are tawny hairs. The underside is of an ash colour, with a broad waved band across the wings. It is the most constant of all our British butterflies in its markings, and the only specimen at all approaching variation I have seen is one in my own cabinet, in which the spots on the upper wings are rather suffused. A form on the continent with confluent spots is called *Testudo*, Esp., and another is called *Pyromela*, Fre.

The egg resembles a short, squat barrel, ribbed with eight or nine longitudinal even ridges, which extend over the flattened top, but appear to cease on reaching the base; the space between the ribs is transversely fluted, but much more finely than in the egg of *Urtica*, although the latter is not half its size; the colour apparently is a dull green. The eggs appear to be deposited in close, regular order, on a twig of elm, after the style of *Clisiocampa neustria*.

The caterpillar is bluish, but more or less sprinkled with ochreous brown freckles on the black, and is clothed with ochreous branching spines. Elm appears to be its favourite food in this country, but many others appear to be eaten occasionally, viz., cherry (the tree generally preferred in France), pear, willow, aspen, wych elm, and white beam tree. It appears also that it will eat nettle, as an occasional caterpillar has been found in company with those of *Urtica*.

The chrysalis is similar to others of the genus in general appearance, but the points at the head are more distinct than usual, being widely separated and well pointed. The butterfly emerges in July, but retires early for hibernation. They pair in April or May, and the eggs are laid in large batches on the twigs of the selected plant. The caterpillar is full-fed by the end of June. It does not remain more than a couple or three weeks in the chrysalis state.

Ichneumon luctatorius has been reared from it on the continent.

Vanessa Polychloros is a butterfly that frequents the borders or outskirts of large woods, or lanes well bordered with trees suitable for the caterpillars.

It sometimes comes to sweets, and is more frequently seen in the spring of the year after hibernation, than in the autumn. On the continent of Europe it is widely spread, being wanting only in the Polar regions; it is also found over the greater part of Asia. In England, it is most plentiful in the Southern counties, occurring less commonly in the Midlands, and very rarely in the Northern counties; where it is only an occasional visitor. Two specimens only have been recorded from Scotland, and none from Ireland. In America, it is replaced by a closely allied species *V-album*; and there is another still closer found in Eastern Europe, viz. *Xanthomelas*, generally occurring near rivers, the caterpillars feeding on smooth-leaved willows.

The first author in Britain to figure and describe it was Thomas Mouffett, in 1633.

John Ray, in his "Historia Insectorum," 1710, writes, "Eruca è qua exit haec species non multum differt ab Urticaria: hoc anno (1695) plures salicis latifoliae folia depaxcentes inveni."

James Petiver, in his "Papilionum Britanniae Icones," 1717, writes "Papilio Testudinarius major, Great Tortoise Shell Butterfly. A large fly. I have observed them both in autumn and spring, they often settle on trees, and commonly the elm."

Eleazer Albin, in his "Natural History of English Insects," writes, "The caterpillar was bluish spotted and bristled with yellow, the head and feet black. It was taken on the elm the 10th of June. The caterpillars, when young keep together, and when full-fed they ordinarily tie themselves up by the tail under the cappings of walls, or some such shelter, and change into chrysalis about the middle of June; and in the beginning of July produce a butterfly, commonly called the Great Tortoise-shell. From several of these chrysalides came broods of small Ichneumon flies."

Lewin, in 1795, writes, "They delight to settle on dry pathways, as also on the trunks of trees, to sun themselves. They fly swift, and are not easily taken, except in the morning, when they are feeding on the blossoms of different plants, near the place where they are bred. Some few of the late bred flies secrete themselves in the hollows of trees, or such places as will protect them from the severity of the weather, and live through the winter. The male is not so large as the female, but in colour and marks they perfectly agree."

Stephens, in his "Illustrations," published in 1828, writes, "This insect is also one of those which occasionally appear in profusion: during the past season it has been particularly abundant near London, occurring in plenty in Copenhagen fields, and near Ripley, in Surrey, last July. I captured in April last some faded specimens at the latter place, which had been produced

in the preceding year : near Ramsgate, Deal, and other parts of Kent, and also in the vicinity of Hastings, and in the New Forest, it likewise occurred during the past summer. There is but one brood, which appears about the middle of July."

Wailes, in his "Catalogue of the Lepidoptera of Northumberland and Durham," published in 1858, writes, "The claim of this species to be admitted into our local fauna rests at present solely on the authority of Wallis : In his "Natural History and Antiquities of Northumberland," published in 1769, enumerates nine species of butterflies and ten of moths. It is somewhat singular that for one of the former, the large Tortoise-shell Butterfly, he is as yet the only authority for its admission into our fauna. There is certainly every probability that future researches will enable us to corroborate his record of the species, though the paucity of the English elm in many part of the two counties, certainly does not add to the chances of success." Since this was published specimens have been recorded both in Northumberland and Durham, but not under circumstances to lead to the belief that the species was a native of either county.

Barrett, in his "Lepidoptera of Norfolk," writes, "Formerly common, but scarcer for some years, until the last summer, 1873, when it again appeared commonly."

In the "Scottish Naturalist," Vol. I., published in 1872, a specimen of *Polychloros* is recorded as being taken near Aberdeen, first in Scotland.

Newman, in his "British Butterflies," writes, "It is generally, although sparingly, diffused throughout the midland and eastern counties of England : its rarity in the north and west is very noticeable. The caterpillars were plentiful on elms at Darent Wood, Kent, in 1830, and the butterflies of very frequent occurrence, at Lewisham, in the spring of 1856, after hybernation. The caterpillars were plentiful at Tonbridge, in 1869. It was very common round Colchester, in 1860, since rare. It is rather a feature in the history of this insect that it so often occurs singly : in the very numerous records I have received more than half speak of single specimens."

I have not seen a single specimen in Dorsetshire, since the wet summer of 1879.

SUB-GENUS GRAPTA.

Kirby.

The species of this sub-genus may be easily recognised by the peculiar shape of the wings, the inner margin of which is deeply emarginate ; the caterpillars also may be distinguished by the tubercular processes on the head.

All the known species have the upper surface more or less brightly fulvous, spotted with black. The lower wings have on the underside a more or less angular silvery or pale golden mark, resembling sometimes the letter L or C.

The geographical range of the genus is nearly confined to the temperate regions of both the Old and New Worlds. Three species are found in the United States of North America, one in Mexico, and one in California; one in China; and two in Europe. Of our European species, one inhabits the more northern and central portion, including England; the other prefers the shores of the Mediterranean, and I have seen it in profusion flying about and settling on the walls of the Acropolis, at Athens: it is named *Egea* by Cramer, and the caterpillar feeds on *Parietaria officinalis*.

VANESSA C-ALBUM.

The Comma.

C-ALBUM, Linn. C-album, so called from the white C like mark on the underside of the hind-wings.

The singularly jagged outline of this insect at once distinguishes it from every other of our British butterflies, though it might be taken for stunted, deformed, and torn specimens of some of our other species, so similar is it in colour and the plan of its markings.

The wings expand from an inch and three-quarters to rather over two inches. On the upperside they are of a bright fulvous with dark hindmargins and base, and several dark brown spots and a few paler ones. On the underside they are elegantly variegated with transverse streaks of rich brown, whitish grey, grey, and metallic green, in which latter are small black specks. The hindwings, as has already been mentioned, have a white C, or comma-like mark in the centre.

Mr. Newman, in his "British Butterflies" observes, "There are three very constant varieties in the colouring of the underside, the characteristics of which may be described as repletion, variety, and depletion: in the first, the brown is dark, dull, and uniform; in the second, it is richly varied with different shades of brown and metallic green; and in the third, the colour seems partially bleached, and assumes a tinge of fulvous yellow. Mr. Dale, one of our best lepidopterists, regards the first and third of these varieties as a first and second brood. Mrs. Hutchinson, who is better acquainted with this butterfly than any other entomologist in the kingdom, considers the uniformly dark brown specimens to be females, and the richly varied specimens to be males. Accepting these views as correct, there remains a little

difficulty in the extreme uniformity of colouring in all the fulvous or vernal specimens: they are certainly not all of one sex."

This difficulty may be met by stating that the underside of the male and female of the autumn brood differs greatly. On the other hand, the summer brood is so constant in its appearance, that Mr. Robson has called it *Hutchinsoni*, in compliment to that lady whose liberality has enriched so many cabinets with specimens.

There is also an extraordinary variation in the outline of the wings. In some specimens the incision in the outer margin of the fore-wings (extending from the first branch of the median vein to the main branch of the post-costal vein) is so deep that it forms nearly a semicircle, whilst in others it is scarcely more than a sextant: the other indentations being equally varied. Mr. Haworth alludes to this in his "Lepidoptera Britannica," observing, "Femina paulo pallidior et subinde minus laciniata."

Petiver, in his "Papilionum Britannicæ Icones," 1717, gives four kinds of *Comma*, viz:—

"*Subtus fusca*. The Silver Comma."

"*Subtus pallidior*. The Pale Comma. This below is of an oker marble, and paler than the last."

"*Alis magis laceratis*. Jagged winged Comma. These wings are deeper cut and more vivid; it is finely marbled underneath, with small greenish eyes, speckled with black."

"*Minor*. Small Comma. It is very dark below, and in all parts less."

A variety occurs in Siberia with the spots confluent, as is the case with so many boreal forms: this has been called *F-album*, by Esper. I have in my own collection a singular variety taken near Doncaster, given to my father by the Rev. F. O. Morris, in which all the black spots on the hind-wings are run into one large patch; and there is also a very dark specimen in Mr. Howard Vaughan's collection.

The egg is somewhat elliptical, standing on end, the lower, which is the largest, being flattened underneath: it has ten projecting ribs. It bears very much the appearance of a miniature gooseberry; and is of a bluish green colour, the ribs being of a whitish green.

The caterpillar is of a dark brown on the underside; on the upperside it is fulvous to the seventh segment, then white to the middle of the twelfth segment, which is so remarkably distinct that the caterpillar may be known by this mark, which looks as if a drop of white paint had just fallen on it, and was still wet and shining. The head is of a dark brown, and is distinguished by two minute tubercles with small branched spines, looking like horns. The whole of the body is covered with similar branched spines, which are of a fulvous or whitish colour.

The chrysalis, suspended by the tail from the underside of a leaf, is very contorted in figure. The head is rather flat, and has two straight horns, which are prolonged at the tips; the back of the thorax rises up sharply to a thin squared central projection, and then falls in again abruptly; and the wing cases are prominent. It varies in colour from dark to light brown, with bright silvery blotches. In some places the chrysalides are known by the name of "silver grubs."

Two parasites, belonging to the Hymenoptera, have been bred from it, viz: *Pimpla flavonotata* and *Pteromalus puparum*. The caterpillar appears to be less fastidious in its food than others of the genus. It is reported as feeding on hop, elm, currant, gooseberry, and nettle. The second brood would appear to prefer hop, but as that plant is scarcely in leaf when the first brood are feeding, the early caterpillars must of necessity find other food.

There are two broods in the year. The caterpillars may be found in May or June, and the butterflies in June or early in July. Then when the hop-picking season comes on, the caterpillars and also the chrysalides are found in much larger numbers, producing butterflies in September, October or even later. These undoubtedly hibernate, and re-appear in March or April, thus remaining six or seven months in the perfect state; whilst the summer brood does not live a tenth part of the time. This, Mr. Robson suggests, would account for the extra abundance of the autumn brood, as such a much larger proportion of the summer butterflies are able to deposit their eggs. See "Young Naturalist" Vol. II., p. 110. The butterflies which emerge in June or July, are always of the pale form, and are produced from eggs laid by the hibernated females. *Vanessa c-album* frequents woods, gardens, lanes, and fields, being particularly fond of bramble blossom and fruit, and of plums and apples when decaying. It occurs all over Europe, except in the Polar Regions, and in Greece and Turkey where it is replaced by *Egea*. It is found also in Northern and Western Asia. In North America it is replaced by many allied species; one of which, *Interrogationis*, likewise feeds on the common hop, to which it often does immense injury. In the summer of 1838, Mr. Edward Doubleday saw the hops in a garden at Ashville, North Carolina, entirely destroyed by them; and the roof of a long verandah was hung with the chrysalides, suspended so closely together, that, the webs by which they were attached being united, he was able to pull them down in masses of thirty or forty at a time. A large portion was attacked by their brilliant little parasite, to which Dr. Harris has given the name of *Pteromalus vanessæ*. *Vanessa c-album* is a local insect in England and Wales, and does not occur in either Scotland or Ireland. Only one specimen is recorded from Northumberland, and only one locality has been reported from Cumberland,

It has entirely disappeared from many places where it was formerly common.

The first English author to describe and figure it was Thomas Mouffet, in his "Insectorum Sine Minimorum Animalium Theatrum" published in the year 1633.

It is also briefly described by Dr. Christopher Merrett, F.R.S., in his "Pinax rerum Naturalium Britanniarum," published in 1667, being the first publication which gives any account of British insects exclusively.

It is described in Ray's "Historia Insectorum," 1710, in the following words, "*Papilio ulmaria similis, sed minor, alie lacinatis interioribus lineola alba increva notatis. Papilio testudinarius alis laceratis, D. Petiver.*"

Moses Harris, in his "Aurelian," 1770, writes, "The caterpillar of the Comma Butterfly, which generally feeds on the leaves of the hop, but is sometimes found on the nettle, is very slow of motions, and may be taken from the latter end of July to the middle of August, about which time it suspends itself by its tail to the branches, or underpart of the leaves of the hop by a web, which, though very fine, is so strong that unless great care be taken in separating them, you will pull the caterpillar asunder; it hangs in this manner about twenty-four hours, then changes to the chrysalis, in which state it remains about fourteen days, and then produces the butterfly, called Comma from a white mark on the underside of the under-wings, resembling that stop in printing. The female is larger, her colour paler, and her wings not so much indented as those of the male. This fly hides itself during all the cold season, and appears again in the month of April, much faded in its colour, when it lays its eggs on the young sprouts of the hop and nettle, which are hatched about the middle of May, go through the same changes as above, and produce a fly by the latter end of June, which lays the eggs that produce the first mentioned caterpillar."

Lewin, in his "Insects of Great Britain," 1795, writes: "A few of this species of butterfly, if the winter has proved mild, lie in the winged state till the spring, and appear in April much wasted in colour, with their wings broken at the edges. Others remain in chrysalis till that time, and may be easily distinguished by their perfect shape, and the brightness of their colour. It is an insect swift in flight, and difficult to take, except when feeding. It flies in lanes, by the sides of banks, on hedges, frequently settling on dry places, and against the bodies of trees."

Donovan, in his "Natural History of British Insects, Vol. VI., published in 1797, writes: In colour and markings the Comma Butterfly seems at first allied to the Tortoise-shell, but the elegant scallops of the margins of the wings sufficiently distinguishes it from every other British species, indeed wings indented in this remarkable manner are rarely seen in any insects,

those from foreign countries not excepted. There is more than one brood in the year; the butterflies are generally found in June, the second brood late in August. The caterpillars are sometimes found in February, but oftener in July; they remain about a fortnight in chrysalis."

Stephens, in his "Illustrations of British Entomology," published in 1828, writes: "This species has become somewhat scarce everywhere within these few years. Prior to 1813, I used to find it very abundantly near Hertford, but since that period I have not seen it. It has, however, occurred during the last and present seasons in several parts of the country; and it appears to be generally distributed over the southern half of the kingdom, and Mr. Backhouse informs me that it is abundant near York."

Miss Jermyn, in her "Butterfly Collector's Vade-Mecum," published in 1837, writes: "The Papilionaceous insects, in general, soon after their emergence from the chrysalis, and commonly during their first flight, discharge drops of red-coloured fluid, more or less intense in different species. This circumstance is peculiarly worthy of attention from the explanation which it affords of a phenomenon often considered, both in ancient and modern times, in the light of a prodigy: viz. the descent of red drops from the air, which has been called a shower of blood; an event recorded by several writers, and particularly by Ovid, among the prodigies which took place before the death of Julius Cæsar.

" With threatening signs the lowering skies are filled,
And sanguine drops from murky clouds distilled."

This highly rational elucidation of a phenomenon, at first view so inexplicable, seems to have been discovered by the celebrated Pierese, at Aix, in Provence, where a shower of this kind fell in 1608. The common people were terrified with the apprehension of some great calamity; but that intelligent Naturalist, enquiring into the affair with minute attention, was fully convinced that these drops were scattered by an innumerable swarm of *Vanessa c-album*, hovering in the air; he preserved several of their caterpillars in a glass, which after transformation discharged these drops of blood. This discovery ruined two hypotheses, which had been supported with equal ability, one, that it was the work of evil spirits, the other, that these drops were formed from red exhalations precipitated again in rain."

Newman, in his "British Butterflies," 1871, writes: "A noticeable feature in its distribution is its absence from what may be called maritime lists, as those from Norfolk, Suffolk, Kent, Sussex, Isle of Wight, Dorsetshire, Devonshire, and Cornwall; this absence from the lists is not sufficient evidence of the butterfly's not occurring there, but certainly of its great rarity. In the midland counties, on the contrary, it is of frequent occur-

rence, and in some of them absolutely abundant; then again, the cultivation of its food-plant, the hop, does not seem to exercise that influence on its choice of localities that might be expected; it abounds in the district where the Worcester hops are grown—namely, Worcestershire and Herefordshire—but it is rarely observed in the Farnham district—namely Surrey, or in the Kent district.”

It was very common in Dorset in 1807, but after 1816 none were seen until 1877, when a specimen was taken near Dorchester. Prior to 1813, J. F. Stephens used to find it very abundantly near Hertford, but none since that year; and Edward Doubleday met with it at Epping, in Essex, about 1817 or 1818. A few were taken in Norfolk as recently as 1861, and also in Yorkshire and Durham; but it appears to have almost deserted the southern counties, and entirely the metropolitan. It occurred very abundantly on the banks of the Wye in 1858; and in Herefordshire in 1875, but the wonderful abundance of 1875 was followed by a nearly total absence of the species in 1876 and 1877, during which years Mrs. Hutchinson did not obtain a single egg, caterpillar, or chrysalis, and but one butterfly only. In 1881 it was very abundant again, both in the caterpillar and chrysalis state, and in 1883 it occurred rather freely at Llandudno, in North Wales. It appears to have been very scarce in 1884 and 1885, but very plentiful again in Herefordshire, in 1886 and 1887. In 1886, wild chrysalides were found in July, August, September, and October, the last butterfly appearing on October 27th; there apparently being three broods in that year.

GENUS XIX.—ARGYNNIS.

ARGYNNIS, a surname of Venus, from the Temple erected in her honour by Agamemnon, on the death of his favourite Argynnus.—Proper IV., 6., 22.

This is a genus of about one hundred species.

They inhabit northern and temperate climes, about one-third are European, and nearly an equal number occur in Asia and North America. One is found in Australia, and but few in South America. One only appears to inhabit Africa, and few of the Asiatic species get so far south as India. Three occur in Greenland and one as far north as Grinnel Land. Six species are recognized as British, of which one is but an occasional visitor. The species distinguished from those of the following by the underside of the hind-wings being adorned with spots or stripes of the most brilliant silver. The colour of the upperside a bright fulvous spotted with black. The English name of Fritillaries appear to have bestowed on the species of this and the following genus from the markings on the upperside resembling those on the old fashioned chequered flowers termed “Fritillaries.”

The costal margin of the fore-wings is arched, and the species have a bold and graceful flight. The antennæ are rather short, terminating in an abrupt pyriform club.

The anterior legs of the males are fringed with long delicate hairs, and those of the three first species have the median nervules clothed with hairs and scales of a peculiar form. The caterpillars are long, cylindrical, and clothed with numerous bristly spines, arranged in whorls round the body; each segment having a whorl of these spines. They feed entirely on the different species of the genus *Viola* or Violets.

The genus has been divided into two sections. In the first of which the second joint of the palpi is much swollen. In the second, which contains two British species, *Euphrosyne* and *Selene*, the second joint of the palpi is not remarkably swollen.

ARGYNNIS PAPHIA.

Silver Striped Fritillary.

PAPHIA, Linn. Paph'ia, a surname of Venus, from the island of Paphos.

This Fritillary expands, in the width of its wings, from about two inches and three quarters to three inches. On the upperside they are of a rich fulvous with a greenish tinge towards the base with longitudinal black spots and bars. The female is without the broad black borders to the veins of the fore-wings which are so prominent in the male, and the black spots are larger. On the underside the hind-wings are of a greenish shade, with silvery hind-margins, and one long and two short silvery stripes: hence the English name of silver striped is most appropriate.

A well known variety of the female is not uncommon in the New Forest, and also in Dorsetshire, Sussex, and other southern counties of England. It has the usual fulvous ground colour replaced by a dark smoky greenish brown. It is spotted in the usual way, but near the tip there are a few light patches: this is known as *Valezina* of Esper. A worn male in the collection of Mr. Bond, is said to be the only known male of this variety. In one, figured by Hubner, the wings on the right-hand side are of this variety, and those on the left as in the ordinary specimens. A similar one to this was taken in the New Forest, Hampshire, in 1879: and I have a very extraordinary hermaphrodite taken likewise in 1879, in the New Forest by Mr. Charles Gulliver; in which the two wings on the left-hand side are male, and on the right-hand side female. But the upper-edge of the fore-wing of the latter side is of the usual fulvous colour, and one-third of the lower-wing is so coloured: so that, to use Mr. Jenner Weir's expression in the "En-

tomologist," Vol. XII., p. 206., "in one insect both gynandromorphism and dimorphism existed." Specimens are not very rare in which the black spots are confluent: and stray specimens have occurred with a white spot on every wing. Another very remarkable variety is figured in the "Entomologist," Vol. XV. In this, the partial melanism of all the wings is correlated with the obliteration of the silvery markings on the underside, with the exception of a pearly patch at the base. A variety, without any silver stripes on the underside of the hind-wings, occurs in Southern Europe and Western Asia, and is named *Anargyra* in Staudinger's catalogue.

The egg in shape is like a dumpy cone, laid erect on the flattened end and rounded off at the top; the shell with about twenty tolerably prominent longitudinal ribs, some not reaching to the top. The colour is, at first, of a pale greenish yellow and glistening, but it turns paler in about a week, with a leaden grey patch near the top.

The young caterpillar, on hatching, breakfasts on the egg shell: it is short and rather stout, and of an ochreous yellow with a shining blackish brown head. On its first appearance in spring, the caterpillar is no more than one-eighth of an inch long, having apparently moulted but once before hibernation. After another moult, some time between April 12th and 20th, the spines appear, they are alike short and stumpy, pinkish brown in colour, with black tips and branches. The head and body are now black, with double lines of whitish violet on the back. When full grown, it measures from about one and a half to one and five-eighths of an inch in length, and is in proportion rather stout. Down the whole length of the back are two stripes of brilliant yellow separated by a black dorsal line; these stripes are relieved by a black, velvet-like borderings of markings. The spines are now of a reddish ochreous colour, with their extreme tips and branches black. It feeds on the leaves of the common violet, and changes into a chrysalis in the beginning of June.

The chrysalis, about an inch long, when seen sideways is deepest across near the end of the wing covers, and the largest projecting points. It is of a pale brown colour, with gold spots on the back, and on the tips of the prominences. On each side of the back is a row of obtuse, tapering, prominent points; a larger pair at the head are suggestive of ears.

Two Hymenopterous parasites, *Amblyteles homocerus*, Wesm., and *Hemiteles melanarius*, Gran., have been bred from it.

The butterfly is on the wing during the whole of the month of July and August, and is rather difficult to capture owing to its partiality to the flowers of the bramble.

It occurs all over Europe, except in the extreme north, in Western Asia,

Siberia; and China, where at Kingiang, all the females hitherto taken strangely enough are of the variety *Valezina*. It is a frequenter of woods, and may be found in open places, on the outskirts of almost every extensive wood in England. It seems to be equally abundant in Ireland, but scarce in Scotland, not occurring north of Perthshire.

It is first recorded as a British species in Ray's "Historia Insectorum," 1710. He calls it "The greater Silver-stroaked Fritillary," and writes: "Ostendit nobis D. Dale utrumque sexum."

Wilkes, in his "English Moths and Butterflies," 1773, informs us that it is most commonly found in woods, and the fields adjacent to woods.

Lewin, in his "Insects of Great Britain, 1795, writes: "The caterpillar of this superb butterfly is not yet discovered in England. The fly is on the wing at the end of June; and is not uncommon on the sides of woods, and in the lanes near them. I suppose, that the old name of fritillary, given to this butterfly, and the nine following species, is from their resemblance to that flower, in their checkered markings on the upper wings. The caterpillars are remarkable for their rough and ugly appearance, being covered with long hairy spines; this formidable figure is their great protection from insectivorous birds; which however fond of smooth caterpillars, do not care to touch these. They are very fearful, for, on the least motion of the plant or leaf they are on, they drop to the ground, and the spines prevent their being bruised in the fall."

ARGYNNIS AGLAIA.

Silver-spotted Fritillary.

AGLAIA, Linn. Aglä'ia, one of the three Graces.

This Fritillary expands in the width of its wings from two inches and a quarter to two inches and three-quarters. On the upperside they are fulvous spotted with black, the female being the darker both in the ground colour and markings. On the underside the hindwings are greenish, and partly tawny, being splendidly studded with about twenty silvery spots; the forewings have marginal silvery spots towards the tip. The wings are more rounded and not so pointed as those of *Paphia*.

A variety differing from the type by having some of the silvery spots near the base much larger, two pairs of them coalescing, has been named and figured by Sowerby, in his "British Miscellany," under the name of "*Charlotte*," in compliment to Queen Charlotte, the Consort of King George the Third. It appears to be least rare in the North of England.

The Scottish specimens are much darker than the English; and I have a very curious variety taken by Leplastrier, at Dover, many years ago, in

which the fulvous ground colour is replaced by a milky drab, and the black spots by fulvous spots. I have also a hermaphrodite, in which the wings on the left hand side are much smaller than those on the right. Like *Adippe*, it also varies by the enlargement and coalescing of the black spots.

The egg is very similar to that of *Adippe*.

The caterpillar is of a dark shining violet grey, thickly marbled with velvety black. It has six rows of black spines, branched, with short black hairs. The spiracles are black, delicately margined with grey, and close below each spiracle is a blotch of bright orange red. The head is black, shining, and hairy. It feeds on the leaves of the dog and the sweet violet (*Viola canina* and *odorata*), and hibernating young, feeds up in the spring.

The chrysalis is of a shining, blackish brown, with paler markings; and is very much curved in outline: on the upper surface are two rows of blunt conical projecting points. It is suspended by the tail to the underside of a leaf, the surface of which it covers, when a caterpillar, with a circular mass of silk, thickest in the centre, to which the anal hooks of the chrysalis are attached in a horizontal position, the back of the abdomen being so much curved round towards the leaf as to imitate the upper two-thirds of the letter S.

The butterfly may be found on the wing in July and August, and frequents the sides of hills, coast sandhills, and heaths.

It is more generally distributed than *Paphia*, and is the commonest of the large Fritillaries throughout Europe, and Northern and Western Asia. In Scotland it ranges as far north as Sutherland, and I have met with it in the Isle of Skye. It also appears to be common in Ireland. Some closely allied species are found in California.

It is figured and described in Moufet's "Insectorum Sine Minimorum Animalium Theatrum," 1633.

Petiver, in his "Papilionum Britanniaë, Icones," &c., 1717, informs us that the Great Silver-spotted Fritillary appears about the midst of July.

Wilkes, in his "English Moths and Butterflies," 1773, writes: "On the 15th July, 1748, I had three eggs laid, and on the 5th of August the young caterpillars came forth. They were of a flesh colour, with rows of black spots on each joint, like the caterpillars of the Emperor Moth, and out of each spot grew hairs of a sandy colour. The eggs were beautifully fluted down the sides, were flat at the bottom, and had a glutenous mixture upon them, which occasioned their sticking fast wherever the fly chose to leave them. The caterpillars on this present 10th of February, 1749, seem to be alive, but are very small, and, I believe, have eaten nothing all the winter, though they have had grass given them, which I take to be their proper food."

Sowerby, in his "British Miscellany," 1806, writes of the var. *Charlotta*, "Some years ago the Rev. Dr. Charles Abbott discovered this curious Fritillary in Bedfordshire; and we do not know that it has been found by any one else. The nineteen silver spots on the under part of the lower wing are very constant. It is an elegant insect, well deserving an honourable name, and comes near to *Aglaia*. As we have, comparatively speaking, but few *Papilio*s in Great Britain, it is a very desirable acquisition. This gentleman first added *P. paniscus* to the British list."

Curtis, in his "British Entomology," 1830, figures a very dark variety of *Aglaia*, which he informs us were taken by Mr. John Seaman, in the parish of Nacton, near Ipswich, the 7th of July, 1827. He goes on to say: "For an intermediate variety, which was captured at Dover, I am indebted to Mr. W. Christy: it is singular that these specimens vary from the type no less in form than in colour, which is not the case I believe with *Charlotta*."

ARGYNNIS ADIPPE.

High-brown Fritillary.

ADIPPE, Linn. Adip'pe. Linné says: "In Faunâ Cydippe perperam pro Adippe legitur." It seems probable that *Adippe* is merely a variation of *Cydippe*, one of the Muses, made in consequence of the latter name having been already appropriated to another species.

This Fritillary expands in the width of its wings from two inches and a quarter to two inches and three-quarters. On the upperside they are fulvous spotted with black. On the underside the hindwings are of a greenish brown, with about twenty silvery spots, the silver on the marginal spots being indistinct; between the marginal and central rows is a row of small dull red spots with bluish centres, which at once distinguishes this species from *Aglaia*.

This species varies both by the enlargement and coalescing of the black spots, and by a change in hue of the ground colour. A very beautiful specimen is in Mr. Gregson's collection, in which the greater portion of both wings is black. Mr. Stevens has one with the spots as usual, but the ground colour is a very pale drab. Others occur in which it is a rich mahogany brown, while intermediate varieties are found. Several varieties of the underside have been named. *Cleodoxa*, Ochr., has the usual silvery spots of the underside pale yellow or very slightly silvered. This form has sometimes occurred in England, but it is commoner in Greece and Sicily. I possess a specimen of it, which was taken near Bedford, by Dr. Abbott, and mistaken for *Niobe*. *Chlorodippe*, H.S., is greener on the underside than the normal

form, and has more central silvery spots. It has been taken by Mr. Gregson near Windermere, in Westmoreland, but is apparently common in Spain. *Cleodippe*, Staud., another Spanish variety, resembles the last, except in the want of the silvery spots.

The egg in shape is conical, the base broad, having a central depression, the sides are very boldly ribbed and reticulated, some ribs being longer than others. When first laid it is of a glistening light ochreous green, but gradually changes to a dull pink.

The caterpillar at first is of a brown colour, with a shining black head, and is decidedly hairy. When full-grown it is about an inch and a half long and stout in proportion, of a dingy pinkish brown minutely freckled, the spines being of a pinkish ochreous. Like the rest of the genus it feeds on the leaves of the violet, and can run at a pace quite equal to the fastest caterpillar of *Arctia caja*.

The chrysalis is of a pitchy brown, with a row of dorsal diamond shapes of less intensity of colour, the margins of the wing-covers deep brownish ochreous, the spiky projections golden and brilliantly glistening. It has two rows of rather blunt pointed obtuse projecting spines, and the thorax is keeled ("Buckler's Larvæ.")

The butterfly is on the wing in July and August. The eggs apparently do not hatch before February or March, and the caterpillars change into chrysalis in June.

It is a rarer species than either *Paphia* or *Aglaiia*, and seems to occur both in woods and on uncultivated hill sides. It is found all over Europe, except in the Polar regions, and in Western Asia. In England it is widely but not generally distributed, but in Scotland is only found in the extreme south such as Dumfriesshire, and does not appear to occur at all in Ireland or the Isle of Man.

It appears to have been first recorded as a British species by James Petiver, in his "Papilionum Britannicæ," 1717. He records it with the last as appearing about the middle of July.

Lewin, in his "Insects of Great Britain," 1795, writes: "Violet Silver-spotted Fritillary. These elegant butterflies make their first appearance on the wing the latter end of June, mostly in lanes near woods in dry situations; and are easily caught when feeding on the bramble or thistle blossoms: but as the sun advances towards the middle of the day, they are restless, sporting and flying with great swiftness, at which time they are very difficult to take, The female lays her eggs in July, on the violets that grow under the shelter of bramble, or some similar cover, or dry banks, or hilly places. The caterpillars are produced in about twelve days, and feed till September, when they

spin a fine web at the root of their food, close to the ground; and under this cover they pass the winter in a torpid state. In February or March, according to the mildness of the spring, they begin to feed again, at this time they are but small, of a dull black colour, and thick set with short blunt spines, finely haired. As spring advances they increase in size, and in May are full-fed. The beginning of June they prepare for their transformation, suspending themselves by the tail, and in a few hours the chrysalis appear. In this state they remain for three weeks; when the first fine morning brings them out to dry and expand their wings, ready for flight. The female differs but little from the male,"

J. F. Stephens, in his "Illustrations of British Entomology," 1828, writes of *Adippe*: "Not quite so abundant as *Aglaia*, but frequently met with in the woods near London, at the end of June and through July. It is also found in Essex, Suffolk, Norfolk, Bedfordshire, Berks, Dorset, Devon, and Hants; in the latter county very commonly in the New Forest."

An allied species, viz., *Niobe*, Linn., has been recorded as British. Stephens, in his "Illustrations of British Entomology," writes of it: "Stewart gives this as a British species, but without any authority; I may say, however, that among the insects purchased by Mr. Dale, from the professed indigenous collection of the late Dr. Abbot, of Bedford, was a single specimen of this species, which was considered by the Doctor as a variety of *Adippe*" (and rightly, J. C. Dale).

Curtis, in his "British Entomology," 1830, writes: "*Niobe*, Linn. Godart thinks this is the *Adippe* of Linnæus; and the same opinion might lead Stewart to record it as a British insect. Dr. Abbott's English collection contained a specimen, which Mr. Dale now possesses; and as it is found in Sweden and the South of France, there is nothing unreasonable in believing that it may occasionally make its appearance in this island."

The next record is of a single specimen which was taken in the New Forest in the summer of 1870, by Mr. Gerrard of Lyndhurst, and sold by him to the Rev. Windsor Hambrough, see "Entomologist," Vol. V., p. 351. This was shown at the National Entomological Exhibition, held at the Westminster Aquarium, in 1878, and recorded in the "Entomologist," Vol. XI., p. 162, with this comment, "upon its correctness there seems some doubt."

Another is recorded on p. 83, Vol. VIII., of the same magazine, as being taken by Mr. Gregson, in August, 1871, at the Devil's Gallop, near Windermere. A more extensive capture of the species was said to have been made in 1874, in a wild gorge, in Kent, between Wye and Ashford, and recorded in the "Entomologist," Vol. VII., but the whole tale seems to have been a fabrication, see "Young Naturalist," Vol. I., p. 395.

ARGYNNIS LATHONIA.

Queen of Spain Fritillary.

LATONA, Linn. Lato'na, the mother of Apollo and Diana. The name is variously spelt—Latona, Latonia, Lathona, and Lathonia.

This is the rarest as well as the most beautiful of our British Fritillaries. The colouring of the upperside resembles that of the rest of the genus, being fulvous spotted with black. Underneath, the fore-wings have nearly the same markings as those on the upper surface, but near the tip is a group of silver spots. The hind-wings are buff, varied with reddish brown, with numerous silver patches of different sizes and shapes, and of which there are about fourteen between the base of the wings and a row of seven dark brown eyed spots with silver pupils, between each of which and the margin of the wing is a large silvery patch resembling mother-of-pearl. It will be observed that the form of the front wings differs from the rest of the Fritillaries, the outer margin being concave in its outline. The inner corner of the hind-wings also is more sharply angular.

The width across the wings is from an inch to an inch and a half.

There does not appear to be any variation to speak of in English caught specimens; but on the Continent it varies much in size, and the black spots on the upper surface are larger, or smaller in different specimens. The Indian form is called *Issæa*, but it scarcely differs from the type. The silver spots on the underside also vary in size, and sometimes are so large that they become confluent. This is the variety *Valdensis* of Esper. A beautiful specimen of this variety from Norway, the upper-side being likewise melanic, is figured in the "Entomologist," Vol. XIV., p. 25.

The egg, caterpillar, and chrysalis have never been found in this country.

The caterpillar is blackish grey, with a whitish stripe down the back, and two brownish yellow lateral lines. The spines are short and of a pale yellow. It feeds on *Viola tricolor*.

The chrysalis is anteriorly dull brown, posteriorly greenish, sprinkled with gold and silver spots, and has a white streak at the end of the wing-cases (J. F. Stephens "Illustrations.")

The butterfly is rather later in emerging than the rest of the Fritillaries, not appearing before August, and continuing on the wing till quite late in the year, several being recorded in October, and one as late as the 4th of November.

In Petiver's time it was not very rare in Gamlingay Wood, Cambridgeshire, in May; but all the recently recorded British examples have occurred in the autumn.

In Kirby's "European Butterflies" it is also said to occur in May and June; whence it would appear to be double-brooded. Godart, however, tells us that the last autumnal specimens hibernate and re-appear in the spring—an anomalous event amongst the Fritillaries, thereby approximating in habits to the *Vanessa*.

The caterpillars are said to hibernate small, as do others of the genus, and to feed up in the spring.

Argynnis lathonia is widely distributed in Europe, Northern and Western Asia to the Himalayas, and North Africa. It does not extend to the Polar regions but is common in Sweden and Norway. It frequents lanes and roads in woods, and its flight resembles that of *Hipparchia megara*, but is more rapid. It sometimes settles on the pathway, and has been seen in clover fields. In England it is a very scarce species, appearing at uncertain intervals, and generally in places on the coast of Kent, leading us to the conclusion that, like *Pieris daphidice*, it is but an occasional visitor. A stray specimen was taken near York, and another near Scarborough, which are the most northerly records for Britain. A single specimen was taken on August 10th, 1864, at Killarney, in Ireland.

The first record we have of its being a British species is in John Ray's "Historia Insectorum," published in 1710, as follows: "Papilio Rigensis aureus minor, maculis argenteis subtus, pubelle notatus. The Lesser Silver-spotted Fritillary. Species est pulchra, et ab aliis congeneribus satis distincta. A. D. David Kreig Riga transmissam primò accepit D. Petiver, postea etiam à D. Vernon, D. Antrobus, et aliis circa Cantabrigiam inventa est."

James Petiver, in his "Papilionum Britanniae," records it as being observed about Cambridge.

Moses Harris, in his "Aurelian's Pocket Companion, 1775, names it the Queen of Spain, and records it as occurring in Gamling Gay Wood, near Cambridge.

Lewin, in his "Insects of Great Britain," 1795, writes: "With the natural history of this rare English insect we are not in the least acquainted, and we have only two or three instances of the butterfly's being taken in this country. Mr. Honey, of the Borough, has a good specimen in his extensive collection of English insects, taken by him in his garden in the month of August. The figure of the caterpillar, with the description, I have added from the elegant and correct work of Sepp: 'The eggs of this butterfly are ribbed and oblong; the broadest end being fast glued to the plant on which it is laid. The female lays them not in clusters, but separate; and it is remarkable that she lays only in the sun, ceasing whenever she is by any means

shaded. From the eggs, which the butterfly began to lay on the 10th of June, the first caterpillars appeared on the 18th. They were of a yellowish grey colour, with black heads; and their bodies were covered with fine short hairs. On the 27th, they changed their skins for the first time, and then acquired spines, beset with long hairs; the colour of the caterpillars was now nearly black, with a light stripe on the back. On the 7th of July they changed their skins a second time, on the 15th a third time, and on the 24th or 25th the fourth and last time. The spines, which after the first change appeared with fine and long hairs, acquired their stiff ones after the last change. In a few days after the fourth change, the caterpillars had attained their full growth.'"

Haworth, in his "Lepidoptera Britannica, 1803, writes: "Habitat Imago prope Cantabrigiam, etiam prope Londinum, et etiam prope Wisbeach, f. Mai. : Sept. sed rarissime."

In the Preface to the above work, Haworth also writes: "Since the body of this work was printed, my friend the Rev. Dr. Abbott, of Bedford, has informed me that he took in May last, near Clapham Park Wood, in Bedfordshire, a specimen of *Papilio podalirius* in the winged state; and that he also took in June last, in White Wood near Gamlingay, Cambridgeshire, the *Papilio daphnidice* (in a faded state), and likewise *Papilio lathonia*. These are three extremely interesting species, and there is not a British specimen of any of them now extant, except the above. (All now belong to J. C. Dale.)

"As to the Gamlingay *Lathonia* (the Queen of Spain Fritillary), it is, in my estimation, the most interesting insect we have in the whole genus; because it is not only extremely rare and beautiful, but, if it is the same as our London *Lathonia*, it is likewise double-brooded, and that in a very singular and unusual manner: that is, a brood of it flies in May at Gamlingay, but not near London; and another separate brood of it flies in September near London, but not at Gamlingay; and never contrarywise. And this is still further extraordinary, as no other Fritillary we possess in Great Britain, was ever known to breed more than once in the same season, and that in the months of May, June, or July.

"*Lathonia* was not very rare in Gamlingay Wood, Cambridgeshire, in the days of Petiver. It has also been taken at Wisbeach, and my friend, Dr. F. Skrimshire, assures me he has seen a specimen of it in some picture, which was taken many years since in his father's garden at that place.

"My friend Mr. Hatchett, of Kingsland, knew an old London Aurelian, of the name of Shelfred (nume inter beatos), who was so much attached to Aurelian amusements, and so much enamoured of the beautiful and rare *Lathonia*, that he absolutely determined upon, and accompanied by his daughter, successfully performed (in postchaises) a journey to Gamlingay, in

pursuit of that charming *Papilio*, which he had the good fortune to meet with and secure; but his specimens are not now extant. Our London *Iathonia* is infinitely more rare than the Gamlingay one; there have only been seen five individuals of it, all in different and distant years, and all in the month of September. Every one of these I have examined; but the Gamlingay *Iatonia* never."

Stephens, in his "Illustrations of British Entomology," 1828, writes, "The effulgent metallic brilliancy of the silver spots which adorn the posterior wings of this beautiful insect beneath, renders it pre-eminently conspicuous in our collections; and its peculiar rarity contributes to the value of its acquisition. Previously to the year 1818, few cabinets possessed even a single specimen; and from the very few known instances of its capture (six only according to Mr. Haworth,) there is reason to believe that some of the specimens at that time placed in collections were foreign; but in the above remarkable year for the appearance of certain papilionaceous insects, this species occurred simultaneously in several, and very distant parts, having been taken in August, by Mr. Haworth, at Halvergate, in Norfolk; by Mr. Vigers, in Battersea fields; by myself at Dover, and during that and the following month near Colchester; Birch Wood, Kent; and Hertford, in plenty by others. At the latter place I saw several specimens, but was not fortunate enough to secure any. In Petiver's time it was not very rare in Gamlingay Wood, Cambridgeshire, in May; but all the recently recorded British examples have occurred towards the autumn, a fact which is apparently corroborated by the captures of 1818. The first specimen (a female) I caught on the 12th of August, sporting at the foot of Shakspeare's Cliff, was in a very faded state, and had evidently been "winging its way" for many weeks; a pair which I took on the 14th, in the Castle meadow, Dover, were also in a faded condition, whereas the specimens taken near Birch Wood, at the end of September, were remarkably fine."

Newman, in his "British Butterflies," 1871, writes: "This common Continental species has always been considered, and still remains, a great rarity in this country; the English localities are rather numerous, but the number of specimens is very small; the maritime position of most of the localities suggests the idea of the specimens having migrated from the Continent: Dover, Ramsgate, Folkestone, Ventnor, &c., seem to support this conclusion; while others, such, for instance, as the celebrated locality in Birch Wood, are so truly inland that we cannot hesitate to believe that the specimens have been bred on the spot where they were captured. I think we may conclude that, like many of our resident birds, such as the goldfinch or skylark, of which thousands of dozens are annually captured on their arrival on our

southern wastes, that accession to the number of *Lathonias* take place every year. Mr. Birchall informs me 'that a single specimen was taken at Killarney, in Ireland, on the 10th of August, 1864, in a lane leading from Muckcross to Mangerton, near a limestone quarry on the left of the road"—a very important and interesting fact, since no doubt can now be entertained of the species existing in the Killarney district in a perfectly natural state, although the constant humidity of the atmosphere may interfere with its appearance on the wing. From Scotland I have no report of its occurrence."

Dr. Knaggs, in his "List of the Macro-Lepidoptera occurring in the neighbourhood of Folkestone," 1870, writes of *Lathonia*: "Two or three examples have been secured in the Warren. It used not to be scarce in some seasons in lucerne fields, at the back of Dover Castle."

Messrs. C. J. and James Paget, in their "Sketch of the Natural History of Yarmouth," 1834, writes, "*Lathonia*—a single specimen taken this year, August 2nd, by Capt. Chawner, near Caistor rails."

In the "Zoologist," Vol. II, both *Daplidice* and *Lathonia* are recorded as being captured in Roseberry Wood, near Exeter, by Mr. Dawson, in the year 1836, and were by him presented to Mr. Thomas Leighton.

In 1839, twelve specimens were captured by Mr. Pierce, in woods in the parish of Shoreham, and recorded in the "Zoologist," Vol. III, p. 945.

In 1842, a couple were taken by Mr. George, in Suffolk, on the 3rd September.

In 1846, two good specimens were taken in October, at Harleston, near Norwich; and three near Dover. In that year *Antiopa* was much commoner than usual, as also were the rare Sphinges.

In 1851, a couple were taken on the race course near Ipswich, and two or three pairs at Jagger, near Colchester.

In 1852, a couple were taken by Mr. Reeks, at Swanage, in Dorsetshire.

In 1854, the Rev. W. H. Hawker recorded in the "Zoologist," Vol. XIII, the capture of six specimens by himself in the Forest of Bere, Kent.

In 1856, one is recorded in the "Intelligencer" as being taken near Chesham, Bucks.

None appear to have been met again till 1864, when one was taken near Ramsgate, on the 17th of September; and another at Killarney, in Ireland.

In 1865, a specimen was taken at Blandford, in Dorsetshire (twenty miles from the sea), and others at Dover and Folkestone, in Kent, and also in Norfolk, Essex, and the Isle of Wight. No less than five were taken in the Isle of Wight, at Sandown and Ventnor, on the 20th, 21st, and 24th of October, and the 4th of November.

In 1868, the great year for *Colias hyale*, no less than thirty specimens of

Lathonia were taken in Kent, Suffolk, and Essex, and one as far North as Scarborough, in Yorkshire. That year had a summer almost unprecedented for the duration and intensity of its heat, and which was followed by an exceedingly mild autumn. *Pieris daplidice* also occurred that year in Kent.

None appear to have been seen in 1869, and but one in 1870, and one in 1871.

In 1872, there were no less than nine of *Lathonia*, four of *Daplidice*, and two of *Antiopa*, taken at Dover by different persons, all three species being unusually common that year. Specimens of *Lathonia* were captured besides at Folkstone, Ramsgate, Canterbury, Felixstowe, Ipswich, Yarmouth, Deal, and Ventnor, in the Isle of Wight. It was also common in Jersey. Mr. Poingdestre, in recording it in the "Entomologist," Vol. VI., p. 235, writes, "I took *Lathonia* rather plentifully on the 1st of April and the 1st of June, on some sandhills near the sea shore: few were on the wing during July and August, but in the middle of September they again appeared. The April specimens were evidently just out of the chrysalis: they were smaller than the autumnal ones."

In 1876, one was taken at Hastings, in Sussex, on the 14th of August.

None appear to have been met with again till 1880, when eighteen specimens were recorded by Mr. Sydney Webb, in the "Entomologist" for that year, as being taken in and near Dover.

In 1882, twenty-five were recorded by Mr. Sabine, in the "Entomologist" for that year, as being likewise taken in and near Dover: the Queen of Spain thus proving herself a brilliant exception to the general entomological poverty of that year.

In 1883, six specimens were recorded by Mr. Sabine, in the "Entomologist" for that year, as being taken in the Dover district; and a couple more were taken in a clover field near Salisbury, by Mr. Penruddocke.

In 1884, one was taken near Canterbury, in August, and another at Ashford.

In 1885, one was taken on the Brighton racecourse, on the 3rd of August, and another at Kingsdown, near Deal: but none appear to have occurred in either 1886 or 1887.

It will thus be seen that the most favourable years, for the Queen of Spain, were those of 1818, 1839, 1865, 1868, 1872, 1880, and 1882.

ARGYNNIS EUPHROSYNE.

Light Pearl-bordered Fritillary.

EUPHROSYNE, Linn. Euphros'ynè, one of the Graces.

This Fritillary expands in the width of the wings from one inch and three quarters to nearly a couple of inches. On the upperside they are fulvous, spotted and marked with black. On the underside, the hind-wings are of a dull yellow or ochreous, with brick-red blotches, a row of silver semi-circular spots at the hind margin, a large oblong silver spot in the centre of the wing, and a smaller one at the base.

It varies similarly to others of the genus. The black spots become larger until they coalesce, sometimes forming bands, &c.

A very curious variety is in the collection of Mr. Vaughan. It is of the ordinary form in all respects, except that the spots on the upperside are silvery or rather leaden in colour, instead of being black as usual.

A specimen in Mr. Brigg's cabinet has the base of the hind-wings entirely black: it was captured at Folkstone, in 1876. In Mr. Bond's collections are specimens of a buff, orange, or almost white ground colour.

Stephens, in his "Illustrations," gives the following.

Var. *b.* With the marginal fascia of silvery spots on the posterior wings wanting.

Var. *c.* With the basal half of all the wings above, black spotted with fulvous; with large black spots on the anterior wings beneath.

Var. *d.* With the ground colour of all the wings of a pale fulvous yellow, both above and below. (This is *Euphrasia*, Haw. M.S.S.)

Var. *e.* Wings above pale fulvous, irregularly spotted with black: anterior beneath pale varied with yellowish and ferruginous towards the tips, with some obsolete black or dusky spots on the disc: posterior wings variegated with ferruginous, yellow, and green, with the pupil of the ocellus very large, the discoidal silvery spot produced to the hinder margin, and the usual marginal spots lengthened inwardly; the usual fasciæ are obliterated, but the silvery spot at the base is somewhat apparent.

The latter is the *Thalia* of the old "Entomological Transactions," published in 1812; but the *Thalia* of the continental writers is referred by Ochsenheimer and Godert to *Selene*. However, it is the *Thalia* of Hubner. Mr. Haworth in recording it writes: "I have an English specimen of this rare and beautiful insect; which is, perhaps, a very extraordinary variety only of *P. euphrosyne*."

Thalia, Hub., occurs more frequently in Sweden and Norway; and another named var. *Fingal*, Herbst., is also found in the more northerly parts of

Europe. This, like many other boreal specimens, is smaller and darker than the type, the spots coalescing into bands.

The egg is of a blunt conical shape, with its lower surface, which adheres to the leaf, flattened, its sides are ribbed; at first it is of a dull greenish yellow colour, but turns afterwards to a brown. Towards the end of June the caterpillar is hatched, being then of a pale greenish tint, but after the first moult it becomes of a browner green, and about the middle of July it attaches itself to the plant and ceases to feed. (W. Buckler.)

The caterpillar, when full-grown, is black, with bluish white stripes on the sides, and a few white spots on the back. The spines on the back are yellow, with black tips, head and legs black, claspers dull. It feeds on the leaves of the dog violet (*Viola canina*), but is rarely met with, and Mr. G. F. Matthew informed Mr. Buckler that they are seldom seen on their food-plant, but generally on a dead leaf in its immediate neighbourhood, or a twig above it. Mr. Buckler records its pace when walking as being very rapid; and that sometimes it fed for a while on the dog violet leaves, and that it sometimes rested quite still basking in the rays of the sun; when these were withdrawn it retired to the underside of a leaf and there remained, apparently without motion, till the hour (viz.: 2 p.m.) of the next day which brought the sun round to the window in which its cage was placed, and then at once it came forth and walked actively about, feeding and basking as before. On May 5th it had changed to a chrysalis, suspended by the tail to a circular mass of silk spun upon the side of the glass cylinder, hanging about three-quarters of an inch from the earth.

The chrysalis, five-eighths of an inch in length, is moderately stout and rather sharply pointed, much curved in outline, and warty: it is grey brown in colour, with a few dots of a paler shade; the wing cases are long in proportion and dull brown in tint.

The butterfly emerges at the end of April (Lewin saw it flying once as early as the 12th), but more frequently in May, and continues on the wing during the earlier part of June. The caterpillar is hatched at the end of June or beginning of July, but does not as a rule feed up till spring in this country. Sometimes, however, it does so, and the butterfly appears in September, but the instances are few and far between.

M. Vandover has published in the "Ann Soc, Linn.," Paris, September, 1827, some curious observations upon the lethargy of the caterpillars of *Dia* and *Euphrosyne*. Some caterpillars reared from eggs of the latter, when about a month old, fell into a lethargic state at the end of June, in which they remained until the following spring: a few, however, revived in August, and became butterflies the same autumn. The same experiment made upon

the caterpillars of *Dia* produced the same result. Hence appears the reason why those butterflies, and *Selene* likewise, are so common in spring and early summer, whilst so very few are found in autumn.

Argynnis Euphrosyne is one of the commonest of the butterflies attached to woods, and occurs all over Europe, except the extreme south, such as Spain and Portugal, Southern Italy, Sicily, &c., and is also found in Northern and Western Asia. It has never been recorded from Ireland, but is one of the very commonest of wood butterflies throughout England. It swarms in the London district, as in Darenth and Birch Woods, and is equally abundant in Northumberland and Durham. It seems to be more common in the northern than in the southern parts of Scotland, especially in Rosshire, but does not occur in Caithness. It is not a common species in Perthshire, but is found in the Scone Woods and at the Bridge of Allan.

The first record we have of it as being a British species is in Ray's "Historia Insectorum," published in 1710. Ray names it the April Fritillary, and after describing it, ends with these words: "Hanc speciem mihi primum ostendit, D. Dale."

Petiver, in his "Papilionum Britannica Icones," published in 1717, writes, "April Fritillary with few spots. This has but one oval silver spot in the midst of the wings beneath. Frequent in Cain Wood."

Lewin, in his "Insects of Great Britain," 1795, writes, "This butterfly is very plentiful in all our woods, and is the first of the Fritillaries that makes its appearance on the wing in the spring of the year, I have seen it flying as early as the 12th of April. The caterpillar is unknown."

ARGYNNIS SELENE.

Dark Pearl-bordered Fritillary.

SELENE, Fab. Selènè, the Greek name for Luna, the Moon.

This Fritillary expands in the width of the wings from an inch and a half to a couple of inches. On the upperside they are fulvous spotted and marked with black. On the underside the hind-wings are of a dull yellow or ochreous with dark red blotches, a row of silver semi-circular spots along the hind-margin, and several other silver spots about the centre and base of the wing. It is liable to considerable variation like the last species, specimens occurring of a buff, orange, or almost a white ground colour. A very beautiful variety, in Mr. Webb's collection, is figured in Mr. Mosley's "Illustrations of Varieties of Lepidoptera." The forewing of this specimen has two rows of small spots at the hind-margin, and only two others on the costa behind the centre, while the hindwing is all black at the base, and the wing rays

are as black streaks to the margin. It is as if nearly all the black of the forewing had been transferred to the hindwing. This specimen also varies much on the underside, which is streaked with red, yellow, and silver, in lieu of the usual spots. It was taken near Ipswich in 1875. The Lapland variety *Hela*, Staud., is smaller and darker than the type. Four others have been named, viz.: *Thalia*, Esp.; *Pales*, Bergst.; *Marphisa*, Herbst.; and *Rinaldus*, Herbst.

The egg is of a dumpy, blunt, sugar-loaf shape, with a thin, soft, glistening shell, which is ribbed with about eighteen ribs, and transversely reticulated: it is at first of a subdued pale yellow, but afterwards turns to more of drab.

The caterpillar when newly hatched is of a pale olive, with a shining black head. When full-grown it is a velvety smoky pink, and has a dark brown dorsal line, which throughout its course expands and contracts twice in each segment: in front of each sub-dorsal spine, and partially enclosing it, is a velvety black spot delicately edged with white, while behind each spine is a blackish interrupted streak. The spiracles are black, the forelegs pale pink with blackish brown tips, and the anterior legs are black and shining. It feeds on the leaves of the dog violet (*Viola canina*), and hibernates when small. Unlike its congener *Euphrosyne*, the caterpillar of *Selene* has an aversion to the rays of the sun, and does not at any stage care to expose itself to their direct influence, but reposes either on the undersides of the leaves, or else on the stems while shaded more or less by the leaves, and feeds while young, on the youngest and most tender leaves of the violet. (W. Buckler. "Larvæ of British Lepidoptera.")

The chrysalis is suspended head downwards; it is about half-an-inch in length, thick, and obtuse in front, and much curved in outline. It is brown in colour, with metallic spots and black spiracles: the ground colour is most delicately reticulated with blackish brown.

The butterfly emerges at the end of May, but more frequently in the beginning of June, and continues on the wing for about a month. When the flight of *Euphrosyne* is nearly over, then *Selene* appears upon the scene; but it is only for a short time the two bear each other company. The caterpillar is hatched in July, but does not, as a rule, feed up till spring in this country. Sometimes, however, it does so, and the butterfly appears in autumn; small and apparently stunted specimens. Like most others of the genus, *Selene* is a wood-frequenting species, and occurs all over Europe, except the southern parts such as Spain and Portugal, Southern Italy, Greece, &c., and is also found in Northern and Western Asia. It has never been recorded from Ireland, but is far commoner in Scotland than *Euphrosyne*, occurring as far

north as Rosshire, and is more widely distributed. Dr. Buchanan White observes it is a common species throughout Perthshire in marshy places, in woods, and on the hill sides, holding the same place as *Euphrosyne* does in England.

The first record we have of it as being a British species is in Ray's "Historia Insectorum," published in 1710, under the name of the May Fritillary.

Petiver, in his "Papilionum Britannica Icones," published in 1717, writes, "Frequent in Cain Wood."

Lewin, in his "Insects of Great Britain," 1795, writes, "*Euphrasia*, Linn. Small Pearl-bordered Fritillary. This butterfly is to be taken in woods about the middle of May, flying with the above; and indeed they are so like each other, that a person not well acquainted with them would suppose them to be the same species. The difference of the markings on the upperside is scarcely discernable: however, the under-wing on the underside is distinctly different, so that there is not in reality any doubt of their being distinct species. The caterpillar is unknown. These are common insects, and both species of flies may be easily taken, when feeding on the different flowers that bloom at the time they are on the wing."

Newman, in his "British Butterflies," 1871, writes, "In the Kentish woods, I have always found that this butterfly makes its appearance from ten to twenty days later than *Euphrosyne*. I have taken it on the 1st of June, but it is more abundant about the 8th or 10th. Dorsetshire: Glanvilles Wootton (but rare of late years) Puby, &c.—J. C. Dale. Essex: Colchester, but not so common now as formerly.—W. H. Harwood."

In June, 1887 and 1888, *Selene* occurred in profusion in the Glanvilles Wootton copses, and in 1887, I took a fresh specimen on the 15th of August, which is about half the usual size.

In 1818, B. Standish met with one or two in Middlesex, during the month of September.

An allied species, *Argynnis dia*, Linn., is figured in Loudon's "Magazine of Natural History," Vol. V. p. 751, published in 1832, by the Rev. W. Bree, who writes, "Mr. Weaver possesses two specimens, both of which were taken in Sutton Park, Birmingham; one about ten years ago, the other not more than five or six. It differs from *Selene* in being rather smaller, and having the black spots and characters on the upperside of both pair of wings larger and stronger, so that the whole assumes a darker appearance than that insect; but the principal difference consists in the underside of the posterior wings, which are of a brownish purple, interspersed with darker markings of the same colour, and numerous irregular semi-metallic spots; a row of which

borders the posterior margin." The chief difference is the straight border to the upperside of the posterior wings.

The caterpillar, like those of the rest of the genus, feeds on the common violet.

It has also been reported as being taken in Alderly Park, Cheshire, by Mr. Stanley (but the specimens appear to have been varieties of *Selene*), and a female as lately as 1872, in Worcester Park, Surrey.—See "Entomologist," Vol. IX., p. 69.

Argynnis dia is common in spring and autumn, in woods, throughout Central and Southern Europe, and also in Western Asia.

GENUS XX. MELITÆA.

Fabricius.

MELITÆA, a town in Thessaly. Sodoffsky proposes *Melinæa*, a surname of Venus, from Mel. honey.

This genus is difficult to characterise in the perfect state, so as to readily distinguish it from the preceding; but there is one important distinctive character which has been pointed out by Drs. Adolfe and Otto Spyer, viz., that the tarsi of the middle and posterior pair of legs are not spiny on the upper surface, whilst they are so invariably in *Argynnis*. The hind-wings also have no silvery spots. The caterpillars differ from those of *Argynnis* in being shorter in proportion to their thickness, and instead of spines are furnished with short fleshy tubercles beset with short bristles. They feed on plantain and scabious, and when young, live in societies under tents of silk.

Melitæa does not contain half as many species as *Argynnis*, only about forty being enumerated. Like it, they inhabit for the most part northern and temperate climes. Many of them are excessively variable, and some species seem to run so much into others, that their discrimination is often a matter of difficulty, which the uniform character of their markings does not tend to simplify. Only three species are British, but though they are variable enough, there is no difficulty in distinguishing them. An American species, *Tharos*, sometimes swarms in countless thousands on Goat Island, in the midst of the falls of Niagara.

MELITÆA CIXIA.

The Glanville Fritillary.

CIXIA, Linn. Cinx'ia, a surname of Juno, connected with cingulus, a girdle.

On the upperside, the wings are of a deep fulvous, tessellated with brownish black, and with a row of black spots on the hind-wings. On the underside, the hind-wings are of a pale straw colour, with two fulvous bands edged with black, and have several rows of small black spots. The width across the wings is from one inch and nine lines to a couple of inches.

This Fritillary is most subject to variation on the underside of the hind-wing by the enlargement or diminution of the black spots. In some specimens they are like larger black blotches or streaks, while in others they are almost wanting, especially on the central pale band. In others, the upperside varies, like the preceding genus, by the enlargement of the black spots or the suffusion of the wing with black, but the variation of the underside is much more frequent. Two varieties, occurring in Sweden, have been named *Fulla* and *Delia*.

The egg appears to be undescribed.

The caterpillar is intensely black, being very slightly spotted with white, and has a red band and claspers, the legs being black. Each segment has eight warts, from which proceed tufts of short bristly black hairs.

The chrysalis is short and stout, of a very dark colour and almost smooth.

The butterfly emerges during May and June, sometimes being quite out at the beginning of the former month. The eggs are laid in batches during May and June on the leaves of the food-plant, the narrow-leaved plantain (*Plantago lanceolata*), and the caterpillars are hatched towards the end of July or in August. They feed rather slowly during the autumn months, and as the cold weather approaches, they spin a kind of tent or covering of silk among the grass stems and plantain leaves, in which they pass the winter. This tent is very compact, and almost of a globular form, the caterpillars in each mass varying considerably in number. In some there are fifty or sixty; in others not more than a dozen. The web is very ingeniously constructed, the blades of grass, as well as the leaves and flowering stems of the plantain being interwoven, and thus rendering the mass firm and compact. The caterpillars when examined in the winter are about a third of an inch long, and directly they are disturbed roll up into little balls. Early in the spring they leave their winter quarters and feed up rapidly. At the end of April they attach themselves by the tail to plantain stems, almost close to the ground, and change into chrysalides.

Melitæa cinxia is well spread over Europe, being only absent from the polar regions. It occurs also in Asia Minor and Siberia. In the British Isles it occurs in but few localities, and all of them on the Southern coast. It is or was abundant in the Isle of Wight, where it was discovered by Mr. E. Newman, on the Undercliff, near Sandown, in 1824. It also occurred at

Ventnor, Newport, Carisbrook Castle, Blackgang Chine, and Freshwater, in the Isle of Wight; near Brokenhurst, in the New Forest; on the cliffs near St. Margaret's Bay, Kent; and very rarely in the neighbourhood of Great Bedwyn and Sarum, Wiltshire. It also formerly occurred in Yorkshire and Lincolnshire. In the Channel Islands it is most abundant, occurring all round the coasts of Guernsey and Jersey; but appears to have almost disappeared from England, a few only having been taken of recent years in the Isle of Wight.

The first record we have of it as being a British species, is in Petiver's "*Gazophylacium Naturæ et. Artis*," published in 1702. It is there recorded as being found in Lincolnshire, and near London in a wood at Dulwich.

Ray, in his "*Historia Insectorum*," published in 1710, calls it "*Papilio Fritillarius Lincolviensis fascius subtus pallidis*," and after describing it, winds up with "*Hujus capiam D. Dale nobis fecit. Nimis fretasse prolixè hanc speciem descripsus.*"

Wilkes, in his "*English Moths and Butterflies*," 1773, writes, "The Plantain Fritillary Butterfly. The caterpillar hereof feeds on plantain, clover, and grass, changes to a chrysalis, within a web of its own spinning, upon the surface of the ground, at the beginning of May, and the fly appears fourteen days after. The caterpillars are sociable, and feed together. They appear of a very timorous nature, for if you move the food on which they are, they immediately quit their hold and fall to the ground, and there remain in a curled up form till such time they think the danger over. The butterfly is swift in flight, but may be taken if diligently attended, in fields of hay-grass, at the time above mentioned."

Moses Harris, in his "*Aurelian*," 1779, writes, "The fly took its name from the ingenious Lady Glanville, whose memory had like to have suffered for her curiosity. Some relations that were disappointed by her will attempted to set it aside by acts of lunacy, for they suggested that none but those who were deprived of their senses would go in pursuit of butterflies. Her relations and legatees subpoenaed Dr. Sloan, founder of the British Museum, and Mr. John Ray to support her character. The last named went to Exeter, and at the trial satisfied the judge and jury of the lady's laudable inquiry into the wonderful works of the creation, and established her Will. She not only made the study of insects part of her amusement, but was as curious in her garden, and raised an Iris from the seed, which is known to this day, by the name of Miss Glanville's Flaming Iris."

Lewin, in his "*Insects of Great Britain*," 1795, writes, "This is not a very common butterfly, but may be met with in meadows and fields of grass, in June."

Donovan, in his "Natural History of British Insects," Vol. VII, published in 1798, writes, "This is the rarest of the British Fritillary Butterflies, if we except *Papilio lathonia*, the Queen of Spain. The flies appear in May. The caterpillars are black, beset with spines and tufts of the same colour: the sides are marked with a double row of white spots, the feet red."

Stephens, in his "Illustrations of British Entomology," 1828, writes, "This is a very local species, and is found in meadows by the sides of woods: in Wilkes' time it was not uncommon in Tottenham Woods; recently the places where it has been chiefly observed have been near Ryde and the Sanddroch Hotel, Isle of Wight; in the latter place in plenty; also at Birch Wood, and near Dartford and Dover, and in a wood near Bedford. I believe it has been found in Yorkshire; and from Ray, it would appear to have been abundant in Lincolnshire in his time. It generally flies in June."

Curtis, in his "British Entomology," 1832, writes: "Rare in meadows on the borders of woods, from the middle of June to the beginning of July. Tottenham Wood, Wilkes; Lincolnshire, Ray and Petiver; Yorkshire, Dulwich, Birch Wood, and near Dartford; near Dover, Mr. Leplastria; Ryde, Isle of Wight, Mr. Sparshall; near the Sandwich Hotel and Undercliff, at the back of the island, Mr. Newman and Mr. Waring."

The Rev. F. O. Morris, in his "History of British Butterflies," 1853, writes: "This butterfly is a very local one, so that its capture must be regarded as a great fact in the experience of by far the greater number of entomologists. J. W. Lukis informs me that this extremely interesting insect is taken, though very rarely, in the neighbourhood of Great Bedwryn and Sarum, Wiltshire. It seems to be most plentiful near Ryde and other places in the Isle of Wight, on the grassy sides of the grassy glens which run down to the sea shore."

In the "Zoologist," for 1846, the Rev. J. F. Dawson gives the following interesting account of the habits of *Melitæa cinxia* in the Isle of Wight. "As this Fritillary is rare in almost every part of the kingdom, some account of its favourite habits and haunts may not prove uninteresting. It cannot be accounted by any means common here, being confined to a few localities only, though where it does occur, it is in general to be found in some abundance. It is not to be expected in cultivated districts, but breeds on steep and broken declivities near the coast, which the scythe or the plough never as yet have invaded, and in such spots it may be met with sooner or later in May, according to the season. Near Sandown, on the side of the cliff, there is one of these broken declivities, occasioned by some former landslip, covered with herbage, which slopes down to the beach. A path-way leads to the base. On the 9th of May, 1844, a hot sunny day, each side of this path-way was

completely carpeted with a profusion of the yellow flowers of *Anthyllis vulneraria*, when I visited the spot; and these flowers were the resort of an abundance of these Fritillaries, which fluttered about them, or rested on their corollas, expanding and sunning their wings, and presenting a most charming picture of entomological loveliness. The great abundance of the narrow-leaved plantain, which also grows there, affords food for their larvæ. The spring of last year, on the other hand, was so very backward, that on visiting that locality at a date some fortnight later than the above, so far from either flowers or butterflies being visible, the larvæ were still feeding, and I could discover but few chrysalides. These latter are found adhering, just above the surface of the ground, to the knotted stems of the plantain, which here consists of aged plants, each with but a few stunted leaves; and occasionally on the underside of large stones, which have fallen from the cliff, and they are suspended and partly surrounded in the latter case with a fine web. They are also generally to be found in pairs. The caterpillars evidently prefer these stunted plants, for at the base of the declivity, where the plantain grows luxuriantly, not one is to be seen. They are black and spiny, with red heads and legs: being hatched in August, they pass the winter in societies, under a kind of tent, formed by a compact web, brought round and over the stems of grasses. I have found several of these societies on the 27th of August, the individuals which composed them being about a quarter of an inch long, rolled up like little balls. All these societies occurred at the base of the declivity, where the herbage grows most luxuriantly; and when the caterpillars have obtained sufficient strength in the spring, they are invariably seen ascending the higher parts of the slope. And herein I imagine that I recognize a beautiful instance of natural instinct, both in the butterfly and caterpillar: the former deposits its eggs low down the declivity, where the young brood may rest most securely sheltered, and least exposed to the wintry storm, but when the caterpillars are sufficiently advanced in growth, they ascend to the higher parts of the steep to feed and undergo their transformation; were the chrysalis formed below they probably would have too much moisture and too little sun; whereas by being formed higher up they have a sufficiency of both to bring them to maturity."

This butterfly is single brooded; but there is a succession of them, varying in duration according to the season. The earliest date on which I have met with it is May 1st, the latest in July; but in the latter case the specimens were bred in captivity. I never remember to have seen it so late in the state of liberty, not later indeed than the middle of June here. They are very difficult to rear; and those that I have bred, are not only disclosed much later than in the state of freedom, but are not nearly so fine and perfect.

They in general fly slowly and peacefully, except when alarmed, gliding gently from flower to flower. I have taken as many as two dozen without moving from the spot where I stood, as they successively visited the stems of the grasses round me.

This Fritillary was much less plentiful last season than heretofore; and in some of its former haunts has quite disappeared. It has many foes; for besides the march of improvement in cultivation which gradually invades its haunts, the same natural causes which promote its abundance, also multiply its enemies. Two necrophagous beetles, *Silpha obscura* and *tristis* destroy the larvæ, and a large ground spider, very numerous in the spots which it frequents, feeds on the perfect insect; it lies in wait till the butterfly alights upon the low plants, or on the ground, then rushing forward, seizes it by the neck, and holds it captive with such tenacity, that both insects may almost be pulled in pieces ere it will relax its grasp."

Newman, in his "British Butterflies," writes, "I had the pleasure in 1824, in company with my friends, George Waring, of Bristol, and Waring Kidd, Godalming, of discovering the now celebrated locality of Undercliff, Isle of Wight. We found the caterpillars, chrysalides, and butterflies equally abundant at the same time. With a feeling of triumph I recorded the discovery in the pages of "Loudon's Magazine of Natural History," then in the zenith of its glory, now a mere memory of the past."

On June 8th, 1855, the Glanville Fritillary was very common at Blackgang Chine.

In 1865, several were found on the Undercliff at Folkestone, by Mr. Briggs, and recorded in the "Entomologist's Monthly Magazine," Vol. II: however, Dr. Knaggs, in "List of the Macro Lepidoptera, occurring in the neighbourhood of Folkestone," published in 1870, records it as "not being observed of late years.

In the "Entomologist," Vol. VI., Mr. Luff writes, "*Melitæa cinxia* is abundant both in Guernsey and Sark. The earliest date I have of its appearance is May 8th, 1870. In 1872, I did not observe one on the wing until the 27th of May, and then they were nothing like the abundance of the previous seasons. I noticed a couple of battered females on the wing as late as the 26th of July. They are to be met with all round the southern coast of Guernsey, from Fermain Bay to Pleinmont Point, but are never found far from the sea coast."

MELITÆA ATHALIA.

The Heath Fritillary.

ATHALIA, Esp. Athali'a, the daughter of Omai, King of Israel, and wife of Jehoram, King of Judah—heroine of Racine's tragedy "Athalie."

She is erroneously recorded in the "Accentuated list of the British Lepidoptera," published in 1858, as being the daughter of Ahab.

Like the last species, the wings on the upperside, are of a deep fulvous tessellated with brownish black, but the black marks are broader, and the row of dots on the hind-wings are wanting: the base of the wings also is often much suffused with black. On the underside, the hind-wings are of a straw colour, with two fulvous bands edged with black, but without any row of black dots. Besides the absence of the distinct black dots so characteristic of the underside of *Cinxia*, the two species may be readily distinguished by the colour of the bands, which is very much paler in *Cinxia* than in *Athalia*. The width across the wings is from an inch and seven lines to two inches and two lines.

This Fritillary varies much both on its upper and under surface. The upper surface varies by being suffused with black scales to a greater or lesser extent than in the normal form. In some specimens the wing is nearly all black; in others there is scarcely any black at all. The underside sometimes has the straw-colour covering the greater part of the wing, while in others there is more black than usual.

Stephens, in his "Illustrations," gives the following varieties, all of which are rare.

Var. *b*. Wings black above, with alternate transverse rows of whitish and pubescent tessellations: the central band on the posterior wings beneath composed of one row of yellowish elongate spots.

Var. *c*. Wings black above, with the two rows of fulvous tessellations towards the hind margin of the anterior wings united.

Var. *d*. Wings black above with very small fulvous spots, those on the outer margin wedge shaped, and the bases of all the wings above nearly immaculate.

Besides these there is the var. *Eos*, of Haworth, now in Mr. Stephen's collection, and is said to be unique, but Mr. Bond has one very like it. The upperside has a darker border on the hind margin, and the inside of the wings suffused with the two colours: within the hind margin of the hind-wings is a series of fulvous lunules, and a single fulvous lunule in the centre of each hind-wing. The underside of the fore-wings has the black concentrated in the middle, and the hind-wings have a broad pale band running across the



underside. It was taken at Peckham, in June, 1803, by Mr. John Howard of Kingsland; and was named by Mr. Haworth in his "Lepidoptera Britannica," after Eos, the Goddess of the morning. Both the upper and the undersides are figured by Stephens in his "Illustrations," under the name of *Pyronia* Hub.

Varieties of *Athalia* occurring on the Continent have been named *Corythalia*, Hub., *Navarina*, De Selys., *Caucasica*, Staud.; all of which appear to be dark forms. *Melanius*, H. S., *Altheria*, Hub., *Tarquinius*, Cort., and *Orientalis*, Men., which has white spots on the underside. *Papilio tessolata*, *serotina*, *Subtus straminea*, as the Straw May Fritillary of Petiver is also a variety of *Athalia*. In Petiver's time, it was pretty common in Caen Wood, where *Athalia* also occurred. It is of a paler shade on the upper surface than the type, and the fore-wings are more fulvous underneath; the hind-wings beneath are entirely straw coloured with black veins; a broad curved fascia of straw yellow runs across the middle of the wings, edged with black, and with an irregular black line running through the middle of it; this is succeeded by a row of black lunules, and the margin is straw yellow with a black vandyked line running along it. Newman, in his "British Butterflies," figures four varieties from the collection of Mr. Bond. The second appears to be a melanic variety with a fulvous band near the hind margins.

The caterpillar, when full grown, is about an inch in length and moderately stout, and is of a black hue with white spots. The spines are of an orange colour, with white tips on the back, and all white at the sides; the spines, bristles, head, and legs being black. Mr. Newman points out the protective resemblance of this caterpillar to the flower of one of the food-plants—the Narrow leaved Plantain, and noticed that his specimens always crawled up the flowering stems in the middle of the day. The food-plants appear to consist of the narrow and broad leaved plantains (*Plantago lanceolata* and *major*), wood sage (*Teucrium scorodonia*), Germander speedwell (*Veronica chamaedryas*), and cow wheat (*Melampyrum pratense*), which latter was a discovery of Mr. Harwood, in May, 1871, and was considered by Mr. Buckler to be the principal food-plant in most of the English habitats of the species.

The chrysalis is half-an-inch in length, very plump, with the usual angles much rounded off; the colour is creamy white, variegated with black and orange.

Ichneumon culpator, Schr., is said to have bred from this species, but not so far as we know in this country.

The butterfly may be found in open places in woods, and heathy localities, during June and July. On the Continent, it is said to fly from May to August. The caterpillars hatch in about a fortnight after the eggs are laid, and after

JANUARY, 1888.

PART XCVII.

THE
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OF

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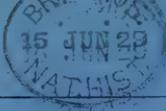
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Owing to press of matter, several papers stand over to next month.

Arrangements have been made for the publication of a series of papers on British Spiders, by F. O. Pickard Cambridge, Esq., which will commence early in the year. They will be very fully illustrated by Mr. C. H. H. Walker, of Liverpool, from drawings by the author, and the Editor trusts it will be the most useful work for the beginner in this study yet published, and at a price within the means of every one. Mr. Walker's long promised paper on "Wings" will also appear early in the year. Further announcements respecting next year's volume will be made in the December magazine.

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